* Fenghua Technology Servo Precision Reducer Products *

90 Degree Right Angle Gearbox | Slide module | Servo stepping motor

FAMED®

Fenghua Transmission is committed to offering you quality products
Specializing in R & D and production of various precision planetary gear transmission products
Free service hotline: 400-8040-668
Click www.3fgearbox.com for CAD, 3D, 2D files of products
www.fht.tw www.3fgearmotor.com

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3F FAMED 锋桦

Precision Reducer-Stepper motors-AC/DC servo motors

Planetary reducer series

AC/DC Servo Motor/Driver/Explosion-proof Servo Motor

90 degree right angle reducer series

Harmonic reducer / RV reducer series

Precision Reducer

Stepper motors-AC/DC servo motors

Complete solutions / Reliable transmission solutions catalog Free 2D-3D drawing download

FAMED®

Fenghua Transmission Technology (Jiangsu) Co.,Ltd.

2025

FAMED® Company Introduction

Fenghua Transmission Technology Co., Ltd. - An innovator leading precision transmission and drive technology

Fenghua Transmission Technology Co., Ltd. started with professional gear manufacturing. With more than 20 years of experience in gear research and design, it has gradually developed into a high-tech enterprise integrating precision reducers, direct drive motors and drive control systems. With innovation as its core concept, the company is committed to providing high-performance and high-reliability transmission and drive solutions for the global automation industry.

Core advantages and technical strengths

- In the field of precision reducers: 1.Fenghua Transmission has been deeply engaged in gear manufacturing technology. In the early days, it cooperated with the Taiwan planetary reducer technology team and successfully developed a series of servo-specific precision planetary reducers with three core characteristics: low backlash (1~3arcmin), low noise (60dB), and high efficiency (≥95%). It can perfectly match servo motors and stepper motors to achieve high torque, high rigidity and precise positioning, help optimize equipment performance, and its performance is comparable to that of German and Japanese brands, with a comprehensive product line coverage. At the same time, the company continues to innovate and expand its diversified products such as 90-degree precision right-angle reducers, RV cycloid pinwheel reducers (suitable for multi-joint robots), harmonic reducers, and precision gear racks, supporting non-standard customization, and is widely used in high-precision industrial fields such as machine tools, laser cutting, 3C automation, new energy equipment, and printing machinery.

- Direct-drive motor and drive control: In order to achieve the optimal structural solution of integrated reducer and motor, Fenghua Transmission cooperated with the technical team of Japan NBK Co., Ltd. to lay out the integrated drive control solution and develop high-performance servo motors, stepper motors, brushless motors and drive controllers. The products are characterized by small size, high torque, high precision and low noise. They are compatible with German and Japanese standard sizes and can be customized for special working conditions such as explosion-proof and corrosion-resistant. Through advanced winding technology and magnetic induction technology, the company has achieved breakthroughs in performance and space optimization, and launched linear motor modules and DD direct-drive motors to meet high-end automation needs.

Fenghua's products have penetrated into core automation fields such as machine tools, laser equipment, new energy (photovoltaic, lithium batteries), packaging machinery, printing and coating, CNC machine tools, etc., and have helped the development of Industry 4.0 and the robotics industry with excellent quality. The company insists on sufficient inventory and rapid response, and works closely with global servo motor manufacturers and system integrators, and is committed to becoming a trustworthy partner in the automation industry.

With technology as the foundation and innovation as the driving force

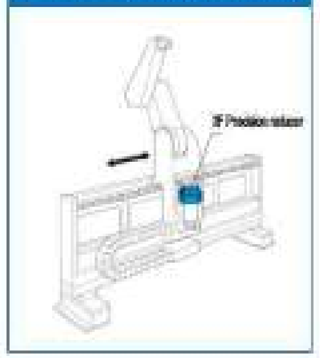
Fenghua Transmission will continue to promote the advancement of precision transmission and drive technology and contribute to the global industrial intelligent upgrade!

Production workshop

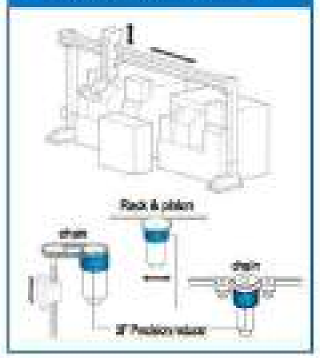
Product Application Industry

Semiconductor liquid crystal manufacturing equipment, robots, machine tools, and other frontier areas requiring precision motion control are widely used.

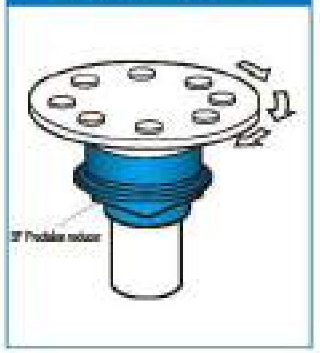
The walking shaft of a robot (rack and pinion)



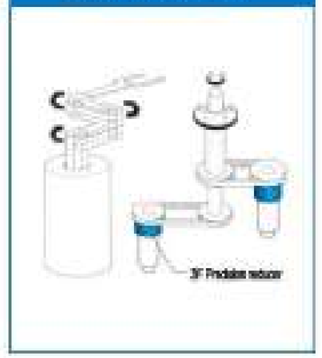
Gantry robot of machine tool



Angle (positioning) control

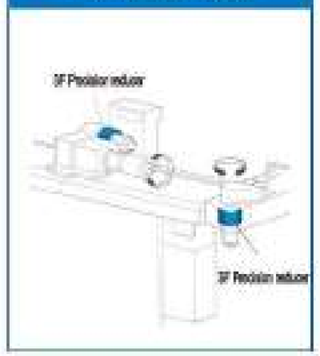


Wafer handling robot



Stamping equipment (riveting)

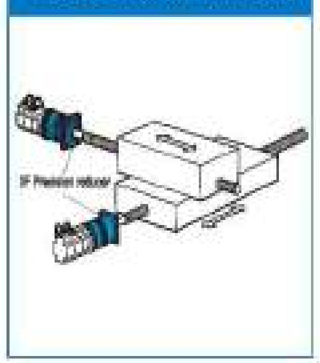
Pipe bending machine



Printed circuit board inspection device

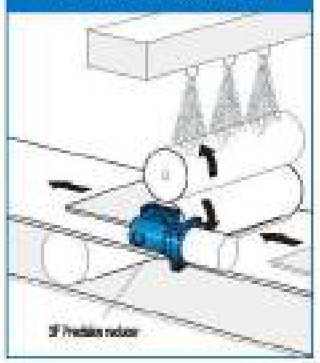
Rotate

Two axis control (XY workbench)

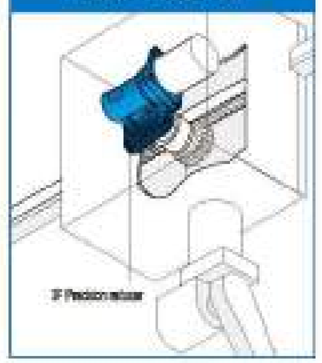


Indexing table drive

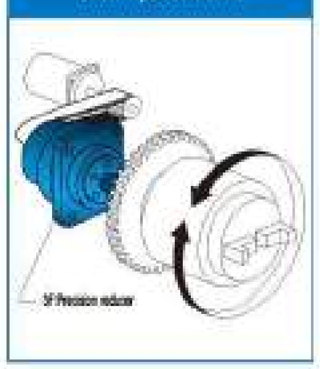
Roller drive for daubing use



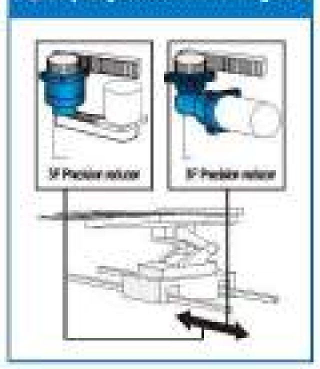
Pulley for loader use



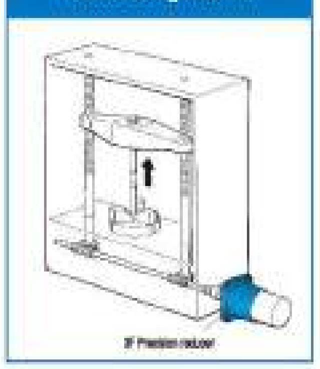
Shaft input belt drive



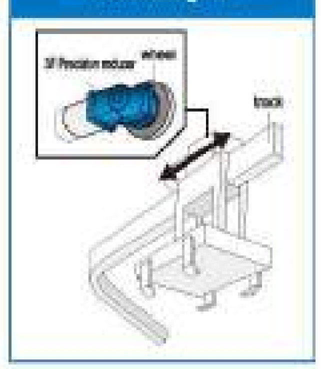
Liquid crystal glass substrate handling robot



Tensile testing machine



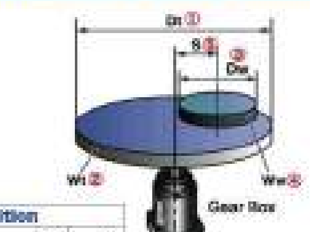
Roof walking van



Assist engineers in providing transmission product selection

Technical engineers can provide load parameters in the chart according to the design working conditions, and the selection engineers will provide selection guidance.

Turntable drive



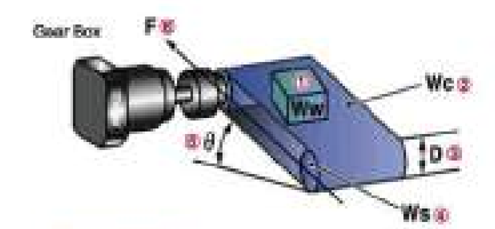
Load condition			
①	Turntable diameter	(Dt)	: (m)
②	Turntable weight	(Wt)	: (kg)
③	Turntable load bearing diameter	(Dw)	: (m)
④	Turntable load weight	(Ww)	: (kg)
⑤	Distance from the rotary center to the load center of gravity	(S)	: (m)
	Connection method with gearbox ● Direct connection		○ Coupling
⑥	Turntable bearing	(Db)	: (m)
⑦	Bearing friction coefficient	(μ)	:

★ Please fill in the corresponding values of ①②③④⑤⑥⑦

Operation mode			
a	Acceleration time	t1	: (sec)
b	Stable operation time	t2	: (sec)
c	Deceleration time	t3	: (sec)
d	Stop time	t4	: (sec)
e	Turntable rotation speed	N	: (rpm)

★ Please fill in the corresponding values of a,b,c,d,e

Belt conveyor drive



Load condition			
①	Transmission weight	(Ww)	: (kg)
②	Conveyor belt weight	(Wc)	: (kg)
③	Conveyor ball diameter	(D)	: (m)
④	Conveyor ball weight	(Ws)	: (kg)
⑤	Conveyor inclination angle	(θ)	: (°)
⑥	Belt tension	(F)	: (N)

★ Please fill in the corresponding values of ①②③④⑤⑥⑦

Operation mode			
a	Acceleration time	t1	: (sec)
b	Stable operation time	t2	: (sec)
c	Deceleration time	t3	: (sec)
d	Stop time	t4	: (sec)
e	Transmission speed	V	: (m/min)

★ Please fill in the corresponding values of a,b,c,d,e

Rack & Pinion Drive

Load condition			
①	Transmission weight	(Ww)	: (kg)
②	Main rack weight	(Wc)	: (kg)
③	Small pinion diameter	(D)	: (m)
④	Small pinion weight	(Ws)	: (kg)
⑤	Main rack tilt angle	(θ)	: (°)
⑥	Friction coefficient	(μ)	:
⑦	Mechanical efficiency	(η)	:

★ Please fill in the corresponding values of ①②③④⑤⑥⑦

Operation mode			
a	Acceleration time	t1	: (sec)
b	Stable operation time	t2	: (sec)
c	Deceleration time	t3	: (sec)
d	Stop time	t4	: (sec)
e	Operating speed	V	: (m/min)

★ Please fill in the corresponding values of a,b,c,d,e

Lifting device drive

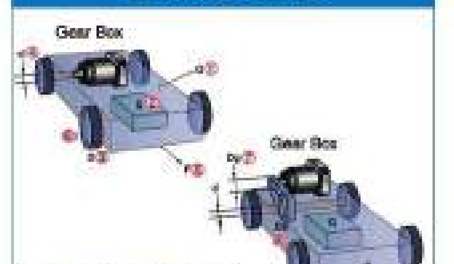
Load condition			
①	Weight of processed product	(Ww)	: (kg)
②	Weight of the weights	(Wb)	: (kg)
③	Lifting device sprocket PCD	(D)	: (m)
④	Weight of lifting device sprocket	(Ws)	: (kg)
⑤	Shaft diameter of lifting device sprocket	(d)	: (m)
	Connection method with gearbox ● Direct connection		○ Sprocket
⑥	Sprocket PCD of gearbox side	(Dg)	: (m)
⑦	Sprocket PCD of lifting device side	(Ds)	: (m)

★ Please fill in the corresponding values of ①②③④⑤⑥⑦

Operation mode			
a	Acceleration time	t1	: (sec)
b	Stable operation time	t2	: (sec)
c	Deceleration time	t3	: (sec)
d	Stop time	t4	: (sec)
e	Moving speed	V	: (m/min)

★ Please fill in the corresponding values of a,b,c,d,e

Bracket drive



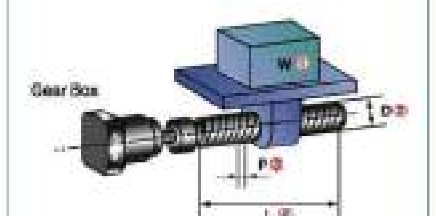
Load condition			
①	Bracket weight	(W)	: (kg)
②	Transmission weight	(G)	: (kg)
③	Bracket shaft diameter	(D)	: (m)
④	Bracket shaft diameter	(d)	: (m)
⑤	Load condition	(F)	: (kg)
⑥	Friction coefficient of wheel diameter	(f)	:
	Connection method with gearbox ● Direct connection		○ Sprocket
⑦	Gearbox side pulley/sprocket PCD	(Dg)	: (m)
⑧	Pulley/sprocket of wheel surface	(Ds)	: (m)
⑨	Belt tension	(Fg)	: (N)

★ : Please fill in the corresponding values of ①②③④⑤⑥⑦⑧⑨

Operation mode			
a	Acceleration time	t1	: (sec)
b	Stable operation time	t2	: (sec)
c	Deceleration time	t3	: (sec)
d	Stop time	t4	: (sec)
e	Operating speed	V	: (m/min)

★ : Please fill in the corresponding values of a,b,c,d,e

Ball screw drive



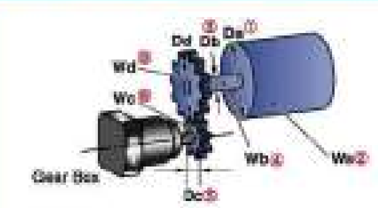
Load condition			
①	Transmission weight	(W)	: (kg)
②	Ball screw diameter	(D)	: (m)
③	Ball screw vibration pitch	(P)	: (m/rev)
④	Ball screw length	(L)	: (m)
⑤	Ball screw setting angle	(θ)	: (°)

★ : Please fill in the corresponding values of ①②③④⑤

Operation mode			
a	Acceleration time	t1	: (sec)
b	Stable operation time	t2	: (sec)
c	Deceleration time	t3	: (sec)
d	Stop time	t4	: (sec)
e	Transmission speed	V	: (m/min)

★ : Please fill in the corresponding values of a,b,c,d,e

Rack & Pinion Drive



Load condition			
①	Workpiece outer diameter	(Da)	: (m)
②	Workpiece weight	(Wa)	: (kg)
③	Rotating axis outer diameter	(Db)	: (m)
④	Rotating axis weight	(Wb)	: (kg)
⑤	Drive gear PCD	(Dc)	: (m)
⑥	Driving gear weight	(Wc)	: (kg)
⑦	Teeth number of drive gear	(Zc)	:
⑧	Driven gear PCD	(Dd)	: (m)
⑨	Passive drive gear weight	(Wd)	: (kg)
⑩	Passive drive gear teeth number	(Zd)	:
⑪	Rotating shaft bearing PCD	(De)	: (m)
⑫	Friction coefficient	(μ)	:

★ : Please fill in the corresponding values of ①②③④⑤⑥⑦⑧⑨⑩⑪⑫

Operation mode			
a	Acceleration time	t1	: (sec)
b	Stable operation time	t2	: (sec)
c	Deceleration time	t3	: (sec)
d	Stop time	t4	: (sec)
e	Spinning rotation speed	N	: (rpm)

★ : Please fill in the corresponding values of a,b,c,d,e

Reduction Gear Comprehensive Catalog

1 Planetary reducer series

2 Servo reducer series

3 90 degree right angle reducer series

4 Precision Rack . Pinion series

5 Harmonic reducer series

6 RV robot joint reducer series

Comprehensive Motor Catalog

1 Open loop motor + closed loop motor + screw stepping motor (pulse and bus stepping driver can be equipped)

(acceleration and deceleration box + brake + waterproof + explosion-proof function can be used) 401–462

2 Stepper motor driver (open / closed loop) (pulse + bus + integrated driver)

PLC RS485 EtherCAT CANopen 463– 470

3 AC servo motor + AC servo driver (pulse + bus type)

PLC RS485 EtherCAT CANopen Modbus

(acceleration and deceleration box + brake + waterproof + explosion-proof function can be used) 471–498

4 DC servo motor + DC servo driver (pulse + bus type) PLC RS485 EtherCAT CANopen

(acceleration and deceleration box + brake + waterproof + explosion-proof function can be used) 499–526

5 DC brushless motor and DC brushless driver PLC RS485 EtherCAT CANopen

(acceleration and deceleration box + brake + waterproof + explosion-proof function can be used) 527–556

6 Direct drive DD motor + linear motor PLC RS485 EtherCAT CANopen

557–570

7 PLC programmable controller / motion controller (card / vision operation control all-in-one machine)

EtherCAT CANopen Modbus

571–576

For stepper / servo motor

Planetary Gearbox

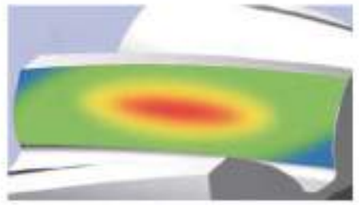
Taiwan excellent technology/precision transmission solutions expert

3F FAMED®

Fenghua Transmission Technology (Jiangsu) Co.,Ltd.

Product Technology

The 3F series planetary gearbox has two multi-national patent lubricating structure, which is used in the internal spiral gear structure to ensure the highest efficient output.
Patent 1: Reducing the axial thrust of the planetary gear operation.
Patent 2: Increase the lubrication, reduce the frictional resistance and noise.



Finite element analysis of gear strength is carried out by using ANSYS technology. Tooth profile and lead trimming of tooth surface are also made to reduce the impact and noise of gear meshing, and increase the service life of gear system.

Carbon-nitriding heat-treated high quality alloy steel is adopted in gear materials to obtain the best wear resistance and impact toughness.

The output planet carrier adopts integral (double support) structure design. The large span of the front and rear bearings is distributed inside the box body, forming a stable integrated structure to ensure high torsion rigidity and accuracy.

PAB series
Take the PAB series as an example

An integrated design of the tooth ring and the output shell is adopted, and high quality steel is used to get high material density by hot forging. The integrated design can ensure that all geometric dimensions are finished in one time and have higher precision and strength compared with other embedded and clamped structures.

The input shaft and locking device are designed in an integrated way. The two bolts are symmetrically distributed to achieve dynamic balance. At the same time, through the strong locking of double bolts, the motor shaft transmission is effectively prevented from slipping and the high-precision zero backlash power transmission is achieved.

Reference Table of Reducer Selection

Selecting reducer according to the output power of servo motor

Capacity	Model	1/3	1/4	1/5	1/7	1/10	1/12	1/15	1/16	1/20	1/25	1/28	1/30	1/35	1/40	1/50	1/70	1/100
100w	042	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
	060	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
200w	060	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	090	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
400w	060	●	●	●	●	●	●	●	●	●	●	●	●					
	090	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
500w	090	●	●	●	●	●	●	●	●	●	●	●						
	120	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
750w	090	●	●	●	●	●	●	●	●	●	●	●						
	120	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
1.0kw	090	●	●	●	●	●												
	120	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	150	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
1.5kw	090	●	●	●	●	●												
	120	●	●	●	●	●	●	●	●	●	●	●	●					
	150	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
2.0kw	120	●	●	●	●	●	●	●										
2.0kw	150	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	180	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
3.5kw	120	●	●	●	●	●	●	●										
3.5kw	150	●	●	●	●	●	●	●	●	●	●	●	●	●				
	180	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	220	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5.0kw	120	●	●	●	●	●	●	●										
5.0kw	150	●	●	●	●	●	●	●	●	●	●	●						
	180	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
	220	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
7.0kw	180	●	●	●	●	●	●	●	●	●								
	220	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
11.0kw	180	●	●	●	●	●												
	220	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
15.0kw	220	●	●	●	●	●	●	●	●	●	●							

P.S : This mark"●"means available reduction ratio.

Note 1: Three-stage speed reduction ratios are not available in the above stable. If needed, pls inform our sales person.

Note 2: Choose a bigger level of reducer to use when the inertia is bigger.

PRECISION PLANETARY GEARBOX

VRB

- 1.Quiet operation
  Helical gears are used to achieve smooth and quiet operation.
- 2.High precision
  The backlash is less than 3 arcmin and the positioning is accurate.
- 3.High rigidity & torqueThe use of integral ball bearings greatly improves the rigidity and torque.
- 4.Methods of flange and connector
  It can be installed on any motor in the world.
- 5.No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 6.Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

VRB Type

VRB090 – 10 – S1 – P1 / Motor

Reducer Model
VRB042, VRB060, VRB090, VRB115
VRB142, VRB180, VRB220

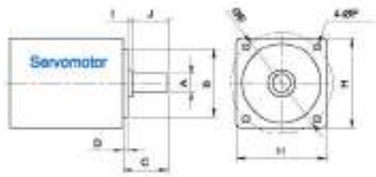
Output Shaft Keyway
S1:(Solid Output Shaft No Keyway)
S2: Standard (Keyway)
S3: Output for holes

Motor Model
Motor Manufacturer & Model

Ratio
1-stage: 3, 4, 5, 6, 7, 8, 9, 10
2-stage: 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100

Backlash Grade
P0: High precision backlash
P1: Precision backlash
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions:



A	B	C	D	E	F	H	I	J

Naming Scheme:

Type	Model	Ratio	Output Shaft Keyway	Backlash Class	MOTOR NO.

VRB Reducer Specifications

Specs	Unit	Stage	Ratio	VRB042	VRB060	VRB090	VRB115	VRB142	VRB180	VRB220
Rated Output Torque / T2N	Nm	1	3	20	55	130	208	342	588	1140
			4	19	50	140	290	542	1050	1700
			5	22	60	160	330	650	1200	2000
			6	20	55	150	310	600	1100	1900
			7	19	50	140	300	550	1100	1800
			8	17	45	120	260	500	1000	1600
			9	14	40	100	230	450	900	1500
			10	14	40	100	230	450	900	1500
		2	15	20	55	130	208	342	588	1140
			20	19	50	140	290	542	1050	1700
			25	22	60	160	330	650	1200	2000
			30	22	55	130	208	342	588	1140
			35	22	60	160	330	650	1200	2000
			40	22	50	140	298	542	1050	1700
			45	14	40	100	230	450	900	1500
			50	22	60	160	330	650	1200	2000
			60	20	55	150	310	600	1100	1900
			70	19	50	140	300	550	1100	1800
			80	17	45	120	280	500	1000	1600
			90	14	40	100	230	450	900	1500
			100	14	40	100	230	450	900	1500
Max.Output Torque / T2max[1]	Nm	1,2	3-100	3Times of Nominal Output Torque						
Rated Input Speed / n1n	rpm	1,2	3-100	5000	5000	4000	4000	3000	3000	2000
Max.Input Speed / n1s	rpm	1,2	3-100	10000	10000	8000	8000	6000	6000	4000
Micro Backlash P0	arcmin	1	3-10	≤1	≤1	≤1	≤1	≤1	≤1	≤1
		2	12-100	≤3	≤3	≤3	≤3	≤3	≤3	≤3
Precision Backlash P1	arcmin	1	3-10	≤3	≤3	≤3	≤3	≤3	≤3	≤3
		2	12-100	≤5	≤5	≤5	≤5	≤5	≤5	≤5
Precision Backlash P2	arcmin	1	3-10	≤5	≤5	≤5	≤5	≤5	≤5	≤5
		2	12-100	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Torsional Rigidity	Nm/arcmin	1,2	3-100	3	7	14	25	50	145	225
Max.Radial Force / Fr2[2]	N	1,2	3-100	780	1530	3250	6700	9400	14500	50000
Max.Axial Force / Fa2[2]	N	1,2	3-100	390	765	1625	3350	4700	7250	25000
Service Life	hr	1,2	3-100	20000h						
Efficiency / η	%	1	3-10	≥97%						
		2	15-100	≥94%						
Weight	kg	1	3-10	0.5	1.3	3.3	7.8	15	28	52
		2	15-100	0.8	1.48	3.9	9.6	18.9	33	66
Operating Temperature	℃	1,2	3-100	(-15℃~+90℃)						
Lubrication		1,2	3-100	(Synthetic Grease)						
Protection Class		1,2	3-100	IP65						
Mounting Position		1,2	3-100	(Any Direction)						
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	3-100	≤56	≤58	≤60	≤63	≤65	≤67	≤70

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	VRB042	VRB060	VRB090	VRB115	VRB142	VRB180	VRB220
Rotary Inertia	$kg.cm^2$	1	3	0.03	0.16	0.61	3.25	9.21	26.88	69.61
			4	0.03	0.14	0.48	2.74	7.54	23.67	54.37
			5	0.03	0.13	0.47	2.71	7.42	23.29	53.27
			6	0.03	0.13	0.45	2.65	7.25	22.75	51.72
			7	0.03	0.13	0.45	2.62	7.14	22.48	50.97
			8	0.03	0.13	0.44	2.58	7.07	22.59	50.84
			9	0.03	0.13	0.44	2.57	7.04	22.53	50.83
			10	0.03	0.13	0.44	2.57	7.03	22.51	50.56
		2	12-40	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			50-100	0.03	0.03	0.13	0.44	2.57	7.03	22.51

1. Ratio (i=Nin/Nout) 2. When output speed is 100rpm, acting on the output shaft center position
3. The Max. acceleration torque T2B=60% of T2NOT, continuous operation, service life is 10000hrs

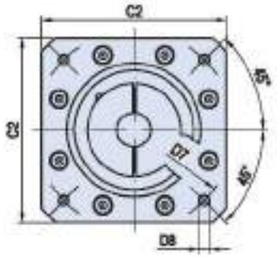
MODEL: VRB

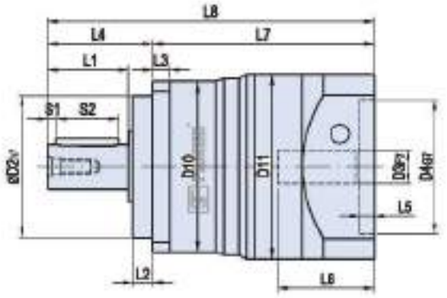
1-Stage

Ratio: 3, 4, 5, 6, 7, 8, 9, 10

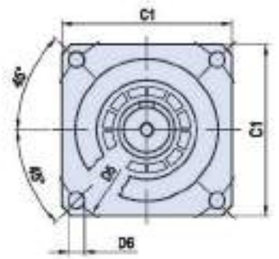
Dimensions:

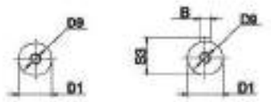
Input





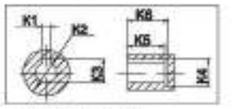
Output





Output shaft type S1

Output shaft type S2



Output hole type S3

Unit:mm

Size	VRB042-L1	VRB060-L1	VRB090-L1	VRB115-L1	VRB142-L1	VRB180-L1	VRB220-L1
D1	ϕ13	ϕ18	ϕ22	ϕ32	ϕ40	ϕ55	ϕ75
D2	ϕ35	ϕ50	ϕ80	ϕ110	ϕ130	ϕ160	ϕ180
D3	ϕ8 (ϕ6.35-11)	ϕ14 (ϕ11-19)	ϕ19 (ϕ16-24)	ϕ22 (ϕ19-35)	ϕ24 (ϕ22-35)	ϕ35 (ϕ35-42)	ϕ42 (ϕ35-55)
D4	ϕ30 (ϕ30-50)	ϕ50 (ϕ50-ϕ70)	ϕ70 (ϕ70-ϕ110)	ϕ110 (ϕ114.3)	ϕ110 (ϕ114.3)	ϕ114.3 (ϕ114.3-200)	ϕ180 (ϕ114.3-200)
D5	ϕ50	ϕ70	ϕ100	ϕ130	ϕ165	ϕ215	ϕ250
D6	4-ϕ3.4	4-ϕ5.5	4-ϕ7	4-ϕ9	4-ϕ11	4-ϕ13	4-ϕ17
D7	ϕ46 (ϕ45-70)	ϕ70 (ϕ70-ϕ90)	ϕ90 (ϕ90-145)	ϕ145 (ϕ145-200)	ϕ145 (ϕ145-200)	ϕ200 (ϕ200-235)	ϕ215 (ϕ200-235)
D8	4-M4(M3-M5)	4-M5 (M4-M6)	4-M6 (M5-M8)	4-M8 (M8-M12)	4-M8 (M8-M12)	4-M12	4-M12
D9	M4X0.7P	M5X0.8P	M8X1.25P	M12X1.75P	M16X2P	M20X2.5P	M20X2.5P
D10	ϕ42	ϕ60	ϕ87	ϕ114.5	ϕ142	ϕ180	ϕ218
D11	ϕ46	ϕ65	ϕ90	ϕ118	ϕ150	ϕ184	ϕ225.5
L1	19.5	28.5	36.5	51	79	82	105
L2	5.5	7	10	12	15	20	30
L3	4	6	8	10	12	15	20
L4	26	37	48	65	97	105	138
L5	5	5	7 (7-8)	6 (5-11)	8 (8-11)	7 (7-10)	8 (8-15)
L6	27.5 (≤32)	34 (≤44)	44 (≤60)	64.5 (≤81.5)	72.5 (≤82)	85 (≤120)	109 (≤119)
L7	65.5 (65.5-70)	78 (78-88)	98 (98-114)	135 (135-153)	154.5 (154.5-164)	179 (179-214)	220 (220-230)
L8	91.5 (91.5-96)	115 (115-125)	146 (146-162)	201 (201-218)	251.5 (251.5-261)	284 (284-319)	358 (358-368)
C1	42	60	90	115	142	180	220
C2	46(46-60)	66(66-80)	90 (90-130)	130 (130-180)	130 (130-180)	180 (180-220)	200 (200-220)
S1	3	3	4	5	5	6	7
S2	14	22	28	40	66	70	90
S3	15	18	24.5	35	43	59	79.5
B	5	5	6	10	12	16	20
K1	-	4	6	8	10	14	18
K2	-	ϕ11	ϕ22	ϕ26	ϕ36	ϕ50	ϕ60
K3	-	12.8	24.5	31.3	41.3	53.8	64.4
K4	-	ϕ16	ϕ32	ϕ38	ϕ48	ϕ60	ϕ72
K5	-	15	20	27	35	43	60
K6	-	18	24	32	40	50	65

Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

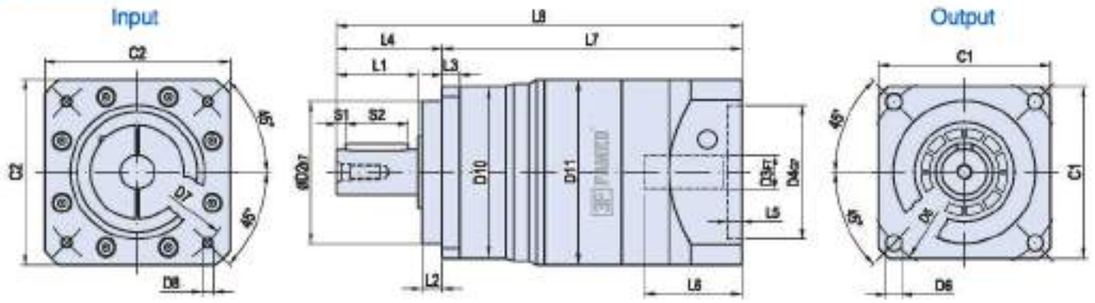
MODEL: VRB

2-Stage

Ratio: 15, 20, 25, 30, 35, 40, 45, 50, 60
70, 80, 90, 100

Dimensions:

Input



Output

Output shaft type S1 | Output shaft type S2 | Output hole type S3

Unit:mm

Size	VRB042-L2	VRB060-L2	VRB090-L2	VRB115-L2	VRB142-L2	VRB180-L2	VRB220-L2
D1	ϕ13	ϕ16	ϕ22	ϕ32	ϕ40	ϕ55	ϕ75
D2	ϕ35	ϕ50	ϕ60	ϕ110	ϕ130	ϕ160	ϕ180
D3	ϕ8 (ϕ6.35-8)	ϕ14 (ϕ11-14)	ϕ19 (ϕ11-19)	ϕ22 (ϕ16-24)	ϕ24 (ϕ19-35)	ϕ35 (ϕ22-35)	ϕ42 (ϕ35-42)
D4	ϕ30 (ϕ30-38.1)	ϕ50	ϕ70 (ϕ50-ϕ80)	ϕ110 (ϕ70-110)	ϕ110 (ϕ114.3)	ϕ114.3 (ϕ110-114.3)	ϕ180 (ϕ114.3-200)
D5	ϕ50	ϕ70	ϕ100	ϕ130	ϕ165	ϕ215	ϕ250
D6	4-ϕ3.4	4-ϕ5.5	4-ϕ7	4-ϕ9	4-ϕ11	4-ϕ13	4-ϕ17
D7	ϕ46 (ϕ45-68.67)	ϕ70	ϕ90 (ϕ70-100)	ϕ145 (ϕ90-145)	ϕ145 (ϕ145-200)	ϕ200 (ϕ145-200)	ϕ215 (ϕ200-235)
D8	4-M4(M3)	4-M5 (M4)	4-M6 (M4-M6)	4-M8 (M5-M8)	4-M8 (M8-M12)	4-M12 (M8-M12)	4-M12
D9	M4X0.7P	M5X0.8P	M8X1.25P	M12X1.75P	M16X2P	M20X2.5P	M20X2.5P
D10	ϕ42	ϕ60	ϕ87	ϕ114.5	ϕ142	ϕ180	ϕ218
D11	ϕ46	ϕ65	ϕ90	ϕ118	ϕ150	ϕ184	ϕ225.5
L1	19.5	28.5	36.5	51	79	82	105
L2	5.5	7	10	12	15	20	30
L3	4	6	8	10	12	15	20
L4	26	37	48	65	97	105	138
L5	5	5	5	8 (7-8)	11 (6-11)	8 (8-11)	8 (7-10)
L6	27.5	34	34 (≤44)	44 (≤60)	64.5 (≤81.5)	72.5 (≤82	85 (≤120)
L7	86	105	124.5 (114.5-124.5)	165.5 (149.5-165.5)	205 (189-205)	235 (225.5-235)	289 (264-299)
L8	112	142	172.5 (162.5-172.5)	230.5 (214.5-230.5)	303 (286-303)	340 (330.5-340)	407 (402-437)
C1	42	60	90	115	142	180	220
C2	46 (46-57)	68	65 (65-86)	90 (90-130)	130 (130-180)	150 (150-180)	200 (180-220)
S1	3	3	4	5	5	6	7
S2	14	22	28	40	65	70	90
S3	15	18	24.5	35	43	59	79.5
B	5	5	6	10	12	16	20
K1	–	4	6	8	10	14	18
K2	–	ϕ11	ϕ22	ϕ28	ϕ38	ϕ50	ϕ60
K3	–	12.8	24.5	31.3	41.3	53.8	64.4
K4	–	ϕ16	ϕ32	ϕ38	ϕ48	ϕ60	ϕ72
K5	–	15	20	27	35	43	60
K6	–	18	24	32	40	50	65

Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

PRECISION PLANETARY GEARBOX

EVB

- 1.Quiet operation
  Helical gears are used to achieve smooth and quiet operation.
- 2.High precision
  The backlash is less than 3 arcmin and the positioning is accurate.
- 3.High rigidity & torqueThe use of integral ball bearings greatly improves the rigidity and torque.
- 4.Methods of flange and connector
  It can be installed on any motor in the world.
- 5.No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 6.Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

EVB Type

EVB090 – 10 – S1 – P1 / Motor

Reducer Model
EVB042, EVB060, EVB090, EVB115
EVB142, EVB180, EVB220

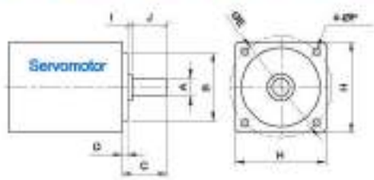
Output Shaft Keyway
S1:(Solid Output Shaft No Keyway)
S2: Standard (Keyway)
S3: Output for holes

Motor Model
Motor Manufacturer & Model

Ratio
1-stage: 3, 4 , 5, 6, 7, 8, 9, 10, 14, 16, 20
2-stage: 15, 20, 25, 30, 35, 40, 50, 70, 80, 100, 120, 140, 160, 180, 200

Backlash Grade
P0: High precision backlash
P1: Precision backlash
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions:



A	B	C	D	E	F	H	I	J

Naming Scheme:

Type	Model	Ratio	Output Shaft Keyway	Backlash Class	MOTOR NO.

Reducer Specifications

Specs	Unit	Stage	Ratio	EVB042	EVB060	EVB090	EVB115	EVB142	EVB180	EVB220
Rated Output Torque / T2N	Nm	1	3	20	55	130	208	342	588	1140
			4	19	50	140	290	542	1050	1700
			5	22	60	160	330	650	1200	2000
			6	20	55	150	310	600	1100	1900
			7	19	50	140	300	550	1100	1800
			8	17	50	140	290	542	1050	1700
			9	14	40	100	230	450	900	1500
			10	14	60	160	330	650	1200	2000
			14	19	50	140	300	550	1100	1800
			20	14	40	100	230	450	900	1500
		2	15	20	55	130	208	342	588	1140
			20	20	50	140	290	542	1050	1700
			25	22	60	160	330	650	1200	2000
			30	22	55	130	208	342	588	1140
			35	22	60	160	330	650	1200	2000
			40	22	50	140	290	542	1050	1700
			50	22	60	160	330	650	1200	2000
			70	22	60	160	330	600	1200	2000
			80	22	50	140	290	542	1050	1700
			100	22	60	160	330	650	1200	2000
			120	—	—	150	310	600	1100	1900
			140	—	—	140	300	550	1100	1800
			160	—	—	120	260	500	1000	1600
			180	—	—	98	225	445	895	1495
			200	—	—	100	230	450	900	1500
Max.Output Torque / T2MAX[1]	Nm	1,2	3–200	3Times of Nominal Output Torque						
Rated Input Speed / n1N	rpm	1,2	3–200	3000	3000	3000	3000	2500	2000	2000
Max.Input Speed / n1M	rpm	1,2	3–200	6000	6000	6000	5500	4500	4500	4000
Precision Backlash P0	arcmin	1	3–20	≤2	≤2	≤2	≤2	≤2	≤2	≤2
		2	15–200	≤4	≤4	≤4	≤4	≤4	≤4	≤4
Precision Backlash P1	arcmin	1	3–20	≤4	≤4	≤4	≤4	≤4	≤4	≤4
		2	15–200	≤6	≤6	≤6	≤6	≤6	≤6	≤6
Standard Backlash P2	arcmin	1	3–20	≤6	≤6	≤6	≤6	≤6	≤6	≤6
		2	15–200	≤8	≤8	≤8	≤8	≤8	≤8	≤8
Torsional Rigidity	Nm/arcmin	1,2	3–200	3	6	14	25	56	140	220
Max.Radial Force / FrM[2]	N	1,2	3–200	780	1300	3200	6750	9400	14500	50000
Max.Axial Force / FarM[2]	N	1,2	3–200	330	700	1580	3300	4700	7200	28000
Service Life	hr	1,2	3–200	21000 h						
Efficiency / η	%	1	3–20	≥93%						
		2	25–200	≥96%						
Weight	kg	1	3–20	0.9	1.5	6.4	13	24.5	51	83
		2	25–200	1.2	2.1	7.8	14.2	27.5	54	95
Operating Temperature	℃	1,2	3–200	(–15℃ – +90℃)						
Lubrication		1,2	3–200	(Synthetic Grease)						
Protection Class		1,2	3–200	IP65						
Mounting Position		1,2	3–200	(Any Direction)						
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	3–200	≤65	≤65	≤66	≤66	≤70	≤72	≤74

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	EVB042	EVB060	EVB090	EVB115	EVB142	EVB180	EVB220
Moment of Inertia	kg.cm²	1	3–10	0.09	0.35	2.25	6.84	23.4	68.9	135.4
			14–20	0.03	0.07	1.87	6.25	21.8	65.6	119.8
		2	15–100	0.09	0.09	0.35	2.25	6.84	23.4	68.9
			120–200	—	—	0.31	1.87	6.25	21.8	65.6

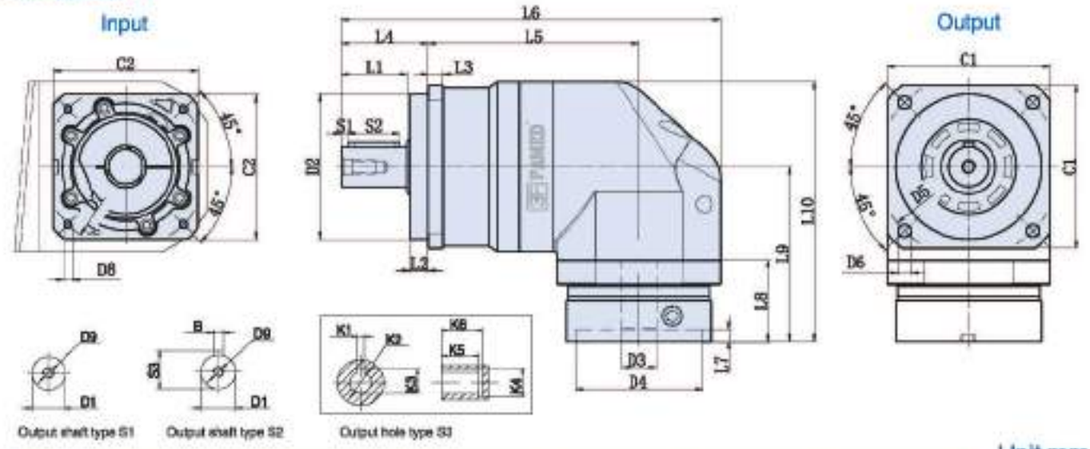
1. The Max. acceleration torque T2B=60% of T2NOT 2. When output speed is 100rpm, inertia acts on the output shaft center position.
3. 3-stage big ratios are not in the above table. There is shaft lengthening and enlarging design. Please tell sales person if you need it.

MODEL: EVB

1–Stage

Ratio: 3, 4 , 5, 6, 7, 8, 9, 10, 14, 16, 20

Dimensions:



Unit:mm

Size	EVB042-L1	EVB060-L1	EVB090-L1	EVB115-L1	EVB142-L1	EVB180-L1	EVB220-L1
D1	ϕ13	ϕ16	ϕ22	ϕ32	ϕ40	ϕ55	ϕ75
D2	ϕ35	ϕ50	ϕ80	ϕ110	ϕ130	ϕ160	ϕ180
D3	ϕ8(≤11)	ϕ14(≤14)	ϕ19(≤24)	ϕ24(≤32)	ϕ35(≤42)	ϕ38(≤50)	ϕ55(≤55)
D4	ϕ30(30-50)	ϕ50 (50-70)	ϕ70 (50-110)	ϕ110 (50-130)	ϕ114.3(95-180)	ϕ180(95-180)	ϕ215(180-255)
D5	ϕ50	ϕ70	ϕ100	ϕ130	ϕ165	ϕ215	ϕ250
D6	4-ϕ3.4	4-ϕ5.5	4-ϕ7	4-ϕ9	4-ϕ11	4-ϕ13	4-ϕ17
D7	ϕ46(22-70)	ϕ70 (70-130)	ϕ90 (70-145)	ϕ145 (70-145)	ϕ200(90-215)	ϕ200(90-300)	ϕ235(200-300)
D8	(4-M3X8L)	(4-M4*8L)	(4-M6*10L)	(4-M8*20L)	(4-M12X30L)	(4-M12X30L)	(4-M12X30L)
D9	M4X0.7P	M5*0.8P*18L	M6*1.25P*19L	M12*1.75P*28L	M16X2.0P	M20X2.5P	M20X2.5P
L1	19	28.5	36.5	51	79	82	105
L2	5.5	7	10	12	15	20	30
L3	4	6	8	10	12	15	20
L4	26	37	48	65	97	105	138
L5	96	86	116	137.5	255	289	346
L6	(122)	153	209	260	(352)	(394)	(484)
L7	(3.5)	(5)	(6.5)	(10)	(14)	(15)	(7)
L8	(30)	(33)	(45)	(64)	(81)	(85)	(85)
L9	(69.5)	(77.5)	(96)	(135.5)	(165)	(213.5)	(268.5)
L10	(95.5)	(111.75)	(143)	(195)	(230)	(303.5)	(378.5)
C1	□42	□60	□90	□115	□142	□180	□220
C2	(□42)	(□60)	(□80)	(□130)	(□142)	(□180)	(□220)
S1	2	3	4	5	5	5	7
S2	16	22	28	40	65	70	90
S3	15	18	24.5	35	43	59	79
B	5	5	6	10	12	16	20
K1	–	3	6	8	10	14	16
K2	–	ϕ8	ϕ18	ϕ26	ϕ38	ϕ50	ϕ60
K3	–	9.2	21	31.3	42	53.8	64.4
K4	–	ϕ11	ϕ24	ϕ38	ϕ48	ϕ60	ϕ72
K5	–	16	30	27	35	43	60
K6	–	18	35	32	40	50	65

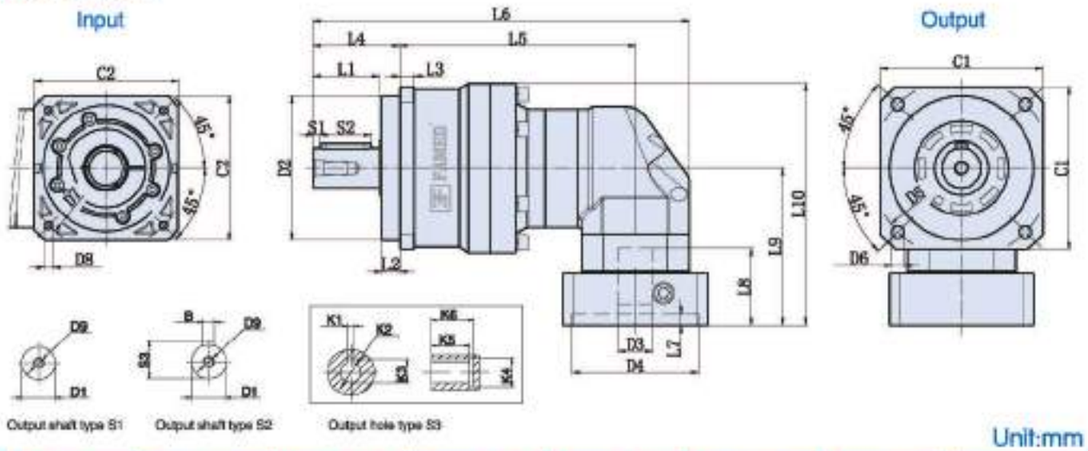
Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

MODEL: EVB

2-Stage

Ratio: 15, 20, 25, 30, 35, 40, 50, 70, 80
100 , 120, 140, 160, 180, 200

Dimensions:



Unit:mm

Size	EVB042-L2	EVB060-L2	EVB090-L2	EVB115-L2	EVB142-L2	EVB180-L2	EVB220-L2
D1	ϕ13	ϕ16	ϕ22	ϕ32	ϕ40	ϕ55	ϕ75
D2	ϕ35	ϕ50	ϕ80	ϕ110	ϕ130	ϕ160	ϕ180
D3	ϕ8(≈11)	ϕ14(≈14)	ϕ19(≈24)	ϕ24(≈32)	ϕ35(≈42)	ϕ38(≈50)	ϕ55(≈55)
D4	ϕ30(30-50)	ϕ50 (50-70)	ϕ70 (50-110)	ϕ110 (50-130)	ϕ114.3(95-180)	ϕ180(95-180)	ϕ215(180-255)
D5	ϕ50	ϕ70	ϕ100	ϕ130	ϕ165	ϕ215	ϕ250
D6	4-ϕ3.4	4-ϕ5.5	4-ϕ7	4-ϕ9	4-ϕ11	4-ϕ13	4-ϕ17
D7	ϕ46(22-70)	ϕ70 (70-130)	ϕ90 (70-145)	ϕ145 (70-145)	ϕ200(90-215)	ϕ200(90-300)	ϕ235(200-300)
D8	(4-M3X8L)	(4-M4*8L)	(4-M6*10L)	(4-M8*20L)	(4-M12X30L)	(4-M12X30L)	(4-M12X30L)
D9	M4X0.7P	M5*0.8P*18L	M6*1.25P*19L	M12*1.75P*28L	M16X2.0P	M20X2.5P	M20X2.5P
L1	19	28.5	36.5	51	79	82	105
L2	5.5	7	10	12	15	20	30
L3	4	6	8	10	12	15	20
L4	26	37	48	65	97	105	138
L5	113	115	130.5	167.5	282	322	383
L6	139	182	208.5	277.5	(378)	(427)	(521)
L7	(3.5)	(5)	(6.5)	(10)	(14)	(15)	(7)
L8	(30)	(33)	(42.5)	(59)	(81)	(85)	(85)
L9	(60.5)	(77.5)	(87)	(120)	(165)	(213.5)	(268.5)
L10	(90.5)	(111.75)	(134)	(179.5)	(236)	(303.5)	(378.5)
C1	□42	□60	□90	□115	□142	□180	□220
C2	(□42)	(□60)	(□80)	(□130)	(□142)	(□180)	(□220)
S1	2	3	4	5	5	5	7
S2	16	22	28	40	65	70	90
S3	15	18	24.5	35	43	59	79
B	5	5	6	10	12	16	20
K1	-	3	6	8	10	14	16
K2	-	ϕ8	ϕ18	ϕ28	ϕ38	ϕ50	ϕ60
K3	-	9.2	21	31.3	42	53.8	64.4
K4	-	ϕ11	ϕ24	ϕ36	ϕ48	ϕ60	ϕ72
K5	-	20	30	27	35	43	60
K6	-	24	36	32	40	50	65

Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

PRECISION PLANETARY GEARBOX

VRL

- 1.Quiet operation
  Helical gears are used to achieve smooth and quiet operation.
- 2.High precision
  The backlash is less than 3 arcmin and the positioning is accurate.
- 3.High rigidity & torqueThe use of integral ball bearings greatly improves the rigidity and torque.
- 4.Methods of flange and connector
  It can be installed on any motor in the world.
- 5.No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 6.Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

VRL Type

VRL090 - 10 - S1 - P1 / Motor

Reducer Model
VRL060, VRL070, VRL090, VRL120
VRL155, VRL205, VRL235

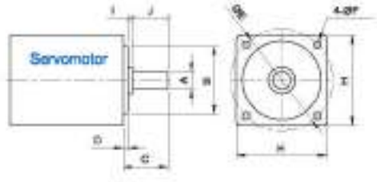
Output Shaft Keyway
S1:(Solid Output Shaft No Keyway)
S2: Standard (Keyway)
S3: Output for holes

Motor Model
Motor Manufacturer & Model

Ratio
1-stage: 3, 4, 5, 6, 7, 8, 9, 10
2-stage: 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100

Backlash Grade
P0: High precision backlash
P1: Precision backlash
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions:



A	B	C	D	E	F	H	I	J

Naming Scheme:

Type	Model	Ratio	Output Shaft Keyway	Backlash Class	MOTOR NO.

VRL Reducer Specifications

Specs	Unit	Stage	Ratio	VRL050	VRL070	VRL090	VRL120	VRL155	VRL205	VRL235
Rated Output Torque / T2N	Nm	1	3	20	55	130	208	342	588	1140
			4	19	50	140	290	542	1050	1700
			5	22	60	160	330	650	1200	2000
			6	20	55	150	310	600	1100	1900
			7	19	50	140	300	550	1100	1800
			8	17	45	120	260	500	1000	1600
			9	14	40	100	230	450	900	1500
			10	14	40	100	230	450	900	1500
		2	15	20	55	130	208	342	588	1140
			20	19	50	140	290	542	1050	1700
			25	22	60	160	330	650	1200	2000
			30	22	55	130	208	342	588	1140
			35	22	60	160	330	650	1200	2000
			40	22	50	140	298	542	1060	1700
			45	14	40	100	230	450	900	1500
			50	22	60	160	330	650	1200	2000
			60	20	55	150	310	600	1100	1900
			70	19	50	140	300	550	1100	1800
			80	17	45	120	260	500	1000	1600
			90	14	40	100	230	450	900	1500
			100	14	40	100	230	450	900	1500
Max.Output Torque / Tacc[1]	Nm	1,2	3~100	3Times of Nominal Output Torque						
Rated Input Speed / n1n	rpm	1,2	3~100	5000	5000	4000	4000	3000	3000	2000
Max.Input Speed / n1a	rpm	1,2	3~100	10000	10000	8000	8000	6000	6000	4000
Micro Backlash P0	arcmin	1	3~10	≤1	≤1	≤1	≤1	≤1	≤1	≤1
		2	15~100	≤3	≤3	≤3	≤3	≤3	≤3	≤3
Precision Backlash P1	arcmin	1	3~10	≤3	≤3	≤3	≤3	≤3	≤3	≤3
		2	15~100	≤5	≤5	≤5	≤5	≤5	≤5	≤5
Precision Backlash P2	arcmin	1	3~10	≤5	≤5	≤5	≤5	≤5	≤5	≤5
		2	15~100	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Torsional Rigidity	Nm/arcmin	1,2	3~100	3	7	14	25	50	145	225
Max.Radial Force / Fer[2]	N	1,2	3~100	680	1260	2880	6000	8200	12800	27800
Max.Axial Force / Fea[2]	N	1,2	3~100	370	780	1580	3360	4660	7250	18500
Service Life	hr	1,2	3~100	20000h						
Efficiency / η	%	1	3~10	≥97%						
		2	15~100	≥94%						
Weight	kg	1	3~10	0.5	1.2	3.5	7.8	14.5	30	50
		2	15~100	0.8	1.4	4.1	9	17.5	33	63
Operating Temperature	℃	1,2	3~100	(-15℃ ~ +90℃)						
Lubrication		1,2	3~100	(Synthetic Grease)						
Protection Class		1,2	3~100	IP65						
Mounting Position		1,2	3~100	(Any Direction)						
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	3~100	≤56	≤58	≤60	≤63	≤65	≤67	≤70

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	VRL050	VRL070	VRL090	VRL120	VRL155	VRL205	VRL235
Moment of Inertia	kg.cm^2	1	3	0.03	0.16	0.61	3.25	9.21	28.98	69.61
			4	0.03	0.14	0.48	2.74	7.54	23.67	54.37
			5	0.03	0.13	0.47	2.71	7.42	23.29	53.27
			6	0.03	0.13	0.45	2.65	7.25	22.75	51.72
			7	0.03	0.13	0.45	2.62	7.14	22.48	50.97
			8	0.03	0.13	0.44	2.58	7.07	22.59	50.84
			9	0.03	0.13	0.44	2.57	7.04	22.53	50.63
			10	0.03	0.13	0.44	2.57	7.03	22.51	50.55
		2	12~40	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			50~100	0.03	0.03	0.13	0.44	2.57	7.03	22.51

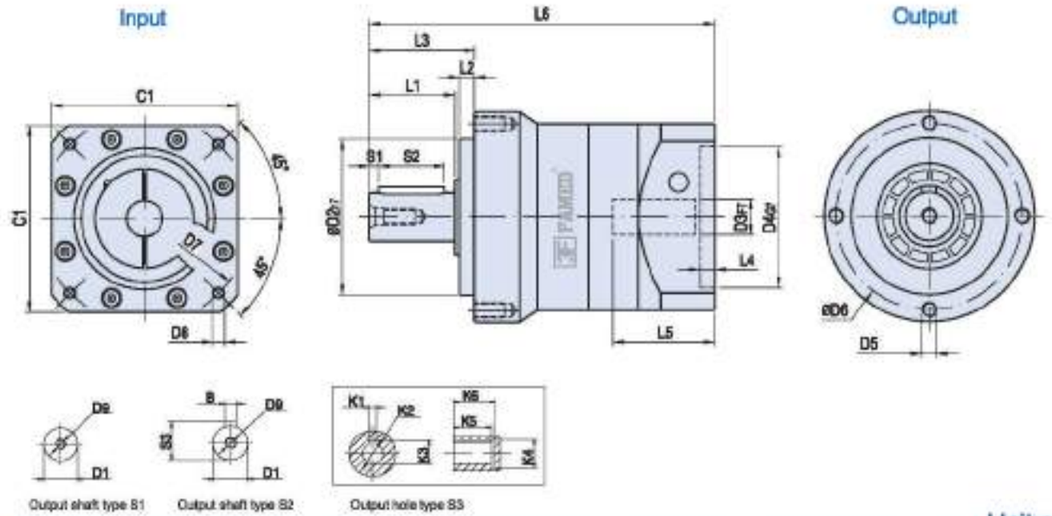
1. Ratio (i=Nin/Nout) 2. Output revolutions 100rpm, acting on the output shaft center position.
3. The Max. acceleration torque T2B≤60% of T2NOT, continuous operation, service life is 10000hrs.

MODEL: VRL

1–Stage

Ratio: 3, 4, 5, 6, 7, 8, 9, 10

Dimensions:



Unit:mm

Size	VRL070–L1	VRL090–L1	VRL120–L1	VRL155–L1	VRL205–L1	VRL235–L1
D1	ϕ16	ϕ22	ϕ32	ϕ40	ϕ55	ϕ75
D2	ϕ52	ϕ66	ϕ90	ϕ120	ϕ160	ϕ180
D3	ϕ14 (ϕ11–14)	ϕ19 (ϕ16–24)	ϕ22 (ϕ19–35)	ϕ24 (ϕ22–35)	ϕ35 (ϕ35–ϕ42)	ϕ42 (ϕ35–55)
D4	ϕ50 (ϕ50–70)	ϕ70 (ϕ70–ϕ110)	ϕ110 (ϕ114.3)	ϕ110 (ϕ114.3)	ϕ114.3 (ϕ114.3–200)	ϕ180 (ϕ114.3–200)
D5	4–M5X10L	4–M6X12L	4–M8X16L	4–M10X20L	4–M12X22L	4–M16X28L
D6	ϕ82	ϕ80	ϕ106	ϕ140	ϕ164	ϕ210
D7	ϕ70 (ϕ70–90)	ϕ90 (ϕ90–145)	ϕ145 (ϕ145–200)	ϕ145 (ϕ145–200)	ϕ200 (ϕ200–235)	ϕ215 (ϕ200–235)
D8	4–M5 (M4–M6)	4–M6 (M5–M8)	4–M8 (M8–M12)	4–M8 (M8–M12)	4–M12	4–M12
D9	M5X0.8P	M6X1.25P	M12X1.75P	M16X2P	M20X2.5P	M20X2.5P
L1	28.5	36.5	51	79	82	105
L2	5	6	9	12	15	18
L3	35	44	62	94	100	126
L4	5	7–8	8–11	8–11	7–10	8–15
L5	34 (≤44)	44 (≤60)	64.5 (≤81.5)	72.5 (≤82)	85 (≤120)	109 (≤119)
L6	115 (115–125)	146 (146–162)	201 (201–218)	251.5 (251.5–261)	284 (284–319)	358 (358–368)
C1	65 (65–80)	90 (90–130)	130 (130–180)	150 (150–180)	180 (180–220)	200 (200–220)
S1	3	4	5	5	6	7
S2	22	28	40	65	70	90
S3	18	24.5	35	43	59	79.5
B	5	6	10	12	16	20
K1	4	6	8	10	14	18
K2	ϕ11	ϕ22	ϕ28	ϕ38	ϕ50	ϕ60
K3	12.8	24.5	31.3	41.3	53.8	64.4
K4	ϕ16	ϕ32	ϕ38	ϕ48	ϕ60	ϕ72
K5	15	20	27	35	43	60
K6	18	24	32	40	50	65

Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

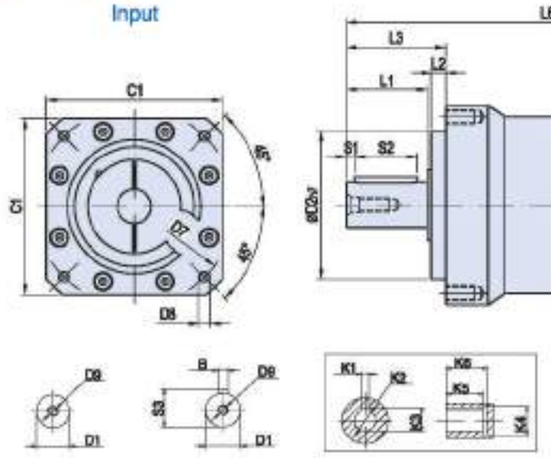
MODEL: VRL

2-Stage

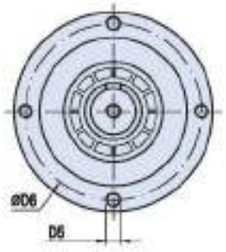
Ratio: 15, 20, 25, 30, 35, 40, 45, 50,
60, 70, 80, 90, 100

Dimensions:

Input



Output



Output shaft type S1 Output shaft type S2 Output hole type S3

Unit:mm

Size	VRL070-L1	VRL090-L2	VRL120-L2	VRL155-L2	VRL205-L2	VRL235-L2
D1	ϕ16	ϕ22	ϕ32	ϕ40	ϕ55	ϕ75
D2	ϕ52	ϕ68	ϕ90	ϕ120	ϕ160	ϕ180
D3	ϕ14 (ϕ11-14)	ϕ19 (ϕ11-19)	ϕ22 (ϕ16-24)	ϕ24 (ϕ19-35)	ϕ35 (ϕ22-35)	ϕ42 (ϕ35-42)
D4	ϕ50	ϕ70 (ϕ50-ϕ80)	ϕ110 (ϕ70-ϕ110)	ϕ110 (ϕ114.3)	ϕ110 (ϕ114.3)	ϕ180 (ϕ114.3-200)
D5	4-M5X10L	4-M6X12L	4-M8X16L	4-M10X20L	4-M12X22L	4-M16X28L
D6	ϕ62	ϕ80	ϕ108	ϕ140	ϕ184	ϕ210
D7	ϕ70	ϕ90 (ϕ70-100)	ϕ145 (ϕ90-145)	ϕ145 (ϕ145-200)	ϕ145 (ϕ145-200)	ϕ215 (ϕ200-235)
D8	4-M5 (M4)	4-M6 (M4-M6)	4-M8 (M5-M8)	4-M8 (M8-M12)	4-M8 (M8-M12)	4-M12
D9	M5X0.8P	M8X1.25P	M12X1.75P	M16X2P	M20X2.5P	M20X2.5P
L1	28.5	36.5	51	79	82	105
L2	5	6	9	12	15	18
L3	35	44	62	94	100	126
L4	5	5	8 (7-8)	11 (6-11)	8 (8-11)	8 (7-10)
L5	34	34 (≤44)	44 (≤60)	64.5 (≤81.5)	72.5 (≤82)	85 (≤120)
L6	142	172.5 (162.5-172.5)	230.5 (214.5-230.5)	296 (286-303)	340 (330.5-340)	407 (402-437)
C1	65	80 (65-86)	130 (90-130)	130 (130-160)	150 (150-180)	200 (180-220)
S1	3	4	5	5	6	7
S2	22	28	40	65	70	90
S3	18	24.5	35	43	59	78.5
B	5	6	10	12	16	20
K1	4	6	8	10	14	18
K2	ϕ11	ϕ22	ϕ28	ϕ38	ϕ50	ϕ60
K3	12.8	24.5	31.3	41.3	53.6	64.4
K4	ϕ16	ϕ32	ϕ38	ϕ48	ϕ60	ϕ72
K5	15	20	27	35	43	60
K6	18	24	32	40	50	65

Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

PRECISION PLANETARY GEARBOX

EVL

- 1.Quiet operation
  Helical gears are used to achieve smooth and quiet operation.
- 2.High precision
  The backlash is less than 3 arcmin and the positioning is accurate.
- 3.High rigidity & torqueThe use of integral ball bearings greatly improves the rigidity and torque.
- 4.Methods of flange and connector
  It can be installed on any motor in the world.
- 5.No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 6.Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

EVL Type

EVL090 – 10 – S1 – P1 / Motor

Reducer Model
EVL070, EVL090, EVL120
EVL145, EVL180

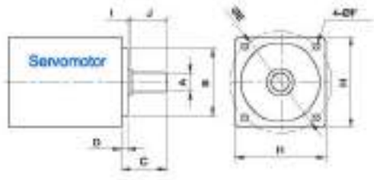
Output Shaft Keyway
S1:(Solid Output Shaft No Keyway)
S2: Standard (Keyway)
S3: Output for holes

Motor Model
Motor Manufacturer & Model

Ratio
1-stage: 3, 4, 5, 6, 7, 8, 9, 10
2-stage: 15, 20, 25, 30, 35, 40, 45, 50,
60, 70, 80, 90, 100

Backlash Grade
P0: High precision backlash
P1: Precision backlash
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions:



A	B	C	D	E	F	H	I	J

Naming Scheme:

Type – Model – Ratio – Output Shaft Keyway – Backlash Class – MOTOR NO.

EVL Reducer Specifications

Specs	Unit	Stage	Ratio	EVL070	EVL090	EVL120	EVL145	EVL180
Rated Output Torque / T2N	Nm	1	3	55	130	208	342	588
			4	50	140	290	542	1050
			5	60	160	330	650	1200
			6	55	150	310	600	1100
			7	50	140	300	550	1100
			8	50	140	290	542	1050
			9	40	100	230	450	900
			10	60	160	330	650	1200
			14	50	140	300	550	1100
			20	40	100	230	450	900
		2	15	55	130	208	342	588
			20	50	140	290	542	1050
			25	60	160	330	650	1200
			30	55	130	208	342	588
			35	60	160	330	650	1200
			40	50	140	290	542	1050
			50	60	160	330	650	1200
			70	60	160	330	600	1200
			80	50	140	290	542	1050
			100	60	160	330	650	1200
			120	—	150	310	600	1100
			140	—	140	300	550	1100
			160	—	120	260	500	1000
			180	—	96	225	445	895
			200	—	100	230	450	900
Max.Output Torque / T2MAX[1]	Nm	1,2	3~200	3Times of Nominal Output Torque				
Rated Input Speed / n1N	rpm	1,2	3~200	6000	6000	5500	4500	4500
Precision Backlash P0	arcmin	1	3~20	≤2	≤2	≤2	≤2	≤2
		2	15~200	≤4	≤4	≤4	≤4	≤4
Precision Backlash P1	arcmin	1	3~20	≤4	≤4	≤4	≤4	≤4
		2	15~200	≤6	≤6	≤6	≤6	≤6
Standard Backlash P2	arcmin	1	3~20	≤8	≤8	≤8	≤8	≤8
		2	15~200	≤8	≤8	≤8	≤8	≤8
Torsional Rigidity	Nm/arcmin	1,2	3~200	6	14	25	56	140
Max.Radial Force / FrM[2]	N	1,2	3~200	1300	3200	6750	9400	14500
Max.Axial Force / FaxM[2]	N	1,2	3~200	700	1580	3300	4700	7200
Service Life	hr	1,2	3~200	21000 h				
Efficiency / η	%	1	3~20	≥93%				
		2	25~200	≥90%				
Weight	kg	1	3~20	1.5	6.4	13	24.5	51
		2	25~200	2.1	7.8	14.2	27.5	54
Operating Temperature	℃	1,2	3~200	(-15℃ ~ +90℃)				
Lubrication		1,2	3~200	(Synthetic Grease)				
Protection Class		1,2	3~200	IP65				
Mounting Position		1,2	3~200	(Any Direction)				
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	3~200	≤65	≤68	≤68	≤70	≤72

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	EVL070	EVL090	EVL120	EVL145	EVL180
Moment of Inertia	kg.cm²	1	3~10	0.35	2.25	6.84	23.4	68.9
			14~20	0.07	1.87	6.25	21.8	65.6
		2	15~100	0.09	0.35	2.25	6.84	23.4
			120~200	—	0.31	1.87	6.25	21.8

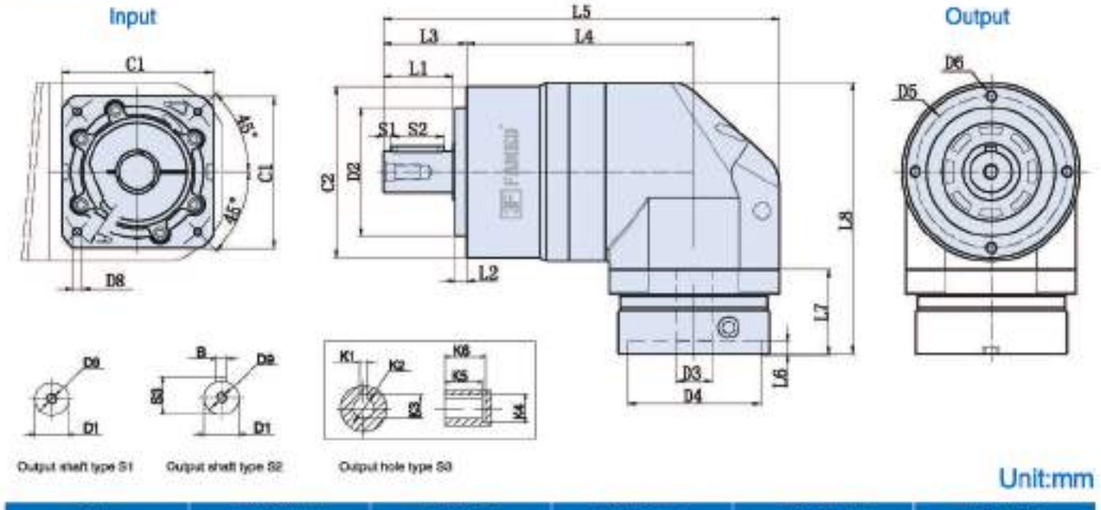
1. The Max. acceleration torque T2B=60% of T2NOT 2. When output speed is 100rpm, inertia acts on the output shaft center position.
3. 3-stage big ratios are not in the above table. There is shaft lengthening and enlarging design. Please tell sales person if you need it.

MODEL: EVL

1–Stage

Ratio: 3, 4, 5, 6, 7, 8, 9, 10

Dimensions:



Unit:mm

Size	EVL070-L1	EVL090-L1	EVL120-L1	EVL145-L1	EVL180-L1
D1	ϕ16	ϕ22	ϕ32	ϕ40	ϕ55
D2	ϕ52	ϕ68	ϕ90	ϕ120	ϕ160
D3	ϕ14 (≤19)	ϕ19(11-24)	ϕ24(16-24)	ϕ24 (≤42)	ϕ35 (≤55)
D4	ϕ50 (50-70)	ϕ70 (50-110)	ϕ110 (50-110)	ϕ110 (≤180)	ϕ114.3 (≤180)
D5	ϕ62	ϕ80	ϕ108	ϕ140	ϕ184
D6	4-M5*10	4-M6*12	4-M8*16	4-M10*20L	4-M12*30L
D7	ϕ70 (70-130)	ϕ90 (70-145)	ϕ145 (90-155)	ϕ145 (≤215)	ϕ200 (≤300)
D8	(4-M4*10L)	(4-M5*12L)	(4-M8*20L)	(4-M12*30L)	(4-M12*30L)
D9	M5*0.8P*15L	M6*1.25P*19L	M12*1.75P*28L	M16*36L	M20*42L
L1	28.5	36.5	51	97	100
L2	5	8	9	79	84
L3	35	44	62	15	15
L4	88	120	140.5	172	294
L5	153	209	260	340	365
L6	(5)	(6.5)	(10)	(10)	(19)
L7	(33)	(45)	(64)	(84)	(81)
L8	(112.50)	(143)	(195.5)	(238)	(278)
C1	(□60)	(□80)	(□130)	(□130)	(□180)
C2	ϕ70	ϕ90	ϕ120	ϕ155	ϕ205
S1	3	4	5	5	6
S2	22	28	40	63	70
S3	18	24.5	35	43	59
B	5	6	10	12	16
K1	4	6	8	10	14
K2	ϕ11	ϕ22	ϕ28	ϕ38	ϕ50
K3	12.8	24.5	31.3	42	53.8
K4	ϕ16	ϕ32	ϕ38	ϕ48	ϕ60
K5	15	20	27	35	43
K6	18	24	32	40	50

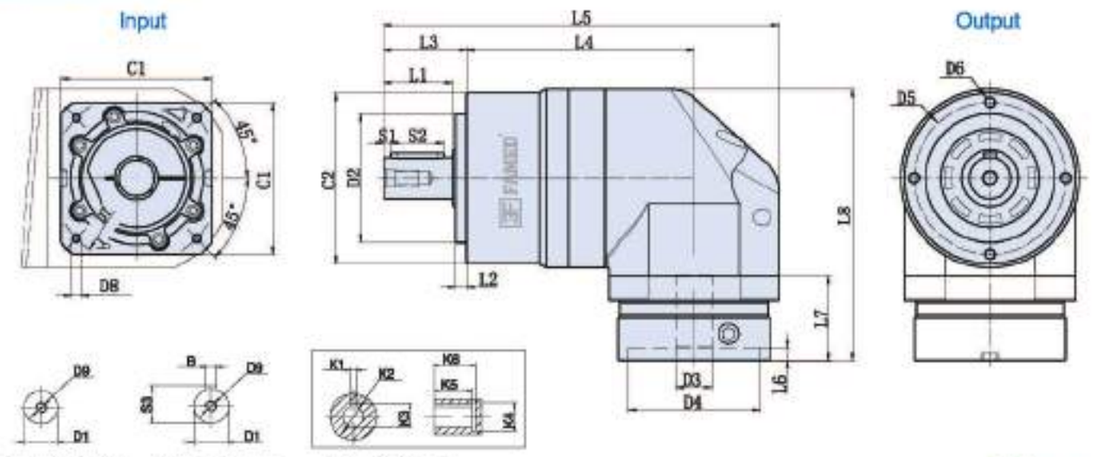
Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

MODEL: EVL

2-Stage

Ratio: 15, 20, 25, 30, 35, 40, 45, 50,
60, 70, 80, 90, 100

Dimensions:



Unit:mm

Size	EVL070-L2	EVL090-L2	EVL120-L2	EVL145-L2	EVL180-L2
D1	ϕ16	ϕ22	ϕ32	ϕ40	ϕ55
D2	ϕ52	ϕ68	ϕ90	ϕ120	ϕ160
D3	ϕ14 (≤19)	ϕ19(11-24)	ϕ24(16-24)	ϕ24 (≤42)	ϕ35 (≤55)
D4	ϕ50 (50-70)	ϕ70 (50-110)	ϕ110 (50-110)	ϕ110 (≤160)	ϕ114.3 (≤180)
D5	ϕ62	ϕ80	ϕ108	ϕ140	ϕ184
D6	4-M5*10	4-M6*12	4-M8*16	4-M10*20L	4-M12*30L
D7	ϕ70 (70-130)	ϕ90 (70-145)	ϕ145 (90-155)	ϕ145 (≤215)	ϕ200 (≤300)
D8	(4-M4*10L)	(4-M5*12L)	(4-M8*20L)	(4-M12*30L)	(4-M12*30L)
D9	M5*0.8P*15L	M6*1.25P*19L	M12*1.75P*26L	M16*36L	M20*42L
L1	28.5	36.5	51	97	100
L2	5	6	9	79	84
L3	35	44	62	15	15
L4	117	134.5	170.5	233	362.5
L5	162	208.5	277.5	401	433.5
L6	(5)	(6.5)	(10)	(10)	(19)
L7	(33)	(42.5)	(59)	(84)	(81)
L8	(112.50)	(134)	(180)	(238)	(278)
C1	(□60)	(□80)	(□130)	(□130)	(□180)
C2	ϕ70	ϕ90	ϕ120	ϕ155	ϕ205
S1	3	4	5	5	6
S2	22	28	40	63	70
S3	18	24.5	35	43	59
B	5	6	10	12	16
K1	4	6	8	10	14
K2	ϕ11	ϕ22	ϕ28	ϕ38	ϕ50
K3	12.8	24.5	31.3	42	53.8
K4	ϕ16	ϕ32	ϕ38	ϕ48	ϕ60
K5	15	20	27	35	43
K6	18	24	32	40	50

Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

High Precision Flange Output Planetray Gearbox

VRT

- 1.Quiet operation
  Helical gears are used to achieve smooth and quiet operation.
- 2.High precision
  The backlash is less than 3 arcmin and the positioning is accurate.
- 3.High rigidity & torqueThe use of integral ball bearings greatly improves the rigidity and torque.
- 4.Methods of flange and connector
  It can be installed on any motor in the world.
- 5.No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 6.Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

VRT Type

VRT090 - 10 - S1 - P1 / Motor

Reducer Model
VRT047, VRT064, VRT090, VRT110
VRT140, VRT200, VRT255

Output flange mode
S1: Standard flange face output
S2: Non standard flange face output

Motor Model
Motor Manufacturer & Model

Ratio
1-stage: 3, 4, 5, 6, 7, 8, 9, 10
2-stage: 12, 15, 16, 20, 25, 28, 30, 35, 40, 50, 70, 80, 100

Backlash Grade
P0: High precision backlash
P1: Precision backlash
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions:

A	B	C	D	E	F	H	I	J

Naming Scheme:

Type	Model	Ratio	Output Shaft Keyway	Backlash Class	MOTOR NO.

VRT Reducer Specifications

Specs	Unit	Stage	Ratio	VRT047	VRT064	VRT090	VRT110	VRT140	VRT200	VRT255
Rated Output Torque / T2N	Nm	1	4	19	50	140	290	542	1050	1700
			5	22	60	160	330	650	1200	2000
			7	19	50	140	300	550	1100	1800
			10	14	40	100	230	450	900	1500
		2	20	22	60	140	290	542	1050	1700
			25	22	55	150	330	650	1200	2000
			35	22	55	160	330	650	1200	1800
			40	19	40	140	290	542	1050	1600
			50	22	55	160	330	650	1200	2000
			70	19	50	140	290	550	1100	1800
			100	14	40	100	230	450	900	1500
Max.Output Torque / T2max[1]	Nm	1,2	4~100	3Times of Nominal Output Torque						
Rated Input Speed / n1n	rpm	1,2	4~100	5000	5000	4000	4000	3000	3000	2000
Max.Input Speed / n1m	rpm	1,2	4~100	10000	10000	8000	8000	6000	6000	4000
Micro Backlash P0	arcmin	1	4~10	≤1	≤1	≤1	≤1	≤1	≤1	≤1
		2	12~100	≤3	≤3	≤3	≤3	≤3	≤3	≤3
Precision Backlash P1	arcmin	1	4~10	≤3	≤3	≤3	≤3	≤3	≤3	≤3
		2	20~100	≤5	≤5	≤5	≤5	≤5	≤5	≤5
Standard Backlash P2	arcmin	1	4~10	≤5	≤5	≤5	≤5	≤5	≤5	≤5
		2	20~100	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Torsional Rigidity	Nm/arcmin	1,2	4~100	8	13	30	80	150	450	1010
Max.Radial Force / FR2[2]	N	1,2	4~100	43	125	235	430	1300	3064	5900
Max.Axial Force / FA2[2]	N	1,2	4~100	990	1050	2850	2990	10590	16660	29430
Service Life	hr	1,2	4~100	22000h						
Efficiency / η	%	1	4~10	≥97%						
		2	20~100	≥94%						
Weight	kg	1	4~10	0.7	1.3	3.2	5.8	12.3	33	57.9
		2	20~100	1	1.5	4.1	7.6	16.8	38	72.6
Operating Temperature	℃	1,2	4~100	(-15℃ ~ +90℃)						
Lubrication		1,2	4~100	(Synthetic Grease)						
Protection Class		1,2	4~100	IP65						
Mounting Position		1,2	4~100	(Any Direction)						
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	4~100	≤58	≤58	≤60	≤63	≤65	≤67	≤70

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	VRT047	VRT064	VRT090	VRT110	VRT140	VRT200	VRT255
Moment of Inertia	kg.cm²	1	4	0.03	0.14	0.48	2.74	7.54	23.67	54.37
			5	0.03	0.13	0.47	2.71	7.42	23.29	53.27
			7	0.03	0.13	0.45	2.62	7.14	22.48	50.97
			10	0.03	0.13	0.44	2.57	7.03	22.51	50.56
		2	20~40	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			50~100	0.03	0.03	0.13	0.44	2.57	7.03	22.51

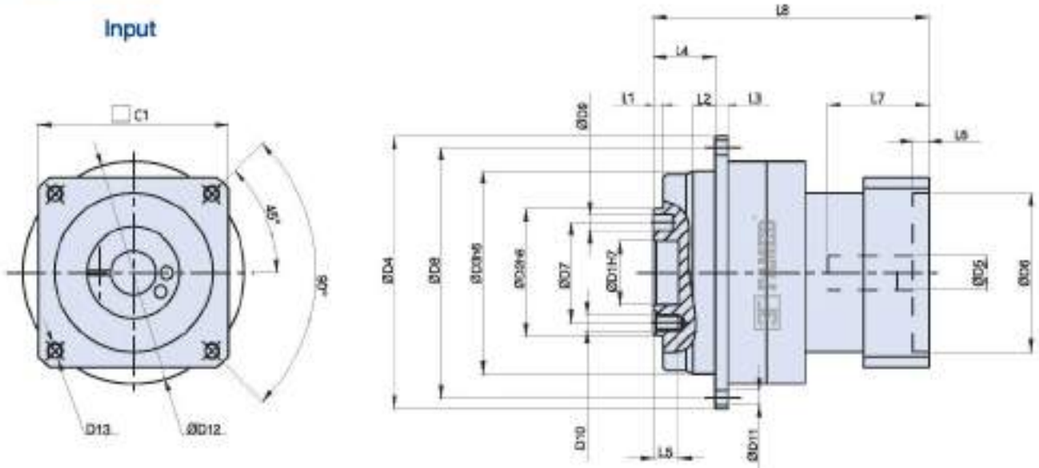
1. Max. reduction ratio(i=Nin/Nout) 2.The Max. acceleration torque T2B=60% of T2NOT
3. When output speed is 100rpm, acting on the output shaft center position, *Continuous operation, service life is 15000hrs。

MODEL: VRT

1-Stage
Ratio: 3, 4, 5, 6, 7, 8, 9, 10

Dimensions:

Input



Unit:mm

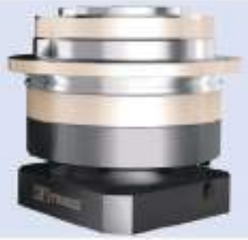
Size	VRT047-L1	VRT064-L1	VRT090-L1	VRT110-L1	VRT140-L1	VRT200-L1	PAD255-L1
D1	12	20	31.5	40	50	80	100
D2	28	40	63	80	100	160	180
D3	47	64	90	110	140	200	255
D4	72	86	118	145	179	247	300
D5	≤11/≤12	11(8 ~ 14)	19(14 ~ 22)	24(22 ~ 28)	24(24 ~ 48)	35(35 ~ 48)	48(48 ~ 55)
D6	30	30(30 ~ 50)	50(50 ~ 110)	110	110(110 ~ 114.3)	114.3(114.3 ~ 200)	200
D7	20	31.5	50	63	80	125	140
D8	67	79	109	135	166	233	280
D9	Ø3	Ø5x深度(D)8	Ø6x深度(D)7	Ø6x深度(D)7	Ø6x深度(D)7	Ø10x深度(D)10	Ø12x深度(D)10
D10	4-M3	7-M5x深度(D)8	8-M6x深度(D)12	11-M6x深度(D)12	11-M8x深度(D)17	11-M10x深度(D)20	12-M16x深度(D)25
D11	8-Ø3.4	8-Ø4.5	8-Ø5.5	8-Ø5.5	12-Ø6.6	12-Ø9	16-Ø13.5
D12	46	45(45 ~ 70)	70(70 ~ 145)	145	145(145 ~ 200)	200(200 ~ 235)	235
D13	M4	M4 ~ M5	M5 ~ M8	M8	M8 ~ M12	M12	M12
L1	3	3	6	6	6	8	12
L2	7	7	10	10	14.5	15	21.5
L3	4	4	7	8	10	12	18
L4	19.5	19.5	30	29	38	50	66
L5	4	8	12	13	12	16	20
L6	3.5	4 ~ 5	5 ~ 10	10	6 ~ 8	6 ~ 10	10
L7	30	28(28 ~ 34)	32(32 ~ 59)	60	73(73 ~ 115)	88(88 ~ 117)	119.5
L8	70	80.5 ~ 87	97(97 ~ 120)	142	159(159 ~ 201)	196(196 ~ 229)	255
C1	46	60(40 ~ 60)	90(60 ~ 130)	130	130(130 ~ 160)	180(160 ~ 220)	220

Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

MODEL: VRT

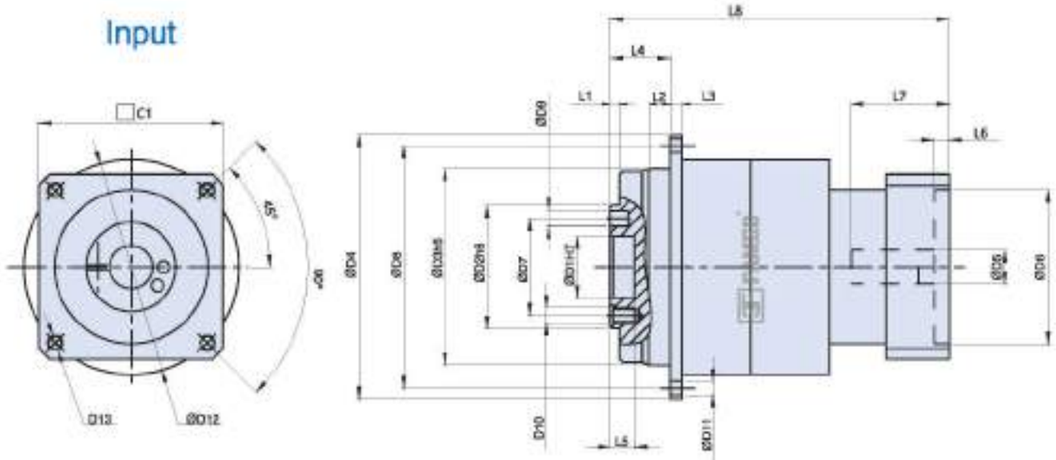
2-Stage

Ratio: 12, 15, 16, 20, 25, 28, 30, 35
40, 50, 70, 80, 100



Dimensions:

Input



Unit:mm

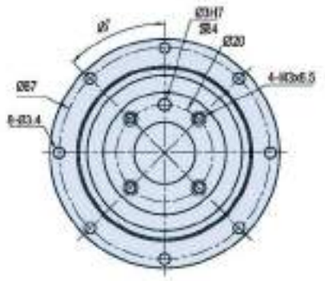
Size	VRT047-L2	VRT064-L2	VRT090-L2	VRT110-L2	VRT140-L2	VRT200-L2	VRT255-L2
D1	12	20	31.5	40	50	80	100
D2	28	40	63	80	100	160	180
D3	47	64	90	110	140	200	255
D4	72	86	118	145	179	247	300
D5	≤11/≤12	11(8 - 14)	19(14 - 22)	19(22 - 28)	19(19 - 38)	35(24 - 48)	38(38 - 55)
D6	30	30(30 - 50)	50(50 - 110)	70(70 - 110)	70(70 - 114.3)	110(110 - 200)	114.3(114.3 - 200)
D7	20	31.5	50	63	80	125	140
D8	67	79	109	135	168	233	280
D9	Ø3	Ø5x深度(D)8	Ø6x深度(D)7	Ø6x深度(D)7	Ø8x深度(D)7	Ø10x深度(D)10	Ø12x深度(D)10
D10	4-M3	7-M5x深度(D)8	8-M6x深度(D)12	11-M6x深度(D)12	11-M8x深度(D)17	11-M10x深度(D)20	12-M16x深度(D)25
D11	8-Ø3.4	8-Ø4.5	8-Ø5.5	8-Ø5.5	12-Ø6.6	12-Ø9	16-Ø13.5
D12	46	45(45 - 70)	70(70 - 145)	90(90 - 145)	90(90 - 200)	145(145 - 235)	200(200 - 235)
D13	M4	M4 ~ M5	M5 ~ M8	M8 ~ M8	M5 ~ M12	M8 ~ M12	M12
L1	3	3	6	6	5	8	12
L2	7	7	10	10	14.5	15	20
L3	4	4	7	8	10	12	18
L4	19.5	19.5	30	29	38	50	66
L5	4	8	12	13	12	18	20
L6	3.5	4 - 5	5 - 10	6 - 10	6 - 8	6 - 10	6 - 10
L7	30	28(28 - 34)	34(34 - 59)	43(43 - 60)	65(65 - 85)	73(73 - 117)	73(73 - 117)
L8	97.5	103(103 - 110)	123(123 - 139)	150(150 - 176)	195(195 - 211)	292(292 - 336)	306(306 - 322)
C1	46	60(40 - 60)	90(60 - 130)	90(90 - 130)	90(90 - 190)	180(130 - 220)	180(180 - 220)

Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

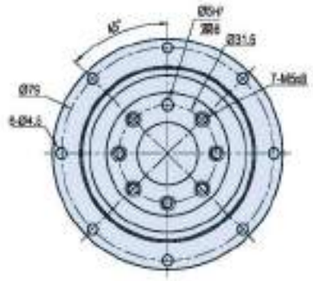
MODEL: VRT

Output Dimensions:

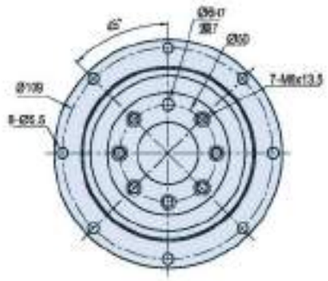
VRT047
OUTPUT



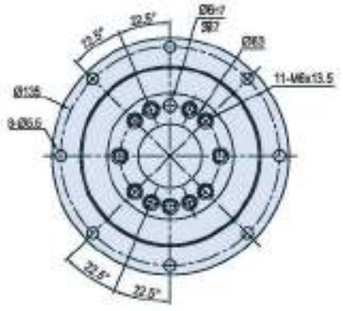
VRT064
OUTPUT



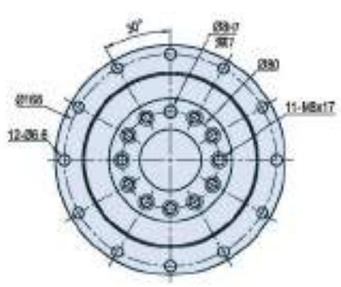
VRT090
OUTPUT



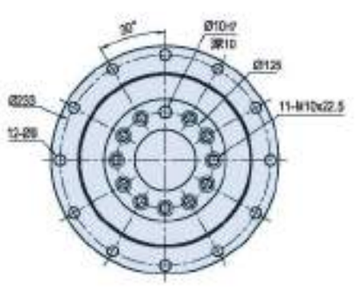
VRT110
OUTPUT



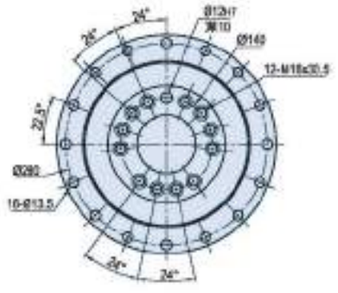
VRT140
OUTPUT



VRT200
OUTPUT



VRT255
OUTPUT



High Precision Flange Output Right Angle Planetary Gearbox

EVT

- 1.Quiet operation
  Helical gears are used to achieve smooth and quiet operation.
- 2.High precision
  The backlash is less than 3 arcmin and the positioning is accurate.
- 3.High rigidity & torqueThe use of integral ball bearings greatly improves the rigidity and torque.
- 4.Methods of flange and connector
  It can be installed on any motor in the world.
- 5.No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 6.Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

EVT Type

EVT090 – 10 – S1 – P1 / Motor

Reducer Model
EVT047, EVT064, EVT090
EVT110, EVT140, EVT200
EVT255

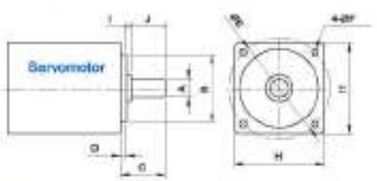
Output flange mode
S1: Standard flange face output
S2: Non standard flange face output

Motor Model
Motor Manufacturer & Model

Ratio
1-stage: 3, 4, 5, 6, 7, 8, 9, 10
2-stage: 12, 15, 16, 20, 25, 28, 30, 35, 40, 50, 70, 80, 100

Backlash Grade
P0: High precision backlash
P1: Precision backlash
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions:



A	B	C	D	E	F	H	I	J

Naming Scheme:

Type — Model — Ratio — Output Shaft Keyway — Backlash Class — MOTOR NO.

EVT Reducer Specifications

Specs	Unit	Stage	Ratio	EVT047	EVT064	EVT090	EVT110	EVT140	EVT200	EVT255
Rated Output Torque / T2N	Nm	1	4	19	50	140	290	542	1050	1700
			5	22	60	160	330	650	1200	2000
			7	19	50	140	300	550	1100	1800
			10	14	60	160	330	650	1200	2000
		2	20	20	50	140	290	542	1050	1700
			25	22	60	160	330	650	1200	2000
			35	22	60	160	330	650	1200	2000
			40	22	50	140	290	542	1050	1700
			50	22	60	160	330	650	1200	2000
			70	22	60	160	330	600	1200	2000
			100	22	60	160	330	650	1200	2000
Max.Output Torque / T2em[1]	Nm	1,2	4~100	3Times of Nominal Output Torque						
Rated Input Speed / n1n	rpm	1,2	4~100	5000	5000	4000	4000	3000	3000	2000
Max.Input Speed / n1a	rpm	1,2	4~100	10000	10000	8000	8000	6000	6000	4000
Micro Backlash P0	arcmin	1	4~10	≤2	≤2	≤2	≤2	≤2	≤2	≤2
		2	12~100	≤4	≤4	≤4	≤4	≤4	≤4	≤4
Precision Backlash P1	arcmin	1	4~10	≤4	≤4	≤4	≤4	≤4	≤4	≤4
		2	20~100	≤6	≤6	≤6	≤6	≤6	≤6	≤6
Standard Backlash P2	arcmin	1	4~10	≤6	≤6	≤6	≤6	≤6	≤6	≤6
		2	20~100	≤8	≤8	≤8	≤8	≤8	≤8	≤8
Torsional Rigidity	Nm/arcmin	1,2	4~100	8	13	30	80	150	450	1010
Max.Radial Force / Fer[2]	N	1,2	4~100	43	125	235	430	1300	3064	5900
Max.Axial Force / Fam[2]	N	1,2	4~100	990	1050	2850	2990	10590	16960	29430
Service Life	hr	1,2	4~100	22000h						
Efficiency / η	%	1	4~10	≥97%						
		2	20~100	≥94%						
Weight	kg	1	4~10	0.7	1.3	3.2	5.8	12.3	33	57.9
		2	20~100	1	1.5	4.1	7.6	16.8	38	72.6
Operating Temperature	℃	1,2	4~100	(-15℃ ~ +90℃)						
Lubrication		1,2	4~100	(Synthetic Grease)						
Protection Class		1,2	4~100	IP65						
Mounting Position		1,2	4~100	(Any Direction)						
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	4~100	≤58	≤59	≤62	≤65	≤68	≤69	≤70

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	EVT047	EVT064	EVT090	EVT110	EVT140	EVT200	EVT255
Moment of Inertia	kg.cm²		4	0.03	0.14	0.48	2.74	7.54	23.67	54.37
		1	5	0.03	0.13	0.47	2.71	7.42	23.29	53.27
			7	0.03	0.13	0.45	2.62	7.14	22.48	50.97
			10	0.03	0.13	0.44	2.57	7.03	22.51	50.56
		2	20~40	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			50~100	0.03	0.03	0.13	0.44	2.57	7.03	22.51

1. Ratio (i=Nin/Nout) . 2. 2.The Max. acceleration torque T2B=60% of T2NOT.
3. When output speed is 100rpm, acting on the output shaft center position *Continuous operation, service life is 15000hrs.

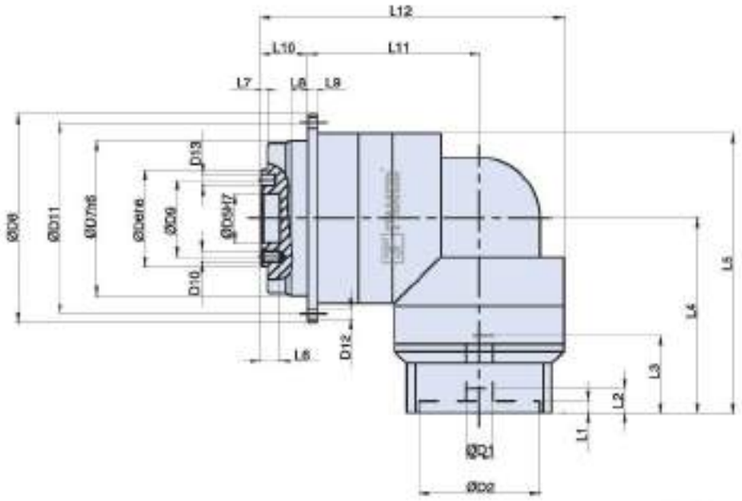
MODEL: EVT

1-Stage

Ratio: 3, 4, 5, 6, 7, 8, 9, 10

Dimensions:

Input



Unit:mm

Size	EVT047-L1	EVT064-L1	EVT090-L1	EVT110-L1	EVT140-L1	EVT200-L1	EVT255-L1
D1	≤11/≤12	11(11 - 14)	19(19 - 24)	24(22 - 32)	32(24 - 35)	≤48	≤55
D2	30	50	70(70 - 110)	110(110 - 130)	110(110 - 114.3)	85	116
D3	46	70	90(90 - 145)	145(145 - 165)	145(145 - 200)	215	235
D4	M4	M4	M6	M8 - M10	M8 - M12	M12	M12
D5	12	20	31.5	40	50	80	100
D6	28	40	63	80	100	160	180
D7	47	64	90	110	140	200	255
D8	72	86	118	145	179	247	300
D9	20	31.5	50	63	80	125	140
D10	4-M3	7-M5x深度(D)8	8-M6x深度(D)12	11-M6x深度(D)12	11-M8x深度(D)17	11-M10x深度(D)20	12-M16x深度(D)25
D11	67	79	109	135	168	233	280
D12	8-Ø3.4	8-Ø4.5	8-Ø5.5	8-Ø5.5	12-Ø6.6	12-Ø9	16-Ø13.5
D13	Ø3	Ø5x深度(D)8	Ø6x深度(D)7	Ø6x深度(D)7	Ø8x深度(D)7	Ø10x深度(D)10	Ø12x深度(D)10
L1	3.5	5	12	10	8	6	6
L2	8	10	13	19	17	20	24
L3	30	32	42 - 47	57 - 60	67 - 77	85	116
L4	74	80.5	107 - 112	134 - 147.5	166.5 - 167	213.5	268.5
L5	104	115.5	152 - 157	195 - 208.5	217.5 - 241.5	316	396.5
L6	6.5	8	12	13	12	22.5	30.5
L7	3	3	6	6	6	8	12
L8	7	7	10	11	15	15	20
L9	4	4	7	8	10	12	18
L10	19.5	19.5	25	29	38	50	66
L11	50	71	102	130	142.5	189	216
L12	107.5	125.5	172	220	255.5	334.5	392
C1	46	60	90(90 - 130)	130 - 160	130(130 - 220)	190	220

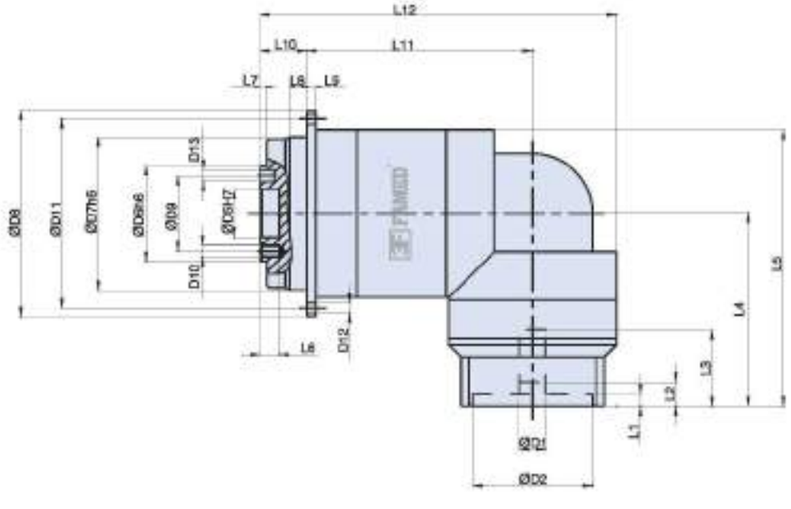
MODEL: EVT

2-Stage

Ratio: 12, 15, 16, 20, 25, 28, 30, 35
40, 50, 70, 80, 100

Dimensions:

Input



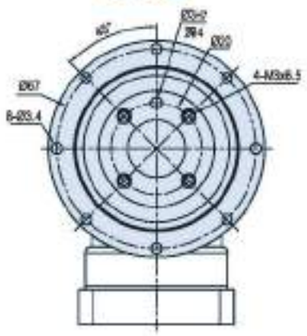
Unit:mm

Size	EVT47-L2	EVT064-L2	EVT090-L2	EVT110-L2	EVT140-L2	EVT200-L2	EVT255-L2
D1	≤11/≤12	11(11 - 14)	19(19 - 24)	24(22 - 32)	32(24 - 35)	≤48	≤55
D2	30	50	70(70 - 110)	110(110 - 130)	110(110 - 114.3)	85	116
D3	46	70	90(90 - 145)	145(145 - 165)	145(145 - 200)	215	235
D4	M4	M4	M6	M8 - M10	M8 - M12	M12	M12
D5	12	20	31.5	40	50	80	100
D6	28	40	63	80	100	160	180
D7	47	64	90	110	140	200	255
D8	72	86	118	145	179	247	300
D9	20	31.5	50	63	80	125	140
D10	4-M3	7-M5x深度(D)8	8-M6x深度(D)12	11-M6x深度(D)12	11-M8x深度(D)17	11-M10x深度(D)20	12-M16x深度(D)25
D11	67	79	109	135	168	233	280
D12	8-Ø3.4	8-Ø4.5	8-Ø5.5	8-Ø5.5	12-Ø6.6	12-Ø9	16-Ø13.5
D13	Ø3	Ø5x深度(D)8	Ø6x深度(D)7	Ø6x深度(D)7	Ø8x深度(D)7	Ø10x深度(D)10	Ø12x深度(D)10
L1	3.5	5	12	10	8	6	6
L2	8	10	13	19	17	20	24
L3	30	32	42 - 47	57 - 60	67 - 77	85	116
L4	74	80.5	107 - 112	134 - 147.5	166.5 - 167	213.5	268.5
L5	103	115.5	152 - 157	195 - 208.5	217.5 - 241.5	269.5	340
L6	4	8	12	13	12	22.5	30.5
L7	3	3	6	6	6	8	12
L8	7	7	10	11	15	15	20
L9	4	4	7	8	10	12	18
L10	19.5	19.5	30	29	38	50	66
L11	79	94.5	117	163.5	187	243	270
L12	122	149	187	253.5	300	382	403
C1	46	60	90(90 - 130)	130 - 160	130(130 - 220)	190	220

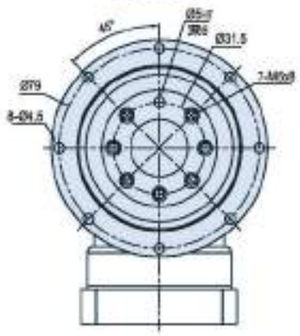
MODEL: EVT

Output Dimensions

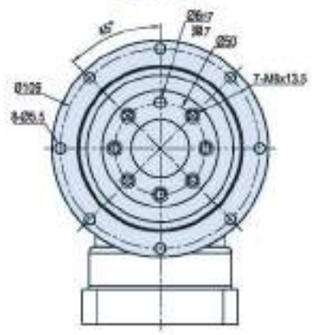
EVT047
OUTPUT



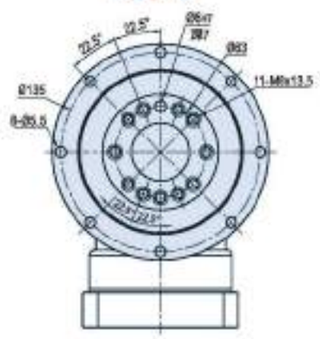
EVT064
OUTPUT



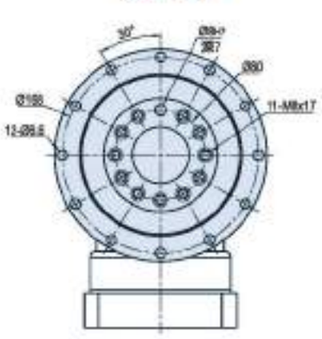
EVT090
OUTPUT



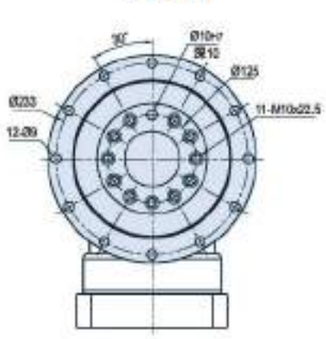
EVT110
OUTPUT



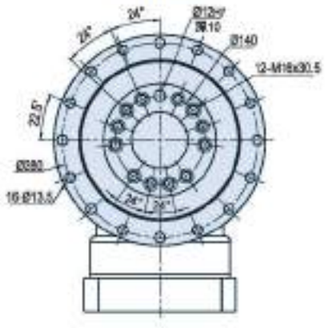
EVT140
OUTPUT



EVT200
OUTPUT



EVT255
OUTPUT



European High Precision High Torque Planetary Gearbox

VRS

- 1.High precision
  The backlash is less than 3 arcmin and the positioning is accurate.
- 2.High rigidity & torque
  The use of integral ball bearings greatly improves the rigidity and torque.
- 3.High load capacity
  The main output shaft adopts taper roller bearing to greater increase the radial and axial force.
- 4.Methods of flange and connector
  It can be installed on any motor in the world.
- 5. No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 6.Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

VRS Type

VRS090 – 10 – S1 – P1 / Motor

Reducer Model
VRS060, VRS075, VRS100, VRS140
VRS180, VRS210, VRS240

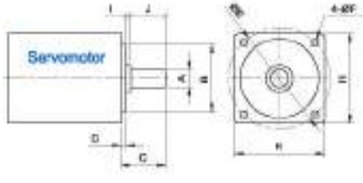
Output Shaft Keyway
S1: Solid Output Shaft No Keyway
S2: Standard (Keyway)
S3: Output for holes

Motor Model
Motor Manufacturer & Model

Ratio
1-stage: 3, 4, 5, 6, 7, 8, 9, 10
2-stage: 12, 15, 16, 20, 25, 28, 30, 35, 40, 50, 70, 80, 100

Backlash Grade
P0: High precision backlash
P1: Precision backlash
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions:



A	B	C	D	E	F	H	I	J

Naming Scheme:

Type	Model	Ratio	Output Shaft Keyway	Backlash Class	MOTOR NO.

VRS Reducer Specifications

Specs	Unit	Stage	Ratio	VRS060	VRS075	VRS100	VRS140	VRS180	VRS210	VRS240
Rated Output Torque / T2N	Nm	1	3	55	130	208	342	588	1140	1500
			4	50	140	290	542	1060	1700	2500
			5	60	160	330	650	1200	2000	2500
			6	55	150	310	600	1100	1900	2260
			7	50	140	300	550	1100	1800	2300
			8	45	120	260	500	1000	1600	2100
			9	40	100	230	450	900	1500	1800
			10	40	100	230	450	900	1500	1800
		2	15	55	130	208	342	588	1140	2300
			16	60	160	330	650	1200	2000	2500
			20	60	160	330	650	1200	2000	2500
			25	55	130	208	342	588	1140	2500
			28	60	160	330	650	1200	2000	2500
			30	50	140	298	542	1060	1700	2300
			35	40	100	230	450	900	1500	2200
			40	60	160	330	650	1200	2000	2350
			50	55	150	310	600	1100	1900	2200
			70	50	140	300	550	1100	1800	2200
			100	40	100	230	450	900	1500	1800
Max Output Torque / Tmax[1]	Nm	1,2	3~100	3Times of Nominal Output Torque						
Rated Input Speed / n1N	rpm	1,2	3~100	6000	4000	4000	3000	3000	2000	1000
Max.Input Speed / n1s	rpm	1,2	3~100	10000	8000	8000	6000	6000	4000	2500
Micro Backlash P0	arcmin	1	3~10	≤1	≤1	≤1	≤1	≤1	≤1	≤1
		2	12~100	≤3	≤3	≤3	≤3	≤3	≤3	≤3
Precision Backlash P1	arcmin	1	3~10	≤3	≤3	≤3	≤3	≤3	≤3	≤3
		2	15~100	≤5	≤5	≤5	≤5	≤5	≤5	≤5
Torsional Rigidity	Nm/arcmin	1,2	3~100	7	14	25	50	145	225	260
Max.Radial Force / Fr2[2]	N	1,2	3~100	2750	4100	6400	9880	15000	20000	27500
Max.Axial Force / Fa2[2]	N	1,2	3~100	2350	3200	5360	9890	14200	28000	30000
Service Life	hr	1,2	3~100	20000h						
Efficiency / η	%	1	3~10	≥96%						
		2	15~100	≥93%						
Weight	kg	1	3~10	1.8	3.8	7.2	16.8	32	49	65
		2	15~100	2.1	4.1	8.1	17.5	35	53	70
Operating Temperature	℃	1,2	3~100	(-15℃ ~ +90℃)						
Lubrication		1,2	3~100	(Synthetic Grease)						
Protection Class		1,2	3~100	IP65						
Mounting Position		1,2	3~100	(Any Direction)						
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	3~100	≤62	≤62	≤66	≤68	≤68	≤70	≤70

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	VRS060	VRS075	VRS100	VRS140	VRS180	VRS210	VRS240
Moment of Inertia	kg.cm^2	1	3	0.16	0.61	3.25	9.21	28.98	69.61	82.16
			4	0.14	0.48	2.74	7.54	23.67	54.37	75.58
			5	0.13	0.47	2.71	7.42	23.29	53.27	75.29
			6	0.13	0.45	2.65	7.25	22.75	51.72	72.35
			7	0.13	0.45	2.62	7.14	22.48	50.97	69.13
			8	0.13	0.44	2.58	7.07	22.59	50.84	69.22
			9	0.13	0.44	2.57	7.04	22.53	50.63	66.23
			10	0.13	0.44	2.57	7.03	22.51	50.56	66.23
		2	15~40	0.03	0.13	0.47	2.71	7.42	23.29	48.23
			50~100	0.03	0.13	0.44	2.57	7.03	22.51	45.58

1. Ratio (i=Nin/Nout) 2. When output speed is 100rpm, acting on the output shaft center position
3. *Continuous operation, service life is 10000hrs

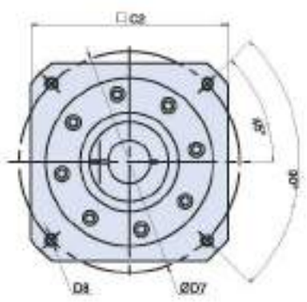
MODEL: VRS

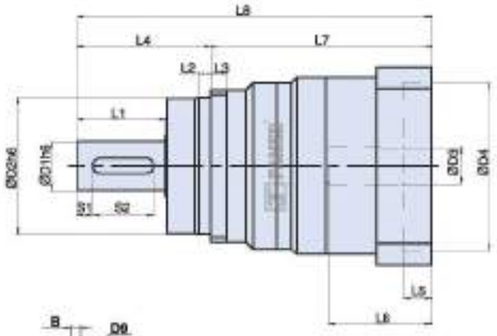
1-Stage

Ratio: 3, 4, 5, 6, 7, 8, 9, 10

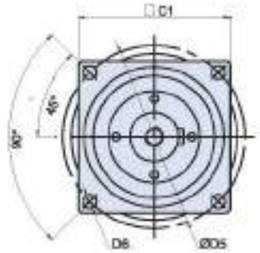
Dimensions:

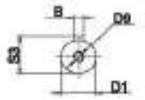
Input





Output





Output shaft type S1 Output shaft type S2

Unit:mm

Size	VRS060-L1	VRS075-L1	VRS100-L1	VRS140-L1	VRS180-L1	VRS210-L1	VRS240-L1
D1	16	22	32	40	55	75	85
D2	60	70	90	130	160	180	200
D3	6(8 ~ 19)	14(14 ~ 24)	19(19 ~ 35)	24(24 ~ 48)	38(38 ~ 48)	48(48 ~ 55)	60
D4	30(30 ~ 70)	50(50 ~ 110)	70(70 ~ 114.3)	110(110 ~ 114.3)	114.3(114.3 ~ 200)	200	220
D5	68	85	120	165	215	250	290
D6	4-Ø5.5	4-Ø6.6	4-Ø9	4-Ø11	4-Ø13.5	4-Ø17	4-Ø17
D7	46(45 ~ 90)	70(70 ~ 145)	90(90 ~ 200)	145(145 ~ 200)	200(200 ~ 235)	235	240
D8	M3 ~ M5	M4 ~ M8	M5 ~ M12	M8 ~ M12	M12	M12	M16
D9	M5	M8	M12	M16	M20	M20	M20
L1	28	36	58	82	82	105	130
L2	5	6	8	10	12	15	20
L3	6	7	10	12	15	17	20
L4	48	56	88	112	112	143	170
L5	7.5 ~ 9	10.5 ~ 16	12 ~ 36.5	8	10	10	12
L6	42 ~ 43.5	50.5 ~ 66	62 ~ 82	69 ~ 115	83 ~ 117	116	55
L7	94.5 ~ 96	117.5 ~ 133	139 ~ 153	170 ~ 216	210 ~ 244	257	295
L8	142.5 ~ 144	173.5 ~ 189	227 ~ 247	282 ~ 328	322 ~ 356	400	465
C1	60	75	100	140	182	215	240
C2	40(40 ~ 80)	60(60 ~ 130)	80(80 ~ 180)	130(130 ~ 180)	180(180 ~ 220)	220	250
S1	2	3	10	5	6	7	3
S2	22	28	40	70	70	90	105
S3	18	24.5	35	43	59	79.5	90
B	5	6	10	12	16	20	22

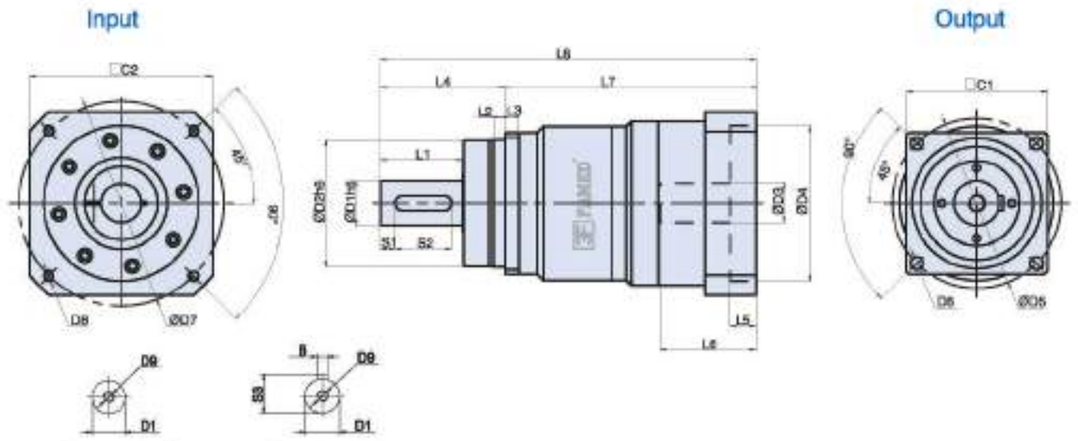
Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

MODEL: VRS

2–Stage

Ratio: 15, 16, 20, 25, 28, 30, 35, 40, 50, 70, 100

Dimensions:



Unit:mm

Size	VRS060–L2	VRS075–L2	VRS100–L2	VRS140–L2	VRS180–L2	VRS210–L2	VRS240–L2
D1	16	22	32	40	55	75	85
D2	60	70	90	130	160	180	200
D3	8(8 – 14)	14(14 – 24)	19(19 – 28)	24(24 – 38)	38(24 – 42)	48(48 – 55)	48
D4	30(30 – 50)	50(50 – 110)	50(50 – 110)	110(110 – 114.3)	114.3(110 – 114.3)	200	220
D5	88	85	120	165	215	250	290
D6	4–Ø5.5	4–Ø6.6	4–Ø9	4–Ø11	4–Ø13.5	4–Ø17	4–Ø17
D7	46(45 – 70)	70(70 – 145)	70(70 – 145)	145(145 – 200)	200(145 – 200)	235	240
D8	M3 – M5	M4 – M8	M5 – M8	M8 – M12	M8 – M12	M12	M16
D9	M5	M8	M12	M16	M20	M20	M20
L1	28	36	58	82	82	105	130
L2	5	6	8	10	12	15	20
L3	6	7	10	12	15	17	20
L4	48	56	88	112	112	143	170
L5	8 – 9	10.5 – 16	12 – 18.5	6 – 8	6 – 10	10	12
L6	42.5 – 43.5	50.5 – 66	61 – 88	69 – 81	69 – 117	116	55
L7	116.5 – 117.5	143 – 158.5	172 – 178	210 – 222	236.5 – 293.5	257	346
L8	164.5 – 165.5	199 – 214.5	260 – 266	322 – 334	348.5 – 406.5	400	516
C1	60	75	100	140	182	215	240
C2	40(40 – 65)	60(60 – 130)	80(60 – 130)	130(130 – 180)	130(130 – 180)	220	250
S1	2	3	10	5	6	7	3
S2	22	28	40	70	70	90	105
S3	18	24.5	35	43	59	79.5	90
B	5	6	10	12	16	20	22

Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

European High Precsion High Torque Right Angle Planetary Gearbox

EVS

- 1.High precision
  The backlash is less than 3 arcmin and the positioning is accurate.
- 2.High rigidity & torque
  The use of integral ball bearings greatly improves the rigidity and torque.
- 3.High load capacity
  The main output shaft adopts taper roller bearing to greater increase the radial and axial force.
- 4.Methods of flange and connector
  It can be installed on any motor in the world.
- 5. No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 6.Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

EVS Type

EVS090 – 10 – S1 – P1 / Motor

Reducer Model
EVS062, EVS075, EVS100
EVS142, EVS180

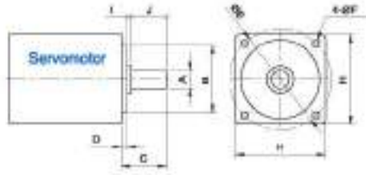
Output Shaft Keyway
S1: Solid Output Shaft No Keyway
S2: Standard (Keyway)
S3: Output for holes

Motor Model
Motor Manufacturer & Model

Ratio
1–stage: 3, 4, 5, 6, 7, 8, 9, 10,12, 14,16, 18, 20
2–stage: 15, 20, 25, 30, 35,40, 50, 60,70, 80
90, 100, 120, 140,160, 180, 200

Backlash Grade
P0: High precision backlash
P1: Precision backlash
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions:



A	B	C	D	E	F	H	I	J

Naming Scheme:

Type – Model – Ratio – Output Shaft Keyway – Backlash Class – MOTOR NO.

EVS Reducer Specifications

Specs	Unit	Stage	Ratio	EVS062	EVS075	EVS100	EVS142	EVS180
Rated Output Torque / T2N	Nm	1	3	55	130	206	342	588
			4	50	140	290	542	1050
			5	60	160	330	650	1200
			6	55	150	310	600	1100
			7	50	140	300	550	1100
			8	50	140	290	542	1050
			9	40	100	230	450	900
			10	60	160	330	650	1200
			14	50	140	300	550	1100
			20	40	100	230	450	900
		2	15	55	130	206	342	588
			20	50	140	290	542	1050
			25	60	160	330	650	1200
			30	55	130	206	342	588
			35	60	160	330	650	1200
			40	50	140	290	542	1050
			50	60	160	330	650	1200
			70	60	160	330	600	1200
			80	50	140	290	542	1050
			100	60	160	330	650	1200
			120	—	150	310	600	1100
			140	—	140	300	550	1100
			160	—	120	260	500	1000
			180	—	98	225	445	895
			200	—	100	230	450	900
Max.Output Torque / T2MAX	Nm	1,2	3~200	3Times of Nominal Output Torque				
Rated Input Speed / n1N	rpm	1,2	3~200	3000	3000	3000	2500	2000
Max.Input Speed / n1M	rpm	1,2	3~200	6000	6000	5500	4500	4500
Precision Backlash P0	arcmin	1	3~20	≤2	≤2	≤2	≤2	≤2
		2	15~200	≤4	≤4	≤4	≤4	≤4
Precision Backlash P1	arcmin	1	3~20	≤4	≤4	≤4	≤4	≤4
		2	15~200	≤6	≤6	≤6	≤6	≤6
Standard Backlash P2	arcmin	1	3~20	≤8	≤8	≤8	≤8	≤8
		2	15~200	≤8	≤8	≤8	≤8	≤8
Torsional Rigidity	Nm/arcmin	1,2	3~200	6	14	25	56	140
Max.Radial Force / FrM	N	1,2	3~200	1300	3200	6750	9460	14500
Max.Axial Force / FaxM	N	1,2	3~200	700	1580	3300	4700	7200
Service Life	hr	1,2	3~200	21000 h				
Efficiency / η	%	1	3~20	≥93%				
		2	25~200	≥90%				
Weight	kg	1	3~20	1.5	6.4	13	24.5	51
		2	25~200	2.1	7.8	14.2	27.5	54
Operating Temperature	℃	1,2	3~200	(-15℃ ~ +90℃)				
Lubrication		1,2	3~200	(Synthetic Grease)				
Protection Class		1,2	3~200	IP65				
Mounting Position		1,2	3~200	(Any Direction)				
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	3~200	≤65	≤68	≤68	≤70	≤72

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	EVS062	EVS075	EVS100	EVS142	EVS180
Moment of Inertia	kg.cm²	1	3~10	0.35	2.25	6.84	23.4	68.9
			14~20	0.07	1.87	6.25	21.8	65.6
		2	15~100	0.09	0.35	2.25	6.84	23.4
			120~200	—	0.31	1.87	6.25	21.8

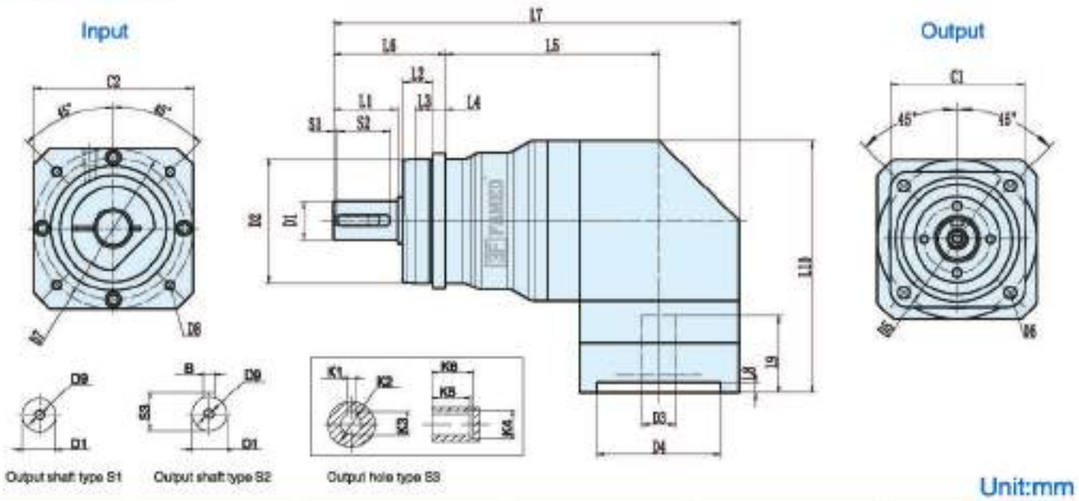
1. The Max. acceleration torque T2B=60% of T2NOT 2. When output speed is 100rpm, inertia acts on the output shaft center position.
3. 3-stage big ratios are not in the above table. There is shaft lengthening and enlarging design. Please tell sales person if you need it.

MODEL: EVS

1–Stage

Ratio: 3, 4, 5, 6, 7, 8, 9, 10, 12, 14,16, 18, 20

Dimensions:



Unit:mm

Size	EVS062-L1	EVS075-L1	EVS100-L1	EVS142-L1	EVS180-L1
D1	ϕ16	ϕ22	ϕ32	ϕ40	ϕ55
D2	ϕ50	ϕ70	ϕ90	ϕ130	ϕ160
D3	ϕ14 (≤19)	ϕ19 (≤24)	ϕ24 (≤35)	ϕ24 (≤42)	ϕ35 (≤42)
D4	ϕ50 (≤70)	ϕ70 (≤110)	ϕ110 (≤114.3)	ϕ110 (≤114.3)	ϕ114.3 (≤180)
D5	ϕ70	ϕ85	ϕ120	ϕ165	ϕ215
D6	4–ϕ5.5	4–ϕ6.6	4–ϕ9	4–ϕ11	4–ϕ13
D7	ϕ70 (≤130)	ϕ90 (≤145)	ϕ145 (≤200)	ϕ145 (≤200)	ϕ200 (≤300)
D8	(4–M4*10L)	(4–M5*12.5L)	(4–M8*20L)	(4–M8*16L)	(4–M12*30L)
D9	M5*12L	M6*15L	M12*25L	M16*36L	M20*42L
L1	28.5	38	56	82	82
L2	18	17.5	27	28	27
L3	10	10	15	10	15
L4	6	7	10	12	15
L5	87	120.5	143.5	163.5	117.5
L6	48	55	88	112	112
L7	171	228.5	299	347.5	394.5
L8	(4)	(6)	(14)	(19)	(10)
L9	(32.5)	(43.5)	(67.5)	(64.5)	(118)
L10	(98)	(142)	(185)	(220)	(276.5)
C1	□62	□76	□100	□140	□180
C2	(□60)	(□90)	(□130)	(□130)	(□180)
S1		2	5	5	6
S2	25	30	40	68	70
S3	18	24.5	35.5	43	59
B	5	6	10	12	16
K1	4	6	8	10	14
K2	ϕ11	ϕ22	ϕ28	ϕ38	ϕ50
K3	12.8	24.5	31.3	42	53.8
K4	ϕ16	ϕ32	ϕ38	ϕ48	ϕ60
K5	15	20	27	35	43
K6	18	24	32	40	50

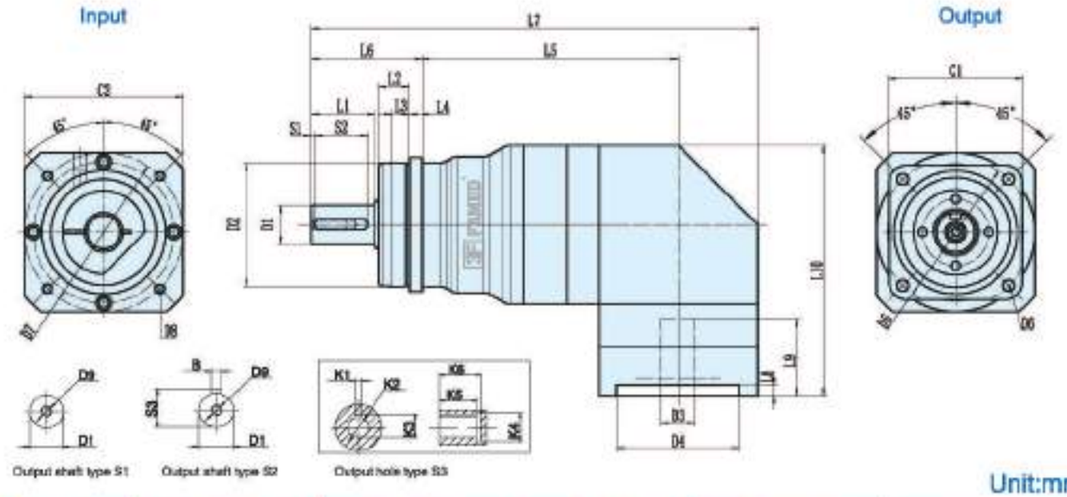
Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

MODEL: EVS

2-Stage

Ratio: 15, 20, 25, 30, 35, 40, 50, 60,70, 80,90
100, 120, 140, 160, 180, 200

Dimensions:



Unit:mm

Size	EVS062-L2	EVS075-L2	EVS100-L2	EVS142-L2	EVS180-L2
D1	ϕ16	ϕ22	ϕ32	ϕ40	ϕ55
D2	ϕ50	ϕ70	ϕ90	ϕ130	ϕ160
D3	ϕ14 (≤19)	ϕ19 (≤24)	ϕ24 (≤35)	ϕ24 (≤35)	ϕ35 (≤55)
D4	ϕ50 (≤70)	ϕ70 (≤110)	ϕ110 (≤114.3)	ϕ110 (≤114.3)	ϕ114.3 (≤180)
D5	ϕ70	ϕ85	ϕ120	ϕ165	ϕ215
D6	4-ϕ5.5	4-ϕ6.6	4-ϕ9	4-ϕ11	4-ϕ13
D7	ϕ70 (≤130)	ϕ90 (≤145)	ϕ145 (≤200)	ϕ145 (≤200)	ϕ200 (≤300)
D8	(4-M4*10L)	(4-M5*12.5L)	(4-M8*20L)	(4-M8*16L)	(4-M12*30L)
D9	M5*12L	M6*15L	M12*25L	M16*36L	M20*42L
L1	28.5	36	56	82	82
L2	18	17.5	27	28	27
L3	10	10	15	10	15
L4	6	7	10	12	15
L5	103.5	148.5	174.5	194.5	217.5
L6	48	56	88	112	112
L7	187.5	256.5	330	378.5	434.5
L8	(4)	(6)	(14)	(6)	(10)
L9	(32.5)	(43.5)	(67.5)	(55.5)	(118)
L10	(98)	(142)	(185)	(196)	(278.5)
C1	□62	□76	□100	□140	□180
C2	(□60)	(□90)	(□130)	(□130)	(□180)
S1		2	5	5	6
S2	25	30	40	68	70
S3	18	24.5	35.5	43	59
B	5	6	10	12	16
K1	4	6	8	10	14
K2	ϕ11	ϕ22	ϕ28	ϕ38	ϕ50
K3	12.8	24.5	31.3	42	53.8
K4	ϕ16	ϕ32	ϕ38	ϕ48	ϕ60
K5	15	20	27	35	43
K6	18	24	32	40	50

Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

High Precsion High Torque Planetary Gearbox

PAB

- The integral structure of the planetary wall frame and the output shaft ensures the maximum torsion rigidity and stability
- The surface of the gear box is treated with electroless Nickel, and the plate is treated with blue anode to improve the tolerance and corrosion resistance of the environment.
- Lowest backlash
- High efficiency 95%
- Life time lubrication

Model Selection of Speed Reducers

PAB Type

PAB090 – 10 – S1 – P1 / Motor

Reducer Model

PAB042, PAB060, PAB090, PAB115
PAB142, PAB180, PAB220, PAB240
PAB280, PAB300

Output Shaft Keyway

S1: Solid Output Shaft No Keyway
S2: Standard (Keyway)
S3: Output for holes

Motor Model

Motor Manufacturer & Model

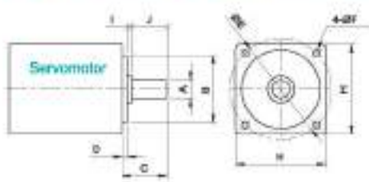
Ratio

1-stage: 3, 4, 5, 6, 7, 8, 9, 10
2-stage: 12, 15, 16, 20, 25, 28, 30, 35, 40, 50, 70, 80, 100

Backlash Grade

P0: High precision backlash
P1: Precision backlash
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions:



A	B	C	D	E	F	H	I	J

Naming Scheme:

Type	Model	Ratio	Output Shaft Keyway	Backlash Class	MOTOR NO.

PAB Reducer Specifications

Specs	Unit	Stage	Ratio	PAB042	PAB060	PAB090	PAB115	PAB142	PAB180	PAB220	PAB242	PAB285	PAB330
Rated Output Torque / T2N	Nm	1	3	20	45	130	208	342	586	1140	1900	4230	8200
			4	19	50	140	290	542	1050	1700	2420	5620	10190
			5	22	60	160	330	650	1200	2000	2560	5600	7180
			6	20	55	150	310	600	1100	1900	—	—	—
			7	19	50	140	300	550	1100	1800	1830	3520	9800
			8	17	45	120	260	500	1000	1600	1360	2595	4080
			9	14	40	100	230	450	900	1500	—	—	—
			10	14	40	100	230	450	900	1500	1150	1820	5000
		2	15	20	45	130	208	342	586	1140	1900	4230	8200
			16	19	50	140	290	542	1050	1700	3200	4230	10800
			20	22	50	140	290	542	1050	1700	2420	4230	10800
			25	22	60	160	330	650	1200	2000	2650	5620	7550
			28	19	50	140	290	542	1050	1700	1830	3250	7550
			30	22	45	130	208	342	586	1140	1150	4230	7000
			35	22	60	160	330	650	1200	2000	2420	5620	9800
			40	22	50	140	290	542	1050	1700	2420	5620	7550
			50	22	55	160	330	650	1200	2000	2650	5620	7550
			70	19	50	140	290	550	1100	1800	1900	3520	5000
			80	17	45	120	260	500	900	1600	—	—	—
			100	14	40	100	230	450	900	1500	1150	1820	2500
Max.Output Torque / T2max[1]	Nm	1,2	3~100	3Times of Nominal Output Torque									
Rated Input Speed / n1n	rpm	1,2	3~100	4000	4000	4000	3500	3000	2000	2000	1000	1000	1000
Max.Input Speed / n1a	rpm	1,2	3~100	6000	6000	6000	5500	4500	4500	4000	1500	1500	1500
Micro Backlash P0	arcmin	1	3~10	≤1	≤1	≤1	≤1	≤1	≤1	≤1	-	-	-
		2	12~100	≤3	≤3	≤3	≤3	≤3	≤3	≤3	-	-	-
Precision Backlash P1	arcmin	1	3~10	≤3	≤3	≤3	≤3	≤3	≤3	≤3	-	-	-
		2	12~100	≤5	≤5	≤5	≤5	≤5	≤5	≤5	-	-	-
Standard Backlash P2	arcmin	1	3~10	≤5	≤5	≤5	≤5	≤5	≤5	≤5	≤8	≤8	≤8
		2	12~100	≤7	≤7	≤7	≤7	≤7	≤7	≤7	≤10	≤10	≤10
Torsional Rigidity	Nm/arcmin	1,2	3~100	3	7	12	25	50	140	210			
Max.Radial Force / FR2[2]	N	1,2	3~100	780	1300	3200	6750	9400	14500	50000	55000	59000	62000
Max.Axial Force / FA2[2]	N	1,2	3~100	330	700	1580	3300	4700	7200	28000	29000	30000	33000
Service Life	hr	1,2	3~100	21000h									
Efficiency / η	%	1	3~10	≥97%									
		2	12~100	≥94%									
Weight	kg	1	3~10	0.5	1.3	3.7	7.8	15	29	52	71	113	245
		2	12~100	0.8	1.48	4.1	9.6	18.9	33	66	75	136	290
Operating Temperature	℃	1,2	3~100	(-15℃ ~ +90℃)									
Lubrication		1,2	3~100	(Synthetic Grease)									
Protection Class		1,2	3~100	IP65									
Mounting Position		1,2	3~100	(Any Direction)									
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	3~100	≤63	≤63	≤63	≤65	≤65	≤70	≤70	≤75	≤75	≤75

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	PAB042	PAB060	PAB090	PAB115	PAB142	PAB180	PAB220	PAB242	PAB285	PAB330
Moment of Inertia	kg.cm²	1	3	0.03	0.16	0.61	3.25	9.21	28.98	69.61	70.21	73.29	75.23
			4	0.03	0.14	0.48	2.74	7.54	23.67	54.37	58.21	70.27	73.37
			5	0.03	0.13	0.47	2.71	7.42	23.29	53.27	59.27	70.61	73.29
			6	0.03	0.13	0.45	2.65	7.25	22.75	51.72	53.37	55.72	58.75
			7	0.03	0.13	0.45	2.62	7.14	22.48	50.97	51.23	53.97	56.61
			8	0.03	0.13	0.44	2.58	7.07	22.59	50.84	51.72	53.84	56.24
			9	0.03	0.13	0.44	2.57	7.04	22.53	50.63	55.27	58.63	60.54
			10	0.03	0.13	0.44	2.57	7.03	22.51	50.56	55.27	58.56	60.72
		2	12~40	0.03	0.03	0.13	0.47	2.71	7.42	23.29	29.20	31.29	24.29
			50~100	0.03	0.03	0.13	0.44	2.57	7.03	22.51	28.20	30.51	35.51

1. The Max. acceleration torque T2B=60% of T2NOT 2. When output speed is 100rpm, inertia acts on the output shaft center position.

3. 3-stage big ratios are not in the above table. There is shaft lengthening and enlarging design. Please tell sales person if you need it.

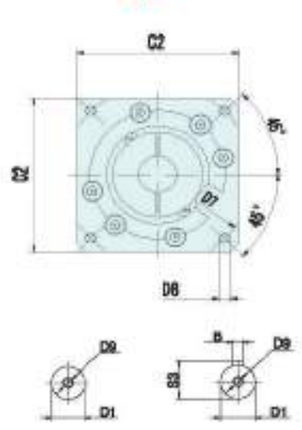
MODEL: PAB

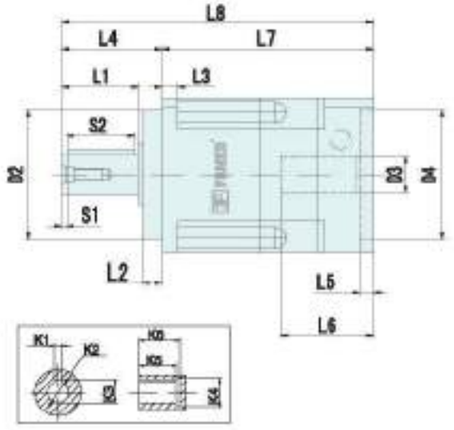
1–Stage

Ratio: 3, 4, 5, 6, 7, 8, 9, 10

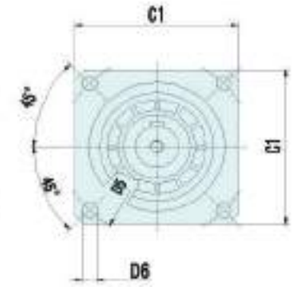
Dimensions:

Input





Output



Output shaft type S1 Output shaft type S2 Output hole type S3

Unit:mm

Size	PAB042-L1	PAB060-L1	PAB090-L1	PAB115-L1	PAB142-L1	PAB180-L1	PAB220-L1	PAB242-L1	PAB285-L1	PAB330-L1
D1	ϕ13	ϕ16	ϕ22	ϕ32	ϕ40	ϕ55	ϕ75	ϕ55	ϕ70	ϕ80
D2	ϕ35	ϕ50	ϕ80	ϕ110	ϕ130	ϕ160	ϕ180	ϕ220	ϕ250	ϕ290
D3	ϕ8(≤11)	ϕ14(≤14)	ϕ19(≤24)	ϕ24(≤32)	ϕ35(≤42)	ϕ38(≤52)	ϕ55(≤55)	ϕ42	ϕ55	ϕ60
D4	ϕ30(30~50)	ϕ50(30~70)	ϕ70(50~110)	ϕ110(50~130)	ϕ114.3(65~160)	ϕ180(95~180)	ϕ215(160~255)	ϕ200(114.3~200)	ϕ200	ϕ230
D5	ϕ50	ϕ70	ϕ100	ϕ130	ϕ165	ϕ215	ϕ250	ϕ265	ϕ315	ϕ370
D6	4-ϕ3.4	4-ϕ5.5	4-ϕ6.6	4-ϕ9	4-ϕ11	4-ϕ13	4-ϕ17	4-ϕ16	4-ϕ18	4-ϕ22
D7	ϕ46(22~70)	ϕ70(45~90)	ϕ90(70~145)	ϕ145(70~145)	ϕ200(90~215)	ϕ200(90~300)	ϕ295(200~300)	ϕ200(200~295)	ϕ235	ϕ265
D8	(4-M3X8L)	(4-M5X10L)	(4-M6X12L)	(4-M8X25L)	(6-M12X30L)	(4-M12X30L)	(4-M12X30L)	4-M12	4-M12	4-M12
D9	M4X0.7P	M5X0.8P	M8X1.25P	M12X1.75P	M16X2.0P	M20X2.5P	M20X2.5P	M20X40	M16X35	M16X35
L1	19	28.5	36.5	51	70	82	105	105	110	120
L2	5.5	7	10	12	15	20	30	20	20	25
L3	4	6	8	10	12	15	20	22	25	30
L4	28	37	48	65	97	105	138	130	135	150
L5	(4)	(5)	(7)	(11)	(7)	(7)	(12.5)	15	7	10
L6	30	34	45	65	67.5	85	105	118	115	145
L7	(65.5)	(78)	(99)	(135)	(150)	(182)	(226)	262	262	391
L8	(91.5)	(115)	(147)	(200)	(247)	(287)	(365)	392(≤392)	417	541
C1	□42	□60	□90	□115	□142	□180	□220	□242	□285	□330
C2	(□42)	(□60)	(□90)	(□130)	(□142)	(□180)	(□220)	220	285	150
S1	2	2	3	5	5	5	7	5	5	5
S2	16	25	32	40	55	70	90	90	100	110
S3	15	18	24.5	35	43	59	79	74.5	74.5	85
B	5	5	6	10	12	16	20	20	20	22
K1	-	4	6	8	10	14	16	-	-	-
K2	-	ϕ11	ϕ22	ϕ28	ϕ38	ϕ50	ϕ60	-	-	-
K3	-	12.7	25	31.3	42	53.8	64.4	-	-	-
K4	-	ϕ16	ϕ32	ϕ38	ϕ48	ϕ60	ϕ72	-	-	-
K5	-	15	20	27	35	43	60	-	-	-
K6	-	18	24	32	40	50	65	-	-	-

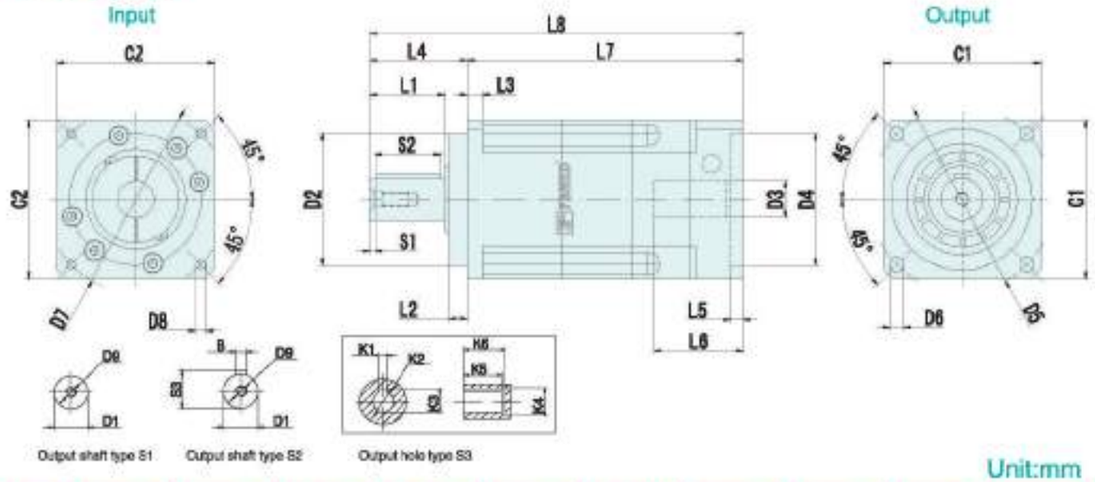
Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

MODEL: PAB

2–Stage

Ratio: 12, 15, 16, 20, 25, 28, 30, 35, 40, 50
70, 80, 100

Dimensions:



Unit:mm

Size	PAB042-L2	PAB060-L2	PAB090-L2	PAB115-L2	PAB142-L2	PAB180-L2	PAB220-L2	PAB242-L2	PAB285-L2	PAB330-L2
D1	ϕ13	ϕ16	ϕ22	ϕ32	ϕ40	ϕ55	ϕ75	ϕ55	ϕ70	ϕ80
D2	ϕ35	ϕ50	ϕ80	ϕ110	ϕ130	ϕ160	ϕ180	ϕ220	ϕ250	ϕ298
D3	ϕ8(≤11)	ϕ14(≤14)	ϕ19	ϕ24(≤32)	ϕ35(≤42)	ϕ38(≤50)	ϕ55(≤55)	ϕ38(≤42)	ϕ42	ϕ42
D4	ϕ30(30-50)	ϕ50(30-70)	ϕ70	ϕ110(50-130)	ϕ114.3(95-180)	ϕ160(95-180)	ϕ215(180-256)	ϕ200(114.3-200)	ϕ200(114.3-200)	ϕ200(114.3-200)
D5	ϕ50	ϕ70	ϕ100	ϕ130	ϕ165	ϕ215	ϕ250	ϕ265	ϕ315	ϕ370
D6	4-ϕ3.4	4-ϕ5.5	4-ϕ6.6	4-ϕ9	4-ϕ11	4-ϕ13	4-ϕ17	4-ϕ18	4-ϕ18	4-ϕ22
D7	ϕ40(22-70)	ϕ70(45-90)	ϕ90	ϕ145(70-145)	ϕ200(90-216)	ϕ200(90-300)	ϕ235(200-300)	ϕ200(200-235)	ϕ200(200-235)	ϕ200(200-235)
D8	(4-M3DEL)	(4-M5X10L)	(4-M6X12L)	(4-M8X25L)	(4-M12X30L)	(4-M12X30L)	(4-M12X30L)	4-M12	4-M12	4-M12
D9	M4X0.7P	M5X0.8P	M8X1.25P	M12X1.75P	M16X2.0P	M20X2.5P	M20X2.5P	M20X40	M16X39	M16X35
L1	19	28.5	38.5	51	79	82	105	105	110	120
L2	5.5	7	10	12	15	20	30	20	20	25
L3	4	6	8	10	12	15	20	22	25	30
L4	26	37	48	65	97	105	138	130	135	150
L5	(4)	(5)	(7)	(11)	(7)	(7)	(12.5)	7	15	15
L6	25	34	45	65	87.5	85	105	120(≤120)	118	118
L7	(93)	(117)	(144)	(161)	(196)	(232)	(277)	325	402.5	459
L8	(114)	(154)	(192)	(226)	(293)	(337)	(415)	466(≤466)	537.5	609
C1	□42	□60	□90	□115	□142	□180	□220	□240	□285	□330
C2	(□42)	(□60)	(□90)	(□130)	(□142)	(□180)	(□220)	180(≤180)	220	220
S1	2	2	3	5	5	5	7	5	5	5
S2	16	25	32	40	65	70	90	90	100	110
S3	15	18	24.5	35	43	59	79	74.5	74.5	85
B	5	5	6	10	12	16	20	20	20	22
K1	–	4	6	8	10	14	16	–	–	–
K2	–	ϕ11	ϕ22	ϕ28	ϕ38	ϕ50	ϕ60	–	–	–
K3	–	12.7	25	31.3	42	53.8	64.4	–	–	–
K4	–	ϕ18	ϕ32	ϕ38	ϕ48	ϕ65	ϕ72	–	–	–
K5	–	15	20	27	35	43	60	–	–	–
K6	–	18	24	32	40	50	65	–	–	–

Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

High Precision High Torque Right Angle Planetary Gearbox

PAR

- 1. Space-saving
  The straight cross reducer uses spiral bevel gear. The installation of the motor can achieve 90 degree bending and save the installation space.
- 2. High rigidity & torqueThe use of integral needle roller bearings greatly improves the rigidity and torque.
- 3. Connector and shaft sleeve mode
  It can be installed on any motor in the world.
- 4. No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 5. Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

PAR Type

PAR090 – 10 – S1 – P1 / Motor

Reducer Model
PAR042, PAR060, PAR090, PAR115
PAR142, PAR180, PAR220, PAR240
PAR280, PAR300

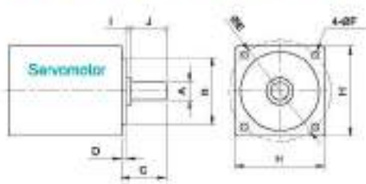
Output Shaft Keyway
S1: Solid Output Shaft No Keyway
S2: Standard (Keyway)
S3: Output for holes

Motor Model
Motor Manufacturer & Model

Ratio
1-stage: 3, 4, 5, 6, 7, 8, 9, 10
2-stage: 15, 20, 25, 30, 35, 40, 50, 70, 80, 100, 120, 140, 160, 180, 200

Backlash Grade
P0: High precision backlash
P1: Precision backlash
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions:



A	B	C	D	E	F	H	I	J

Naming Scheme:

Type – Model – Ratio – Output Shaft Keyway – Backlash Class – MOTOR NO.

PAR Reducer Specifications

Specs	Unit	Stage	Ratio	PAR042	PAR060	PAR090	PAR115	PAR142	PAR180	PAR220
Rated Output Torque / T2N	Nm	1	3	20	55	130	208	342	588	1140
			4	19	50	140	290	542	1050	1700
			5	22	60	160	330	650	1200	2000
			6	20	55	150	310	600	1100	1900
			7	19	50	140	300	550	1100	1800
			8	17	50	140	290	542	1050	1700
			9	14	40	100	230	450	900	1500
			10	14	60	160	330	650	1200	2000
			14	19	50	140	300	550	1100	1800
			20	14	40	100	230	450	900	1500
		2	15	20	55	130	208	342	588	1140
			20	20	50	140	290	542	1050	1700
			25	22	60	160	330	650	1200	2000
			30	22	55	130	208	342	588	1140
			35	22	60	160	330	650	1200	2000
			40	22	50	140	290	542	1050	1700
			50	22	60	160	330	650	1200	2000
			70	22	60	160	330	600	1200	2000
			80	22	50	140	290	542	1050	1700
			100	22	60	160	330	650	1200	2000
			120	—	—	150	310	600	1100	1900
			140	—	—	140	300	550	1100	1800
			160	—	—	120	260	500	1000	1600
			180	—	—	98	225	445	885	1495
			200	—	—	100	230	450	900	1500
Max.Output Torque / T2MAX[1]	Nm	1,2	3–200	3Times of Nominal Output Torque						
Rated Input Speed / n1n	rpm	1,2	3–200	3000	3000	3000	3000	2500	2000	2000
Max.Input Speed / n1m	rpm	1,2	3–200	6000	6000	6000	5500	4500	4500	4000
Precision Backlash P0	arcmin	1	3–20	≤1	≤1	≤1	≤1	≤1	≤1	≤1
		2	15–200	≤3	≤3	≤3	≤3	≤3	≤3	≤3
Precision Backlash P1	arcmin	1	3–20	≤3	≤3	≤3	≤3	≤3	≤3	≤3
		2	15–200	≤5	≤5	≤5	≤5	≤5	≤5	≤5
Standard Backlash P2	arcmin	1	3–20	≤5	≤5	≤5	≤5	≤5	≤5	≤5
		2	15–200	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Torsional Rigidity	Nm/arcmin	1,2	3–200	3	6	14	25	56	140	220
Max.Radial Force / Fr2[2]	N	1,2	3–200	780	1300	3200	6750	9400	14500	50000
Max.Axial Force / Fa2[2]	N	1,2	3–200	330	700	1580	3300	4700	7200	28000
Service Life	hr	1,2	3–200	21000 h						
Efficiency / η	%	1	3–20	≥93%						
		2	25–200	≥90%						
Weight	kg	1	3–20	0.9	1.5	6.4	13	24.5	51	83
		2	25–200	1.2	2.1	7.8	14.2	27.5	54	95
Operating Temperature	℃	1,2	3–200	(–15℃ ~ +90℃)						
Lubrication		1,2	3–200	(Synthetic Grease)						
Protection Class		1,2	3–200	IP65						
Mounting Position		1,2	3–200	(Any Direction)						
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	3–200	≤65	≤65	≤68	≤68	≤70	≤72	≤74

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	PAR042	PAR060	PAR090	PAR115	PAR142	PAR180	PAR220
Moment of Inertia	kg.cm²	1	3–10	0.09	0.35	2.25	6.84	23.4	68.9	135.4
			14–20	0.03	0.07	1.87	6.25	21.8	65.6	119.8
		2	15–100	0.09	0.09	0.35	2.25	6.84	23.4	68.9
			120–200	—	—	0.31	1.87	6.25	21.8	65.6

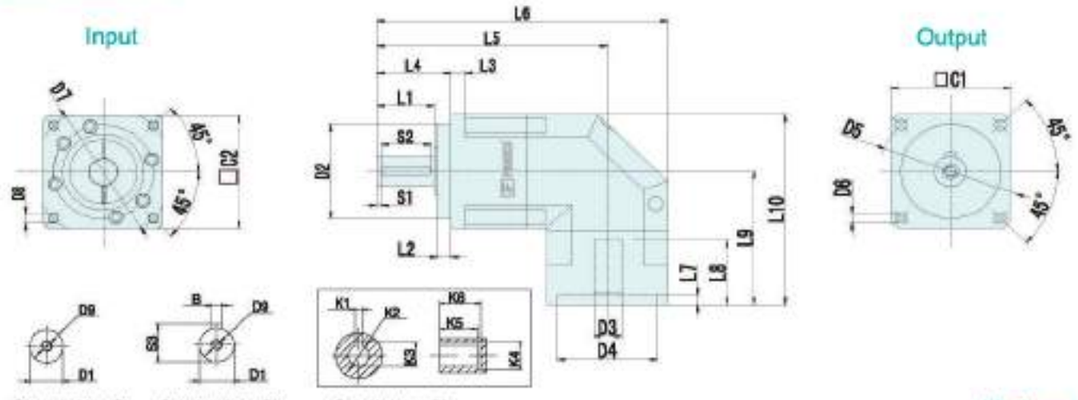
1. The Max. acceleration torque T2B=60% of T2NOT 2. When output speed is 100rpm, inertia acts on the output shaft center position.
3. 3-stage big ratios are not in the above table. There is shaft lengthening and enlarging design. Please tell sales person if you need it.

MODEL: PAR

1–Stage

Ratio: 3, 4 , 5, 6, 7, 8, 9, 10, 14, 16, 20

Dimensions:



Unit:mm

Size	PAR042–L1	PAR060–L1	PAR090–L1	PAR115–L1	PAR142–L1	PAR180–L1	PAR220–L1
D1	ϕ13	ϕ16	ϕ22	ϕ32	ϕ40	ϕ55	ϕ75
D2	ϕ35	ϕ50	ϕ80	ϕ110	ϕ130	ϕ160	ϕ180
D3	ϕ8(≤11)	ϕ14(≤14)	ϕ19(≤24)	ϕ24(≤32)	ϕ35(≤42)	ϕ38(≤50)	ϕ55(≤55)
D4	ϕ30(30–50)	ϕ50(30–70)	ϕ70(50–110)	ϕ110(50–130)	ϕ114.3(95–180)	ϕ180(95–180)	ϕ215(180–255)
D5	ϕ50	ϕ70	ϕ100	ϕ130	ϕ165	ϕ215	ϕ250
D6	4–ϕ3.4	4–ϕ5.5	4–ϕ6.6	4–ϕ9	4–ϕ11	4–ϕ13	4–ϕ17
D7	ϕ46(22–70)	ϕ70(45–90)	ϕ90(70–145)	ϕ145(70–145)	ϕ200(90–215)	ϕ200(90–300)	ϕ235(200–300)
D8	(4–M3X8L)	(4–M5X10L)	(4–M6X12L)	(4–M8X25L)	(4–M12X30L)	(4–M12X30L)	(4–M12X30L)
D9	M4X0.7P	M5X0.8P	M8X1.25P	M12X1.75P	M16X2.0P	M20X2.5P	M20X2.5P
L1	19	28.5	36.5	51	79	82	105
L2	5.5	7	10	12	15	20	30
L3	4	6	8	10	12	15	20
L4	26	37	48	65	97	105	136
L5	96	117	175	227	255	289	346
L6	(122)	(154)	(223)	(292)	(352)	(394)	(484)
L7	(3.5)	(5)	(5)	(11)	(14)	(15)	(7)
L8	(30)	(34)	(44)	(60)	(81)	(85)	(85)
L9	(69.5)	(81.5)	(107.5)	(134)	(165)	(213.5)	(268.5)
L10	(95.5)	(110.5)	(158)	(199)	(230)	(303.5)	(378.5)
C1	□42	□60	□90	□115	□142	□180	□220
C2	(□42)	(□60)	(□90)	(□130)	(□142)	(□180)	(□220)
S1	2	2	2	5	5	5	7
S2	16	25	32	40	65	70	90
S3	15	18	24.5	35	43	59	79
B	5	5	6	10	12	16	20
K1	–	4	6	8	10	14	16
K2	–	ϕ11	ϕ22	ϕ28	ϕ38	ϕ50	ϕ60
K3	–	12.7	25	31.3	42	53.8	64.4
K4	–	ϕ16	ϕ32	ϕ38	ϕ48	ϕ60	ϕ72
K5	–	15	20	27	35	43	60
K8	–	18	24	32	40	50	65

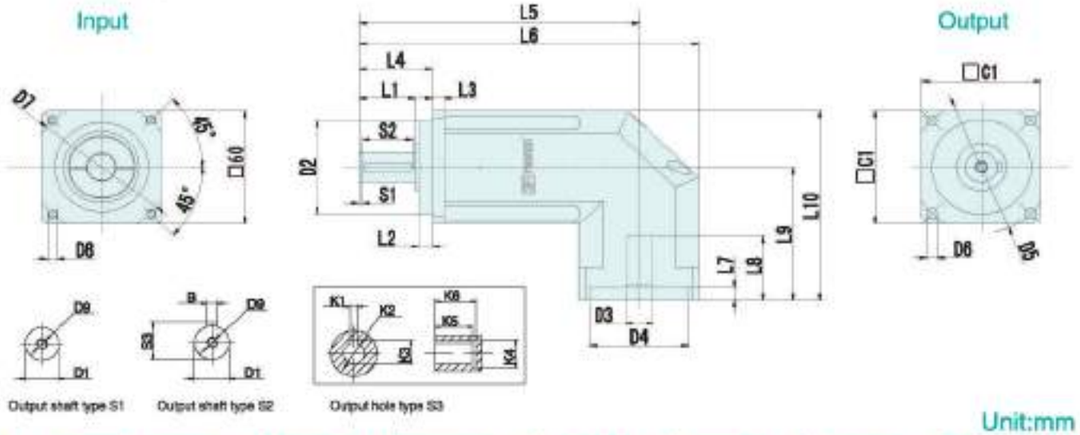
Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

MODEL: PAR

2-Stage

Ratio: 15, 20, 25, 30, 35, 40, 50, 70, 80, 100 , 120, 140, 160, 180, 200

Dimensions:



Unit:mm

Size	PAR042-L2	PAR060-L2	PAR090-L2	PAR115-L2	PAR142-L2	PAR180-L2	PAR220-L2
D1	ϕ13	ϕ16	ϕ22	ϕ32	ϕ40	ϕ55	ϕ75
D2	ϕ35	ϕ50	ϕ80	ϕ110	ϕ130	ϕ160	ϕ180
D3	ϕ8(≤11)	ϕ14(≤14)	ϕ14	ϕ24(≤32)	ϕ35(≤42)	ϕ38(≤50)	ϕ55(≤55)
D4	ϕ30(30~50)	ϕ50(30~70)	ϕ50	ϕ110(50~130)	ϕ114.3(95~180)	ϕ180(95~180)	ϕ215(180~255)
D5	ϕ50	ϕ70	ϕ100	ϕ130	ϕ165	ϕ215	ϕ250
D6	4-ϕ3.4	4-ϕ5.5	4-ϕ6.6	4-ϕ9	4-ϕ11	4-ϕ13	4-ϕ17
D7	ϕ46(22~70)	ϕ70(45~90)	ϕ70	ϕ145(70~145)	ϕ200(90~215)	ϕ200(90~300)	ϕ235(200~300)
D8	(4-M3X8L)	(4-M5X10L)	(4-M5X12L)	(4-M8X25L)	(4-M12X30L)	(4-M12X30L)	(4-M12X30L)
D9	M4X0.7P	M5X0.8P	M8X1.25P	M12X1.75P	M16X2.0P	M20X2.5P	M20X2.5P
L1	19	28.5	36.5	51	79	82	105
L2	5.5	7	10	12	15	20	30
L3	4	6	6	10	12	15	20
L4	26	37	48	65	97	105	138
L5	113	134	157	224	282	322	383
L6	139	171	205	(292)	(378)	(427)	(521)
L7	(3.5)	(5)	(5)	(11)	(14)	(15)	(7)
L8	(30)	(34)	(44)	(60)	(81)	(85)	(85)
L9	(69.5)	(81.5)	(107.5)	(134)	(165)	(213.5)	(268.5)
L10	(90.5)	(111.5)	(152.5)	(191.5)	(236)	(303.5)	(378.5)
C1	□42	□60	□90	□115	□142	□180	□220
C2	(□42)	(□60)	(□90)	(□130)	(□142)	(□180)	(□220)
S1	2	2	2	5	5	5	7
S2	16	25	32	40	55	70	90
S3	15	18	24.5	35	43	59	79
B	5	5	6	10	12	16	20
K1	-	4	6	8	10	14	16
K2	-	ϕ11	ϕ22	ϕ28	ϕ38	ϕ50	ϕ60
K3	-	12.7	25	31.3	42	53.8	64.4
K4	-	ϕ16	ϕ32	ϕ38	ϕ48	ϕ60	ϕ72
K5	-	15	20	27	35	43	60
K6	-	18	24	32	40	50	65

Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

Precision Planetary Gearbox

VRSF

- 1.Quiet operation
  Helical gears are used to achieve smooth and quiet operation.
- 2.High precision
  The backlash is less than 3 arcmin and the positioning is accurate.
- 3.High rigidity & torqueThe use of integral ball bearings greatly improves the rigidity and torque.
- 4.Methods of flange and connector
  It can be installed on any motor in the world.
- 5.No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 6.Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

VRSF Type

VRSF080 – 10 – S1 – P1 / Motro

Reducer Model
VRSF060, VRSF080
VRSF100, VRSF125

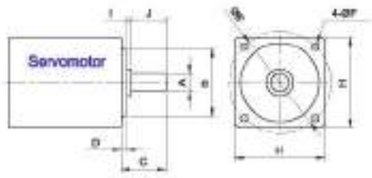
Output Shaft Keyway
S1: Solid Output Shaft No Keyway
S2: Standard (Keyway)
S3: Output for holes

Motor Model
Motor Manufacturer & Model

Ratio
1-stage: 3, 4 , 5, 7, 10
2-stage: 15, 20, 25, 30, 35, 40, 50, 70, 100

Backlash Grade
P0: High precision backlash
P1: Precision backlash
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions:



A	B	C	D	E	F	H	I	J

Naming Scheme:

Type	Model	Ratio	Output Shaft Keyway	Backlash Class	MOTOR NO.

VRSF Reducer Specifications

Specs	Unit	Stage	Ratio	VRSF060	VRSF080	VRSF100	VRSF125
Rated Output Torque / T2N	Nm	1	3	54	112	165	286
			4	48	110	146	255
			5	45	108	160	264
			7	41	105	149	245
			10	40	100	141	234
		2	15	54	112	165	286
			20	48	110	146	255
			25	45	108	160	264
			30	41	112	165	286
			35	41	105	149	245
			40	39	110	146	255
			50	45	108	160	264
			70	41	105	149	245
			100	40	100	141	234
Max.Output Torque / T2M[1]	Nm	1,2	3~100	3Times of Nominal Output Torque			
Rated Input Speed / n1N	rpm	1,2	3~100	3000	3000	3000	3000
Max.Input Speed / n1M	rpm	1,2	3~100	5000	5000	5000	5000
Precision Backlash P1	arcmin	1	3~10	≤5	≤5	≤5	≤5
		2	12~100	≤7	≤7	≤7	≤7
Standard Backlash P2	arcmin	1	3~10	≤8	≤8	≤8	≤8
		2	12~100	≤10	≤10	≤10	≤10
Torsional Rigidity	Nm/arcmin	1,2	3~100	5	12	14	23
Max.Radial Force / F2rM[2]	N	1,2	3~100	800	1200	3200	5220
Max.Axial Force / F2aM[2]	N	1,2	3~100	400	600	1600	2600
Service Life	hr	1,2	3~100	21000 h			
Efficiency / η	%	1	3~10	≥97%			
		2	15~100	≥94%			
Weight	kg	1	3~10	1.2	1.6	3.76	7.43
		2	15~100	2.1	2.8	5.92	10.3
Operating Temperature	℃	1,2	3~100	-25℃~+90℃			
Lubrication		1,2	3~100	Synthetic Grease			
Protection Class		1,2	3~100	Any Direction			
Mounting Position		1,2	3~100				
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	3~100	<60	<62	<65	<67

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	VRSF060	VRSF080	VRSF100	VRSF125
Moment of Inertia	$kg.cm^2$	1	3	0.16	0.61	3.25	9.21
			4	0.14	0.48	2.74	7.54
			5	0.13	0.47	2.71	7.42
			6	0.13	0.45	2.65	7.25
			7	0.13	0.45	2.62	7.14
			8	0.13	0.44	2.58	7.07
			9	0.13	0.44	2.57	7.04
			10	0.13	0.44	2.57	7.03
		2	12~40	0.03	0.13	0.47	2.71
			50~100	0.03	0.13	0.44	2.57

1. Ratio (i=Nin/Nout) 2. The Max. acceleration torque T2B=60% of T2NOT

3. When output speed is 100rpm, inertia acts on the output shaft center position.continuous operation, service life is 15000hrs.

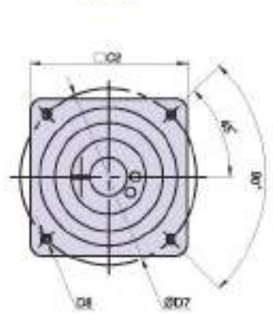
MODEL: VRSF

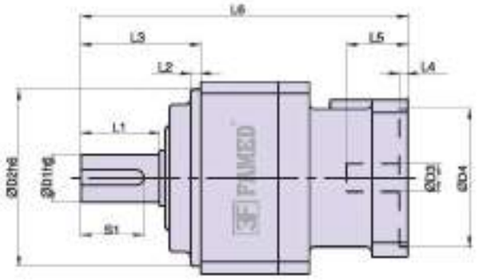
1–Stage

Ratio: 3, 4, 5, 7, 10

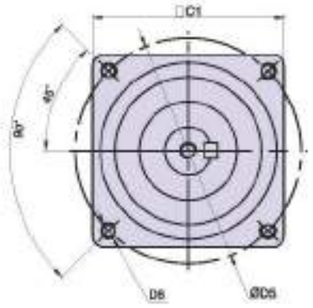
Dimensions

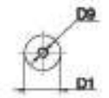
Input



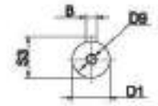


Output





Output shaft type S1



Output shaft type S2

Unit:mm

Size	VRSF060-L1	VRSF080-L1	VRSF100-L1	VRSF125-L1
D1	12	19	24	32
D2	50	70	90	110
D3	8(8 – 14)	14(14 – 19)	19	22(22 – 24)
D4	30(30 – 50)	50(50 – 70)	70	110
D5	60	90	115	135
D6	M5	M6	M8	M10
D7	45(45 – 70)	70(70 – 90)	90	145
D8	M4 – M5	M4 – M5	M6	M8
D9	M4	M6	M8	M12
L1	20	30	40	55
L2	3	3	5	5
L3	32	50	61	75
L4	4	4	4	8
L5	27 – 32	32	38	65.5
L6	109	143.5 – 148.5	177	215.5
C1	52	78	98	125
C2	40(40 – 52)	60(60 – 80)	90	125(125 – 130)
S1	18	22	32	52
S2	13.5	21.5	27	35
B	4	6	8	10

Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.

Note 2: The reducer output shaft size and length can be customized for customers.

Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

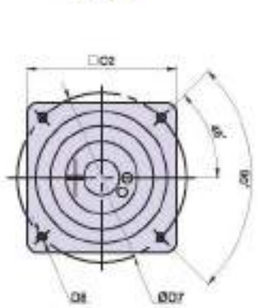
MODEL: VRSF

2-Stage

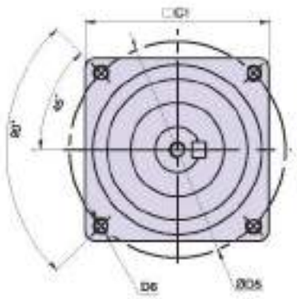
Ratio: 15, 20, 25, 30, 35, 40, 50, 70, 100

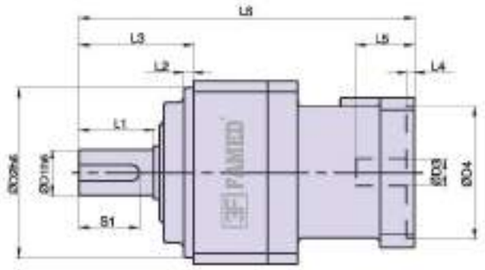
Dimensions:

Input



Output





Output shaft type S1

Output shaft type S2

Unit:mm

Size	VRSF060-L2	VRSF080-L2	VRSF100-L2	VRSF125-L2
D1	12	19	24	32
D2	50	70	90	110
D3	11(11 ~ 14)	14(14 ~ 19)	14 ~ 19	22(22 ~ 24)
D4	50	50(50 ~ 70)	50(50 ~ 70)	110
D5	60	90	115	135
D6	M5	M6	M8	M10
D7	45(45 ~ 70)	70(70 ~ 90)	70 ~ 90	145
D8	M4 ~ M5	M4 ~ M5	M4 ~ M5	M8
D9	M4	M6	M8	M12
L1	20	30	40	55
L2	3	3	5	5
L3	32	50	61	75
L4	4	4	4	8
L5	32	32	38	65.5
L6	109	150 ~ 155	165 ~ 179	250.5
C1	52	78	98	125
C2	52	60(60 ~ 80)	60(60 ~ 80)	125(125 ~ 130)
S1	18	22	32	52
S2	13.5	21.5	27	35
B	4	6	8	10

Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

Precision Planetary Gearbox

FB

- 1.Quiet operation
  Helical gears are used to achieve smooth and quiet operation.
- 2.High precision
  The backlash is less than 3 arcmin and the positioning is accurate.
- 3.High rigidity & torqueThe use of integral ball bearings greatly improves the rigidity and torque.
- 4.Methods of flange and connector
  It can be installed on any motor in the world.
- 5.No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 6.Convenient maintenance
  No need to replace the greese in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

FB Type

FB090 - 10 - S1 - P1 / Motor

Reducer Model
FB040, FB060, FB090
FB120, FB160

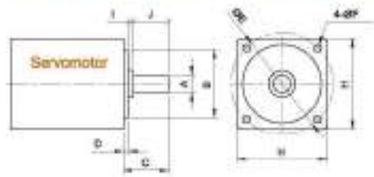
Output Shaft Keyway
S1: Solid Output Shaft No Keyway
S2: Standard (Keyway)
S3: Output for holes

Motor Model
Motor Manufacturer & Model

Ratio
1-stage: 3,4,5,6,7,8,9,10
2-stage: 12,15,16,20,25,28,30,35,40,50,70,80,100
3-stage: 60,64,72,80,90,100,120,144,150,160,180,200, 240,258,288,320,384,512,600,800,1000

Backlash Grade
P0: High precision backlash
P1: Precision backlash
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions:



A	B	C	D	E	F	H	I	J

Naming Scheme:

Type		Model		Ratio	Output Shaft Keyway	Backlash Class		MOTOR NO.

FB Reducer Specifications

Specs	Unit	Stage	Ratio	FB040	FB060	FB090	FB120	FB160
Rated Output Torque / T2N	Nm	1	3	20	55	130	208	342
			4	19	50	140	290	542
			5	22	60	160	330	650
			7	19	50	140	300	550
			10	14	40	100	230	450
		2	15	20	55	130	208	342
			20	19	50	145	290	542
			25	22	60	160	330	650
			30	22	55	130	208	342
			35	22	60	160	330	650
			40	22	50	140	290	542
			50	20	60	160	330	650
			70	19	50	140	300	550
			100	14	40	100	230	450
Max.Output Torque / T2em[2]	Nm	1,2	3–100	3Times of Nominal Output Torque				
Rated Input Speed / n1n	rpm	1,2	3–100	3000	3000	3000	3000	2500
Max.Input Speed / n1m	rpm	1,2	3–100	5000	5000	5000	5000	3800
Precision Backlash P1	arcmin	1	3–10	≤3	≤3	≤3	≤3	≤3
		2	12–100	≤5	≤5	≤5	≤5	≤5
Standard Backlash P2	arcmin	1	3–10	≤5	≤5	≤5	≤5	≤5
		2	12–100	≤7	≤7	≤7	≤7	≤7
Torsional Rigidity	Nm/arcmin	1,2	3–100	3	6	12	22	50
Max.Radial Force / Fr2[2]	N	1,2	3–100	320	460	1300	3200	6520
Max.Axial Force / Fa2[2]	N	1,2	3–100	160	230	660	1600	3260
Service Life	hr	1,2	3–100	20000 h				
Efficiency / η	%	1	3–10	≥97%				
		2	15–100	≥94%				
Weight	kg	1	3–10	0.73	0.99	2.1	4.96	18.2
		2	15–100	1.05	1.46	3.2	6.92	24.9
Operating Temperature	℃	1,2	3–100	-25℃~+90℃				
Lubrication		1,2	3–100	Synthetic Grease				
Protection Class		1,2	3–100	IP65				
Mounting Position		1,2	3–100	Any				
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	3–100	≤62	≤63	≤65	≤67	≤68

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	FB040	FB060	FB090	FB120	FB160
Moment of Inertia	kg.cm²	1	3	0.03	0.16	0.61	3.25	9.21
			4	0.03	0.14	0.48	2.74	7.54
			5	0.03	0.13	0.47	2.71	7.42
			7	0.03	0.13	0.45	2.66	7.25
			10	0.03	0.13	0.45	2.62	7.14
		2	12–40	0.03	0.13	0.44	2.58	7.07
			50–100	0.03	0.13	0.44	2.57	7.04

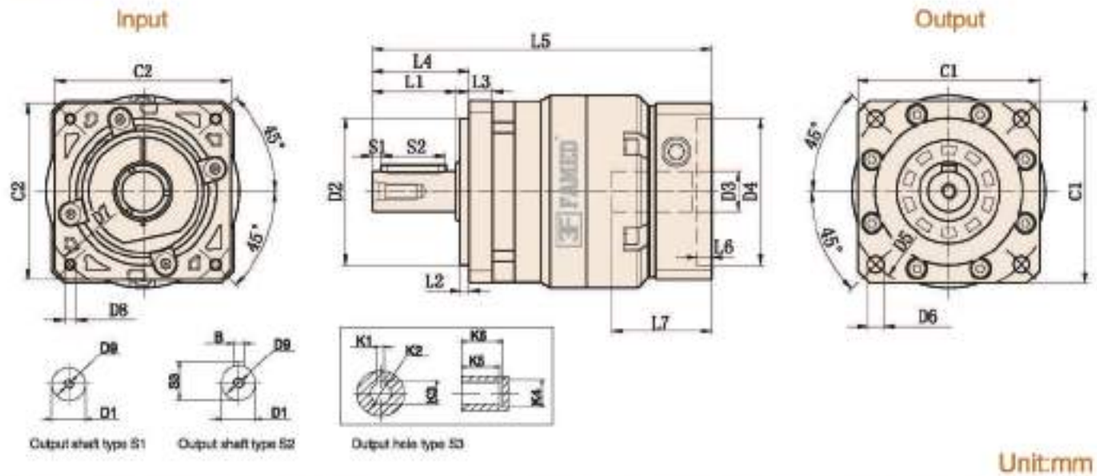
1. Ratio (i=Nin/Nout) 2. Output revolutions 100rpm, acting on the output shaft center position.
3. *Continuous operation, service life is 10000hrs.

MODEL: FB

1–Stage

Ratio: 3, 4, 5, 6, 7, 8, 9, 10

Dimensions:



Unit:mm

Size	FB040–L1	FB060–L1	FB090–L1	FB120–L1	FB160–L1
D1	ϕ12(13)	ϕ14(16)	ϕ20(22)	ϕ25(32)	ϕ40
D2	ϕ26	ϕ50	ϕ80	ϕ110	ϕ130
D3	ϕ8(≤11)	ϕ14(≤19)	ϕ19(≤24)	ϕ24(≤32)	ϕ35(42)
D4	ϕ30(30–50)	ϕ50 (50–70)	ϕ70 (50–110)	ϕ110(70–130)	ϕ114.3(110–150)
D5	ϕ48	ϕ70	ϕ100	ϕ130	ϕ165(165)
D6	4–ϕ3.4	4–ϕ5.5	4–ϕ7	4–ϕ9	4–ϕ11
D7	ϕ46(45–70)	ϕ70 (70–130)	ϕ90 (70–145)	ϕ145(90–165)	ϕ200(145–220)
D8	(4–M4X8L)	(4–M4*10L)	(4–M5*12L)	(4–M8X25L)	(4–M12X25L)
D9	M4X0.7P	M5*0.8P*15L	M6*1.0P*16.5L	M10X1.5P	M16X2.0P
L1	18	28.5	36.5	50	80
L2	3	3	3	4	5
L3	4	6	10	15	16
L4	22.5	33	40.5	55	87
L5	(5)	(115.5)	(147)	(6)	(7)
L6	(32)	(5)	(6.5)	(59)	(86)
L7	(88)	(34)	(42)	(211)	(292)
C1	□45	□62	□90	□124	□175
C2	(□50)	(□60)	(□80)	(□120)	(□176)
S1	2	3	4	5	8
S2	14	22	28	40	65
S3	13.5	16	22.5	28	43
B	4	5	6	8	12
K1	–	3	5	8	10
K2	–	ϕ8	ϕ18	ϕ25	ϕ35
K3	–	9.2	21	26	38.3
K4	–	ϕ11	ϕ24	ϕ32	ϕ42
K5	–	20	30	40	52
K6	–	24	35	48	58

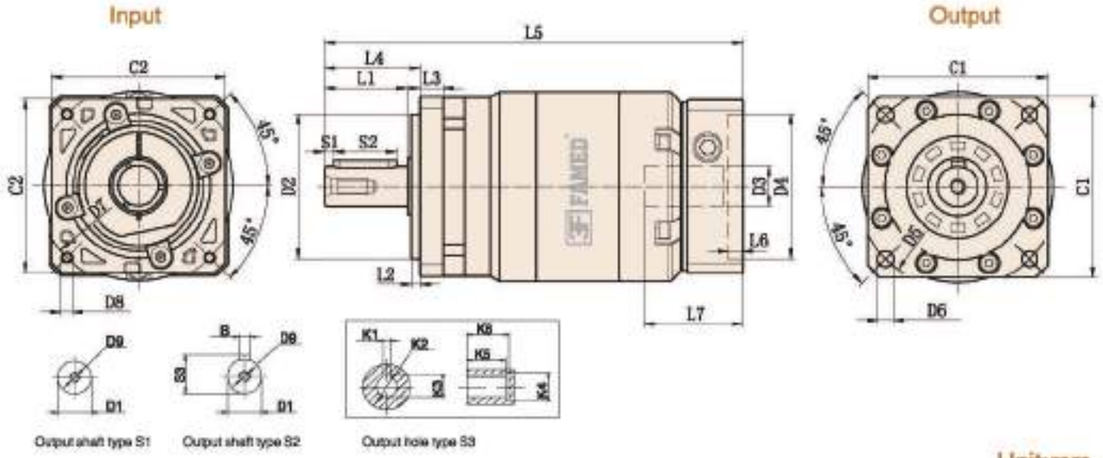
Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

MODEL: FB

2-Stage

Ratio: 12, 15, 16, 20, 25, 28, 30, 35, 40, 50
70, 80, 100

Dimensions:



Unit:mm

Size	FB040-L2	FB060-L2	FB090-L2	FB120-L2	FB160-L2
D1	ϕ12(13)	ϕ14(16)	ϕ20(22)	ϕ25(32)	ϕ40
D2	ϕ26	ϕ50	ϕ80	ϕ110	ϕ130
D3	ϕ8(≤11)	ϕ14(≤19)	ϕ19(≤24)	ϕ24(≤32)	ϕ35(42)
D4	ϕ30(30-50)	ϕ50 (50-70)	ϕ70 (50-110)	ϕ110 (70-130)	ϕ114.3(110-150)
D5	ϕ48	ϕ70	ϕ100	ϕ130	ϕ185(165)
D6	4-ϕ3.4	4-ϕ5.5	4-ϕ7	4-ϕ9	4-ϕ11
D7	ϕ46(45-70)	ϕ70 (70-130)	ϕ90 (70-145)	ϕ145 (90-165)	ϕ200(145-220)
D8	(4-M4X8L)	(4-M4*10L)	(4-M5*12L)	(4-M8*20L)	(4-M12X25L)
D9	M4X0.7P	M5*0.8P*15L	M6*1.0P*16.5L	M10*1.5P*23L	M16X2.0P
L1	18	28.5	36.5	50	80
L2	3	3	3	4	5
L3	4	8	10	15	16
L4	22.5	33	40.5	55	87
L5	(5)	(144.5)	(177.5)	(232.5)	(7)
L6	(32)	(5)	(6.5)	(11)	(86)
L7	(105)	(34)	(42)	(59)	(295)
C1	□45	□62	□90	□120	□175
C2	(□50)	(□60)	(□80)	(□130)	(□176)
S1	2	3	4	5	8
S2	14	22	28	40	65
S3	13.5	16	22.5	28	43
B	4	5	6	8	12
K1	-	3	6	8	10
K2	-	ϕ8	ϕ18	ϕ25	ϕ35
K3	-	9.2	21	28	38.3
K4	-	ϕ11	ϕ24	ϕ32	ϕ42
K5	-	20	30	40	52
K6	-	24	35	48	58

Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.

Note 2: The reducer output shaft size and length can be customized for customers.

Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

Precision Right Angle Planetary Gearbox

FBR

- 1. Space-saving
  The straight cross reducer uses spiral bevel gear. The installation of the motor can achieve 90 degree bending and save the installation space.
- 2.High rigidity & torque
  The use of integral ball bearings greatly improves the rigidity and torque.
- 3. Connector and shaft sleeve mode
  It can be installed on any motor in the world.
- 4. No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 5.Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

FBR Type

FBR090 - 10 - S1 - P1 / Motor

Reducer Model
FBR040, FBR060, FBR090
FBR120, FBR160

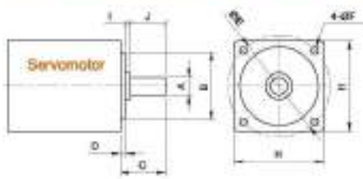
Output Shaft Keyway
S1: Solid Output Shaft No Keyway
S2: Standard (Keyway)
S3: Output for holes

Motor Model
Motor Manufacturer & Model

Ratio
1-stage: 3,4,5,6,7,8,9,10
2-stage: 12,15,16,20,25,28,30,35,40,50,70,80,100
3-stage: 60,64,72,80,90,100,120,144,150,160,180,200
240,258,288,320,384,512,600,800,1000

Backlash Grade
P0: High precision backlash
P1: Precision backlash
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions:



A	B	C	D	E	F	H	I	J

Naming Scheme:

Type	Model	Ratio	Output Shaft Keyway	Backlash Class	MOTOR NO.

FBR Reducer Specifications

Specs	Unit	Stage	Ratio	FBR040	FBR060	FBR090	FBR120	FBR160
Rated Output Torque / T2N	Nm	1	3	20	55	130	208	342
			4	19	50	140	290	542
			5	22	60	160	330	650
			7	19	50	140	300	550
			10	14	40	100	230	450
		2	15	20	55	130	208	342
			20	19	50	145	290	542
			25	22	60	160	330	650
			30	22	55	130	208	342
			35	22	60	160	330	650
			40	22	50	140	290	542
			50	20	60	160	330	650
			70	19	50	140	300	550
			100	14	40	100	230	450
Max.Output Torque / T2max[1]	Nm	1,2	3–100	3Times of Nominal Output Torque				
Rated Input Speed / n1n	rpm	1,2	3–100	3000	3000	3000	3000	2500
Max.Input Speed / n1u	rpm	1,2	3–100	5000	5000	5000	5000	3600
Precision Backlash P1	arcmin	1	3–10	≤8	≤8	≤8	≤8	≤8
		2	12–100	≤10	≤10	≤10	≤10	≤10
Standard Backlash P2	arcmin	1	3–10	≤11	≤11	≤11	≤11	≤11
		2	12–100	≤13	≤13	≤13	≤13	≤13
Torsional Rigidity	Nm/arcmin	1,2	3–100	3	6	12	22	50
Max.Radial Force / Fr2[2]	N	1,2	3–100	320	460	1300	3200	6520
Max.Axial Force / Fa2[2]	N	1,2	3–100	160	230	660	1600	3260
Service Life	hr	1,2	3–100	20000 h				
Efficiency / η	%	1	3–10	≥97%				
		2	15–100	≥94%				
Weight	kg	1	3–10	0.73	0.99	2.1	4.98	18.2
		2	15–100	1.05	1.46	3.2	6.92	24.9
Operating Temperature	℃	1,2	3–100	-25℃~+90℃				
Lubrication		1,2	3–100	Synthetic Grease				
Protection Class		1,2	3–100	IP65				
Mounting Position		1,2	3–100	Any Direction				
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	3–100	≤62	≤63	≤65	≤67	≤68

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	FBR040	FBR060	FBR090	FBR120	FBR160
Moment of Inertia	kg.cm²	1	3	0.03	0.16	0.61	3.25	9.21
			4	0.03	0.14	0.48	2.74	7.54
			5	0.03	0.13	0.47	2.71	7.42
			7	0.03	0.13	0.45	2.65	7.25
			10	0.03	0.13	0.45	2.62	7.14
		2	12–40	0.03	0.13	0.44	2.58	7.07
			50–100	0.03	0.13	0.44	2.57	7.04

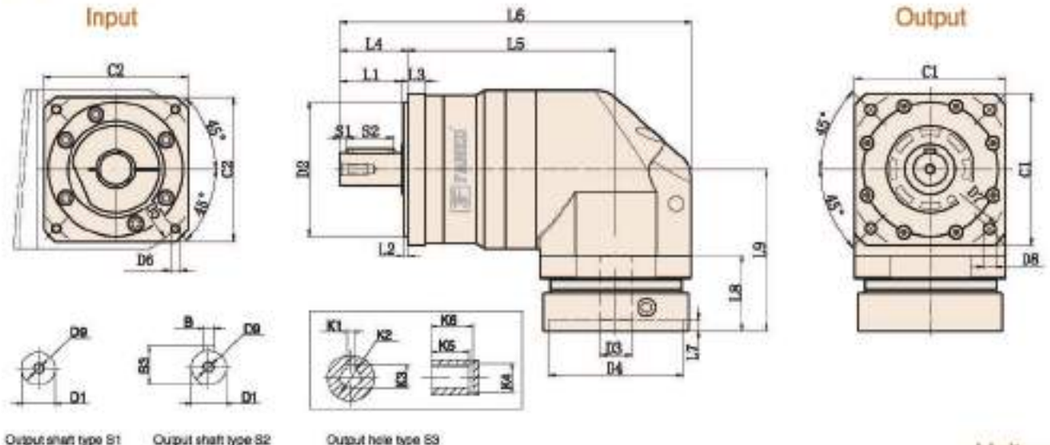
1. The Max. acceleration torque T2B=60% 2.When output speed is 100rpm, acting on the output shaft center position
3. 3-stage big ratios are not in the above table. There is shaft lengthening and enlarging design. Please tell sales person if you need it.

MODEL: FBR

1-Stage

Ratio: 3, 4, 5, 6, 7, 8, 9, 10

Dimensions:



Unit:mm

Size	FBR060-L1	FBR090-L1	FBR120-L1	FBR160-L1
D1	ϕ14	ϕ20 (22)	ϕ25	ϕ40
D2	ϕ50	ϕ80	ϕ110	ϕ130
D3	ϕ14(6.35–19)	ϕ19 (ϕ11–24)	ϕ22(16–24)	ϕ35 (ϕ22–38)
D4	ϕ50 (50–70)	ϕ80 (50–110)	ϕ80 (50–110)	ϕ114.3 (ϕ110–114.3)
D5	ϕ70 (70–130)	ϕ100 (70–145)	ϕ145 (90–155)	ϕ200 (ϕ145–200)
D6	(4–M4*10L)	(4–M6*14L)	(4–M8*20L)	4–M12 (M8–M12)
D7	ϕ70	ϕ100	ϕ130	ϕ185
D8	4–ϕ5.5	4–ϕ7	4–ϕ9	4–ϕ11
D9	M5*0.8P*15L	M8*1.0P*16.5L	M10*1.5P*23L	M16X2P
L1	28.5	36.5	50	87
L2	3	3	4	78
L3	8	10	15	5
L4	33	40.5	55	20
L5	90	123.5	165.5	111
L6	153	209	259	295
L7	(5)	(6.5)	(10)	5 (5–7)
L8	(33)	(45)	(64)	86 (62–86)
L9	(77.5)	(98)	(135.5)	165.5 (165.5–189.5)
C1	□62	□90	□120	□160
C2	(□60)	(□86)	(□130)	□175 (142)
S1	3	4	5	5
S2	22	28	40	70
S3	16	22.5	28	43
B	5	6	8	12
K1	3	6	8	10
K2	ϕ8	ϕ18	ϕ28	ϕ38
K3	9.2	21	31.3	41.3
K4	ϕ11	ϕ24	ϕ38	ϕ48
K5	20	30	27	35
K6	24	35	32	40

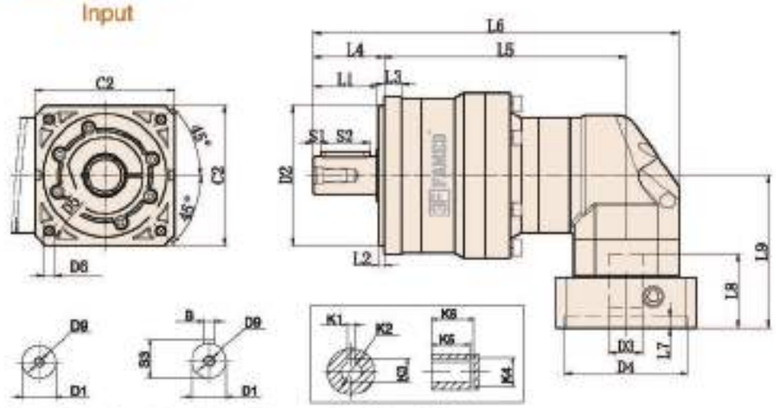
MODEL: FBR

2-Stage

Ratio: 12, 15, 16, 20, 25, 28, 30, 35, 40, 50
70, 80, 100

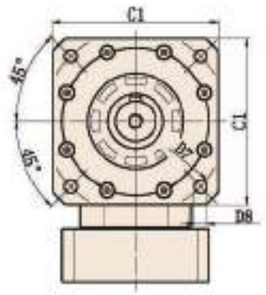
Dimensions:

Input



Output shaft type S1 Output shaft type S2 Output hole type S3

Output



Unit:mm

Size	FBR060-L2	FBR090-L2	FBR120-L2	FBR160-L2
D1	ϕ14	ϕ20 (22)	ϕ25 (32)	ϕ40
D2	ϕ50	ϕ80	ϕ110	ϕ130
D3	ϕ19(6.35-19)	ϕ19 (ϕ11-24)	ϕ22 (ϕ16-24)	ϕ35 (ϕ22-38)
D4	ϕ70 (50-70)	ϕ70 (50-110)	ϕ110 (ϕ55.5-110)	ϕ114.3 (ϕ110-114.3)
D5	ϕ90 (70-130)	ϕ90 (70-145)	ϕ145 (ϕ90-155)	ϕ200 (ϕ145-200)
D6	(4-M4*10L)	(4-M6*14L)	4-M8 (M5-M12)	4-M12 (M8-M12)
D7	ϕ70	ϕ100	ϕ130	ϕ165
D8	4-ϕ5.5	4-ϕ7	4-ϕ8.5	4-ϕ11
D9	M5*0.8P*15L	M6*1.0P*16.5L	M10X1.5P	M16X2P
L1	28.5	36.5	55	87
L2	3	3	49	78
L3	8	10	4	5
L4	33	40.5	15	20
L5	119	138	110	149
L6	182	208.5	303	333
L7	(6.5)	(6.5)	8(5-8)	5 (5-7)
L8	(42.5)	(42.5)	70 (59-70)	86 (62-86)
L9	(87)	(87)	130 (119-130)	165.5 (165.5-189.5)
C1	□62	□90	□120	□160
C2	(□80)	(□86)	130 (120)	175 (142)
S1	3	4	5	5
S2	22	28	40	70
S3	16	22.5	28	43
B	5	6	8	12
K1	3	6	8	10
K2	ϕ8	ϕ18	ϕ28	ϕ38
K3	9.2	21	31.3	41.3
K4	ϕ11	ϕ24	ϕ38	ϕ48
K5	20	30	27	35
K6	24	35	32	40

Precision Planetary Gearbox

FE

- 1.Quiet operation
  Helical gears are used to achieve smooth and quiet operation.
- 2.High precision
  The backlash is less than 3 arcmin and the positioning is accurate.
- 3.High rigidity & torqueThe use of integral ball bearings greatly improves the rigidity and torque.
- 4.Methods of flange and connector
  It can be installed on any motor in the world.
- 5.No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 6.Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

FE Type

FE090 – 10 – S1 – P1 / Motor

Reducer Model
FE040, FE060, FE090
FE120, FE160

Output Shaft Keyway
S1: Solid Output Shaft No Keyway
S2: Standard (Keyway)
S3: Output for holes

Motor Model
Motor Manufacturer & Model

Ratio
1-stage: 3,4,5,6,7,8,9,10
2-stage: 12,15,16,20,25,28,30,35,40,50,70,80,100
3-stage: 60,64,72,80,90,100,120,144,150,160,180,200
240,258,288,320,384,512,600,800,1000

Backlash Grade
P0: High precision backlash
P1: Precision backlash
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions:

A	B	C	D	E	F	H	I	J

Naming Scheme:

Type	Model	Ratio	Output Shaft Keyway	Backlash Class	MOTOR NO.

FE Reducer Specifications

Specs	Unit	Stage	Ratio	FE040	FE060	FE090	FE120	FE160
Rated Output Torque / T2N	Nm	1	3	20	55	130	208	342
			4	19	50	140	290	542
			5	22	60	160	330	650
			7	19	50	140	300	550
			10	14	40	100	230	450
		2	15	20	55	130	208	342
			20	19	50	145	290	542
			25	22	60	160	330	650
			30	22	55	130	208	342
			35	22	60	160	330	650
			40	22	50	140	290	542
			50	20	60	160	330	650
			70	19	50	140	300	550
			100	14	40	100	230	450
Max.Output Torque / T2max[1]	Nm	1,2	3–100	3Times of Nominal Output Torque				
Rated Input Speed / n1n	rpm	1,2	3–100	3000	3000	3000	3000	2500
Max.Input Speed / n1m	rpm	1,2	3–100	5000	5000	5000	5000	3600
Precision Backlash P1	arcmin	1	3–10	≤3	≤3	≤3	≤3	≤3
		2	12–100	≤5	≤5	≤5	≤5	≤5
Standard Backlash P2	arcmin	1	3–10	≤5	≤5	≤5	≤5	≤5
		2	12–100	≤7	≤7	≤7	≤7	≤7
Torsional Rigidity	Nm/arcmin	1,2	3–100	3	6	12	22	50
Max.Radial Force / Fr2[2]	N	1,2	3–100	320	460	1300	3200	6520
Max.Axial Force / Fa2[2]	N	1,2	3–100	160	230	660	1600	3260
Service Life	hr	1,2	3–100	20000 h				
Efficiency / η	%	1	3–10	≥97%				
		2	15–100	≥94%				
Weight	kg	1	3–10	0.73	0.99	2.1	4.98	18.2
		2	15–100	1.05	1.46	3.2	6.92	24.9
Operating Temperature	℃	1,2	3–100	-25℃~+90℃				
Lubrication		1,2	3–100	Synthetic Grease				
Protection Class		1,2	3–100	IP65				
Mounting Position		1,2	3–100	Any Direction				
Noise Level (n1=3000rpm，No load)	dB(A)	1,2	3–100	≤62	≤63	≤65	≤67	≤68

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	FE040	FE060	FE090	FE120	FE160
Moment of Inertia	kg·cm²	1	3	0.03	0.16	0.61	3.25	9.21
			4	0.03	0.14	0.48	2.74	7.54
			5	0.03	0.13	0.47	2.71	7.42
			7	0.03	0.13	0.45	2.65	7.25
			10	0.03	0.13	0.45	2.62	7.14
		2	12–40	0.03	0.13	0.44	2.58	7.07
			50–100	0.03	0.13	0.44	2.57	7.04

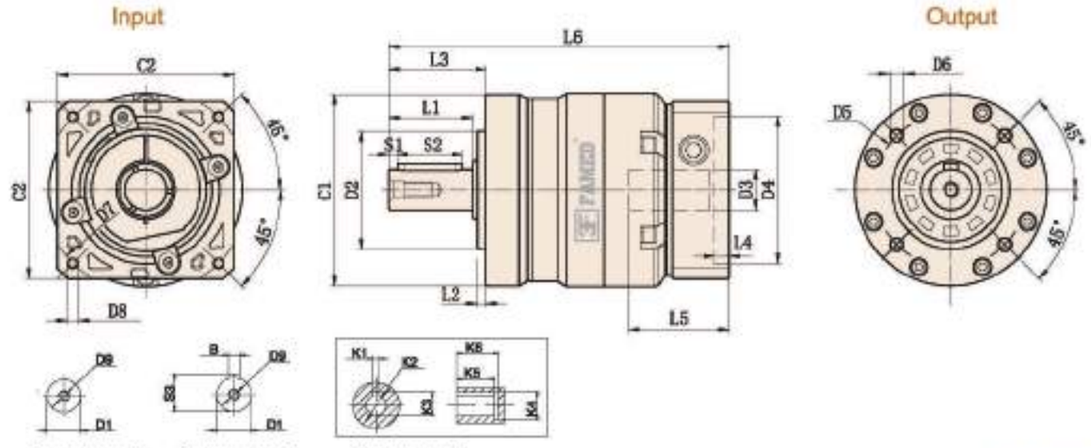
1. Ratio (i=Nin/Nout)　　2. Output revolutions 100rpm, acting on the output shaft center position.
3. *Continuous operation, service life is 10000hrs.

MODEL: FE

1–Stage

Ratio: 3, 4, 5, 6, 7, 8, 9, 10

Dimensions:



Unit:mm

Size	FE040–L1	FE060–L1	FE090–L1	FE120–L1	FE160–L1
D1	ϕ12(13)	ϕ14(16)	ϕ20(22)	ϕ25(32)	ϕ40
D2	ϕ26	ϕ40	ϕ60	ϕ80	ϕ130
D3	ϕ8(≈11)	ϕ14(≈19)	ϕ19(≈24)	ϕ24(≈32)	ϕ35(42)
D4	ϕ30(30–50)	ϕ50 (50–70)	ϕ70 (50–70)	ϕ110 (70–130)	ϕ114.3(110–150
D5	ϕ34	ϕ52	ϕ70	ϕ100	ϕ145
D6	4–M4	4–M5*10	4–M6*12	4–M10*20	4–M12
D7	ϕ46(45–70)	ϕ70 (70–130)	ϕ90 (70–130)	ϕ145 (90–165)	ϕ200(145–220)
D8	(4–M4X8L)	(4–M4*10L)	(4–M5*12L)	(4–M8*20L)	(4–M12X25L)
D9	M4X0.7P	M5*0.8P*15L	M6*1.0P*16.5L	M10*1.5P*23L	M16X2.0P
L1	18	28.5	36.5	50	60
L2	2	3	3	4	5
L3	26	33	36.5	55	67
L4	(4)	(5)	(6.5)	(10)	(7)
L5	26	(34)	(42)	(59)	86
L6	88	(115.5)	(147)	(193)	282
C1	ϕ42	ϕ65	ϕ91	ϕ120	ϕ160
C2	(□50)	(□60)	(□80)	(□130)	(□176)
S1	2	3	4	5	8
S2	14	22	28	40	65
S3	13.5	16	22.5	28	43
B	4	5	6	8	12
K1	–	3	6	8	10
K2	–	ϕ8	ϕ18	ϕ25	ϕ35
K3	–	9.2	21	28	38.3
K4	–	ϕ11	ϕ24	ϕ32	ϕ42
K5	–	20	30	40	52
K6	–	24	35	48	58

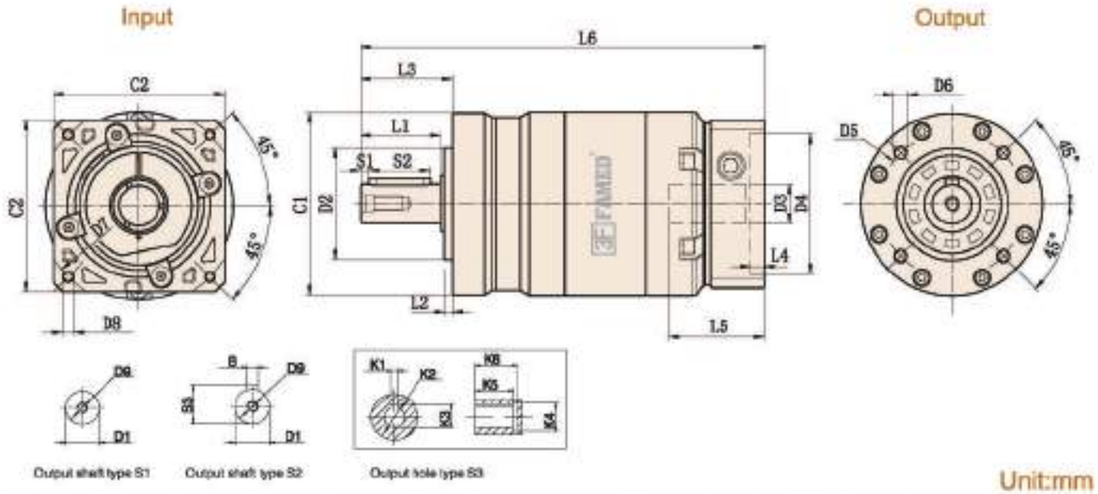
Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

MODEL: FE

2-Stage

Ratio: 12, 15, 16, 20, 25, 28, 30, 35
40, 50, 70, 80, 100

Dimensions:



Unit:mm

Size	FE040-L2	FE060-L2	FE090-L2	FE120-L2	FE160-L2
D1	ϕ12(13)	ϕ14(16)	ϕ20(22)	ϕ25(32)	ϕ40
D2	ϕ26	ϕ40	ϕ60	ϕ80	ϕ130
D3	ϕ8(≤11)	ϕ14(≤19)	ϕ19(≤24)	ϕ24(≤32)	ϕ35(42)
D4	ϕ30(30-50)	ϕ50 (50-70)	ϕ70 (50-70)	ϕ110 (70-130)	ϕ114.3(110-150)
D5	ϕ34	ϕ52	ϕ70	ϕ100	ϕ145
D6	4-M4	4-M5*10	4-M6*12	4-M10*20	4-M12
D7	ϕ46(45-70)	ϕ70 (70-130)	ϕ90 (70-130)	ϕ145 (90-165)	ϕ200(145-220)
D8	(4-M4X8L)	(4-M4*10L)	(4-M5*12L)	(4-M8*20L)	(4-M12X25L)
D9	M4X0.7P	M5*0.8P*15L	M6*1.0P*16.5L	M10*1.5P*23L	M16X2.0P
L1	18	28.5	36.5	50	80
L2	2	3	3	4	5
L3	26	33	36.5	55	87
L4	(4)	(5)	(6.5)	(10)	(7)
L5	26	(34)	(42)	(59)	86
L6	104.5	(144.5)	(177.5)	(232.5)	331.5
C1	ϕ42	ϕ66	ϕ91	ϕ120	ϕ160
C2	(□50)	(□60)	(□80)	(□130)	(□176)
S1	2	3	4	5	8
S2	14	22	28	40	65
S3	13.5	16	22.5	28	43
B	4	5	6	8	12
K1	-	3	6	8	10
K2	-	ϕ8	ϕ18	ϕ25	ϕ35
K3	-	9.2	21	28	38.3
K4	-	ϕ11	ϕ24	ϕ32	ϕ42
K5	-	20	30	40	52
K6	-	24	35	48	58

Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

Precision Right Angle Planetary Gearbox

FER

- 1. Space-saving
  The straight cross reducer uses spiral bevel gear. The installation of the motor can achieve 90 degree bending and save the installation space.
- 2.High rigidity & torque
  The use of integral ball bearings greatly improves the rigidity and torque.
- 3. Connector and shaft sleeve mode
  It can be installed on any motor in the world.
- 4. No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 5.Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

FER Type

FER090 - 10 - S1 - P1 / Motor

Reducer Model
FER040, FER060, FER090
FER120, FER160

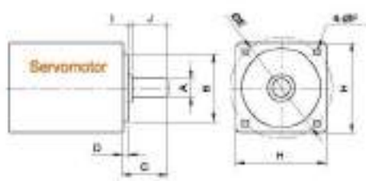
Output Shaft Keyway
S1: Solid Output Shaft No Keyway
S2: Standard (Keyway)
S3: Output for holes

Motor Model
Motor Manufacturer & Model

Ratio
1-stage: 3,4,5,6,7,8,9,10
2-stage: 12,15,16,20,25,28,30,35,40,50,70,80,100
3-stage: 60,64,72,80,90,100,120,144,150,160,180,200
240,258,288,320,384,512,600,800,1000

Backlash Grade
P0: High precision backlash
P1: Precision backlash
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions:



A	B	C	D	E	F	H	I	J

Naming Scheme:

Type — Model — Ratio — Output Shaft Keyway — Backlash Class — MOTOR NO.

FER Reducer Specifications

Specs	Unit	Stage	Ratio	FER040	FER060	FER090	FER120	FER160
Rated Output Torque / T2N	Nm	1	3	20	55	130	208	342
			4	19	50	140	290	542
			5	22	60	160	330	650
			7	19	50	140	300	550
			10	14	40	100	230	450
		2	15	20	55	130	208	342
			20	19	50	145	290	542
			25	22	60	160	330	650
			30	22	55	130	208	342
			35	22	60	160	330	650
			40	22	50	140	290	542
			50	20	60	160	330	650
			70	19	50	140	300	550
			100	14	40	100	230	450
Max.Output Torque / T2max[1]	Nm	1,2	3~100	3Times of Nominal Output Torque				
Rated Input Speed / n1N	rpm	1,2	3~100	3000	3000	3000	3000	2500
Max.Input Speed / n1s	rpm	1,2	3~100	5000	5000	5000	5000	3800
Precision Backlash P1	arcmin	1	3~10	≤8	≤8	≤8	≤8	≤8
		2	12~100	≤10	≤10	≤10	≤10	≤10
Standard Backlash P2	arcmin	1	3~10	≤11	≤11	≤11	≤11	≤11
		2	12~100	≤13	≤13	≤13	≤13	≤13
Torsional Rigidity	Nm/arcmin	1,2	3~100	3	6	12	22	50
Max.Radial Force / Fr2[2]	N	1,2	3~100	320	460	1300	3200	6520
Max.Axial Force / Fa2[2]	N	1,2	3~100	160	230	650	1600	3260
Service Life	hr	1,2	3~100	20000 h				
Efficiency / η	%	1	3~10	≥97%				
		2	15~100	≥94%				
Weight	kg	1	3~10	0.73	0.99	2.1	4.98	18.2
		2	15~100	1.05	1.46	3.2	6.92	24.9
Operating Temperature	℃	1,2	3~100	-25℃~+90℃				
Lubrication		1,2	3~100	Synthetic Grease				
Protection Class		1,2	3~100	IP65				
Mounting Position		1,2	3~100	Any Direction				
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	3~100	≤62	≤63	≤65	≤67	≤68

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	FER040	FER060	FER090	FER120	FER160
Moment of Inertia	kg.cm²	1	3	0.03	0.16	0.61	3.25	9.21
			4	0.03	0.14	0.48	2.74	7.54
			5	0.03	0.13	0.47	2.71	7.42
			7	0.03	0.13	0.45	2.65	7.25
			10	0.03	0.13	0.45	2.62	7.14
		2	12~40	0.03	0.13	0.44	2.58	7.07
			50~100	0.03	0.13	0.44	2.57	7.04

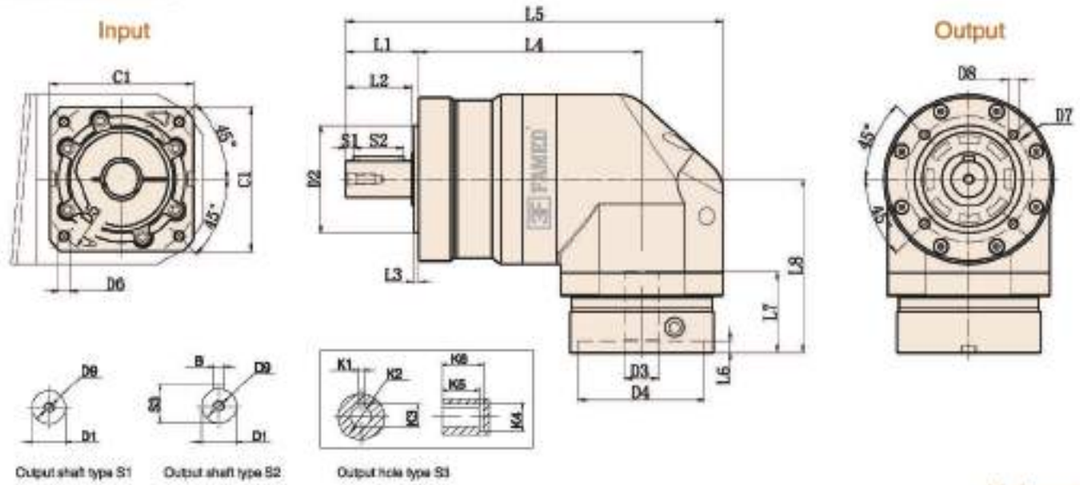
1. The Max. acceleration torque T2B=60% of T2NOT 2. When output speed is 100rpm, acting on the output shaft center position.
3. 3-stage big ratios are not in the above table. There is shaft lengthening and enlarging design. Please tell sales person if you need it.

MODEL: FER

1-Stage

Ratio: 3, 4, 5, 6, 7, 8, 9, 10

Dimensions:



Unit:mm

Size	FER060-L1	FER090-L1	FER120-L1	FER160-L1
D1	ϕ14(16)	ϕ20(22)	ϕ26(32)	ϕ40
D2	ϕ40	ϕ60	ϕ80	ϕ130
D3	ϕ14(6.35-19)	ϕ19(11-24)	ϕ22(16-24)	ϕ35 (ϕ22-38)
D4	ϕ50 (30-70)	ϕ70 (50-110)	ϕ110 (50-110)	ϕ114.3 (ϕ110-114.3)
D5	ϕ70(45-90)	ϕ90 (70-145)	ϕ145 (90-155)	ϕ200 (ϕ145-200)
D6	(4-M5*12L)	(4-M6*14L)	(4-M8*20L)	4-M12 (M8-M12)
D7	ϕ52	ϕ70	ϕ100	ϕ145
D8	4-M5*10L	4-M6*12L	4-M8*20L	4-M12X24L
D9	M5*0.8P*15L	M8*1.0P*16.5L	M10*1.5P*23L	M16X2P
L1	33	40.5	55	87
L2	28.5	36.5	50	80
L3	3	3	4	5
L4	90	123.5	148.5	111
L5	153	209	259	295
L6	(5)	6.5	(10)	5 (5-7)
L7	(33)	(45)	(64)	85 (62-86)
L8	(77.5)	(96)	(135.5)	165.5 (165.5-189.5)
C1	(□60)	(□80)	(□130)	175 (142)
S1	3	4	5	5
S2	22	28	40	70
S3	16	22.5	28	43
B	5	6	8	12
K1	4	6	8	10
K2	ϕ11	ϕ22	ϕ28	ϕ38
K3	12.8	24.5	31.3	41.3
K4	ϕ16	ϕ32	ϕ38	ϕ48
K5	15	20	27	35
K6	18	24	32	40

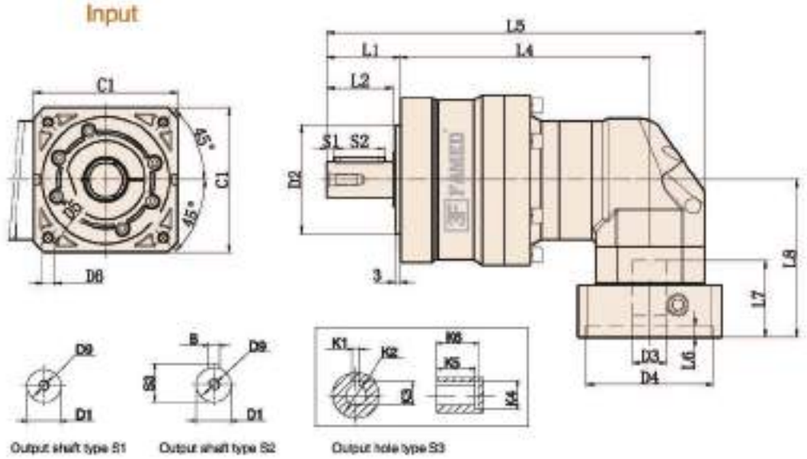
MODEL: FER

2-Stage

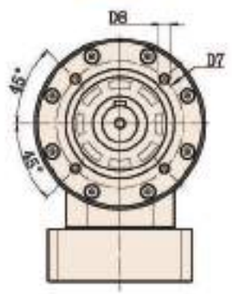
Ratio: 12, 15, 16, 20, 25, 28, 30, 35
40, 50, 70, 80, 100

Dimensions:

Input



Output



Unit:mm

Size	FER060-L2	FER090-L2	FER120-L2	FER160-L2
D1	ϕ14(16)	ϕ20(22)	ϕ25(32)	ϕ40
D2	ϕ40	ϕ60	ϕ80	ϕ130
D3	ϕ14(6.35-19)	ϕ19(11-24)	ϕ22(16-24)	ϕ35 (ϕ22-38)
D4	ϕ50 (30-70)	ϕ70 (50-110)	ϕ110 (50-110)	ϕ114.3 (ϕ110-114.3)
D5	ϕ70(45-90)	ϕ90 (70-145)	ϕ145 (90-155)	ϕ200 (ϕ145-200)
D6	(4-M5*12L)	(4-M6*14L)	(4-M8*20L)	4-M12 (M8-M12)
D7	ϕ52	ϕ70	ϕ100	ϕ145
D8	4-M5*10L	4-M6*12L	4-M8*20L	4-M12X24L
D9	M5*0.8P*15L	M6*1.0P*16.5L	M10*1.5P*23L	M16X2P
L1	33	40.5	55	87
L2	28.5	36.5	50	80
L3	3	3	4	5
L4	119	138	176.5	149
L5	182	208.5	276.5	333
L6	(5)	6.5	(10)	5 (5-7)
L7	(33)	(42.5)	(59)	86 (62-86)
L8	(77.5)	(87)	(120)	165.5 (165.5-189.5)
C1	(□60)	(□80)	(□130)	175 (142)
S1	3	4	5	5
S2	22	28	40	70
S3	16	22.5	28	43
B	5	6	8	12
K1	4	6	8	10
K2	ϕ11	ϕ22	ϕ28	ϕ38
K3	12.8	24.5	31.3	41.3
K4	ϕ16	ϕ32	ϕ38	ϕ48
K5	15	20	27	35
K6	18	24	32	40

Standard Type Planetary Gearbox

PLF

- 1.Quiet operation
  Helical gears are used to achieve smooth and quiet operation.
- 2.High rigidity & torqueThe use of integral ball bearings greatly improves the rigidity and torque.
- 3.Methods of flange and connector
  It can be installed on any motor in the world.
- 4.No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 5.Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

PLF Type

PLF080 – 10 – S1 – P1 / Motor

Reducer Model
PLF040, PLF060, PLF080, PLF090
PLF120, PLF160

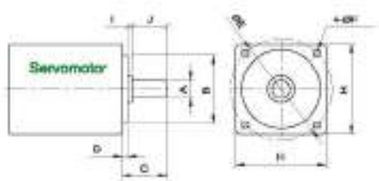
Output Shaft Keyway
S1: Solid Output Shaft No Keyway
S2: Standard (Keyway)
S3: Output for holes

Motor Model
Motor Manufacturer & Model

Ratio
1-stage: 3,4,5,6,7,8,9,10
2-stage: 12,15,16,20,25,28,30,35,40,50,70,80,100
3-stage: 60,64,72,80,90,100,120,144,150,160,180,200
240,258,288,320,384,512,600,800,1000

Backlash Grade
P0: High precision backlash
P1: Precision backlash
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions:



A	B	C	D	E	F	H	I	J

Naming Scheme:

Type	Model	Ratio	Output Shaft Keyway	Backlash Class	MOTOR NO.

PLF Reducer Specifications

Specs	Unit	Stage	Ratio	PLF040	PLF060	PLF080	PLF090	PLF120	PLF160
Rated Output Torque / T2N	Nm	1	3	14	28	105	113	120	323
			4	15	38	108	115	215	364
			5	17	40	112	118	230	423
			7	13	35	105	110	160	358
			10	10	15	50	56	110	293
		2	15	14	28	105	113	120	323
			20	15	36	108	120	240	364
			25	17	40	112	118	250	423
			30	13	28	105	113	120	323
			35	17	35	112	118	240	358
			40	12	38	110	115	236	364
			50	15	40	108	118	230	423
			70	13	35	105	110	210	358
			100	12	31	50	56	210	293
Max.Output Torque / Tmax[1]	Nm	1,2	3~100	3Times of Nominal Output Torque					
Rated Input Speed / n1N	rpm	1,2	3~100	3000	3000	3000	3000	3000	2500
Max.Input Speed / n1m	rpm	1,2	3~100	5000	5000	5000	5000	5000	3600
Precision Backlash P1	arcmin	1	3~10	≤6	≤6	≤6	≤6	≤6	≤6
		2	12~100	≤8	≤8	≤8	≤8	≤8	≤8
Standard Backlash P2	arcmin	1	3~10	≤7	≤7	≤7	≤7	≤7	≤7
		2	12~100	≤10	≤10	≤10	≤10	≤10	≤10
Torsional Rigidity	Nm/arcmin	1,2	3~100	3	6	12	12	22	50
Max.Radial Force / Fr2[2]	N	1,2	3~100	320	460	1300	1300	3200	6520
Max.Axial Force / Fa2[2]	N	1,2	3~100	160	230	660	660	1600	3260
Service Life	hr	1,2	3~100	20000 h					
Efficiency / η	%	1	3~10	≥97%					
		2	15~100	≥94%					
Weight	kg	1	3~10	0.73	0.99	2.1	2.5	4.96	18.2
		2	15~100	1.05	1.46	3.2	3.5	6.92	24.9
Operating Temperature	℃	1,2	3~100	-25℃~+90℃					
Lubrication		1,2	3~100	Synthetic Grease					
Protection Class		1,2	3~100	IP65					
Mounting Position		1,2	3~100	Any Direction					
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	3~100	≤62	≤63	≤65	≤65	≤67	≤68

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	PLF040	PLF060	PLF080	PLF090	PLF120	PLF160
Moment of Inertia	kg.cm²	1	3	0.03	0.16	0.61	0.61	3.25	9.21
			4	0.03	0.14	0.48	0.48	2.74	7.54
			5	0.03	0.13	0.47	0.47	2.71	7.42
			7	0.03	0.13	0.45	0.45	2.65	7.25
			10	0.03	0.13	0.45	0.45	2.62	7.14
		2	12~40	0.03	0.13	0.44	0.44	2.58	7.07
			50~100	0.03	0.13	0.44	0.44	2.57	7.04

1. Ratio (i=Nin/Nout) 2. Output revolutions 100rpm, acting on the output shaft center position.
3. *Continuous operation, service life is 10000hrs.

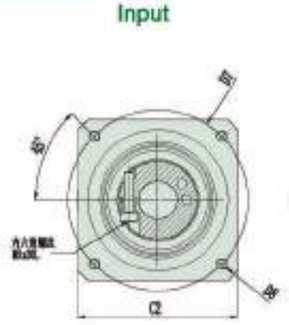
MODEL: PLF

1-Stage

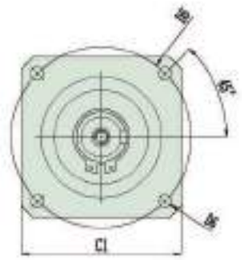
Ratio: 3, 4, 5, 6, 7, 8, 9, 10

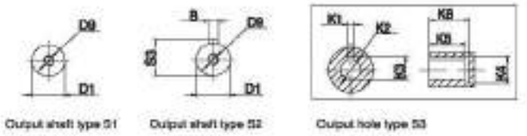
Dimensions:

Input



Output





Unit:mm

Size	PLF040-L1	PLF060-L1	PLF080-L1	PLF090-L1	PLF120-L1	PLF160-L1
D1	ϕ10	ϕ14	ϕ20	ϕ20	ϕ25	ϕ40
D2	ϕ35	ϕ50	ϕ80	ϕ80	ϕ110	ϕ130
D3	ϕ8 (≤8)	ϕ14 (≤19)	ϕ19 (≤19)	ϕ19 (≤22)	ϕ22 (≤24)	ϕ35 (≤35)
D4	ϕ30 (30-50)	ϕ50 (50-70)	ϕ70 (50-110)	ϕ70 (50-110)	ϕ110 (70-130)	ϕ114.3 (110-150)
D5	ϕ50	ϕ70	ϕ100	ϕ100	ϕ130	ϕ185
D6	4-ϕ3.5	4-ϕ5.5	4-ϕ6.5	4-ϕ6.5	4-ϕ8.5	4-ϕ11
D7	ϕ46 (45-70)	ϕ70 (70-130)	ϕ90 (70-145)	ϕ90 (70-145)	ϕ145 (90-165)	ϕ200 (145-220)
D8	(4-M4*12L)	(4-M4*8L)	(4-M6*10L)	(4-M6*10L)	(4-M8*16L)	(4-M12*20L)
D9	M3*9L	M5*18L	M6*18L	M6*18L	M10*25L	M16*36L
L1	23	30	38	38	50	80
L2	2	3	3	3	4	5
L3	5	11	10	10	18	20
L4	26	35	40.5	40.5	55.5	87
L5	(3.5)	(4)	(5)	(6)	(10)	(10)
L6	(27)	(31)	(42)	(47)	(62.5)	(81)
L7	(88)	(115)	(139)	(150)	(210)	(276)
C1	□42	□60	□90	□90	□120	□165
C2	(□42)	(□60)	(□80)	(□90)	(□120)	(□176)
S1	2	3	3	3	5	5
S2	16	20	25	25	40	65
S3	11.2	16	22.5	22.5	28	43
B	3	5	6	6	8	12
K1	-	3	5	5	6	10
K2	-	ϕ10	ϕ15	ϕ15	ϕ20	ϕ35
K3	-	11.4	17.3	17.3	22.8	38.3
K4	-	20	30	30	38	58
K5	-	15	20	20	27	35
K6	-	18	24	24	32	40

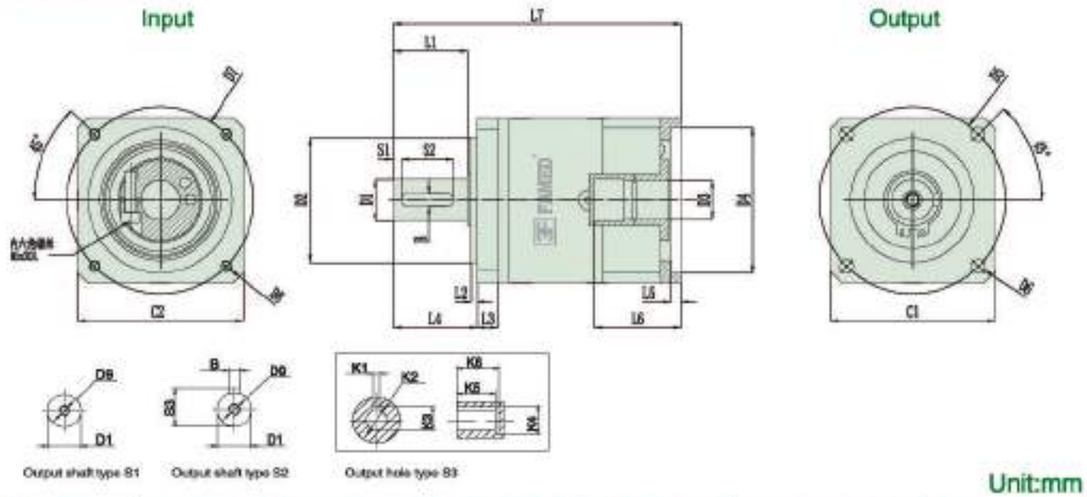
Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

MODEL: PLF

2-Stage

Ratio: 12, 15, 16, 20, 25, 28, 30, 35
40, 50, 70, 80, 100

Dimensions:



Unit:mm

Size	PLF040-L2	PLF060-L2	PLF080-L2	PLF090-L2	PLF120-L2	PLF160-L2
D1	ϕ10	ϕ14	ϕ20	ϕ20	ϕ25	ϕ40
D2	ϕ35	ϕ50	ϕ80	ϕ80	ϕ110	ϕ130
D3	ϕ8 (≤8)	ϕ14 (≤19)	ϕ19 (≤19)	ϕ19 (≤22)	ϕ22 (≤24)	ϕ35 (≤35)
D4	ϕ30 (30-50)	ϕ50 (50-70)	ϕ70 (50-110)	ϕ70 (50-110)	ϕ110 (70-130)	ϕ114.3 (110-150)
D5	ϕ50	ϕ70	ϕ100	ϕ100	ϕ130	ϕ185
D6	4-ϕ3.5	4-ϕ5.5	4-ϕ6.5	4-ϕ6.5	4-ϕ8.5	4-ϕ11
D7	ϕ46 (45-70)	ϕ70 (70-130)	ϕ90 (70-145)	ϕ90 (70-145)	ϕ145 (90-165)	ϕ200 (145-220)
D8	(4-M4*12L)	(4-M4*8L)	(4-M6*10L)	(4-M6*10L)	(4-M8*16L)	(4-M12*20L)
D9	M3*9L	M5*18L	M6*18L	M6*18L	M10*25L	M16*36L
L1	23	30	36	36	50	60
L2	2	3	3	3	4	5
L3	5	11	10	10	18	20
L4	26	35	40.5	40.5	55.5	67
L5	(3.5)	(4)	(5)	(5)	(10)	(10)
L6	(27)	(31)	(42)	(47)	(62.5)	(81)
L7	(103)	(133)	(159)	(170)	(240)	(317)
C1	□42	□60	□90	□90	□120	□165
C2	(□42)	(□60)	(□80)	(□90)	(□120)	(□176)
S1	2	3	3	3	5	5
S2	16	20	25	25	40	65
S3	11.2	16	22.5	22.5	28	43
B	3	5	6	6	8	12
K1	-	3	5	5	6	10
K2	-	ϕ10	ϕ15	ϕ15	ϕ20	ϕ35
K3	-	11.4	17.3	17.3	22.8	38.3
K4	-	20	30	30	38	58
K5	-	15	20	20	27	35
K6	-	18	24	24	32	40

Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

Standard Type Right Angle Planetary Gearbox

PFR

- 1. Space-saving
  The straight cross reducer uses spiral bevel gear. The installation of the motor can achieve 90 degree bending and save the installation space.
- 2.High rigidity & torque
  The use of integral ball bearings greatly improves the rigidity and torque.
- 3. Connector and shaft sleeve mode
  It can be installed on any motor in the world.
- 4. No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 5.Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

PFR Type

PFR090 - 10 - S1 - P1 / Motor

Reducer Model
PFR040, PFR060, PFR090
PFR120, PFR160

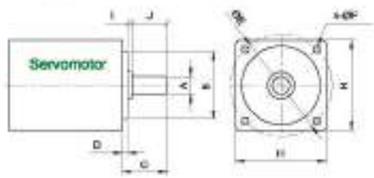
Output Shaft Keyway
S1: Solid Output Shaft No Keyway
S2: Standard (Keyway)
S3: Output for holes

Motor Model
Motor Manufacturer & Model

Ratio
1-stage: 3,4,5,6,7,8,9,10
2-stage: 12,15,16,20,25,28,30,35,40,50,70,80,100
3-stage: 60,64,72,80,90,100,120,144,150,160,180,200
240,256,288,320,384,512,600,800,1000

Backlash Grade
P0: High precision backlash
P1: Precision backlash
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions:



A	B	C	D	E	F	H	I	J

Naming Scheme:

Type	Model	Ratio	Output Shaft Keyway	Backlash Class	MOTOR NO.

PFR Reducer Specifications

Specs	Unit	Stage	Ratio	PFR040	PFR060	PFR090	PFR120	PFR160
Rated Output Torque / T2N	Nm	1	3	14	28	113	161	323
			4	15	38	115	210	364
			5	17	40	118	210	423
			7	13	35	110	170	358
			10	12	16	56	86	293
		2	15	14	28	113	161	323
			20	15	38	120	210	364
			25	17	40	118	210	423
			30	13	28	113	210	323
			35	17	35	118	210	358
			40	12	38	115	210	364
			50	15	40	118	210	423
			70	13	35	110	170	358
			100	12	16	56	86	293
Max.Output Torque / T2max[1]	Nm	1,2	3-100	3Times of Nominal Output Torque				
Rated Input Speed / n1n	rpm	1,2	3-100	3000	3000	3000	3000	2500
Max.Input Speed / n1w	rpm	1,2	3-100	5000	5000	5000	5000	3600
Precision Backlash P1	arcmin	1	3-10	≤10	≤10	≤10	≤10	≤10
		2	12-100	≤12	≤12	≤12	≤12	≤12
Standard Backlash P2	arcmin	1	3-10	≤12	≤12	≤12	≤12	≤12
		2	12-100	≤14	≤14	≤14	≤14	≤14
Torsional Rigidity	Nm/arcmin	1,2	3-100	3	6	12	22	50
Max.Radial Force / Fr2[2]	N	1,2	3-100	320	460	1300	3200	6520
Max.Axial Force / Fa2[2]	N	1,2	3-100	160	230	660	1600	3260
Service Life	hr	1,2	3-100	20000 h				
Efficiency / η	%	1	3-10	≥97%				
		2	15-100	≥94%				
Weight	kg	1	3-10	0.73	0.99	2.1	4.98	18.2
		2	15-100	1.05	1.46	3.2	6.92	24.9
Operating Temperature	℃	1,2	3-100	-25℃~+90℃				
Lubrication		1,2	3-100	Synthetic Grease				
Protection Class		1,2	3-100	IP65				
Mounting Position		1,2	3-100	Any Direction				
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	3-100	≤62	≤63	≤65	≤67	≤68

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	PFR040	PFR060	PFR090	PFR120	PFR160
Moment of Inertia	kg·cm²	1	3	0.03	0.16	0.61	3.25	9.21
			4	0.03	0.14	0.48	2.74	7.54
			5	0.03	0.13	0.47	2.71	7.42
			7	0.03	0.13	0.45	2.65	7.25
			10	0.03	0.13	0.45	2.62	7.14
		2	12-40	0.03	0.13	0.44	2.58	7.07
			50-100	0.03	0.13	0.44	2.57	7.04

1. The Max. acceleration torque T2B=60% 2.When output speed is 100rpm, acting on the output shaft center position
3. 3-stage big ratios are not in the above table. There is shaft lengthening and enlarging design. Please tell sales person if you need it.

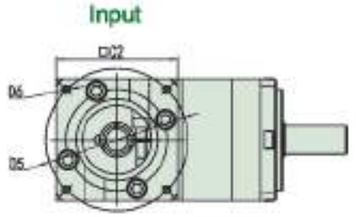
MODEL: PFR

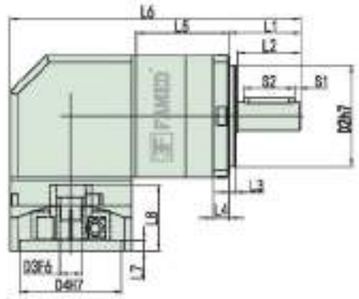
1-Stage

Ratio: 3, 4 , 5, 6, 7, 8, 9, 10

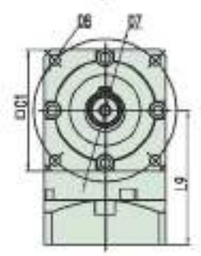
Dimensions:

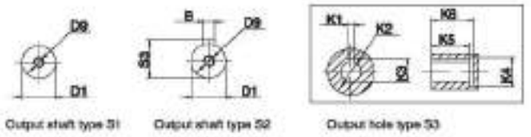
Input





Output





Output shaft type S1 Output shaft type S2 Output hole type S3

Unit:mm

Size	PFR060-L1	PFR080-L1	PFR120-L1	PFR160-L1
D1	ϕ14(16)	ϕ20 (22)	ϕ25 (32)	ϕ40
D2	ϕ50	ϕ60	ϕ110	ϕ130
D3	ϕ14 (ϕ6.35-19)	ϕ19 (ϕ11-24)	ϕ22 (ϕ16-24)	ϕ35 (ϕ22-38)
D4	ϕ50 (ϕ30-70)	ϕ70 (ϕ50-110)	ϕ110 (ϕ55.5-110)	ϕ114.3 (ϕ110-114.3)
D5	ϕ70 (ϕ45-90)	ϕ90 (ϕ70-145)	ϕ145 (ϕ90-155)	ϕ200 (ϕ145-200)
D6	4-M4 (M3-M5)	4-M5 (M4-M8)	4-M8 (M6-M12)	4-M12 (M8-M12)
D7	ϕ70	ϕ100	ϕ130	ϕ165
D8	4-ϕ5.5	4-ϕ6.5	4-ϕ8.5	4-ϕ11
D9	M5X0.8P	M8X1.25P	M10X1.5P	M16X2P
L1	35	40	55	87
L2	31	35	49	78
L3	3	3	4	5
L4	8	12	15	20
L5	46	55	80	111
L6	143	190	273	285
L7	5(4-5)	8(5-8)	8(5-8)	5 (5-7)
L8	32(32-44)	42(42-60)	70 (59-70)	86 (62-86)
L9	66(66-88)	95.5(95.5-113.5)	130 (119-130)	165.5 (165.5-189.5)
C1	60	90	120	160
C2	60(60-90)	90(90-130)	130 (120)	175 (142)
S1	3	3	5	5
S2	25	30	40	70
S3	16	22.5	28	43
B	5	6	8	12
K1	4	6	8	10
K2	ϕ11	ϕ22	ϕ26	ϕ36
K3	12.8	24.5	31.3	41.3
K4	ϕ16	ϕ32	ϕ38	ϕ48
K5	15	20	27	35
K6	18	24	32	40

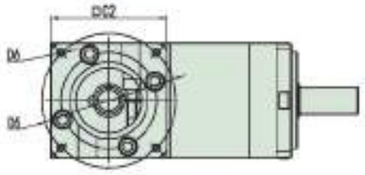
MODEL: PFR

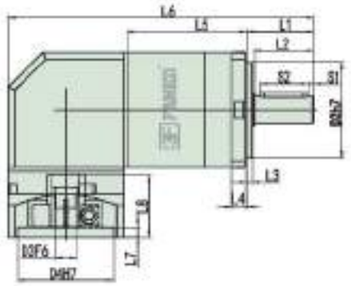
2-Stage

Ratio: 12, 15, 16, 20, 25, 28, 30, 35
40, 50, 70, 80, 100

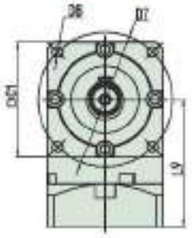
Dimensions:

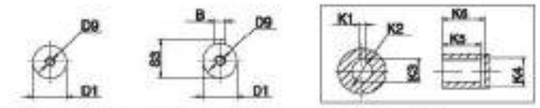
Input





Output





Output shaft type S1 | Output shaft type S2 | Output hole type S3

Unit:mm

Size	PFR060-L2	PFR080-L2	PFR120-L2	PFR160-L2
D1	ϕ14(16)	ϕ20 (22)	ϕ25 (32)	ϕ40
D2	ϕ50	ϕ80	ϕ110	ϕ130
D3	ϕ14 (ϕ6.35-19)	ϕ19 (ϕ11-24)	ϕ22 (ϕ16-24)	ϕ35 (ϕ22-38)
D4	ϕ50 (ϕ30-70)	ϕ70 (ϕ50-110)	ϕ110 (ϕ55.5-110)	ϕ114.3 (ϕ110-114.3)
D5	ϕ70 (ϕ45-90)	ϕ90 (ϕ70-145)	ϕ145 (ϕ90-155)	ϕ200 (ϕ145-200)
D6	4-M4 (M3-M6)	4-M5 (M4-M8)	4-M8 (M6-M12)	4-M12 (M8-M12)
D7	ϕ70	ϕ100	ϕ130	ϕ165
D8	4-ϕ5.5	4-ϕ6.5	4-ϕ8.5	4-ϕ11
D9	M5X0.8P	M8X1.25P	M10X1.5P	M16X2P
L1	35	40	55	87
L2	31	35	49	78
L3	3	3	4	5
L4	8	12	15	20
L5	62	78.5	110	149
L6	159	213.5	303	333
L7	5(4-6)	8(5-8)	8(5-8)	5 (5-7)
L8	32(32-44)	42(42-60)	70 (59-70)	86 (62-86)
L9	66(66-88)	95.5(95.5-113.5)	130 (119-130)	165.5 (165.5-189.5)
C1	60	90	120	160
C2	60(60-90)	90(90-130)	130 (120)	175 (142)
S1	3	3	5	5
S2	25	30	40	70
S3	16	22.5	28	43
B	5	6	8	12
K1	4	6	8	10
K2	ϕ11	ϕ22	ϕ28	ϕ38
K3	12.8	24.5	31.3	41.3
K4	ϕ16	ϕ32	ϕ38	ϕ48
K5	15	20	27	35
K6	18	24	32	40

Standard Type Planetary Gearbox

PLE

- 1.Quiet operation
  Helical gears are used to achieve smooth and quiet operation.
- 2.High rigidity & torqueThe use of integral ball bearings greatly improves the rigidity and torque.
- 3.Methods of flange and connector
  It can be installed on any motor in the world.
- 4.No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 5.Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

PLE Type

PLE080 – 10 – S1 – P1 / Motor

Reducer Model
PLE040, PLE060, PLE080, PLE090
PLE120, PLE160

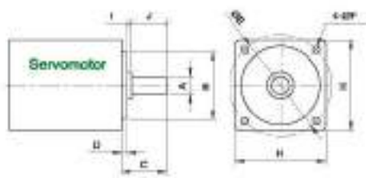
Output Shaft Keyway
S1: Solid Output Shaft No Keyway
S2: Standard (Keyway)
S3: Output for holes

Motor Model
Motor Manufacturer & Model

Ratio
1-stage: 3,4,5,6,7,8,9,10
2-stage: 12,15,16,20,25,28,30,35,40,50,70,80,100
3-stage: 60,64,72,80,90,100,120,144,150,160,180,200
240,258,288,320,384,512,600,800,1000

Backlash Grade
P0: High precision backlash
P1: Precision backlash
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions:



A	B	C	D	E	F	H	I	J

Naming Scheme:

Type	Model	Ratio	Output Shaft Keyway	Backlash Class	MOTOR NO.

PLE Reducer Specifications

Specs	Unit	Stage	Ratio	PLE040	PLE060	PLE080	PLE090	PLE120	PLE160
Rated Output Torque / T2N	Nm	1	3	14	28	105	113	120	323
			4	15	38	108	115	215	364
			5	17	40	112	118	230	423
			7	13	35	105	110	160	358
			10	10	15	50	56	110	293
		2	15	14	28	105	113	120	323
			20	15	38	108	120	240	364
			25	17	40	112	118	250	423
			30	13	28	105	113	120	323
			35	17	35	112	118	240	358
			40	12	38	110	115	236	364
			50	15	40	108	118	230	423
			70	13	35	105	110	210	358
			100	12	31	50	56	210	293
Max.Output Torque / T2max[1]	Nm	1,2	3~100	3Times of Nominal Output Torque					
Rated Input Speed / n1n	rpm	1,2	3~100	3000	3000	3000	3000	3000	2500
Max.Input Speed / n1max	rpm	1,2	3~100	5000	5000	5000	5000	5000	3600
Precision Backlash P1	arcmin	1	3~10	≤6	≤6	≤6	≤6	≤6	≤6
		2	12~100	≤6	≤6	≤6	≤6	≤6	≤6
Standard Backlash P2	arcmin	1	3~10	≤8	≤8	≤8	≤8	≤8	≤8
		2	12~100	≤10	≤10	≤10	≤10	≤10	≤10
Torsional Rigidity	Nm/arcmin	1,2	3~100	3	6	12	12	22	50
Max.Radial Force / F_{2r}[2]	N	1,2	3~100	320	460	1300	1300	3200	6520
Max.Axial Force / F_{2a}[2]	N	1,2	3~100	160	230	660	660	1600	3260
Service Life	hr	1,2	3~100	20000 h					
Efficiency / η	%	1	3~10	≥97%					
		2	15~100	≥94%					
Weight	kg	1	3~10	0.73	0.99	2.1	2.4	4.98	18.2
		2	15~100	1.05	1.46	3.2	3.6	6.92	24.9
Operating Temperature	℃	1,2	3~100	-25℃~+90℃					
Lubrication		1,2	3~100	Synthetic Grease					
Protection Class		1,2	3~100	IP65					
Mounting Position		1,2	3~100	Any Direction					
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	3~100	≤62	≤63	≤65	≤65	≤67	≤68

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	PLE040	PLE060	PLE080	PLE090	PLE120	PLE160
Moment of Inertia	kg.cm²	1	3	0.03	0.16	0.61	0.61	3.25	9.21
			4	0.03	0.14	0.48	0.48	2.74	7.54
			5	0.03	0.13	0.47	0.47	2.71	7.42
			7	0.03	0.13	0.45	0.45	2.65	7.25
			10	0.03	0.13	0.45	0.45	2.62	7.14
		2	12~40	0.03	0.13	0.44	0.44	2.58	7.07
			50~100	0.03	0.13	0.44	0.44	2.57	7.04

1. Ratio (i=Nin/Nout) 2. Output revolutions 100rpm, acting on the output shaft center position.
3. *Continuous operation, service life is 10000hrs.

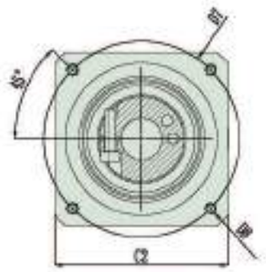
MODEL: PLE

1-Stage

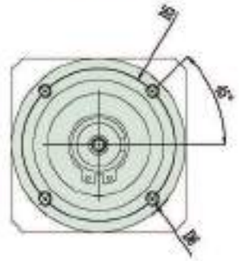
Ratio: 3, 4, 5, 6, 7, 8, 9, 10

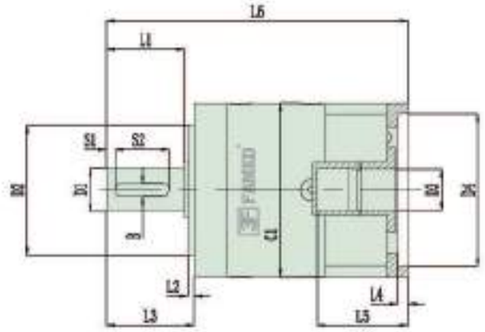
Dimensions:

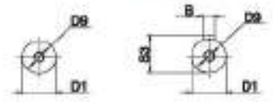
Input



Output

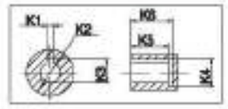






Output shaft type S1

Output shaft type S2



Output hole type S3

Unit:mm

Size	PLE040-L1	PLE060-L1	PLE080-L1	PLE090-L1	PLE120-L1	PLE160-L1
D1	ϕ10	ϕ14	ϕ20	ϕ20	ϕ25	ϕ40
D2	ϕ26	ϕ40	ϕ60	ϕ60	ϕ60	ϕ130
D3	ϕ8 (≤8)	ϕ14 (≤14)	ϕ19 (≤19)	ϕ19 (≤24)	ϕ22 (≤24)	ϕ35 (≤35)
D4	ϕ30 (30~50)	ϕ50 (50~70)	ϕ70 (50~110)	ϕ70 (50~110)	ϕ110 (70~130)	ϕ114.3 (110~150)
D5	ϕ34	ϕ52	ϕ70	ϕ70	ϕ100	ϕ145
D6	(4-M4*8L)	(4-M5*15L)	(4-M6*12L)	(4-M6*20L)	(4-M10*18L)	(4-M12*24L)
D7	ϕ46 (45~70)	ϕ70 (70~130)	ϕ90 (70~145)	ϕ90 (70~145)	ϕ145 (90~185)	ϕ200 (145~220)
D8	(4-M4*12L)	(4-M5*10L)	(4-M6*15L)	(4-M6*15L)	(4-M8*16L)	(4-M12*20L)
D9	M3*9L	M5*16L	M6*18L	M6*18L	M10*25L	M16*30L
L1	23	30	36	36	50	80
L2	2	3	3	3	4	5
L3	26	35	40.5	40.5	55.5	87
L4	(3.5)	(4)	(5)	(6)	(10)	(10)
L5	(27)	(31)	(42)	(47)	(62.5)	(81)
L6	(88)	(115)	(139.0)	(150)	(210)	(276)
C1	ϕ42	ϕ60	ϕ80		ϕ120	ϕ165
C2	(□42)	(□60)	(□80)	(□90)	(□120)	(□176)
S1	2	3	4	3	5	5
S2	16	20	25	25	40	65
S3	11.2	16	22.5	22.5	28	43
B	3	5	6	6	8	12
K1	-	3	5	5	6	10
K2	-	ϕ10	ϕ15	ϕ15	ϕ20	ϕ35
K3	-	11.4	17.3	17.3	22.8	38.3
K4	-	20	30	30	38	58
K5	-	15	20	20	27	35
K6	-	18	24	24	32	40

Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

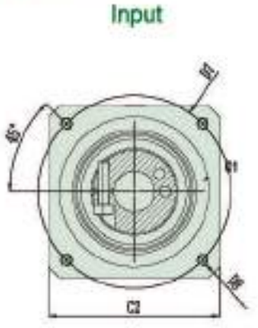
MODEL: PLE

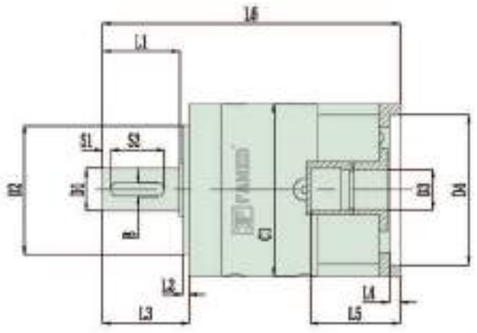
2-Stage

Ratio: 12, 15, 16, 20, 25, 28, 30, 35
40, 50, 70, 80, 100

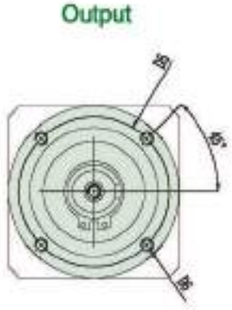
Dimensions:

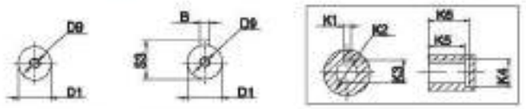
Input





Output





Output shaft type S1 Output shaft type S2 Output hole type S3

Unit:mm

Size	PLE040-L2	PLE060-L2	PLE080-L2	PLE090-L2	PLE120-L2	PLE160-L2
D1	φ10	φ14	φ20	φ20	φ25	φ40
D2	φ26	φ40	φ60	φ60	φ80	φ130
D3	φ8 (≤8)	φ14 (≤14)	φ19 (≤19)	φ19 (≤24)	φ22 (≤24)	φ35 (≤35)
D4	φ30 (30-50)	φ50 (50-70)	φ70 (50-110)	φ70 (50-110)	φ110 (70-130)	φ114.3 (110-150)
D5	φ34	φ52	φ70	φ70	φ100	φ145
D6	(4-M4*8L)	(4-M5*15L)	(4-M6*12L)	(4-M6*20L)	(4-M10*16L)	(4-M12*24L)
D7	φ46 (45-70)	φ70 (70-130)	φ90 (70-145)	φ90 (70-145)	φ145 (90-165)	φ200 (145-220)
D8	(4-M4*12L)	(4-M5*10L)	(4-M6*15L)	(4-M6*15L)	(4-M8*16L)	(4-M12*20L)
D9	M3*9L	M5*16L	M6*18L	M6*16L	M10*25L	M16*30L
L1	23	30	36	36	50	80
L2	2	3	3	3	4	5
L3	26	35	40.5	40.5	55.5	87
L4	(3.5)	(4)	(5)	(6)	(10)	(10)
L5	(27)	(31)	(42)	(47)	(62.5)	(81)
L6	(103)	(133)	(159.0)	(170)	(239.5)	(317)
C1	φ42	φ60	φ80		φ120	φ165
C2	(□42)	(□60)	(□80)	(□90)	(□120)	(□176)
S1	2	3	4	3	5	5
S2	16	20	25	25	40	65
S3	11.2	16	22.5	22.5	28	43
B	3	5	6	6	8	12
K1	-	3	5	5	6	10
K2	-	φ10	φ15	φ15	φ20	φ35
K3	-	11.4	17.3	17.3	22.8	38.3
K4	-	20	30	30	38	58
K5	-	15	20	20	27	35
K6	-	18	24	24	32	40

Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

Standard Type Right Angle Planetary Gearbox

PER

- 1. Space-saving
  The straight cross reducer uses spiral bevel gear. The installation of the motor can achieve 90 degree bending and save the installation space.
- 2.High rigidity & torque
  The use of integral ball bearings greatly improves the rigidity and torque.
- 3. Connector and shaft sleeve mode
  It can be installed on any motor in the world.
- 4. No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 5.Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

PER Type

PER090 - 10 - S1 - P1 / Motor

Reducer Model
PER040, PER060, PER090
PER120, PER160

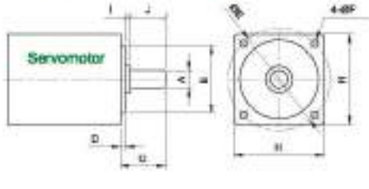
Output Shaft Keyway
S1: Solid Output Shaft No Keyway
S2: Standard (Keyway)
S3: Output for holes

Motor Model
Motor Manufacturer & Model

Ratio
1-stage: 3,4,5,6,7,8,9,10
2-stage: 12,15,16,20,25,28,30,35,40,50,70,80,100
3-stage: 60,64,72,80,90,100,120,144,150,160,180,200
240,258,288,320,384,512,600,800,1000

Backlash Grade
P0: High precision backlash
P1: Precision backlash
P2: Standard backlash

The gearbox matching motor needs to be confirmed with following dimensions:



A	B	C	D	E	F	H	I	J

Naming Schema:

Type - Model - Ratio - Output Shaft Keyway - Backlash Class - MOTOR NO.

PER Reducer Specifications

Specs	Unit	Stage	Ratio	PER040	PER060	PER090	PER120	PER160
Rated Output Torque / T2N	Nm	1	3	14	28	113	161	323
			4	15	38	115	210	364
			5	17	40	118	210	423
			7	13	35	110	170	358
			10	12	16	56	86	293
		2	15	14	28	113	161	323
			20	15	38	120	210	364
			25	17	40	118	210	423
			30	13	28	113	210	323
			35	17	35	118	210	358
			40	12	38	115	210	364
			50	15	40	118	210	423
			70	13	35	110	170	358
			100	12	16	56	86	293
Max.Output Torque / T2MAX[1]	Nm	1,2	3~100	3Times of Nominal Output Torque				
Rated Input Speed / n1N	rpm	1,2	3~100	3000	3000	3000	3000	2500
Max.Input Speed / n1B	rpm	1,2	3~100	5000	5000	5000	5000	3600
Precision Backlash P1	arcmin	1	3~10	≤10	≤10	≤10	≤10	≤10
		2	12~100	≤12	≤12	≤12	≤12	≤12
Standard Backlash P2	arcmin	1	3~10	≤12	≤12	≤12	≤12	≤12
		2	12~100	≤14	≤14	≤14	≤14	≤14
Torsional Rigidity	Nm/arcmin	1,2	3~100	3	6	12	22	50
Max.Radial Force / Frad[2]	N	1,2	3~100	320	460	1300	3200	6520
Max.Axial Force / Faxi[2]	N	1,2	3~100	160	230	660	1600	3260
Service Life	hr	1,2	3~100	20000 h				
Efficiency / η	%	1	3~10	≥97%				
		2	15~100	≥94%				
Weight	kg	1	3~10	0.73	0.99	2.1	4.98	18.2
		2	15~100	1.05	1.46	3.2	6.92	24.9
Operating Temperature	℃	1,2	3~100	-25℃~+90℃				
Lubrication		1,2	3~100	Synthetic Grease				
Protection Class		1,2	3~100	IP65				
Mounting Position		1,2	3~100	Any Direction				
Noise Level (n1=3000rpm, No load)	dB(A)	1,2	3~100	≤62	≤63	≤65	≤67	≤68

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	PER040	PER060	PER090	PER120	PER160
Moment of Inertia	kg.cm²	1	3	0.03	0.16	0.61	3.25	9.21
			4	0.03	0.14	0.48	2.74	7.54
			5	0.03	0.13	0.47	2.71	7.42
			7	0.03	0.13	0.45	2.65	7.25
			10	0.03	0.13	0.45	2.62	7.14
		2	12~40	0.03	0.13	0.44	2.58	7.07
			50~100	0.03	0.13	0.44	2.57	7.04

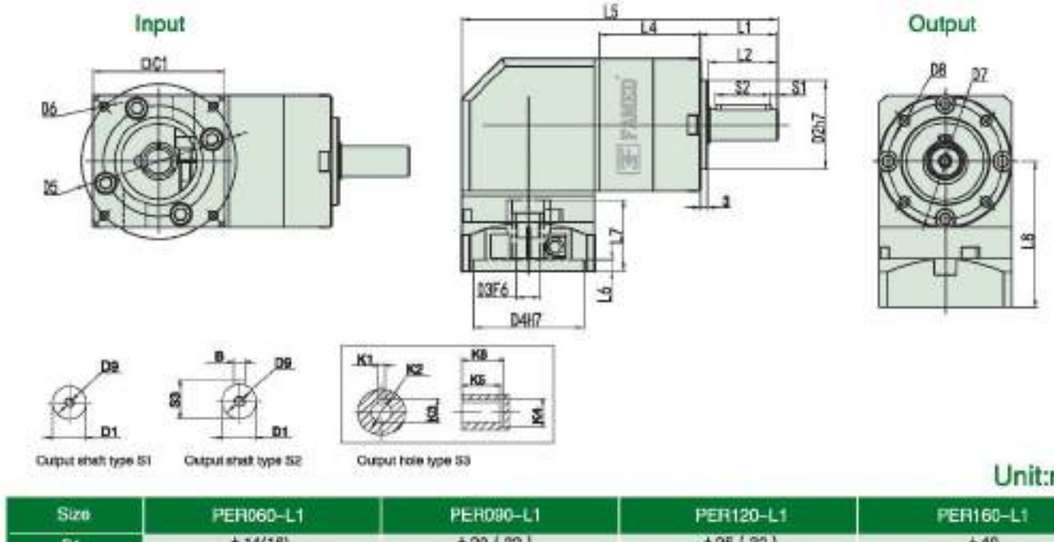
1. The Max. acceleration torque T2B=60% of T2NOT 2. When output speed is 100rpm, acting on the output shaft center position.
3. 3-stage big ratios are not in the above table. There is shaft lengthening and enlarging design. Please tell sales person if you need it.

MODEL: PER

1-Stage

Ratio: 3, 4, 5, 6, 7, 8, 9, 10

Dimensions:



Unit:mm

Size	PER060-L1	PER090-L1	PER120-L1	PER160-L1
D1	ϕ14(18)	ϕ20 (22)	ϕ25 (32)	ϕ40
D2	ϕ40	ϕ60	ϕ80	ϕ130
D3	ϕ14 (ϕ6.35-19)	ϕ19 (ϕ11-24)	ϕ22 (ϕ16-24)	ϕ35 (ϕ22-38)
D4	ϕ50 (ϕ30-70)	ϕ70 (ϕ50-110)	ϕ110 (ϕ55.5-110)	ϕ114.3 (ϕ110-114.3)
D5	ϕ70 (ϕ45-90)	ϕ90 (ϕ70-145)	ϕ145 (ϕ90-155)	ϕ200 (ϕ145-200)
D6	4-M4 (M3-M6)	4-M5 (M4-M8)	4-M8 (M6-M12)	4-M12 (M8-M12)
D7	ϕ52	ϕ70	ϕ100	ϕ145
D8	4-M5X10L	4-M6X12L	4-M10X20L	4-M12X24L
D9	M5X0.8P	M8X1.25P	M10X1.5P	M16X2P
L1	35	40	55	87
L2	31	35	49	80
L3	3	3	4	5
L4	46	55	80	111
L5	143	190	273	295
L6	5(4-6)	8(5-8)	8(5-8)	5 (5-7)
L7	32(32-44)	42(42-60)	70 (59-70)	86 (62-86)
L8	66(66-88)	95.5(95.5-113.5)	130 (119-130)	165.5 (165.5-189.5)
C1	60(60-90)	90(90-130)	130 (120)	175 (142)
S1	3	3	5	5
S2	25	30	40	70
S3	16	22.5	28	43
B	5	6	8	12
K1	4	6	8	10
K2	ϕ11	ϕ22	ϕ28	ϕ36
K3	12.8	24.5	31.3	41.3
K4	ϕ16	ϕ32	ϕ38	ϕ48
K5	15	20	27	35
K6	18	24	32	40

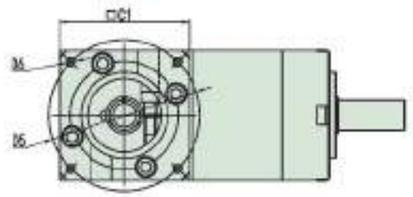
MODEL: PER

2-Stage

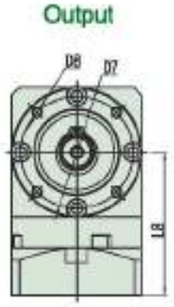
Ratio: 12, 15, 16, 20, 25, 28, 30, 35
40, 50, 70, 80, 100

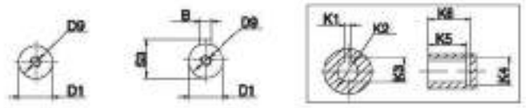
Dimensions:

Input



Output





Output shaft type S1 Output shaft type S2 Output hole type S3

Unit:mm

Size	PER060-L2	PER090-L2	PER120-L2	PER160-L2
D1	ϕ14(16)	ϕ20 (22)	ϕ25 (32)	ϕ40
D2	ϕ40	ϕ60	ϕ80	ϕ130
D3	ϕ14 (ϕ5.35-19)	ϕ19 (ϕ11-24)	ϕ22 (ϕ16-24)	ϕ35 (ϕ22-38)
D4	ϕ50 (ϕ30-70)	ϕ70 (ϕ50-110)	ϕ110 (ϕ55.5-110)	ϕ114.3 (ϕ110-114.3)
D5	ϕ70 (ϕ45-90)	ϕ90 (ϕ70-145)	ϕ145 (ϕ90-155)	ϕ200 (ϕ145-200)
D6	4-M4 (M3-M6)	4-M5 (M4-M8)	4-M8 (M6-M12)	4-M12 (M8-M12)
D7	ϕ52	ϕ70	ϕ100	ϕ145
D8	4-M5X10L	4-M6X12L	4-M10X20L	4-M12X24L
D9	M5X0.8P	M8X1.25P	M10X1.5P	M16X2P
L1	35	40	55	87
L2	31	35	49	80
L3	3	3	4	5
L4	62	78.5	110	149
L5	159	213.5	303	333
L6	5(4-6)	8(5-8)	8(5-8)	5 (5-7)
L7	32(32-44)	42(42-60)	70 (59-70)	86 (62-86)
L8	66(66-88)	95.5(95.5-113.5)	130 (119-130)	165.5 (165.5-189.5)
C1	60(60-90)	90(90-130)	130 (120)	175 (142)
S1	3	3	5	5
S2	25	30	40	70
S3	16	22.5	28	43
B	5	6	8	12
K1	4	6	8	10
K2	ϕ11	ϕ22	ϕ28	ϕ38
K3	12.8	24.5	31.3	41.3
K4	ϕ16	ϕ32	ϕ38	ϕ48
K5	15	20	27	35
K6	18	24	32	40

Installation

Mounting procedure to the motor

1 Wipe off anti-rust agent and oil on the motor shaft.

2 Remove the plug

3 Turn the input shaft until the cap screw is seen. Make sure the cap screw is loosened.

In case the bushing has been attached, Please fix it to the reducer as the drawing below.

4 Please place reducer vertically on the flat surface so the motor mounting part faces up. Carefully insert the motor shaft into the input shaft. (It should be inserted smoothly) Make sure the motor flange is perfectly fit to the reducer's flange. Tighten the motor installing bolts to the proper torque.(See table1)

5 Tighten the clamping bolt of the input shaft with torque wrench to the proper torque.(See table1)

6 Reinstall the plug. The procedure is done.

Table1

Bolt size	Retaining bolt		Clamping bolt	
	Nm	kgfm	Nm	kgfm
M3	1.1	0.11	1.9	0.18
M4	2.5	0.26	4.3	0.44
M5	5.1	0.52	8.7	0.89
M6	8.7	0.89	15	1.5
M8	21	2.1	36	3.7
M10	42	4.3	71	7.2
M12	72	7.3	125	13
M16	134	14	-	-

Table 2

Bolt size	Tightening torque	
	Nm	kgfm
M3	1.9	0.18
M4	4.3	0.44
M5	8.7	0.89
M6	15	1.5
M8	36	3.7
M10	71	7.2
M12	125	13
M16	310	32
M20	603	62

※Recommended bolt: Strength 12.9

Precision Hollow Rotary Actuator

DG

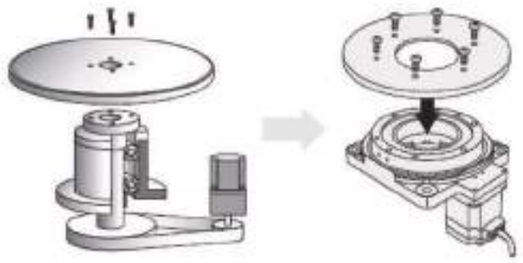
Hollow rotary transmission device with large diameter
Simple wiring and piping

Direct connection
Simple design to improve trust

High positioning precision
The accuracy of repeated positioning is + 15sec Lost motion is 2mins
Angle transmission error is 4mins

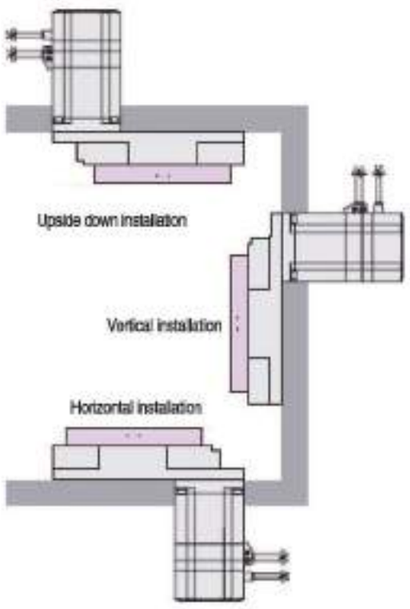
Easy of origin regression
regression thanks to the using the origin sensor kit
(Choose and purchase accessories)

Short time positioning
The positioning of the inertial load can be realized in a short time



Motor + mechanism components
(separate design * procurement)

DGII series
(Integrated product)



Hollow rotary transmission device

● Direct connection→Simple design to improve trust

The hollow output platform can directly install the worktable and machine arm of the equipment. When the general equipment is positioned and run through the belt pulley and other parts, the precision of the transmission efficiency of the mechanism is reduced, or the necessity of maintaining the parts of the mechanism.
The DG series can be directly installed because it does not pass through the intermediate parts, except that the accuracy of the product itself, it can also realize free–maintenance.

● Hollow rotary platform with large diameter→ simple wiring and piping

The design of a large diameter hollow hole (penetration) is realized by using one stage reduction gear mechanism to increase the diameter of the driven gear. It is suitable for the complicated wiring and piping application and so on, which makes the equipment design more succinct.

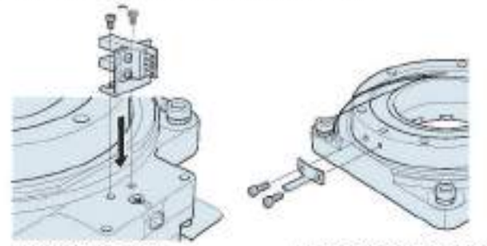
	Size(mm)	Hollow diameter
DG60	60	28
DG85R	85	33
DG130R	130	62

Eg: The application of DG130R

● Simple origin regression→ save time and labor for design and parts procurement.

In order to simplify the operation of the origin regression, the company also prepares the original sensor kit for customers(Choose and purchase accessories).
The kit includes all the parts required to mark the original point. It can save the users' time and labor of installing the sensor for the design, production, and part purchase.

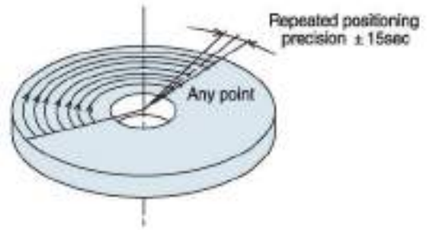
(DG130R sensor, example of shading plate installation)



Installation of sensor　　Installation of shading plate

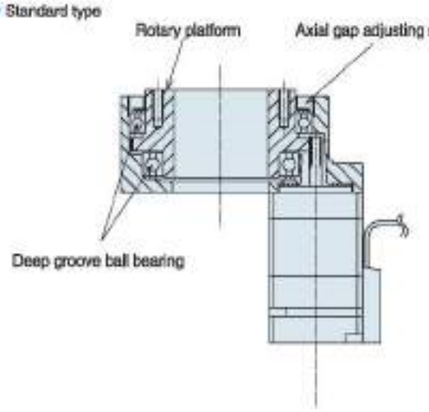
● High Positioning accuracy → repeated positioning accuracy is + 15sec Lost Motion is 2mins

The mechanism part have no backlash, because the gearbox adopts micro precision gear, and it can eliminate the backlash through its own adjusting mechanism. The repeated positioning accuracy of single direction is 15sec; while the lost motion is 2mins of two direction positioning, so it can achieve high precision positioning.

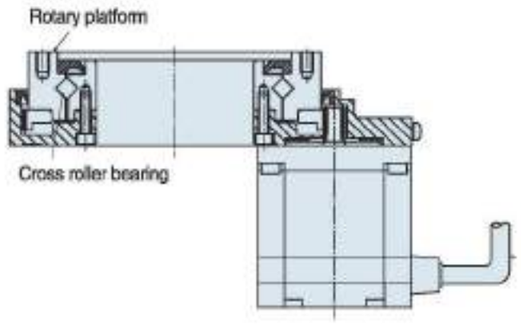


Structure drawing

● Standard type



● High rigidity type
(DG85R、DG130R)



Ordering Model Indication

DG — 60 — R — 5 — Motor

- DG: Hollow Rotating Series
- 60: Specifications
- R: Optional
- 5: Ratio
- Motor: Motor Manufacturer & Model

R: Standard servo motor interface
B: Integrated with stepper motor
ZR: Plus right angle gearbox
F: Plus planetary gearbox

Specification

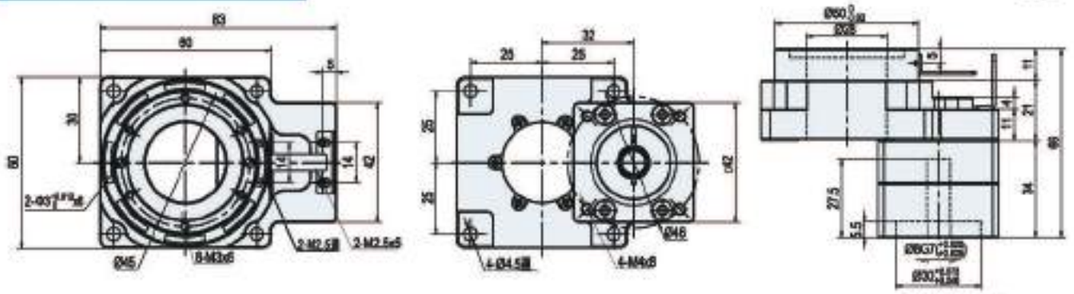
Product model	Unit	DG060-R-5	DG060-B-10	DG060-ZR-15	DG060-F-10
Ratio		5	10	15	30/40/50
Matching servo motor	W	100	Stepper	100	400/100
Bearing structure		Crossed roller bearing	Crossed roller bearing	Crossed roller bearing	Crossed roller bearing
Allowable torque	N.M	5	5	5	5
Moment of inertia	$kg.m^2$	4500×10^{-7}	4500×10^{-7}	4500×10^{-7}	21090×10^{-7}
Allowable plate output speed	r/min	200	200	200	200
Allowable inertia moment load	N.M	9	9	9	62/27
Allowable axial load	N	300	300	300	800
Repeat positioning accuracy	arc-sec	±5	±5	±5	±5
Positioning accuracy	arc-min	±0.5	±0.5	±0.5	≥3
Rotating platform surface deviation (plane bounce)	mm	±0.005	±0.005	±0.005	±0.005
Rotating platform concentricity	mm	±0.01	±0.01	±0.01	±0.01
Rotating platform parallelism	mm	±0.015	±0.015	±0.015	±0.015
Accuracy life	h	25000	25000	25000	25000
Protection class		IP40	IP40	IP40	IP40
Mass	kg	0.55	1.04	1	1.23

★ The above technical parameters are for reference only, and the actual specs and dimensions are issued according to the data provided by customers.

Dimensions Unit: mm

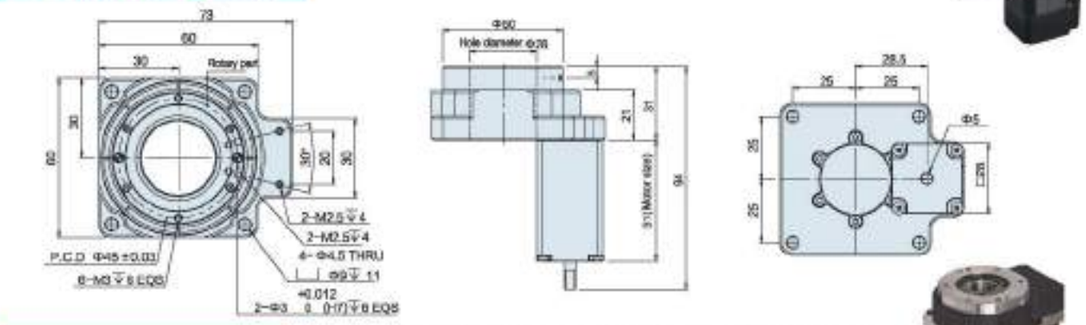
DG060-R-5

(A self assembled motor with a connecting seat)



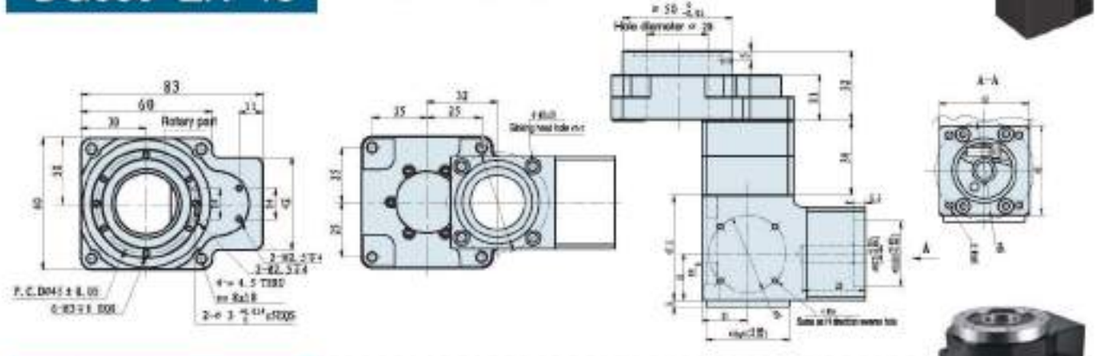
DG060-B-10

(This model contains stepper motor 42H5K-2A)



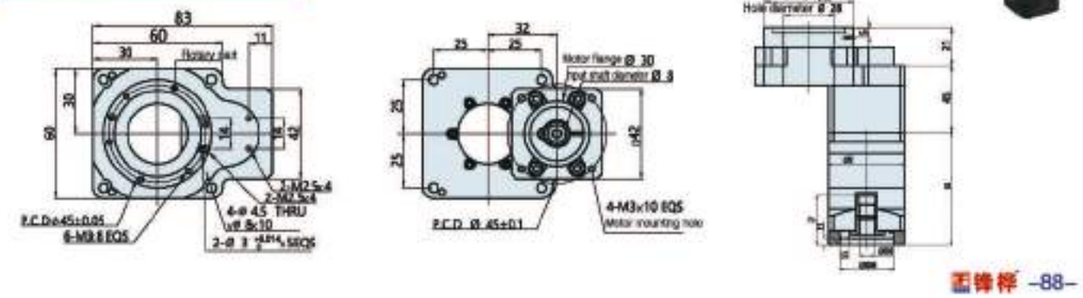
DG060-ZR-15

(Right angle steering 1:15)



DG060-F-10

(Attached planetary reducer ratio 30,40,50)



Ordering Model Indication

DG — 85 — R — 5/10 — Motor

Hollow Rotating Series | Specifications | Optional | Ratio | Motor Manufacturer & Model

R: Standard servo motor interface
B: Integrated with stepper motor
S: Integrated with servo motor
ZR: Plus right angle gearbox
F: Plus planetary gearbox

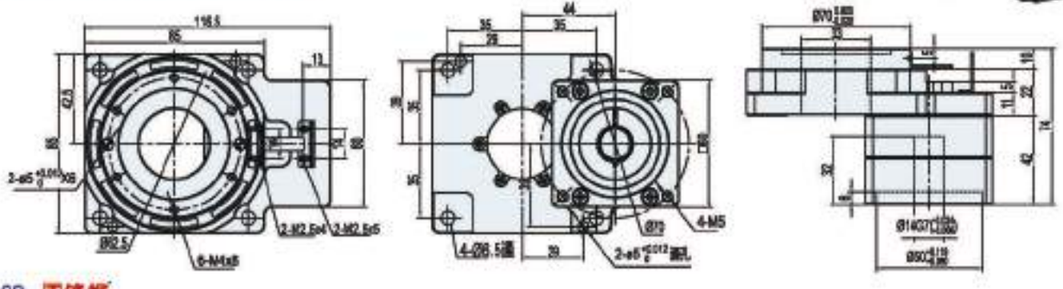
Specification

Product model	Unit	DG085-R-5	DG085-B-10	DG085-S-10	DG085-ZR-10	DG085-F-10
Ratio		5/10	10	10	20/30	30/40/50
Matching servo motor	W	400/100	100	100	100	100
Bearing structure		Crossed roller bearing	Crossed roller bearing	Crossed roller bearing	Crossed roller bearing	Crossed roller bearing
Allowable torque	N.M	20/16	20/16	20/16	20/16	20/16
Moment of inertia	$kg.m^2$	21090×10^{-7}	21090×10^{-7}	21090×10^{-7}	21090×10^{-7}	21090×10^{-7}
Allowable plate output speed	r/min	200	200	200	200	200
Allowable inertia moment load	N.M	62/27	62/27	62/27	62/27	62/27
Allowable axial load	N	800	800	800	800	800
Repeat positioning accuracy	arc-sec	±5	±5	±5	±5	±5
Positioning accuracy	arc-min	±0.5	±0.5	±0.5	≥3	≥3
Rotating platform surface lateralon (plane bounce)	mm	±0.005	±0.005	±0.005	±0.005	±0.005
Rotating platform concentricity	mm	±0.01	±0.01	±0.01	±0.01	±0.01
Rotating platform parallelism	mm	±0.015	±0.015	±0.015	±0.015	±0.015
Accuracy life	h	25000	25000	25000	25000	25000
Protection class		IP40	IP40	IP40	IP40	IP40
Mass	kg	1.15	1.85	2.1	2.05	2.1

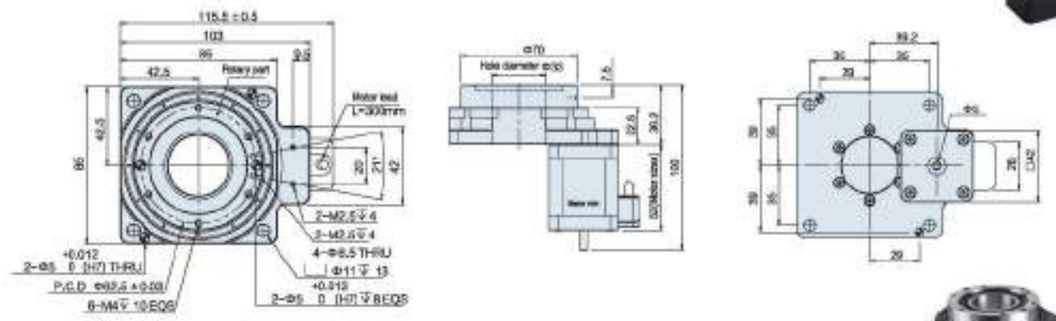
★ The above technical parameters are for reference only, and the actual specs and dimensions are issued according to the data provided by customers.

Dimensions Unit: mm

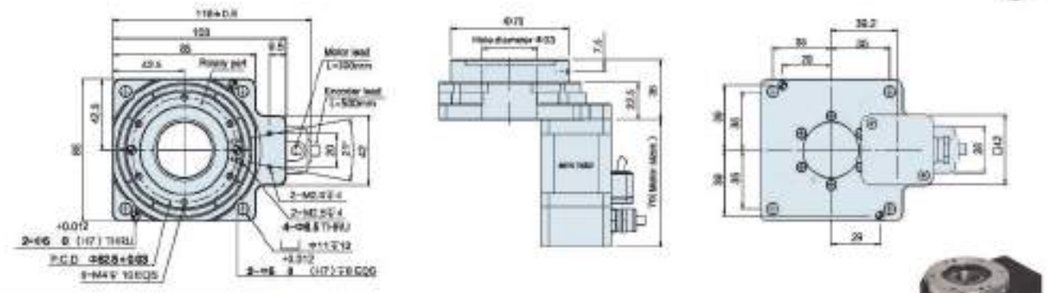
DG085-R-(5/10) (A self assembled motor with a connecting seat)



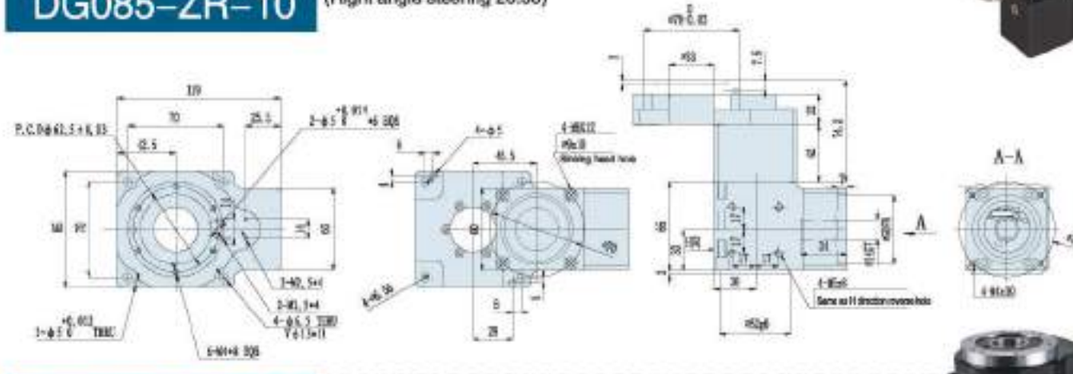
DG085-B-10 (This model contains stepper motor 57H5K-2A)



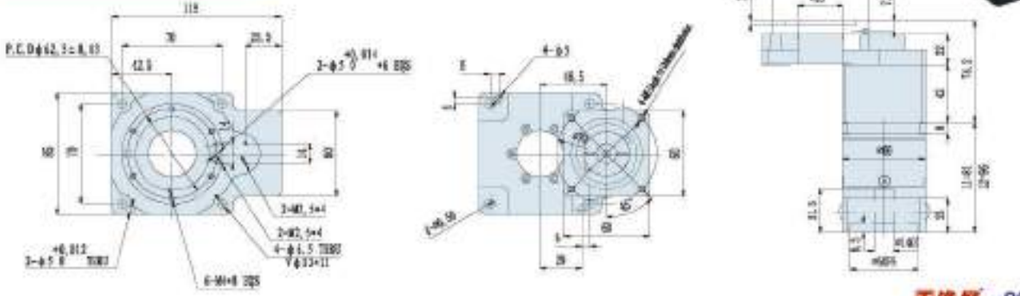
DG085-S-10 (200W This model contains Servo motor)



DG085-ZR-10 (Right angle steering 20:30)



DG085-F-10 (Attached planetary reducer ratio 30,40,50)



Ordering Model Indication

DG — 130 — R — 10/18 — Motor

- DG: Hollow Rotating Series
- 130: Specifications
- R: Optional
- 10/18: Ratio
- Motor: Motor Manufacturer & Model

R: Standard servo motor interface
B: Integrated with stepper motor
S: Integrated with servo motor
ZR: Plus right angle gearbox
F: Plus planetary gearbox

Specification

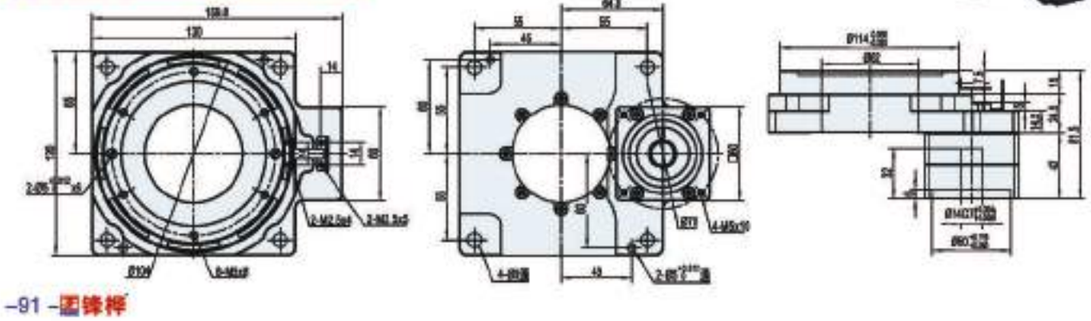
Product model	Unit	DG0130-R-10	DG130-B-18	DG130-S-18	DG130-ZR-20	DG130-F-10
Ratio		6/10/18	18	18	20/30	30/40/50
Matching servo motor	W	400	400	400	400	400
Bearing structure		Crossed roller bearing	Crossed roller bearing	Crossed roller bearing	Crossed roller bearing	Crossed roller bearing
Allowable torque	N.M	55/35	35	35	55	55/35
Moment of inertia	$kg.m^2$	110725×10^{-7}	110725×10^{-7}	110725×10^{-7}	110725×10^{-7}	110725×10^{-7}
Allowable plate output speed	r/min	200	200	200	200	200
Allowable inertia moment load	N.M	90/58	90/58	90/58	90/58	90/58
Allowable axial load	N	2500	2500	2500	2500	2500
Repeat positioning accuracy	arc-sec	±5	±5	±5	±5	±5
Positioning accuracy	arc-min	±0.5	±0.5	±0.5	≥3	≥3
Rotating platform surface deviation (plane bounce)	mm	±0.005	±0.005	±0.005	±0.005	±0.005
Rotating platform concentricity	mm	±0.01	±0.01	±0.01	±0.01	±0.01
Rotating platform parallelism	mm	±0.015	±0.015	±0.015	±0.015	±0.015
Accuracy life	h	25000	25000	25000	25000	25000
Protection class		IP40	IP40	IP40	IP40	IP40
Mass	kg	2.3	3.3	3.85	4.1	4.5

★ The above technical parameters are for reference only, and the actual specs and dimensions are issued according to the data provided by customers.

Dimensions Unit: mm

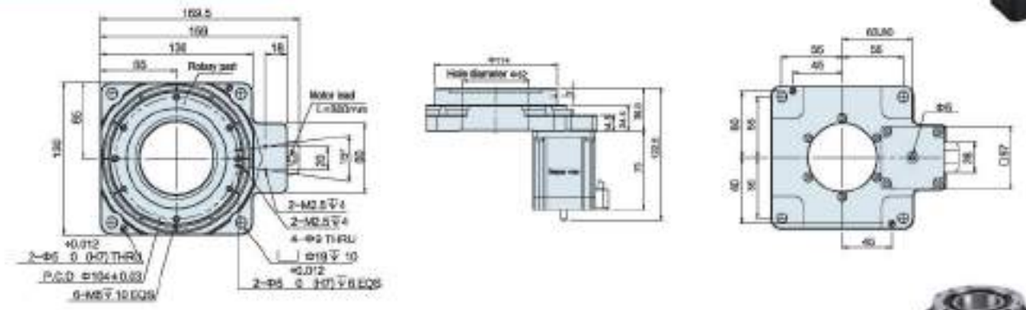
DG130-R-(6/10/18)

(A self assembled motor with a connecting seat)



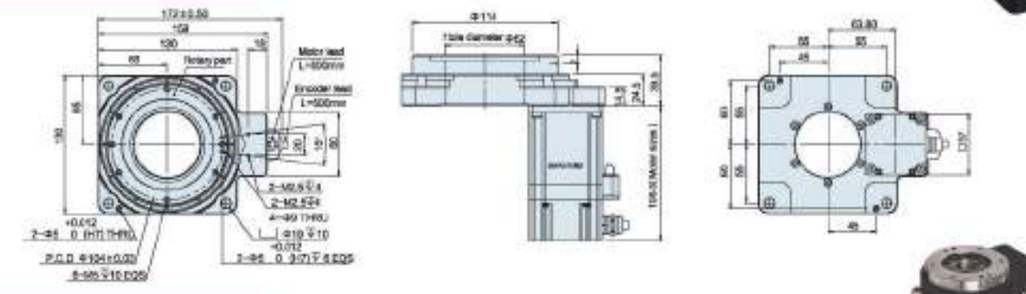
DG130-B-18

(This model contains stepper motor 57H5K-2A)



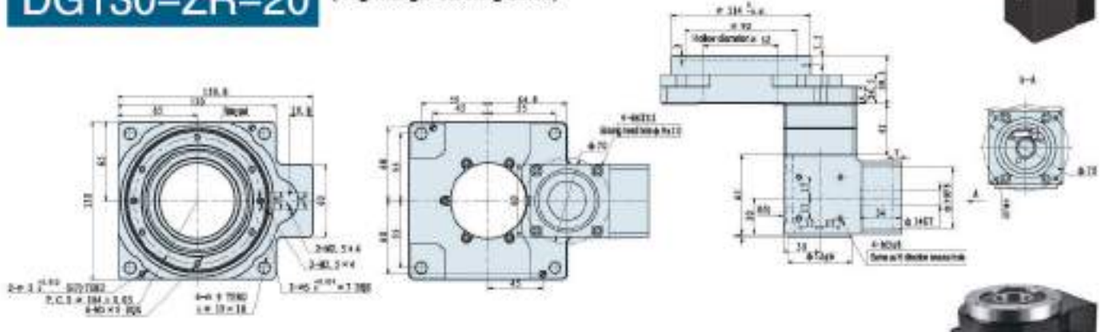
DG130-S-18

(400W This model contains Servo motor)



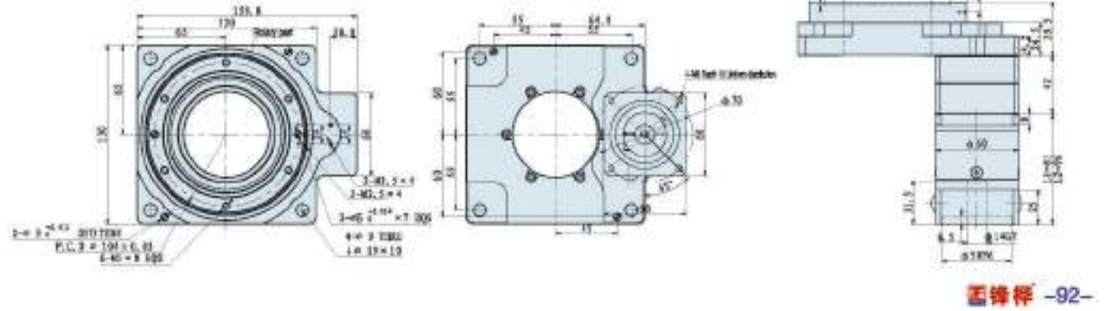
DG130-ZR-20

(Right angle steering 20:30)



DG130-F-10

(Attached planetary reducer ratio 30、40、50)



Ordering Model Indication

DG — 200 — R — 10/18 — Motor

- DG: Hollow Rotating Series
- 200: Specifications
- R: Optional
- 10/18: Ratio
- Motor: Motor Manufacturer & Model

R: Standard servo motor interface
B: Integrated with stepper motor
S: Integrated with servo motor
ZR: Plus right angle gearbox
F: Plus planetary gearbox

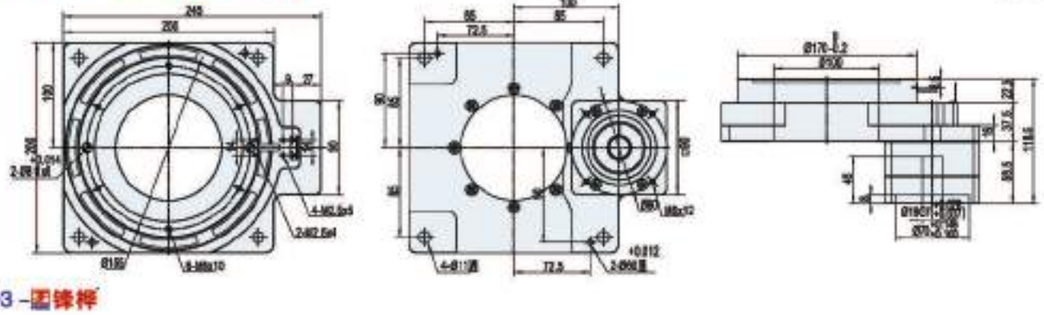
Specification

Product model	Unit	DG0200-R-10	DG200-B-18	DG200-S-18	DG200-ZR-20	DG200-F-30
Ratio		10/18	18	18	20/30	30/40/50
Matching servo motor	W	750	750	750	750	750
Bearing structure		Crossed roller bearing	Crossed roller bearing	Crossed roller bearing	Crossed roller bearing	Crossed roller bearing
Allowable torque	N.M	120/80	80	80	120/80	120/80
Moment of inertia	$kg.m^2$	876410×10^{-7}	876410×10^{-7}	876410×10^{-7}	876410×10^{-7}	876410×10^{-7}
Allowable plate output speed	r/min	200	200	200	200	200
Allowable inertia moment load	N.M	140/96	140/96	140/96	140/96	140/96
Allowable axial load	N	4500	4500	4500	4500	4500
Repeat positioning accuracy	arc-sec	±5	±5	±5	±5	±5
Positioning accuracy	arc-min	±0.5	±0.5	±0.5	≥3	≥3
Rotating platform surface beriation (plane bounce)	mm	±0.005	±0.005	±0.005	±0.005	±0.005
Rotating platform concentricity	mm	±0.01	±0.01	±0.01	±0.01	±0.01
Rotating platform parallelism	mm	±0.015	±0.015	±0.015	±0.015	±0.015
Accuracy life	h	25000	25000	25000	25000	25000
Protection class		IP40	IP40	IP40	IP40	IP40
Mass	kg	7.85	10.3	11	12.5	9.9

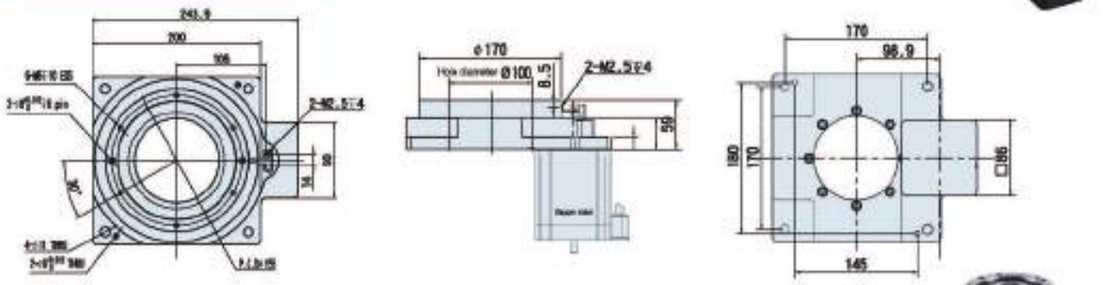
★ The above technical parameters are for reference only, and the actual specs and dimensions are issued according to the data provided by customers.

Dimensions Unit: mm

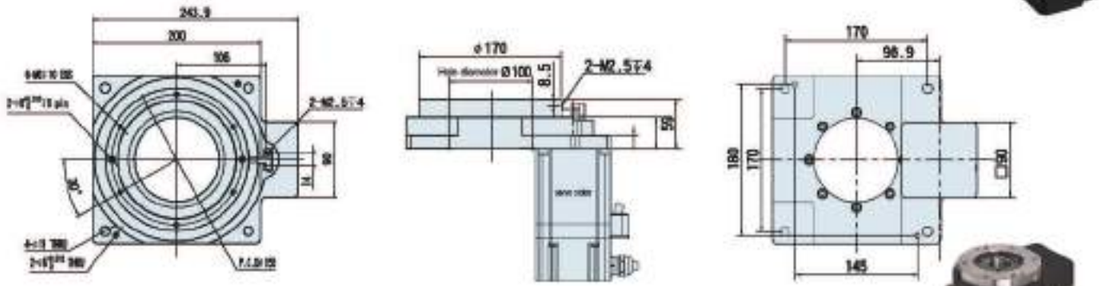
DG200-R-(10/18) (A self assembled motor with a connecting seat)



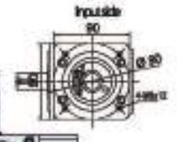
DG200-B-18 (This model contains stepper motor 86H5K-2A)

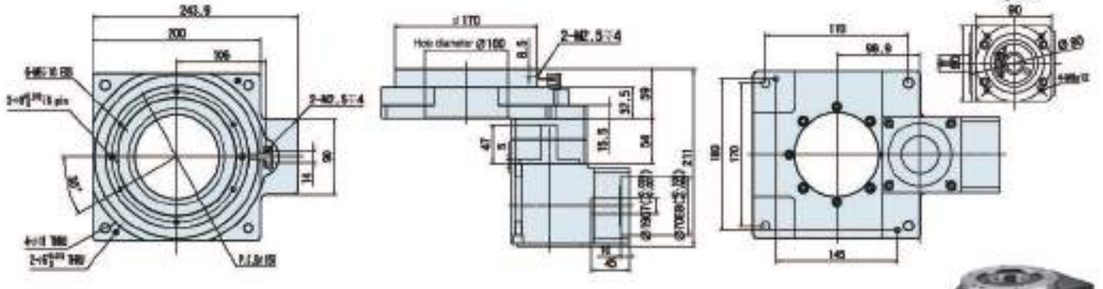


DG200-S-18 (750W This model contains Servo motor)

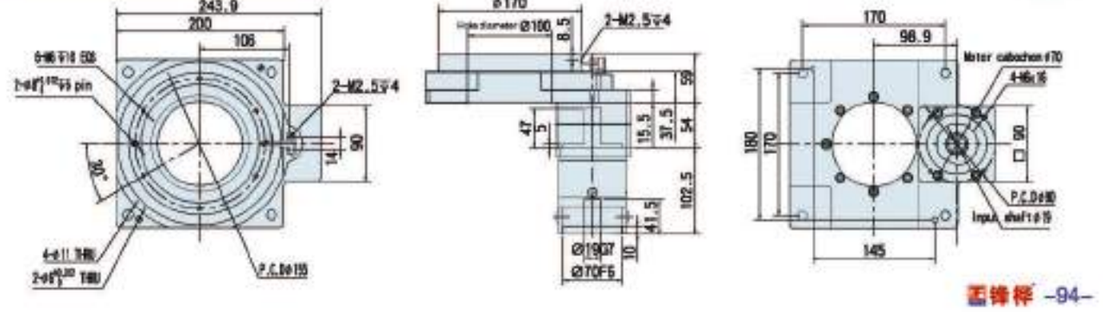


DG200-ZR-20 (Right angle steering 20:30)





DG200-F-30 (Attached planetary reducer ratio 30,40,50)



Ordering Model Indication

DG — 280 — R — 10/18 — Motor

Hollow Rotating Series | Specifications | Optional | Ratio | Motor Manufacturer & Model

R: Standard servo motor interfece
B: Integrated with stepper motor
S: Integrated with servo motor
F: Plus planetary gearbox

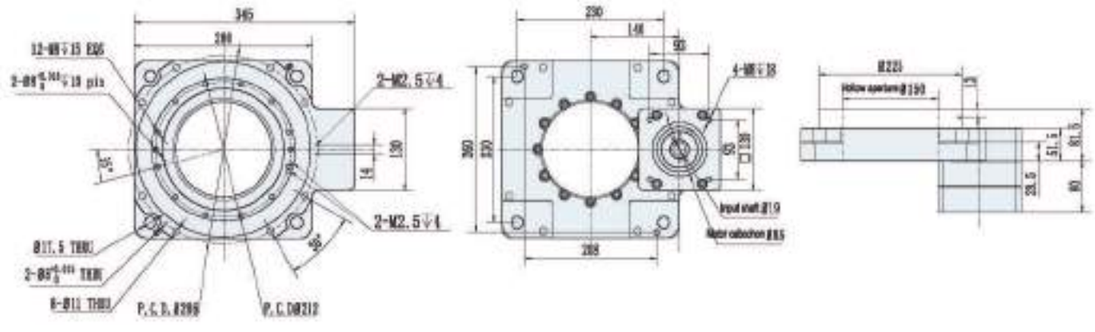
Specification

Motor Model	110 Stepping Motor		1500W AC Servo Motor	
Bearings of Rotating Table	Crossed Roller Bearing		Crossed Roller Bearing	
Ratio	1:10	1:18	1:10	1:18
Rated Output Torque	126Nm	95Nm	126Nm	96Nm
Allowable Disk Speed	≤200r/min (Intermittent Operation)		≤200r/min (Intermittent Operation)	
Max.Load of Inertia	350Nm	300Nm	350Nm	300Nm
Max.Axial Force	7500N		7500N	
Positioning Accuracy	≤1arcmin		≤1arcmin	
Repeatability	≤20arcsec		≤20arcsec	
Parallelism of Rotating Table	≤0.01mm		≤0.01mm	
Concentricity of Rotating Table	≤0.01mm		≤0.01mm	
Life	20000h(Intermittent Operation)		20000h(Intermittent Operation)	
Degree of Protection	IP40		IP40	
Weight	19Kg		19Kg	

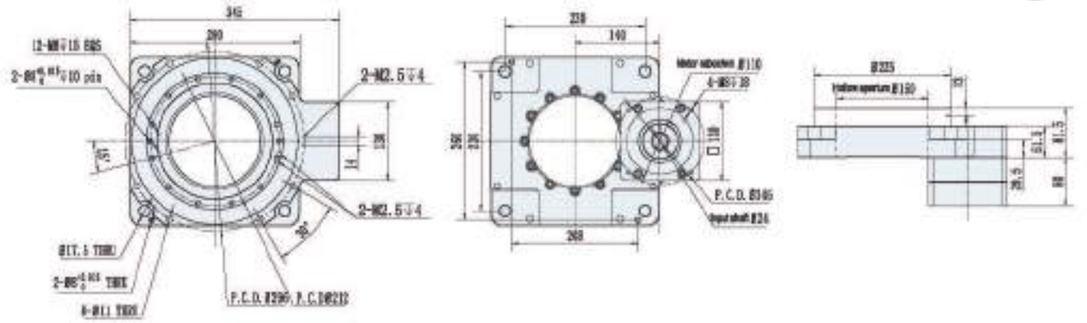
★ All specifications, dimensions and design characteristics shown in this catalogue are subject to change without notice.

Dimensions Unit: mm

DG280-B-(10/18) (This model contains stepper motor 110H5K-2A)



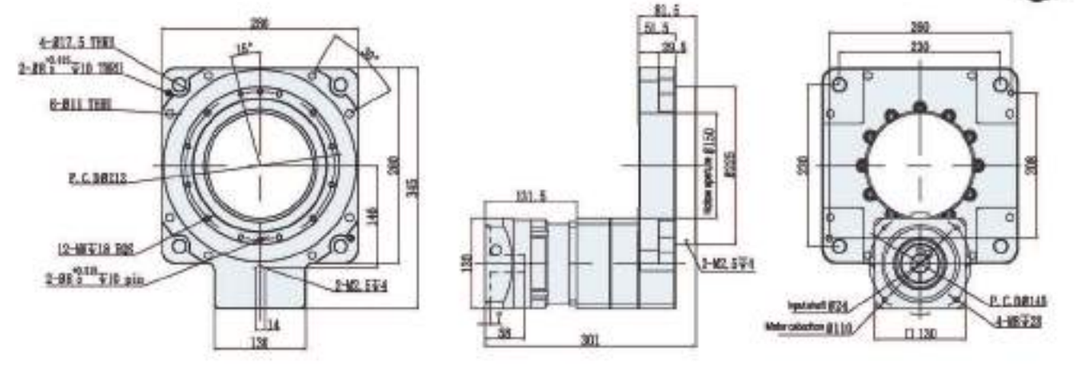
DG280-S-(10/18) (This model contains Servo motor)



Application Examples Technical Data

Description		i²	DN115 Direct Junction Planetary Reducer
Nominal Output Torque T2N[3]	Nm	3	208
		4	290
		5	330
		7	300
		10	230
Emergency Stop Torque T2N[3]	Nm		2.5 Times of Nominal Output Torque
Nominal Input Speed	rpm		4000
Max. Input Speed	rpm		8000
Backlash	arcmin		≤5
Torsional Stiffness	Nm/arcmin		25
Max. Radial Force[4]	N		6700
Max. Axial Force[4]	N		3000
Service Life	Hr		20000(Continuous operation reduces service life 50%)
Efficiency	%		96%
Operating Temp	°C		-10°C ~ +90°C
Degree of Protection			IP 65
Lubrication			Synthetic Lubricating Grease
Noise	dB(A)		≤63

DG280-F-30 (Attached planetary reducer ratio 30、40、50)



Ordering Model Indication

DG — 350 — R — 10/18 — Motor

Hollow Rotating Series | Specifications | Optional | Ratio | Motor Manufacturer & Model

R: Standard servo motor interface
S: Integrated with servo motor
F: Plus planetary gearbox

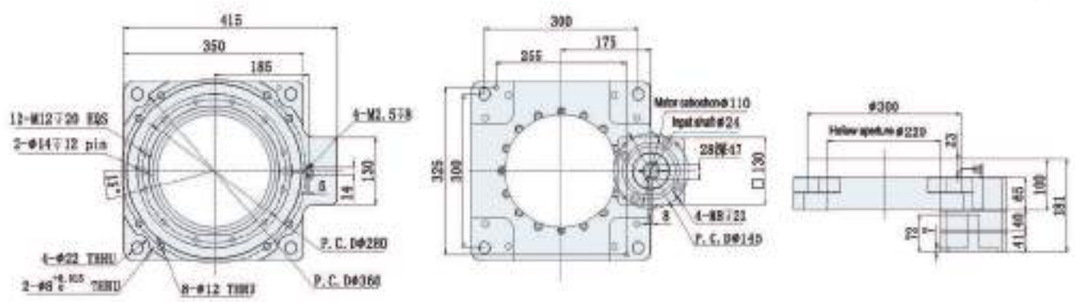
Specification

Motor Model	1500W AC Servo Motor	
Bearings of Rotating Table	Crossed Roller Bearing	
Ratio	1:10	1:18
Rated Output Torque	356Nm	356Nm
Allowable Disk Speed	≤200r/min (Intermittent Operation)	
Max.Load of Inertia	450Nm	356Nm
Max.Axial Force	10000N	11500N
Positioning Accuracy	≤1.5arcmin	≤1.5arcmin
Repeatability	≤20arcsec	≤20arcsec
Parallelism of Rotating Table	≤0.02mm	≤0.02mm
Concentricity of Rotating Table	≤0.02mm	≤0.02mm
Life	20000h(Intermittent Operation)	
Degree of Protection	IP40	IP40
Weight	41Kg	41Kg

★ All specifications, dimensions and design characteristics shown in this catalogue are subject to change without notice.

Dimensions Unit: mm

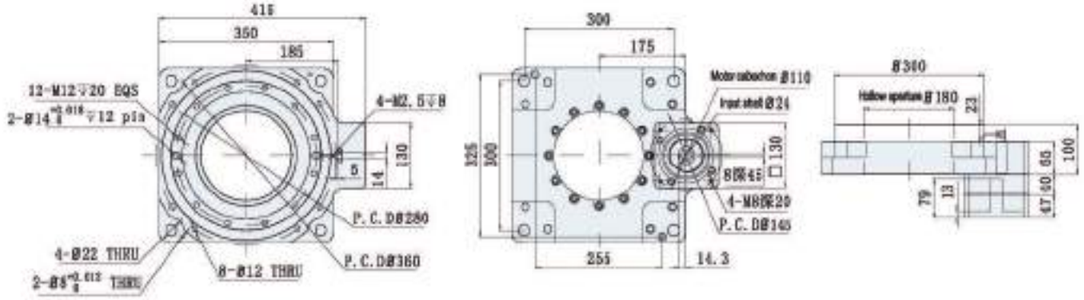
DG350-S-(1/10) (1500W This model contains Servo motor)



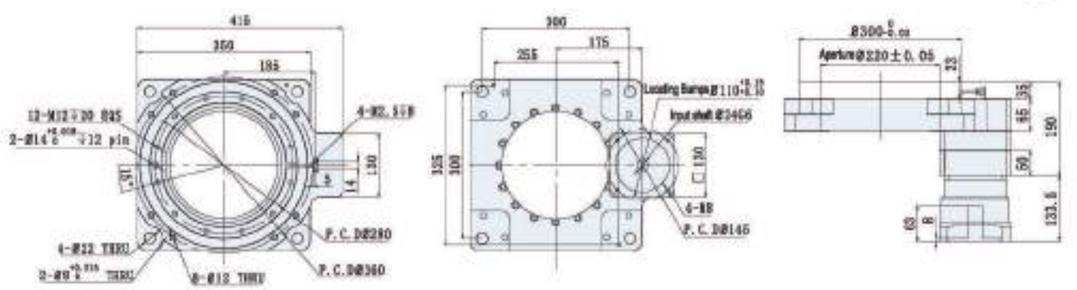
Application Examples Technical Data

Description		i'	DN115 Direct Junction Planetary Reducer
Nominal Output Torque T2N'	Nm	3	220
		4	300
		5	360
		7	360
		10	240
Emergency Stop Torque T2N'	Nm		2.5 Times of Nominal Output Torque
Nominal Input Speed	rpm		3000
Max. Input Speed	rpm		6000
Backlash	arcmin		≤5
Torsional Stiffness	Nm/arcmin		25
Max. Radial Force'	N		6200
Max. Axial Force'	N		4000
Service Life	Hr		20000(Continuous operation reduces service life 50%)
Efficiency	%		96%
Operating Temp	°C		-10°C ~ +90°C
Degree of Protection			IP 65
Lubrication			Synthetic Lubricating Grease
Noise	dB(A)		≤63

DG350-S-(1/18) (1500W This model contains Servo motor)



DG350-F-30 (Attached planetary reducer ratio 30、40、50)



Ordering Model Indication

DG — 450 — R — 10/18 — Motor

- DG: Hollow Rotating Series
- 450: Specifications
- R: Optional
  - R: Standard servo motor interface
  - S: Integrated with servo motor
  - F: Plus planetary gearbox
- 10/18: Ratio
- Motor: Motor Manufacturer & Model

Specification

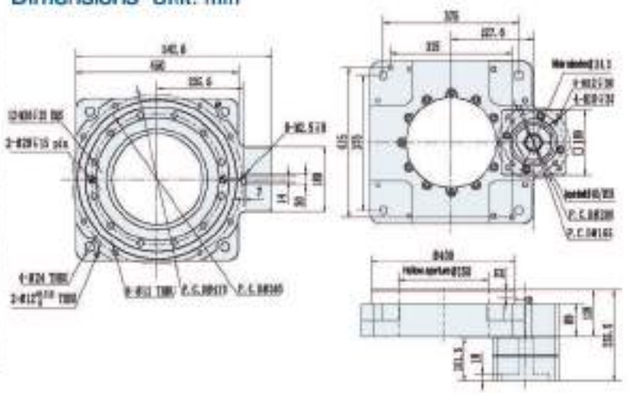
Motor Model	3KW AC Servo Motor
Bearings of Rotating Table	Crossed Roller Bearing
Ratio	1:10
Rated Output Torque	356Nm
Allowable Disk Speed	≤200r/min (Intermittent Operation)
Max.Load of Inertia	600Nm
Max.Axial Force	15000N
Positioning Accuracy	≤2arcmin
Repeatability	≤20arcsec
Parallelism of Rotating Table	≤0.02mm
Concentricity of Rotating Table	≤0.02mm
Life	20000h(Intermittent Operation)
Degree of Protection	IP40
Weight	80Kg

★ All specifications, dimensions and design characteristics shown in this catalogue are subject to change without notice.

DG450–S–(1/10)

(3KW This model contains Servo motor)

Dimensions Unit: mm



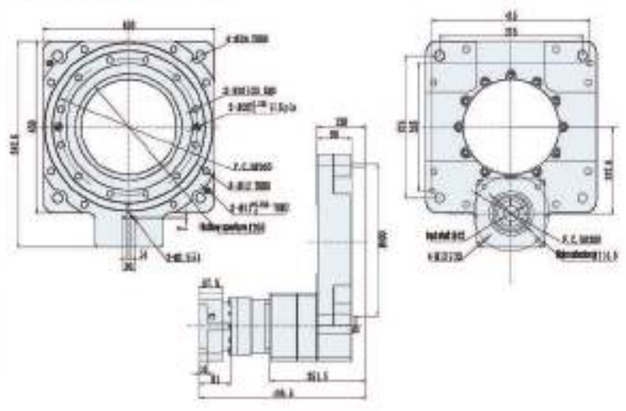
Application Examples Technical Data

Description		i	DN142 Direct Junction Planetary Reducer
Nominal Output Torque T2N*	Nm	3	340
		4	500
		5	600
		7	600
		10	380
Emergency Stop Torque T2N*	Nm		3.0 Times of Nominal Output Torque
Nominal Input Speed	rpm		3000
Max. Input Speed	rpm		6000
Backlash	arcmin		≤5
Torsional Stiffness	Nm/arcmin		50
Max. Radial Force*	N		9000
Max. Axial Force*	N		4200
Service Life	Hr		20000(Continuous operation reduces service life 80%)
Efficiency	%		96%
Operating Temp	℃		-10℃ ~ +90℃
Degree of Protection			IP 65
Lubrication			Synthetic Lubricating Grease
Noise	dB(A)		≤65

DG450–F–30

(Attached planetary reducer ratio 30、40、50)

Dimensions Unit: mm



DGS Series
Miniature rotary axis

Rotary shaft model code

DGS085 - 060 - 100 - SVA-SVB

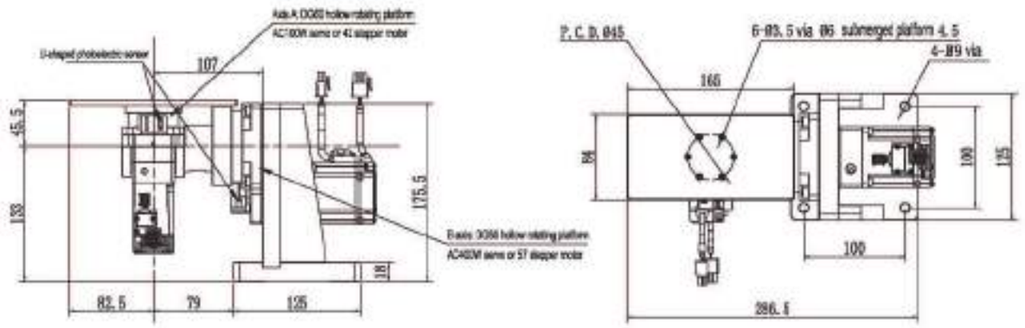
Axis A	Axis B	Turning Radius	Motor type
060 / 085 130 / 200	060 / 085 130 / 200	Customization	SV: AC Servo motor ST: Stepping motor

Technical Parameter

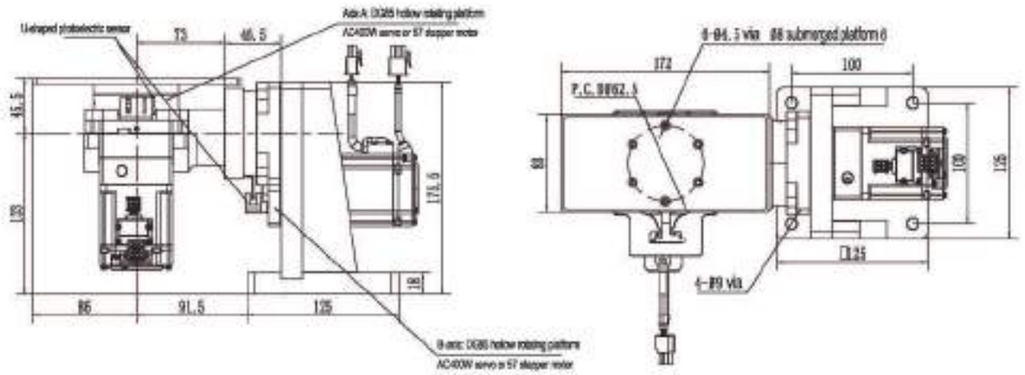
Parameter items	DGS085-060-SV/ST		DGS085-085-SV/ST		DGS200-130-SV/ST	
	A Axis	B Axis	A Axis	B Axis	A Axis	B Axis
Model	DG060-05	DG085-05	DG085-05	DG085-05	DG200-10	DG130-10
Allowable Torque	5Nm		20Nm		52Nm	
Allowable Load	3Kg*		10Kg*		20Kg*	
Rotation Angle	360°	180°	360°	180°	360°	180°
Rotation Accuracy	0.5arcmin		0.5arcmin		0.5arcmin	
Repeat positioning accuracy	5arcsec		5arcsec		5arcsec	
Max turning radius	82mm (Customizable)		86mm (Customizable)		130mm (Customizable)	
Rotational parallelism	0.02mm		0.02mm		0.02mm	
Rotational concentricity	0.02mm		0.02mm		0.02mm	
Disk rotation amplitude	0.005mm		0.005mm		0.005mm	
Allowable rotating speed	200r/min		200r/min		200r/min	
Protection level	IP40		IP40		IP40	
Motor configuration	100W Servo Motor/42 Stepper Motor	400W Servo Motor/57 Stepper Motor	400W Servo Motor/57 Stepper Motor	400W Servo Motor/57 Stepper Motor	750W Servo Motor/86 Stepper Motor	400W Servo Motor/57 Stepper Motor

External Dimensions

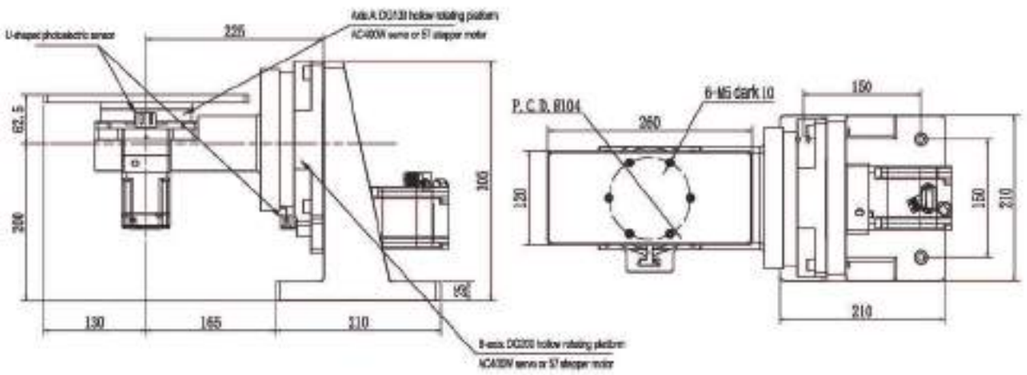
DGS085-060-SV/ST



DGS085-085-SV/ST



DGS200-130-SV/ST



DGT Series
Micro Rotary Table

Rotary Table Model Code

DGT130 - 130 - 200 - SVA-SVB

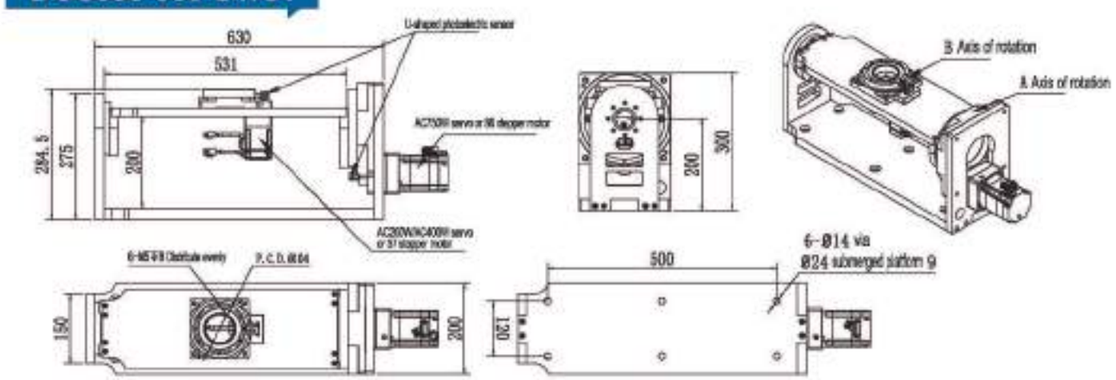
Axis A	Axis B	Plate Length	Motor type
060 / 085 130 / 200	060 / 085 130 / 200	Customization	SV: AC Servo motor ST: Stepping motor

Technical Parameter

Parameter items	DGT200-130-SV/ST-630	
	A Axis	B Axis
Model	DG200-10	DG130-18
Max. Torque	32Nm	
Max.Load Torque	35Kg*	
Rotation Angle	100°	360°
Rotation Positioning Accuracy	1arcmin	
Repeatability	15arcsec	
Turning Radius	255mm (Customizable)	
Parallelism of Rotating Table	0.015mm	
Concentricity of Rotating Table	0.01mm	
Max.Speed	200r/min	
Degree of Protection	IP40	
Motor	750W Sevor Motor/86 Stepper Motor	400W Sevor Motor/57 Stepper Motor

External Dimensions

DGS085-060-SV/ST



Hollow Rotary Actuator

ZK

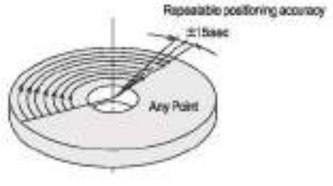
- Working objects can be locked directly
  The rotating disk surface can directly lock the working objects, and therefore improve the convenience of the workpiece transfer.
- Wiring convenience
  Featured with a hollow design, the rotating platform is convenient for wiring or piping.

- Alternative D.D motor and cam splitter
  Straight lines motions and circular motions are two kinds of mechanical movements. Linear motion are mainly based on various types of slides, while circular motions are the most representative motion of cam indexers. And due to the maturity of technology and the accuracy requirement of equipment, D.D motor is becoming more and more popular. However, the traditional splitter has been unable to meet the needs of any segmentation. Though D. D Motor can be applied in multiple ways and with high precision, its high price is the main factors that make user reconsider. ZK series hollow rotating table has successfully got a balance between the cam indexers and D.D motor. It fits the functional requirements that not only can greatly reduce the cost of D.D Motor, but also can meet the high-precision and digital control that the cam divider can't provide.

ZK60-5-5A ZK100-8 ZK130-10 ZK200-10 ZK275-10

- High positioning accuracy. Repeatable positioning accuracy is ±15 sec and idling accuracy is 2 min

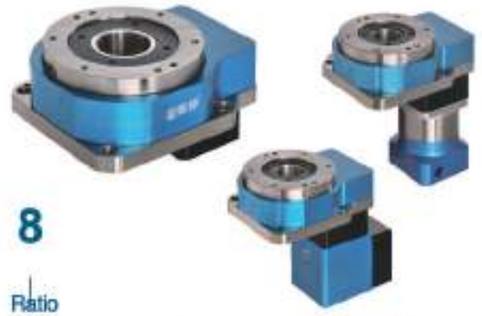
Ultra-precision machined gears are used in the speed reduction mechanism to eliminate the backlash through its own adjustment mechanism, thus there will be no backlash in the part of mechanism. As repeated positioning accuracy is ±15 sec in one direction and idling precision is 2 min in two directions, positioning with high accuracy is possible.



- Direct connection - simple design enhances trust

The worktable and robot arm of the equipment can be installed directly on the hollow output platform. When the general equipment positions and operates by means of pulleys and other mechanical parts. It is mostly affected by the transmission efficiency of the mechanical parts and therefore the accuracy is reduced, or there is a need to maintain the parts of the mechanism. While the ZK series hollow rotary actuators can be installed directly without intermediate parts. Therefore, in addition to the direct use of the accuracy of the actuator itself, maintenance can be avoided.

Ordering Model Indication



ZK — 100 — R — 8

Hollow Rotating Series	Specifications	Optional(Selectable)	Ratio
	60	B: Integrated with stepper motor	5
	100	S: Integrated with servo motor	8
	130	R: Standard servo motor interface	10
	200	P: Attached planetary reducer	
	275		

The following single rotary table sizes
Right-angle and planetary gearboxes can be connected
For specific dimensions, please consult the sales engineer

Specification

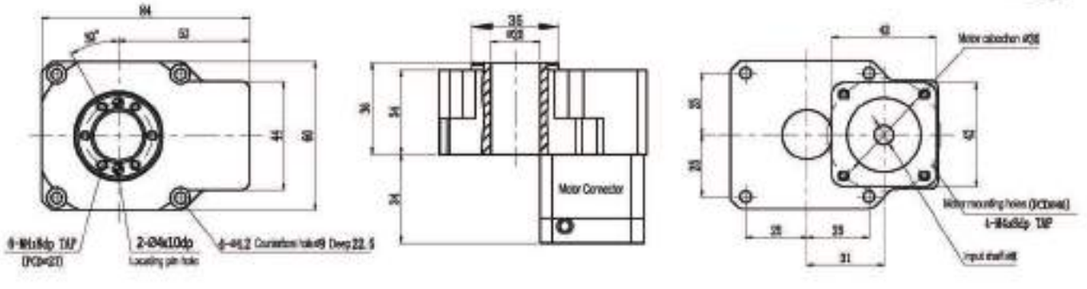
Model	ZK60-5	ZK100-8	ZK130-10	ZK200-10	ZK275-10
Bearing of rotate table	Deep groove ball+Thrust ball bearing	Tapered roller bearing	Tapered roller bearing	Tapered roller bearing	Tapered roller bearing
Allowable torque (N.m)	5	45	45	80	80
Precision lifetime	15000Hrs	20000Hrs	20000Hrs	20000Hrs	20000Hrs
Allowable speed (rpm)	200(Plate)	200(Plate)	200(Plate)	200(Plate)	200(Plate)
Ratio	5	8	10	10	10
Repeated accuracy(arc-sec)	≤15	≤10	≤10	≤10	≤10
Positioning accuracy(arc-min)	≤1	≤1	≤1	≤1	≤1
Parallelism of rotate plate(mm)	≤0.02	≤0.02	≤0.02	≤0.02	≤0.02
Coaxiality of rotate plate(mm)	≤0.02	≤0.02	≤0.02	≤0.02	≤0.015
Protection Class	IP40	IP40	IP40	IP40	IP40

P.S: Circumferential unit: 1 rpm=360° 1° =60'(arc-min) 1'=60"(arc-sec)
Circumferential error conversion linear error:Disc diameter x 3.14159 ÷ (360° x60' x 60")The value of backlash

Dimensions Unit: mm

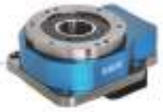
ZK60-5

The following single rotary table sizes, Right-angle and planetary gearboxes can be connected,
For specific dimensions, please consult the sales engineer

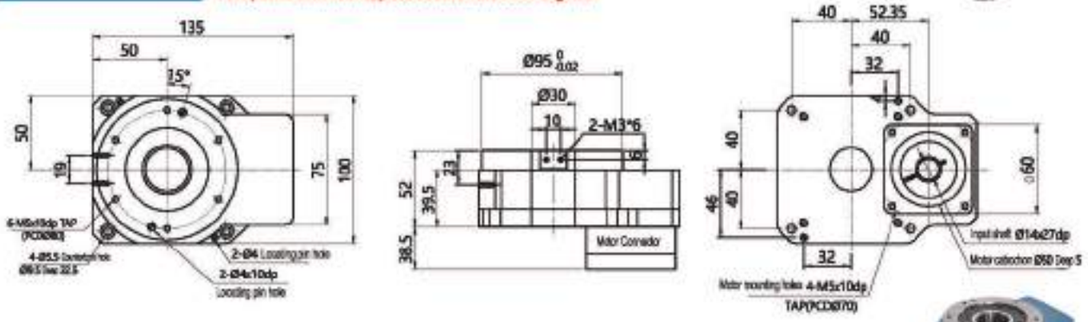


Dimensions Unit: mm

ZK100-8



The following single rotary table sizes, Right-angle and planetary gearboxes can be connected,
For specific dimensions, please consult the sales engineer



ZK130-10

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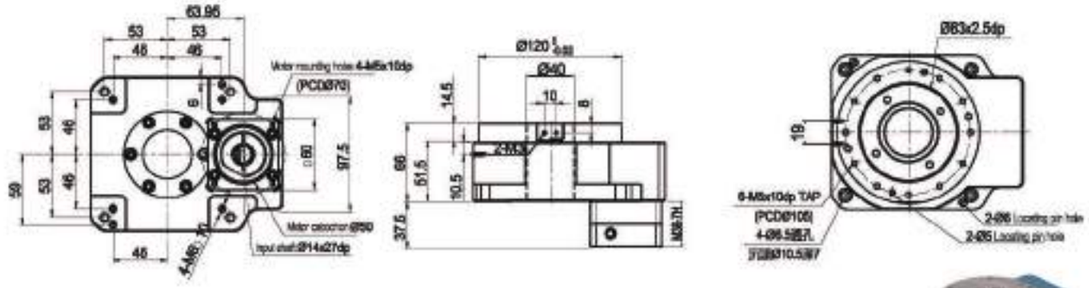
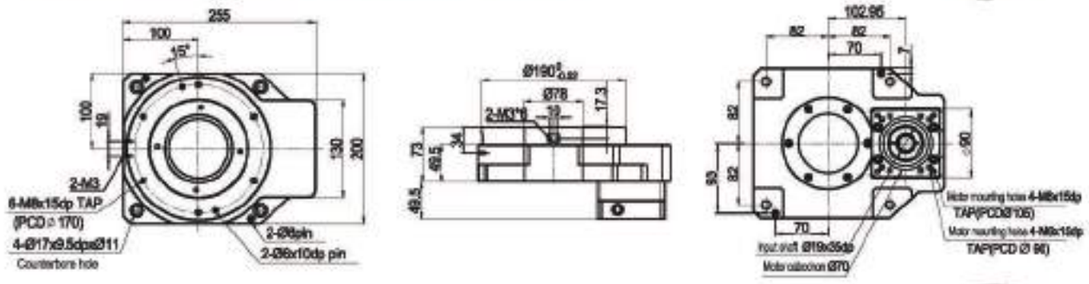
For specific dimensions, please consult the sales engineer



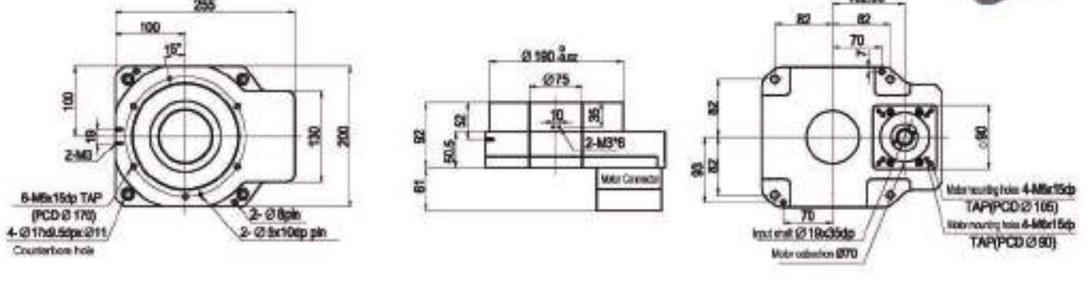
ZK200-10

The following single rotary table sizes, Right-angle and planetary gearboxes can be connected,
For specific dimensions, please consult the sales engineer



ZK275-10

The following single rotary table sizes, Right-angle and planetary gearboxes can be connected,
For specific dimensions, please consult the sales engineer



RIGHT ANGLE GEARBOX

ZR

Low rotating backlash less than 10 seconds

- The right angle reducer is processed using a high precision six axial machine. It is clamped and and finished all in one process.
- Transmission gears can achieve low rotating backlash and high accuracy through precision grinding.
- Precision transmission and quiet, stable operation can realize low noise, high rigidity and other requirements.

ZR-P
Solid shaft

ZR-H
Hollow shaft

ZR-2P
Double output shaft

Features

- The reducer body with a compact structure and small volume to save the mounting space.
- Although the reducer is small in volume and light in weight, and it features of high torque output and low backlash.
- When ordering, please inform the sizes of motor flange and shaft.

Ordering Model Indication

ZR — 042 — 3 — P

ZR	042	3	P
Right Angle Reducer	Specifications	Ratio	Output mode

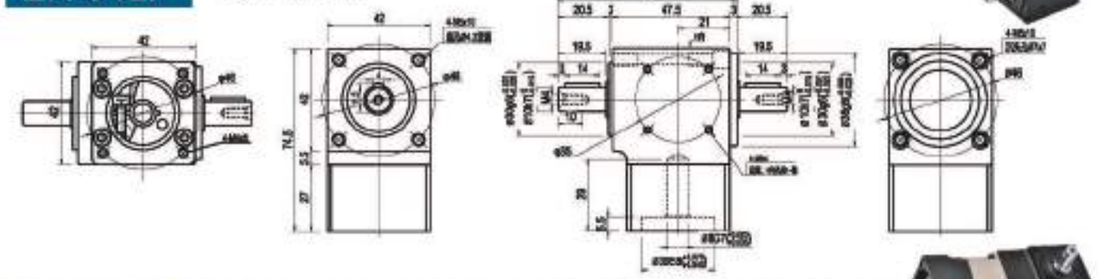
P: Single output shaft
2P: Double output shaft
H: Hole output
S: with planetary gearbox

Specification

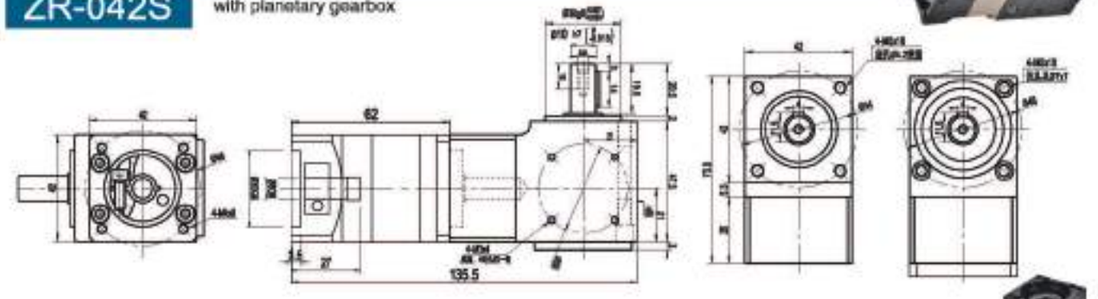
Model No. \ Description	Ratio	Allowable Max Torque (kgf.m/N.m)	Breaking Torque (kgf.m/N.m)	Allowable Max Speed (rpm/min)	Backlash (min-arc)	Weight (kg)
ZR042	3	1.5/15	2.5/24	2500	0.5	0.5
ZR042S	9.12.15.21.30	1.5/15	2.5/24	2500	2	0.9

Dimensions Unit: mm

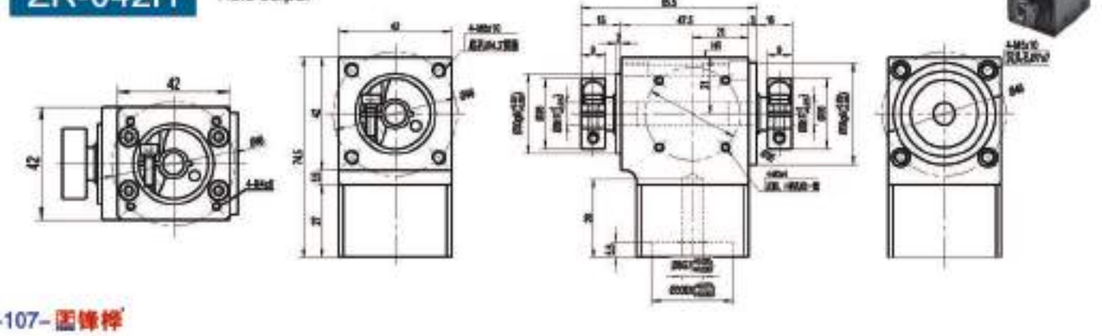
ZR-042P Single output shaft



ZR-042S with planetary gearbox



ZR-042H Hole output



Ordering Model Indication

ZR — 060 — 3 — P

ZR	060	3	P
Right Angle Reducer	Specifications	Ratio	Output mode

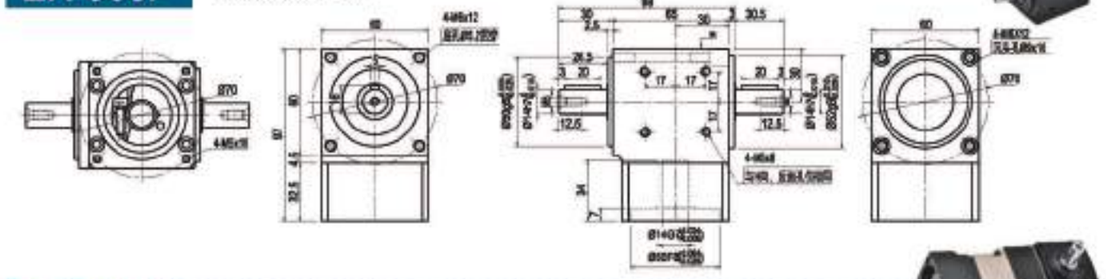
P: Single output shaft
2P: Double output shaft
H: Hole output
S: with planetary gearbox

Specification

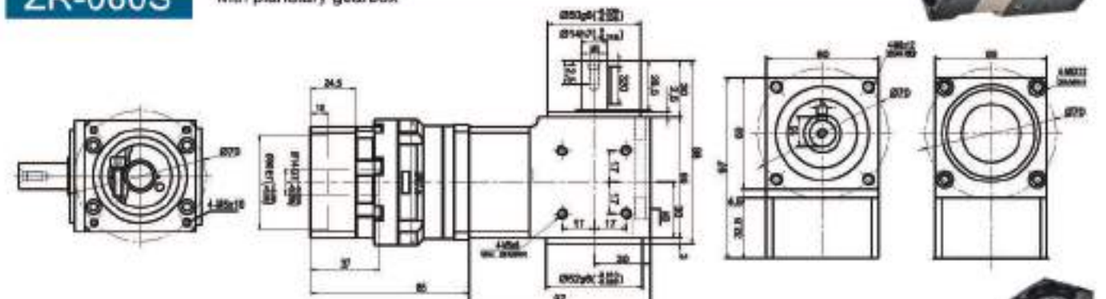
Model No. \ Description	Ratio	Allowable Max Torque (kgf.m/N.m)	Breaking Torque (kgf.m/N.m)	Allowable Max Speed (rpm/min)	Backlash (min-arc)	Weight (kg)
ZR060	2 / 3	4.5/45	7.5/72	2500	0.5	1.2
ZR060S	6.8.10.14.20	4.5/45	7.5/72	2500	2	2

Dimensions Unit: mm

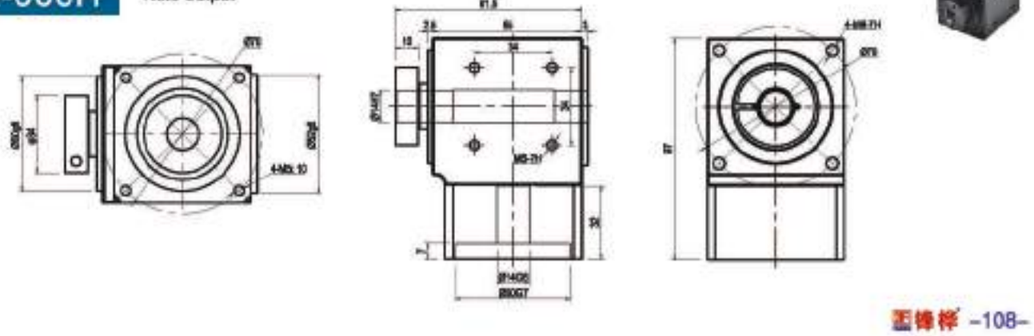
ZR-060P Single output shaft



ZR-060S with planetary gearbox



ZR-060H Hole output



Ordering Model Indication

ZR — 090 — 3 — P

ZR	090	3	P
Right Angle Reducer	Specifications	Ratio	Output mode

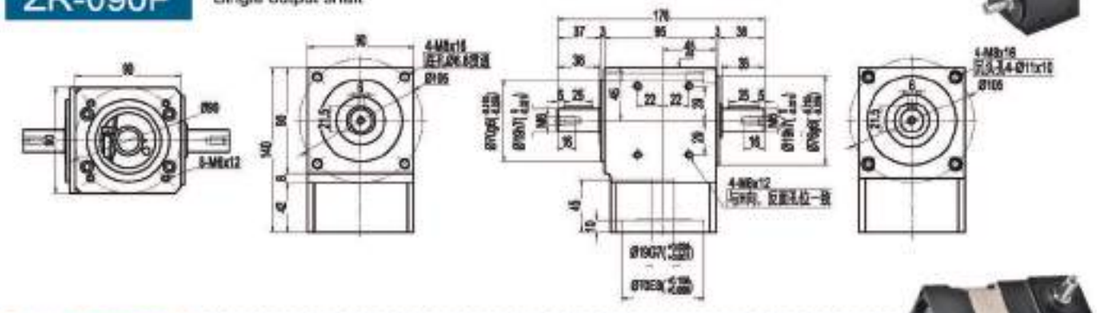
P: Single output shaft
2P: Double output shaft
H: Hole output
S: with planetary gearbox

Specification

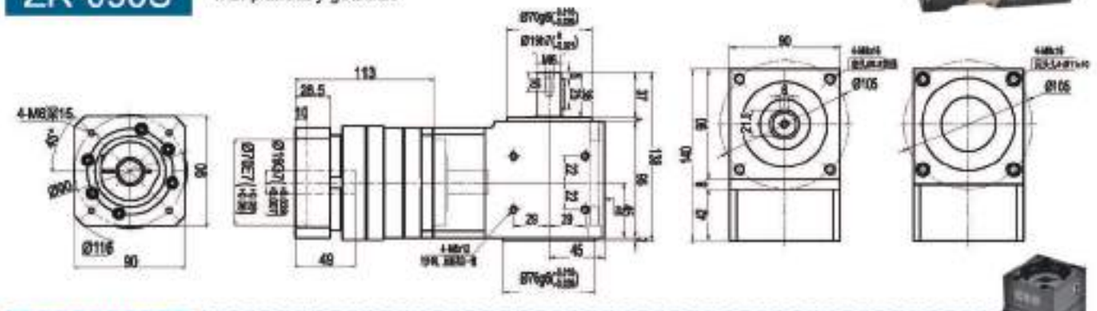
Model No. \ Description	Ratio	Allowable Max Torque (kgf.m/N.m)	Breaking Torque (kgf.m/N.m)	Allowable Max Speed (rpm/min)	Backlash (min-arc)	Weight (kg)
ZR090	2 / 3	12/120	18/180	2500	0.5	3.6
ZR090S	6.8.10.14.20	12/120	18/180	2500	2	6.5

Dimensions Unit: mm

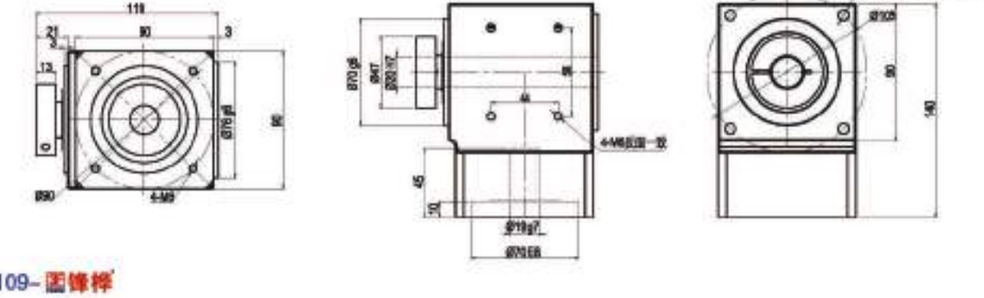
ZR-090P Single output shaft



ZR-090S with planetary gearbox



ZR-090H Hole output



Ordering Model Indication

ZR — 120 — 3 — P

ZR	120	3	P
Right Angle Reducer	Specifications	Ratio	Output mode

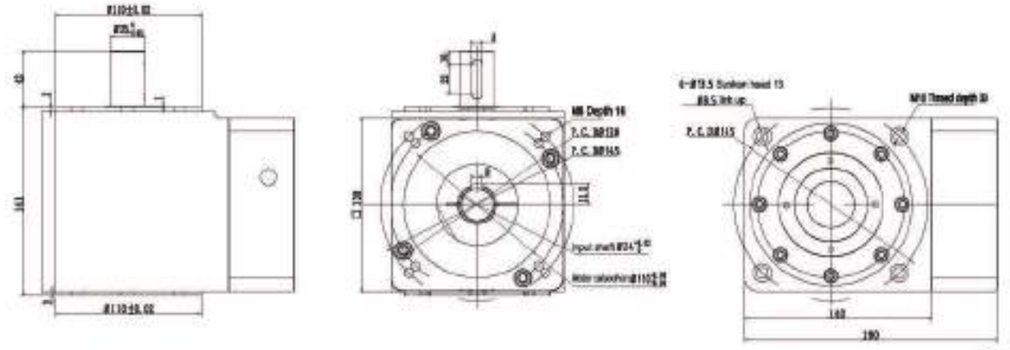
P: Single output shaft
2P: Double output shaft
H: Hole output
S: with planetary gearbox

Specification

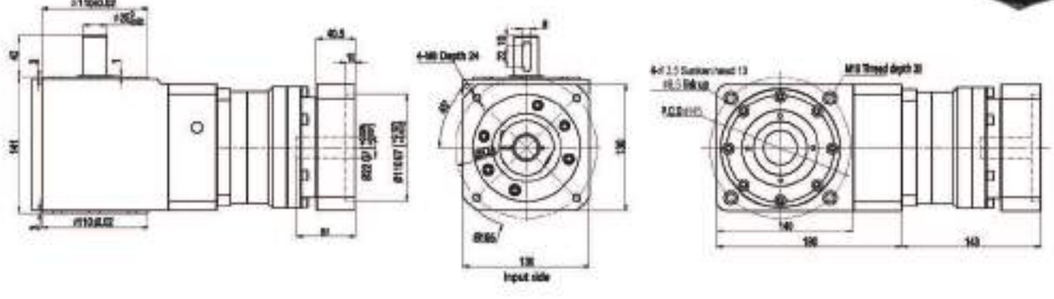
Model No. \ Description	Ratio	Allowable Max Torque (kgf.m/N.m)	Breaking Torque (kgf.m/N.m)	Allowable Max Speed (rpm/min)	Backlash (min-arc)	Weight (kg)
ZR120	2	16/160	36/345	2500	0.5	8
ZR120S	6.8.10.14.20	16/160	36/345	2500	2	15.5

Dimensions Unit: mm

ZR-120P Single output shaft



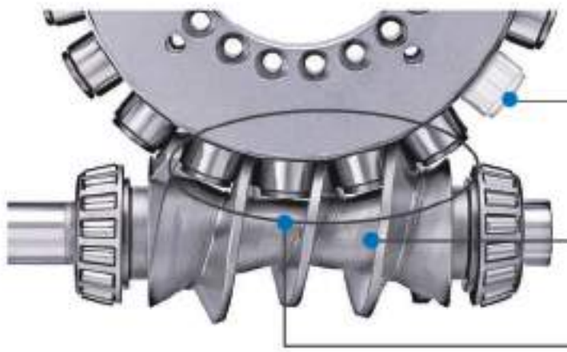
ZR-120S with planetary gearbox



Precision Heavy Duty Hollow Rotary Table Series

Large hollow · High rigidity · High precision

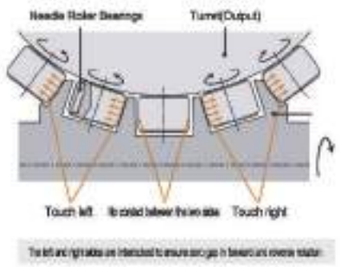
Cam roller mechanism features



I Preload state diagram

Zero clearance — High precision

- The cam curve and needle bearing mesh perfectly;
- The mechanism is always in preload state to eliminate backlash. Even if the direction is rotated during processing, the processing surface can be perfectly processed (forward and reverse, zero gap)



Ordering Model Indication

DK — **70** — **20** — **F**

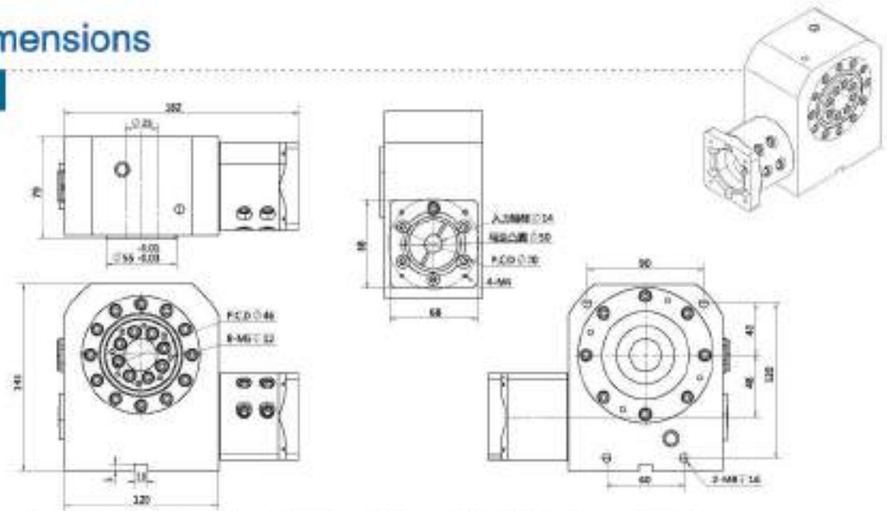
- **DK** — DK Series
- **70** — Specification and model: DK50 DK120 / DK70 DK220 / DK85 DK320 / DK90 DK420
- **20** — Ratio: 15 / 20 / 24 / 40 / 60. If the speed ratio is not enough, you can add a planetary reduction ratio. Please consult for details.
- **F** — Motor Type: F: Connect to planetary reducer; S: Servo motor; B: Stepper motor

Technical Parameter

Model	DK50-15
Rotating platform bearings	Crossed roller bearings
Reduction ratio (i)	1:15(excluding reducer)
Radial load(kgf)	30
Working disc diameter (mm)	Φ55
Minimum segmentation angle (deg)	0.001
Repeatability (arc-sec)	8
Adaptive motor	60 frame servo
Center height(mm)	90
Motor(W)	400
Center hole diameter (mm)	Φ25
Segmentation accuracy (sec)	±25
Precision life (hr)	20000(intermittent operation)

External Dimensions

DK50-15



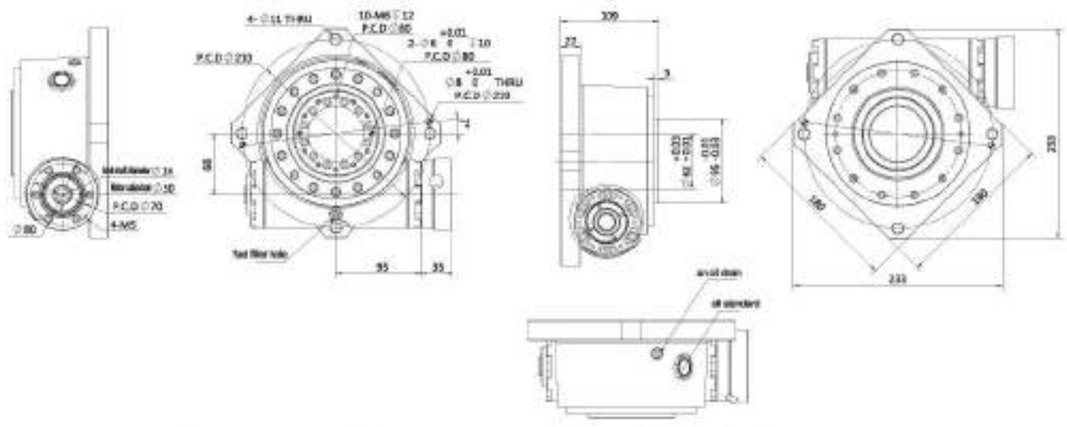
* Tips: The recommended maximum diameter of the rotating tooling plate is 400mm and the load-bearing capacity is 30kg.

Technical Parameter

Model	DK70-20	DK85-24	DK90-20	DK120-20	DK220-40	DK320-60	DK420-60
Rotating platform bearings	Crossed roller bearings	Crossed roller bearings	Crossed roller bearings	Crossed roller bearings	Crossed roller bearings	Crossed roller bearings	Crossed roller bearings
Reduction ratio (i)	1: 20 (Excluding reducer)	1: 24 (Excluding reducer)	1: 20 (Excluding reducer)	1: 20 (Excluding reducer)	1: 40 (Excluding reducer)	1: 60 (Excluding reducer)	1: 60 (Excluding reducer)
Tipping moment (N.m)	400	584	625	1028	3749	13354	30000
Radial load (T)	/	/	/	/	1.9	2.5	4.5
Allowable input torque (N.m)	≤30	≤68	≤72	≤90	/	/	/
Allowable input speed (r/min)	<1000	<1000	<1000	<1000	<800	<800	<800
Repeatability (arc-sec)	±15	±15	±15	±15	±15	±15	±15
Positioning accuracy (arc-sec)	±30	±30	±30	±30	±30	±30	±30
Adaptive motor	60 frame servo	80 frame servo	80 frame servo	130 frame servo	130 frame servo	180 frame servo	180 frame servo
Motor Type	Planetary Reducer Servo Motor	Planetary Reducer Servo Motor	Planetary Reducer Servo Motor	Planetary Reducer Servo Motor	Planetary Reducer Servo Motor	Planetary Reducer Servo Motor	Planetary Reducer Servo Motor
Allowable vertical pressure (N)	/	/	/	/	18000	28000	60000
Allowable moment of inertia load(Kg.m)	75	200	220	250	/	/	/
Parallelism of rotary stage(mm)	0.02	0.02	0.02	0.02	0.02	0.03	0.03
Concentricity of rotary stage(mm)	0.02	0.02	0.02	0.02	0.02	0.03	0.03
Accuracy life(hr)	20000(intermittent operation)	20000(intermittent operation)	20000(intermittent operation)	20000(intermittent operation)	20000(intermittent operation)	20000(intermittent operation)	20000(intermittent operation)
Protection class(IP)	40	40	40	40	40	40	40

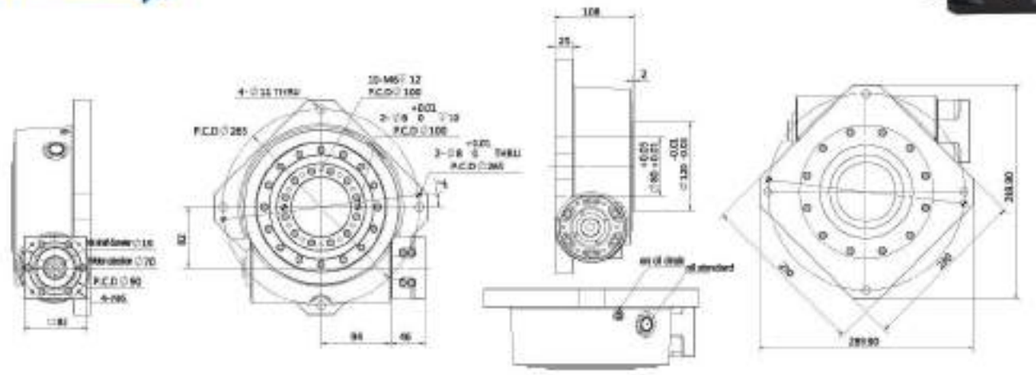
External Dimensions

DK70-20



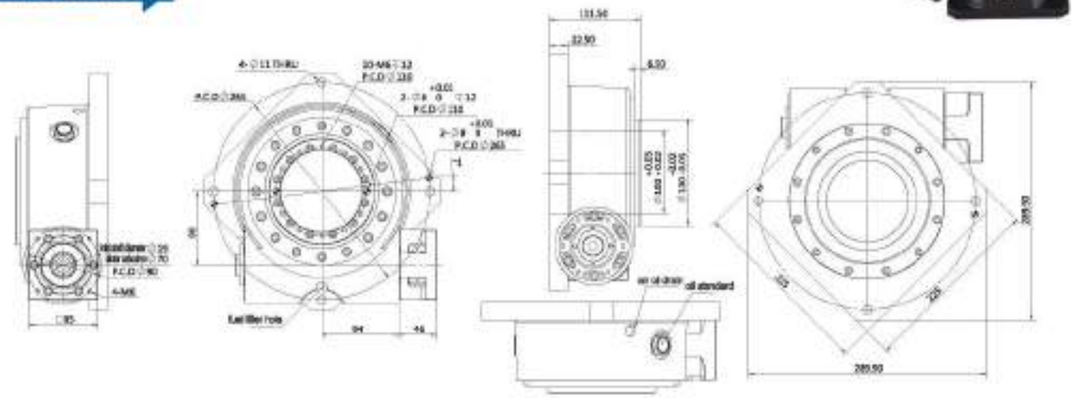
* Tips: The recommended maximum diameter of the rotating tooling plate is 500mm and the load-bearing capacity is 80kg.

DK85-24



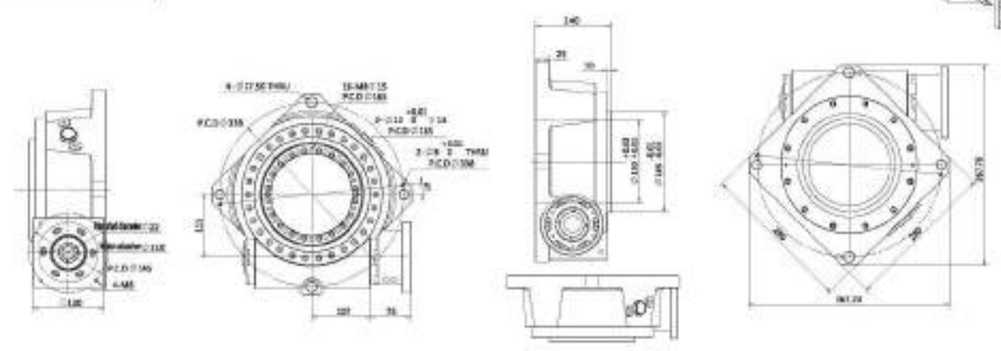
* Tips: The recommended maximum diameter of the rotating tooling plate is 600mm and the load-bearing capacity is 200kg.

DK90-20



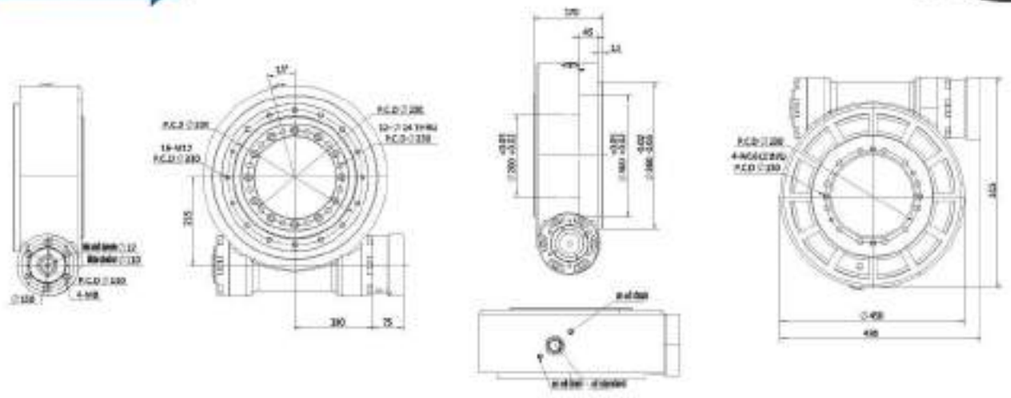
* Tips: The recommended maximum diameter of the rotating tooling plate is 600mm and the load-bearing capacity is 260kg.

DK120-20



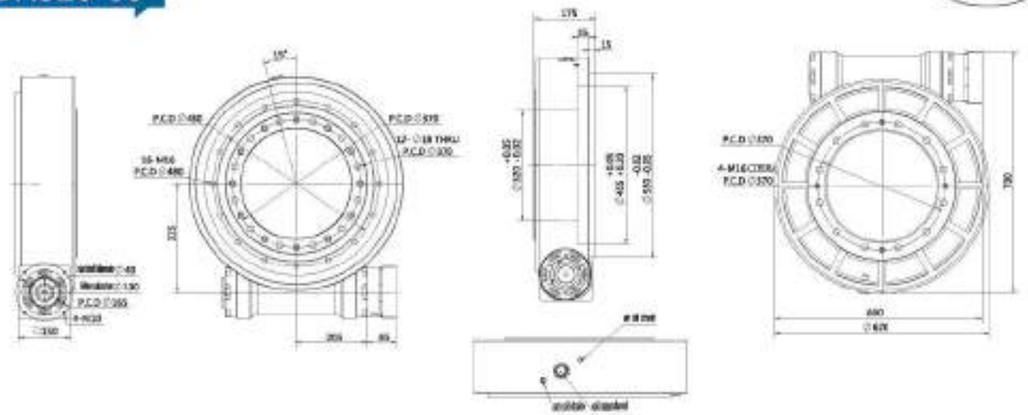
* Tips: The recommended maximum diameter of the rotating tooling plate is 800mm and the load-bearing capacity is 500kg.

DK220-40



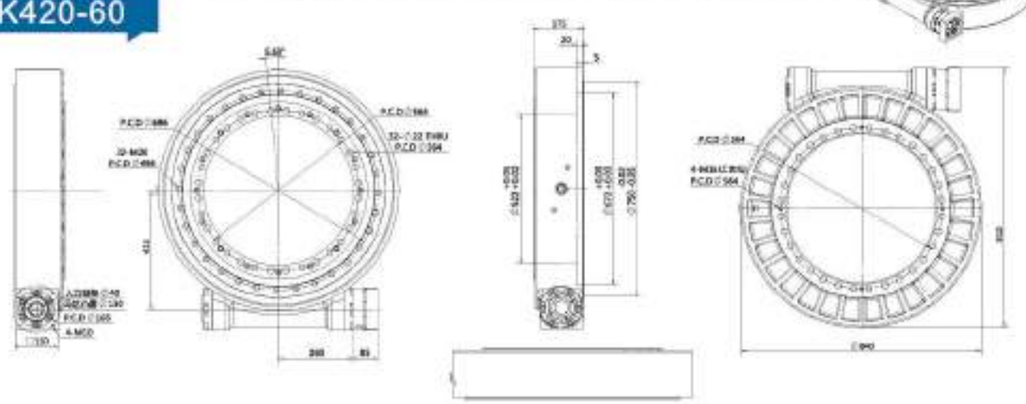
* Tips: The recommended maximum diameter of the rotating tooling plate is 1300mm and the load-bearing capacity is 1500kg.

DK320-60



* Tips: The recommended maximum diameter of the rotating tooling plate is 1400mm and the load-bearing capacity is 2500kg.

DK420-60



* Tips: The recommended maximum diameter of the rotating tooling plate is 1900mm and the load-bearing capacity is 4500kg.

DKH Series

Precision Heavy Duty Hollow Rotary Table Series

Ordering Model Indication

DKH M - 50 R - 15 (14 J 5 - 30 - 50 - 70 - M5)

DKH	Axis spacing or code	Reduction ratio	Motor shaft + diameter (2-A)	key	key width	Motor shaft length* (2-C)	Motor can* (2-B)	Mounting holes P.C.D* (2-E)	Mounting screw* (2-F)
Code/Meaning:	Input Flange Direction: (1)*								
N: Without planetary reducer M: With direct-connected planetary reducer R: With angle planetary reducer	L : Left side R : Right side								

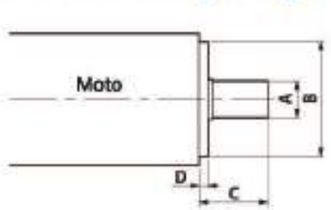
* Mark: Please refer to the figure below

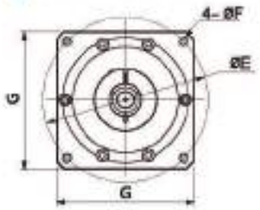
Cam roller indexing table type D input flange direction

DKH-L

DKH-R

The motor can refer to the example diagram and provide relevant dimensions





• When ordering, please provide the following information to facilitate order processing

A	B	C	D	E	F	G

Selection parameter comparison table

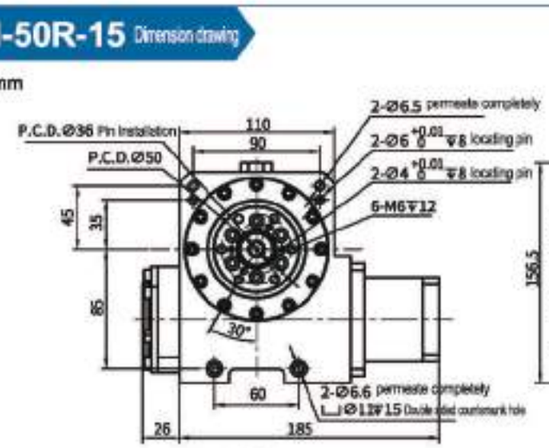
Model	DKH50	DKH70	DKH90	DKH120	DKH150	DKH220	DKH365
Ratio	15	20	20	30	30	40	60
Recommended disc dia	600	900	1200	1500	2000	2500	3000
Recommended load	50KG	150KG	300KG	600KG	1200KG	2500KG	6000KG
With reducer	60	60/90	90/115	90/115	90/115	115/142	115/142
Servo motor	0.2/0.4	0.4/0.75	0.75/1.0	0.75/1.0/1.3	1.3/1.8	1.3/1.8	1.3/1.8
Speed	Avoid to choose ratio 1:3						

DKH Performance data

Specification		DKH-50R-15 DKHM-50R-i DKHR-50R-i	DKH-70R-20 DKHM-70R-i DKHR-70R-i	DKH-90R-20 DKHM-90R-i DKHR-90R-i	DKH-120R-30 DKHM-120R-i DKHR-120R-i	DKH-150R-30 DKHM-150R-i DKHR-150R-i	DKH-220R-40 DKHM-220R-i DKHR-220R-i	DKH-365R-60 DKHM-365R-i DKHR-365R-i	DKH-445R-72 DKHM-445R-i DKHR-445R-i	DKH-575R-90 DKHM-575R-i DKHR-575R-i
Ratio	Single platform	15	20	20	30	30	40	60	72	90
	With straight planetary reducer	45~150	60~200	60~200	90~300	90~300	120~400	180~600	126~720	270~900
	With angle planetary reducer	45~300	60~400	60~400	90~600	90~600	120~800	180~1200	216~1440	270~1800
Adaptive motor		Servo motor + planetary								
Adaptive servo motor power KW		0.85/1.3/1.8	0.75/1.0	0.75/1.0	3.0/4.0/5.0	1.0/1.5/2.0	3.0/4.0/5.0	2.9/4.4	2.9/4.4	2.9/4.4
Allowable disk speed r/min		<70	<50	<75	<50	<50	<40	<25	<20	<16
Allowable load torque N.m		156	286	954	2276	2538	4480	13384	21356	46930
Allowable overturning moment N.m		109	200	668	1593	1777	3136	9369	14949	32851
Allowable axial load dynamic N		3460	4020	15270	25290	27690	56000	143400	168600	197600
Allowable radial load dynamic N		2455	2650	12435	16980	21120	37723	88203	103770	113002
Moment of inertia kg.m²		9.46X10⁻⁴	43.73x10⁻⁴	195.85x10⁻⁴	0.08	0.24	0.85	7.97	31.66	102.53
Graduation accuracy arcsec		±15	±20	±20	±20	±20	±20	±20	±20	±20
Repeatability arcsec		±5(0.0013°)	±10(0.0026°)	±10(0.0026°)	±10(0.0026°)	±10(0.0026°)	±10(0.0026°)	±10(0.0026°)	±5(0.0013°)	±5(0.0013°)
Parallelism of rotating table (mm)		±0.005	±0.005	±0.005	±0.005	±0.005	±0.005	±0.005	±0.005	±0.005
Concentricity of rotating table (mm)		±0.01	±0.01	±0.01	±0.01	±0.01	±0.01	±0.01	±0.01	±0.01
Service life hr		20000	20000	20000	20000	20000	20000	20000	20000	20000
Protection level		IP54	IP54	IP54	IP54	IP54	IP54	IP54	IP54	IP54
Weight (excluding motor) kg		9.5	12	39	65	85	195	490	910	1485

DKH-50R-15 Dimension drawing

Unit: mm



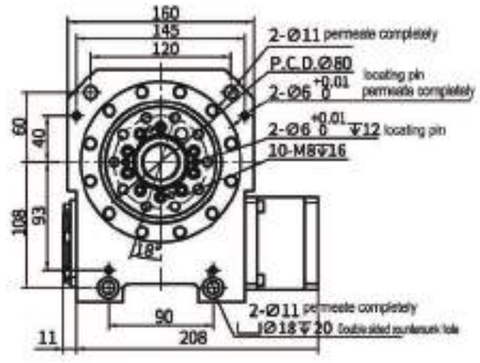
DKHM-50R-i

DKHR-50R-i

* The turntable can be connected to a direct-connected or angle planetary reducer to increase the speed ratio and torque. The installation size of the turntable remains unchanged, but the size of the reducer will be increased. Please consult the sales engineer for specific parameters and drawings.

DKH-70R-20 Dimension drawing

Unit: mm



DKHM-70R-i

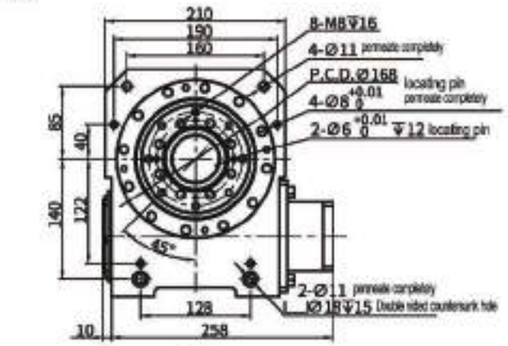
DKHR-70R-i

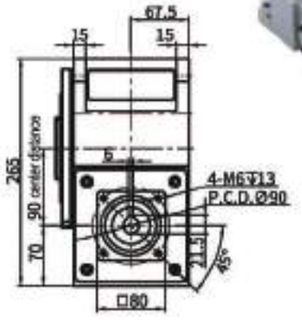
* The turntable can be connected to a direct-connected or angle planetary reducer to increase the speed ratio and torque. The installation size of the turntable remains unchanged, but the size of the reducer will be increased. Please consult the sales engineer for specific parameters and drawings.

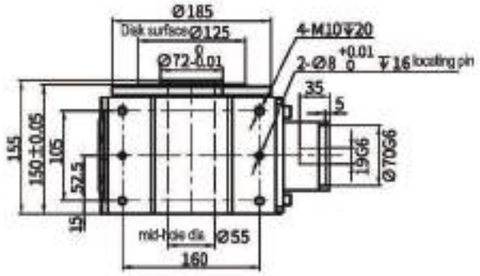
*** The above drawings are for standard installation methods and input flange dimensions. Please contact us if other installation methods and input flange dimensions are required.**

DKH-90R-20 Dimension drawing

Unit: mm







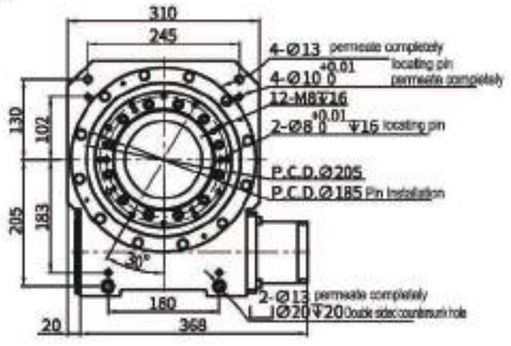
DKHM-90R-I

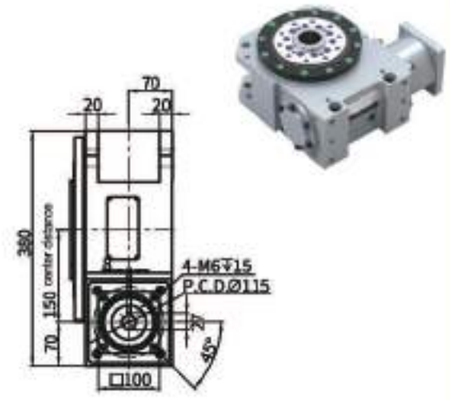
DKHR-90R-I

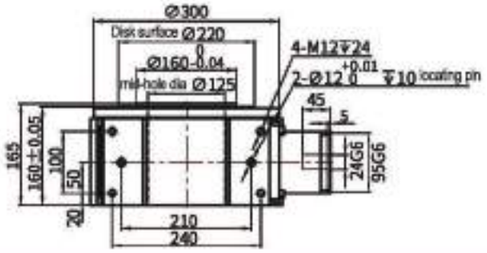
* The turntable can be connected to a direct-connected or angle planetary reducer to increase the speed ratio and torque. The installation size of the turntable remains unchanged, but the size of the reducer will be increased. Please consult the sales engineer for specific parameters and drawings.

DKH-150R-30 Dimension drawing

Unit: mm







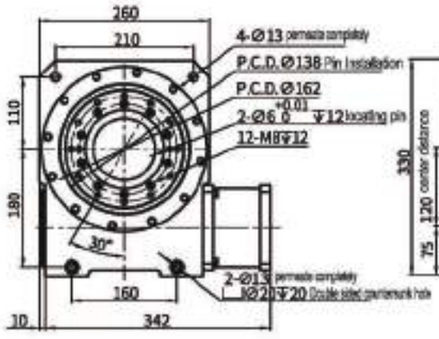
DKHM-150R-I

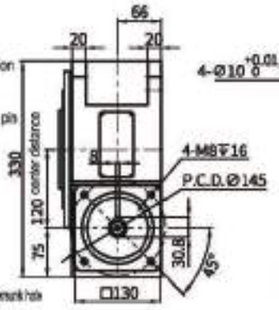
DKHR-150R-i

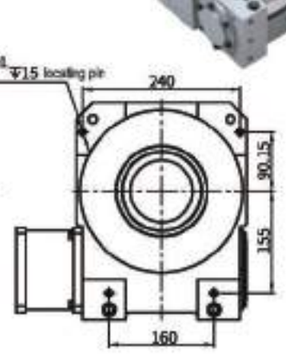
* The turntable can be connected to a direct-connected or angle planetary reducer to increase the speed ratio and torque. The installation size of the turntable remains unchanged, but the size of the reducer will be increased. Please consult the sales engineer for specific parameters and drawings.

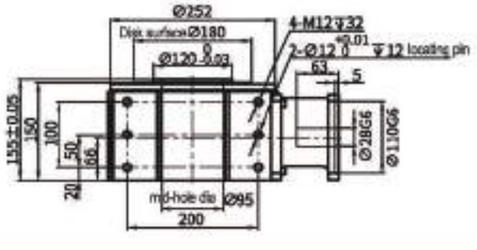
DKH-120R-30 Dimension drawing

Unit: mm









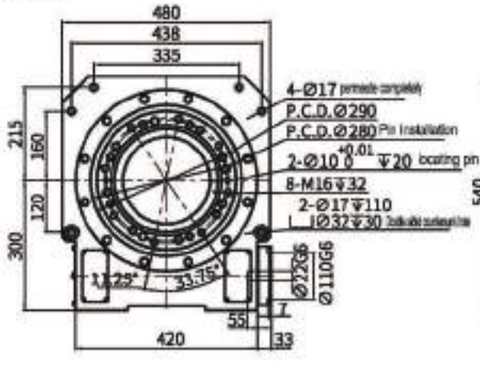
DKHM-120R-I

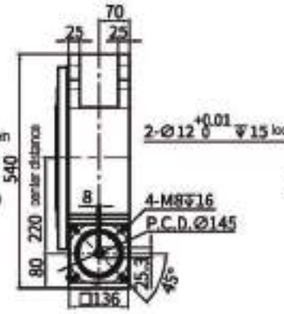
DKHR-120R-i

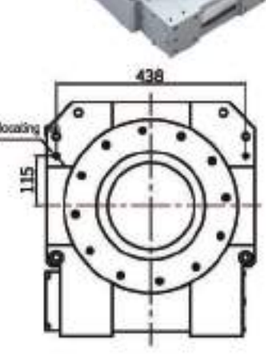
* The turntable can be connected to a direct-connected or angle planetary reducer to increase the speed ratio and torque. The installation size of the turntable remains unchanged, but the size of the reducer will be increased. Please consult the sales engineer for specific parameters and drawings.

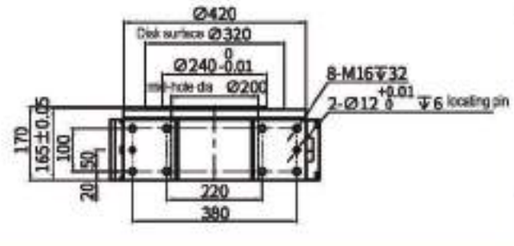
DKH-220R-40 Dimension drawing

Unit: mm









DKHM-220R-I

DKHR-220R-i

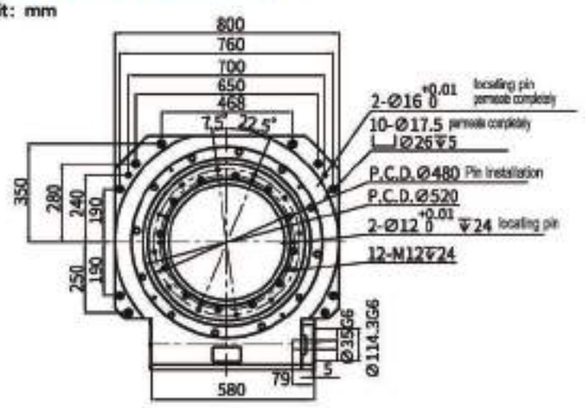
* The turntable can be connected to a direct-connected or angle planetary reducer to increase the speed ratio and torque. The installation size of the turntable remains unchanged, but the size of the reducer will be increased. Please consult the sales engineer for specific parameters and drawings.

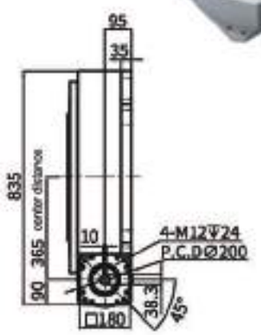
* The above drawings are for standard installation methods and input flange dimensions. Please contact us if other installation methods and input flange dimensions are required.

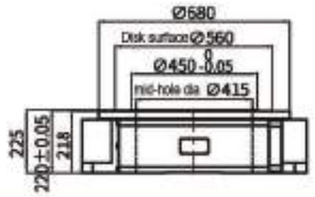
* The above drawings are for standard installation methods and input flange dimensions. Please contact us if other installation methods and input flange dimensions are required.

DKH-365R-60 Dimension drawing

Unit: mm





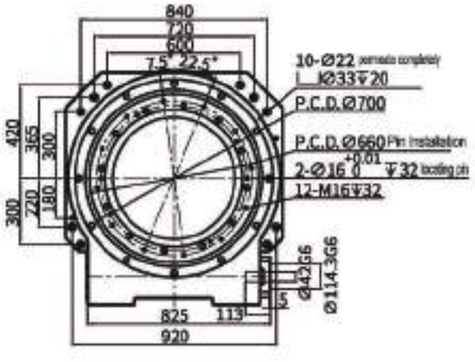


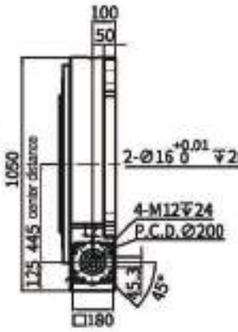
DKHM-365R-I | DKHR-365R-I

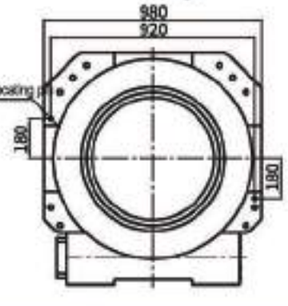
* The turntable can be connected to a direct-connected or angle planetary reducer to increase the speed ratio and torque. The installation size of the turntable remains unchanged, but the size of the reducer will be increased. Please consult the sales engineer for specific parameters and drawings.

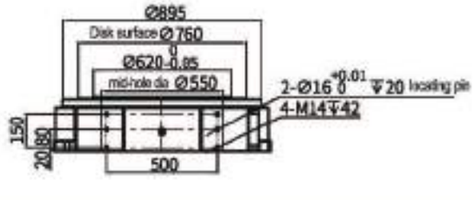
DKH-445R-72 Dimension drawing

Unit: mm









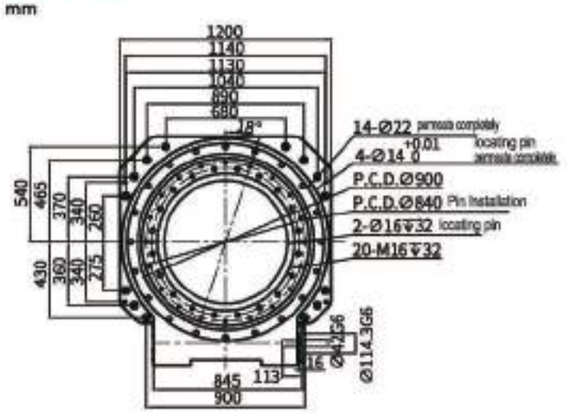
DKHM-445R-I | DKHR-445R-I

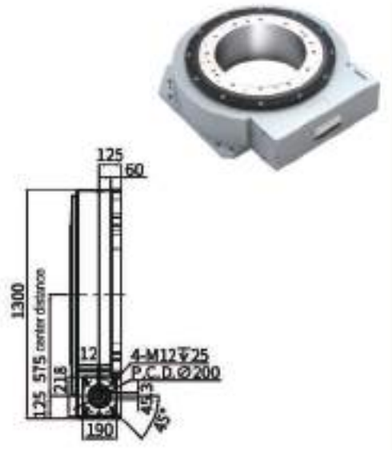
* The turntable can be connected to a direct-connected or angle planetary reducer to increase the speed ratio and torque. The installation size of the turntable remains unchanged, but the size of the reducer will be increased. Please consult the sales engineer for specific parameters and drawings.

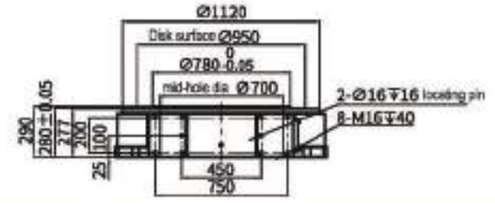
* The above drawings are for standard installation methods and input flange dimensions.
Please contact us if other installation methods and input flange dimensions are required.

DKH-575R-90 Dimension drawing

Unit: mm





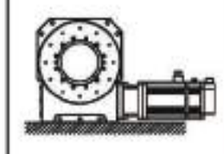
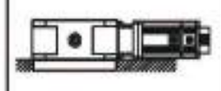
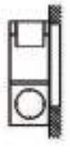


DKHM-575R-I | DKHR-575R-I

* The turntable can be connected to a direct-connected or angle planetary reducer to increase the speed ratio and torque. The installation size of the turntable remains unchanged, but the size of the reducer will be increased. Please consult the sales engineer for specific parameters and drawings.

* The above drawings are for standard installation methods and input flange dimensions.
Please contact us if other installation methods and input flange dimensions are required.

Precision hollow rotary indexing table installation

				
Z-Side mounting	D-Horizontal mounting	U-Ceiling Installation	BD-Wall Mount Base Installation	BP-Wall-mounted top surface installation

RT Series

Precision Hai Bo tooth hollow rotary platform

Ordering Model Indication

RT - 110 - 30 - K - N

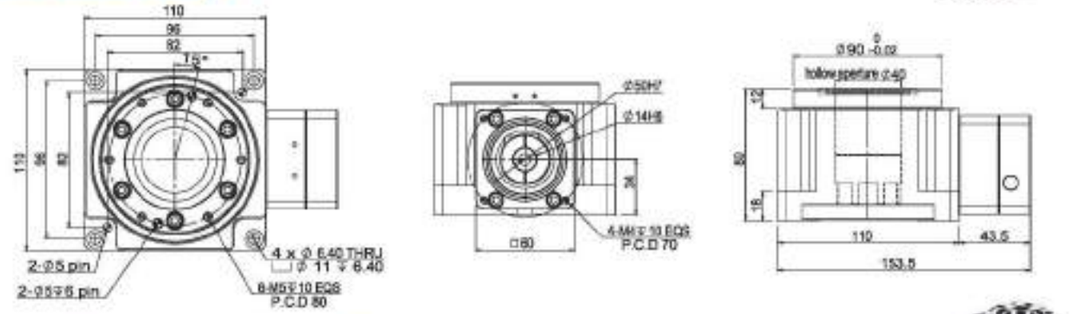
Code	Model Specification	Ratio	Structural form	Motor Specification
RT	110 150	10 30 50 70	K	N: PCD70 M4 / PCD90 M6 N1: PCD70 M5 N2: PCD70 M4

Technical Parameter

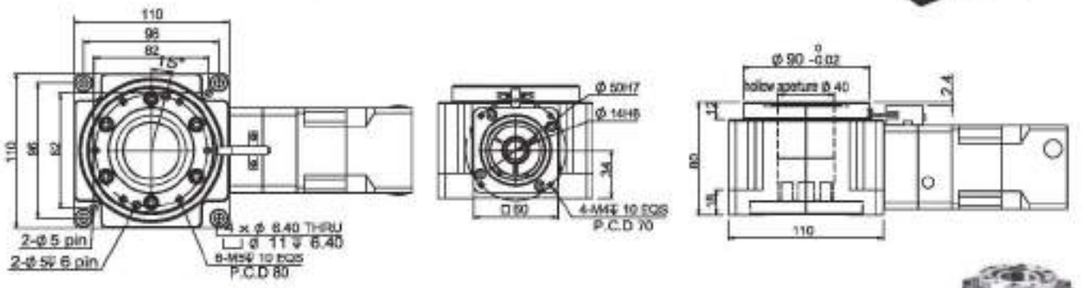
Model	Unit	RT110-10-N	RT110-K-(30/50/70)-N	RT150-10-N	RT150-K-(30/50/70)-N
Matching motor specifications	W	400	400	750	750
Rotating platform bearings		/	/	/	/
Permissible torque	N.M	45	45	80	80
Allowable moment of inertia	N.M	50	50	90	90
Allowable disk speed	rpm	200	200	200	200
Ratio	i	10	30/50/70	10	30/50/70
Repeat positioning accuracy	arc-sec	±5	±5	±5	±5
Positioning accuracy	arc-min	±0.5	±1	±0.5	±1
Precision life	h	30000	30000	30000	30000
Allowable axial load	N	2000	2000	2000	2000
Rotational plane amplitude	mm	±0.005	±0.005	±0.005	±0.005
Rotational concentricity	mm	±0.005	±0.005	±0.005	±0.005
Protection level	IP	50	50	50	50
Operating temperature	(°)	-20℃-90℃	-20℃-90℃	-20℃-90℃	-20℃-90℃
Weight	kg	3	4.2	7.5	11.5

Outline Dimension Drawing

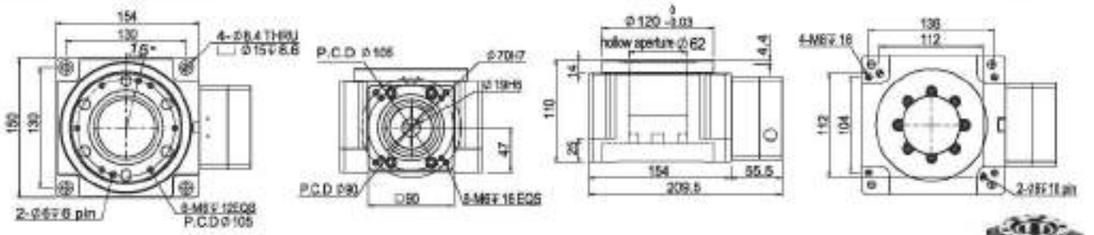
RT110-10-N



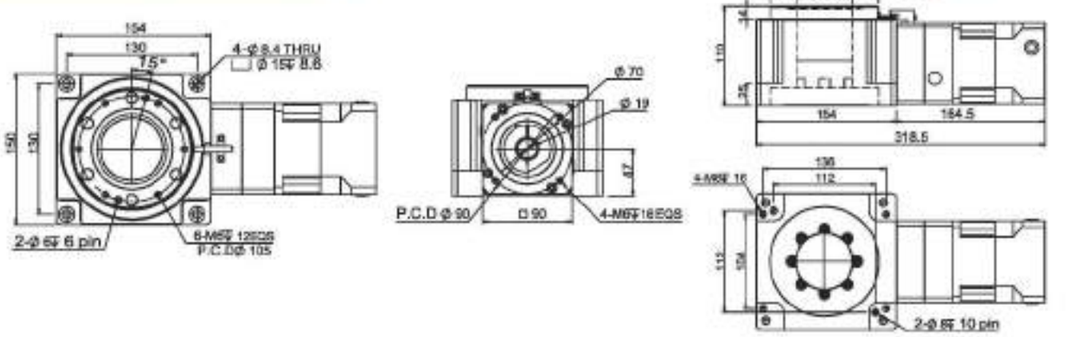
RT110-K-(30/50/70)-N



RT150-10-N



RT150-K-(30/50/70)-N



RK Series

Hypotooth Hollow Rotating Platform

Ordering Model Indication

RK - 100 - 30 - N

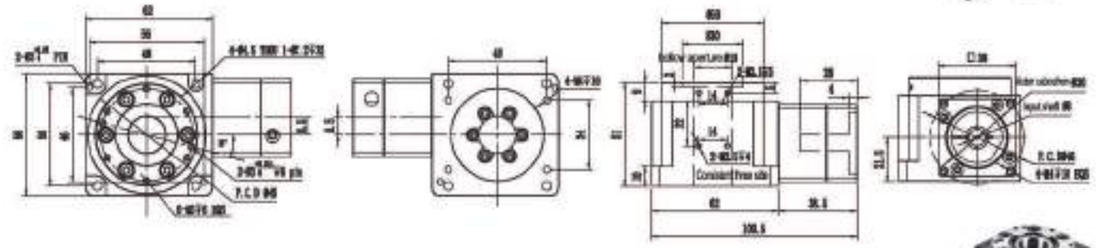
Code	Model Specification	Ratio	Motor Specification
RK	60 100 150 200	30	N: Φ8 PCD45 M3 / PCD70 M4 PCD90 M6 / PCD145 M8 N1: Φ8 PCD46 M4 / PCD70 M5 / PCD145 M8 N2: PCD70 M4

Technical Parameter

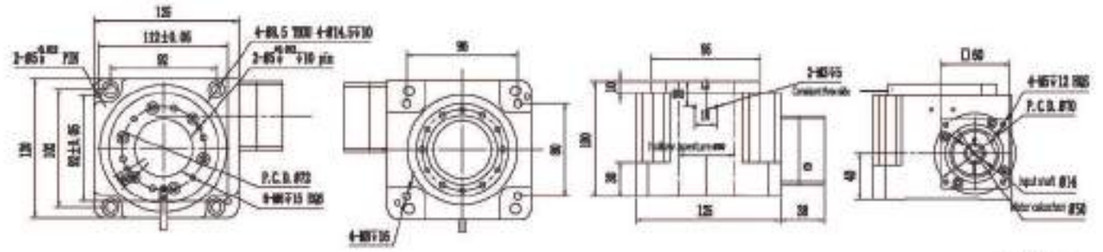
Model	Unit	RK60-30-N	RK100-30-N	RK150-30-N	RK200-30-N
Matching motor specifications	W	100	400	750	1000
Rotating platform bearings		/	/	/	/
Permissible torque	N.M	35	120	220	450
Allowable moment of inertia	N.M	40	140	240	500
Allowable disk speed	rpm	200	100	100	100
Ratio	i	30	30	30	30
Repeat positioning accuracy	arc-sec	±5	±5	±5	±5
Positioning accuracy	arc-min	1	30	30	30
Precision life	h	30000	30000	30000	30000
Allowable axial load	N	800	3000	7000	12000
Rotational plane amplitude	mm	±0.005	±0.005	±0.005	±0.005
Rotational concentricity	mm	±0.005	±0.005	±0.005	±0.005
Protection level	IP	50	50	50	50
Operating temperature	(°)	-20℃-90℃	-20℃-90℃	-20℃-90℃	-20℃-90℃
Weight	kg	0.9	8.5	18	59

Outline Dimension Drawing

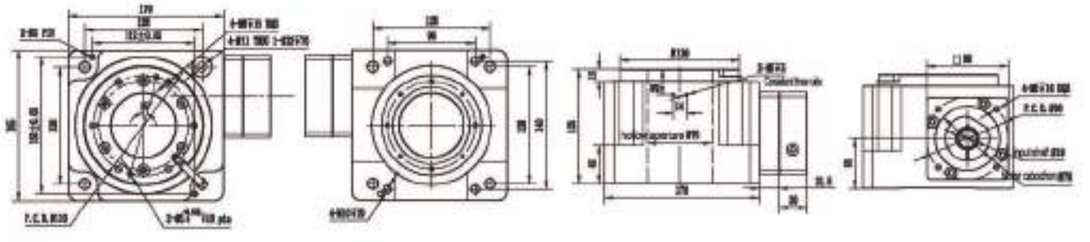
RK60-30-N (The speed ratio of the main body is 30. If the speed ratio is not enough, you can add a planetary reduction ratio. Please consult for details.)



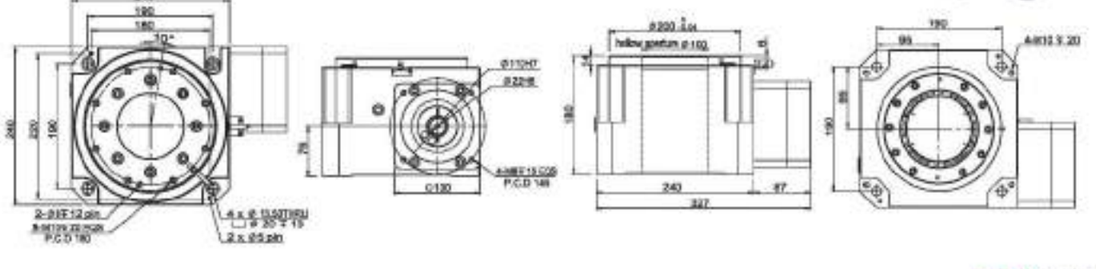
RK100-30-N (The speed ratio of the main body is 30. If the speed ratio is not enough, you can add a planetary reduction ratio. Please consult for details.)



RK150-30-N (The speed ratio of the main body is 30. If the speed ratio is not enough, you can add a planetary reduction ratio. Please consult for details.)



RK200-30-N (The speed ratio of the main body is 30. If the speed ratio is not enough, you can add a planetary reduction ratio. Please consult for details.)



RM Series

Right angle hollow rotating platform

Ordering Model Indication

RM - 130 - 30 - 14 - 50 - 70

Code	Model Specification	Ratio	Motor shaft diameter	Motor Positioning Boss	Motor mounting hole distance
RM	130 180 225 260	L1: 15/21/30/50 L2: 60/75/90/120 150/210/300			

Can be equipped with double-stage planetary gears. Please consult sales engineers for specific parameters and dimensions.

Note: (Diagonal hole distance of servo motor mounting surface)
(Single-side hole distance of stepper motor mounting surface)

Technical Parameter

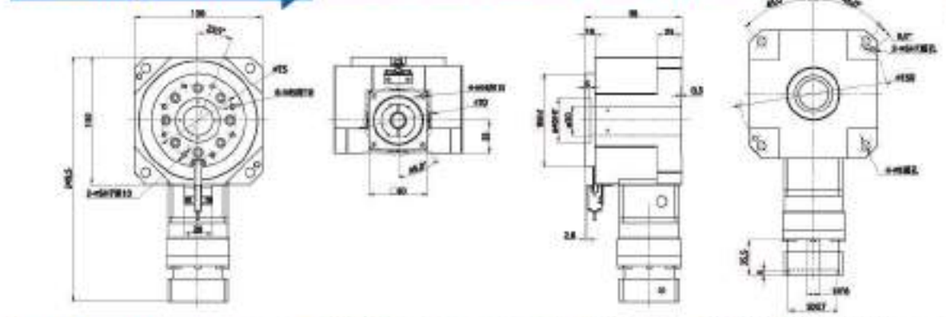
Model	Unit	RM130-L1				RM180-L1				RM225-L1				RM260-L1			
Bearing structure		Cross roller bearing															
Reduction ratio	i	15	21	30	50	15	21	30	50	15	21	30	50	15	21	30	50
Rated output torque	N.m	150	150	150	110	470	470	470	315	1350	1350	1350	950	2950	2950	2950	1950
Output torque	N.m	3 Times rated torque															
Positioning accuracy	arc-min	≤1.5				≤1.5				≤1.5				≤2			
Repeated positioning accuracy	arc-sec	≤30				≤30				≤30				≤30			
Allowable disk speed	rpm	200 Intermittent operation															
Adapt to servo motor	W	200–400				750–1500				1000–3000				2000–5000			
Suitable for stepping motor		57 Stepper				86 Stepper				130/150 Stepper				130/150 Stepper			
Allowable axial load	N	7300				13500				19500				29600			
Allowable radial load	N	7300				13500				19500				29600			
Design load	Kg	70				230				480				1000			
Allowable moment of inertia	N.m	50				110				220				750			
Torsional rigidity	N.m/arcmin	25				45				80				175			
Overturning moment	N.m	520				1420				2530				6300			
Accuracy life	h	20000h Intermittent operation															
Protection level	IP	65															
Lubrication method		Long-term lubrication															
Installation method		Arbitrary															
Concentricity of rotating platform	mm	≤0.01															
Parallelism of rotating platform	mm	≤0.01															
Transmission efficiency	%	95				95				95				95			
Noise	db	≤57				≤63				≤67				≤67			
Weight	Kg	7				17				36				46			

Note: If you have higher requirements for the parallelism of the rotating platform, please contact our sales staff.

Outline Dimension Drawing

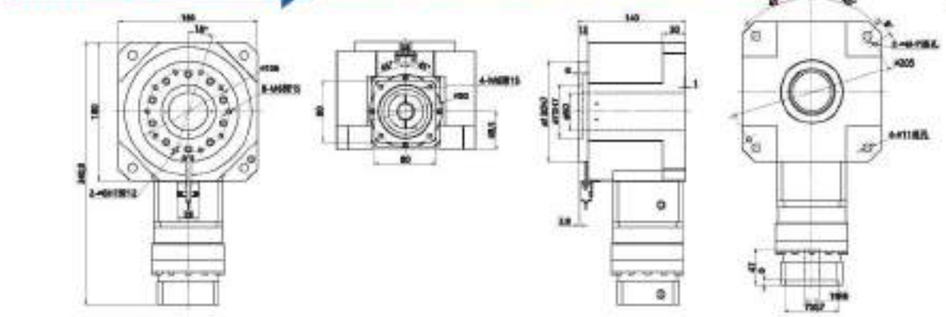
RM130-(15/21/30/50)

Can be equipped with servo motor 200-400W, 57 stepper



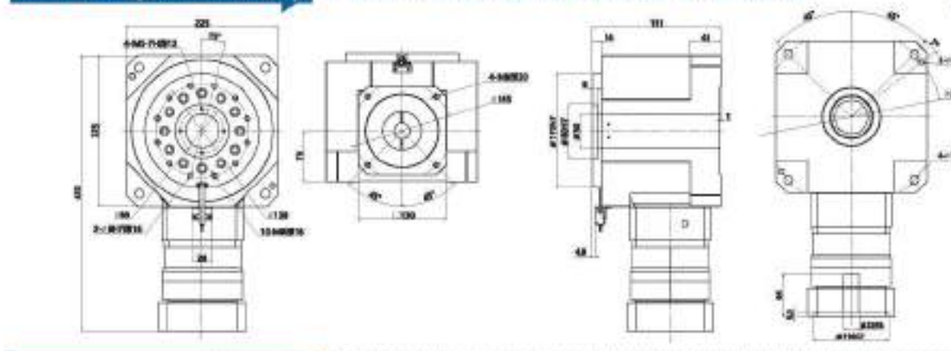
RM180-(15/21/30/50)

Can be equipped with servo motor 750-1500W, 86/110 stepper



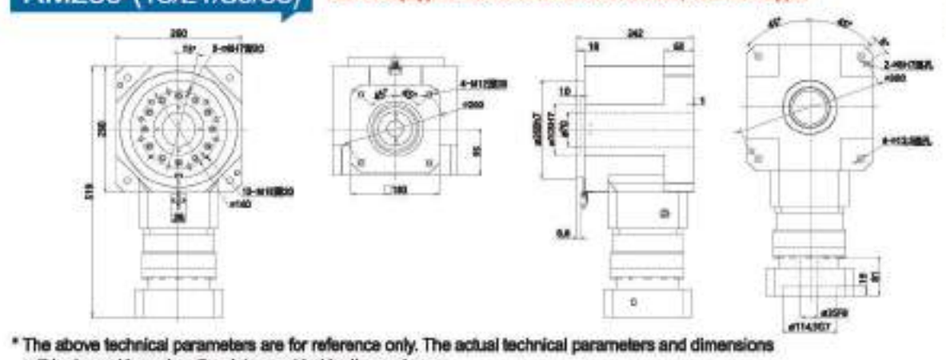
RM225-(15/21/30/50)

Can be equipped with servo motor 1000-3000W, 130/150 stepper



RM260-(15/21/30/50)

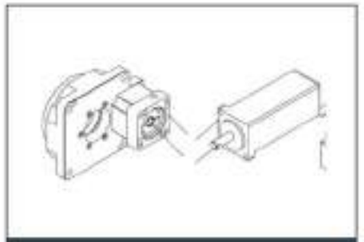
Can be equipped with servo motor 2000-5000W, 130/150 stepper



* The above technical parameters are for reference only. The actual technical parameters and dimensions will be issued based on the data provided by the customer.

Installation instructions for hollow rotating platform and motor

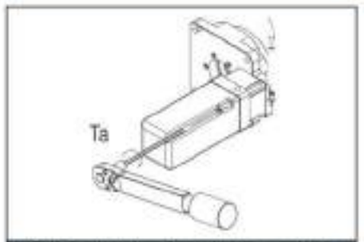
Motor Installation Instructions



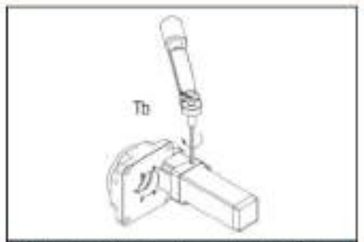
First, match the size of the motor and the rotating platform and remove all foreign matter from the surface.

Remove the screw plug on the adapter flange and adjust the position until the fastening screws are visible.

Adjust the position of the motor and the adapter flange and gently tighten the fixing bolts until the locking ring no longer rotates idly.



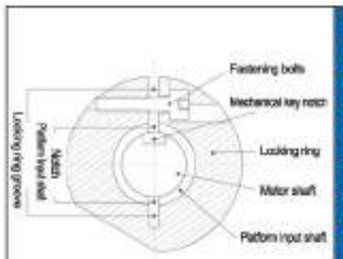
Initially fix the bolts diagonally. After completing step ②, tighten the fixing bolts referring to the tightening torque standard Ta.



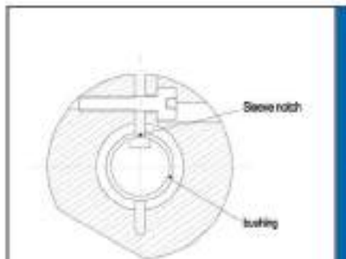
Refer to the tightening torque standard Ta and tighten the fixing bolts.

Tighten the screw plug.

Note 1: How to install the motor



Pull out the mechanical key, adjust the position of the locking ring so that its notch is aligned with the notch of the input shaft of the rotating platform, and then tighten the input shaft of the platform.Grease the shaft hole and motor shaft, insert the motor shaft, align the mechanical key slot with the locking ring slot to maximize Tighten the fastening bolts of the locking ring to make the connection more secure.



If the motor shaft diameter is too small to match the platform input shaft hole, a sleeve can be added for adjustment. The installation method is the same as with the belt. The motor installation method of the mechanical key is the same. Just put the sleeve in and align it with the slot of the locking ring, then tighten the locking ring. Just tighten the bolts.

Note 2: Wrench bolt tightening torque

Wrench bolt size	Locking ring installation Ta(8.8T)		Locking ring installation Tb(12.9T)	
	N.m	kgf.cm	N.m	kgf.cm
M3	1.28	13	2.15	22
M4	2.9	30	4.95	50
M5	5.75	59	9.7	99
M6	9.9	101	16.5	168
M8	24	245	40	408
M10	48	489	81	826
M12	83	846	140	1428
M14	132	1346	220	2243
M16	200	2039	340	3467

AGV Trolley Servo Wheel Module

- Support external forced brake release
- Reducer with low backlash and high precision
- Standard Canopen communication protocol
- Improve vehicle efficiency and start faster when fully loaded
- Stronger climbing and obstacle crossing, better performance
- Built-in temperature sensor abnormal early alarm
- Comprehensive security

Product Advantages

Highly integrated: The four main components of the drive, motor, reducer and wheel are highly integrated, with a compact structure, which is conducive to the miniaturization of the vehicle body;
High installation precision: bracket installation, simple and convenient installation, high installation precision, improve walking control precision;
High reliability: integrated module, only power supply and communication cables are external, good anti-interference performance, improving the stability and reliability of the vehicle system;
Good maintainability: The integrated product has a single supplier, which is conducive to the subsequent product maintenance and reduces the supply chain and after-sales costs.
Compatible design, seamless switching: The usage of servo wheel products is no different from that of Buke standard products, and the switching is seamless;

Application Scenario

Can carry 100kg、300kg 600kg、1T、1.5T mobile robot

AGV servo wheel (1T load) standard parameters

2.14m/s Top speed	100Ap Driver Peak	99Nm Peak Torque	
40Nm Rated torque	2.4 times the main frequency increase	16K Speed ring	8K Position Ring

Power servo wheel module specially designed for mobile robots with loads below 600 kg
Power servo wheel module specially designed for mobile robots with loads below 1 to 1.5 tons.

Naming convention

AGV - 104 09 - 022 22 - A 165 - M B D T - XXXX

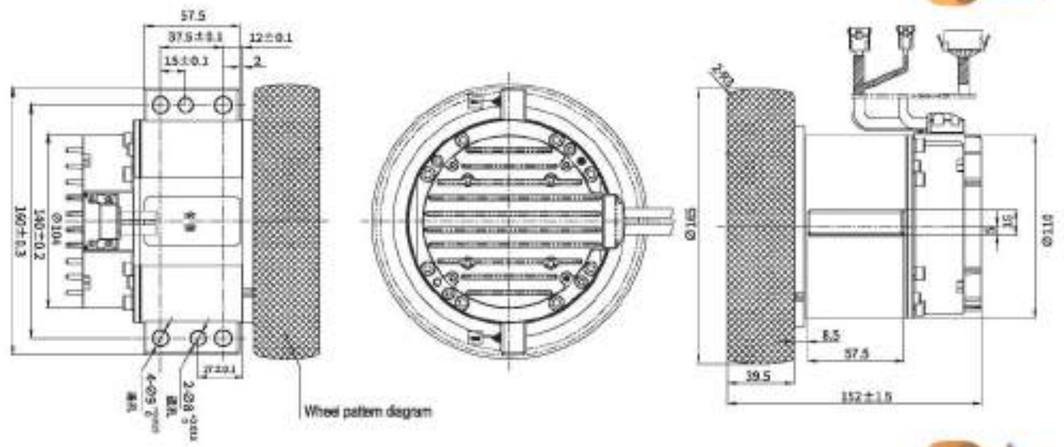
Model identification AGV 4 in 1 servo wheel HGV single reducer	Electronic stator outer diameter 104	Ratio 9、11	Torsion 22Nm、40Nm	Wheel speed (after reducer output) 22*10rpm 23*10rpm	Wheel Cover Material/Pattern Type A: Polyurethane Raised cross section, diamond pattern 0: No wheel	Wheel outer diameter 165mm 180mm 0mm	Encoder Type M: Single-turn communication magnetoelectric encoder	Holding brake B: With brake A: Without brake	Supply voltage D: DC48V	Connector type, cable length, etc. T: Standard connector and cable length	Special Customization Custom Suffix

Parameter specifications

AGV Series Integrated Servo Wheel		AGV10409-02222-A165-M■DT	AGV10411-04023-A180-M■DT
Power supply	Power supply	24VDC~60VDC	
	Logic Power Supply	24VDC	
Rated line speed (m/s)		1.9	2.14
Rated torque Tn(Nm)		21	40
Peak torque Tn(Nm)		60	99
Tire diameter (mm)		165	180
Tire width (mm)		39.5	50
Tire material		Polyurethane (optional)	
Tire hardness grade		85A	90A
Dynamic braking		An external braking resistor is required (depending on the operating conditions, mainly used in rapid start and stop situations)	
Dynamic braking voltage absorption point		DC63V±2V (Default value, configurable)	
Overvoltage alarm voltage		DC68V±2V	
Undervoltage alarm voltage		DC18V±2V	
Input Specifications		2-way digital input, common COMI terminal, high level: 2.5-30VDC, low level: 0-5VDC, maximum frequency: 1KHz, input impedance: 5KΩ,	
Output specifications		1 digital output channel common COMO terminal maximum output current: 100mA	
Holding brake		Built-in brake and control circuit	
Forced brake release interface		1-way forced brake release interface, only used when the servo wheel has no power input.	
RS485 debug port		Maximum supported baud rate: 115.2Kbps	
CAN BUS		Supports a maximum baud rate of 1Mbps and can communicate with the controller using the CANopen protocol	
Power supply	Maximum continuous output current (rms)	16A	26A
	Peak current (PEAK)	100Ap(<2s)	100Ap(<2s)
Motor	Motor rated speed nN(rpm)	2000	2500
	Motor rated torque Tn(Nm)	2.4	4
	Brake holding torque T(Nm)	4	
Noise		<65dB	
Cooling method		Natural cooling, auxiliary heat dissipation of the vehicle body	
Operating environment	Operating temperature	0~40°C	
	Storage temperature	-20°C~60°C	
	Humidity (non-condensing)	90%RH以下	
	Protection level	IP54	
	high	Rated working altitude is below 1000m. When the working altitude is above 1000m, the rating shall be derated by 1.5% for every 100m increase. The maximum working altitude is 3000m.	
	Atmospheric pressure	86kpa~ 106kpa	

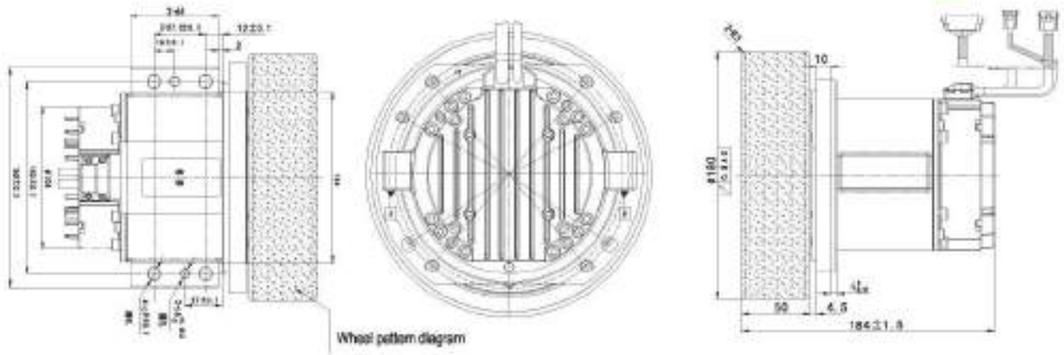
• AGV10409-02222-A165-M■DT

Dimensions:

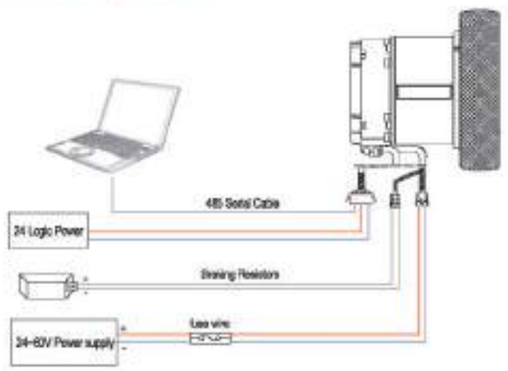


• AGV10411-04023-A180-M■DT

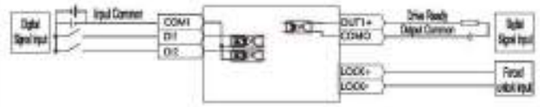
Dimensions:



External Wiring Diagram



Integrated servo wheel control wiring diagram

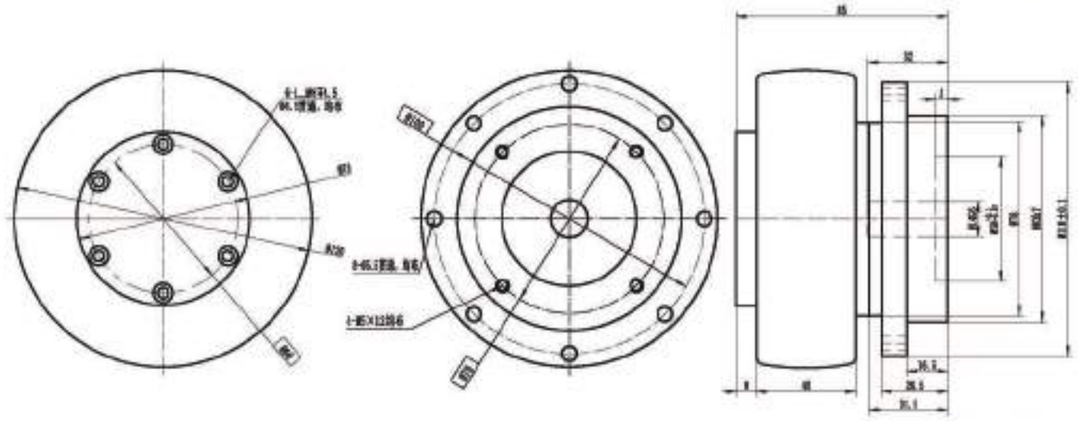


Recommended circuit wiring diagram for forced brake release

Note: Use after cutting off the logic power and power of the servo wheel.

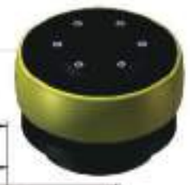
• HGV080-9B-120

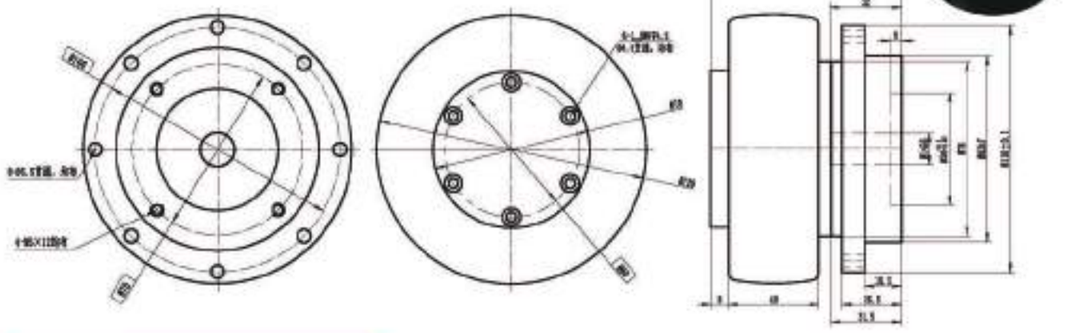
Dimensions:



• HGV090-9B-120

Dimensions:





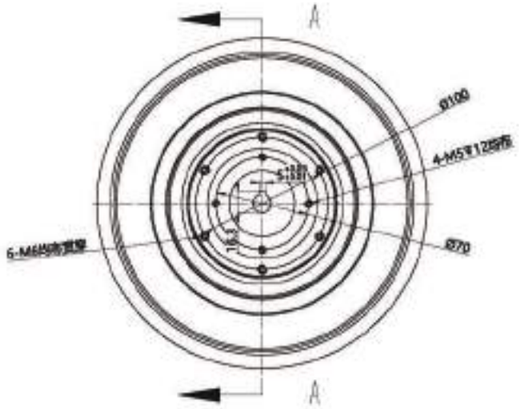
Performance Parameters

Performance / Model	HGV080-9B-120	HGV090-9B-120
Transmission ratio	9	9
Series	1	1
Rated output torque	30N.m	40N.m
Maximum output torque	54N.m	60N.m
Rated input speed	3000rpm	3000rpm
Maximum input speed	6000rpm	6000rpm
Noise value	≤60dB(A)@lm	≤60dB(A)@lm
Rated load efficiency	≥96%	≥94%
Backlash	≤20arcmin	≤15arcmin
lifetime	20000h	20000h
Ambient temperature	-30~90°C	-30~90°C
Protection level	Ip54	Ip54
Maximum radial force	2000N	2300N
Maximum axial force	450N	700N
Total Weight	300KG	

Note: Specifications are subject to change without prior notice.

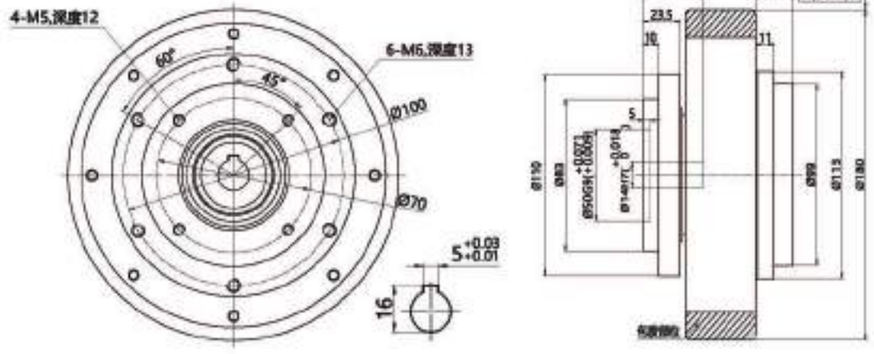
• HGV115-15B-140-250

Dimensions:



• HGV138-L2-21B

Dimensions:



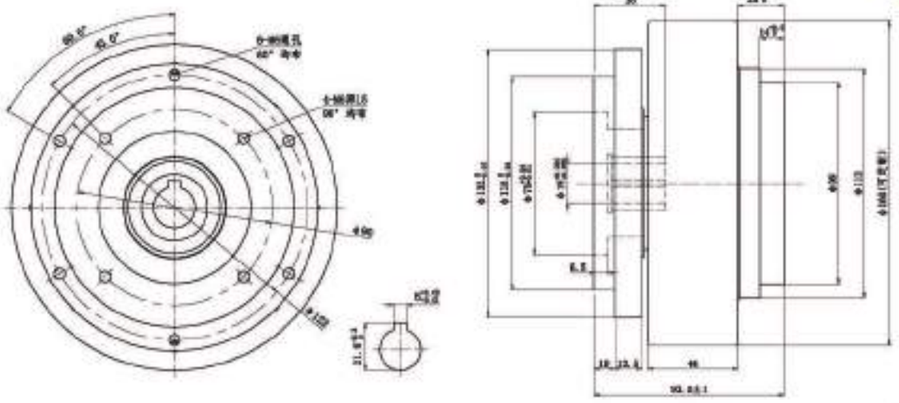
Performance Parameters

Performance / Model	HGV115-15B-140-250	HGV138-L2-21B
Transmission ratio	15	21
Series	2	2
Rated output torque	80N.m	60N.m
Maximum output torque	160N.m	150N.m
Rated input speed	3000rpm	3000rpm
Maximum input speed	6000rpm	6000rpm
Noise value	≤65dB(A)@lm	≤60dB(A)@lm
Rated load efficiency	≥93%	≥93%
Backlash	≤6arcmin	≤6arcmin
lifetime	10000h	10000h
Ambient temperature	-10~90°C	-10~90°C
Protection level	Ip54	Ip54
Maximum radial force	3250N	3250N
Maximum axial force	1600N	1600N
Total Weight	300KG	500KG

Note: Specifications are subject to change without prior notice.

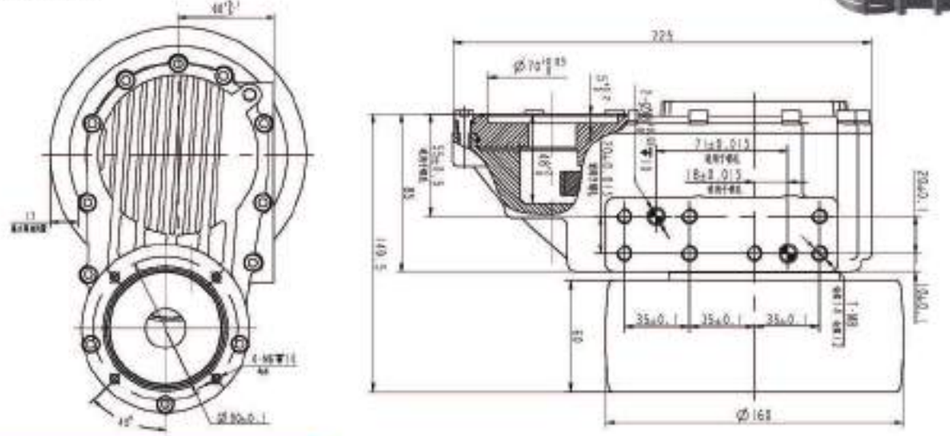
HGV138-L2-30B

Dimensions:



减速机 HX2-20-A109-T100

Dimensions:



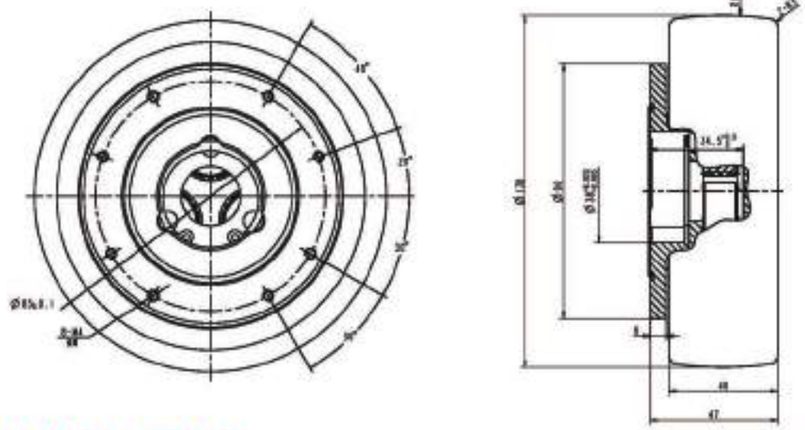
Performance Parameters

Performance / Model	HGV138-L2-30B	HX2-20-A109-T100
Transmission ratio	30	20
Series	2	2
Rated output torque	60N.m	100N.m
Maximum output torque	150N.m	200N.m
Rated input speed	3000rpm	3000rpm
Maximum input speed	6000rpm	6000rpm
Noise value	≤60dB(A)@lm	≤60dB(A)@lm
Rated load efficiency	≥93%	≥95%
Backlash	≤6arcmin	≤20arcmin
lifetime	20000h	20000h
Ambient temperature	-10~90°C	-15~90°C
Protection level	Ip65	Ip54
Maximum radial force	6000N	7000N
Maximum axial force	1000N	2500N
Total Weight	500KG	/

Note: Specifications are subject to change without prior notice.

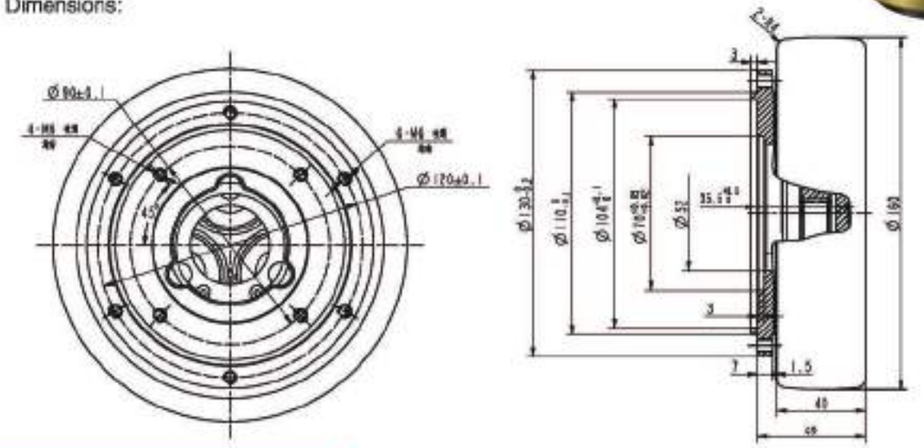
HGV080-5B-130

Dimensions:



HGV120-9B-160

Dimensions:



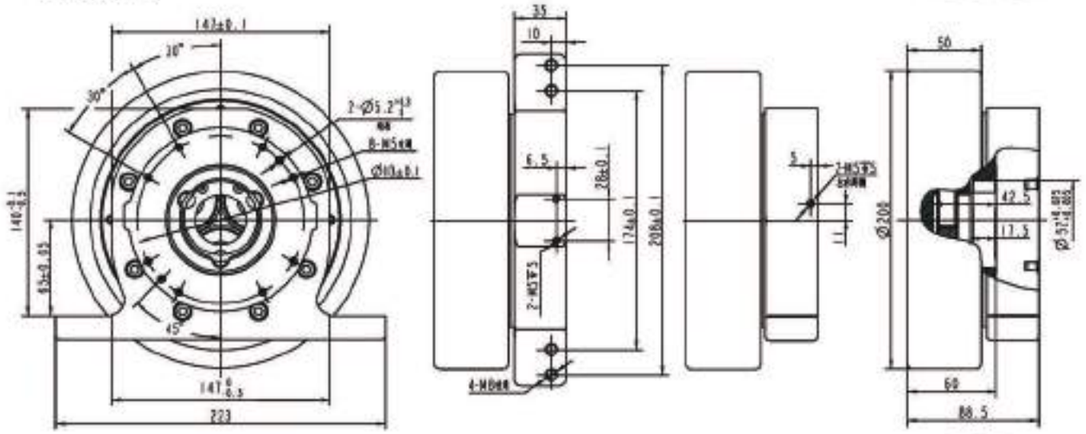
Performance Parameters

Performance / Model	HGV080-5B-130	HGV120-9B-160
Transmission ratio	5	9
Series	1	1
Rated output torque	30N.m	80N.m
Maximum output torque	54N.m	200N.m
Rated input speed	3000rpm	3000rpm
Maximum input speed	6000rpm	6000rpm
Noise value	≤60dB(A)@lm	≤65dB(A)@lm
Rated load efficiency	≥96%	≥95%
Backlash	≤20arcmin	≤12arcmin
lifetime	20000h	20000h
Ambient temperature	-30~90°C	-30~60°C
Protection level	Ip54	Ip54
Maximum radial force	2000N	3000N
Maximum axial force	450N	1000N
Total Weight	300KG	600KG

Note: Specifications are subject to change without prior notice.

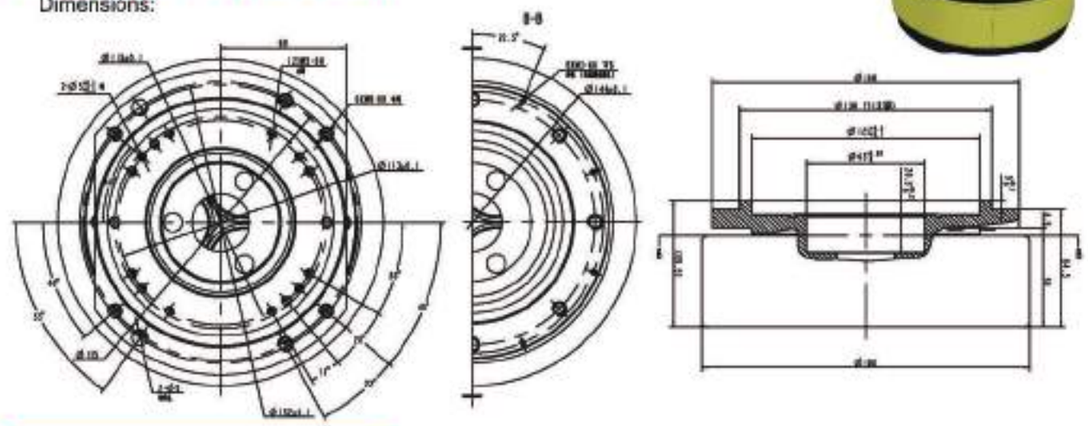
• HGV120-11B-200

Dimensions:



• HGV120-11B-180-1T

Dimensions:



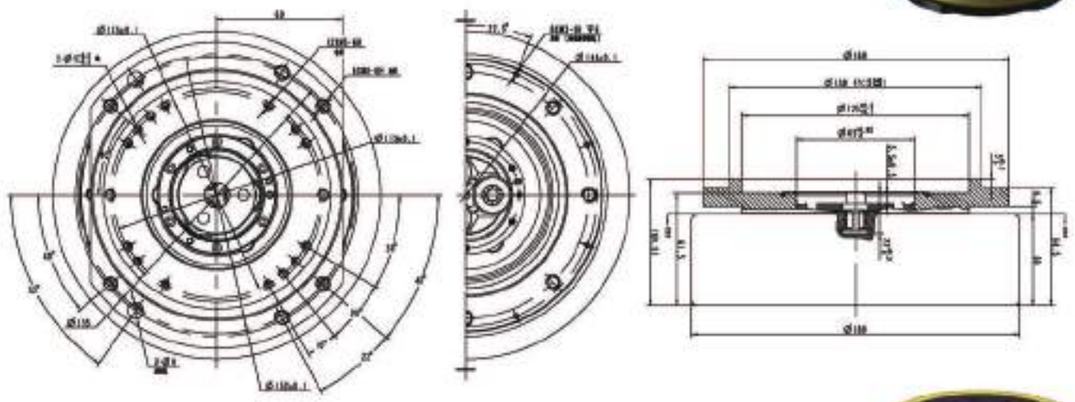
Performance Parameters

Performance / Model	HGV120-11B-200	HGV120-11B-180-1T
Transmission ratio	11	11
Series	2	1
Rated output torque	80N.m	80N.m
Maximum output torque	200N.m	200N.m
Rated input speed	3000rpm	3000rpm
Maximum input speed	6000rpm	6000rpm
Noise value	≤60dB(A)@lm	≤60dB(A)@lm
Rated load efficiency	≥95%	≥97%
Backlash	≤15arcmin	≤15arcmin
lifetime	20000h	20000h
Ambient temperature	-15~90°C	-30~90°C
Protection level	Ip54	Ip54
Maximum radial force	73000N	7000N
Maximum axial force	1500N	1500N
Total Weight	800KG	1000KG

Note: Specifications are subject to change without prior notice.

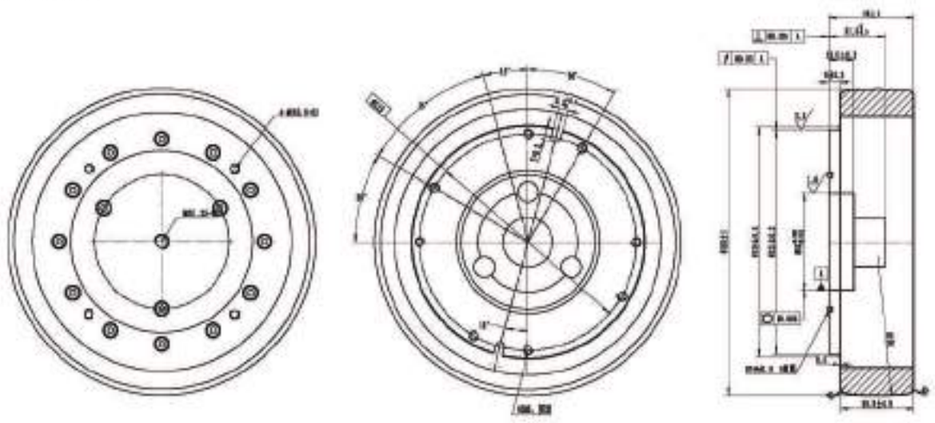
• HGV120-20B-180-1.5T

Dimensions:



• HGV120-9E-165

Dimensions:



Performance Parameters

Performance / Model	HGV120-20B-180-1.5T	HGV120-9B-160
Transmission ratio	20	9
Series	2	2
Rated output torque	110N.m	130N.m
Maximum output torque	275N.m	325N.m
Rated input speed	3000rpm	3000rpm
Maximum input speed	6000rpm	6000rpm
Noise value	≤60dB(A)@lm	≤60dB(A)@lm
Rated load efficiency	≥94%	≥95%
Backlash	≤15arcmin	≤12arcmin
lifetime	20000h	20000h
Ambient temperature	-30~90°C	-20~90°C
Protection level	Ip54	Ip65
Maximum radial force	7000N	6000N
Maximum axial force	1500N	1000N
Total Weight	1500KG	600KG

Note: Specifications are subject to change without prior notice.

FEQ Wheel Gearbox

Wheel reducer naming definition

FEQ 115N - 20 - 10 - 19 - ** - H40 - W160

Reducer code	Specification (matching hub diameter)	Ratio	Maximum radial load	Motor shaft diameter	Customized serial number	Wheel width	Wheel diameter
FEQ	095/115 145/195	16/20 32/40	05-500 Kg 10-1000Kg 15-1500Kg 30-3000Kg	14-φ14 19-φ19 22-φ22	**	40	160-φ160

FEQ reducer - Technical parameters

Reduction gear parameters		FEQ095			FEQ115			FEQ145	
Reduction Ratio	i	16	20	32	16	20	32	20	32
Rated torque	N.m	65	65	93.	100	130	130	130	250
Maximum Acceleration Torque	N.m	117	117	167	180	234	234	234	450
Emergency stop torque	N.m	195	195	279	300	390	390	390	750
Rated Input Speed	r/min	3000			3000			3000	
Maximum input speed	r/min	4500			4500			4500	
Maximum radial load	kg	500			1000			1500	
Maximum axial load	kg	150			250			375	
Noise	dB	60			60			65	
Transmission efficiency	%	94			94			94	
Lubrication method		Synthetic grease							
Operating temperature	°C	-10°C ~ 90°C							
Service life	h	20000							
Protection class		IP54							
Weight	Kg	3.3	3.3	3.3	5.9	5.9	5.9	10.2	10.2

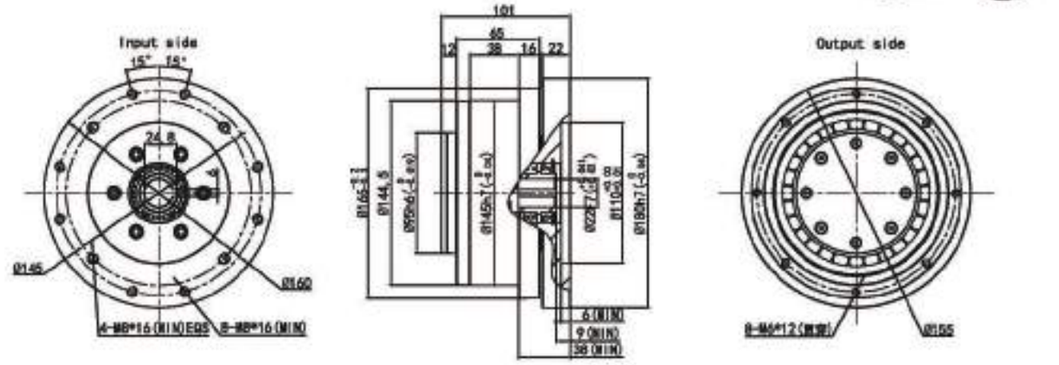
With gear reducer - Technical parameters

Performances		FEQ095		FEQ115			FEQ145	
Maximum load of reducer	kg	500		1000			1500	
Wheel Diameter	mm	125	150	160	180	200	200	230
Wheel width	mm	37	45	40	55	55	77	77
Polyurethane wheel load	Kg	250	400	350	450	1000	800	1500
Maximum speed with full load	m/s	3		3			3	
Maximum speed without load	m/s	3		3			3	
Total length	mm	75		85			101	
weight	kg	4.3	5.3	7.8	9.2	9.5	16	16.9
Moment of inertia	Kg.cm²	72	113	205	285	316	697	787

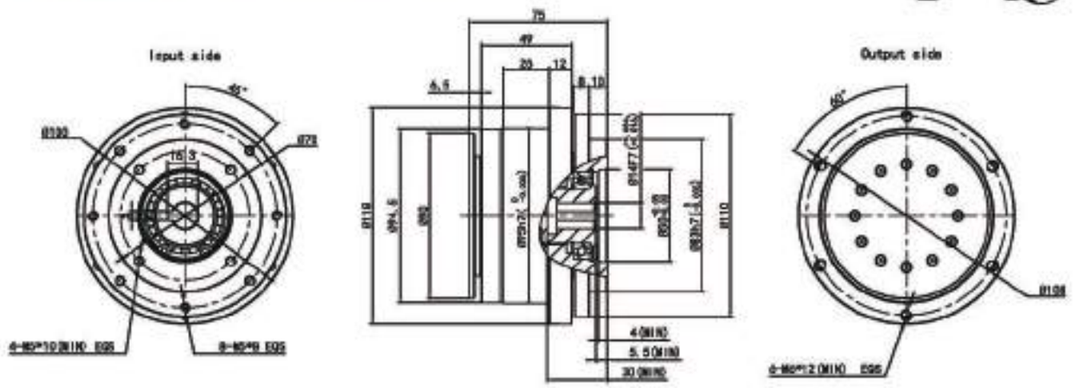
FEQ Mate - Technical Information

Pulley characteristic value	Mate 125	Mate 150	Mate 160	Mate 180	Mate 200		Mate 230
Wheel width (mm)	37	45	40	55	55	77	77
Static friction coefficient	>0.25 (The friction coefficient depends on the ground. When the wheels run on dry, polished steel rails, the friction coefficient μ=0.25)						
Temperature range (°C)	-30°C to +70°C. If the ambient temperature exceeds +40°C the load capacity will be reduced.						
Tread	Smooth and bitten treads are suitable for various working conditions						
Tread color	Black						
hardness	90±3 HA						
Tread properties	Low noise operation, high dynamic load-bearing capacity, ground protection, anti-wear, cut-resistant, tear-resistant, no marking, no staining.						

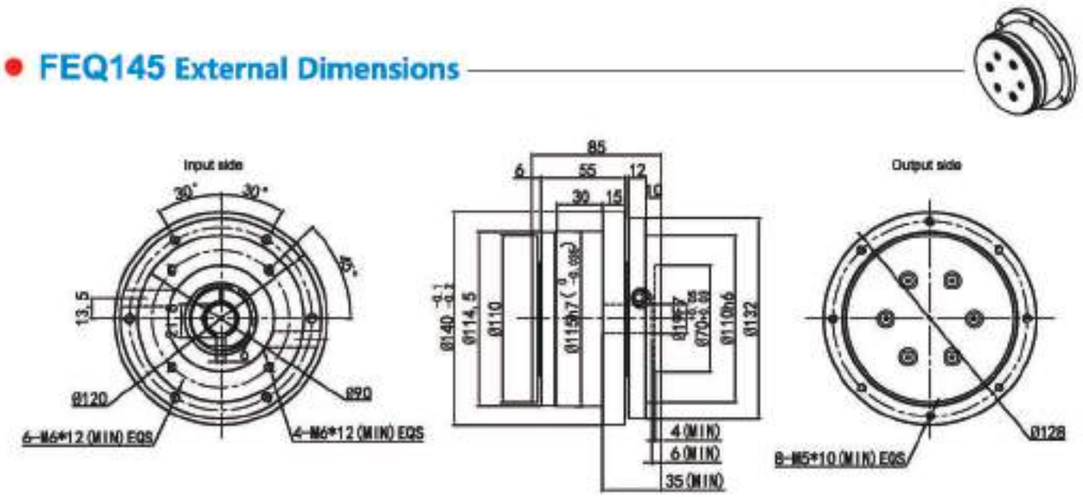
FEQ095 External Dimensions



FEQ115 External Dimensions



FEQ145 External Dimensions



Size Parameter Table

Model	FEQ095			FEQ115			FEQ145	
Gear ratio	16	20	32	16	20	32	20	32
D1	125		150	160	180	200	200	230
D2	118			140			165	
D3	110			132			180	
D4	83			110			—	
D5	50			70			110	
D6	14			19			22	
D7	90			110			95	
D8	95			115			145	
D9	105			128			155	
D10	100			120			160	
D11	70			90			145	
K1	75			85			101	
K2	49			55			65	
K3	19.5			24			24	
K4	37		45	40	55	55	77	77
K5	10			10			—	
K6	8			12			16	
K7	6.5			6			12	
K8	4			4			6	
K9	30			35			38	
K10	16.3			21.8			24.8	
K11	5			6			6	
A	12 - M4*12			8 - M5*10			8 - M6*12	
B	8 - M5*8			6 - M6*12			8 - M8*16	
C	4 - M5*10			4 - M6*12			4 - M8*16	

90 Degree Right Angle Precision Gearbox

Screw synchronous lift

Multiple output-shaft types Reduction ratio 1/1~1/250
Suitable for servo motor / stepper motor
Applicable capacity 100W~15KW

FAMED®

Fenghua Transmission Technology (Jiangsu) Co.,Ltd.

90 degree right angle reducer series

Classic example

CCW Classic planetary input to steering  146-152

CCT Classic shaft input steering  153-158

Lifting platform

CB Synchronous screw elevator  159-172

Universal Type

AT Axle input steering gear  173-182

AT-F Flange Input 90 Degree Reducer  183-196

Precision Type

AAW-AS Precision 90 Degree Reducer  197-207

AAT-AS Precision steering gear  208-217

AATM-AS Precision steering gear  218-229

Lifting platform

RB Synchronous screw elevator  230-245

Standard type

PT-A Standard steering gear  246-251

PAW-A Accurate 90 Degree Reducer  252-260

Product Characteristics of Right Angle Reducer

High precision grinded and carburized spiral bevel gears

- High precision grinded and carburized spiral bevel gears to meet standard AGMA12.

Low Backlash

- Using Gleason high precision CNC grinding machine to grinding the spiral bevel gears.
- Torsional backlash depending on design up to <2 arcmin.

Mounting Position

- Multiple precision machined surface is easy for assembly, suitable for any optional mounting orientation.
- Output shaft and input shaft are designed to suit for various industries applications.

More High Gear Ratio

- High precision grinded and carburized spiral bevel gears with optimal designed planetary gear can do ratio 500: 1.

No Maintenance

- It features no maintenance and long service life.

High Output Torque

- The gear box is one-piece constructed to ensure the high rigidity and corrosion-resistant capability.

Collet Locking Mechanism

- The input-end and the motor are coupled through a collet locking meshanism. It has passed dynamical balance analysis to assure concentricity and balance on the connection and no backlash for power transmission while running at high speed.

CCW / CCT Series

90 Degree Precision Speed Reducer
Classic input with shaft steering、
Reduction Ratio 1/2~1/600、1/2~1/5
Applicable Servo Motor Capacity：0.1kw-45kw

The output bearing adopts tapered roller bearing, which greatly improves the axial force of the product.
The output shaft form has added flange face output, base mounting, which can be used for Large load rotating platform application use.
The bevel gears are made of high-strength carburized alloy steel, and the grinding process effectively ensures the accuracy and noise of the product.
The bevel gears are made of high strength carburized alloy steel with grinding process, which effectively guarantees the precision and noise of the product.
The speed ratio is arbitrarily matched to the planetary speed reducer, and the speed ratio can be up to 2,000 speed ratios.
The internal box adopts imported grease, maintenance-free.
The case is made of high-strength aluminum alloy, which ensures the strength while the whole machine is more convenient to install.

Large hollow hole swivel flange: suitable for large load occasions.
TFT-LCD panel flip, rotary mechanism, robotic arm Base rotation, swing arm rotation, indexing rotation and other mechanisms.

Hollow hole (clamping type), single hollow shaft and double hollow shaft.
Applicable: Conveyor handling mechanism.

Expansion sleeve with hollow hole and keyway: suitable for large loads.
Applicable: roller mechanism, conveyor handling mechanism, cam mechanism
LCD panel turning mechanism, rack and pinion mechanism.

Hollow hole with keyway: Suitable for large loads.
Roller mechanism, cam mechanism, conveyor handling and other mechanisms.

CCW Classic planetary input to steering

Reduction Ratio：1/2~1/600

CCW090 – L2 – 20 – RF – P1 – MOTOR

Model:
CCW062 / CCW090
CCW125 / CCW155
CCW185 / CCW215
CCW260

Gear Ratio
Ratio selected by reference to performance table

Motor
Remarks motor model/power
Input Connector Size
Note: Shaft input type does not add this comment.

Number of gear ratio segments
L1 Ratio =1/6~1/20
L2 Ratio=1/24~1/200

Backlash Grade:
P2(Standard Backlash)
L1≤8 arcmin，L2≤10 arcmin
P1 (Precision Backlash)
L1≤6 arcmin，L2≤8 arcmin
P0 (Ultra-precision backlash)
L1≤3 arcmin，L2≤5 arcmin

Output shaft type

P：Single Output Hole with Keyway		HP-K: Single Side Outlet Expansion Bushing - Hollow Bore with Keyway	
2P：Dual output shaft with keyway		2HP-K: Bilateral Output Expansion Sleeve - Hollow Bore with Keyway	
RF：Swivel flange output hollow hole		C-K: Single Output Clamping Sleeve - Hollow Bore with Keyway	
CR：Hollow bore output with keyway		2C-K: Bilateral Output Clamping Sleeve - Hollow Bore with Keyway	

Installation Features:

Patent point: The mounting surface of this reducer is optimized for flanged through-hole mounting, and it is convenient to remove the screws on the front and back sides, and the box can be fixed and mounted in all six directions.

It is possible to locate the mounting flange with this A-right side direction outer tab stop and lock the mounting flange with screws.

It is also possible to use this B left side direction to locate the inner recessed table stop, with the base mounted flat and the mounting flange locked in place with screws.

Specifications Sheet: CCW

Classic planetary input to steering

Reduction Ratio：1/2~1/600

Stage		Reduction Ratio	CCW062	CCW090	CCW125	CCW155	CCW185	CCW215	CCW260
Allowable rated output torque (Nm)	1-Stage ratio(L1)	6	15	78.5	230	350	750	1200	2150
		8,10,12	15	78.5	230	350	750	1200	2150
		14,16,20	15	78.5	230	350	750	1000	2150
		20,30 40,50	12.5	49.0	123	208	490	900	2150
	2-Stage ratio(L2)	24,30,40,50 60,80,100 140,160,200	15	70	170	350	750	900	2150
		30,32,40,50	15	78.5	230	350	750	1200	2150
		60,70,80	15	78.5	230	350	750	1000	2150
		120,140,160,200	15	78.5	230	350	750	1050	2150
		40,60,80 100,120,140 160,200	15	49.0	123	208	490	900	1500
Maximum acceleration torque(Nm)	L1,L2	6~250	1.5 Times of Nominal Output Torque(Nm)						
Instantaneous output torque (Nm) (Allow a short time of 3 seconds)	L1,L2	6~250	3 Times of Nominal Output Torque(Nm)						
Input speed(rpm)	L1,L2	6~250	3000	3000	3000	2000	2000	1500	1500
Maximum input speed(rpm)	L1,L2	6~250	4500	4500	3000	3000	3000	3000	2000
P2(Standard backlash) (arc-min)	L1	6~50	≤6	≤6	≤6	≤6	≤6	≤6	≤6
	L2	24~250	≤8	≤8	≤8	≤8	≤8	≤8	≤9
P1 (Precision backlash) (arc-min)	L1	6~50	≤4	≤4	≤4	≤4	≤4	≤4	≤5
	L2	24~250	≤6	≤6	≤6	≤6	≤6	≤6	≤8
P0(Ultra-precision backlash) P0(arc-min)	L1	6~50	≤2	≤2	≤2	≤2	≤2	≤2	≤3
	L2	24~250	≤3	≤3	≤3	≤3	≤3	≤3	≤5
Allowable radial force(N)	L1,L2	6~250	2800	3900	5500	9800	16500	24100	45000
Allowable axial force(N)	L1,L2	6~250	2800	3900	5500	9800	16500	24100	45000
Efficiency(%)	L1	6~50	90%						
	L2	24~250	85%						
Weight(kg)	L1	6~50	3.5	5.5	11.0	21.0	41.0	42.5	175.0
	L2	24~250	5.0	6.0	13.0	24.5	36.5	47.5	205.0
Operating temperature(℃)	L1,L2	6~250	-10℃~+70℃						
Lubricating oil	L1,L2	6~250	Synthetic Grease						
Installation Orientation	L1,L2	6~250	Any Direction						
Noise level(db) (2000rpm)	L1,L2	6~250	≤68	≤68	≤70	≤72	≤73	≤76	≤76

(1) Noise level measurement (decibel meter 1M away from the gearbox, input speed 2000RPM): (Input speed above 2000RPM will increase the noise level.)
(2) Measurement of backlash value (force distance measurement at 2% of rated revolution).

Rotary Inertia of Reducer

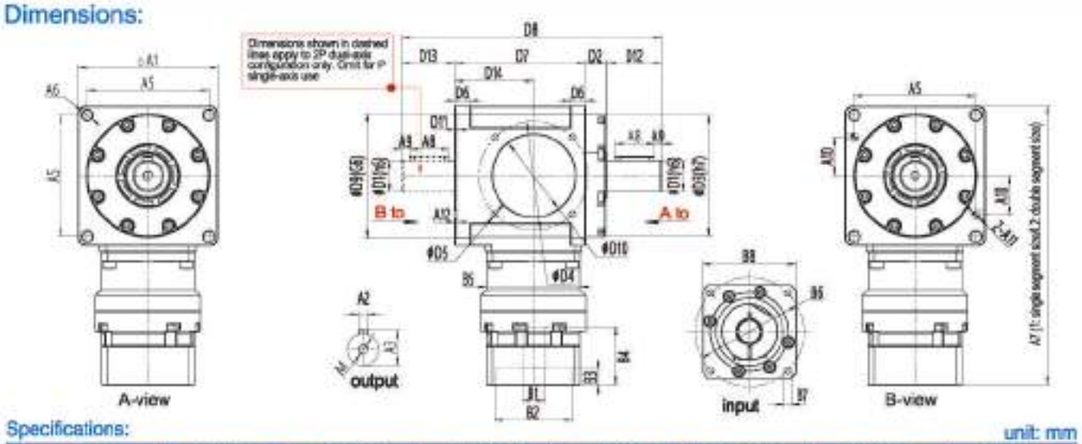
Stage	Unit of inertia	Gear ratio	CCW062	CCW090	CCW125	CCW155	CCW185	CCW215	CCW260
1-Stage ratio (L1)	(kg·cm²)	6,15	0.56	0.56	3.92	6.28	14.83	14.83	33.21
		8,10,12		0.47	3.75	5.64	11.85	11.85	29.25
		14,16,18,20	0.43	0.43	3.70	5.12	10.25	10.25	25.16
		25,30,35,40,50	0.4	0.4	3.65	5.06	9.66	9.66	24.02
2-Stageratio (L2)	(kg·cm²)	24,30,75		0.56	3.92	6.28	14.83	14.83	33.21
		32,40,50,60,175		0.47	3.75	5.64	11.85	11.85	29.25
		56,70,80 100,125,250		0.43	3.70	5.12	10.25	10.25	25.16
		120,140,160 180,200		0.4	3.65	5.06	9.66	9.66	24.02

CCW-P/2P (Single/Double) shaft output with keyway

Classic planetary input to steering

Reduction Ratio：1/2~1/600

Dimensions:



Specifications:

unit: mm

Specification	CCW062	CCW090	CCW125	CCW155	CCW185	CCW215	CCW260
A1	62	90	125	155	185	215	260
A2	4	6	8	12	16	20	20
A3	13.8	22.5	33	43	59	79.5	84.5
A4	M4	M6	M8	M12	M16	M20	M20
A5	54	78	108	135	162	182	224
A6	4-Φ4.5	4-Φ6.8	4-Φ9	4-Φ11	4-Φ13	4-Φ15	4-Φ22
A7(L1:Single stage size)	124	179	238	298	365	396	438
A7(L2:Double stage size)	144.5	207	276	330	386.5	417.5	490.5
A8	2	5	5	5	3	5	5
A9	15	25	35	45	70	90	75
A10	18	25	36	47.5	60	67	85
A11	2-Φ3 deep 5	2-Φ5 deep 10	2-Φ8 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10
A12	slit deep 2	slit deep 2	slit deep 3	slit deep 3	slit deep 5	slit deep 5	slit deep 5
B1	5，8	6.35,8,9.11,14,16,19	11,14,16,19,22,24	14,16,19,22,24,28,32,35	19,22,24,28,32,35,38,42	19,22,24,28,32,35,38,42	22,24,28,32,35,38,42,55
B2	22，30	30,36,38.1,40,50,60,70	50,60,70,80,95,110	70,80,95,110,114.3,130	95,110,114.3,130,180	95,110,114.3,136,180	110,114.3,130,165,180,200
B3	3	4,5	5,7,10	10	10	10	10
B4	≤26.5	≤41	≤62	≤80	≤86	≤86	≤117
B5	42	60	90	115	142	142	179
B6	31,46	45,46,66.7,70,70.7,75,90	70,75,90,100,115,130,145	90,115,130,145,165,200	115,130,145,165,200,215	115,130,145,165,200,215	130,145,165,200,215,235
B7	3.5,M4	M3,M4,M5,M6	M4,M5,M6,M8	M6,M8,M10,M12	M6,M8,M10,M12	M6,M8,M10,M12	M8,M10,M12
B8	42	62,80,90	90,115,120	120,140,180	142,180,200	142,180,200	182,200,220
D1	12	20	30	40	55	80	80
D2	9	13	13	10	12	7.5	21
D3	56	78	106	133	163	195	245
D4	50	70	100	120	150	180	215
D5	4-M3	4-M5	4-M6	4-M10	4-M12	4-M14	4-M16
D6	6	10	12	15	17	20	25
D7	57	84	113	135	164	200	155
D8	70.5	167	214	254	332	402	463
D9	55	80	110	135	165	200	255
D10	35 deep 3	52 deep 4	83 deep 4	90 deep 4	120 deep 5	130 deep 5	160 deep 6
D11	2	2	4	3	6	6.5	5
D12	20	35	45	55	80	100	95
D13	19	33	41	52	74	93	90
D14	34.5	50.5	66	75	92	108	141.5

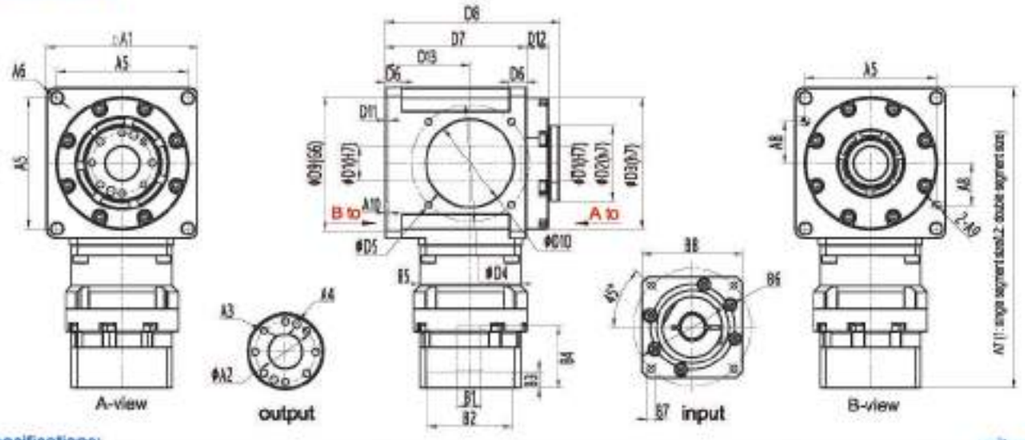
Note: Single-axis output form can be selected according to the requirements of working conditions.

CCW-RF Swivel flange output hollow hole

Classic planetary input to steering

Reduction Ratio：1/2~1/600

Dimensions:



Specifications:

unit: mm

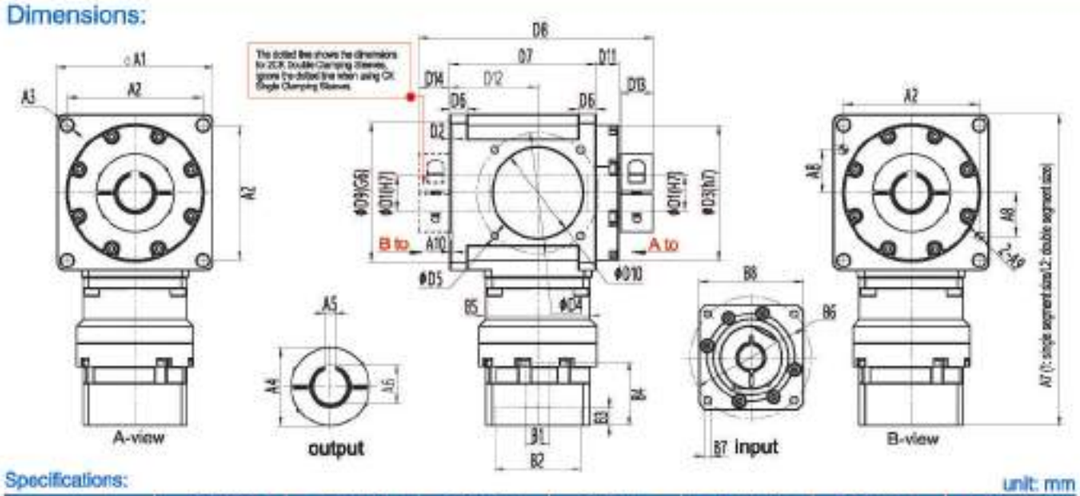
Specification	CCW062	CCW090	CCW125	CCW155	CCW185	CCW215	CCW260
A1	62	90	125	155	185	215	260
A2	22	36	50	70	95	124	124
A3	6-M4x8	8-M5	8-M5	8-M8	8-M8	12-M8	12-M10
A4	2-Φ4深6	2-Φ6	2-Φ6	2-Φ8	2-Φ8	2-Φ8	2-Φ10
A5	54	78	108	135	162	182	224
A6	4-Φ4.5	4-Φ6.8	4-Φ9	4-Φ11	4-Φ13	4-Φ15	4-Φ22
A7(L1:Single stage size)	124	179	238	298	365	396	438
A7(L2:Double stage size)	144.5	207	276	330	386.5	417.5	490.5
A8	18	25	36	47.5	60	67	85
A9	2-Φ3 deep 5	2-Φ5 deep 10	2-Φ8 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10
A10	slit deep 2	slit deep 2	slit deep 3	slit deep 3	slit deep 5	slit deep 5	slit deep 5
B1	5，8	6.35,8,9,11,14,16,19	11,14,16,19,22,24	14,16,19,22,24,28,32,35	19,22,24,28,32,35,38,42	19,22,24,28,32,35,38,42	22,24,28,32,35,38,42,55
B2	22，30	30,36,38.1,40,50,60,70	50,60,70,80,95,110	70,80,95,110,114.3,130	95,110,114.3,130,180	95,110,114.3,130,180	110,114.3,130,165,180,200
B3	3	4,5	5,7,10	10	10	10	10
B4	≤26.5	≤41	≤62	≤80	≤86	≤86	≤117
B5	42	60	90	115	142	142	179
B6	31,46	45,46,66.7,70,70.7,75,90	70,75,90,100,115,130,145	90,115,130,145,165,200	115,130,145,165,200,215	115,130,145,165,200,215	130,145,165,200,215,235
B7	3.5,M4	M3,M4,M5,M6	M4,M5,M6,M8	M6,M8,M10,M12	M6,M8,M10,M12	M6,M8,M10,M12	M8,M10,M12
B8	42	62,80,90	90,115,120	120,140,180	142,180,200	142,180,200	182,200,220
D1	12	20	30	40	55	80	80
D2	30	80	65	85	110	140	140
D3	56	78	106	133	163	195	245
D4	50	70	100	120	150	180	215
D5	4-M3	4-M5	4-M6	4-M10	4-M12	4-M14	4-M16
D6	6	10	12	15	17	20	25
D7	57	84	113	135	164	200	155
D8	70.5	104	135.5	154.5	193	229.5	291
D9	55	80	110	135	165	200	255
D10	35 deep 3	52 deep 4	83 deep 4	90 deep 4	120 deep 5	130 deep 5	160 deep 6
D11	2	2	4	3	6	6.5	5
D12	9	13	13	10	12	7.5	21
D13	34.5	50.5	66	75	92	108	141.5

CCW-CK/2CK (Single/Double) Clamping Sleeve-Hollow Bore Output with Keyway

Classic planetary input to steering

Reduction Ratio：1/2~1/600

Dimensions:



Specifications:

unit: mm

Specification	CCW062	CCW090	CCW125	CCW155	CCW185	CCW215	CCW260
A1	62	90	125	155	185	215	260
A2	54	78	108	135	162	182	224
A3	4-Φ4.5	4-Φ6.8	4-Φ9	4-Φ11	4-Φ13	4-Φ15	4-Φ22
A4	34	45	74	77	104	116	125
A5	4	无	8	12	14	18	20
A6	13.8	无	33.3	43.3	58.8	69.4	84.9
A7(L1:Single stage size)	124	179	238	298	365	396	396
A7(L2:Double stage size)	144.5	207	276	330	386.5	417.5	417.5
A8	18	25	36	47.5	60	67	67
A9	2-Φ3 deep 5	2-Φ5 deep 8	2-Φ8 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10
A10	slit deep 2	slit deep 2	slit deep 3	slit deep 3	slit deep 5	slit deep 5	slit deep 5
B1	5，8	6.35,8,9,11,14,16,19	11,14,16,19,22,24	14,16,19,22,24,28,32,35	19,22,24,28,32,35,38,42	19,22,24,28,32,35,38,42	22,24,28,32,35,38,42,55
B2	22，30	30,36,38.1,40,50,60,70	50,60,70,80,95,110	70,80,95,110,114.3,130	95,110,114.3,130,180	95,110,114.3,130,180	110,114.3,130,165,180,200
B3	3	4,5	5,7,10	10	10	10	10
B4	≤26.5	≤41	≤62	≤80	≤86	≤86	≤86
B5	42	60	90	115	142	142	142
B6	31,46	45,46,66.7,70,70.7,75,90	70,75,90,100,115,130,145	90,115,130,145,165,200	115,130,145,165,200,215	115,130,145,165,200,215	115,130,145,165,200,215
B7	3.5,M4	M3,M4,M5,M6	M4,M5,M6,M8	M6,M8,M10,M12	M6,M8,M10,M12	M6,M8,M10,M12	M6,M8,M10,M12
B8	42	62,80,90	90,115,120	120,140,180	142,180,200	142,180,200	142,180,200
D1	12	20	30	40	55	65	65
D2	2	2	4	3	6	6.5	6.5
D3	56	78	106	133	163	195	195
D4	50	70	100	120	150	180	180
D5	4-M3	4-M5	4-M6	4-M10	4-M12	4-M14	4-M14
D6	6	10	12	15	17	20	20
D7	57	84	113	135	164	200	200
D8	92	137	174	212	236	267	267
D9	55	80	110	135	165	200	200
D10	35 deep 3	52 deep 4	83 deep 4	90 deep 4	120 deep 5	130 deep 5	130 deep 5
D11	9	13	13	10	12	7.5	7.5
D12	34.5	50.5	66	75	92	108	141.5
D13	10	19	25	33	32	31	31
D14	10	17	21	31	26	25.5	25.5

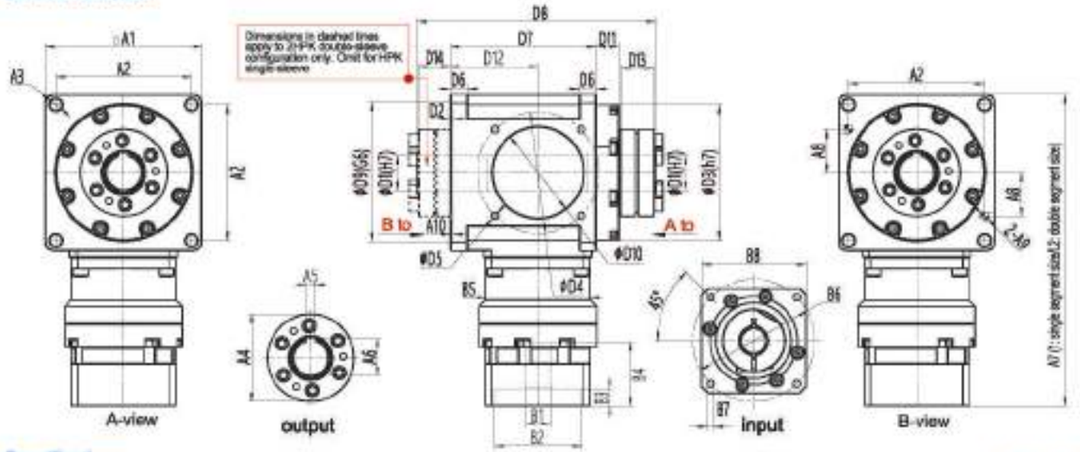
Note: Single-side jacket output form can be selected according to the requirements of working conditions.

CCW-HPK/2HPK (Single/Double) Expansion Sleeve - Hollow Bore Output with Keyway

Classic planetary input to steering

Reduction Ratio: 1/2~1/600

Dimensions:



Specifications: unit: mm

Specification	CCW062	CCW090	CCW125	CCW155	CCW185	CCW215	CCW260
A1	62	90	125	155	185	215	260
A2	54	78	108	135	162	182	224
A3	4-Φ4.5	4-Φ6.8	4-Φ9	4-Φ11	4-Φ13	4-Φ15	4-Φ22
A4	41	50	80	90	115	145	170
A5	4	None	8	12	14	18	20
A6	13.8	None	33.3	43.3	58.8	69.4	84.9
A7(L1:Single stage size)	124	179	238	298	365	396	396
A7(L2:Double stage size)	144.5	207	276	330	386.5	417.5	417.5
A8	18	25	36	47.5	60	67	67
A9	2-Φ3 deep 5	2-Φ5 deep 10	2-Φ8 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10
A10	slit deep 2	slit deep 2	slit deep 3	slit deep 3	slit deep 5	slit deep 5	slit deep 5
B1	5, 8	6.35,8,9,11,14,16,19	11,14,16,19,22,24	14,16,19,22,24,28,32,35	19,22,24,28,32,35,38,42	19,22,24,28,32,35,38,42	22,24,28,32,35,38,42,55
B2	22, 30	30,36,38.1,40,50,60,70	50,60,70,80,95,110	70,80,95,110,114.3,130	95,110,114.3,130,180	95,110,114.3,130,180	110,114.3,130,165,180,200
B3	3	4,5	5,7,10	10	10	10	10
B4	≤26.5	≤41	≤62	≤80	≤86	≤86	≤86
B5	42	60	90	115	142	142	142
B6	31,46	45,46,66.7,70,70.7,75,90	70,75,90,100,115,130,145	90,115,130,145,165,200	115,130,145,165,200,215	115,130,145,165,200,215	115,130,145,165,200,215
B7	3.5,M4	M3,M4,M5,M6	M4,M5,M6,M8	M6,M8,M10,M12	M6,M8,M10,M12	M6,M8,M10,M12	M6,M8,M10,M12
B8	42	62,80,90	90,115,120	120,140,180	142,180,200	142,180,200	142,180,200
D1	12	20	30	40	55	65	65
D2	2	2	4	3	6	6.5	6.5
D3	56	78	106	133	163	195	195
D4	50	70	100	120	150	180	180
D5	4-M3	4-M5	4-M6	4-M10	4-M12	4-M14	4-M14
D6	6	10	12	15	17	20	20
D7	57	84	113	135	164	200	200
D8	92	137	174	212	236	267	267
D9	55	80	110	135	165	200	200
D10	35 deep 3	52 deep 4	83 deep 4	90 deep 4	120 deep 5	130 deep 5	130 deep 5
D11	9	13	13	10	12	7.5	21
D12	34.5	50.5	66	75	92	108	141.5
D13	10	19	25	27	30	31	31
D14	10	17	21	25	24	25.5	25.5

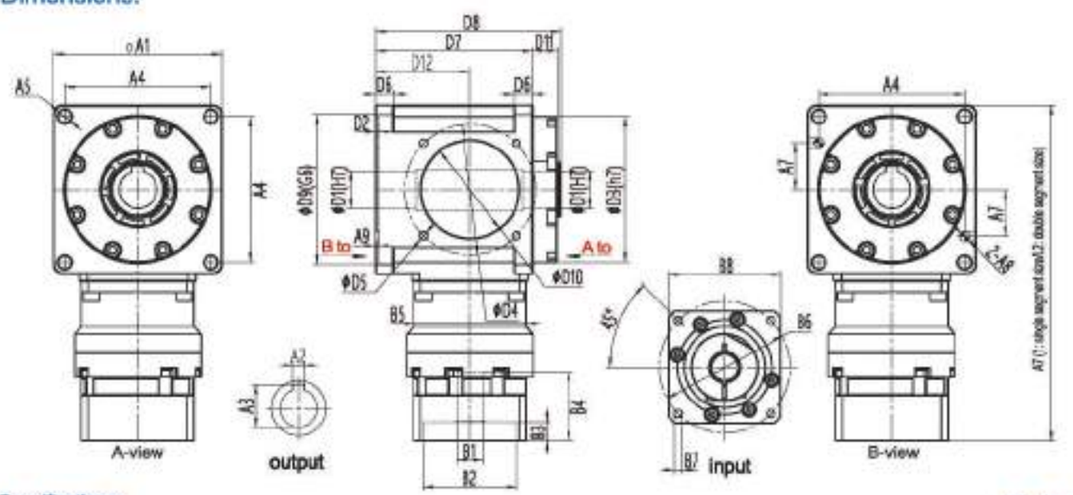
Note: According to the requirements of the working conditions, you can choose one side of the tightening sleeve output form.

CCW-CRK Hollow bore output with keyway

Classic planetary input to steering

Reduction Ratio: 1/2~1/600

Dimensions:



Specifications: unit: mm

Specification	CCW062	CCW090	CCW125	CCW155	CCW185	CCW215	CCW260
A1	62	90	125	155	185	215	260
A2	4	6	8	12	14	18	20
A3	13.8	22.7	33.3	43.3	58.8	69.4	84.8
A4	54	78	108	135	162	182	224
A5	4-Φ4.5	4-Φ6.8	4-Φ9	4-Φ11	4-Φ13	4-Φ15	4-Φ22
A7(L1:Single stage size)	124	179	238	298	365	396	438
A7(L2:Double stage size)	144.5	207	276	330	386.5	417.5	490.5
A7	18	25	36	47.5	60	67	85
A8	2-Φ3 deep 5	2-Φ5 deep 10	2-Φ8 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10
A9	slit deep 2	slit deep 2	slit deep 3	slit deep 3	slit deep 5	slit deep 5	slit deep 5
B1	5, 8	6.35,8,9,11,14,16,19	11,14,16,19,22,24	14,16,19,22,24,28,32,35	19,22,24,28,32,35,38,42	19,22,24,28,32,35,38,42	22,24,28,32,35,38,42,55
B2	22, 30	30,36,38.1,40,50,60,70	50,60,70,80,95,110	70,80,95,110,114.3,130	95,110,114.3,130,180	95,110,114.3,130,180	110,114.3,130,165,180,200
B3	3	4,5	5,7,10	10	10	10	10
B4	≤26.5	≤41	≤62	≤80	≤86	≤86	≤117
B5	42	60	90	115	142	142	179
B6	31,46	45,46,66.7,70,70.7,75,90	70,75,90,100,115,130,145	90,115,130,145,165,200	115,130,145,165,200,215	115,130,145,165,200,215	130,145,165,200,215,235
B7	3.5,M4	M3,M4,M5,M6	M4,M5,M6,M8	M6,M8,M10,M12	M6,M8,M10,M12	M6,M8,M10,M12	M8,M10,M12
B8	42	62,80,90	90,115,120	120,140,180	142,180,200	142,180,200	182,200,220
D1	12	20	30	40	55	65	80
D2	2	2	4	3	6	6.5	5
D3	56	78	106	133	163	195	245
D4	50	70	100	120	150	180	215
D5	4-M3	4-M5	4-M6	4-M10	4-M12	4-M14	4-M16
D6	6	10	12	15	17	20	25
D7	57	84	113	135	164	200	155
D8	70.5	99	128	148	178	209.5	278
D9	55	80	110	135	165	200	255
D10	35 deep 3	52 deep 4	83 deep 4	90 deep 4	120 deep 5	130 deep 5	160 deep 6
D11	9	13	13	10	12	7.5	21
D12	34.5	50.5	66	75	92	108	141.5

CCT Classic shaft input steering

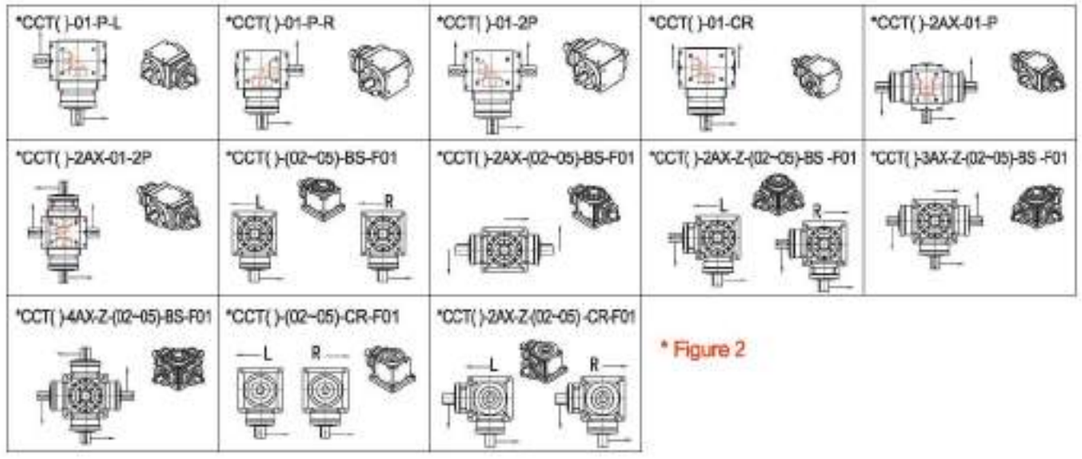
Reduction Ratio: 1/2~1/5

CCT090 — 01 — P — L — 2AX

- **Model:** CCT062 / CCT090 / CCT125 / CCT155 / CCT185 / CCT215 / CCT260
- **Gear Ratio:** 1/2~1/5
- **Direction of rotation of output axis:** As shown in Figure 2 (L left/ R right)
- 2AX: 2 Input shaft type
  3AX: 3 Input shaft type
  No Marks: 1 Input shaft type
  2AX-Z: 2 Input shaft type
  3AX-Z: 3 Input shaft type
  4AX-Z: 4 Input shaft type
- **Output shaft type**
  - P: Single Output Hole with Keyway
  - 2P: Dual output shaft with keyway
  - RF: Swivel flange output hollow hole
  - CR: Hollow bore output with keyway
  - HP-K: Single Side Outlet Expansion Bushing - Hollow Bore with Keyway
  - 2HP-K: Bilateral Output Expansion Sleeve - Hollow Bore with Keyway
  - C-K: Single Output Clamping Sleeve - Hollow Bore with Keyway
  - 2C-K: Bilateral Output Clamping Sleeve - Hollow Bore with Keyway

Performance Parameter Table

	Gear Type	Reduction Ratio	CCT062	CCT090	CCT125	CCT155	CCT185	CCT215	CCT260
Rated output torque (Nm)	Spiral bevel gear	1/2	15	78.5	230	350	750	1200	2150
		1/3	12	55	150	250	550	1000	1650
		1/5	9	49	123	208	490	800	1200
Maximum acceleration torque(Nm)		2、3、5	1.5 Times of Nominal Output Torque(Nm)						
Input speed(rpm)			2000	2000	2000	1500	1500	1000	1000
Standard backlash(arc-min)									
Allowable radial force(N)			2800	3900	5500	9800	16500	24100	45000
Allowable axial force(N)			2800	3900	5500	9800	16500	24100	45000
Efficiency(%)									
Weight(kg)			3.5	4.8	8.2	15.5	27.5	32.5	70
Operating temperature(°C)			-10℃ ~ +80℃						
lubricating oil			Synthetic Grease						
Installation Orientation			Any Direction						
Noise level(db)*1500(rpm)			≤ 70	≤ 70	≤ 72	≤ 73	≤ 74	≤ 76	≤ 78

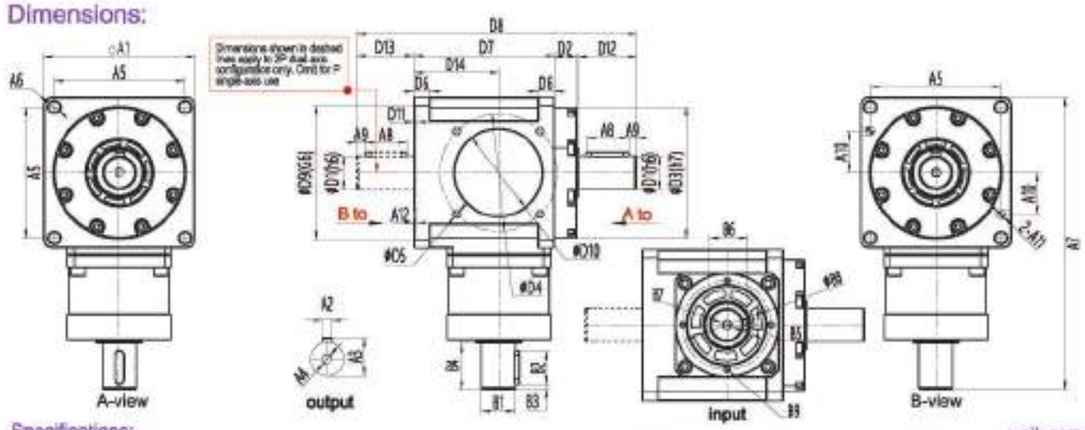


* Figure 2

CCT-P/2P (Single/Double) shaft output with keyway

Classic shaft input steering Reduction Ratio: 1/2~1/5

Dimensions:



Specifications: unit: mm

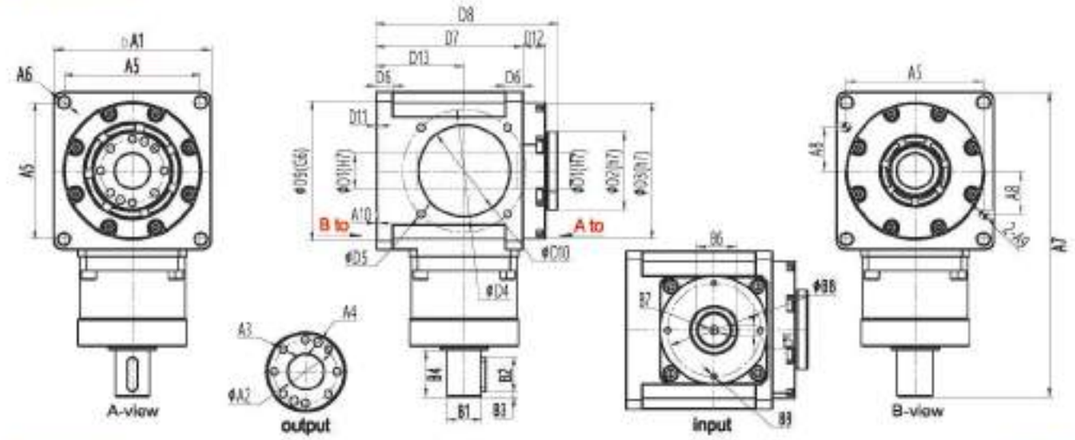
Specification	CCT062	CCT090	CCT125	CCT155	CCT185	CCT215	CCT260
A1	62	90	125	155	185	215	260
A2	4	6	8	12	16	20	20
A3	13.8	22.5	33	43	59	79.5	84.5
A4	M4	M6	M8	M12	M16	M20	M20
A5	54	78	108	135	162	182	224
A6	4-Φ4.5	4-Φ6.8	4-Φ9	4-Φ11	4-Φ13	4-Φ15	4-Φ22
A7	113.5	174	216	258.5	323.5	356.5	445
A8	2	5	5	5	3	5	5
A9	15	25	35	45	70	90	75
A10	18	25	36	47.5	60	67	85
A11	2-Φ3 deep 5	2-Φ5 deep 10	2-Φ8 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10
A12	Notch depth 2	Notch depth 2	Notch depth 3	Notch depth 3	Notch depth 5	Notch depth 5	Notch depth 5
B1	12	20	28	35	50	50	55
B2	15	20	30	35	50	50	70
B3	2	3	5	5	5	5	5
B4	20	27	40	45	65	65	80
B5	4	6	8	10	14	14	16
B6	13.5	22.5	31	38	53.5	53.5	59
B7	M4	M6	M8	M10	M12	M16	M16
B8	40	53	75	82	120	125	155
B9	4-M3	4-M4	4-M6	4-M6	4-M8	4-M8	4-M12
D1	12	20	30	40	55	80	80
D2	9	13	13	10	12	7.5	21
D3	56	78	106	133	163	195	245
D4	50	70	100	120	150	180	215
D5	4-M3	4-M5	4-M6	4-M10	4-M12	4-M14	4-M16
D6	6	10	12	15	17	20	25
D7	57	84	113	135	164	200	155
D8	70.5	167	214	254	332	402	463
D9	55	80	110	135	165	200	255
D10	35 deep 3	52 deep 4	83 deep 4	90 deep 4	120 deep 5	130 deep 5	160 deep 6
D11	2	2	4	3	6	6.5	5
D12	20	35	45	55	80	100	95
D13	19	33	41	52	74	93	90
D14	34.5	50.5	66	75	92	108	141.5

Note: Single-axis output form can be selected according to the requirements of working conditions.

CCT–RF Swivel flange output hollow hole

Classic shaft input steering Reduction Ratio: 1/2~1/5

Dimensions:



Specifications:

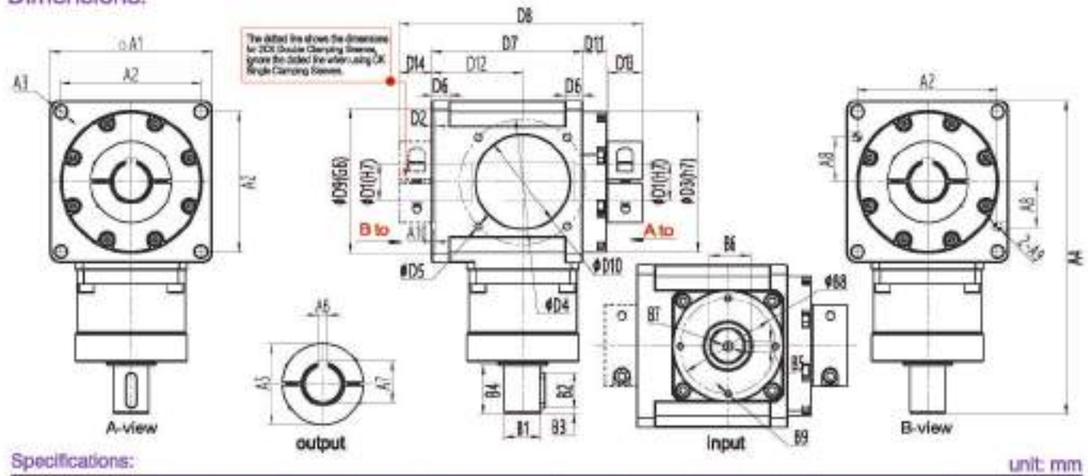
unit: mm

Specification	CCT062	CCT090	CCT125	CCT155	CCT185	CCT215	CCT260
A1	62	90	125	155	185	215	260
A2	22	36	50	70	95	124	124
A3	6-M4x8	8-M5x10	8-M5x12	8-M8x14	8-M8x16	12-M8x16	12-M10x20
A4	2-Φ4 deep 6	2-Φ5 deep 8	2-Φ6 deep 8	2-Φ8 deep 10	2-Φ8 deep 10	2-Φ8 deep 10	2-Φ10 deep 12
A5	54	78	108	135	162	182	224
A6	4-Φ4.5	4-Φ6.8	4-Φ9	4-Φ11	4-Φ13	4-Φ15	4-Φ22
A7	113.5	174	216	258.5	323.5	356.5	445
A8	18	25	36	47.5	60	67	85
A9	2-Φ3 deep 5	2-Φ5 deep 10	2-Φ8 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10
A10	Notch depth 2	Notch depth 2	Notch depth 3	Notch depth 3	Notch depth 5	Notch depth 5	Notch depth 5
B1	12	20	28	35	50	50	55
B2	15	20	30	35	50	50	70
B3	2	3	5	5	5	5	5
B4	20	27	40	45	65	65	80
B5	4	6	8	10	14	14	16
B6	13.5	22.5	31	38	53.5	53.5	59
B7	M4	M6	M8	M10	M12	M16	M16
B8	40	53	75	82	120	125	155
B9	4-M3	4-M4	4-M6	4-M6	4-M8	4-M8	4-M12
D1	12	20	30	40	55	80	80
D2	30	80	65	85	110	140	140
D3	56	78	106	133	163	195	245
D4	50	70	100	120	150	180	215
D5	4-M3	4-M5	4-M6	4-M10	4-M12	4-M14	4-M16
D6	6	10	12	15	17	20	25
D7	57	84	113	135	164	200	155
D8	70.5	104	135.5	154.5	193	229.5	291
D9	55	80	110	135	165	200	255
D10	35 deep 3	52 deep 4	83 deep 4	90 deep 4	120 deep 5	130 deep 5	160 deep 6
D11	2	2	4	3	6	6.5	5
D12	9	13	13	10	12	7.5	21
D13	34.5	50.5	66	75	92	108	141.5

CCT-CK/2CK (Single/Double) Clamping Sleeve–Hollow Bore Output with Keyway

Classic shaft input steering Reduction Ratio: 1/2~1/5

Dimensions:



Specifications:

unit: mm

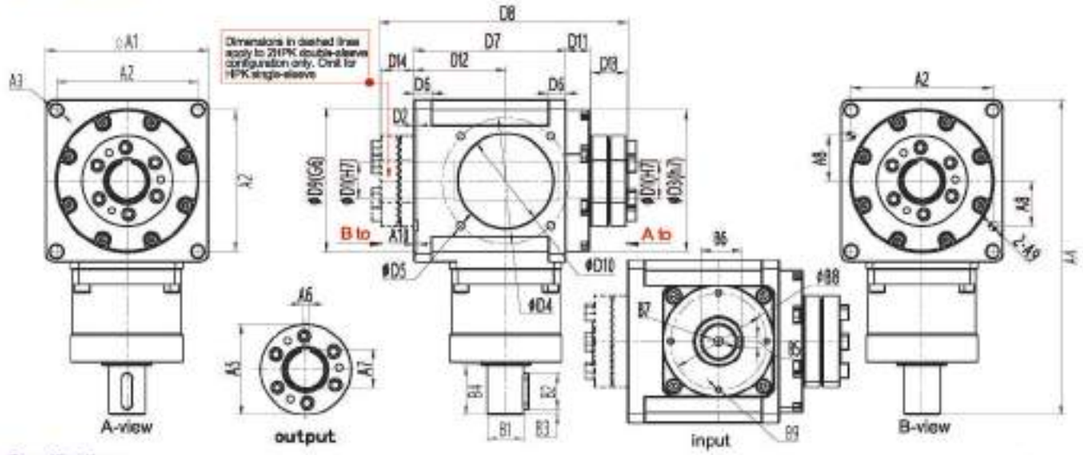
Specification	CCT062	CCT090	CCT125	CCT155	CCT185	CCT215	CCT260
A1	62	90	125	155	185	215	260
A2	54	78	108	135	162	182	224
A3	4-Φ4.5	4-Φ6.8	4-Φ9	4-Φ11	4-Φ13	4-Φ15	4-Φ22
A4	113.5	174	216	258.5	323.5	356.5	445
A5	34	45	74	77	104	116	125
A6	4	Not	8	12	14	18	20
A7	13.8	Not	33.3	43.3	58.8	69.4	84.9
A8	18	25	36	47.5	60	67	85
A9	2-Φ3 deep 5	2-Φ5 deep 8	2-Φ8 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10
A10	Notch depth 2	Notch depth 2	Notch depth 3	Notch depth 3	Notch depth 5	Notch depth 5	Notch depth 5
B1	12	20	28	35	50	50	55
B2	15	20	30	35	50	50	70
B3	2	3	5	5	5	5	5
B4	20	27	40	45	65	65	80
B5	4	6	8	10	14	14	16
B6	13.5	22.5	31	38	53.5	53.5	59
B7	M4	M6	M8	M10	M12	M16	M16
B8	40	53	75	82	120	125	155
B9	4-M3	4-M4	4-M6	4-M6	4-M8	4-M8	4-M12
D1	12	20	30	40	55	65	80
D2	2	2	4	3	6	6.5	6
D3	56	78	106	133	163	195	245
D4	50	70	100	120	150	180	215
D5	4-M3	4-M5	4-M6	4-M10	4-M12	4-M14	4-M16
D6	6	10	12	15	17	20	25
D7	57	84	113	135	164	200	155
D8	92	137	174	212	236	267	278
D9	55	80	110	135	165	200	255
D10	35 deep 3	52 deep 4	83 deep 4	90 deep 4	120 deep 5	130 deep 5	160 deep 6
D11	9	13	13	10	12	7.5	21
D12	34.5	50.5	66	75	92	108	141.5
D13	10	19	25	33	32	31	31
D14	10	17	21	31	26	25.5	25.5

Note: Single-side jacket output form can be selected according to the requirements of working conditions.

CCT-HPK/2HPK (Single/Double) Expansion Sleeve - Hollow Bore Output with Keyway

Classic shaft input steering Reduction Ratio: 1/2~1/5

Dimensions:



Specifications:

unit: mm

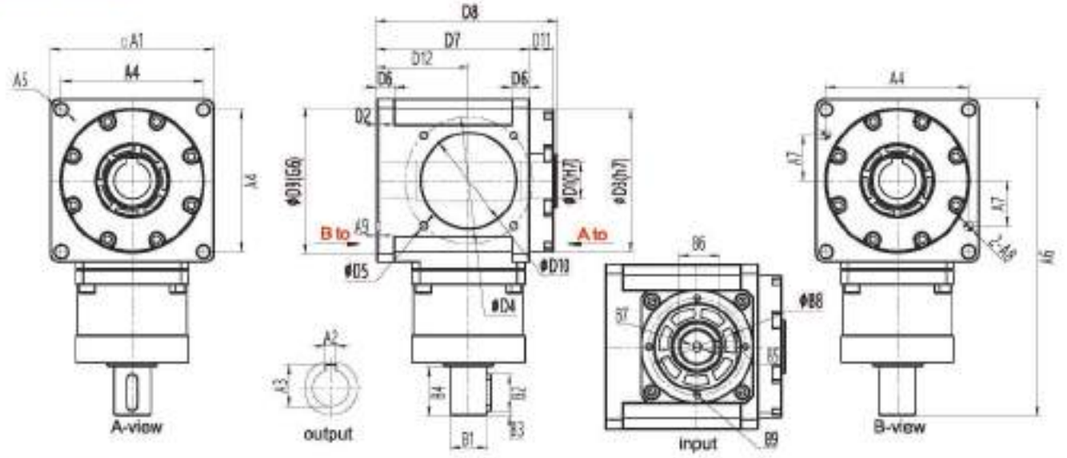
Specification	CCT062	CCT090	CCT125	CCT155	CCT185	CCT215	CCT260
A1	62	90	125	155	185	215	260
A2	54	78	108	135	162	182	224
A3	4-Φ4.5	4-Φ6.8	4-Φ9	4-Φ11	4-Φ13	4-Φ15	4-Φ22
A4	113.5	174	216	258.5	323.5	356.5	445
A5	41	50	80	90	115	145	170
A6	4	Not	8	12	14	18	20
A7	13.8	Not	33.3	43.3	58.8	69.4	84.9
A8	18	25	36	47.5	60	67	85
A9	2-Φ3 deep 5	2-Φ5 deep 10	2-Φ8 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10
A10	Notch depth 2	Notch depth 2	Notch depth 3	Notch depth 3	Notch depth 5	Notch depth 5	Notch depth 5
B1	12	20	28	35	50	50	55
B2	15	20	30	35	50	50	70
B3	2	3	5	5	5	5	5
B4	20	27	40	45	65	65	80
B5	4	6	8	10	14	14	16
B6	13.5	22.5	31	38	53.5	53.5	59
B7	M4	M6	M8	M10	M12	M16	M16
B8	40	53	75	82	120	125	155
B9	4-M3	4-M4	4-M6	4-M6	4-M8	4-M8	4-M12
D1	12	20	30	40	55	65	80
D2	2	2	4	3	6	6.5	6
D3	56	78	106	133	163	195	245
D4	50	70	100	120	150	180	215
D5	4-M3	4-M5	4-M6	4-M10	4-M12	4-M14	4-M16
D6	6	10	12	15	17	20	25
D7	57	84	113	135	164	200	155
D8	92	137	174	212	236	267	278
D9	55	80	110	135	165	200	255
D10	35 deep 3	52 deep 4	83 deep 4	90 deep 4	120 deep 5	130 deep 5	160 deep 6
D11	9	13	13	10	12	7.5	21
D12	34.5	50.5	66	75	92	108	141.5
D13	10	19	25	27	30	31	31
D14	10	17	21	25	24	25.5	25.5

Note: According to the requirements of the working conditions, you can choose one side of the tightening sleeve output form.

CCT-CRK Hollow bore output with keyway

Classic shaft input steering Reduction Ratio: 1/2~1/5

Dimensions:



Specifications:

unit: mm

Specification	CCT062	CCT090	CCT125	CCT155	CCT185	CCT215	CCT260
A1	62	90	125	155	185	215	260
A2	4	6	8	12	14	18	20
A3	13.8	22.7	33.3	43.3	58.8	69.4	84.8
A4	54	78	108	135	162	182	224
A5	4-Φ4.5	4-Φ6.8	4-Φ9	4-Φ11	4-Φ13	4-Φ15	4-Φ22
A6	113.5	174	216	258.5	323.5	356.5	445
A7	18	25	36	47.5	60	67	85
A8	2-Φ3 deep 5	2-Φ5 deep 10	2-Φ8 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10	2-Φ10 deep 10
A9	Notch depth 2	Notch depth 2	Notch depth 3	Notch depth 3	Notch depth 5	Notch depth 5	Notch depth 5
B1	12	20	28	35	50	50	55
B2	15	20	30	35	50	50	70
B3	2	3	5	5	5	5	5
B4	20	27	40	45	65	65	80
B5	4	6	8	10	14	14	16
B6	13.5	22.5	31	38	53.5	53.5	59
B7	M4	M6	M8	M10	M12	M16	M16
B8	40	53	75	82	120	125	155
B9	4-M3	4-M4	4-M6	4-M6	4-M8	4-M8	4-M12
D1	12	20	30	40	55	65	80
D2	2	2	4	3	6	6.5	5
D3	56	78	106	133	163	195	245
D4	50	70	100	120	150	180	215
D5	4-M3	4-M5	4-M6	4-M10	4-M12	4-M14	4-M16
D6	6	10	12	15	17	20	25
D7	57	84	113	135	164	200	155
D8	70.5	99	128	148	178	209.5	278
D9	55	80	110	135	165	200	255
D10	35 deep 3	52 deep 4	83 deep 4	90 deep 4	120 deep 5	130 deep 5	160 deep 6
D11	9	13	13	10	12	7.5	21
D12	34.5	50.5	66	75	92	108	141.5

CB Synchronized screw jacks

CB090 – G4U – W – 10 – BS – T – VD – HA – L200 – 500x600

- **Model**: CB090 / CB125, CB155 / CB185, CB215 / CB260
- **Drive position**: W: Power at the center; V: Power on the side (V for small space)
- **Number of screw axes**: Figure (4)
- **Overall velocity ratio**: Selected according to the customer's desired lifting speed
- **Lifting method**: BS: Screw Jack; CR: Nut Lift; JD: Electric Cylinder Lift — Figure (1)
- **Screw head mounting**: T: Flange type; O: Shaft with keyway; S: Threaded; Q: Flat head type — Figure (2)
- **Load power output direction**: VD: up, DT: down — Figure (3)
- **Protective device**: HA: Jacking End Protection; HB: Save and protection; HC: Completely enclosed protection
- **Valid itinerary**: According to the customer's needs
- **Span**: Suitable for multi-point jacking solutions

Lifting method

Figure (1)

BS: Screw Jack

CR: Nut Lift

JD: Electric Cylinder Lift

Screw head mounting method

Figure (2)

T: Flange type O: Shaft with keyway S: Threaded Q: Flat head type

Load power output direction

Figure (3)

VD: Up DT: down

Number of screw axes

Figure (4)

G1 Single-point

G1: Single-point BST

G1: Single-point CR

G1: Single-point JD

G1: Single-point BS

G2 Two-point

G2: 2 axle BST、G2-V

G2-A: 2 axle BST、G2-V

G2: 2 axle CR、G2-V

G2-A: 2 axle JD、G2-W

G2: 2 axle JD、G2-V

G2-A: 2 axle BST、G2-W

G2: 2 axle CR、G2-W

G2: 2 axle JD、G2-W

G4 Four-point

G4U-A: 4 axle BST、G4U-V

G4U-A: 4 axle BST-V

G4U-A: 4 axle CR、G4U-W

G4U-A: 4 axle JD、G4U-W

G6\G8 Six/eight-point

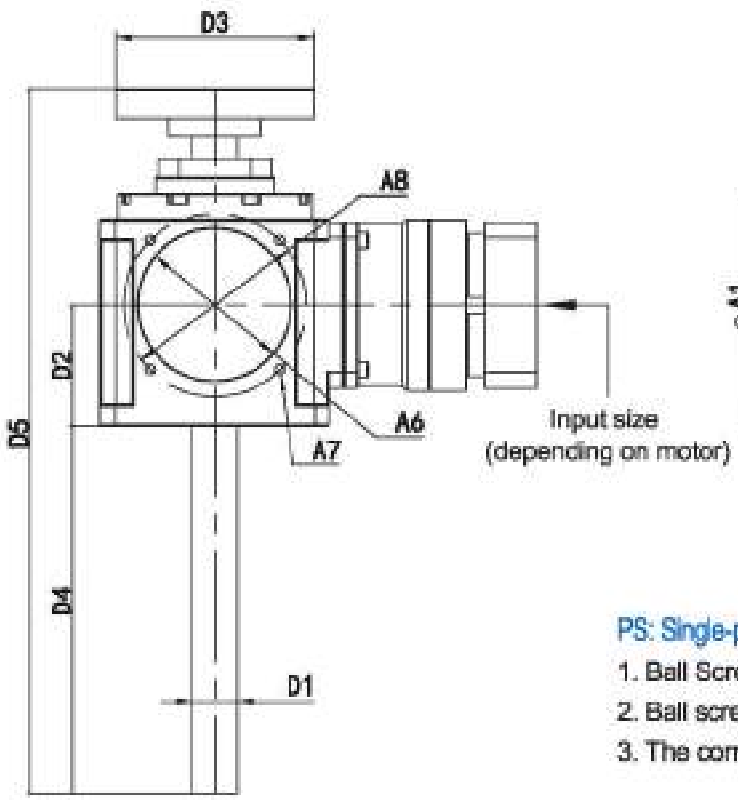
G6H-A: 6 axle BST、G6H-W

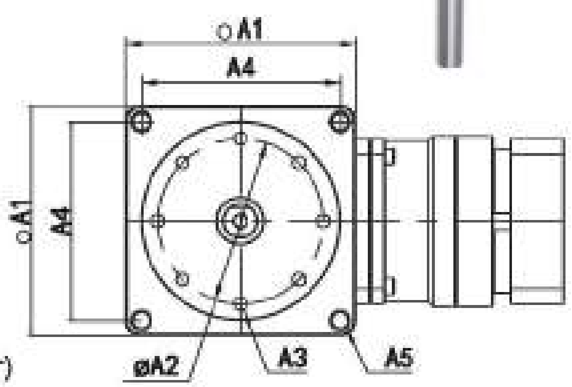
G8H-A: 8 axle BST、G8H-W

CB-G1-BST

Single Point Screw Jack Reducer Type

Dimensions:





PS: Single-point lifting and lowering with ball screws of various brands.

1. Ball Screw Diameter(16/20/25/32/40/50)
2. Ball screw guide (5/10/25/32/40/50)
3. The correct size is based on 2D/3D.

Specification parameter table

G1	Specification	Screw Diameter	Screwdriver lift Screw lead(mm)			Recommended Speed Ratio	Screwdriver lift Recommended speed(mm/s)			Top speed (mm/s)	Screwdriver lift Recommended Load(Kg)			Recommended Servo (KW)	Drive efficiency
Single-point	CB090	16	5	10	16	≥6	≤40	≤80	≤130	Actual operating speed depends on the customer's load scenario	≤100	≤100	≤80	0.4~2	85%
	CB125	25	5	10	25	≥6	≤40	≤80	≤200		≤300	≤400	≤250	0.75~2.5	85%
	CB155	32	10	20	32	≥6	≤80	≤160	≤260		≤800	≤700	≤600	1~4	85%
	CB185	40	10	20	40	≥6	≤80	≤160	≤330		≤1200	≤1000	≤800	2~5	85%
	CB215	50	10	20	50	≥6	≤80	≤160	≤410		≤1500	≤1500	≤900	3~7.5	85%

Dimensional parameter table

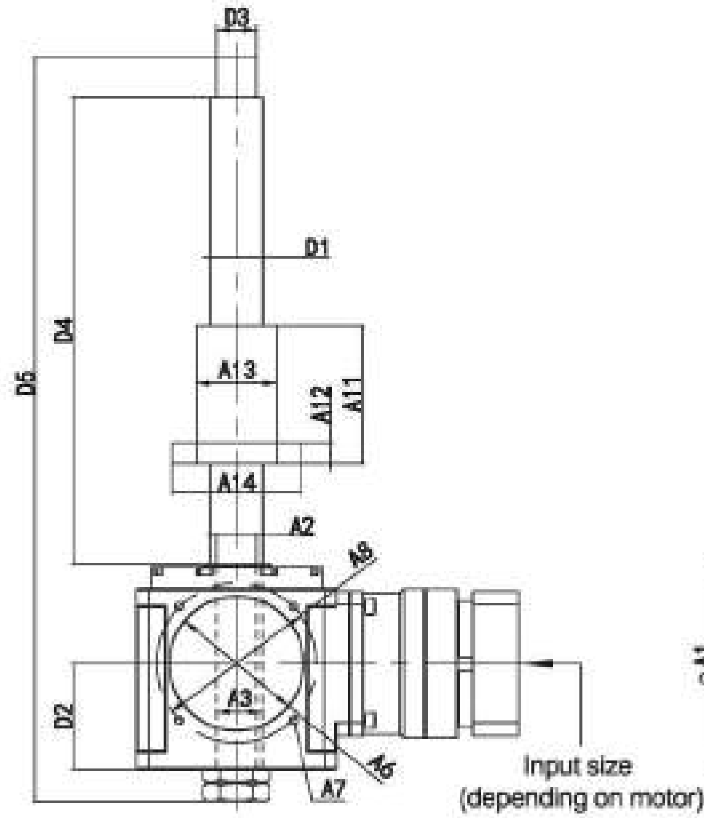
unit: mm

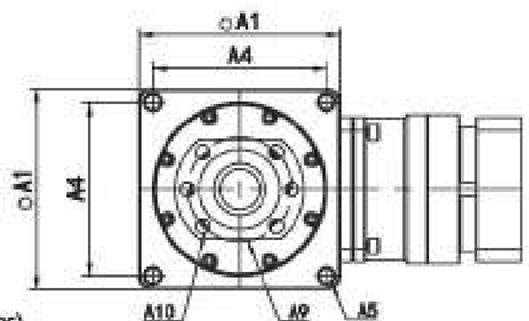
Specification	A1	A2	A3	A4	A5	A6	A7	A8	D1	D2	D3	D4	D5	Input Size
CB090	90	ø45	8-M5	78	4-ø6.8	ø52	4-M5	ø70	16	50.5	ø54	Effective length of the screw	Depends on customer selection	
CB125	125	ø90	8-M8	108	4-ø9	ø83	4-M6	ø100	25	66	ø108			
CB155	155	ø108	8-M8	135	4-ø11	ø90	4-M10	ø120	32	75	ø108			
CB185	185	ø139	8-M8	162	4-ø13	ø120	4-M12	ø150	40	92	ø139			
CB215	215	ø156	8-M12	182	4-ø15	ø130	4-M14	ø180	50	108	ø178			

CB-G1-CR

Single Point Nut Lift Reducer Type

Dimensions:





Specification parameter table

G1	Specification	Screw Diameter	Nut Lift Screw lead(mm)			Recommended Speed Ratio	Nut Lift Recommended speed(mm/s)			Top speed (mm/s)	Nut Lift Recommended Load(Kg)			Recommended Servo (KW)	Drive efficiency
Single-point	CB090	25	5	10	25	≥6	≤40	≤80	≤200	Actual operating speed depends on the customer's load scenario	≤300	≤400	≤250	0.4~2	85%
	CB125	32	10	20	32	≥6	≤80	≤160	≤260		≤800	≤600	≤600	0.75~2.5	85%
	CB155	40	10	20	40	≥6	≤80	≤160	≤330		≤1200	≤1000	≤800	1~4	85%
	CB185	50	10	20	50	≥6	≤80	≤160	≤410		≤1500	≤1500	≤900	2~5	85%
	CB215	63	10	20	-	≥6	≤80	≤110	-		≤2000	≤3000	-	3~7.5	85%

Dimensional parameter table

unit: mm

Specification	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14
CB090	90	Depends on the diameter of the screw shaft		78	4-ø6.8	ø52	4-M5	ø70	51	ø6.5	70	10	ø40	ø62
CB125	125			108	4-ø9	ø83	4-M6	ø100	65	ø9	74	12	ø50	ø80
CB155	155			135	4-ø11	ø90	4-M10	ø120	78	ø9	71	14	ø63	ø93
CB185	185			162	4-ø13	ø120	4-M12	ø150	93	ø11	93	16	ø75	ø110
CB215	215			182	4-ø15	ø130	4-M14	ø180	115	ø13.5	149	20	ø95	ø135

Specification	D1	D2	D3	D4	D5	Input Size
CB090	25	50.5	Depends on customer requirements	Effective length of the screw	Depends on customer selection	
CB125	32	66				
CB155	40	75				
CB185	50	92				
CB215	63	108				

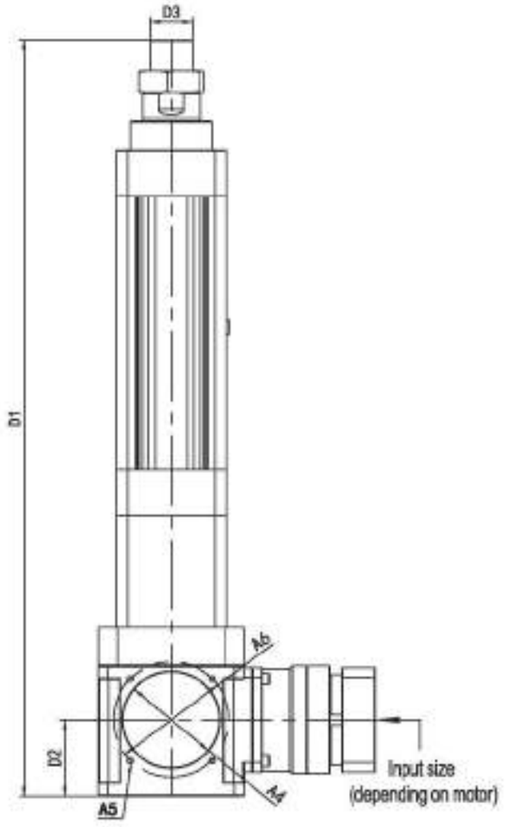
PS: Single-point lifting and lowering with ball screws of various brands.

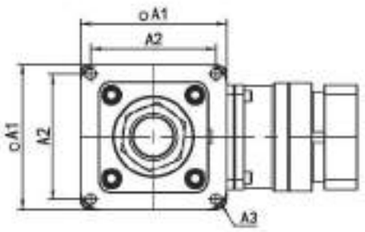
1. Ball Screw Diameter(16/20/25/32/40/50)
2. Ball screw guide (5/10/25/32/40/50)
3. The correct size is based on 2D/3D.

CB–G1–JD

Single point electric cylinder lifting reducer type

Dimensions:





PS: Single-point lifting and lowering with ball screws of various brands.

1. Ball Screw Diameter(16/20/25/32/40/50)
2. Ball screw guide (5/10/25/32/40/50)
3. The correct size is based on 2D/3D.

Specification parameter table

	Specification	Screw Diameter	Electric cylinder lifting Screw lead(mm)			Recommended Speed Ratio	Electric cylinder lifting Recommended speed(mm/s)			Top speed (mm/s)	Electric cylinder lifting Recommended Load(Kg)			Recommended Servo (KW)	Drive efficiency
G1 Single-point	CB090	25	5	10	16	≥6	≤40	≤80	≤130	Actual operating speed depends on the customer's load scenario	≤100	≤100	≤80	0.4~2	85%
	CB125	32	5	10	25	≥6	≤40	≤80	≤200		≤300	≤400	≤250	0.75~2.5	85%
	CB155	40	10	20	32	≥6	≤80	≤160	≤260		≤800	≤700	≤600	1~4	85%
	CB185	50	10	20	40	≥6	≤80	≤160	≤330		≤1200	≤1000	≤800	2~5	85%
	CB215	63	10	20	50	≥6	≤80	≤160	≤410		≤1500	≤1500	≤900	3~7.5	85%

Dimensional parameter table

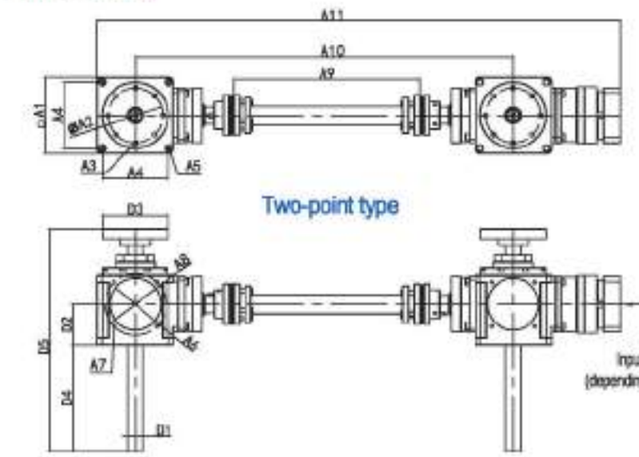
unit: mm

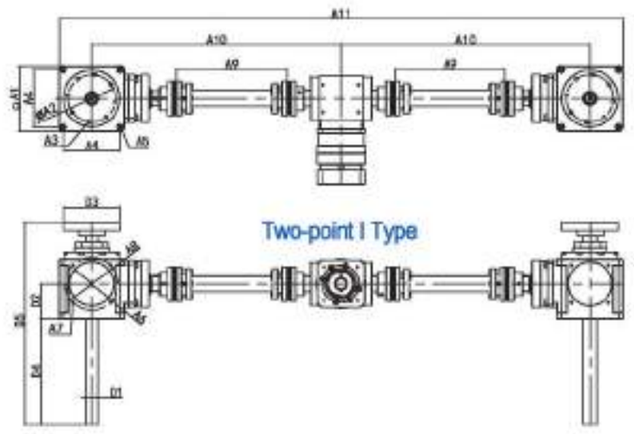
Specification	A1	A2	A3	A4	A5	A6	D1	D2	D3	Input Size
CB090	90	78	4-ø6.8	ø52	4-M5	ø70	Based on actual itinerary	50.5	Depends on customer requirements	Depends on customer selection
CB125	125	108	4-ø9	ø83	4-M6	ø100		66		
CB155	155	135	4-ø11	ø90	4-M10	ø120		75		
CB185	185	162	4-ø13	ø120	4-M12	ø150		92		
CB215	215	182	4-ø15	ø130	4-M14	ø180		108		

CB–G2–BST

Two-Point/Two-Point I Screw Jack Reducer Type

Dimensions:





PS: Two point lifting with various brands of ball screws

1. Ball Screw Diameter(16/20/25/32/40/50)
2. Ball screw guide (5/10/25/32/40/50)
3. The correct size is based on 2D/3D.

Specification parameter table

	Specification	Screw Diameter	Screwdriver lift Screw lead(mm)			Recommended Speed Ratio	Screwdriver lift Recommended speed(mm/s)			Top speed (mm/s)	Screwdriver lift Recommended Load(Kg)			Recommended Servo (KW)	Drive efficiency
G2 Two-point	CB090	16	5	10	16	≥6	≤40	≤80	≤130	Actual operating speed depends on the customer's load scenario	≤200	≤200	≤120	0.4~2	75%
	CB125	25	5	10	25	≥6	≤40	≤80	≤200		≤600	≤700	≤400	0.75~2.5	75%
	CB155	32	10	20	32	≥6	≤80	≤160	≤260		≤1600	≤1200	≤1000	1~4	75%
	CB185	40	10	20	40	≥6	≤80	≤160	≤330		≤2200	≤1800	≤1100	2~5	75%
	CB215	50	10	20	50	≥6	≤80	≤160	≤410		≤2600	≤2200	≤900	3~7.5	75%

Dimensional parameter table

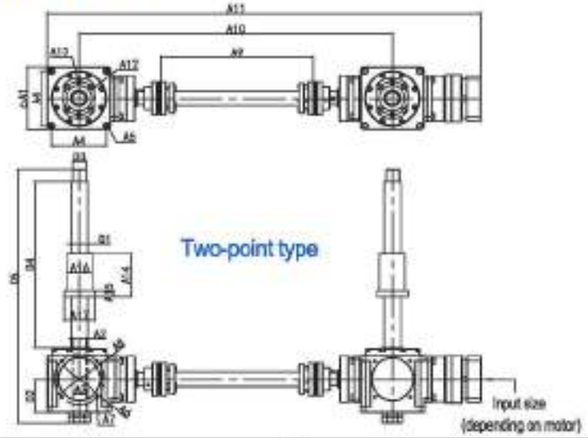
unit: mm

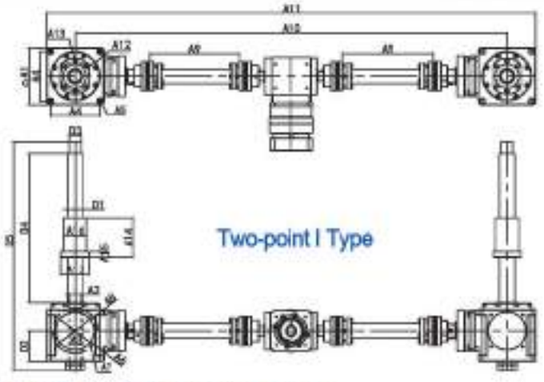
Specification	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	D1	D2	D3	D4	D5	Input Size
CB090	90	ø45	8-M5	78	4-ø6.8	ø52	4-M5	ø70	Determined by the screw span			16	50.5	ø54	Effective length of the screw	Depends on customer selection	
CB125	125	ø90	8-M8	108	4-ø9	ø83	4-M6	ø100				25	66	ø108			
CB155	155	ø108	8-M8	135	4-ø11	ø90	4-M10	ø120				32	75	ø108			
CB185	185	ø139	8-M8	162	4-ø13	ø120	4-M12	ø150				40	92	ø139			
CB215	215	ø156	8-M12	182	4-ø15	ø130	4-M14	ø180				50	108	ø178			

CB–G2–CR

Two-Point/Two-Point I Nut Lift Reducer Type

Dimensions:





Specification parameter table

G2 Two-point	Specification	Screw Diameter	Nut Lift Screw lead(mm)			Recommended Speed Ratio	Nut Lift Recommended speed(mm/s)			Top speed (mm/s)	Nut Lift Recommended Load(Kg)			Recommended Servo (KW)	Drive efficiency
	CB090	25	5	10	25	≥6	≤40	≤80	≤200	Actual operating speed depends on the customer's load scenario	≤800	≤700	≤400	0.4~2	75%
	CB125	32	10	20	32	≥6	≤80	≤160	≤260		≤1500	≤1000	≤800	0.75~2.5	75%
	CB155	40	10	20	40	≥6	≤80	≤160	≤330		≤2200	≤1800	≤900	1~4	75%
	CB185	50	10	20	50	≥6	≤80	≤160	≤410		≤2600	≤2200	≤900	2~5	75%
	CB215	63	10	20	-	≥6	≤40	≤80	-		≤4000	≤5500	-	3~7.5	75%

Dimensional parameter table

unit: mm

Specification	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17
CB090	90	Depends on the diameter of the screw shaft		78	4-ø6.8	ø52	4-M5	ø70	Depends on screw span			51	ø6.5	70	10	ø40	ø62
CB125	125			108	4-ø9	ø83	4-M6	ø100				65	ø9	74	12	ø50	ø80
CB155	155			135	4-ø11	ø90	4-M10	ø120				78	ø9	71	14	ø63	ø93
CB185	185			162	4-ø13	ø120	4-M12	ø150				93	ø11	93	16	ø75	ø110
CB215	215			182	4-ø15	ø130	4-M14	ø180				115	ø13.5	149	20	ø95	ø135

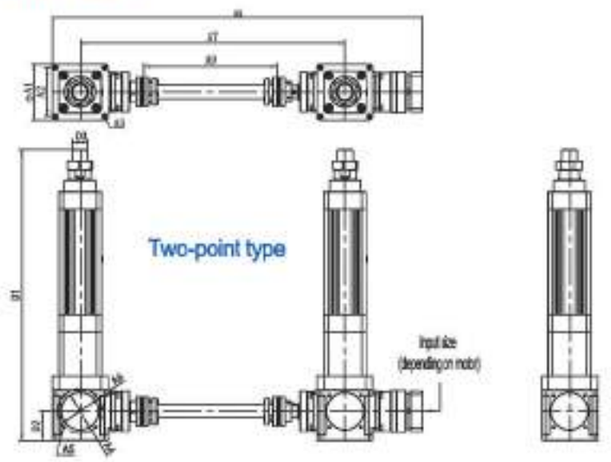
Specification	D1	D2	D3	D4	D5	Input Size
CB090	25	50.5	Depends on customer requirements	Effective length of the screw	Depends on customer selection	
CB125	32	66				
CB155	40	75				
CB185	50	92				
CB215	63	108				

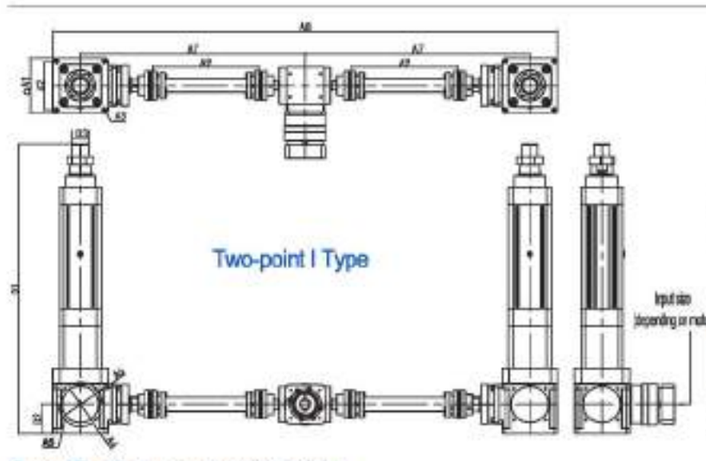
PS: Two point lifting with various brands of ball screws
1. Ball Screw Diameter(16/20/25/32/40/50)
2. Ball screw guide (5/10/25/32/40/50)
3. The correct size is based on 2D/3D.

CB–G2–JDT

Two-Point/Two-Point I Cylinder Lift Reducer Type

Dimensions:





PS: Two point lifting with various brands of ball screws
1. Ball Screw Diameter(16/20/25/32/40/50)
2. Ball screw guide (5/10/25/32/40/50)
3. The correct size is based on 2D/3D.

Specification parameter table

G2 Two-point	Specification	Screw Diameter	Electric cylinder lifting Screw lead(mm)			Recommended Speed Ratio	Electric cylinder lifting Recommended speed(mm/s)			Top speed (mm/s)	Electric cylinder lifting Recommended Load(Kg)			Recommended Servo (KW)	Drive efficiency
	CB090	25	5	10	16	≥6	≤40	≤80	≤130	Actual operating speed depends on the customer's load scenario	≤200	≤200	≤120	0.4~2	75%
	CB125	32	5	10	25	≥6	≤40	≤80	≤200		≤600	≤700	≤400	0.75~2.5	75%
	CB155	40	10	20	32	≥6	≤80	≤160	≤260		≤1600	≤1200	≤1000	1~4	75%
	CB185	50	10	20	40	≥6	≤80	≤160	≤330		≤2200	≤1800	≤1100	2~5	75%
	CB215	63	10	20	50	≥6	≤80	≤160	≤410		≤2600	≤2200	≤900	3~7.5	75%

Dimensional parameter table

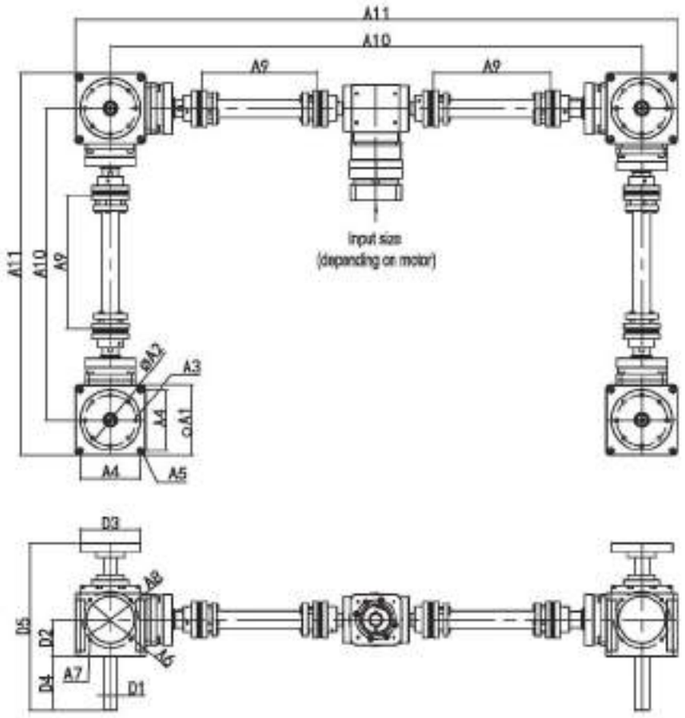
unit: mm

Specification	A1	A2	A3	A4	A5	A6	A7	A8	A9	D1	D2	D3	Input Size
CB090	90	78	4-ø6.8	ø52	4-M5	ø70	Depends on screw span			Based on actual itinerary	50.5	Depends on customer requirements	Depends on customer selection
CB125	125	108	4-ø9	ø83	4-M6	ø100					66		
CB155	155	135	4-ø11	ø90	4-M10	ø120					75		
CB185	185	162	4-ø13	ø120	4-M12	ø150					92		
CB215	215	182	4-ø15	ø130	4-M14	ø180					108		

CB–G4U–BST

Four-point screw jack reducer type

Dimensions:



PS: four-point lift with ball screws of various brands

1. Ball Screw Diameter(16/20/25/32/40/50)
2. Ball screw guide (5/10/25/32/40/50)
3. The correct size is based on 2D/3D.

Specification parameter table

G4 Four-point	Specification	Screw Diameter	Screwdriver lift Screw lead(mm)			Recommend Speed Ratio	Screwdriver lift Recommended speed(mm/s)			Top speed (mm/s)	Screwdriver lift Recommended Load(Kg)			Recommend Servo (KW)	Drive efficiency
	CB090	16	5	10	16	≥6	≤40	≤80	≤130	Actual operating speed depends on the customer's load scenario	≤300	≤300	≤200	0.4~2.5	60%
	CB125	25	5	10	25	≥6	≤40	≤80	≤200		≤1200	≤1500	≤700	0.75~2.5	60%
	CB155	32	10	20	32	≥6	≤80	≤160	≤260		≤3000	≤1700	≤1100	1~5	60%
	CB185	40	10	20	40	≥6	≤55	≤110	≤220		≤4000	≤2600	≤1300	3~7.5	60%
	CB215	50	10	20	50	≥6	≤55	≤110	≤270		≤5000	≤2600	≤1000	4~7.5	60%

Dimensional parameter table

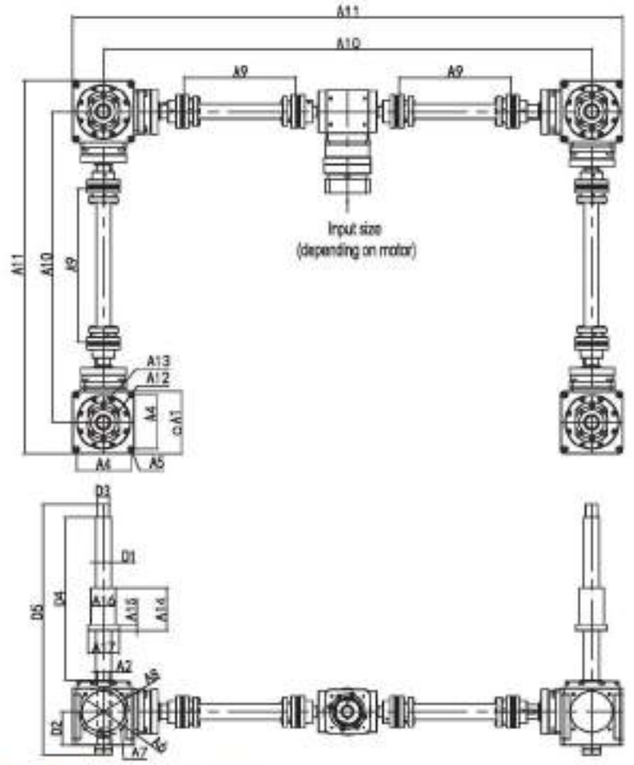
unit: mm

Specification	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	D1	D2	D3	D4	D5	Input Size
CB090	90	ø45	8-M5	78	4-ø6.8	ø52	4-M5	ø70	Determined by the screw span			16	50.5	ø54	Effective length of the screw	Depends on customer selection	
CB125	125	ø90	8-M8	108	4-ø9	ø83	4-M6	ø100				25	66	ø108			
CB155	155	ø108	8-M8	135	4-ø11	ø90	4-M10	ø120				32	75	ø108			
CB185	185	ø139	8-M8	162	4-ø13	ø120	4-M12	ø150				40	92	ø139			
CB215	215	ø156	8-M12	182	4-ø15	ø130	4-M14	ø180				50	108	ø178			

CB–G4U–CR

Four Points Nut Lift Reducer Type

Dimensions:



Specification parameter table

G4 Four-point	Specification	Screw Diameter	Nut Lift Screw lead(mm)			Recommend Speed Ratio	Nut Lift Recommended speed(mm/s)			Top speed (mm/s)	Nut Lift Recommended Load(Kg)			Recommend Servo (KW)	Drive efficiency
	CB090	25	5	10	25	≥6	≤40	≤80	≤200	Actual operating speed depends on the customer's load scenario	≤1200	≤1200	≤700	0.4~2.5	60%
	CB125	32	5	20	32	≥6	≤50	≤100	≤160		≤2500	≤1500	≤800	0.75~2.5	60%
	CB155	40	10	20	40	≥6	≤55	≤110	≤220		≤4000	≤2600	≤1300	1~5	60%
	CB185	50	10	20	50	≥6	≤55	≤110	≤270		≤5000	≤2600	≤1000	3~7.5	60%
	CB215	63	10	20	-	≥12	≤20	≤40	-		≤8000	≤10000	-	4~7.5	60%

Dimensional parameter table

unit: mm

Specification	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17
CB090	90	Depends on the diameter of the screw shaft		78	4-ø6.8	ø52	4-M5	ø70	Depends on screw span			51	ø6.5	70	10	ø40	ø62
CB125	125			108	4-ø9	ø83	4-M6	ø100				65	ø9	74	12	ø50	ø80
CB155	155			135	4-ø11	ø90	4-M10	ø120				78	ø9	71	14	ø63	ø93
CB185	185			162	4-ø13	ø120	4-M12	ø150				93	ø11	93	16	ø75	ø110
CB215	215			182	4-ø15	ø130	4-M14	ø180				115	ø13.5	149	20	ø95	ø135

Specification	D1	D2	D3	D4	D5	Input Size
CB090	25	50.5	Depends on customer requirements	Effective length of the screw	Depends on customer selection	
CB125	32	66				
CB155	40	75				
CB185	50	92				
CB215	63	108				

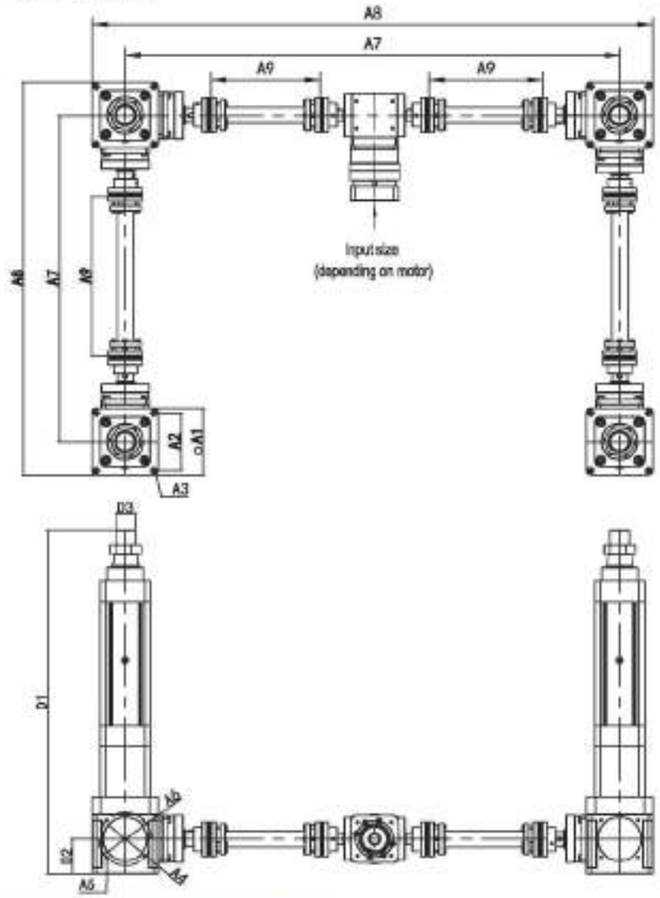
PS: four-point lift with ball screws of various brands

1. Ball Screw Diameter(16/20/25/32/40/50)
2. Ball screw guide (5/10/25/32/40/50)
3. The correct size is based on 2D/3D.

CB–G4U–JD

Four-point electric cylinder lifting reducer type

Dimensions:



PS: four-point lift with ball screws of various brands
1. Ball Screw Diameter(16/20/25/32/40/50)
2. Ball screw guide (5/10/25/32/40/50)
3. The correct size is based on 2D/3D.

Specification parameter table

G4 Four-point	Specifcation	Screw Diameter	Electic cylinder lifting Screw lead(mm)			Recommended Speed Ratio	Electric cylinder lifting Recommended speed(mm/s)			Top speed (mm/s)	Electic cylinder lifting Recommended Load(Kg)			Recommended Servo (KW)	Drive efficiency
	CB090	25	5	10	16	≥6	≤40	≤80	≤130	Actual operating speed depends on the customer's load scenario	≤300	≤300	≤200	0.4~2.5	60%
	CB125	32	5	10	25	≥6	≤40	≤80	≤200		≤1200	≤1500	≤700	0.75~2.5	60%
	CB155	40	10	20	32	≥6	≤80	≤160	≤260		≤3000	≤1700	≤1100	1~5	60%
	CB185	50	10	20	40	≥6	≤55	≤110	≤220		≤4000	≤2800	≤1300	3~7.5	60%
	CB215	63	10	20	50	≥6	≤55	≤110	≤270		≤5000	≤2800	≤1000	4~7.5	60%

Dimensional parameter table

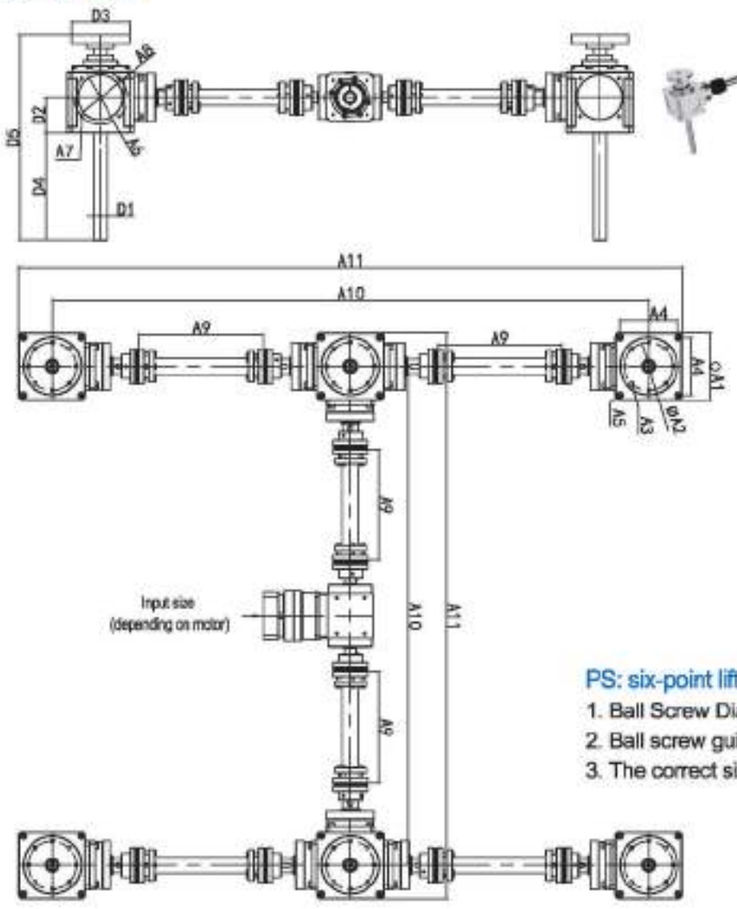
unit: mm

Specifcation	A1	A2	A3	A4	A5	A6	A7	A8	A9	D1	D2	D3	Input Size
CB090	90	78	4-ø6.8	ø52	4-M5	ø70	Depends on screw span			Based on actual literary	50.5	Depends on customer requirements	Depends on customer selection
CB125	125	108	4-ø9	ø83	4-M6	ø100					66		
CB155	155	135	4-ø11	ø90	4-M10	ø120					75		
CB185	185	162	4-ø13	ø120	4-M12	ø150					92		
CB215	215	182	4-ø15	ø130	4-M14	ø180					108		

CB–G6H–BST

Six Points Screw Jack Reducer Type

Dimensions:



PS: six-point lift with ball screws of various brands
1. Ball Screw Diameter(16/20/25/32/40/50)
2. Ball screw guide (5/10/25/32/40/50)
3. The correct size is based on 2D/3D.

Specification parameter table

G6 Six-point	Specifcation	Screw Diameter	Screwdriver lift Screw lead(mm)			Recommend Speed Ratio	Screwdriver lift Recommended speed(mm/s)			Top speed (mm/s)	Screwdriver lift Recommended Load(Kg)			Recommend Servo (KW)	Drive efficiency
	CB090	16	5	10	16	≥6	≤40	≤80	≤130	Actual operating speed depends on the customer's load scenario	≤400	≤400	≤300	0.4~2.5	50%
	CB125	25	5	10	25	≥6	≤40	≤80	≤200		≤1600	≤1400	≤700	0.75~2.5	50%
	CB155	32	10	20	32	≥6	≤55	≤110	≤170		≤4500	≤2200	≤1400	1~5	50%
	CB185	40	10	20	40	≥6	≤40	≤80	≤160		≤8000	≤4000	≤2200	4~7.5	50%
	CB215	50	10	20	50	≥6	≤40	≤80	≤200		≤7500	≤4500	≤1800	4~7.5	50%

Dimensional parameter table

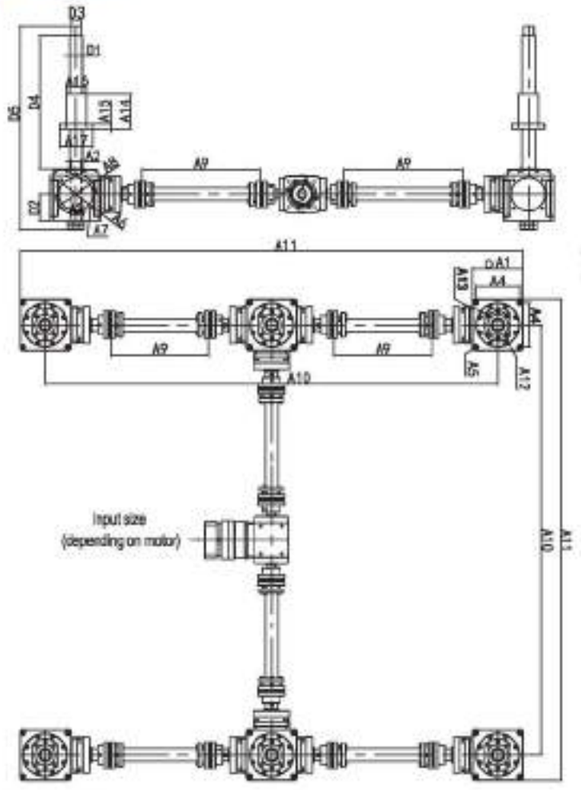
unit: mm

Specifcation	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	D1	D2	D3	D4	D5	Input Size
CB090	90	ø45	8-M5	78	4-ø6.8	ø52	4-M5	ø70	Determined by the screw span			16	50.5	ø54	Effective length of the screw	Depends on customer selection	
CB125	125	ø90	8-M8	108	4-ø9	ø83	4-M6	ø100				25	66	ø108			
CB155	155	ø108	8-M8	135	4-ø11	ø90	4-M10	ø120				32	75	ø108			
CB185	185	ø139	8-M8	162	4-ø13	ø120	4-M12	ø150				40	92	ø139			
CB215	215	ø156	8-M12	182	4-ø15	ø130	4-M14	ø180				50	108	ø178			

CB–G6H–CR

Six Points Nut Lift Reducer Type

Dimensions:



Specification parameter table

G6 Six-point	Specification	Screw Diameter	Nut Lift Screw lead(mm)			Recommended Speed Rate	Nut Lift Recommendec speed(mm/s)			Top speed (mm/s)	Nut Lift Recommended Load(Kg)			Recommended Servo (KW)	Drive efficiency
	CB090	25	5	10	25	≥6	≤40	≤80	≤200	Actual operating speed depends on the customer's load scenario	≤1400	≤1400	≤800	0.4~2.5	50%
	CB125	32	10	20	32	≥10	≤50	≤100	≤160		≤2500	≤1200	≤700	0.75~2.5	50%
	CB155	40	10	20	40	≥8	≤55	≤110	≤220		≤6000	≤3000	≤1500	1~5	50%
	CB185	50	10	20	50	≥6	≤40	≤80	≤200		≤7500	≤4500	≤1600	4~7.5	50%
	CB215	63	10	20	-	≥14	≤17	≤35	-		≤12000	≤10000	-	4~7.5	50%

Dimensional parameter table

unit: mm

Specification	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17
CB090	90	Depends on the diameter of the screw shaft		78	4-ø6.8	ø52	4-M5	ø70	Depends on screw span			51	ø6.5	70	10	ø40	ø62
CB125	125			108	4-ø9	ø83	4-M6	ø100				65	ø9	74	12	ø50	ø80
CB155	155			135	4-ø11	ø90	4-M10	ø120				78	ø9	71	14	ø63	ø93
CB185	185			162	4-ø13	ø120	4-M12	ø150				93	ø11	93	16	ø75	ø110
CB215	215			182	4-ø15	ø130	4-M14	ø180				115	ø13.5	149	20	ø95	ø135

Specification	D1	D2	D3	D4	D5	Input Size
CB090	25	50.5	Depends on customer requirements	Effective length of the screw	Depends on customer selection	
CB125	32	66				
CB155	40	75				
CB185	50	92				
CB215	63	108				

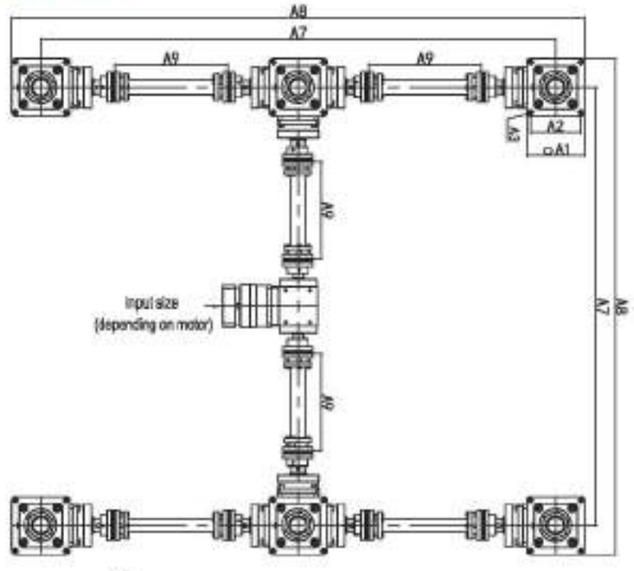
PS: six-point lift with ball screws of various brands

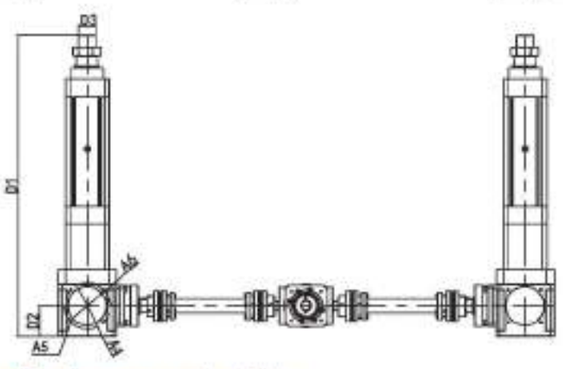
1. Ball Screw Diameter(16/20/25/32/40/50)
2. Ball screw guide (5/10/25/32/40/50)
3. The correct size is based on 2D/3D.

CB–G6H–JD

Six Points Electric Cylinder Lifting Reducer Type

Dimensions:





PS: six-point lift with ball screws of various brands

1. Ball Screw Diameter(16/20/25/32/40/50)
2. Ball screw guide (5/10/25/32/40/50)
3. The correct size is based on 2D/3D.

Specification parameter table

G6 Six-point	Specification	Screw Diameter	Electric cylinder lifting Screw lead(mm)			Recommended Speed Rate	Electric cylinder lifting Recommended speed(mm/s)			Top speed (mm/s)	Electric cylinder lifting Recommended Load(Kg)			Recommended Servo (KW)	Drive efficiency
	CB090	25	5	10	16	≥6	≤40	≤80	≤130	Actual operating speed depends on the customer's load scenario	≤400	≤400	≤300	0.4~2.5	50%
	CB125	32	5	10	25	≥6	≤40	≤80	≤200		≤1600	≤1400	≤700	0.75~2.5	50%
	CB155	40	10	20	32	≥6	≤55	≤110	≤170		≤4500	≤2200	≤1400	1~5	50%
	CB185	50	10	20	40	≥6	≤40	≤80	≤160		≤6000	≤4000	≤2200	4~7.5	50%
	CB215	63	10	20	50	≥6	≤40	≤80	≤200		≤7500	≤4500	≤1600	4~7.5	50%

Dimensional parameter table

unit: mm

Specification	A1	A2	A3	A4	A5	A6	A7	A8	A9	D1	D2	D3	Input Size
CB090	90	78	4-ø6.8	ø52	4-M5	ø70	Depends on screw span				50.5	Depends on customer requirements	Depends on customer selection
CB125	125	108	4-ø9	ø83	4-M6	ø100					66		
CB155	155	135	4-ø11	ø90	4-M10	ø120					75		
CB185	185	162	4-ø13	ø120	4-M12	ø150					92		
CB215	215	182	4-ø15	ø130	4-M14	ø180					108		

Double Output Shaft Series

Product Features

1. Integrated stainless steel body ensures maximum nigidity and corrosion resistance. Multiple precision machined surface for easy assembly.

2. The adoption of the top spiral worm gear design software and the optimized design of contact tooth surface make the even load and allow high torque output.Gears are made of high strength carburizing alloy steel and the grinding precision is up to the standard of DIN 5 level .

3. Multiple stainless steel output and input shaft design can be applied to various of industrial applications needs.

4. The combination of high– precision grinded worm bevel gear set and the optimized the design of planetary gearset can make the reduction speed up to 500:1.

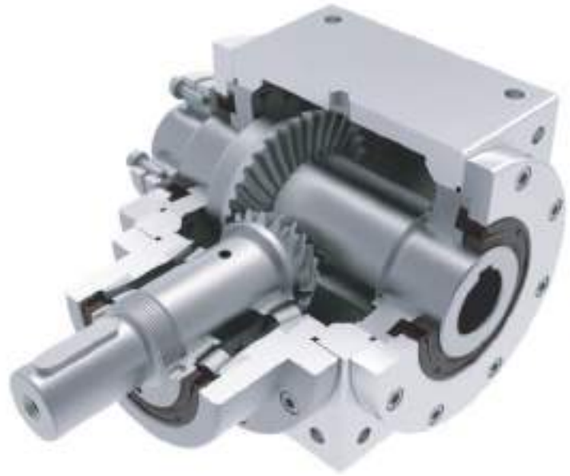
5. High torque and low backlash design of the compact structure is suitable for the application of precision servo.

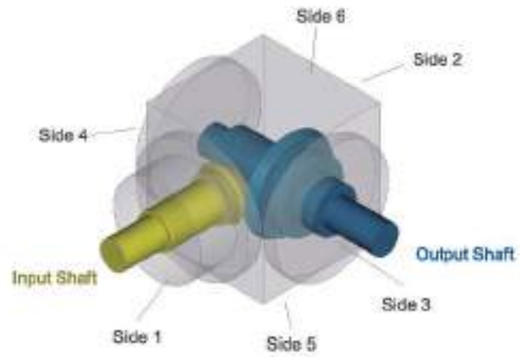
6. Maintenance– free without replacing the lubrication oil, long operating life.

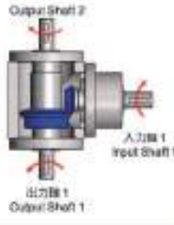
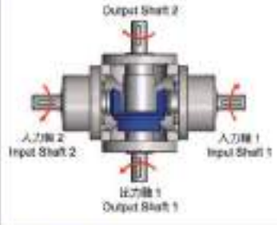
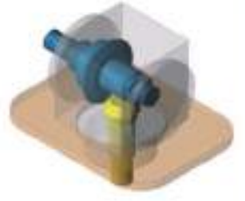
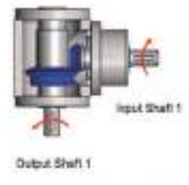
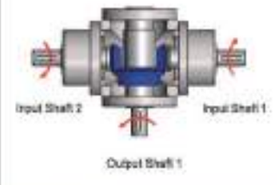
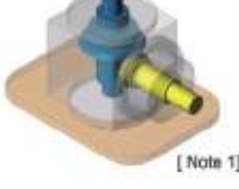
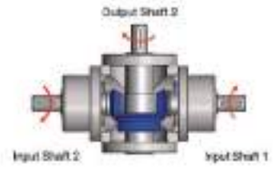
Weight

Model No.		Stage	Ratio[1]	AT065	AT075	AT090	AT110	AT140	AT170	AT210	AT240	AT280
L Series	kg	1	1~5	2.6	4.2	6.8	11.6	19.8	34.8	66.2	98.1	155.7
L1 Series		1	1~5	2.6	4.1	6.7	11.5	19.5	34.2	65.1	96.6	153.4
H Series		1	1~5	2.5	3.9	6.4	11.0	18.1	31.6	60.0	89.4	143.4
C Series		1	1~5	2.8	4.2	6.9	11.4	19.6	33.7	63.3	97.9	149.1
R1 Series		1	1~5	2.6	4.1	6.7	11.5	19.5	34.2	65.1	96.6	153.4
LM Series		1	1	3.5	5.6	9.0	15.2	24.1	42.4	81.4	122.0	190.9
RM Series		1	1	3.5	5.6	9.0	15.2	24.1	42.4	81.4	122.0	190.9
4M Series		1	1	3.5	5.6	9.1	15.4	24.8	42.6	82.5	123.5	193.3

Rotating Direction





L Shaft Direction		Side 1	Side 2
			
L Shaft Direction		**Side 3**	**Side 4**
			 [Note 1]
R Shaft Direction		**Side 5**	**Side 6**
			

Standard product is L shaft direction, R shaft direction is optional.

[Note 1] Side 4 operation shall be avoid.

Purchase of reducers

AT065 – L – 1 – S1

Reducer Mode :
AT065, AT075, AT090, AT110, AT140, AT170, AT210, AT240, AT280

Reduction Ratio :
Single Section : 1, 1.5, 2, 3, 4, 5

Reducer Type :
L / L1 / H / C / R1 / LM / RM / 4M

Selection of Shaft Type :
S1: Smooth Straight Shaft
S2: Attached Key Straight Shaft

Selection Example : AT065–L–1–S1

AT210 – FL1 – 200 – S1 / MOTOR

Reducer Model :
AT065, AT075, AT090, AT110, AT140, AT170, AT210, AT240, AT280

Reduction Ratio :
Single Section : 1, 1.5, 2, 3, 4, 5
Double joint: 7, 10, 15, 20, 25, 35, 50
Triple joint : 75, 100, 125, 150, 200, 250, 350, 500

Motor Model :
Motor Manufacture & Model

Reducer Types :
FL / FLM1 / FLM2 / FL1 / FL1M1 / FL1M2 / FR1 / FR1M1 / FR1M2 / FH / FHM1 / FHM2 / FC / FCM1 / FCM2

Shaft Type Selection :
S1: Smooth Straight Shaft
S2: Attached Key Straight Shaft

Selection Example : AT210–FL1–200–S1 / SIEMENS 1FK6 032–6AK71

Double Output Shaft Series

Files of Reducer Performance

Specification	Stage	Ratio*	AT065 L / AT065 L1 / AT065 H / AT065 C / AT065 R1 / AT065 LM / AT065 RM / AT065 4M	AT075 L / AT075 L1 / AT075 H / AT075 C / AT075 R1 / AT075 LM / AT075 RM / AT075 4M	AT090 L / AT090 L1 / AT090 H / AT090 C / AT090 R1 / AT090 LM / AT090 RM / AT090 4M	AT110 L / AT110 L1 / AT110 H / AT110 C / AT110 R1 / AT110 LM / AT110 RM / AT110 4M	AT140 L / AT140 L1 / AT140 H / AT140 C / AT140 R1 / AT140 LM / AT140 RM / AT140 4M	AT170 L / AT170 L1 / AT170 H / AT170 C / AT170 R1 / AT170 LM / AT170 RM / AT170 4M	AT210 L / AT210 L1 / AT210 H / AT210 C / AT210 R1 / AT210 LM / AT210 RM / AT210 4M	AT240 L / AT240 L1 / AT240 H / AT240 C / AT240 R1 / AT240 LM / AT240 RM / AT240 4M	AT280 L / AT280 L1 / AT280 H / AT280 C / AT280 R1 / AT280 LM / AT280 RM / AT280 4M
Rated Output Torque T_{2N} Nm	1	1	25	45	78	150	360	585	1,300	2,150	3,200
		1.5	25	45	78	150	360	585	1,300	2,150	3,200
		2	24	42	68	150	330	544	1,220	2,010	3,050
		3	18	33	54	120	270	450	1,020	1,650	2,850
		4	13	28	48	100	224	376	860	1,410	2,300
		5	12	25	40	85	196	320	740	1,210	2,000
Maximum acceleration torque T_{2B} Nm	1	1~5	1.5 Times of Rated Output Torque								
Maximum Acceleration Input Speed n_{1B} rpm	1	1~5	7,500	6,500	5,500	4,500	3,500	3,000	2,200	2,000	1,700
Backlash* arcmin	1	1~5	≤6	≤6	≤6	≤6	≤6	≤6	≤6	≤6	≤6
Allowable radial force F_{r1} [2] Input d1 N	1	1~5	700	950	1,450	2,100	2,700	3,800	7,800	9,600	10,500
Allowable radial force F_{r2} [3] Output d2 N	1	1~5	900	1,100	1,700	2,700	4,800	6,600	11,500	16,000	18,000
Allowable radial force F_{a1} [2] Input d1 N	1	1~5	350	425	725	1,050	1,350	1,900	3,900	4,800	5,250
Allowable radial force F_{a2} [3] Output d2 N	1	1~5	450	550	850	1,350	2,400	3,300	5,750	8,500	9,000
Service Life hr	1	1~5	20,000*								
Efficiency η %	1	1~5	≥98%								
Operating Temp °C	1	1~5	-10°C ~ 90°C								
Lubrication			Fully Synthetic Grease								
Noise level(n=1500rpm , No Load)dB(A)	1	1~5	≤68	≤70	≤74	≤76	≤77	≤78	≤80	≤82	≤83

1. Deceleration ratio ($i=N_1/N_{out}$)
2. Acting on the centre of input shaft @ n_{1B}
3. Acting on the centre of input shaft @ n_{1B}
* Continuous operation reduces the service life by one-half.
+ Backlash value is measured at 2% of rated torque T_{2N}
AT-LM/RM/ 4M only provides 1:1 ratio.

Rotary Inertia of Reducer

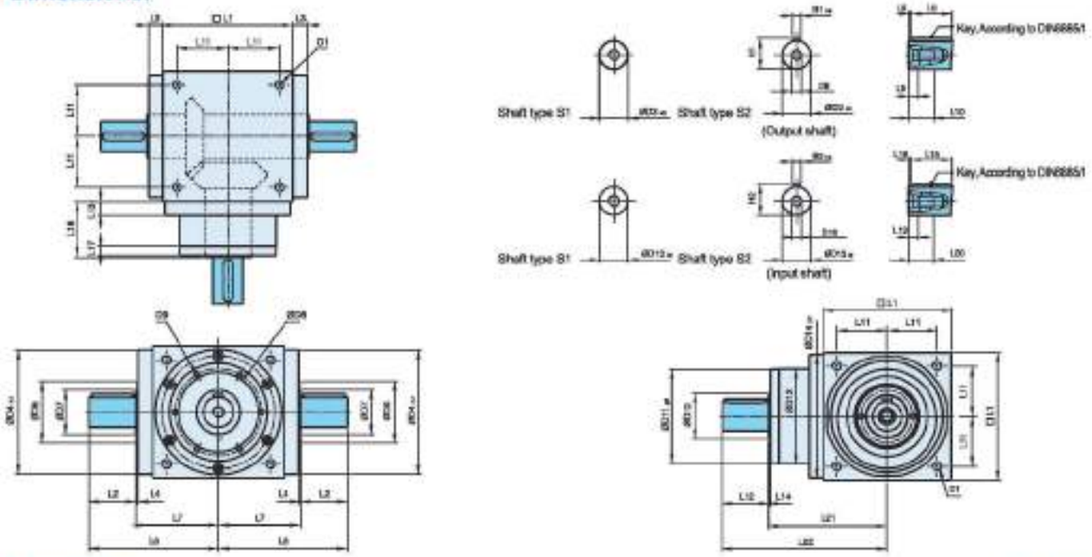
Specification	Stage	Ratio^	AT065 L / AT065 L1 / AT065 H / AT065 C / AT065 R1 / AT065 LM / AT065 RM / AT065 4M	AT075 L / AT075 L1 / AT075 H / AT075 C / AT075 R1 / AT075 LM / AT075 RM / AT075 4M	AT090 L / AT090 L1 / AT090 H / AT090 C / AT090 R1 / AT090 LM / AT090 RM / AT090 4M	AT110 L / AT110 L1 / AT110 H / AT110 C / AT110 R1 / AT110 LM / AT110 RM / AT110 4M	AT140 L / AT140 L1 / AT140 H / AT140 C / AT140 R1 / AT140 LM / AT140 RM / AT140 4M	AT170 L / AT170 L1 / AT170 H / AT170 C / AT170 R1 / AT170 LM / AT170 RM / AT170 4M	AT210 L / AT210 L1 / AT210 H / AT210 C / AT210 R1 / AT210 LM / AT210 RM / AT210 4M	AT240 L / AT240 L1 / AT240 H / AT240 C / AT240 R1 / AT240 LM / AT240 RM / AT240 4M	AT280 L / AT280 L1 / AT280 H / AT280 C / AT280 R1 / AT280 LM / AT280 RM / AT280 4M
Rotary Inertia J , kg · cm²	1	1	0.51	1.30	3.16	7.70	23.57	58.99	195.40	369.34	799.12
		1.5	0.64	1.16	2.82	6.74	19.37	49.28	155.45	283.58	595.78
		2	0.44	1.11	2.70	6.31	17.75	45.35	140.24	249.74	511.76
		3	0.43	1.09	2.66	6.17	17.18	44.01	134.95	237.71	483.06
		4	0.43	1.09	2.65	6.13	17.06	43.70	133.58	234.72	476.26
		5	0.43	1.09	2.65	6.12	17.02	43.60	133.14	233.67	473.58

AT–L Series

Double Output Shaft Type

Size（1–stage, ratio i=1~5）

Dimensions:



Specifications:

Unit: mm

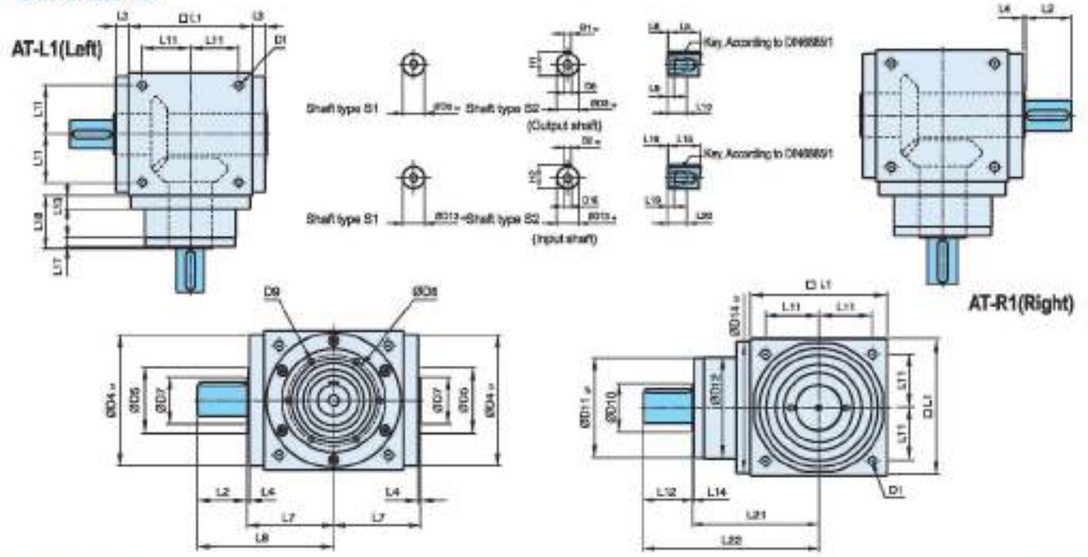
Sizes	AT065 L	AT075 L	AT090 L	AT110 L	AT140 L	AT170 L	AT210 L	AT240 L	AT280 L
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D3 k6	13	16	18	22	32	40	50	55	60
D4 h7	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D6	M4	M5	M5	M8	M12	M16	M16	M16	M20
D7	21	22	28	33	47	55	75	85	110
D8	53	62	76	95	92	114	142	160	176
D9	4xM4xL7	4xM5xL8	4xM5xL8	6xM6xL10	6xM8xL12.5	6xM8xL12.5	6xM8xL12.5	6xM8xL12.5	6xM10xL15
D10	15.4	20.4	25.8	35.8	49.8	59.3	79.3	92.3	102.3
D11 g6	62.9	72.9	87	107	103	127	158	178	198
D12	62	72	86	106	104	128	160	180	200
D13 k6	13	16	18	22	32	40	50	55	60
D14 h7	63	73	88	108	135	165	205	235	275
D16	M4	M5	M5	M8	M12	M16	M16	M16	M20
L1	65	75	90	110	140	170	210	240	280
L2	19.5	30	35	40	50	60	75	85	110
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70	80	100
L6	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L7	47.5	54	62	72	87	102	127	147	167
L8	87	84	97	112	137	162	202	232	277
L9	4.5	4.8	4.8	7.2	10	12	12	12	15
L10	10	12.5	12.5	19	28	36	36	36	42
L11	27	30	36	44	55	67	85	95	110
L12	19.5	30	35	40	50	60	75	85	110
L13	13	15	15	15	15	15	20	25	25
L14	2	2	2	2	2	2	2	2	2
L15	16	25	28	32	45	50	70	80	100
L16	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L17	6	8	8	8	10	10	10	10	10
L18	43	52.5	55	60	60	70	90	105	120
L19	4.5	4.8	4.8	7.2	10	12	12	12	15
L20	10	12.5	12.5	19	28	36	36	36	42
L21	75.5	90	100	115	130	155	195	225	260
L22	95	120	135	155	180	215	270	310	370
B1 h8	5	5	6	6	10	12	14	16	18
B2 h8	5	5	6	6	10	12	14	16	18
H1	15	18	20.5	24.5	35	43	53.5	59	64
H2	15	18	20.5	24.5	35	43	53.5	59	64

AT–L1(Left) / AT–R1(Right) Series

Single–side Output Shaft Type

Size（1–stage, ratio i=1~5）

Dimensions:



Specifications:

Unit: mm

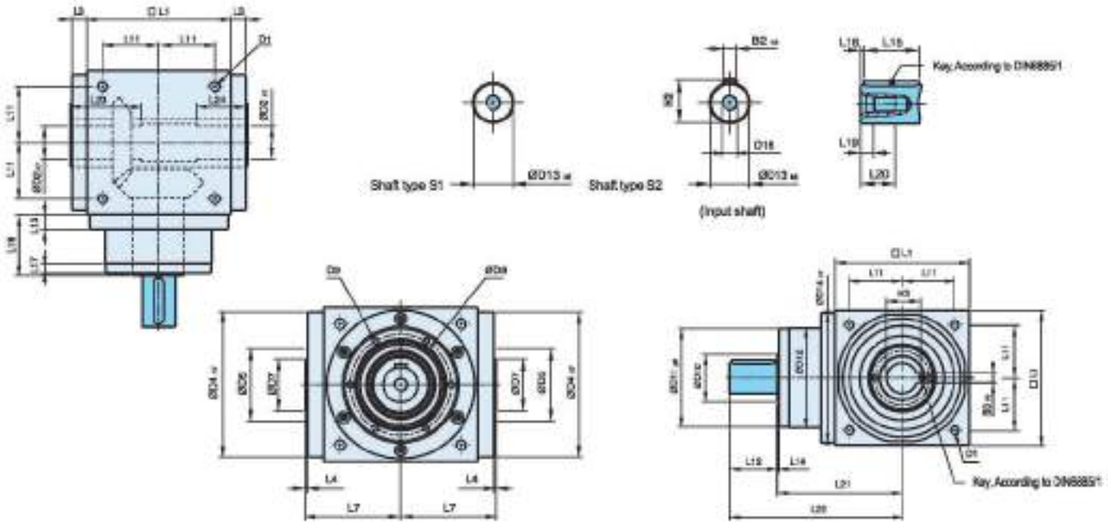
Sizes	AT065 L1/R1	AT075 L1/R1	AT090 L1/R1	AT110 L1/R1	AT140 L1/R1	AT170 L1/R1	AT210 L1/R1	AT240 L1/R1	AT280 L1/R1
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D3 k6	13	16	18	22	32	40	50	55	60
D4 h7	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D6	M4	M5	M5	M8	M12	M16	M16	M16	M20
D7	21	22	28	33	47	55	75	85	110
D8	53	62	76	95	92	114	142	160	176
D9	4xM4xL7	4xM5xL8	4xM5xL8	6xM6xL10	6xM8xL10	6xM8xL12.5	6xM8xL12.5	6xM8xL12.5	6xM10xL15
D10	15.4	20.4	25.8	35.8	49.8	59.3	79.3	92.3	102.3
D11 g6	62.9	72.9	87	107	103	127	158	178	198
D12	62	72	86	106	104	128	160	180	200
D13 k6	13	16	18	22	32	40	50	55	60
D14 h7	63	73	88	108	135	165	205	235	275
D16	M4	M5	M5	M8	M12	M16	M16	M16	M20
L1	65	75	90	110	140	170	210	240	280
L2	19.5	30	35	40	50	60	75	85	110
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70	80	100
L6	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L7	47.5	54	62	72	87	102	127	147	167
L8	87	84	97	112	137	162	202	232	277
L9	4.5	4.8	4.8	7.2	10	12	12	12	15
L10	10	12.5	12.5	19	28	36	36	36	42
L11	27	30	36	44	55	67	85	95	110
L12	19.5	30	35	40	50	60	75	85	110
L13	13	15	15	15	15	15	20	25	25
L14	2	2	2	2	2	2	2	2	2
L15	16	25	28	32	45	50	70	80	100
L16	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L17	6	8	8	8	10	10	10	10	10
L18	43	52.5	55	60	60	70	90	105	120
L19	4.5	4.8	4.8	7.2	10	12	12	12	15
L20	10	12.5	12.5	19	28	36	36	36	42
L21	75.5	90	100	115	130	155	195	225	260
L22	95	120	135	155	180	215	270	310	370
B1 h8	5	5	6	6	10	12	14	16	18
B2 h8	5	5	6	6	10	12	14	16	18
H1	15	18	20.5	24.5	35	43	53.5	59	64
H2	15	18	20.5	24.5	35	43	53.5	59	64

AT–H Series

Hole Input Type

Size（1–stage, ratio i=1~5）

Dimensions:



Specifications:

Unit: mm

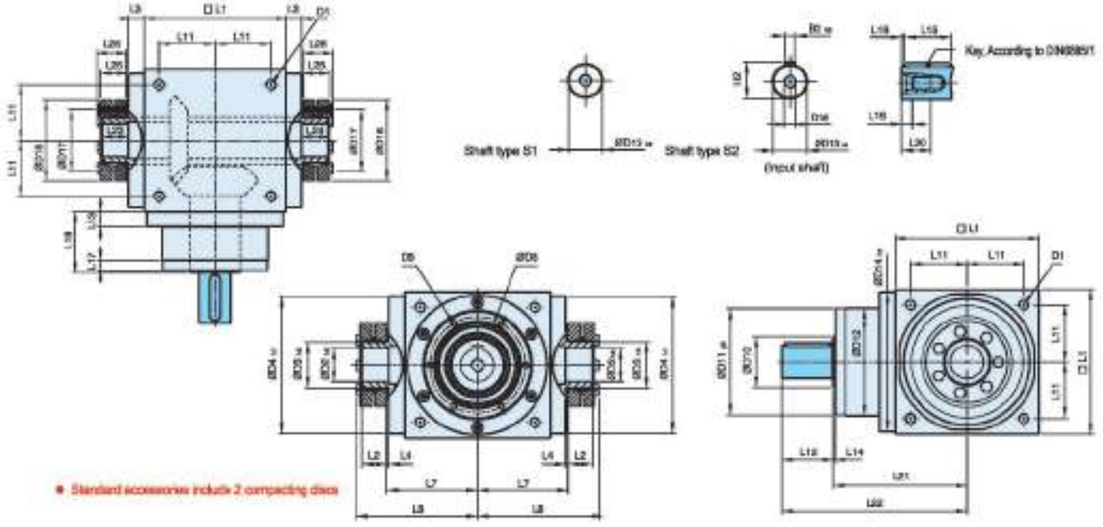
Sizes	AT065 H	AT075 H	AT090 H	AT110 H	AT140 H	AT170 H	AT210 H	AT240 H	AT280 H
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D2 H7	13	14	18	22	32	40	50	55	60
D4 h7	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D7	21	22	28	33	47	55	75	85	110
D8	53	62	76	95	92	114	142	160	176
D9	4xM4xL7	4xM5xL8	4xM5xL8	6xM6xL10	6xM8xL10	6xM8xL12.5	6xM8xL12.5	6xM8xL12.5	6xM10xL15
D10	15.4	20.4	25.8	35.8	49.8	59.3	79.3	92.3	102.3
D11 g6	62.9	72.9	87	107	103	127	158	178	198
D12	62	72	86	106	104	128	160	180	200
D13 k6	13	16	18	22	32	40	50	55	60
D14 h7	63	73	88	108	135	165	205	235	275
D16	M4	M5	M5	M8	M12	M16	M16	M16	M20
L1	65	75	90	110	140	170	210	240	280
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L7	47.5	54	62	72	87	102	127	147	167
L11	27	30	36	44	55	67	85	95	110
L12	19.5	30	35	40	50	60	75	85	110
L13	13	15	15	15	15	15	20	25	25
L14	2	2	2	2	2	2	2	2	2
L15	16	25	28	32	45	50	70	80	100
L16	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L17	6	8	8	8	10	10	10	10	10
L18	43	52.5	55	60	60	70	90	105	120
L19	4.5	4.8	4.8	7.2	10	12	12	12	15
L20	10	12.5	12.5	19	28	36	36	36	42
L21	75.5	90	100	115	130	155	195	225	260
L22	95	120	135	155	180	215	270	310	370
L23	40	47	52	53	70	80	95	115	115
L24	30	32	35	35	50	55	65	80	80
B2 h9	5	5	6	6	10	12	14	16	18
B3 P9	5	5	6	6	10	12	14	16	18
H2	15	18	20.5	24.5	35	43	53.5	59	64
H3	15.3	16.3	20.8	24.8	35.3	43.3	53.8	59.3	64.4

AT–C Series

Hole Output Hoop Type

Size（1–stage, ratio i=1~5）

Dimensions:



Specifications:

Unit: mm

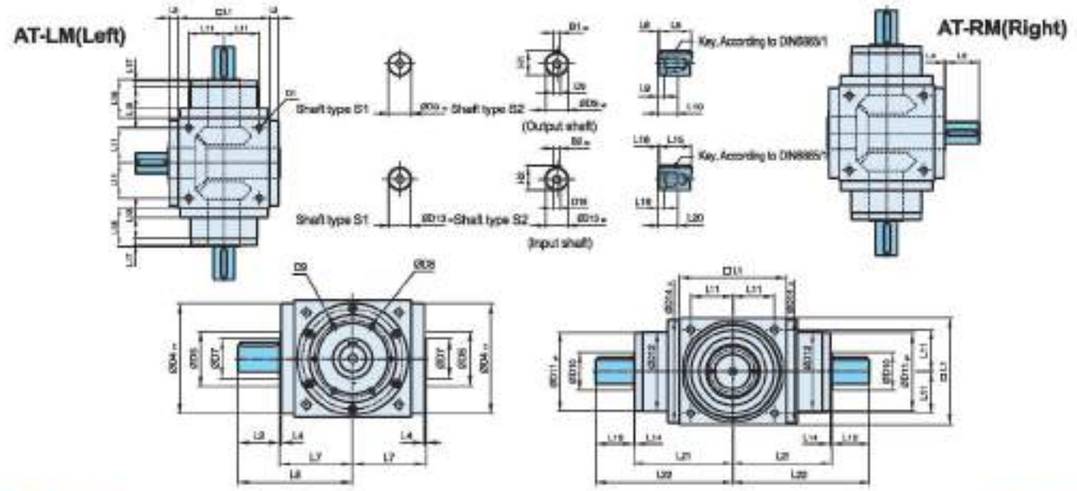
Sizes	AT065 C	AT075 C	AT090 C	AT110 C	AT140 C	AT170 C	AT210 C	AT240 C	AT280 C
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D2 H8	13	14	18	22	32	40	50	55	60
D3 h8	16	16	22	25	44	50	62	68	75
D4 h7	63	73	88	108	135	165	205	235	275
D8	53	62	76	95	92	114	142	160	176
D9	4xM4xL7	4xM5xL8	4xM5xL8	6xM6xL10	6xM8xL10	6xM8xL12.5	6xM8xL12.5	6xM8xL12.5	6xM10xL15
D10	15.4	20.4	25.8	35.8	49.8	59.3	79.3	92.3	102.3
D11 g6	62.9	72.9	87	107	103	127	158	178	198
D12	62	72	86	106	104	128	160	180	200
D13 k6	13	16	18	22	32	40	50	55	60
D14 h7	63	73	88	108	135	165	205	235	275
D16	M4	M5	M5	M8	M12	M16	M16	M16	M20
D17	26	26	36	38	61	70	86	86	100
D18	41	41	50	50	80	90	110	115	138
L1	65	75	90	110	140	170	210	240	280
L2	14	14	18	18	24	26	29	29	30.5
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L7	47.5	54	62	72	87	102	127	147	167
L8	66	72.5	85	95	116.5	133.5	161.5	181.5	205
L11	27	30	36	44	55	67	85	95	110
L12	19.5	30	35	40	50	60	75	85	110
L13	13	15	15	15	15	15	20	25	25
L14	2	2	2	2	2	2	2	2	2
L15	16	25	28	32	45	50	70	80	100
L16	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L17	6	8	8	8	10	10	10	10	10
L18	43	52.5	55	60	60	70	90	105	120
L19	4.5	4.8	4.8	7.2	10	12	12	12	15
L20	10	12.5	12.5	19	28	36	36	36	42
L21	75.5	90	100	115	130	155	195	225	260
L22	95	120	135	155	180	215	270	310	370
L23	15	15	20	20	26	28	31	31	32.5
L24	15	15	20	20	26	28	31	31	32.5
L25	15	15	19.5	19.5	25.5	27.5	30.5	30.5	32.5
L26	16.5	16.5	23	23	29.5	31.5	34.5	34.5	38
B2 h9	5	5	6	6	10	12	14	16	18
H2	15	18	20.5	24.5	35	43	53.5	59	64

AT–LM(Left) / AT–RM(Right) Series

Double Output Shaft Opposite Direction Type

Size（1–stage, ratio i=1）

Dimensions:



Specifications:

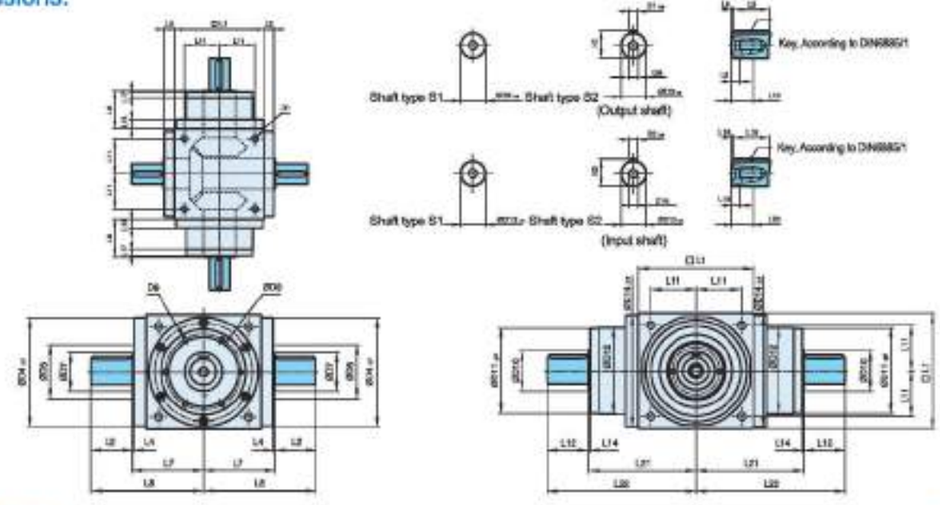
Unit: mm

Sizes	AT065LM/RM	AT075LM/RM	AT090LM/RM	AT110LM/RM	AT140LM/RM	AT170LM/RM	AT210LM/RM	AT240LM/RM	AT280LM/RM
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D3 $_{k6}$	13	16	18	22	32	40	50	55	60
D4 $_{h7}$	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D6	M4	M5	M5	M8	M12	M16	M16	M16	M20
D7	21	22	28	33	47	55	75	85	110
D8	53	62	76	95	92	114	142	160	176
D9	4xM4xL7	4xM5xL8	4xM5xL8	6xM6xL10	6xM6xL10	6xM8xL12.5	6xM8xL12.5	6xM8xL12.5	6xM10xL15
D10	15.4	20.4	25.8	35.8	49.8	59.3	79.3	92.3	102.3
D11 $_{g6}$	62.9	72.9	87	107	103	127	158	176	196
D12	62	72	86	106	104	128	160	180	200
D13 $_{k6}$	13	16	18	22	32	40	50	55	60
D14 $_{h7}$	63	73	88	108	135	165	205	235	275
D16	M4	M5	M5	M8	M12	M16	M16	M16	M20
L1	65	75	90	110	140	170	210	240	280
L2	19.5	30	35	40	50	60	75	85	110
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70	80	100
L6	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L7	47.5	54	62	72	87	102	127	147	167
L8	67	84	97	112	137	162	202	232	277
L9	4.5	4.8	4.8	7.2	10	12	12	12	15
L10	10	12.5	12.5	19	28	36	36	36	42
L11	27	30	36	44	55	67	85	95	110
L12	19.5	30	35	40	50	60	75	85	110
L13	13	15	15	15	15	15	20	25	25
L14	2	2	2	2	2	2	2	2	2
L15	16	25	28	32	45	50	70	80	100
L16	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L17	6	8	8	8	10	10	10	10	10
L18	43	52.5	55	60	60	70	90	105	120
L19	4.5	4.8	4.8	7.2	10	12	12	12	15
L20	10	12.5	12.5	19	28	36	36	36	42
L21	75.5	90	100	115	130	155	195	225	260
L22	95	120	135	155	180	215	270	310	370
B1 $_{h9}$	5	5	6	6	10	12	14	16	18
B2 $_{h9}$	5	5	6	6	10	12	14	16	18
H1	15	18	20.5	24.5	35	43	53.5	59	64
H2	15	18	20.5	24.5	35	43	53.5	59	64

AT–4M Series

Size（1–stage, ratio i=1）

Dimensions:



Specifications:

Unit: mm

Sizes	AT065 4M	AT075 4M	AT090 4M	AT110 4M	AT140 4M	AT170 4M	AT210 4M	AT240 4M	AT280 4M
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D3 $_{k6}$	13	16	18	22	32	40	50	55	60
D4 $_{h7}$	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D6	M4	M5	M5	M8	M12	M16	M16	M16	M20
D7	21	22	28	33	47	55	75	85	110
D8	53	62	76	95	92	114	142	160	176
D9	4xM4xL7	4xM5xL8	4xM5xL8	6xM8xL10	6xM6xL10	6xM8xL12.5	6xM8xL12.5	6xM8xL12.5	6xM10xL15
D10	15.4	20.4	25.8	35.8	49.8	59.3	79.3	92.3	102.3
D11 $_{g6}$	62.9	72.9	87	107	103	127	158	176	196
D12	62	72	86	106	104	128	160	180	200
D13 $_{k6}$	13	16	18	22	32	40	50	55	60
D14 $_{h7}$	63	73	88	108	135	165	205	235	275
D16	M4	M5	M5	M8	M12	M16	M16	M16	M20
L1	65	75	90	110	140	170	210	240	280
L2	19.5	30	35	40	50	60	75	85	110
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70	80	100
L6	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L7	47.5	54	62	72	87	102	127	147	167
L8	67	84	97	112	137	162	202	232	277
L9	4.5	4.8	4.8	7.2	10	12	12	12	15
L10	10	12.5	12.5	19	28	36	36	36	42
L11	27	30	36	44	55	67	85	95	110
L12	19.5	30	35	40	50	60	75	85	110
L13	13	15	15	15	15	15	20	25	25
L14	2	2	2	2	2	2	2	2	2
L15	16	25	28	32	45	50	70	80	100
L16	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L17	6	8	8	8	10	10	10	10	10
L18	43	52.5	55	60	60	70	90	105	120
L19	4.5	4.8	4.8	7.2	10	12	12	12	15
L20	10	12.5	12.5	19	28	36	36	36	42
L21	75.5	90	100	115	130	155	195	225	260
L22	95	120	135	155	180	215	270	310	370
B1 $_{h9}$	5	5	6	6	10	12	14	16	18
B2 $_{h9}$	5	5	6	6	10	12	14	16	16
H1	15	18	20.5	24.5	35	43	53.5	59	64
H2	15	18	20.5	24.5	35	43	53.5	59	64

AT–F Input Flange Series

Files of Reducer Performance

Specification		Stages	Ratio	AT065 FL AT065 FL1 AT065 FH AT065 FC AT065 FR1	AT075 FL AT075 FL1 AT075 FH AT075 FC AT075 FR1	AT090 FL AT090 FL1 AT090 FH AT090 FC AT090 FR1	AT110 FL AT110 FL1 AT110 FH AT110 FC AT110 FR1	AT140 FL AT140 FL1 AT140 FH AT140 FC AT140 FR1	AT170 FL AT110 FL1 AT110 FH AT170 FC AT170 FR1	AT210 FL AT210 FL1 AT210 FH AT210 FC AT210 FR1	AT240 FL AT240 FL1 AT240 FH AT240 FC AT240 FR1	AT280 FL AT280 FL1 AT280 FH AT280 FC AT280 FR1
Rated output torque T_{2n}	Nm	1	1	25	45	78	150	360	585	1,300	2,150	3,200
			1.5	25	45	78	150	360	585	1,300	2,150	3,200
			2	24	42	68	150	330	544	1,220	2,010	3,050
			3	18	33	54	120	270	450	1,020	1,650	2,850
			4	13	28	48	100	224	376	860	1,410	2,300
			5	12	25	40	85	196	320	740	1,210	2,000
		2	7	12	12	33	91	91	91	195	358	358
			10	24	28	68	150	208	208	430	846	846
			15	18	33	54	120	270	312	645	1,269	1,269
			20	13	28	48	100	224	376	860	1,410	1,692
			25	12	25	40	85	196	320	740	1,210	2,000
			35	12	25	40	85	196	320	740	1,210	1,790
			50	12	25	40	85	196	320	740	1,210	1,465
		3	75	-	-	-	120	210	312	585	1,269	1,269
			100	-	-	-	100	224	376	780	1,410	1,692
			125	-	-	-	85	196	320	740	1,210	2,000
			150	-	-	-	120	135	312	390	975	975
			200	-	-	-	100	180	376	520	1,300	1,300
			250	-	-	-	85	196	320	650	1,210	1,625
			350	-	-	-	85	196	320	740	1,210	1,790
			500	-	-	-	85	196	320	740	1,210	1,465
Max. acceleration torque T_{2B}	Nm	1,2,3	1~500	1.5 Times of Rated Output Torque								
Max. acceleration input speed n_{1B}	rpm	1	1~5	7,500	6,500	5,500	4,500	3,500	3,000	2,200	2,000	1,700
		2	7~50	8,000	8,000	6,000	6,000	6,000	6,000	4,800	3,600	3,600
		3	75~500	-	-	-	8,000	8,000	6,000	6,000	6,000	6,000
Backlash*	arcmin	1	1~5	≤8	≤8	≤8	≤8	≤8	≤8	≤8	≤8	≤8
		2	7~50	≤8	≤8	≤8	≤8	≤8	≤8	≤8	≤8	≤8
		3	75~500	-	-	-	≤10	≤10	≤10	≤10	≤10	≤10
Permissible radial force F_{2R}[2] Output axis d2	N	1,2,3	1~500	900	1,100	1,700	2,700	4,800	6,600	11,500	16,000	18,000
Permissible radial force F_{2R}[2] Output axis d2	N	1,2,3	1~500	450	550	850	1,350	2,400	3,300	5,750	8,500	9,000
Service life	hr	1,2,3	1~500	20,000*								
Efficiency η	%	1	1~5	≥98%								
		2,3	7~500	≥94%								
Operating temperature	°C	1,2,3	1~500	-10°C ~ 90°C								
Lubrication				Fully Synthetic Grease								
Noise value (n=1500rpm , no-loaded)	dB (A)	1,2,3	1~500	≤71	≤72	≤76	≤77	≤78	≤79	≤81	≤83	≤84

1. Reduction Ratio ($i=N_1/N_{out}$)

2. Acting on the centre of the output shaft@ n_{1B}

* Continuous operation reduces the service life by one-half.

* The backlash value is measured at 2% of the rated torque T_{2n} of torque

AT–F Input Flange Series

Rotary inertia of Reducer

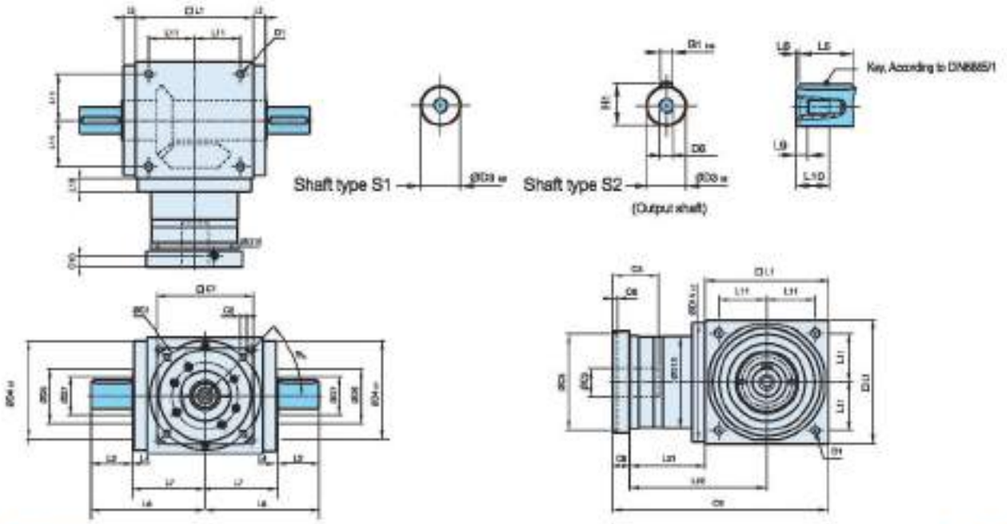
Specification		Stage	Ratio	AT065 FL AT065 FL1 AT065 FH AT065 FC AT065 FR1	AT075 FL AT075 FL1 AT075 FH AT075 FC AT075 FR1	AT090 FL AT090 FL1 AT090 FH AT090 FC AT090 FR1	AT110 FL AT110 FL1 AT110 FH AT110 FC AT110 FR1	AT140 FL AT140 FL1 AT140 FH AT140 FC AT140 FR1	AT170 FL AT170 FL1 AT170 FH AT170 FC AT170 FR1	AT210 FL AT210 FL1 AT210 FH AT210 FC AT210 FR1	AT240 FL AT240 FL1 AT240 FH AT240 FC AT240 FR1	AT280 FL AT280 FL1 AT280 FH AT280 FC AT280 FR1
Rotary inertia J_1	kg · cm²	1	1	0.51	1.30	3.14	7.62	23.54	59.09	195.96	365.38	787.63
			1.5	0.46	1.15	2.80	6.65	19.34	49.38	156.02	279.62	584.28
			2	0.44	1.10	2.68	6.23	17.72	45.44	140.80	245.78	500.26
			3	0.43	1.09	2.64	6.08	17.16	44.11	135.51	233.75	471.56
			4	0.43	1.08	2.63	6.05	17.03	43.79	134.14	230.77	464.76
			5	0.43	1.08	2.63	6.04	16.99	43.69	133.71	229.71	462.08
		2	7	0.15	0.15	0.50	2.79	2.79	2.79	9.91	29.26	29.26
			10	0.15	0.15	0.50	2.80	2.80	2.80	9.96	29.43	29.43
			15	0.15	0.15	0.50	2.80	2.80	2.80	9.96	29.43	29.43
			20	0.15	0.15	0.50	2.80	2.80	2.80	9.96	29.43	29.43
			25	0.15	0.15	0.50	2.80	2.80	2.80	9.96	29.43	29.43
			35	0.15	0.15	0.50	2.79	2.79	2.79	9.91	29.26	29.26
			50	0.15	0.15	0.50	2.79	2.79	2.79	9.89	29.20	29.20
		3	75	-	-	-	2.80	2.80	2.80	9.96	29.43	29.43
			100	-	-	-	2.80	2.80	2.80	9.96	29.43	29.43
			125	-	-	-	2.80	2.80	2.80	9.96	29.43	29.43
			150	-	-	-	2.79	2.79	2.79	9.89	29.20	29.20
			200	-	-	-	2.79	2.79	2.79	9.89	29.20	29.20
			250	-	-	-	2.79	2.79	2.79	9.89	29.20	29.20
			350	-	-	-	2.79	2.79	2.79	9.89	29.20	29.20
			500	-	-	-	2.79	2.79	2.79	9.89	29.20	29.20

Weight

Reducer model		Stage	Ratio	AT065	AT075	AT090	AT110	AT140	AT170	AT210	AT240	AT280
FL Series	kg	1	1~5	2.8	4.4	7.1	12.1	20.9	36.1	69.4	101.2	158.3
		2	7~50	3.2	4.6	8.1	14.3	24.2	38.5	74.1	112.4	171.0
		3	75~500	-	-	-	13.9	23.7	38.8	73.4	110.2	168.7
FL1 Series		1	1~5	2.7	4.3	7.1	11.9	20.3	35.5	68.3	99.6	156.0
		2	7~50	3.2	4.6	8.0	14.2	23.9	37.9	73.0	110.8	168.6
		3	75~500	-	-	-	13.8	23.4	38.2	72.3	108.6	166.4
FH Series		1	1~5	2.6	4.1	6.7	11.4	18.9	32.9	63.2	92.5	146.0
		2	7~50	3.1	4.6	7.7	13.6	22.4	35.3	67.9	103.7	158.7
		3	75~500	-	-	-	13.3	21.9	35.6	67.2	101.5	156.5
FC Series		1	1~5	2.9	4.4	7.2	11.8	20.4	35.0	66.5	96.0	151.7
		2	7~50	3.3	4.9	8.2	14.1	24.1	37.4	71.2	107.2	164.4
		3	75~500	-	-	-	13.7	23.5	37.5	70.5	105.0	162.2
FR1 Series		1	1~5	2.7	4.3	7.1	11.9	20.3	35.5	68.3	99.6	156.0
		2	7~50	3.2	4.6	8.0	14.2	23.9	37.9	73.0	110.8	168.6
		3	75~500	-	-	-	13.8	23.4	38.2	72.3	108.6	166.4

AT–FL Series
Double Output Shaft Type
Size (1–stage, ratio i=1~5)

Dimensions:



Specifications:

Unit: mm

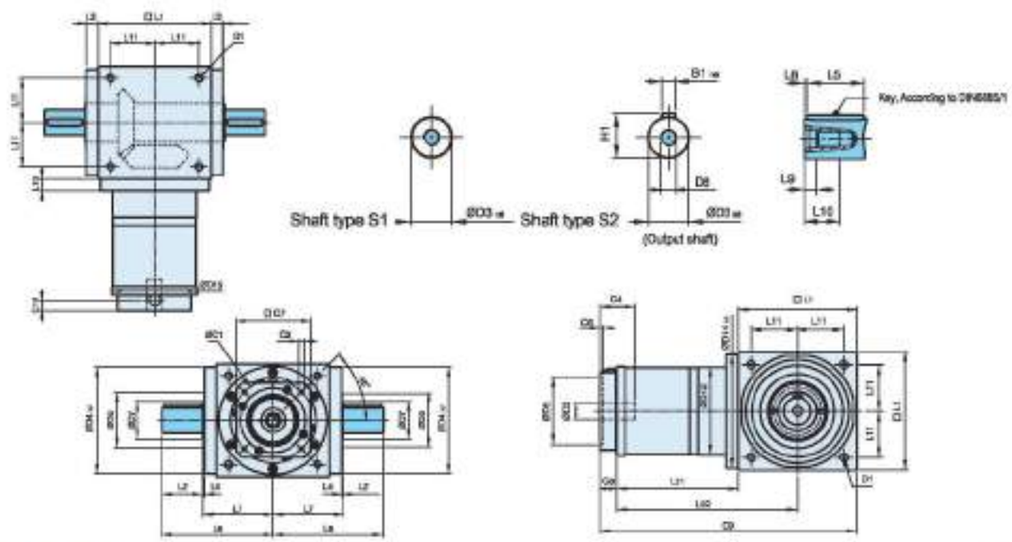
Sizes	AT065 FL	AT075 FL	AT090 FL	AT110 FL	AT140 FL	AT170 FL	AT210 FL	AT240 FL	AT280 FL
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D3 h8	13	16	18	22	32	40	50	55	60
D4 h7	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D6	M4	M5	M5	M8	M12	M16	M16	M16	M20
D7	21	22	28	33	47	55	75	85	110
D12	62	72	86	106	104	128	160	180	200
D14 h7	63	73	88	108	135	165	205	235	275
D15	62.9	72.9	87	107	105	127	158	178	198
L1	65	75	90	110	140	170	210	240	280
L2	19.5	30	35	40	50	60	75	85	110
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70	80	100
L6	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L7	47.5	54	62	72	87	102	127	147	167
L8	67	84	97	112	137	162	202	232	277
L9	4.5	4.8	4.8	7.2	10	12	12	12	15
L10	10	12.5	12.5	19	28	36	36	36	42
L11	27	30	36	44	55	67	85	95	110
L13	13	15	15	15	15	15	20	25	25
L21	49	60.5	63	69.5	85.5	95	130	144.5	135
L22	81.5	98	108	124.5	155.5	180	235	264.5	275
C1[3]	46	70	100	100	130	165	215	215	235
C2[3]	M4	M5	M6	M8	M8	M10	M12	M12	M12
C3[3]	★≤11 / ≤12	★≤14 / ≤15.875 / ≤16	≤19	≤24	≤32	≤38	≤42	≤48	≤55
C4[3]	30	34	40	40	50	60	85	85	116
C5[3]	30	50	60	80	110	130	180	180	200
C6[3]	3.5	8	4	4	5	6	8	6	6
C7[3]	42	60	90	90	115	142	190	190	220
C8[3]	19.5	19	17	17	19.5	22.5	29	29	63
C9[3]	133.5	154.5	170	196.5	245	287.5	369	413.5	478
C10[3]	13.25	13.5	10.75	10.75	13	15	20.75	20.75	53.5
B1 h8	5	5	6	6	10	12	14	16	18
H1	15	18	20.5	24.5	35	43	53.5	59	64

3. C1~C10 are the dimensions of metric standard motor connecting plate, please click 'Reducer Selection' to find out the correct dimensions.

★AT065 FLM1 Supplied C3 ≤12 option ★AT075 FLM1 Supplied C3 ≤16 option ★AT075 FLM2 Supplied C3 ≤15.875 option

AT–FL Series
Double Output Shaft Type
Size (2–stage, ratio i=7~50)

Dimensions:



Specifications:

Unit: mm

Sizes	AT065 FL	AT075 FL	AT090 FL	AT110 FL	AT140 FL	AT170 FL	AT210 FL	AT240 FL	AT280 FL
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D3 h8	13	16	18	22	32	40	50	55	60
D4 h7	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D6	M4	M5	M5	M8	M12	M16	M16	M16	M20
D7	21	22	28	33	47	55	75	85	110
D12	62	72	86	106	104	128	160	180	200
D14 h7	63	73	88	108	135	165	205	235	275
D15	62.9	72.9	87	107	106	127	158	178	198
L1	65	75	90	110	140	170	210	240	280
L2	19.5	30	35	40	50	60	75	85	110
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70	80	100
L6	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L7	47.5	54	62	72	87	102	127	147	167
L8	67	84	97	112	137	162	202	232	277
L9	4.5	4.8	4.8	7.2	10	12	12	12	15
L10	10	12.5	12.5	19	28	36	36	36	42
L11	27	30	36	44	55	67	85	95	110
L13	13	15	15	15	15	15	20	25	25
L21	75	84.5	99	122	144.5	157.5	206.5	239	248
L22	107.5	122	144	177	214.5	242.5	311.5	359	388
C1[4]	46	46	70	100	100	100	130	165	165
C2[4]	M4	M4	M5	M6	M8	M6	M8	M10	M10
C3[4]	≤12	≤12	≤16	≤24	≤24	≤24	≤32	≤38	≤38
C4[4]	30	30	34	40	40	40	50	60	60
C5[4]	30	30	50	80	80	80	110	130	130
C6[4]	3.5	3.5	8	4	4	4	5	6	6
C7[4]	42	42	60	92	92	92	115	142	142
C8[4]	21.5	21.5	21.5	20	20	20	24	31	31
C9[4]	161.5	181	210.5	252	304.5	347.5	440.5	510	559
C10[4]	14.5	14.5	15.5	13	13	13	16	21	21
B1 h8	5	5	6	6	10	12	14	16	18
H1	15	18	20.5	24.5	35	43	53.5	59	64

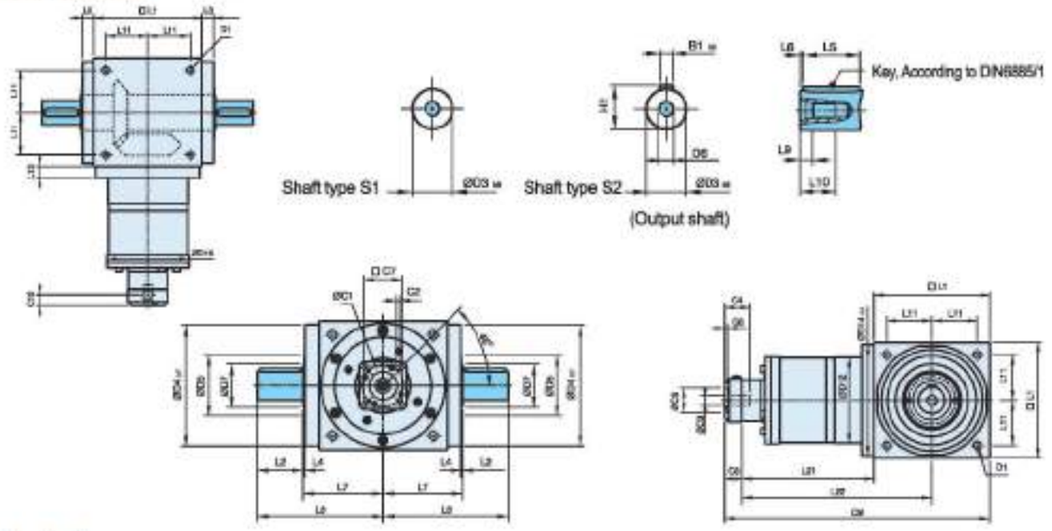
4. C1~C10 are the dimensions of metric standard motor connecting plate, please click 'Reducer Selection' to find out the correct dimensions.

AT–FL Series

Double Output Shaft Type

Size（3–stage, ratio i=75~500）

Dimensions:



Specifications:

Unit: mm

Sizes	AT110 FL	AT140 FL	AT170 FL	AT210 FL	AT240 FL	AT280 FL
D1	M6	M10	M12	M16	M16	M16
D3 h8	22	32	40	50	55	60
D4 h7	108	135	165	205	235	275
D5	53	68	83	104	124	144
D6	M8	M12	M16	M16	M16	M20
D7	33	47	55	75	85	110
D12	106	104	128	160	180	200
D14 h7	108	135	165	205	235	275
D15	107	106	127	158	178	198
L1	110	140	170	210	240	280
L2	40	50	60	75	85	110
L3	15	15	15	20	25	25
L4	2	2	2	2	2	2
L5	32	45	50	70	80	100
L6	4	2.5	5	2.5	2.5	5
L7	72	87	102	127	147	167
L8	112	137	162	202	232	277
L9	7.2	10	12	12	12	15
L10	19	28	36	36	36	42
L11	44	55	67	85	95	110
L13	15	15	15	20	25	25
L21	136.5	159.5	183.5	228	269	278
L22	191.5	229.5	268.5	331	389	418
C1*	46	46	70	70	100	100
C2*	M4	M4	M5	M5	M6	M6
C3*	≤12	≤12	≤16	≤16	≤24	≤24
C4*	30	30	34	34	40	40
C5*	30	30	50	50	80	80
C6*	3.5	3.5	6	6	4	4
C7*	42	42	60	60	92	92
C8*	21.5	21.5	21.5	21.5	20	20
C9*	288	321	375	457.5	529	578
C10*	14.5	14.5	15.5	15.5	13	13
B1 h8	6	10	12	14	16	18
H1	24.5	35	43	53.5	59	64

5. C1~C10 are the dimensions of metric standard motor connecting plate, please click 'Reducer Selection' to find out the correct dimensions.

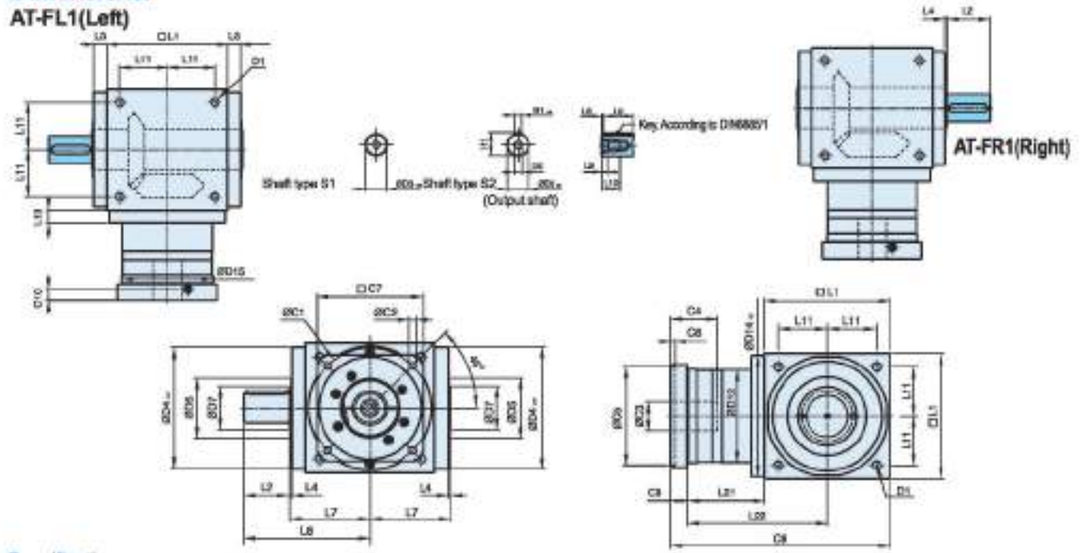
AT–FL1(Left) / AT–FR(Right) Series

Single Output Shaft Type

Size（1–stage, ratio i=1~5）

Dimensions:

AT-FL1(Left)



Specifications:

Unit: mm

Sizes	AT065 FL1/FR1	AT075 FL1/FR1	AT090 FL1/FR1	AT110 FL1/FR1	AT140 FL1/FR1	AT170 FL1/FR1	AT210 FL1/FR1	AT240 FL1/FR1	AT280 FL1/FR1
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D3 h8	13	16	18	22	32	40	50	55	60
D4 h7	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D6	M4	M5	M5	M8	M12	M16	M16	M16	M20
D7	21	22	28	33	47	55	75	85	110
D12	62	72	86	106	104	128	160	180	200
D14 h7	63	73	88	108	135	165	205	235	275
D15	62.9	72.9	87	107	106	127	158	178	198
L1	65	75	90	110	140	170	210	240	280
L2	19.5	30	35	40	50	60	75	85	110
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70	80	100
L6	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L7	47.5	54	62	72	87	102	127	147	167
L8	67	84	97	112	137	162	202	232	277
L9	4.5	4.8	4.8	7.2	10	12	12	12	15
L10	10	12.5	12.5	19	28	36	36	36	42
L11	27	30	36	44	55	67	85	95	110
L13	13	15	15	15	15	15	20	25	25
L21	49	60.5	63	69.5	85.5	95	130	144.5	135
L22	81.5	98	108	124.5	155.5	180	235	264.5	275
C1*	46	70	100	100	130	165	215	215	235
C2*	M4	M5	M6	M6	M8	M10	M12	M12	M12
C3*	★≤11 / ≤12	★≤14 / ≤15.875 / ≤16	≤19	≤24	≤32	≤38	≤42	≤48	≤55
C4*	30	34	40	40	50	60	85	85	116
C5*	30	50	80	80	110	130	180	180	200
C6*	3.5	6	4	4	5	6	6	6	6
C7*	42	60	90	90	115	142	190	190	220
C8*	19.5	19	17	17	19.5	22.5	29	29	63
C9*	133.5	154.5	170	196.5	245	287.5	369	413.5	478
C10*	13.25	13.5	10.75	10.75	13	15	20.75	20.75	53.5
B1 h8	5	5	6	6	10	12	14	16	18
H1	15	18	20.5	24.5	35	43	53.5	59	64

6. C1~C10 are the dimensions of metric standard motor connecting plate, please click 'Reducer Selection' to find out the correct dimensions.

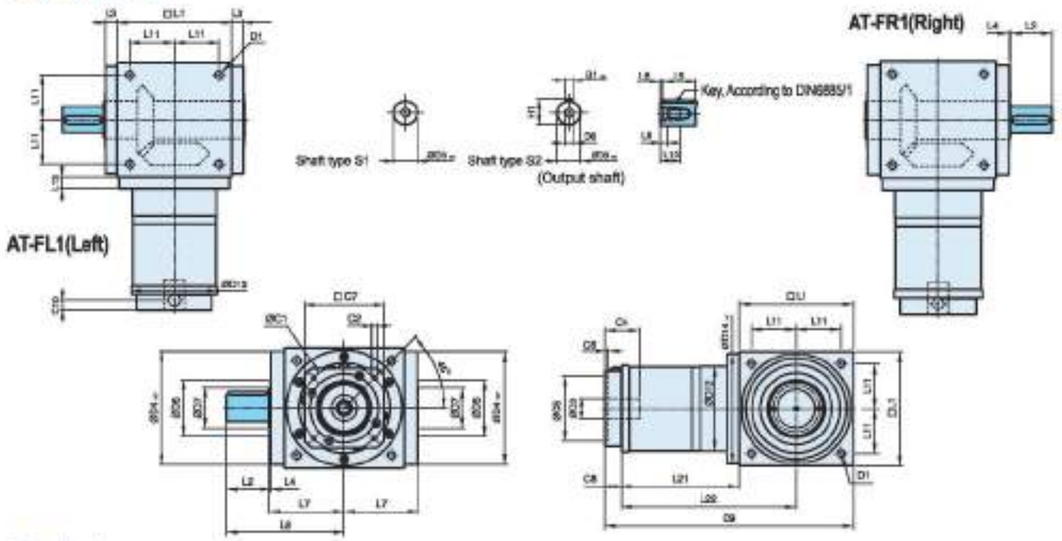
★AT065 FL1/FR1M1 Supplied C3 ≤12 option. ★AT075 FL1/FR1M1 Supplied C3 ≤16 option. ★AT075 FL1/FR1M2 Supplied C3 ≤15.875 option.

AT–FL1(Left) / AT–FR1(Right) Series

Single Output Shaft Type

Size (2–stage, ratio i=7~50)

Dimensions:



Specifications:

Unit: mm

Sizes	AT065 FL1/FR1	AT075 FL1/FR1	AT090 FL1/FR1	AT110 FL1/FR1	AT140 FL1/FR1	AT170 FL1/FR1	AT210 FL1/FR1	AT240 FL1/FR1	AT280 FL1/FR1
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D3 k6	13	16	19	22	32	40	50	55	60
D4 h7	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D6	M4	M5	M5	M8	M12	M16	M16	M16	M20
D7	21	22	28	33	47	55	75	85	110
D12	62	72	86	106	104	128	160	180	200
D14 h7	63	73	88	108	135	165	205	235	275
D15	62.9	72.9	87	107	106	127	158	178	198
L1	65	75	90	110	140	170	210	240	280
L2	18.5	30	35	40	50	60	75	85	110
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70	80	100
L6	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L7	47.5	54	62	72	87	102	127	147	167
L8	67	84	97	112	137	162	202	232	277
L9	4.5	4.8	4.8	7.2	10	12	12	12	15
L10	10	12.5	12.5	19	28	36	36	36	42
L11	27	30	36	44	55	67	85	95	110
L13	13	15	15	15	15	15	20	25	25
L21	75	84.5	99	122	144.5	157.5	206.5	239	248
L22	107.5	122	144	177	214.5	242.5	311.5	359	386
C1 7	46	46	70	100	100	100	130	165	165
C2 7	M4	M4	M5	M6	M6	M6	M8	M10	M10
C3 7	≤12	≤12	≤16	≤24	≤24	≤24	≤32	≤38	≤38
C4 7	30	30	34	40	40	40	50	60	60
C5 7	30	30	50	80	80	80	110	130	130
C6 7	3.5	3.5	8	4	4	4	5	6	6
C7 7	42	42	60	92	92	92	115	142	142
C8 7	21.5	21.5	21.5	20	20	20	24	31	31
C9 7	181.5	181	210.5	252	304.5	347.5	440.5	510	559
C10 7	14.55	14.5	15.5	13	13	13	16	21	21
B1 k6	5	5	6	6	10	12	14	16	18
H1	15	18	20.5	24.5	35	43	53.5	59	64

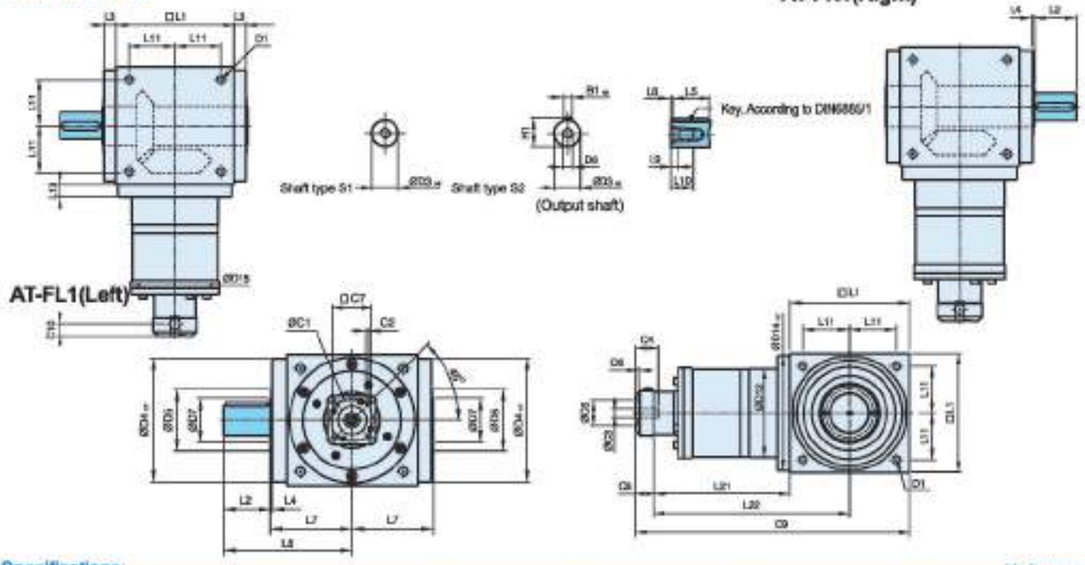
7, C1~C10 are the dimensions of metric standard motor connecting plate, please click 'Reducer Selection' to find out the correct dimensions.

AT–FL1(Left) / AT–FR1(Right) Series

Single Output Shaft Type

Size (3–stage, ratio i=75~500)

Dimensions:



Specifications:

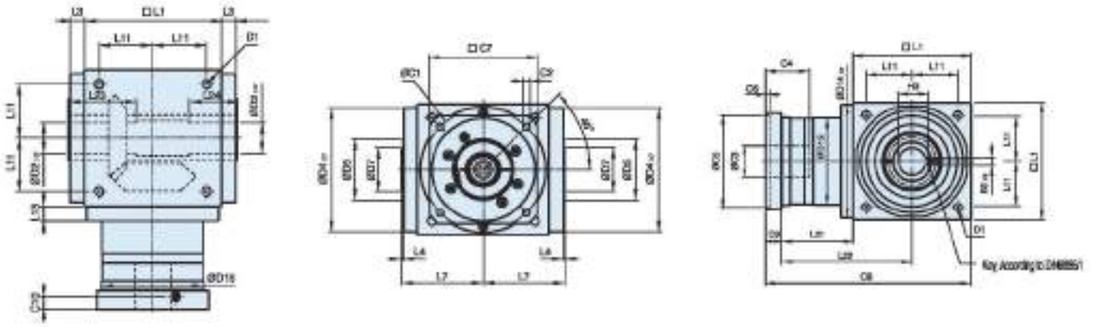
Unit: mm

Sizes	AT110 FL1/FR1	AT140 FL1/FR1	AT170 FL1/FR1	AT210 FL1/FR1	AT240 FL1/FR1	AT280 FL1/FR1
D1	M8	M10	M12	M16	M16	M16
D3 k6	22	32	40	50	55	60
D4 h7	108	135	165	205	235	275
D5	53	68	83	104	124	144
D6	M8	M12	M16	M16	M16	M20
D7	33	47	55	75	85	110
D12	106	104	128	160	180	200
D14 h7	108	135	165	205	235	275
D15	107	106	127	158	178	198
L1	110	140	170	210	240	280
L2	40	50	60	75	85	110
L3	15	15	15	20	25	25
L4	2	2	2	2	2	2
L5	32	45	50	70	80	100
L6	4	2.5	5	2.5	2.5	5
L7	72	87	102	127	147	167
L8	112	137	162	202	232	277
L9	7.2	10	12	12	12	15
L10	19	28	36	36	36	42
L11	44	55	67	85	95	110
L13	15	15	15	20	25	25
L21	136.5	159.5	183.5	226	269	278
L22	191.5	229.5	268.5	331	389	418
C1 8	46	46	70	70	100	100
C2 8	M4	M4	M5	M5	M6	M6
C3 8	≤12	≤12	≤16	≤16	≤24	≤24
C4 8	30	30	34	34	40	40
C5 8	30	30	50	50	80	80
C6 8	3.5	3.5	8	8	4	4
C7 8	42	42	60	60	92	92
C8 8	21.5	21.5	21.5	21.5	20	20
C9 8	268	321	375	457.5	529	578
C10 8	14.5	14.5	15.5	15.5	13	13
B1 k6	6	10	12	14	16	18
H1	24.5	35	43	53.5	59	64

8 C1~C10 are the dimensions of metric standard motor connecting plate, please click 'Reducer Selection' to find out the correct dimensions.

AT–FH Series
Hole Output Type
Size（1–stage, ratio i=1~5）

Dimensions:



Specifications:

Unit: mm

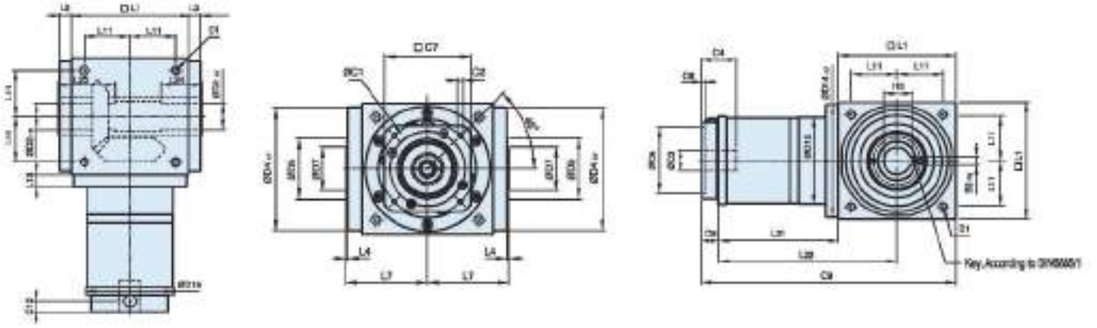
Sizes	AT065FH	AT075FH	AT090FH	AT110FH	AT140FH	AT170FH	AT210FH	AT240FH	AT280FH
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D2 H7	13	14	18	22	32	40	50	55	60
D4 h7	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D7	21	22	28	33	47	55	75	85	110
D12	62	72	86	106	104	128	160	180	200
D14 N7	63	73	88	108	135	165	205	235	275
D15	62.9	72.9	87	107	105	127	158	178	198
L1	65	75	90	110	140	170	210	240	280
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L7	47.5	54	62	72	87	102	127	147	167
L11	27	30	36	44	55	67	85	95	110
L13	13	15	15	15	15	15	20	25	25
L21	49	60.5	63	69.5	85.5	95	130	144.5	135
L22	81.5	96	108	124.5	155.5	180	235	264.5	275
L23	40	47	52	53	70	80	95	115	115
L24	30	32	35	35	50	55	65	80	80
C1[9]	46	70	100	100	130	165	215	215	235
C2[9]	M4	M5	M6	M6	M8	M10	M12	M12	M12
C3[9]	▲≤11 / ≤12	▲≤14 / ≤15 875 / ≤16	≤19	≤24	≤32	≤38	≤42	≤48	≤55
C4[9]	30	34	40	40	50	60	85	85	116
C5[9]	30	50	80	80	110	130	180	180	200
C6[9]	3.5	6	4	4	5	6	6	6	6
C7[9]	42	60	90	90	115	142	190	190	220
C8[9]	19.5	19	17	17	19.5	22.5	29	29	63
C9[9]	133.5	154.5	170	196.5	245	287.5	369	413.5	478
C10[9]	13.25	13.5	10.75	10.75	13	15	20.75	20.75	53.5
B3 P9	5	5	6	6	10	12	14	16	18
H3	15.3	16.3	20.8	24.8	35.3	43.3	53.8	59.3	64.4

9. C1~C10 are the dimensions of metric standard motor connecting plate, please click 'Reducer Selection' to find out the correct dimensions.

▲ AT065 FHM1 Supplied C3 ≤12 option ▲ AT075 FHM1 Supplied C3 ≤16 option ▲ AT075 FHM2 Supplied C3 ≤15 875 option

AT–FH Series
Hole Output Type
Size（2–stage, ratio i=7~50）

Dimensions:



Specifications:

Unit: mm

Sizes	AT065FH	AT075FH	AT090FH	AT110FH	AT140FH	AT170FH	AT210FH	AT240FH	AT280FH
D1	M4	M6	M6	M6	M10	M12	M16	M16	M16
D2 H7	13	14	18	22	32	40	50	55	60
D4 h7	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D7	21	22	28	33	47	55	75	85	110
D12	62	72	86	106	104	128	160	180	200
D14 N7	63	73	88	108	135	165	205	235	275
D15	62.9	72.9	87	107	106	127	158	178	198
L1	65	75	90	110	140	170	210	240	280
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L7	47.5	54	62	72	87	102	127	147	167
L11	27	30	36	44	55	67	85	95	110
L13	13	15	15	15	15	15	20	25	25
L21	75	84.5	99	122	144.5	157.5	206.5	239	248
L22	107.5	122	144	177	214.5	242.5	311.5	359	388
L23	40	47	52	53	70	80	95	115	115
L24	30	32	35	35	50	55	65	80	80
C1[10]	46	46	70	100	100	100	130	165	165
C2[10]	M4	M4	M5	M6	M6	M6	M8	M10	M10
C3[10]	≤12	≤12	≤16	≤24	≤24	≤24	≤32	≤38	≤38
C4[10]	30	30	34	40	40	40	50	60	60
C5[10]	30	30	50	80	80	80	110	130	130
C6[10]	3.5	3.5	8	4	4	4	5	6	6
C7[10]	42	42	60	92	92	92	115	142	142
C8[10]	21.5	21.5	21.5	20	20	20	24	31	31
C9[10]	161.5	181	210.5	252	304.5	347.5	440.5	510	559
C10[10]	14.5	14.5	15.5	13	13	13	16	21	21
B3 P9	5	5	6	6	10	12	14	16	18
H3	15.3	16.3	20.8	24.8	35.3	43.3	53.8	59.3	64.4

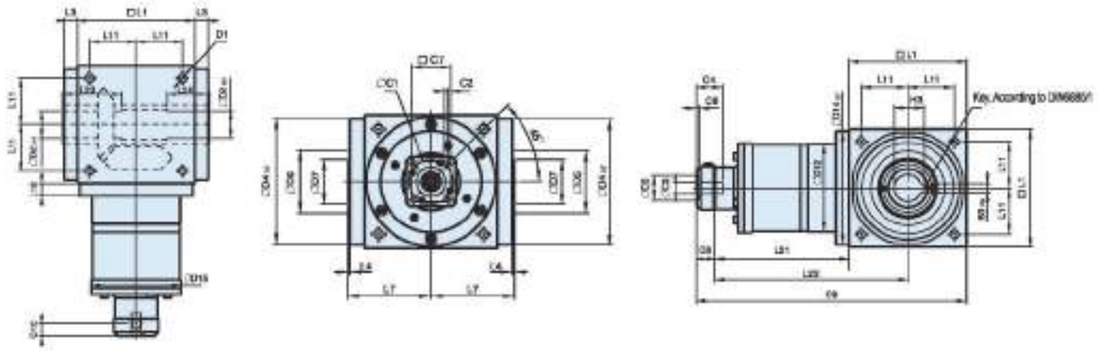
10. C1~C10 are the dimensions of metric standard motor connecting plate, please click 'Reducer Selection' to find out the correct dimensions.

AT–FH Series

Hole Output Type

Size（3–stage, ratio i=75~500）

Dimensions:



Specifications:

Unit: mm

尺寸 Sizes	AT110FH	AT140FH	AT170FH	AT210FH	AT240FH	AT280FH
D1	M8	M10	M12	M16	M16	M16
D2 H7	22	32	40	50	55	60
D4 h7	108	135	165	205	235	275
D5	53	68	83	104	124	144
D7	33	47	55	75	85	110
D12	106	104	126	160	180	200
D14 h7	108	135	165	205	235	275
D15	107	106	127	158	178	198
L1	110	140	170	210	240	280
L3	15	15	15	20	25	25
L4	2	2	2	2	2	2
L7	72	87	102	127	147	167
L11	44	55	67	85	95	110
L13	15	15	15	20	25	25
L21	136.5	159.5	183.5	226	269	278
L22	191.5	229.5	268.5	331	389	418
L23	53	70	80	95	115	115
L24	35	50	55	65	80	80
C1 [11]	46	46	70	70	100	100
C2 [11]	M4	M4	M5	M5	M6	M6
C3 [11]	≤12	≤12	≤16	≤16	≤24	≤24
C4 [11]	30	30	34	34	40	40
C5 [11]	30	30	50	50	80	80
C6 [11]	3.5	3.5	8	8	4	4
C7 [11]	42	42	60	60	92	92
C8 [11]	21.5	21.5	21.5	21.5	20	20
C9 [11]	268	321	375	457.5	529	578
C10 [11]	14.5	14.5	15.5	15.5	13	13
B3 h9	6	10	12	14	16	18
H3	24.8	35.3	43.3	53.8	59.3	64.4

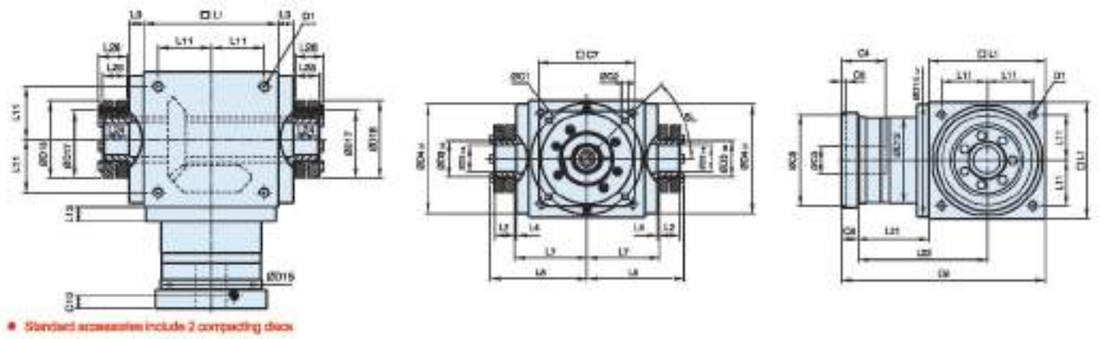
11. C1~C10 are the dimensions of metric standard motor connecting plate, please click 'Reducer Selection' to find out the correct dimensions.

AT–FC Series

Hole Output Hoop Type

Size（1–stage, ratio i=1~5）

Dimensions:



● Standard accessories include 2 compacting discs

Specifications:

Unit: mm

尺寸 Sizes	AT065FC	AT075FC	AT090FC	AT110FC	AT140FC	AT170FC	AT210FC	AT240FC	AT280FC
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D2 H8	13	14	18	22	32	40	50	55	60
D3 e8	16	16	22	25	44	50	62	68	75
D4 h7	63	73	88	108	135	165	205	235	275
D12	62	72	86	106	104	126	160	180	200
D14 h7	63	73	88	108	135	165	205	235	275
D15	62.9	72.9	87	107	105	130	158	178	198
D17	26	26	36	38	61	70	86	86	100
D18	41	41	50	50	80	90	110	115	138
L1	65	75	90	110	140	170	210	240	280
L2	14	14	18	18	24	26	29	29	30.5
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L7	47.5	54	62	72	87	102	127	147	167
L8	66	72.5	85	95	116.5	113.5	161.5	181.5	205
L11	27	30	36	44	55	67	85	95	110
L13	13	15	15	15	15	15	20	25	25
L21	49	60.5	63	69.5	85.5	95	130	144.5	135
L22	81.5	98	108	124.5	155.5	180	235	264.5	275
L23	15	15	20	20	26	28	31	31	32.5
L24	15	15	20	20	26	28	31	31	32.5
L25	15	15	19.5	19.5	25.5	27.5	30.5	30.5	32.5
L26	18.5	18.5	23	23	29.5	31.5	34.5	34.5	38
C1 [12]	46	70	100	100	130	165	215	215	235
C2 [12]	M4	M5	M6	M6	M8	M10	M12	M12	M12
C3 [12]	★≤11 / ≤12	★≤14 / ≤15.875 / ≤16	≤19	≤24	≤32	≤38	≤42	≤48	≤55
C4 [12]	30	34	40	40	50	60	85	85	116
C5 [12]	30	50	80	80	110	130	160	180	200
C6 [12]	3.5	8	4	4	5	6	6	6	6
C7 [12]	42	60	90	90	115	142	190	190	220
C8 [12]	19.5	19	17	17	19.5	22.5	29	29	63
C9 [12]	133.5	154.5	170	196.5	245	287.5	369	413.5	478
C10 [12]	13.25	13.5	10.75	10.75	13	15	20.75	20.75	53.5

12. C1~C10 are the dimensions of metric standard motor connecting plate, please click 'Reducer Selection' to find out the correct dimensions.

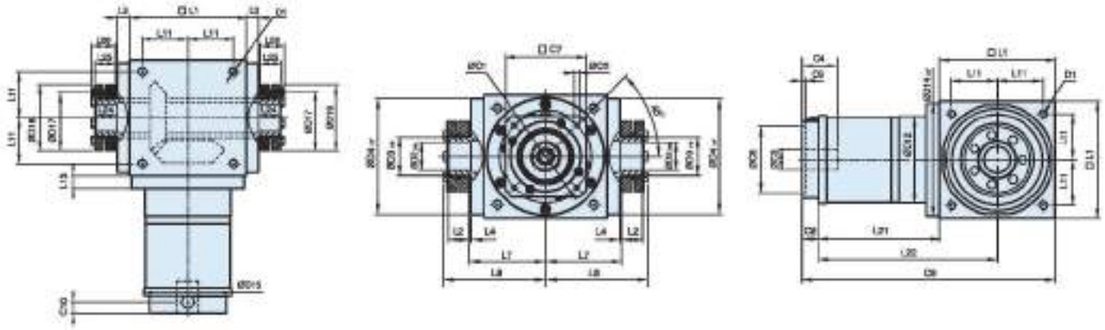
★AT065 FCM1 Supplied C3 ≤12 option. ★AT075 FCM1 Supplied C3 ≤16 option. ★AT075 FCM2 Supplied C3 ≤15.875 option.

AT-FC Series

Hole Output Hoop Type

Size（2-stage, ratio i=7~50）

Dimensions:



* Standard accessories include 2 compacting discs

Specifications:

Unit: mm

Sizes	AT065FC	AT075FC	AT090FC	AT110FC	AT140FC	AT170FC	AT210FC	AT240FC	AT280FC
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D2 H8	13	14	18	22	32	40	50	55	60
D3 h8	16	16	22	25	44	50	62	68	75
D4 h7	63	73	88	108	135	165	205	235	275
D12	62	72	86	106	104	128	160	180	200
D14 h7	63	73	88	108	135	165	205	235	275
D15	62.9	72.9	87	107	106	127	158	178	198
D17	26	26	36	38	61	70	86	86	100
D18	41	41	50	50	80	90	110	115	138
L1	65	75	90	110	140	170	210	240	280
L2	14	14	18	18	24	26	29	29	30.5
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L7	47.5	54	62	72	87	102	127	147	167
L8	66	72.5	85	95	116.5	133.5	161.5	181.5	205
L11	27	30	36	44	55	67	85	95	110
L13	13	15	15	15	15	15	20	25	25
L21	75	84.5	99	122	144.5	157.5	206.5	239	248
L22	107.5	122	144	177	214.5	242.5	311.5	359	388
L23	15	15	20	20	26	28	31	31	32.5
L24	15	15	20	20	26	28	31	31	32.5
L25	15	15	19.5	19.5	25.5	27.5	30.5	30.5	32.5
L26	18.5	18.5	23	23	29.5	31.5	34.5	34.5	38
C1[13]	46	46	70	100	100	100	130	165	165
C2[13]	M4	M4	M5	M6	M6	M6	M8	M10	M10
C3[13]	≤12	≤12	≤16	≤24	≤24	≤24	≤32	≤38	≤38
C4[13]	30	30	34	40	40	40	50	60	60
C5[13]	30	30	50	80	80	80	110	130	130
C6[13]	3.5	3.5	8	4	4	4	5	8	8
C7[13]	42	42	60	92	92	92	115	142	142
C8[13]	21.5	21.5	21.5	20	20	20	24	31	31
C9[13]	161.5	181	210.5	262	304.5	347.5	446.5	510	559
C10[13]	14.5	14.5	15.5	13	13	13	16	21	21

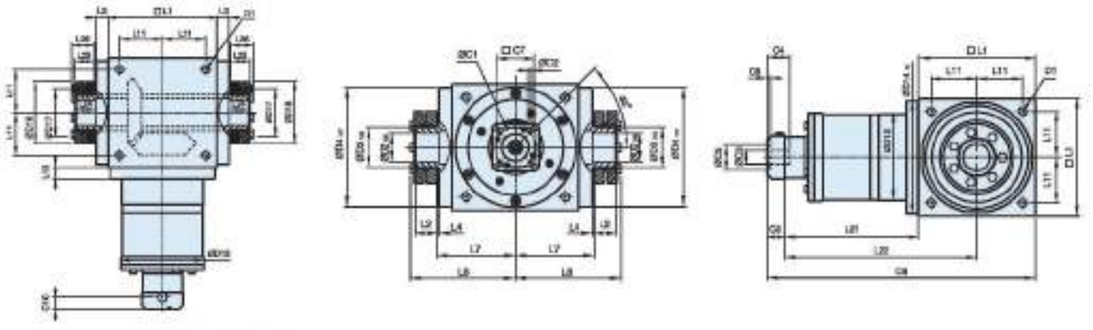
13. C1~C10 are the dimensions of metric standard motor connecting plate, please click 'Reducer Selection' to find out the correct dimensions.

AT-FC Series

Hole Output Hoop Type

Size（3-stage, ratio i=75~500）

Dimensions:



* Standard accessories include 2 compacting discs

Specifications:

Unit: mm

Sizes	AT110FC	AT140FC	AT170FC	AT210FC	AT240FC	AT280FC
D1	M8	M10	M12	M16	M16	M16
D2 H8	22	32	40	50	55	60
D3 h8	25	44	50	62	68	75
D4 h7	108	135	165	205	235	275
D12	106	104	128	160	180	200
D14 h7	108	135	165	205	235	275
D15	107	106	127	158	178	198
D17	38	61	70	86	86	100
D18	50	80	90	110	115	138
L1	110	140	170	210	240	280
L2	18	24	26	29	29	30.5
L3	15	15	15	20	25	25
L4	2	2	2	2	2	2
L7	72	87	102	127	147	167
L8	95	116.5	133.5	161.5	181.5	205
L11	44	55	67	85	95	110
L13	15	15	15	20	25	25
L21	136.5	159.5	183.5	226	269	278
L22	191.5	229.5	268.5	331	389	418
L23	20	26	28	31	31	32.5
L24	20	26	28	31	31	32.5
L25	19.5	25.5	27.5	30.5	30.5	32.5
L26	23	29.5	31.5	34.5	34.5	38
C1[14]	46	46	70	70	100	100
C2[14]	M4	M4	M5	M5	M6	M6
C3[14]	≤12	≤12	≤16	≤16	≤24	≤24
C4[14]	30	30	34	34	40	40
C5[14]	30	30	50	50	80	80
C6[14]	3.5	3.5	8	8	4	4
C7[14]	42	42	60	60	92	92
C8[14]	21.5	21.5	21.5	21.5	20	20
C9[14]	268	321	375	457.5	529	578
C10[14]	14.5	14.5	15.5	15.5	13	13

14. C1~C10 are the dimensions of metric standard motor connecting plate, please click 'Reducer Selection' to find out the correct dimensions.

AAW-AS

Precision input belt planetary right-angle reducer

Reduction ratio(1/6 ~ /300)

AAW135AS – L2 – 50 – RF – B1 – d – B – C – G

Gear Ratio
Ratio selected by reference to performance table

Number of gear ratio segments
L1 Ratio=1/6 ~ 1/50
L2 Ratio=1/24 ~ 1/250

Model
AAW045AS / AAW070AS
AAW080AS / AAW110AS
AAW135AS / AAW135BS
AAW165AS / AAW165BS
AAW200AS / AAW200BS
AAW250AS

Backlash Grade :
No Marks: stands for standard backlash
L1≦6arcmin L2≦9arcmin
Precision Backlash B1
L1≦3arcmin L2≦5arcmin
Precision Backlash B2
L1≦5arcmin L2≦8arcmin

Input Flange Shaft Diameter(φd)
Shown in Figure 1

Introduction to Input France(φB)
Shown in Figure 1

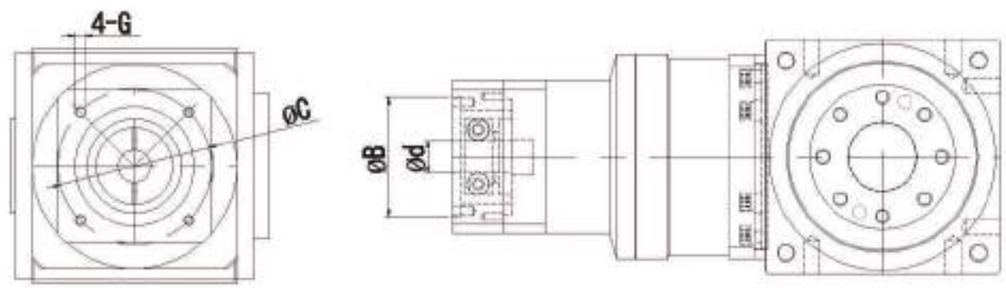
Threaded holes for input flanges(G)
Shown in Figure 1

Output shaft type

CR:Hollow shaft with keyway
HP: Single hollow shaft without key (Expansion sleeve)
HP-K: Single hollow shaft with keyway (Expanding sleeve)
2HP: Double hollow shaft without key (Expansion sleeve)
2HP-K: Double hollow shaft with keyway (Expansion sleeve)
P: Single solid shaft with keyway.
2P: Double solid shaft with keyway.
RF: Hollow shaft rotary flange
RF-K: Hollow shaft rotary flange with keyway
P.S: RXIW045AS (P/2P only)

Input Flange Thread Pitch PVC(φC)
Shown in Figure 1

Input Flange Size:



* Figure 1

Performance meter: AAW-AS

Precision input belt planetary right-angle reducer

Reduction ratio(1/6 ~ /300)

	Paragraph	Reduction Ratio	AAW045AS	AAW070AS	AAW080AS	AAW110AS	AAW135AS	AAW135BS	AAW165AS	AAW165BS	AAW200AS	AAW200BS	AAW250AS
Allowable rated output torque (Nm)	1-paragraph ratio (L1)	6	9.5	30	78.5	230	350	320	750	600	1500	1200	2150
		8, 10, 12	9.5	30	78.5	230	350	320	750	600	1500	1200	2150
		14, 16, 20	9.5	30	78.5	230	350	240	750	560	1500	1000	2150
		20, 30 40, 50	9.5	24.5	49.0	123	208	208	490	460	800	900	2150
	2-paragraph ratio (L2)	24, 30, 40, 50 60, 80, 100 140, 160, 200			70	170	350	170	750	400	1500	900	2150
		30, 32, 40, 50			78.5	230	350	320	750	660	1500	1200	2150
		60, 70, 80			78.5	230	350	260	750	560	1500	1000	2150
		120, 140, 160, 200			78.5	230	350	240	750	600	1500	1050	2150
		40, 60, 80 100, 120, 140 160, 200			49.0	123	208	208	490	460	800	900	1500
Maximum acceleration torque(Nm)	L1, L2	6~250	1.5 Times of Nominal Output Torque(Nm)										
Instantaneous output torque (Nm) (Allow a short time of 3 seconds)	L1, L2	6~250	3 Times of Nominal Output Torque(Nm)										
Input speed(rpm)	L1, L2	6~250	3000	3000	3000	3000	3000	3000	3000	3000	2000	3000	2000
Maximum input speed(rpm)	L1, L2	6~250	4500	4500	4500	3000	3000	3000	3000	3000	2000	3000	2000
Standard backlash (arc-min)	L1	6~50	≦10	≦6	≦6	≦6	≦6	≦6	≦6	≦6	≦6	≦6	≦6
	L2	24~250		≦9	≦9	≦9	≦9	≦9	≦9	≦9	≦9	≦9	≦9
Precision backlash B2(arc-min)	L1	6~50	≦8	≦5	≦5	≦5	≦5	≦5	≦5	≦5	≦5	≦5	≦5
	L2	24~250		≦8	≦8	≦8	≦8	≦8	≦8	≦8	≦8	≦8	≦8
Precision backlash B1(arc-min)	L1	6~50		≦3	≦3	≦3	≦3	≦3	≦3	≦3	≦3	≦3	≦3
	L2	24~250		≦5	≦5	≦5	≦5	≦5	≦5	≦5	≦5	≦5	≦5
Allowable radial load(N)	L1, L2	6~250	1100	2800	3900	5500	9800	9800	16500	16500	24100	24100	45000
Allowable axial load(N)	L1, L2	6~250	650	2800	3900	5500	9800	9800	16500	16500	24100	24100	45000
Efficiency(%)	L1	6~50	90%										
	L2	24~250	85%										
Weight(kg)	L1	6~50	1.8	3.5	5.5	11.0	21.0	17.0	41.0	29.0	55.3	42.5	175.0
	L2	24~250		5.0	6.0	13.0	24.5	19.0	36.5	33.0	65.5	47.5	205.0
Operating temperature	L1, L2	6~250	-10°C~+70°C										
Lubricating oil	L1, L2	6~250	Synthetic Grease										
Installation Orientation	L1, L2	6~250	Any Direction										
Noise level(db) /2000(rpm)	L1, L2	6~250	≦62	≦68	≦68	≦70	≦72	≦72	≦73	≦73	≦76	≦76	≦76

(1) Noise level measurement (decibel meter 1M away from the gearbox, input speed 2000RPM): (Input speed above 2000RPM will increase the noise level.)
(2) Measurement of backlash value (force distance measurement at 2% of rated revolution).
(3) Continuous use (12 hours/day) reduces life by 1/2 (according to P3 selection). p.s: special order: gear ratio 1/300~1/1000

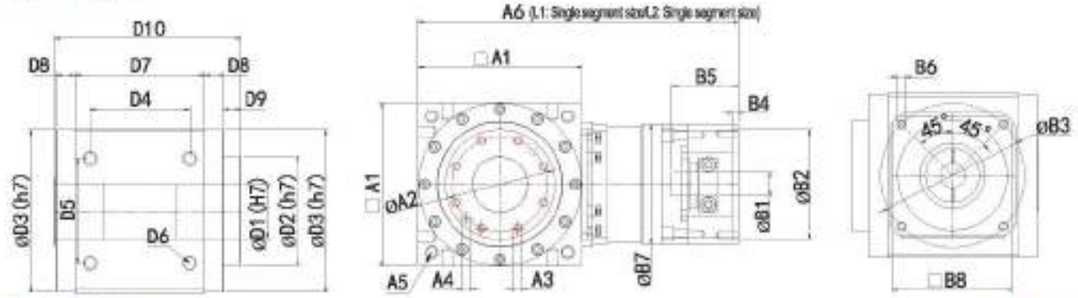
Rotary Inertia of Reducer

Paragraph	Unit of inertia	Gear ratio	AAW045AS	AAW070AS	AAW080AS	AAW110AS	AAW135AS	AAW135BS	AAW165AS	AAW165BS	AAW200AS	AAW200BS	AAW250AS
1-paragraph ratio (L1)	(kg-cm²)	6, 15	0.042	0.56	0.56	3.92	6.28	3.92	14.83	6.28	33.21	14.83	33.21
		8, 10, 12	0.032		0.47	3.75	5.64	3.75	11.85	5.64	29.25	11.85	29.25
		14, 16, 18, 20	0.027	0.43	0.43	3.70	5.12	3.70	10.25	5.12	25.16	10.25	25.16
		25, 30, 35, 40, 50		0.4	0.4	3.65	5.06	3.65	9.66	5.06	24.02	9.66	24.02
2-paragraph ratio (L2)	(kg-cm²)	24, 30, 75			0.56	3.92	6.28	3.92	14.83	6.28	33.21	14.83	33.21
		32, 40, 50, 60, 175			0.47	3.75	5.64	3.75	11.85	5.64	29.25	11.85	29.25
		56, 70, 80 100, 125, 250			0.43	3.70	5.12	3.70	10.25	5.12	25.16	10.25	25.16
		120, 140, 160 180, 200			0.4	3.65	5.06	3.65	9.66	5.06	24.02	9.66	24.02

AAW–RF Hollow rotating disc type

Reduction ratio(1/6 ~ /300) Precision input belt planetary right-angle reducer

Dimensions:



Specifications: unit: mm

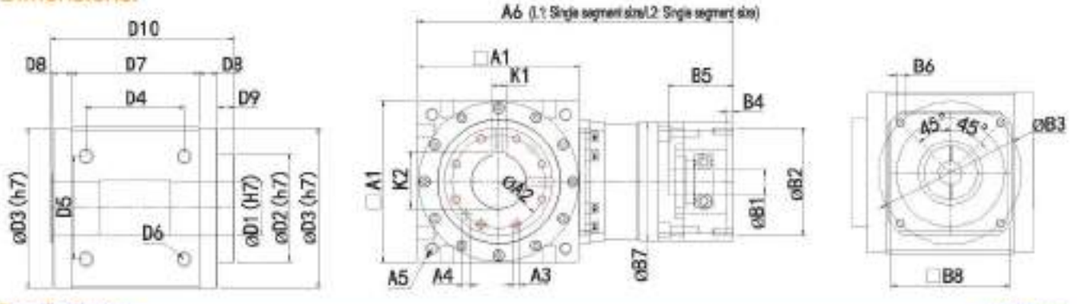
Specifications	AAW045AS	AAW070AS	AAW090AS	AAW110AS	AAW135AS	AAW135BS	AAW165AS	AAW165BS	AAW200AS	AAW200BS	AAW250AS
D1	9	16	*16/20	*25/30	*35/40	*35/40	*50/55	*50/55	*65/80	*65/80	75
D2	20	38	45	65	85	85	110	110	140	140	140
D3	43. 2	60	78	106	133	133	163	163	195	195	245
D4	36	41. 43	49. 5	68	86	86	106	106	141	141	176. 78
D5	26	41. 43	49. 5	65	83	83	105	105	130	130	176. 78
D6	4-M4*P0. 7	4-M5*P0. 8	4-M6*P0. 8	4-M8*P1. 25	4-M10*P1. 5	4-M10*P1. 5	4-M14*P2. 0	4-M14*P2. 0	4-M14*P2. 0	4-M14*P2. 0	4-M20*P2. 5
D7	54	70	67	90	120	120	142	142	182	182	227
D8	10. 5	6. 25	13	15	10	10	13	13	8. 5	8. 5	21
D9	3. 5	8. 25	7	9. 5	9. 5	9. 5	17	17	22	22	15
D10	80	92. 25	102	131. 5	151. 5	151. 5	187	187	223	223	284
A1	46	70	80	110	138	138	168	168	200	200	250
A2	15. 5	30	36	50	70	70	95	95	124	124	124
A3	6-M3*P0. 5	6-M5*P0. 8	8-M5*P0. 8	8-M5*P0. 8	8-M8*P1. 25	8-M8*P1. 25	8-M8*P1. 25	8-M8*P1. 25	12-M8*P1. 25	12-M8*P1. 25	12-M10*P1. 5
A4 (H7)		2-φ5	2-φ5	2-φ5	2-φ8	2-φ8	2-φ8	2-φ8	2-φ8	2-φ8	2-φ10
A5	P. C. D φ 53 4-M5*P0. 8	P. C. D φ 75 4-M5*P0. 8	P. C. D φ 93 4-M6*P1. 0	P. C. D φ 130 4-M8*P1. 25	P. C. D φ 160 4-M10*P1. 5	P. C. D φ 160 4-M10*P1. 5	P. C. D φ 193 4-M12*P1. 75	P. C. D φ 193 4-M12*P1. 75	P. C. D φ 240 4-M16*P2. 0	P. C. D φ 240 4-M16*P2. 0	P. C. D φ 300 4-M30*P2. 5
A3(L1: Single segment size)	121	159	170	227	290	251	344	312	425	378	467
A3(L2: Single segment size)			192	254	321	289	391	343	476	425	520
B1	5, 6, 35, 8	6. 35, 8, 9 11, 14	6. 35, 8, 9 11, 14, 16, 19	11, 14, 16 19, 22, 24	14, 16, 19 22, 24, 28 32, 35	11, 14, 16 19, 22, 24	19, 22, 24 28, 32, 35 38, 42	14, 16, 19 22, 24, 28 32, 35	22, 24, 28 32, 35, 38 42, 55	19, 22, 24 28, 32, 35 38, 42	32, 35, 38 42, 55
B2	22, 30, 38. 1	30, 38. 1 40, 50, 60	30, 36, 38. 1 40, 50 60, 70	50, 60, 70 80, 95, 110	70, 80, 95 110, 114. 3 130	50, 60, 70 80, 95, 110	95, 110 114. 3, 130 180	70, 80, 95 110, 114. 3 130	110, 114. 3 130, 165 180, 200	95, 110 114. 3, 130 180	110, 114. 3 130, 165 180, 200
B3	43. 8, 45, 46 66. 7, 70. 7	45, 46, 66. 7 70, 70. 7, 75	45, 46, 66. 7 70, 70. 7 75, 90	70, 75, 90 100, 115 130, 145	90, 115, 130 145, 165 200	70, 75, 90 100, 115 130, 145	115, 130 145, 165 200, 215	90, 115, 130 145, 165 200	130, 145 165, 200 215, 235 250	115, 130 145, 165 200, 215	165, 200 215, 235 250
B4	3	4	4, 5	5, 7	7	5, 7	7	7	10	7	10
B5	≦28	≦31	≦41	≦62	≦80	≦62	≦86	≦80	≦117	≦86	≦125
B6	M3, M4	M3, M4 M5	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M4, M5 M6, M8	M6, M8 M10, M12	M6, M8 M10, M12	M8, M10 M12	M6, M8 M10, M12	M10, M12 M14, M16 M20
B7	46	60	60	90	120	90	142	120	182	142	200
B8	46	62, 80	62, 80, 90	90, 115, 120	120, 140, 180	90, 115, 120	142, 180, 200	120, 140, 180	182, 200, 220	142, 180, 200	200, 220, 250

1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AAW–RF-K Hollow rotating disc with keyway type

Reduction ratio(1/6 ~ /300) Precision input belt planetary right-angle reducer

Dimensions:



Specifications: unit: mm

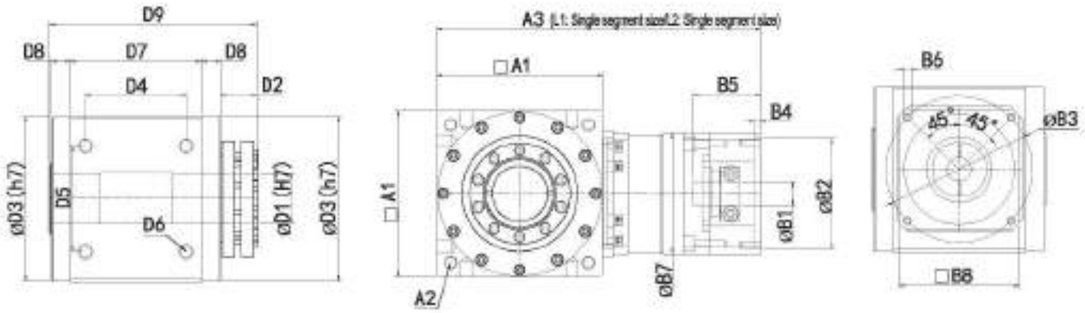
Specifications	AAW045AS	AAW070AS	AAW090AS	AAW110AS	AAW135AS	AAW135BS	AAW165AS	AAW165BS	AAW200AS	AAW200BS	AAW250AS
D1		16	*16/20	*25/30	*35/40	*35/40	*50/55	*50/55	*65/80	*65/80	75
D2		38	45	65	85	85	110	110	140	140	140
D3		60	78	106	133	133	163	163	195	195	245
D4		41. 43	49. 5	68	86	86	106	106	141	141	176. 78
D5		41. 43	49. 5	65	83	83	105	105	130	130	176. 78
D6		4-M5*P0. 8	4-M6*P0. 8	4-M8*P1. 25	4-M10*P1. 5	4-M10*P1. 5	4-M14*P2. 0	4-M14*P2. 0	4-M14*P2. 0	4-M14*P2. 0	4-M20*P2. 5
D7		70	67	90	120	120	142	142	182	182	227
D8		6. 25	13	15	10	10	13	13	8. 5	8. 5	21
D9		8. 25	7	9. 5	9. 5	9. 5	17	17	22	22	15
D10		92. 25	102	131. 5	151. 5	151. 5	187	187	223	223	284
A1		70	80	110	138	138	168	168	200	200	250
A2		30	36	50	70	70	95	95	124	124	124
A3		6-M5*P0. 8	8-M5*P0. 8	8-M5*P0. 8	8-M8*P1. 25	8-M8*P1. 25	8-M8*P1. 25	8-M8*P1. 25	12-M8*P1. 25	12-M8*P1. 25	12-M10*P1. 5
A4 (H7)		2-φ5	2-φ5	2-φ5	2-φ8	2-φ8	2-φ8	2-φ8	2-φ8	2-φ8	2-φ10
A5		P. C. D φ 75 4-M5*P0. 8	P. C. D φ 93 4-M6*P1. 0	P. C. D φ 130 4-M8*P1. 25	P. C. D φ 160 4-M10*P1. 5	P. C. D φ 160 4-M10*P1. 5	P. C. D φ 193 4-M12*P1. 75	P. C. D φ 193 4-M12*P1. 75	P. C. D φ 240 4-M16*P2. 0	P. C. D φ 240 4-M16*P2. 0	P. C. D φ 300 4-M30*P2. 5
A3(L1: Single segment size)		159	170	227	290	251	344	312	425	378	467
A3(L2: Single segment size)			192	254	321	289	391	343	476	425	520
K1		5	6	8	*10/12	*10/12	14	14	18	18	20
K2		18. 3	22. 8	*28. 3/33. 3	*38. 3/43. 3	*38. 3/43. 3	*53. 8/58. 8	*53. 8/58. 8	69. 4	69. 4	84. 9
B1		6. 35, 8, 9 11, 14	6. 35, 8, 9 11, 14, 16, 19	11, 14, 16 19, 22, 24	14, 16, 19 22, 24, 28 32, 35	11, 14, 16 19, 22, 24	19, 22, 24 28, 32, 35 38, 42	14, 16, 19 22, 24, 28 32, 35	22, 24, 28 32, 35, 38 42, 55	19, 22, 24 28, 32, 35 38, 42	32, 35, 38 42, 55
B2		30, 38. 1 40, 50, 60	30, 36, 38. 1 40, 50 60, 70	50, 60, 70 80, 95, 110	70, 80, 95 110, 114. 3 130	50, 60, 70 80, 95, 110	95, 110 114. 3, 130 180	70, 80, 95 110, 114. 3 130	110, 114. 3 130, 165 180, 200	95, 110 114. 3, 130 180	110, 114. 3 130, 165 180, 200
B3		45, 46, 66. 7 70, 70. 7, 75	45, 46, 66. 7 70, 70. 7 75, 90	70, 75, 90 100, 115 130, 145	90, 115, 130 145, 165 200	70, 75, 90 100, 115 130, 145	115, 130 145, 165 200, 215	90, 115, 130 145, 165 200	130, 145 165, 200 215, 235	115, 130 145, 165 200, 215	165, 200 215, 235 250
B4		4	4, 5	5, 7	7	5, 7	7	7	10	7	10
B5		≦31	≦41	≦62	≦80	≦62	≦86	≦80	≦117	≦86	≦125
B6		M3, M4 M5	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M4, M5 M6, M8	M6, M8 M10, M12	M6, M8 M10, M12	M8, M10 M12	M6, M8 M10, M12	M10, M12 M14, M16 M20
B7		60	60	90	120	90	142	120	182	142	200
B8		62, 80	62, 80, 90	90, 115, 120	120, 140, 180	90, 115, 120	142, 180, 200	120, 140, 180	182, 200, 220	142, 180, 200	200, 220, 250

1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AAW–HP Hollow shaft expansion sleeve type

Reduction ratio(1/6 ~ /300) Precision input belt planetary right-angle reducer

Dimensions:



Specifications: unit: mm

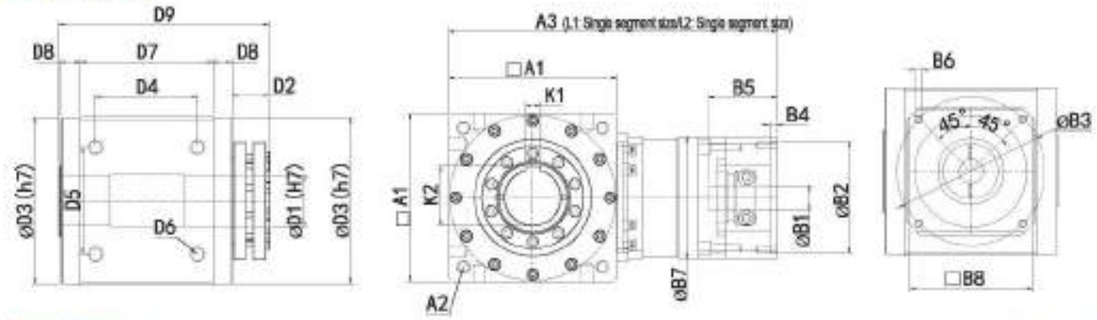
Specifications	AAW045AS	AAW070AS	AAW080AS	AAW110AS	AAW135AS	AAW135BS	AAW165AS	AAW165BS	AAW200AS	AAW200BS	AAW250AS
D1		16	20	*25/30	*35/40	*35/40	*50/55	*50/55	65	65	80
D2		22	23. 25	32	36	36	36	36	36. 5	36. 5	52
D3		60	78	106	133	133	163	163	195	195	245
D4		41. 43	49. 5	68	86	86	106	106	141	141	176. 78
D5		41. 43	49. 5	65	83	83	105	105	130	130	176. 78
D6		4-M5*P0. 8	4-M6*P0. 8	4-M8*P1. 25	4-M10*P1. 5	4-M10*P1. 5	4-M14*P2. 0	4-M14*P2. 0	4-M14*P2. 0	4-M14*P2. 0	4-M20*P2. 5
D7		70	67	90	120	120	142	142	182	182	227
D8		6. 25	13	15	10	10	13	13	8. 5	8. 5	21
D9		104. 5	116. 25	152	176	176	204	204	235. 5	235. 5	325
A1		70	80	110	138	138	168	168	200	200	250
A2		P. C. D φ 75 4-M5*P0. 8	P. C. D φ 93 4-M6*P1. 0	P. C. D φ 130 4-M8*P1. 25	P. C. D φ 160 4-M10*P1. 5	P. C. D φ 160 4-M10*P1. 5	P. C. D φ 192 4-M12*P1. 75	P. C. D φ 193 4-M12*P1. 75	P. C. D φ 240 4-M16*P2. 0	P. C. D φ 240 4-M16*P2. 0	P. C. D φ 300 4-M30*P2. 5
A3(L1: Single segment size)		159	170	227	290	251	344	312	425	378	467
A3(L2: Single segment size)			192	254	321	289	391	343	476	425	520
B1		6. 35, 8, 9 11, 14	6. 35, 8, 9 11, 14, 16, 19	11, 14, 16 19, 22, 24	14, 16, 19 22, 24, 28 32, 35	11, 14, 16 19, 22, 24	19, 22, 24 28, 32, 35 38, 42	14, 16, 19 22, 24, 28 32, 35	22, 24, 28 32, 35, 38 42, 55	19, 22, 24 28, 32, 35 38, 42	32, 35, 38 42, 55
B2		30, 38. 1 40, 50, 60	30, 36, 38. 1 40, 50 60, 70	50, 60, 70 80, 95, 110	70, 80, 95 110, 114. 3 130	50, 60, 70 80, 95, 110	95, 110 114. 3, 130 180	70, 80, 95 110, 114. 3 130	110, 114. 3 130, 165 180, 200	95, 110 114. 3, 130 180	110, 114. 3 130, 165 180, 200
B3		45, 46, 66. 7 70, 70. 7, 75	45, 46, 66. 7 70, 70. 7 75, 90	70, 75, 90 100, 115 130, 145	90, 115, 130 145, 165 200	70, 75, 90 100, 115 130, 145	115, 130 145, 165 200, 215	90, 115, 130 145, 165 200	130, 145 165, 200 215, 235	115, 130 145, 165 200, 215	165, 200 215, 235 250
B4		4	4, 5	5, 7	7	5, 7	7	7	10	7	10
B5		≦31	≦41	≦62	≦80	≦62	≦86	≦80	≦117	≦86	≦125
B6		M3, M4 M5	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M4, M5 M6, M8	M6, M8 M10, M12	M6, M8 M10, M12	M8, M10 M12	M6, M8 M10, M12	M10, M12 M14, M16 M20
B7		60	60	90	120	90	142	120	182	142	200
B8		62, 80	62, 80, 90	90, 115, 120	120, 140, 180	90, 115, 120	142, 180, 200	120, 140, 180	182, 200, 220	142, 180, 200	200, 220, 250

1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AAW–HP–K Hollow shaft expansion sleeve with keyway type

Reduction ratio(1/6 ~ /300) Precision input belt planetary right-angle reducer

Dimensions:



Specifications: unit: mm

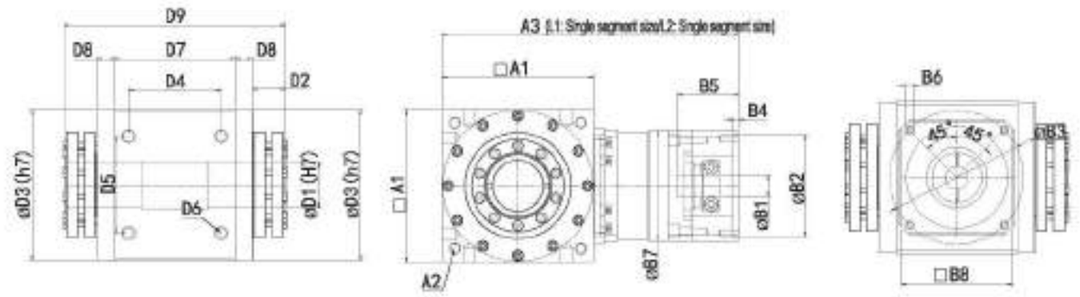
Specifications	AAW045AS	AAW070AS	AAW080AS	AAW110AS	AAW135AS	AAW135BS	AAW165AS	AAW165BS	AAW200AS	AAW200BS	AAW250AS
D1		16	16	*25/30	*35/40	*35/40	*50/55	*50/55	65	65	80
D2		22	23. 25	32	36	36	36	36	36. 5	36. 5	52
D3		60	78	106	133	133	163	163	195	195	245
D4		41. 43	49. 5	68	86	86	106	106	141	141	176. 78
D5		41. 43	49. 5	65	83	83	105	105	130	130	176. 78
D6		4-M5*P0. 8	4-M6*P0. 8	4-M8*P1. 25	4-M10*P1. 5	4-M10*P1. 5	4-M14*P2. 0	4-M14*P2. 0	4-M14*P2. 0	4-M14*P2. 0	4-M20*P2. 5
D7		70	67	90	120	120	142	142	182	182	227
D8		6. 25	13	15	10	10	13	13	8. 5	8. 5	21
D9		104. 5	116. 25	152	176	176	204	204	235. 5	235. 5	325
A1		70	80	110	138	138	168	168	200	200	250
A2		P. C. D φ 75 4-M5*P0. 8	P. C. D φ 93 4-M6*P1. 0	P. C. D φ 130 4-M8*P1. 25	P. C. D φ 160 4-M10*P1. 5	P. C. D φ 160 4-M10*P1. 5	P. C. D φ 193 4-M12*P1. 75	P. C. D φ 193 4-M12*P1. 75	P. C. D φ 240 4-M16*P2. 0	P. C. D φ 240 4-M16*P2. 0	P. C. D φ 300 4-M30*P2. 5
A3(L1: Single segment size)		159	170	227	290	251	344	312	425	378	467
A3(L2: Single segment size)			192	254	321	289	391	343	476	425	520
K1		5	5	8	*10/12	*10/12	14	14	18	18	20
K2		18. 3	18. 3	*28. 3/33. 3	*38. 3/43. 3	*38. 3/43. 3	*53. 8/58. 8	*53. 8/58. 8	69. 4	69. 4	84. 9
B1		6. 35, 8, 9 11, 14	6. 35, 8, 9 11, 14, 16, 19	11, 14, 16 19, 22, 24	14, 16, 19 22, 24, 28 32, 35	11, 14, 16 19, 22, 24	19, 22, 24 28, 32, 35 38, 42	14, 16, 19 22, 24, 28 32, 35	22, 24, 28 32, 35, 38 42, 55	19, 22, 24 28, 32, 35 38, 42	32, 35, 38 42, 55
B2		30, 38. 1 40, 50, 60	30, 36, 38. 1 40, 50 60, 70	50, 60, 70 80, 95, 110	70, 80, 95 110, 114. 3 130	50, 60, 70 80, 95, 110	95, 110 114. 3, 130 180	70, 80, 95 110, 114. 3 130	110, 114. 3 130, 165 180, 200	95, 110 114. 3, 130 180	110, 114. 3 130, 165 180, 200
B3		45, 46, 66. 7 70, 70. 7, 75	45, 46, 66. 7 70, 70. 7 75, 90	70, 75, 90 100, 115 130, 145	90, 115, 130 145, 165 200	70, 75, 90 100, 115 130, 145	115, 130 145, 165 200, 215	90, 115, 130 145, 165 200	130, 145 165, 200 215, 235	115, 130 145, 165 200, 215	165, 200 215, 235 250
B4		4	4, 5	5, 7	7	5, 7	7	7	10	7	10
B5		≦31	≦41	≦62	≦80	≦62	≦86	≦80	≦117	≦86	≦125
B6		M3, M4 M5	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M4, M5 M6, M8	M6, M8 M10, M12	M6, M8 M10, M12	M8, M10 M12	M6, M8 M10, M12	M10, M12 M14, M16 M20
B7		60	60	90	120	90	142	120	182	142	200
B8		62, 80	62, 80, 90	90, 115, 120	120, 140, 180	90, 115, 120	142, 180, 200	120, 140, 180	182, 200, 220	142, 180, 200	200, 220, 250

1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AAW-2HP Double hollow shaft expansion sleeve type

Reduction ratio(1/6 ~ /300) Precision input belt planetary right-angle reducer

Dimensions:



Specifications:

unit: mm

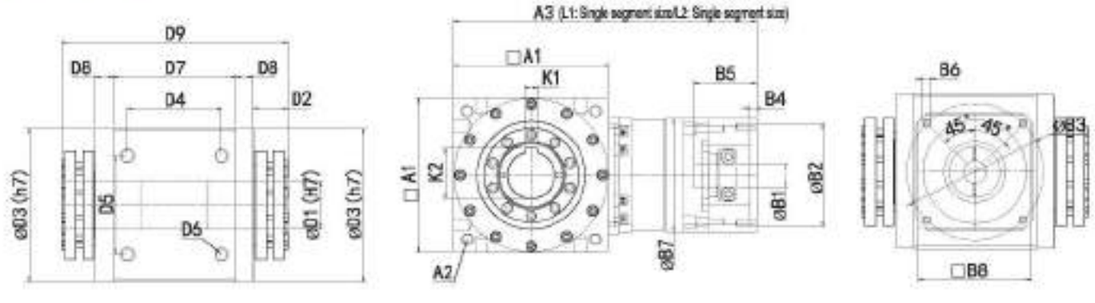
Specifications	AAW045AS	AAW070AS	AAW080AS	AAW110AS	AAW135AS	AAW135BS	AAW165AS	AAW165BS	AAW200AS	AAW200BS	AAW250AS
D1		16	20	*25/30	*35/40	*35/40	*50/55	*50/55	65	65	80
D2		22	23. 25	32	36	36	36	36	36. 5	36. 5	52
D3		60	78	106	133	133	163	163	195	195	245
D4		41. 43	49. 5	68	86	86	106	106	141	141	176. 78
D5		41. 43	49. 5	65	83	83	105	105	130	130	176. 78
D6		4-M5*P0. 8	4-M6*P0. 8	4-M8*P1. 25	4-M10*P1. 5	4-M10*P1. 5	4-M14*P2. 0	4-M14*P2. 0	4-M14*P2. 0	4-M14*P2. 0	4-M20*P2. 5
D7		70	67	90	120	120	142	142	182	182	227
D8		6. 25	13	15	10	10	13	13	8. 5	8. 5	21
D9		126. 5	139. 5	184	212	212	240	240	272	272	377
A1		70	80	110	138	138	168	168	200	200	250
A2		P. C. Dφ 75 4-M5*P0. 8	P. C. Dφ 93 4-M6*P1. 0	P. C. Dφ130 4-M8*P1. 25	P. C. Dφ160 4-M10*P1. 5	P. C. Dφ160 4-M10*P1. 5	P. C. Dφ193 4-M12*P1. 75	P. C. Dφ193 4-M12*P1. 75	P. C. Dφ240 4-M16*P2. 0	P. C. Dφ240 4-M16*P2. 0	P. C. Dφ300 4-M30*P2. 5
A3(L1: Single segment size)		159	170	227	290	251	344	312	425	378	467
A3(L2: Single segment size)			192	254	321	289	391	343	476	425	520
B1		6, 35, 8, 9 11, 14	6. 35, 8, 9 11, 14, 16, 19	11, 14, 16 19, 22, 24	14, 16, 19 22, 24, 28 32, 35	11, 14, 16 19, 22, 24	19, 22, 24 28, 32, 35 38, 42	14, 16, 19 22, 24, 28 32, 35	22, 24, 28 32, 35, 38 42, 55	19, 22, 24 28, 32, 35 38, 42	32, 35, 38 42, 55
B2		30, 38. 1 40, 50, 60	30, 36, 38. 1 40, 50 60, 70	50, 60, 70 80, 95, 110	70, 80, 95 110, 114. 3 130	50, 60, 70 80, 95, 110	95, 110 114. 3, 130 180	70, 80, 95 110, 114. 3 130	110, 114. 3 130, 165 180, 200	95, 110 114. 3, 130 180	110, 114. 3 130, 165 180, 200
B3		45, 46, 66. 7 70, 70. 7, 75	45, 46, 66. 7 70, 70. 7 75, 90	70, 75, 90 100, 115 130, 145	90, 115, 130 145, 165 200	70, 75, 90 100, 115 130, 145	115, 130 145, 165 200, 215	90, 115, 130 145, 165 200	130, 145 165, 200 215, 235	115, 130 145, 165 200, 215	165, 200 215, 235 250
B4		4	4, 5	5, 7	7	5, 7	7	7	10	7	10
B5		≦ 31	≦ 41	≦ 62	≦ 80	≦ 62	≦ 86	≦ 80	≦ 117	≦ 86	≦ 125
B6		M3, M4 M5	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M4, M5 M6, M8	M6, M8 M10, M12	M6, M8 M10, M12	M8, M10 M12	M6, M8 M10, M12	M10, M12 M14, M16 M20
B7		60	60	90	120	90	142	120	182	142	200
B8		62, 80	62, 80, 90	90, 115, 120	120, 140, 180	90, 115, 120	142, 180, 200	120, 140, 180	182, 200, 220	142, 180, 200	200, 220, 250

1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AAW-2HP-K Double hollow shaft expansion sleeve with keyway type

Reduction ratio(1/6 ~ /300) Precision input belt planetary right-angle reducer

Dimensions:



Specifications:

unit: mm

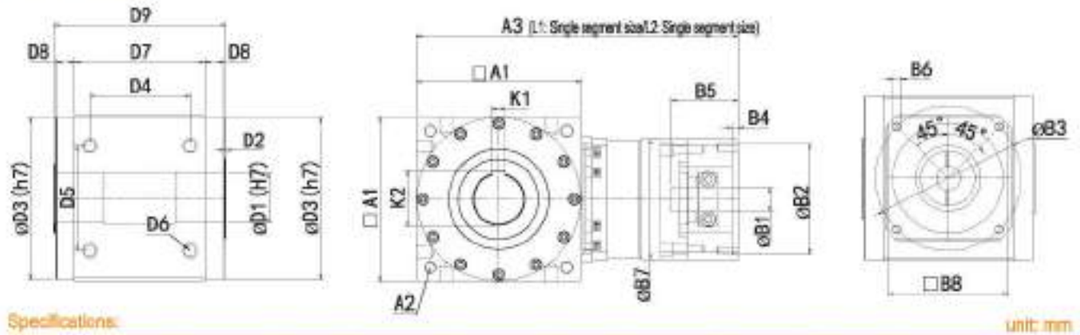
Specifications	AAW045AS	AAW070AS	AAW080AS	AAW110AS	AAW135AS	AAW135BS	AAW165AS	AAW165BS	AAW200AS	AAW200BS	AAW250AS
D1		16	16	*25/30	*35/40	*35/40	*50/55	*50/55	65	65	80
D2		22	23. 25	32	36	36	36	36	36. 5	36. 5	52
D3		60	78	106	133	133	163	163	195	195	245
D4		41. 43	49. 5	68	86	86	106	106	141	141	176. 78
D5		41. 43	49. 5	65	83	83	105	105	130	130	176. 78
D6		4-M5*P0. 8	4-M6*P0. 8	4-M8*P1. 25	4-M10*P1. 5	4-M10*P1. 5	4-M14*P2. 0	4-M14*P2. 0	4-M14*P2. 0	4-M14*P2. 0	4-M20*P2. 5
D7		70	67	90	120	120	142	142	182	182	227
D8		6. 25	13	15	10	10	13	13	8. 5	8. 5	21
D9		126. 5	139. 5	184	212	212	240	240	272	272	377
A1		70	80	110	138	138	168	168	200	200	250
A2		P. C. Dφ 75 4-M5*P0. 8	P. C. Dφ 93 4-M6*P1. 0	P. C. Dφ130 4-M8*P1. 25	P. C. Dφ160 4-M10*P1. 5	P. C. Dφ160 4-M10*P1. 5	P. C. Dφ193 4-M12*P1. 75	P. C. Dφ193 4-M12*P1. 75	P. C. Dφ240 4-M16*P2. 0	P. C. Dφ240 4-M16*P2. 0	P. C. Dφ300 4-M30*P2. 5
A3(L1: Single segment size)		159	170	227	290	251	344	312	425	378	467
A3(L2: Single segment size)			192	254	321	289	391	343	476	425	520
K1		5	5	8	*10/12	*10/12	14	14	18	18	20
K2		18. 3	18. 3	*28. 3/33. 3	*38. 3/43. 3	*38. 3/43. 3	*53. 8/58. 8	*53. 8/58. 8	69. 4	69. 4	84. 9
B1		6. 35, 8, 9 11, 14	6. 35, 8. 9 11, 14, 16, 19	11, 14, 16 19, 22, 24	14, 16, 19 22, 24, 28 32, 35	11, 14, 16 19, 22, 24	19, 22, 24 28, 32, 35 38, 42	14, 16, 19 22, 24, 28 32, 35	22, 24, 28 32, 35, 38 42, 55	19, 22, 24 28, 32, 35 38, 42	32, 35, 38 42, 55
B2		30, 38. 1 40, 50, 60	30, 36, 38. 1 40, 50 60, 70	50, 60, 70 80, 95, 110	70, 80, 95 110, 114. 3 130	50, 60, 70 80, 95, 110	95, 110 114. 3, 130 180	70, 80, 95 110, 114. 3 130	110, 114. 3 130, 165 180, 200	95, 110 114. 3, 130 180	110, 114. 3 130, 165 180, 200
B3		45, 46, 66. 7 70, 70. 7, 75	45, 46, 66. 7 70, 70. 7 75. 90	70, 75, 90 100, 115 130, 145	90, 115, 130 145, 165 200	70, 75, 90 100, 115 130, 145	115, 130 145, 165 200, 215	90, 115, 130 145, 165 200	130, 145 165, 200 215, 235	115, 130 145, 165 200, 215	165, 200 215, 235 250
B4		4	4, 5	5, 7	7	5, 7	7	7	10	7	10
B5		≦ 31	≦ 41	≦ 62	≦ 80	≦ 62	≦ 86	≦ 80	≦ 117	≦ 86	≦ 125
B6		M3, M4 M5	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M4, M5 M6, M8	M6, M8 M10, M12	M6, M8 M10, M12	M8, M10 M12	M6, M8 M10, M12	M10, M12 M14, M16 M20
B7		60	60	90	120	90	142	120	182	142	200
B8		62, 80	62, 80, 90	90, 115, 120	120, 140, 180	90, 115, 120	142, 180, 200	120, 140, 180	182, 200, 220	142, 180, 200	200, 220, 250

1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AAW–CR Hollow shaft with keyway type

Reduction ratio(1/6 ~ /300) Precision input belt planetary right-angle reducer

Dimensions:



Specifications: unit: mm

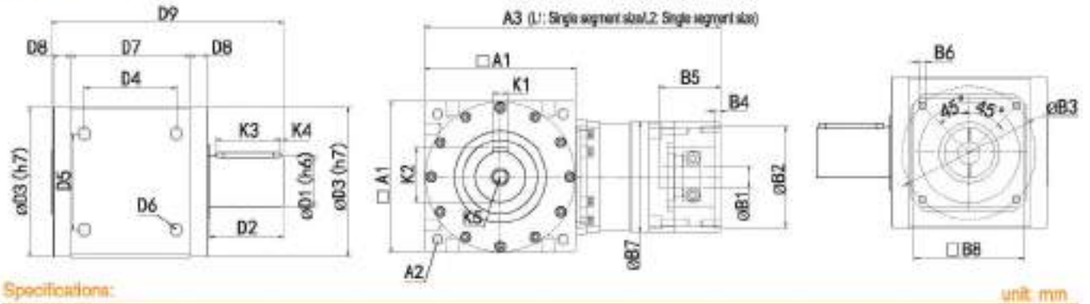
Specifications	AAW045AS	AAW070AS	AAW080AS	AAW110AS	AAW135AS	AAW135BS	AAW165AS	AAW165BS	AAW200AS	AAW200BS	AAW250AS
D1		16	20	*25/30	*35/40	*35/40	*50/55	*50/55	65	65	80
D2		1.5	1.75	2	3	3	2	2	2	2	2
D3		60	78	106	133	133	163	163	195	195	245
D4		41.43	49.5	68	86	86	106	106	141	141	176.78
D5		41.43	49.5	65	83	83	105	105	130	130	176.78
D6		4-M5*P0.8	4-M6*P0.8	4-M8*P1.25	4-M10*P1.5	4-M10*P1.5	4-M14*P2.0	4-M14*P2.0	4-M14*P2.0	4-M14*P2.0	4-M20*P2.5
D7		70	67	90	120	120	142	142	182	182	227
D8		6.25	13	15	10	10	13	13	8.5	8.5	21
D9		85.5	96.5	124	146	146	172	172	202	202	273
A1		70	80	110	138	138	168	168	200	200	250
A2		P.C.Dφ75 4-M5*P0.8	P.C.Dφ93 4-M6*P1.0	P.C.Dφ130 4-M8*P1.25	P.C.Dφ160 4-M10*P1.5	P.C.Dφ160 4-M10*P1.5	P.C.Dφ193 4-M12*P1.75	P.C.Dφ193 4-M12*P1.75	P.C.Dφ240 4-M16*P2.0	P.C.Dφ240 4-M16*P2.0	P.C.Dφ300 4-M30*P2.5
A3(L1: Single segment size)		159	170	227	290	251	344	312	425	378	467
A3(L2: Single segment size)			192	254	321	289	391	343	476	425	520
K1		5	5	8	*10/12	*10/12	14	14	18	18	20
K2		18.3	22.8	*28.3/33.3	*38.3/43.3	*38.3/43.3	*53.8/58.8	*53.8/58.8	69.4	69.4	84.9
B1		6.35, 8, 9 11, 14	6.35, 8, 9 11, 14, 16, 19	11, 14, 16 19, 22, 24	14, 16, 19 22, 24, 28 32, 35	11, 14, 16 19, 22, 24	19, 22, 24 28, 32, 35 38, 42	14, 16, 19 22, 24, 28 32, 35	22, 24, 28 32, 35, 38 42, 55	19, 22, 24 28, 32, 35 38, 42	32, 35, 38 42, 55
B2		30, 38.1 40, 50, 60	30, 36, 38.1 40, 50 60, 70	50, 60, 70 80, 95, 110	70, 80, 95 110, 114.3 130	50, 60, 70 80, 95, 110	95, 110 114.3, 130 180	70, 80, 95 110, 114.3 130	110, 114.3 130, 165 180, 200	95, 110 114.3, 130 180	110, 114.3 130, 165 180, 200
B3		45, 46, 66.7 70, 70.7, 75	45, 46, 66.7 70, 70.7 75, 90	70, 75, 90 100, 115 130, 145	90, 115, 130 145, 165 200	70, 75, 90 100, 115 130, 145	115, 130 145, 165 200, 215	90, 115, 130 145, 165 200	130, 145 165, 200 215, 235	115, 130 145, 165 200, 215	165, 200 215, 235 250
B4		4	4, 5	5, 7	7	5, 7	7	7	10	7	10
B5		≤ 31	≤ 41	≤ 62	≤ 80	≤ 62	≤ 86	≤ 80	≤ 117	≤ 86	≤ 125
B6		M3, M4 M5	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M4, M5 M6, M8	M6, M8 M10, M12	M6, M8 M10, M12	M8, M10 M12	M6, M8 M10, M12	M10, M12 M14, M16 M20
B7		60	60	90	120	90	142	120	182	142	200
B8		62, 80	62, 80, 90	90, 115, 120	120, 140, 180	90, 115, 120	142, 180, 200	120, 140, 180	182, 200, 220	142, 180, 200	200, 220, 250

1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AAW–P Single output shaft type

Reduction ratio(1/6 ~ /300) Precision input belt planetary right-angle reducer

Dimensions:



Specifications: unit: mm

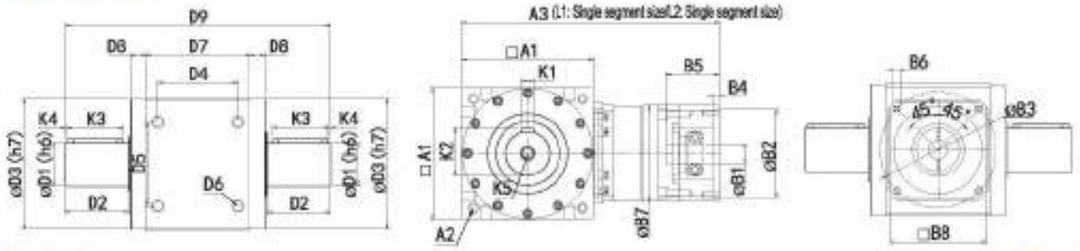
Specifications	AAW045AS	AAW070AS	AAW080AS	AAW110AS	AAW135AS	AAW135BS	AAW165AS	AAW165BS	AAW200AS	AAW200BS	AAW250AS
D1	13	16	20	30	40	40	55	55	75	75	80
D2	20	25	35	45	55	55	80	80	100	100	95
D3	43.2	60	75	106	133	133	163	163	195	195	245
D4	36	41.43	49.5	68	86	86	106	106	141	141	176.78
D5	26	41.43	49.5	65	83	83	105	105	130	130	176.78
D6	4-M4*P0.7	4-M5*P0.8	4-M6*P0.8	4-M8*P1.25	4-M10*P1.5	4-M10*P1.5	4-M14*P2.0	4-M14*P2.0	4-M14*P2.0	4-M14*P2.0	4-M20*P2.5
D7	54	70	67	90	120	120	142	142	182	182	227
D8	10.5	6.25	13	15	10	10	13	13	8.5	8.5	21
D9	98	110.5	132	169	201	201	252	252	302	302	368
A1	46	70	80	110	138	138	168	168	200	200	250
A2	P.C.Dφ53 4-M5*P0.8	P.C.Dφ75 4-M5*P0.8	P.C.Dφ93 4-M6*P1.0	P.C.Dφ130 4-M8*P1.25	P.C.Dφ160 4-M10*P1.5	P.C.Dφ160 4-M10*P1.5	P.C.Dφ193 4-M12*P1.75	P.C.Dφ193 4-M12*P1.75	P.C.Dφ240 4-M16*P2.0	P.C.Dφ240 4-M16*P2.0	P.C.Dφ300 4-M30*P2.5
A3(L1: Single segment size)	121	159	170	227	290	251	344	312	425	378	467
A3(L2: Single segment size)			192	254	321	289	391	343	476	425	520
K1	4	5	6	8	12	12	16	16	20	20	20
K2	14.5	18	22.5	33	43	43	59	59	79.5	79.5	84.5
K3	15	20	30	35	45	45	70	70	90	90	75
K4	2.5	3	3	5	5	5	3	3	5	5	5
K5	M4	M5	M6	M8	M12	M12	M16	M16	M20	M20	M20
B1	5, 6.35, 8	6.35, 8, 9 11, 14	6.35, 8, 9 11, 14, 16, 19	11, 14, 16 19, 22, 24	14, 16, 19 22, 24, 28 32, 35	11, 14, 16 19, 22, 24	19, 22, 24 28, 32, 35 38, 42	14, 16, 19 22, 24, 28 32, 35	22, 24, 28 32, 35, 38 42, 55	19, 22, 24 28, 32, 35 38, 42	32, 35, 38 42, 55
B2	22, 30, 38.1	30, 38.1 40, 50, 60	30, 36, 38.1 40, 50 60, 70	50, 60, 70 80, 95, 110	70, 80, 95 110, 114.3 130	50, 60, 70 80, 95, 110	95, 110 114.3, 130 180	70, 80, 95 110, 114.3 130	110, 114.3 130, 165 180, 200	95, 110 114.3, 130 180	110, 114.3 130, 165 180, 200
B3	43.8, 45, 46 66.7, 70.7	45, 46, 66.7 70, 70.7, 75	45, 46, 66.7 70, 70.7 75, 90	70, 75, 90 100, 115 130, 145	90, 115, 130 145, 165 200	70, 75, 90 100, 115 130, 145	115, 130 145, 165 200, 215	90, 115, 130 145, 165 200	130, 145 165, 200 215, 235	115, 130 145, 165 200, 215	165, 200 215, 235 250
B4	3	4	4, 5	5, 7	7	5, 7	7	7	10	7	10
B5	≤ 28	≤ 31	≤ 41	≤ 62	≤ 80	≤ 62	≤ 86	≤ 80	≤ 117	≤ 86	≤ 125
B6	M3, M4	M3, M4 M5	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M4, M5 M6, M8	M6, M8 M10, M12	M6, M8 M10, M12	M8, M10 M12	M6, M8 M10, M12	M10, M12 M14, M16 M20
B7	46	60	60	90	120	90	142	120	182	142	200
B8	46	62, 80	62, 80, 90	90, 115, 120	120, 140, 180	90, 115, 120	142, 180, 200	120, 140, 180	182, 200, 220	142, 180, 200	200, 220, 250

1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AAW–2P Dual output shaft type

Reduction ratio(1/6 ~ /300) Precision input belt planetary right-angle reducer

Dimensions:



Specifications:

unit: mm

Specifications	AAW045AS	AAW070AS	AAW080AS	AAW110AS	AAW135AS	AAW135BS	AAW165AS	AAW165BS	AAW200AS	AAW200BS	AAW250AS
D1	13	16	20	30	40	40	55	55	75	75	80
D2	20	25	35	45	55	55	80	80	100	100	95
D3	43. 2	60	75	106	133	133	163	163	195	195	245
D4	36	41. 43	49. 5	68	86	86	106	106	141	141	176. 78
D5	26	41. 43	49. 5	65	83	83	105	105	130	130	176. 78
D6	4-M4*P0. 7	4-M5*P0. 8	4-M6*P0. 8	4-M8*P1. 25	4-M10*P1. 5	4-M10*P1. 5	4-M14*P2. 0	4-M14*P2. 0	4-M16*P2. 0	4-M16*P2. 0	4-M20*P2. 5
D7	54	70	67	90	120	120	142	142	182	182	227
D8	10. 5	6. 25	13	15	10	10	13	13	8. 5	8. 5	21
D9	118	135. 5	167	214	256	256	332	332	402	402	463
A1	46	70	80	110	138	138	168	168	200	200	250
A2	P. C. Dφ 53 4-M5*P0. 8	P. C. Dφ 75 4-M5*P0. 8	P. C. Dφ 93 4-M6*P1. 0	P. C. Dφ 130 4-M8*P1. 25	P. C. Dφ 160 4-M10*P1. 5	P. C. Dφ 160 4-M10*P1. 5	P. C. Dφ 193 4-M12*P1. 75	P. C. Dφ 193 4-M12*P1. 75	P. C. Dφ 240 4-M16*P2. 0	P. C. Dφ 240 4-M16*P2. 0	P. C. Dφ 300 4-M30*P2. 5
A3(L1: Single segment size)	121	159	170	227	290	251	344	312	425	378	467
A3(L2: Single segment size)			192	254	321	289	391	343	476	425	520
K1	4	5	6	8	12	12	16	16	20	20	20
K2	14. 5	18	22. 5	33	43	43	59	59	79. 5	79. 5	84. 5
K3	15	20	30	35	45	45	70	70	90	90	75
K4	2. 5	3	3	5	5	5	3	3	5	5	5
K5	M4	M5	M6	M8	M12	M12	M16	M16	M20	M20	M20
B1	5, 6. 35, 8	6. 35, 8, 9 11, 14	6. 35, 8, 9 11, 14, 16, 19	11, 14, 16 19, 22, 24	14, 16, 19 22, 24, 28 32, 35	11, 14, 16 19, 22, 24	19, 22, 24 28, 32, 35 38, 42	14, 16, 19 22, 24, 28 32, 35	22, 24, 28 32, 35, 38 42, 55	19, 22, 24 28, 32, 35 38, 42	32, 35, 38 42, 55
B2	22, 30, 38. 1	30, 38. 1 40, 50, 60	30, 36, 38. 1 40, 50 60, 70	50, 60, 70 80, 95, 110	70, 80, 95 110, 114. 3 130	50, 60, 70 80, 95, 110	95, 110 114. 3, 130 180	70, 80, 95 110, 114. 3 130	110, 114. 3 130, 165 180, 200	95, 110 114. 3, 130 180	110, 114. 3 130, 165 180, 200
B3	43. 8, 45, 46 66. 7, 70. 7	45, 46, 66. 7 70, 70. 7, 75	45, 46, 66. 7 70, 70. 7 75, 90	70, 75, 90 100, 115 130, 145	90, 115, 130 145, 165 200	70, 75, 90 100, 115 130, 145	115, 130 145, 165 200, 215	90, 115, 130 145, 165 200	130, 145 165, 200 215, 235	115, 130 145, 165 200, 215	165, 200 215, 235 250
B4	3	4	4, 5	5, 7	7	5, 7	7	7	10	7	10
B5	≦ 28	≦ 31	≦ 41	≦ 62	≦ 80	≦ 62	≦ 86	≦ 80	≦ 117	≦ 86	≦ 125
B6	M3, M4	M3, M4 M5	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M4, M5 M6, M8	M6, M8 M10, M12	M6, M8 M10, M12	M8, M10 M12	M6, M8 M10, M12	M10, M12 M14, M16 M20
B7	46	60	60	90	120	90	142	120	182	142	200
B8	46	62, 80	62, 80, 90	90, 115, 120	120, 140, 180	90, 115, 120	142, 180, 200	120, 140, 180	182, 200, 220	142, 180, 200	200, 220, 250

1. Actuel dimensions are based on 2D/3D drawings. 2. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AAT-AS Precision input with shaft steering

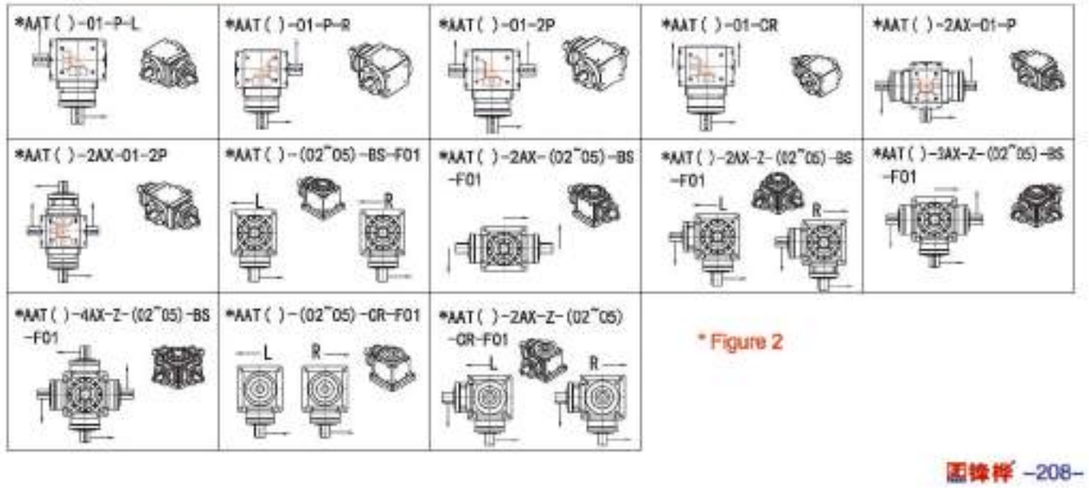
Reduction ratio 1/2~1/5

AAT045A – 2AX – 01 – P – L – F01

- 2AX: 2 Input shaft type
  3AX: 3 Input shaft type
  No Marks: 1 Input shaft type
  2AX-Z: 2 Input shaft type
  3AX-Z: 3 Input shaft type
  4AX-Z: 4 Input shaft type
- Gear ratio 1/2~1/5
- Direction of rotation of output axis: As shown in Figure 2 (L left R right)
- Base
- Model (Input solid shaft type)
  AAT045AS / AAT080AS
  AAT110AS / AAT135AS
  AAT165AS / AAT200AS
- Output shaft type
  P: Single solid shaft with keyway.
  2P:Double solid shaft with keyway.
  CR:Hollow shaft with keyway
  RF:Hollow shaft rotary flange
  BS:For Ball Screws
  P.S:RT045A(Produce only P/2P)

Performance meter: AAT-AS Series Spiral Bevel Gear – (Gear Ratio) 1/2~1/5

	Gear Type	Reduction Ratio	AAT045AS	AAT070AS	AAT080AS	AAT110AS	AAT135AS	AAT165AS	AAT200AS	AAT250AS
Rated output torque (Nm)	Spiral bevel gear	1/2	9. 5		78. 5	230	350	750	1200	No production
		1/3			38. 5	75	160	325	750	
		1/5		24. 5	49	123	208	490	800	
Maximum acceleration torque(Nm)		2, 3, 5	1.5 Times of Nominal Output Torque(Nm)							
Input speed(rpm)			2000	2000	2000	2000	1500	1500	1000	
Standard backlash (arc-min)										
Allowable radial force(N)			1100	2800	3900	5500	9800	16500	24100	
Allowable axial force(N)			660	2800	3900	5500	9800	16500	24100	
Efficiency(%)										
Weight(kg)			1. 5	3. 5	4. 8	8. 2	15. 5	27. 5	32. 5	
Operating temperature(C)			–10°C~ +80°C							
lubricating oil			Synthetic Grease							
Installation Orientation			Any Direction							
Noise level(db) /1500(rpm)			≤ 65	≤ 70	≤ 70	≤ 72	≤ 73	≤ 74	≤ 76	

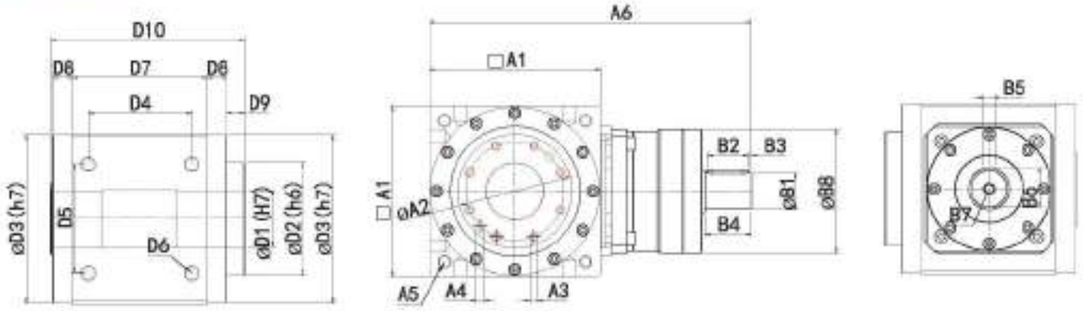


* Figure 2

AAT–RF Hollow Swivel Flange Type

Reduction ratio: 1/2~1/5 Precision type input with shaft steering

Dimensions:



Specifications:

unit: mm

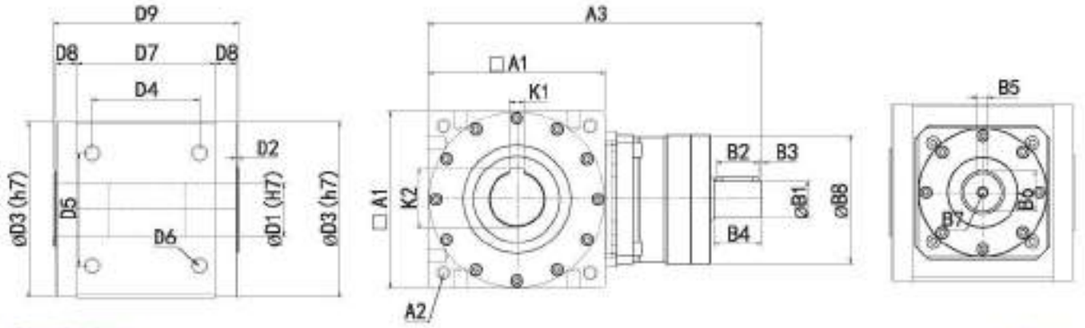
Specifications	AAT045AS	AAT080AS	AAT110AS	AAT135AS	AAT165AS	AAT200AS
D1	9	*16/20	*25/30	*35/40	*50/55	*65/80
D2	20	45	65	85	110	140
D3	43.2	78	106	133	163	195
D4	36	49.5	68	86	106	141
D5	26	49.5	65	83	105	130
D6	4-M4*P0.7	4-M6*P0.8	4-M8*P1.25	4-M10*P1.5	4-M14*P2.0	4-M14*P2.0
D7	54	67	90	120	142	182
D8	10.5	13	15	10	13	8.5
D9	3.5	7	9.5	9.5	17	22
D10	80	102	131.5	151.5	187	223
A1	46	80	110	138	168	200
A2	15.5	36	50	70	95	124
A3	6-M3*P0.5	8-M5*P0.8	8-M5*P0.8	8-M8*P1.25	8-M8*P1.25	12-M8*P1.25
A4 (H7)		2-φ5	2-φ5	2-φ8	2-φ8	2-φ8
A5	P.C.Dφ53 4-M5*P0.8	P.C.Dφ93 4-M6*P1.0	P.C.Dφ130 4-M8*P1.25	P.C.Dφ160 4-M10*P1.5	P.C.Dφ193 4-M12*P1.75	P.C.Dφ240 4-M16*P2.0
A6 (Total length)	141	173	209	279	353.5	385
B1	13	20	28	35	50	50
B2	15	20	35	40	50	50
B3	2	3	3	3	3	3
B4	20	30	40	45	65	65
B5	4	6	8	10	14	14
B6	14.5	22.5	31	38	53.5	53.5
B7	M4	M6	M8	M10	M12	M12
B8	49	62	95	120	147	147

1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AAT–CR Hollow shaft with keyway type

Reduction ratio: 1/2~1/5 Precision type input with shaft steering

Dimensions:



Specifications:

unit: mm

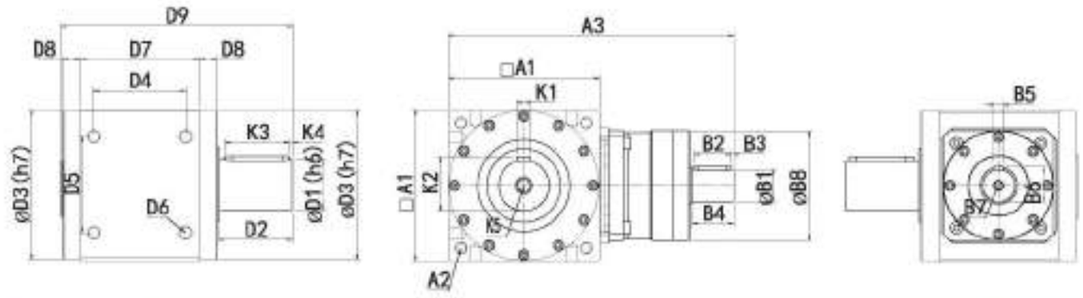
Specifications	AAT045A	AAT080AS	AAT110AS	AAT135AS	AAT165AS	AAT200AS
D1	No production	20	*25/30	*35/40	*50/55	65
D2		1.75	2	3	2	2
D3		78	106	133	163	195
D4		49.5	68	86	106	141
D5		49.5	65	83	105	130
D6		4-M6*P1.0	4-M8*P1.25	4-M10*P1.5	4-M14*P2.0	4-M14*P2.0
D7		67	90	120	142	182
D8		13	15	10	13	8.5
D9		96.5	124	146	172	202
A1		80	110	138	168	200
A2		P.C.Dφ93 4-M6*P1.0	P.C.Dφ130 4-M8*P1.25	P.C.Dφ160 4-M10*P1.5	P.C.Dφ193 4-M12*P1.75	P.C.Dφ240 4-M14*P2.0
A3 (Total length)		173	209	279	353.5	385
K1		6	8	*10/12	14	18
K2		22.8	*28.3/33.3	*38.3/43.3	*53.8/58.8	59.4
B1		20	28	35	50	50
B2		20	35	40	50	50
B3		3	3	3	3	3
B4		30	40	45	65	65
B5		6	8	10	14	14
B6		22.5	31	38	53.5	53.5
B7		M6	M8	M10	M12	M12
B8		62	95	120	147	147

1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AAT–P Single output shaft type

Reduction Ratio: 1/2~1/5 Precision Input with Shaft Steerer

Dimensions:



Specifications: unit: mm

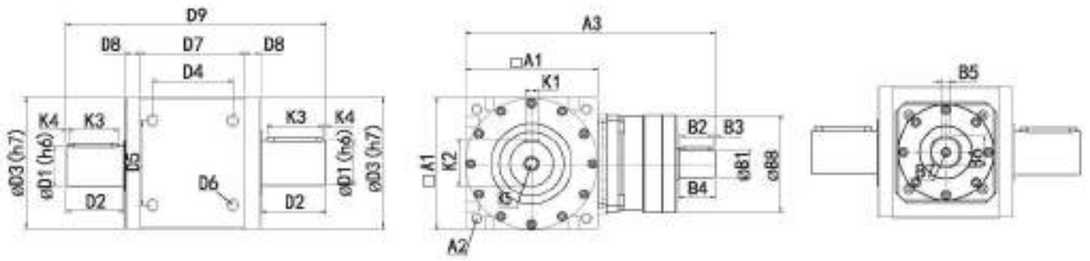
Specifications	AAT045AS	AAT080AS	AAT110AS	AAT135AS	AAT165AS	AAT200AS
D1	13	20	30	40	55	75
D2	20	35	45	55	80	100
D3	43. 2	78	106	133	163	195
D4	36	49. 5	68	86	106	141
D5	26	49. 5	65	83	105	130
D6	4-M4*P0. 7	4-M6*P0. 8	4-M8*P1. 25	4-M10*P1. 5	4-M14*P2. 0	4-M14*P2. 0
D7	54	67	90	120	142	182
D8	10. 5	13	15	10	13	8. 5
D9	98	132	169	201	252	302
A1	46	80	110	138	168	200
A2	P. C. Dφ 53 4-M5*P0. 8	P. C. Dφ 93 4-M6*P1. 0	P. C. Dφ 130 4-M8*P1. 25	P. C. Dφ 160 4-M10*P1. 5	P. C. Dφ 193 4-M12*P1. 75	P. C. Dφ 240 4-M14*P2. 0
A3 (Total length)	141	173	209	279	353. 5	385
K1	4	6	8	12	16	20
K2	14. 5	22. 5	33	43	59	79. 5
K3	15	30	35	45	70	90
K4	2. 5	3	5	5	3	5
K5	M4	M6	M8	M12	M16	M20
B1	13	20	28	35	50	50
B2	15	20	35	40	50	50
B3	2	3	3	3	3	3
B4	20	30	40	45	65	65
B5	4	6	8	10	14	14
B6	14. 5	22. 5	31	38	53. 5	53. 5
B7	M4	M6	M8	M10	M12	M12
B8	49	62	95	120	147	147

1. Actual dimensions are based on 2D/3D drawings. 2. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AAT–2P Dual output shaft type

Reduction Ratio: 1/2~1/5 Precision Input with Shaft Steerer

Dimensions:



Specifications: unit: mm

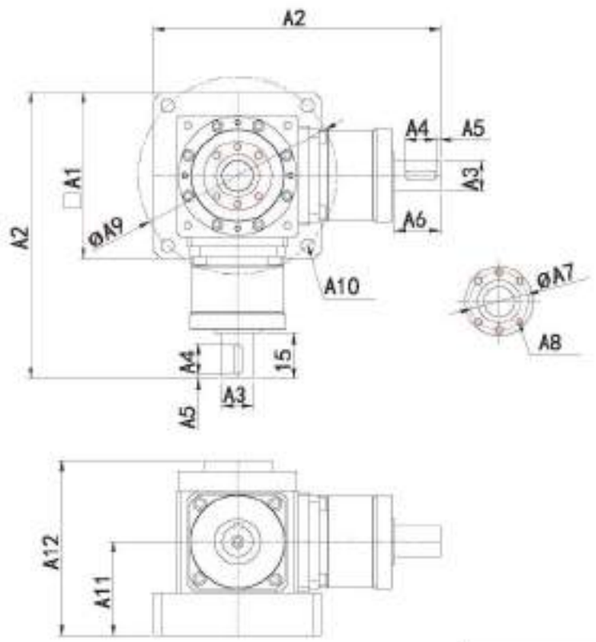
Specifications	AAT045A	AAT080AS	AAT110AS	AAT135AS	AAT165AS	AAT200AS
D1	13	20	30	40	55	75
D2	20	35	45	55	80	100
D3	43. 2	78	106	133	163	195
D4	36	49. 5	68	86	106	141
D5	26	49. 5	65	83	105	130
D6	4-M4*P0. 7	4-M6*P0. 8	4-M8*P1. 25	4-M10*P1. 5	4-M14*P2. 0	4-M14*P2. 0
D7	54	67	90	120	142	182
D8	10. 5	13	15	10	13	8. 5
D9	118	152	214	256	332	402
A1	46	80	110	138	168	200
A2	P. C. Dφ53 4-M5*P0. 8	P. C. Dφ93 4-M6*P1. 0	P. C. Dφ130 4-M8*P1. 25	P. C. Dφ160 4-M10*P1. 5	P. C. Dφ193 4-M12*P1. 75	P. C. Dφ240 4-M14*P2. 0
A3	141	173	209	279	353. 5	385
K1	4	6	8	12	16	20
K2	14. 5	22. 5	33	43	59	79. 5
K3	15	30	35	45	70	90
K4	2. 5	3	5	5	3	5
K5	M4	M6	M8	M12	M16	M20
B1	13	20	28	35	50	50
B2	15	20	35	40	50	50
B3	2	3	3	3	3	3
B4	20	30	40	45	65	65
B5	4	6	8	10	14	14
B6	14. 5	22. 5	31	38	53. 5	53. 5
B7	M4	M6	M8	M10	M12	M12
B8	49	62	95	120	147	147

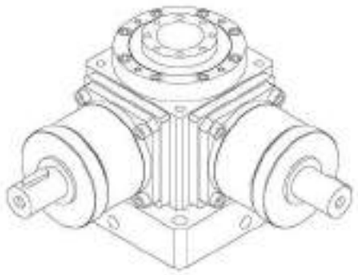
1. Actual dimensions are based on 2D/3D drawings. 2. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

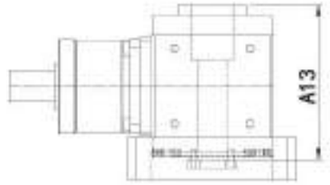
AAT–Multi axis screw lifting type

Reduction Ratio: 1/2~1/5 2AX-Z-BS(Output in three directions)

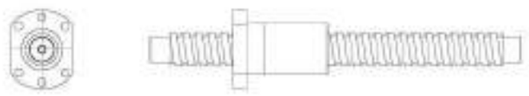
Dimensions:







Ball screw:



P. S: (Multi axis screw hoist using - BS axis)

1. Ball screw diameter (16/20/25/32).
2. Ball screw lead (5/10/20/25/30/32).
3. The correct size is based on 2D/3D.

Specifications:

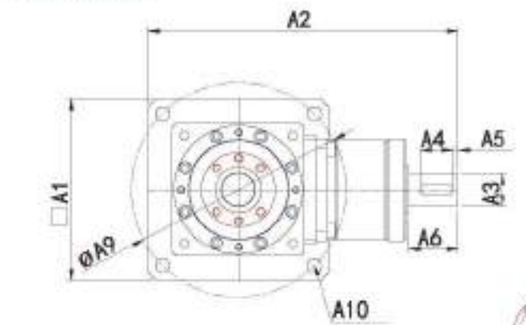
unit: mm

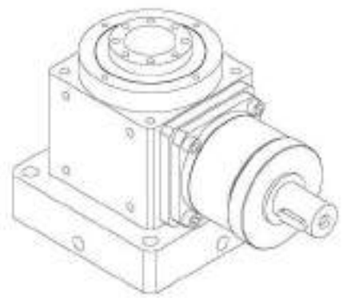
Specifications	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13
AAT080AS-2AX-Z	110	188.2	20	20	3	30	According to the actual screw size of the screw stem		130	4-φ8.5	61.5	According to the actual screw size of the screw stem	
AAT110AS-2AX-Z	142	224.5	28	35	3	40			170	4-φ8.5	61.5/65		
AAT135AS-2AX-Z	180	300	35	40	3	45			215	4-φ13	94		

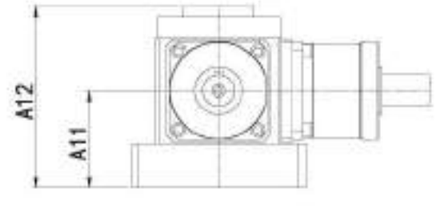
AAT–BS Multi axis screw lifting type

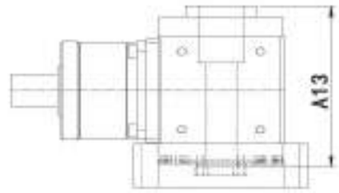
Reduction Ratio: 1/2~1/5

Dimensions:

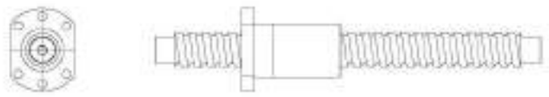








Ball screw:



P. S: (Use of multi axis screw elevator - BS axis)

1. Ball screw diameter (16/20/25/32).
2. Ball screw lead (5/10/20/25/30/32).
3. The correct size is based on 2D/3D.

Specifications:

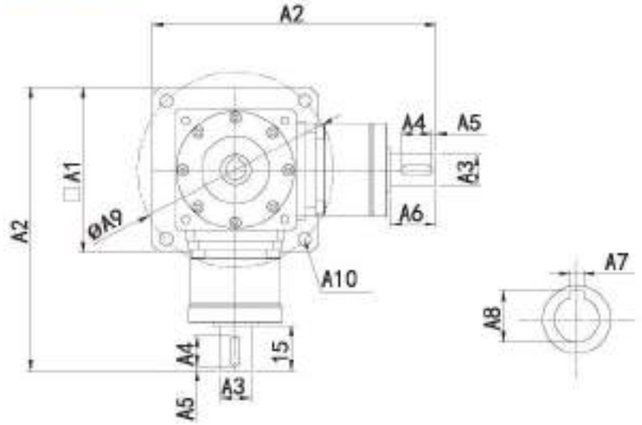
unit: mm

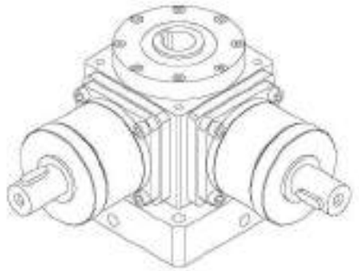
Specifications	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13
AAT080AS-BS	110	188.2	20	20	3	30	According to the actual screw size of the screw stem		130	4-φ8.5	61.5	According to the actual screw size of the screw stem	
AAT110AS-BS	142	224.5	28	35	3	40			170	4-φ8.5	61.5/65		
AAT135AS-BS	180	300	35	40	3	45			215	4-φ13	94		

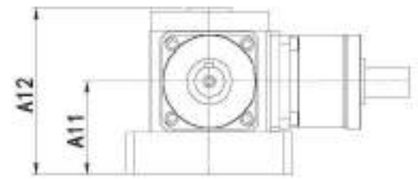
AAT–Hollow shaft type for multi–point lifting

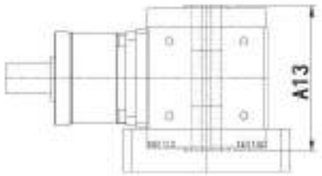
Reduction Ratio: 1/2~1/5 2AX–Z(Output in three directions)

Dimensions:

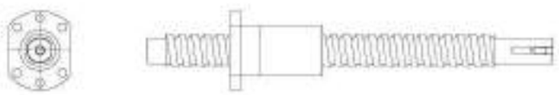








Ball screw: Shoulder machining (with hollow shaft)



P. S: (Multi-point lift use - Hollow shaft)

1. Ball screw diameter (16/20/25/32/40/50).
2. Ball screw lead (5/10/20/25/30/32/40/50).
3. The correct size is based on 2D/3D.

Specifications:

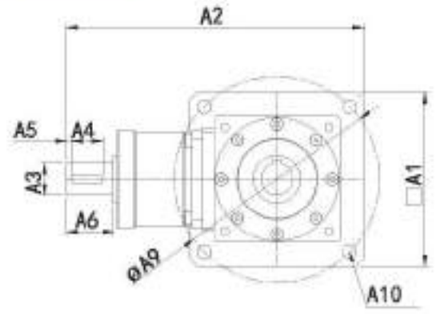
unit: mm

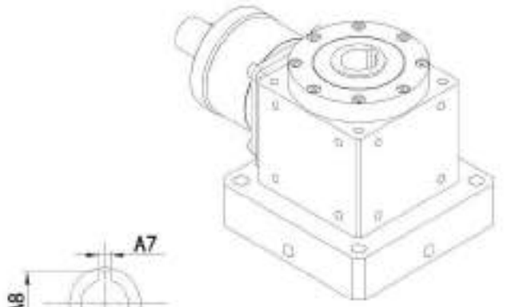
Specifications	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13
AAT080AS–2AX–Z	110	188.2	20	20	3	30	Depends on the actual machining axis diameter of the screw shoulder.		130	4–φ8.5	61.5	109.75	96
AAT110AS–2AX–Z	142	224.5	28	35	3	40			170	4–φ8.5	61.5/65	123.5	124
AAT135AS–2AX–Z	180	300	35	40	3	45			215	4–φ13	94	158	146

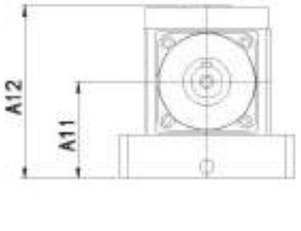
AAT–CR Hollow shaft type for multi–point lifting

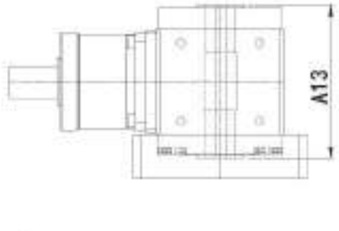
Reduction Ratio: 1/2~1/5

Dimensions:

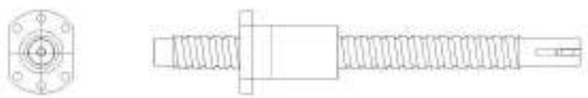








Ball screw: Shoulder machining (with hollow shaft)



P. S: (Multi-point lift use - Hollow shaft)

1. Ball screw diameter (16/20/25/32/40/50).
2. Ball screw lead (5/10/20/25/30/32/40/50).
3. The correct size is based on 2D/3D.

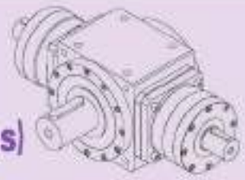
Specifications:

unit: mm

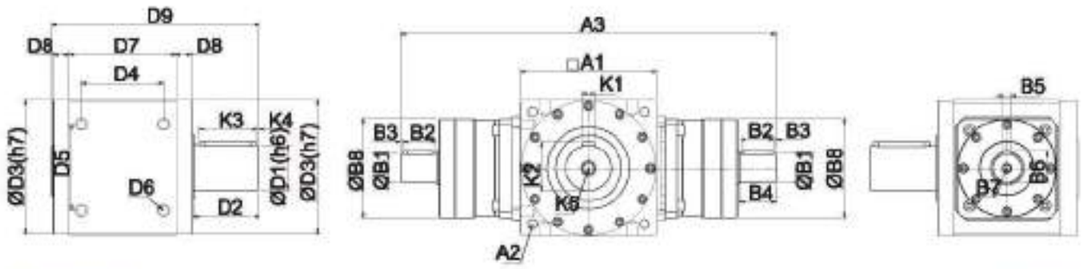
Specifications	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13
AAT080AS–CR–F01	110	188.2	20	20	3	30	Depends on the actual machining axis diameter of the screw shoulder.		130	4–φ8.5	61.5	109.75	96
AAT110AS–CR–F01	142	224.5	28	35	3	40			170	4–φ8.5	61.5/65	123.5	124
AAT135AS–CR–F01	180	300	35	40	3	45			215	4–φ13	94	158	146

AAT–2AX–P Type

Reduction Ratio: 1/2~1/5 (2AX–P)(Output in three directions)



Dimensions:



Specifications: unit: mm

Specifications	AAT045A	AAT080AS	AAT110AS	AAT135AS	AAT165AS	AAT200AS
D1	13	20	30	40	55	75
D2	20	35	45	55	80	100
D3	43.2	78	106	133	163	195
D4	36	49.5	68	86	106	141
D5	26	49.5	65	83	105	130
D6	4-M4*P0.7	4-M6*P0.8	4-M8*P1.25	4-M10*P1.5	4-M14*P2.0	4-M14*P2.0
D7	54	67	90	120	142	182
D8	10.5	13	15	10	13	8.5
D9	98	132	169	201	252	302
A1	46	80	110	138	168	200
A2	P.C.Dφ53 4-M5*P0.8	P.C.Dφ93 4-M6*P1.0	P.C.Dφ130 4-M8*P1.25	P.C.Dφ160 4-M10*P1.5	P.C.Dφ193 4-M12*P1.75	P.C.Dφ240 4-M14*P2.0
A3 (Total length)	209	267	307	414.5	528.5	570
K1	4	6	8	12	16	20
K2	14.5	22.5	33	43	59	79.5
K3	15	30	35	45	70	90
K4	2.5	3	5	5	3	5
K5	M4	M6	M8	M12	M16	M20
B1	13	20	28	35	50	50
B2	15	20	35	40	50	50
B3	2	3	3	3	3	3
B4	20	30	40	45	65	65
B5	4	6	8	10	14	14
B6	14.5	22.5	31	38	53.5	53.5
B7	M4	M6	M8	M10	M12	M12
B8	49	62	95	120	147	147

1. Actual dimensions are based on 2D/3D drawings. 2. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AATM–AS / AAT–AS
AAW–AS Series

90 Degree Precision Speed Reducer

Multiple Output Shaft Type Reduction Ratio 1:2-1:500

Applicable Servo Motor Capacity: 0.1kw-45kw

Large hollow shaft rotation flange: suitable for heavy load occasions.
TFT-LCD panel turnover, rotation mechanism, mechanical arm base rotation, swing arm rotation, indexing rotation and other mechanisms.

Hollow shaft tightening ring: suitable for heavy load occasions.
Roller mechanism, cam mechanism, conveying and transporting mechanism.

Output shaft type: applied in heavy load occasions.
Coupling mechanism, belt conveyor and other mechanisms.

Screw welding reducer: suitable for linear motion occasions.
Vertical, horizontal linear motion and other mechanisms.

Hollow rotation platform: suitable for heavy load occasions.
TFT-LCD panel turnover, indexing plate and other mechanisms.

Steering gear

AATM-AS Input flanged steering
Reduction Ratio: 1/2 ~ 1/10

AATM080AS – 02 – P – B2 – d – b – C – G

- **02** — Gear Ratio: 1/2, 1/3, 1/5, 1/10
- **P** — Backlash Grade:
  - No Marks: stands for standard backlash ≤6arcmin
  - Precision Backlash B2 ≤4arcmin
- **B2** — Input Flange Shaft Diameter(φd): Shown in Figure 1
- **d** — Introduction to Input France(φB): Shown in Figure 1
- **b** — Input Flange Thread Pitch(φC): Shown in Figure 1
- **C** — Threaded holes for Input flanges(G): Shown in Figure 1
- **G**

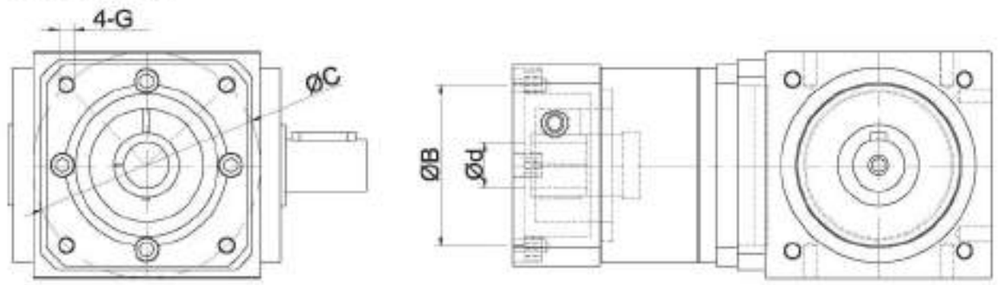
Model(Input Belt Flange Type)

AATM045AS / AATM070AS
AATM080AS / AATM110AS
AATM135AS / AATM165AS
AATM200AS / AATM250AS

Output shaft type

CR:Hollow shaft with keyway
HP: Single hollow shaft without key (Expansion sleeve)
HP-K: Single hollow shaft with keyway (Expanding sleeve)
2HP: Double hollow shaft without key (Expansion sleeve)
2HP-K: Double hollow shaft with keyway (Expansion sleeve)
P: Single solid shaft with keyway.
2P:Double solid shaft with keyway.
RF:Hollow shaft rotary flange
RF-K: Hollow shaft rotary flange with keyway
*RTM045AS (P/2P only)

Input Flange Size:



* Figure 1

Performance meter: AATM-AS Input flanged steering
Reduction Ratio :1/2 ~ 1/10

	Gear Type	Reduction Ratio	AATM045AS	AATM070AS	AATM080AS	AATM110AS	AATM135AS	AATM165AS	AATM200AS	AATM250AS
Rated output torque (Nm)	Spiral bevel gear	1/2	9.5		78.5	230	350	750	1200	2150
		1/3			38.5	75	160	325	750	1500
		1/5		24.5	49	123	208	490	800	1500
		1/10		14.5	30	73	140	340	480	
Maximum acceleration torque (Nm)		2, 3, 5, 10	1.5 Times of Nominal Output Torque(Nm)							
Input speed (rpm)			2000							
Standard backlash (arc-min)			≦ 6							
Precise B2 (arc-min)			≦ 4							
Allowable radial force (N)			1100	2800	3900	5500	9800	16500	24100	45000
Allowable axial force (N)			660	2800	3900	5500	9800	16500	24100	45000
Efficiency(%)			90%							
Weight(kg)			1.5	3.5	4.8	8.2	15.5	27.5	32.5	170
Operating temperature (C)			-10°C~ +80°C							
lubricating oil			Synthetic Grease							
Installation Orientation			Any Direction							
Noise level (db/1500(rpn)			≦ 65	≦ 70	≦ 70	≦ 72	≦ 73	≦ 74	≦ 76	≦ 76

(1) Noise level measurement (decibel meter at 1M from gearbox / speed 1500RPM): (Noise level increases at speeds above 2000RPM)
(2) Measurement of backlash value (force distance measurement at 2% of rated revolution).
(3) Continuous use (12 hours/day) reduces life by 1/2 (according to P3 selection).

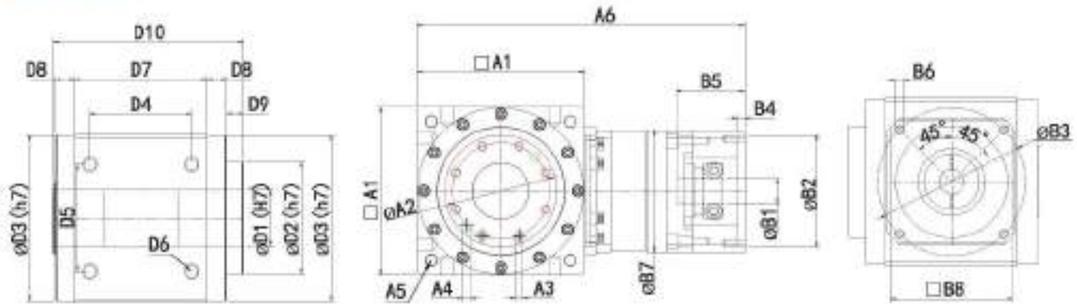
Rotary Inertia of Reducer

Specifications	Gear ratio	AATM045AS	AATM070AS	AATM080AS	AATM110AS	AATM135AS	AATM165AS	AATM200AS	AATM250AS
Inertia gearbox ($kg\text{-}cm^2$)	1/2	0.82		1.68	8.06	24.85	60.25	65.55	152.25
	1/3			1.57	7.92	23.25	55.35	59.50	142.34
	1/5		1.32	1.42	7.58	19.12	47.56	52.57	140.45
	1/10		1.16	1.25	7.35	16.23	41.72	46.42	

AATM–RF Hollow rotating disk type

Reduction Ratio: 1/2 Input with Flange Steering

Dimensions:



Specifications: unit: mm

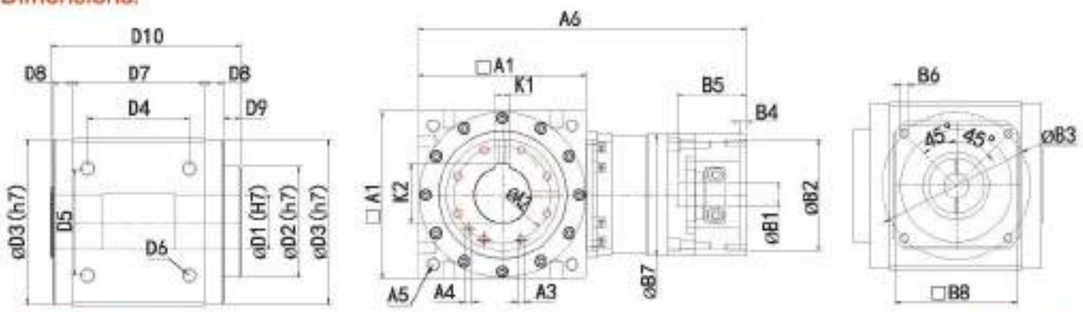
Specifications	AATM045AS	AATM070AS	AATM080AS	AATM110AS	AATM135AS	AATM165AS	AATM200AS	AATM250AS
D1	9	16	*16/20	*25/30	*35/40	*50/55	*65/80	75
D2	20	38	45	65	85	110	140	140
D3	43.2	60	78	106	133	163	195	245
D4	36	41.43	49.5	68	86	106	141	176.78
D5	26	41.43	49.5	65	83	105	130	176.78
D6	4-M4*P0.7	4-M5*P0.8	4-M6*P0.8	4-M8*P1.25	4-M10*P1.5	4-M14*P2.0	4-M14*P2.0	4-M20*P2.5
D7	54	70	67	90	120	142	182	227
D8	10.5	6.25	13	15	10	13	8.5	21
D9	3.5	8.25	7	9.5	9.5	17	22	15
D10	80	92.25	102	131.5	151.5	187	223	284
A1	46	70	80	110	138	168	200	250
A2	15.5	30	36	50	70	95	124	124
A3	6-M3*P0.5	6-M5*P0.8	8-M5*P0.8	8-M5*P0.8	8-M8*P1.25	8-M8*P1.25	12-M8*P1.25	12-M10*P1.5
A4 (H7)		2-φ5	2-φ5	2-φ5	2-φ8	2-φ8	2-φ8	2-φ10
A5	P.C.Dφ53 4-M5*P0.8	P.C.Dφ75 4-M5*P0.8	P.C.Dφ93 4-M6*P1.0	P.C.Dφ130 4-M8*P1.25	P.C.Dφ160 4-M10*P1.5	P.C.Dφ193 4-M12*P1.75	P.C.Dφ240 4-M16*P2.0	P.C.Dφ300 4-M30*P2.5
A6 (總長度)	106	159	157	204	255	307	339	409
B1	5, 6.35, 8	6.35, 8, 9 11, 14	6.35, 8, 9 11, 14, 16, 19	11, 14, 16 19, 22, 24	14, 16, 19 22, 24, 28 32, 35	19, 22, 24 28, 32, 35 38, 42	19, 22, 24 28, 32, 35 38, 42	32, 35, 38 42, 55
B2	22, 30, 38.1	30, 38.1, 40, 50, 60	30, 36, 38.1 40, 50 60, 70	50, 60, 70 80, 95, 110	70, 80, 95 110, 114.3 130	95, 110 114.3, 130 180	95, 110 114.3, 130 180	110, 114.3 130, 165 180, 200
B3	43.8, 45, 46 66.7, 70.7	45, 46, 66.7 70, 70.7, 75	45, 46, 66.7 70, 70.7 75, 90	70, 75, 90 100, 115 130, 145	90, 115, 130 145, 165 200	115, 130 145, 165 200, 215	115, 130 145, 165 200, 215	165, 200 215, 235 250
B4	3	4	4, 5	5, 7	7	7	7	10
B5	≦ 28	≦ 31	≦ 41	≦ 62	≦ 80	≦ 86	≦ 86	≦ 125
B6	M3, M4	M3, M4, M5	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M6, M8 M10, M12	M6, M8 M10, M12	M10, M12 M14, M16 M20
B7	46	60	60	90	120	142	142	200
B8	46	62, 80	62, 80, 90	90, 115, 120	120, 140, 180	142, 180, 200	142, 180, 200	200, 220, 250

1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AATM–RF-K Hollow rotating disk with keyway type

Reduction Ratio: 1/2 Input with Flange Steering

Dimensions:



Specifications: unit: mm

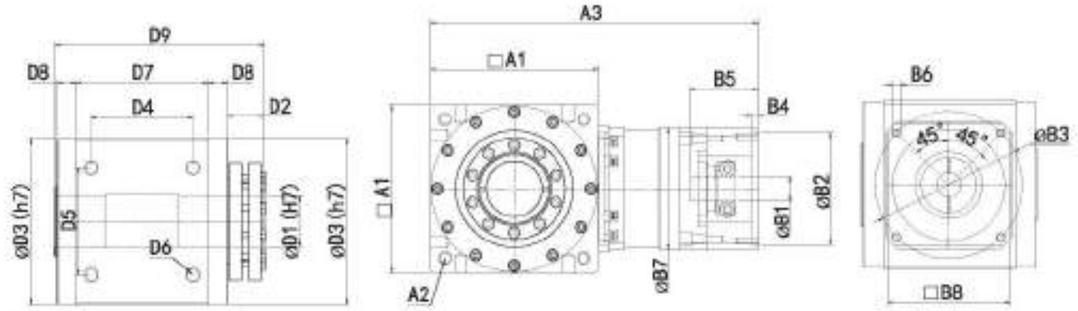
Specifications	AATM045AS	AATM070AS	AATM080AS	AATM110AS	AATM135AS	AATM165AS	AATM200AS	AATM250AS
D1	No production	16	*16/20	*25/30	*35/40	*50/55	*65/80	75
D2		38	45	65	85	110	140	140
D3		60	78	106	133	163	195	245
D4		41.43	49.5	68	86	106	141	176.78
D5		41.43	49.5	65	83	105	130	176.78
D6		4-M5*P0.8	4-M6*P0.8	4-M8*P1.25	4-M10*P1.5	4-M14*P2.0	4-M14*P2.0	4-M20*P2.5
D7		70	67	90	120	142	182	227
D8		6.25	13	15	10	13	8.5	21
D9		8.25	7	9.5	9.5	17	22	15
D10		92.25	102	131.5	151.5	187	223	284
A1		70	80	110	138	168	200	250
A2		30	36	50	70	95	124	124
A3		6-M5*P0.8	8-M5*P0.8	8-M5*P0.8	8-M8*P1.25	8-M8*P1.25	12-M8*P1.25	12-M10*P1.5
A4 (H7)		2-φ5	2-φ5	2-φ5	2-φ8	2-φ8	2-φ8	2-φ10
A5		P.C.Dφ75 4-M5*P0.8	P.C.Dφ93 4-M6*P1.0	P.C.Dφ130 4-M8*P1.25	P.C.Dφ160 4-M10*P1.5	P.C.Dφ193 4-M12*P1.75	P.C.Dφ240 4-M16*P2.0	P.C.Dφ300 4-M30*P2.5
A6 (Total length)		159	157	204	255	307	339	409
K1		5	6	8	*10/12	14	18	20
K2		18.3	22.8	*28.3/33.3	*38.3/43.3	*53.8/58.8	69.4	84.9
B1		6.35, 8, 9 11, 14	6.35, 8, 9 11, 14, 16, 19	11, 14, 16 19, 22, 24	14, 16, 19 22, 24, 28 32, 35	19, 22, 24 28, 32, 35 38, 42	19, 22, 24 28, 32, 35 38, 42	32, 35, 38 42, 55
B2		30, 38.1, 40, 50, 60	30, 36, 38.1 40, 50 60, 70	50, 60, 70 80, 95, 110	70, 80, 95 110, 114.3 130	95, 110 114.3, 130 180	95, 110 114.3, 130 180	110, 114.3 130, 165 180, 200
B3		45, 46, 66.7 70, 70.7, 75	45, 46, 66.7 70, 70.7 75, 90	70, 75, 90 100, 115 130, 145	90, 115, 130 145, 165 200	115, 130 145, 165 200, 215	115, 130 145, 165 200, 215	165, 200 215, 235 250
B4		4	4, 5	5, 7	7	7	7	10
B5		≦ 31	≦ 41	≦ 62	≦ 80	≦ 86	≦ 86	≦ 125
B6		M3, M4 M5	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M6, M8 M10, M12	M6, M8 M10, M12	M10, M12 M14, M16 M20
B7		60	60	90	120	142	142	200
B8		62, 80	62, 80, 90	90, 115, 120	120, 140, 180	142, 180, 200	142, 180, 200	200, 220, 250

1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AATM–HP Hollow shaft expansion sleeve type

Reduction Ratio: 1/2 Input with Flange Steering

Dimensions:



Specifications:

unit: mm

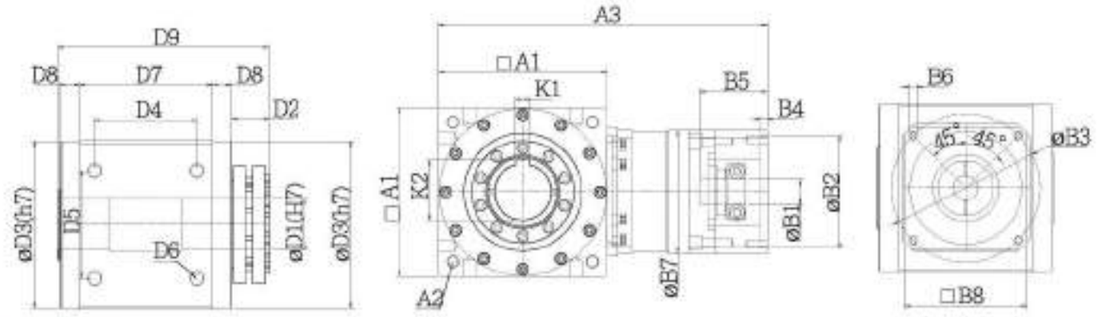
Specifications	AATM045AS	AATM070AS	AATM080AS	AATM110AS	AATM135AS	AATM165AS	AATN200AS	AATM250AS
D1	No production	16	20	*25/30	*35/40	*50/55	65	80
D2		22	23. 25	32	36	36	36. 5	52
D3		60	78	106	133	163	195	245
D4		41. 43	49. 5	68	86	106	141	176. 78
D5		41. 43	49. 5	65	83	105	130	176. 78
D6		4-M5*P0. 8	4-M6*P0. 8	4-M8*P1. 25	4-M10*P1. 5	4-M14*P2. 0	4-M14*P2. 0	4-M20*P2. 5
D7		70	67	90	120	142	182	227
D8		6. 25	13	15	10	13	8. 5	21
D9		104. 5	116. 25	152	176	204	235. 5	325
A1		70	80	110	138	168	200	250
A2		P. C. Dφ 75 4-M5*P0. 8	P. C. Dφ 93 4-M6*P1. 0	P. C. Dφ 130 4-M8*P1. 25	P. C. Dφ 160 4-M10*P1. 5	P. C. Dφ 193 4-M12*P1. 75	P. C. Dφ 240 4-M16*P2. 0	P. C. Dφ 300 4-M30*P2. 5
A3 (Total length)		159	157	204	255	307	339	409
B1		6. 35, 8, 9 11, 14	6. 35, 8, 9 11, 14, 16, 19	11, 14, 16 19, 22, 24	14, 16, 19 22, 24, 28 32, 35	19, 22, 24 28, 32, 35 38, 42	19, 22, 24 28, 32, 35 38, 42	32, 35, 38 42, 55
B2		30, 38. 1, 40, 50, 60	30, 36, 38. 1 40, 50 60, 70	50, 60, 70 80, 95, 110	70, 80, 95 110, 114. 3 130	95, 110 114. 3, 130 180	95, 110 114. 3, 130 180	110, 114. 3 130, 165 180, 200
B3		45, 46, 66. 7 70, 70. 7, 75	45, 46, 66. 7 70, 70. 7 75, 90	70, 75, 90 100, 115 130, 145	90, 115, 130 145, 165 200	115, 130 145, 165 200, 215	115, 130 145, 165 200, 215	165, 200 215, 235 250
B4		4	4, 5	5, 7	7	7	7	10
B5		≦ 31	≦ 41	≦ 62	≦ 80	≦ 86	≦ 86	≦ 125
B6		M3, M4 M5	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M6, M8 M10, M12	M6, M8 M10, M12	M10, M12 M14, M16 M20
B7		60	60	90	120	142	142	200
B8		62, 80	62, 80, 90	90, 115, 120	120, 140, 180	142, 180, 200	142, 180, 200	200, 220, 250

1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AATM–HP-K Hollow Shaft Expansion Bushing with Keyway Type

Reduction Ratio: 1/2 Input with Flange Steering

Dimensions:



Specifications:

unit: mm

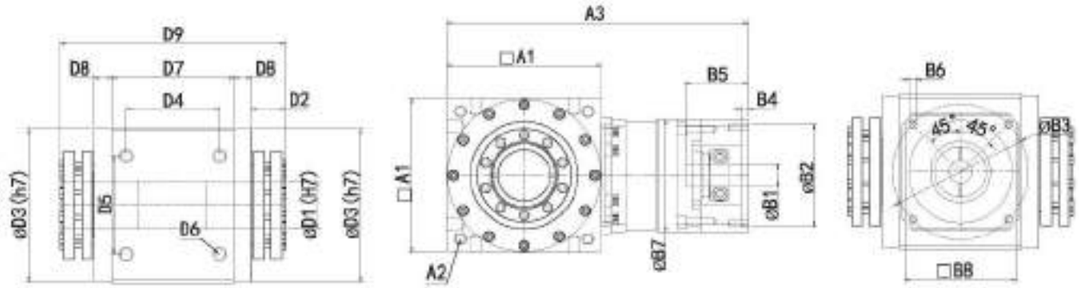
Specifications	AATM045AS	AATM070AS	AATM080AS	AATM110AS	AATM135AS	AATM165AS	AATM200AS	AATM250AS
D1	No production	16	16	*25/30	*35/40	*50/55	65	80
D2		22	23. 25	32	36	36	36. 5	52
D3		60	78	106	133	163	195	245
D4		41. 43	49. 5	68	86	106	141	176. 78
D5		41. 43	49. 5	65	83	105	130	176. 78
D6		4-M5*P0. 8	4-M6*P0. 8	4-M8*P1. 25	4-M10*P1. 5	4-M14*P2. 0	4-M14*P2. 0	4-M20*P2. 5
D7		70	67	90	120	142	182	227
D8		6. 25	13	15	10	13	8. 5	21
D9		104. 5	116. 25	152	176	204	235. 5	325
A1		70	80	110	138	168	200	250
A2		P. C. Dφ 75 4-M5*P0. 8	P. C. Dφ 93 4-M6*P1. 0	P. C. Dφ 130 4-M8*P1. 25	P. C. Dφ 160 4-M10*P1. 5	P. C. Dφ 193 4-M12*P1. 75	P. C. Dφ 240 4-M16*P2. 0	P. C. Dφ 300 4-M30*P2. 5
A3 (Total length)		159	157	204	255	307	339	409
K1		5	5	8	*10/12	14	18	20
K2		18. 3	18. 3	*28. 3/33. 3	*38. 3/43. 3	*53. 8/58. 8	69. 4	84. 9
B1		6. 35, 8, 9 11, 14	6. 35, 8, 9 11, 14, 16, 19	11, 14, 16 19, 22, 24	14, 16, 19 22, 24, 28 32, 35	19, 22, 24 28, 32, 35 38, 42	19, 22, 24 28, 32, 35 38, 42	32, 35, 38 42, 55
B2		30, 38. 1, 40, 50, 60	30, 36, 38. 1 40, 50 60, 70	50, 60, 70 80, 95, 110	70, 80, 95 110, 114. 3 130	95, 110 114. 3, 130 180	95, 110 114. 3, 130 180	110, 114. 3 130, 165 180, 200
B3		45, 46, 66. 7 70, 70. 7, 75	45, 46, 66. 7 70, 70. 7 75, 90	70, 75, 90 100, 115 130, 145	90, 115, 130 145, 165 200	115, 130 145, 165 200, 215	115, 130 145, 165 200, 215	165, 200 215, 235 250
B4		4	4, 5	5, 7	7	7	7	10
B5		≦ 31	≦ 41	≦ 62	≦ 80	≦ 86	≦ 86	≦ 125
B6		M3, M4 M5	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M6, M8 M10, M12	M6, M8 M10, M12	M10, M12 M14, M16 M20
B7		60	60	90	120	142	142	200
B8		62, 80	62, 80, 90	90, 115, 120	120, 140, 180	142, 180, 200	142, 180, 200	200, 220, 250

1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AATM-2HP Double hollow shaft expansion sleeve type

Reduction Ratio: 1/2 Input with Flange Steering

Dimensions:



Specifications: unit: mm

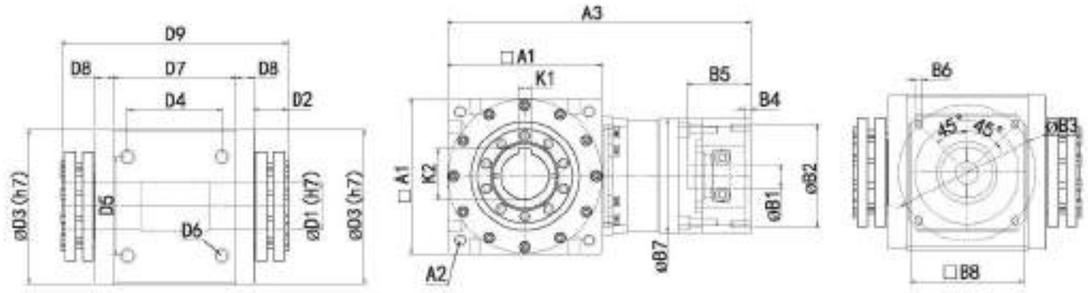
Specifications	AATM045AS	AATM070AS	AATM080AS	AATM110AS	AATM135AS	AATM165AS	AATM200AS	AATM250AS
D1	No production	16	20	*25/30	*35/40	*50/55	65	80
D2		22	23. 25	32	36	36	36. 5	52
D3		60	78	106	133	163	195	245
D4		41. 43	49. 5	68	86	106	141	176. 78
D5		41. 43	49. 5	65	83	105	130	176. 78
D6		4-M5*P0. 8	4-M6*P0. 8	4-M8*P1. 25	4-M10*P1. 5	4-M14*P2. 0	4-M14*P2. 0	4-M20*P2. 5
D7		70	67	90	120	142	182	227
D8		6. 25	13	15	10	13	8. 5	21
D9		104. 5	116. 25	152	176	204	235. 5	325
A1		70	80	110	138	168	200	250
A2		P. C. Dφ 75 4-M5*P0. 8	P. C. Dφ 93 4-M6*P1. 0	P. C. Dφ 130 4-M8*P1. 25	P. C. Dφ 160 4-M10*P1. 5	P. C. Dφ 193 4-M12*P1. 75	P. C. Dφ 240 4-M16*P2. 0	P. C. Dφ 300 4-M30*P2. 5
A3 (Total length)		159	157	204	255	307	339	409
B1		6. 35, 8, 9 11, 14	6. 35, 8, 9 11, 14, 16, 19	11, 14, 16 19, 22, 24	14, 16, 19 22, 24, 28 32, 35	19, 22, 24 28, 32, 35 38, 42	19, 22, 24 28, 32, 35 38, 42	32, 35, 38 42, 55
B2		30, 38. 1, 40, 50, 60	30, 36, 38. 1 40, 50 60, 70	50, 60, 70 80, 95, 110	70, 80, 95 110, 114. 3 130	95, 110 114. 3, 130 180	95, 110 114. 3, 130 180	110, 114. 3 130, 165 180, 200
B3		45, 46, 66. 7 70, 70. 7, 75	45, 46, 66. 7 70, 70. 7 75, 90	70, 75, 90 100, 115 130, 145	90, 115, 130 145, 165 200	115, 130 145, 165 200, 215	115, 130 145, 165 200, 215	165, 200 215, 235 250
B4		4	4. 5	5. 7	7	7	7	10
B5		≦31	≦41	≦62	≦80	≦86	≦86	≦125
B6		M3, M4 M5	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M6, M8 M10, M12	M6, M8 M10, M12	M10, M12 M14, M16 M20
B7		60	60	90	120	142	142	200
B8		62, 80	62, 80, 90	90, 115, 120	120, 140, 180	142, 180, 200	142, 180, 200	200, 220, 250

1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AATM-2HP-K Double Hollow Shaft Expansion Bushing with Keyway Type

Reduction Ratio: 1/2 Input with Flange Steering

Dimensions:



Specifications: unit: mm

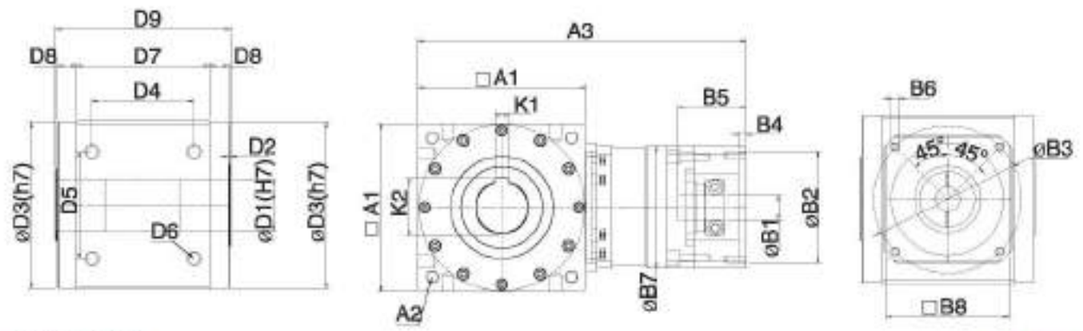
Specifications	AATM045AS	AATM070AS	AATM080AS	AATM110AS	AATM135AS	AATM165AS	AATM200AS	AATM250AS
D1	No production	16	16	*25/30	*35/40	*50/55	65	80
D2		22	23. 25	32	36	36	36. 5	52
D3		60	78	106	133	163	195	245
D4		41. 43	49. 5	68	86	106	141	176. 78
D5		41. 43	49. 5	65	83	105	130	176. 78
D6		4-M5*P0. 8	4-M6*P0. 8	4-M8*P1. 25	4-M10*P1. 5	4-M14*P2. 0	4-M14*P2. 0	4-M20*P2. 5
D7		70	67	90	120	142	182	227
D8		6. 25	13	15	10	13	8. 5	21
D9		126. 5	139. 5	184	212	240	272	377
A1		70	80	110	138	168	200	250
A2		P. C. Dφ 75 4-M5*P0. 8	P. C. Dφ 93 4-M6*P1. 0	P. C. Dφ 130 4-M8*P1. 25	P. C. Dφ 160 4-M10*P1. 5	P. C. Dφ 193 4-M12*P1. 75	P. C. Dφ 240 4-M16*P2. 0	P. C. Dφ 300 4-M30*P2. 5
A3 (Total length)		159	157	204	255	307	339	409
K1		5	5	8	*10/12	14	18	20
K2		18. 3	18. 3	*28. 3/33. 3	*38. 3/43. 3	*53. 8/58. 8	69. 4	84. 9
B1		6. 35, 8, 9 11, 14	6. 35, 8, 9 11, 14, 16, 19	11, 14, 16 19, 22, 24	14, 16, 19 22, 24, 28 32, 35	19, 22, 24 28, 32, 35 38, 42	19, 22, 24 28, 32, 35 38, 42	32, 35, 38 42, 55
B2		30, 38. 1, 40, 50, 60	30, 36, 38. 1 40, 50 60, 70	50, 60, 70 80, 95, 110	70, 80, 95 110, 114. 3 130	95, 110 114. 3, 130 180	95, 110 114. 3, 130 180	110, 114. 3 130, 165 180, 200
B3		45, 46, 66. 7 70, 70. 7, 75	45, 46, 66. 7 70, 70. 7 75, 90	70, 75, 90 100, 115 130, 145	90, 115, 130 145, 165 200	115, 130 145, 165 200, 215	115, 130 145, 165 200, 215	165, 200 215, 235 250
B4		4	4, 5	5, 7	7	7	7	10
B5		≦31	≦41	≦62	≦80	≦86	≦86	≦125
B6		M3, M4 M5	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M6, M8 M10, M12	M6, M8 M10, M12	M10, M12 M14, M16 M20
B7		60	60	90	120	142	142	200
B8		62, 80	62, 80, 90	90, 115, 120	120, 140, 180	142, 180, 200	142, 180, 200	200, 220, 250

1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AATM–CR Hollow shaft with keyway

Reduction Ratio: 1/2 Input with Flange Steering

Dimensions:



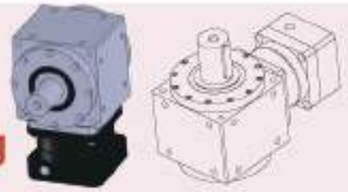
Specifications: unit: mm

Specifications	AATM045AS	AATM070AS	AATM080AS	AATM110AS	AATM135AS	AATM165AS	AATM200AS	AATM250AS
D1	No production	16	20	*25/30	*35/40	*50/55	65	80
D2		1.5	1.75	2	3	2	2	2
D3		60	78	106	133	163	195	245
D4		41.43	49.5	68	86	106	141	176.78
D5		41.43	49.5	65	83	105	130	176.78
D6		4-M5*P0.8	4-M6*P0.8	4-M8*P1.25	4-M10*P1.5	4-M14*P2.0	4-M14*P2.0	4-M20*P2.5
D7		70	67	90	120	142	182	227
D8		6.25	13	15	10	13	8.5	21
D9		85.5	96.5	124	146	172	202	273
A1		70	80	110	138	168	200	250
A2		P.C.Dφ 75 4-M5*P0.8	P.C.Dφ 93 4-M6*P1.0	P.C.Dφ 130 4-M8*P1.25	P.C.Dφ 160 4-M10*P1.5	P.C.Dφ 193 4-M12*P1.75	P.C.Dφ 240 4-M16*P2.0	P.C.Dφ 300 4-M30*P2.5
A3 (Total length)		159	157	204	255	307	339	409
K1		5	6	8	*10/12	14	18	20
K2		18.3	22.8	*28.3/33.3	*38.3/43.3	*53.8/58.8	69.4	84.9
B1		6, 35, 8, 9 11, 14	6, 35, 8, 9 11, 14, 16, 19	11, 14, 16 19, 22, 24	14, 16, 19 22, 24, 28 32, 35	19, 22, 24 28, 32, 35 38, 42	19, 22, 24 28, 32, 35 38, 42	32, 35, 38 42, 55
B2		30, 38.1, 40, 50, 60	30, 36, 38.1 40, 50 60, 70	50, 60, 70 80, 95, 110	70, 80, 95 110, 114.3 130	95, 110 114.3, 130 180	95, 110 114.3, 130 180	110, 114.3 130, 165 180, 200
B3		45, 46, 66.7 70, 70.7, 75	45, 46, 66.7 70, 70.7 75, 90	70, 75, 90 100, 115 130, 145	90, 115, 130 145, 165 200	115, 130 145, 165 200, 215	115, 130 145, 165 200, 215	165, 200 215, 235 250
B4		4	4, 5	5, 7	7	7	7	10
B5		≦31	≦41	≦62	≦80	≦86	≦86	≦125
B6		M3, M4 M5	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M6, M8 M10, M12	M6, M8 M10, M12	M10, M12 M14, M16 M20
B7		60	60	90	120	142	142	200
B8		62, 80	62, 80, 90	90, 115, 120	120, 140, 180	142, 180, 200	142, 180, 200	200, 220, 250

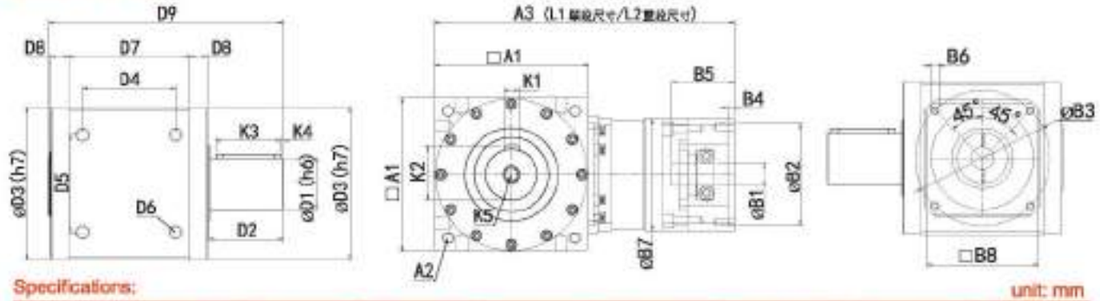
1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

AATM–P Single output shaft type

Reduction Ratio: 1/2 Input with Flange Steering



Dimensions:



Specifications: unit: mm

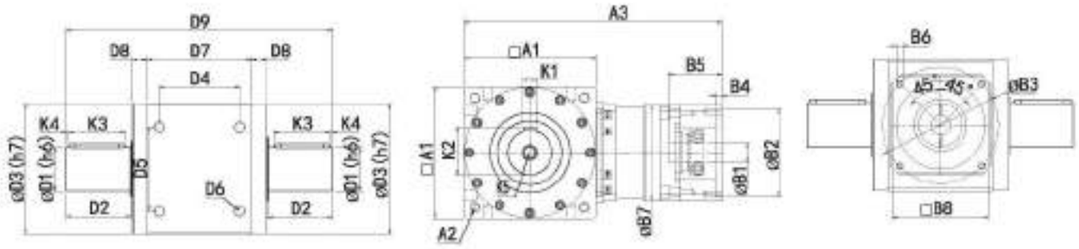
Specifications	AATM045AS	AATM070AS	AATM080AS	AATM110AS	AATM135AS	AATM165AS	AATM200AS	AATM250AS
D1	13	16	20	30	40	55	75	80
D2	20	25	35	45	55	80	100	95
D3	43.2	60	78	106	133	163	195	245
D4	36	41.43	49.5	68	86	106	141	176.78
D5	26	41.43	49.5	65	83	105	130	176.78
D6	4-M4*P0.7	4-M5*P0.8	4-M6*P0.8	4-M8*P1.25	4-M10*P1.5	4-M14*P2.0	4-M14*P2.0	4-M20*P2.5
D7	54	70	67	90	120	142	182	227
D8	10.5	6.25	13	15	10	13	8.5	21
D9	98	110.5	132	169	201	252	402	368
A1	46	70	80	110	138	168	200	250
A2	P.C.Dφ 53 4-M5*P0.8	P.C.Dφ 75 4-M5*P0.8	P.C.Dφ 93 4-M6*P1.0	P.C.Dφ 130 4-M8*P1.25	P.C.Dφ 160 4-M10*P1.5	P.C.Dφ 193 4-M12*P1.75	P.C.Dφ 240 4-M16*P2.0	P.C.Dφ 300 4-M30*P2.5
A3 (Total length)	106	159	157	204	255	307	339	409
K1	4	5	6	8	12	16	20	20
K2	14.5	18	22.5	33	43	59	79.5	84.5
K3	15	20	30	35	45	70	90	75
K4	2.5	3	3	5	5	3	5	5
K5	M4	M5	M6	M8	M12	M16	M20	M20
B1	5, 6.35, 8	6.35, 8, 9 11, 14	6.35, 8, 9 11, 14 16, 19	11, 14, 16 19, 22, 24	14, 16, 19 22, 24, 28 32, 35	19, 22, 24 28, 32, 35 38, 42	19, 22, 24 28, 32, 35 38, 42	32, 35, 38 42, 55
B2	22, 30, 38.1	30, 38.1, 40 50, 60	30, 36, 38.1 40, 50 60, 70	50, 60, 70 80, 95, 110	70, 80 95, 110 114.3, 130	95, 110 114.3, 130 180	95, 110 114.3, 130 180	110, 114.3 130, 165 180, 200
B3	43.8, 45, 46 66.7, 70.7	45, 46, 66.7 70, 70.7, 75	45, 46, 66.7 70, 70.7 75, 90	70, 75, 90 100, 115 130, 145	90, 115 130, 145 165, 200	115, 130 145, 165 200, 215	115, 130 145, 165 200, 215	165, 200 215, 235 250
B4	3	4	4, 5	5, 7	7	7	7	10
B5	≦28	≦31	≦41	≦62	≦80	≦86	≦86	≦125
B6	M3, M4	M3, M4 M5	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M6, M8 M10, M12	M6, M8 M10, M12	M10, M12 M14, M16 M20
B7	46	60	60	90	120	142	142	200
B8	46	62, 80	62, 80, 90	90, 115 120	120, 140 180	142, 180 200	142, 180 200	200, 220 250

1. Actual size is based on 2D/3D drawings. 2. Life expectancy will be shortened by 1/2 if used continuously for more than 12 hours/day.

AATM–2P Dual output shaft type

Reduction Ratio: 1/2 Input with Flange Steering

Dimensions:



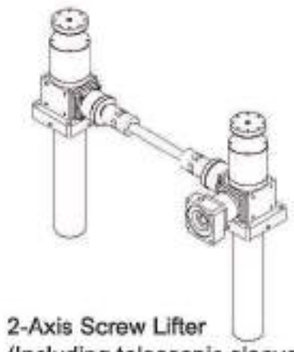
Specifications: unit: mm

Specifications	AATM045AS	AATM070AS	AATM080AS	AATM110AS	AATM135AS	AATM165AS	AATM200AS	AATM250AS
D1	13	16	20	30	40	55	75	80
D2	20	25	35	45	55	80	100	95
D3	43. 2	60	78	106	133	163	195	245
D4	36	41. 43	49. 5	68	86	106	141	176. 78
D5	26	41. 43	49. 5	65	83	105	130	176. 78
D6	4-M4*P0. 7	4-M5*P0. 8	4-M6*P0. 8	4-M8*P1. 25	4-M10*P1. 5	4-M14*P2. 0	4-M16*P2. 0	4-M20*P2. 5
D7	54	70	67	90	120	142	182	227
D8	10. 5	6. 25	13	15	10	13	8. 5	21
D9	118	135. 5	167	214	256	332	402	463
A1	46	70	80	110	138	168	200	250
A2	P. C. Dφ 53 4-M5*P0. 8	P. C. Dφ 75 4-M5*P0. 8	P. C. Dφ 93 4-M6*P1. 0	P. C. Dφ 130 4-M8*P1. 25	P. C. Dφ 160 4-M10*P1. 5	P. C. Dφ 193 4-M12*P1. 75	P. C. Dφ 240 4-M16*P2. 0	P. C. Dφ 300 4-M30*P2. 5
A3 (Total length)	106	159	157	204	255	307	339	409
K1	4	5	6	8	12	16	20	20
K2	14. 5	18	22. 5	33	43	59	79. 5	84. 5
K3	15	20	30	35	45	70	90	75
K4	2. 5	3	3	5	5	3	5	5
K5	M4	M5	M6	M8	M12	M16	M20	M20
B1	5, 6. 35, 8	6. 35, 8, 9 11, 14	6. 35, 8, 9 11, 14 16, 19	11, 14, 16 19, 22, 24	14, 16, 19 22, 24, 28 32, 35	19, 22, 24 28, 32, 35 38, 42	19, 22, 24 28, 32, 35 38, 42	32, 35, 38 42, 55
B2	22, 30, 38. 1	30, 38. 1, 40 50, 60	30, 36, 38. 1 40, 50 60, 70	50, 60, 70 80, 95, 110	70, 80 95, 110 114. 3, 130	95, 110 114. 3, 130 180	95, 110 114. 3, 130 180	110, 114. 3 130, 165 180, 200
B3	43. 8, 45, 46 66. 7, 70. 7	45, 46, 66. 7 70, 70. 7, 75	45, 46, 66. 7 70, 70. 7 75, 90	70, 75, 90 100, 115 130, 145	90, 115 130, 145 165, 200	115, 130 145, 165 200, 215	115, 130 145, 165 200, 215	165, 200 215, 235 250
B4	3	4	4, 5	5, 7	7	7	7	10
B5	≤28	≤31	≤41	≤62	≤80	≤86	≤86	≤125
B6	M3, M4	M3, M4 M5	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M6, M8 M10, M12	M6, M8 M10, M12	M10, M12 M14, M16 M20
B7	46	60	60	90	120	142	142	200
B8	46	62, 80	62, 80, 90	90, 115 120	120, 140 180	142, 180 200	142, 180 200	200, 220 250

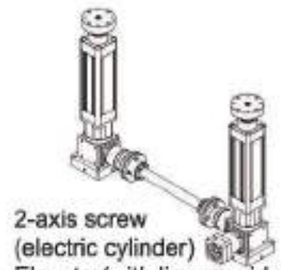
1. Actual size is based on 2D/3D drawings. 2. Life expectancy will be shortened by 1/2 if used continuously for more than 12 hours/day.

RB Introduction of screw lift types

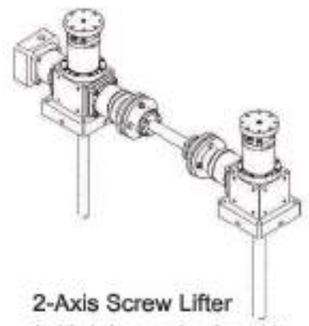
1.Screw type 2.Electric cylinder type 3.Piston type 4.Multi-point type
2.Multi-axis selection: 1 axis/2 axis/3 axis/4 axis/5 axis/6 axis.
3.Customised products



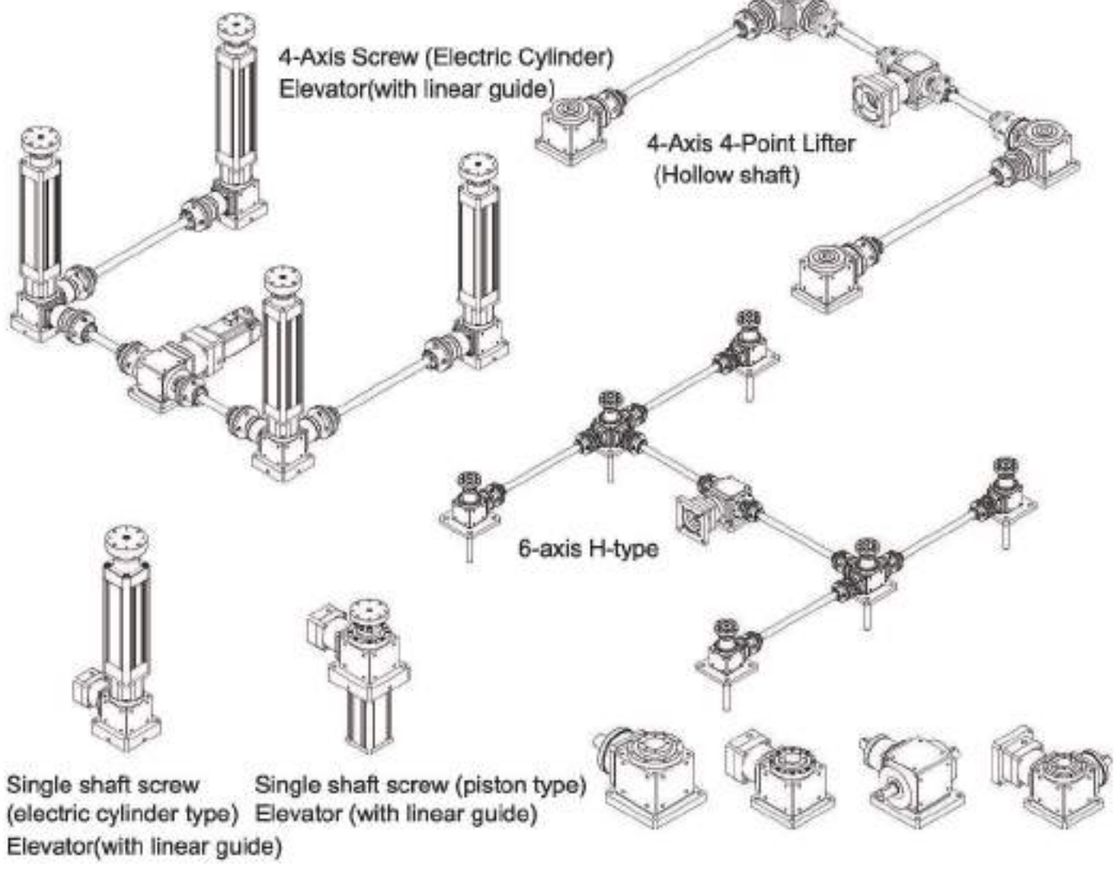
2-Axis Screw Lifter
(Including telescopic sleeve and tube)



2-axis screw
(electric cylinder)
Elevator(with linear guide)



2-Axis Screw Lifter
(with telescopic sleeve)



Single shaft screw
(electric cylinder type)
Elevator(with linear guide)

Single shaft screw (piston type)
Elevator (with linear guide)

RB Synchronised Screw Jacks

RB-G1-JDT

Single-axis screw jack cylinder type

RB080AS – G4U – A – 10 – BST – M – L100 – d – B – C – 4-G

Model
RB080AS
RB110AS
RB135AS
RB165AS
200BS

Transmission type
Motor driven centre

Gear ratio
Gears according to performance table
1/3~1/100

Retractable tube

Effective length
L100:100(mm)
Production range 20~600(mm)

Input shaft bore φd, flange φB threaded hole φC/4-G
As shown in Fig. 1

Lifting method

BS:Screw (horizontal/lifting)
BST:Screw lifting + top plate
JDT:Cylinder lifting type + top plate
AHT:Piston lifting type + top plate
BHT:Screw lifting + telescopic tube
CR:Multi-point lifting (Nut movement)

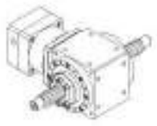
Number of screw shafts

G1:Single Axis BST

G1:Single Axis AHT

G1:Single Axis JDT

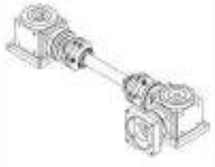
G1:Single Axis BS



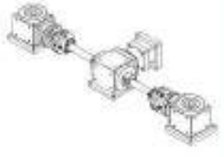
G2:2 Axis BST

G2-A:2 Axis BST

G2:2 Axis CR



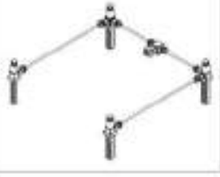
G2-A:2 Axis CR



G4U-A:4 Axis JDT

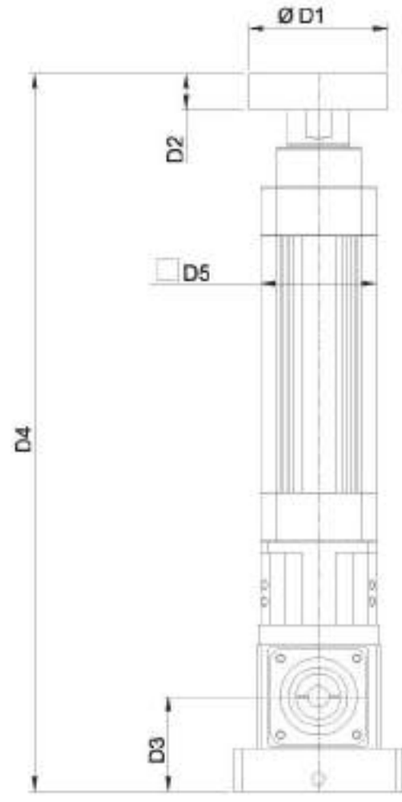
G4H-A:4 Axis JDT

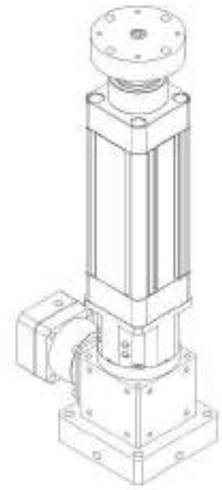
G4U-A:4 Axis AHT

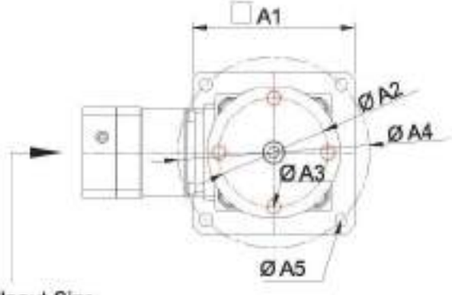


G4-A:4 Axis CR

Dimensions:







*Input Size
(depending on the selected motor)

P.S: Electric Cylinder Type (Including Linear Guide)

1. Ball screw diameter (16/20/25/32).
2. Ball screw guide (5/10/20/25/32).
3. Correct size according to 2D/3D standard.

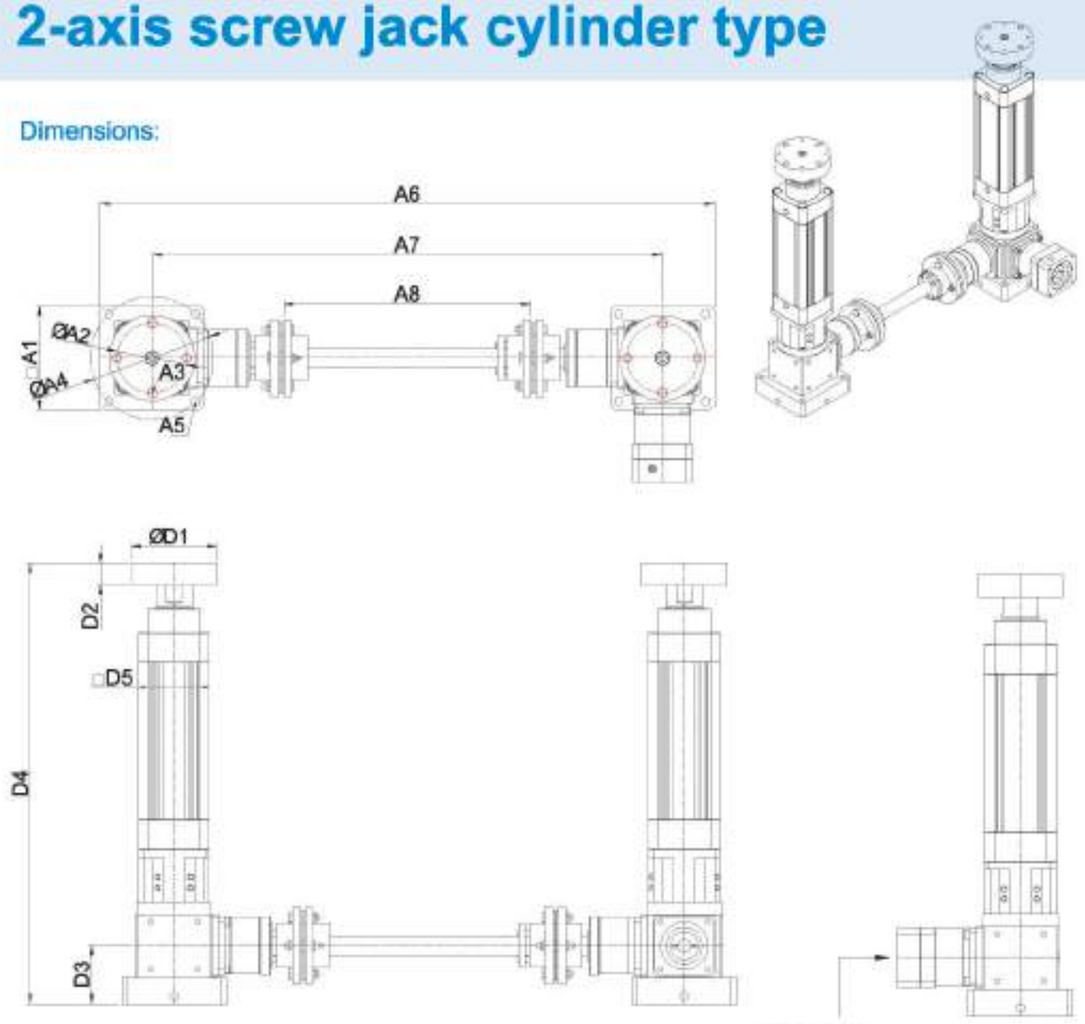
Specifications: unit: mm

Specification	D1	D2	D3	D4	D5	A1	A2	A3	A4	A5
RB080AS-G1-JDT75	90	23	61.5	Interactive itinerary (mm)	75	110	74	4-M10	130	4-φ 8.5
RB110AS-G1-JDT97	90	23	61.5/65		97	142	74	4-M10	170	4-φ 8.5

RB-G2-JDT

2-axis screw jack cylinder type

Dimensions:



P.S: Electric Cylinder Type (Including Linear Guide)

1. Ball screw diameter (16/20/25/32).
2. Ball screw guide (5/10/20/25/32).
3. Correct size according to 2D/3D standard.

Specifications:

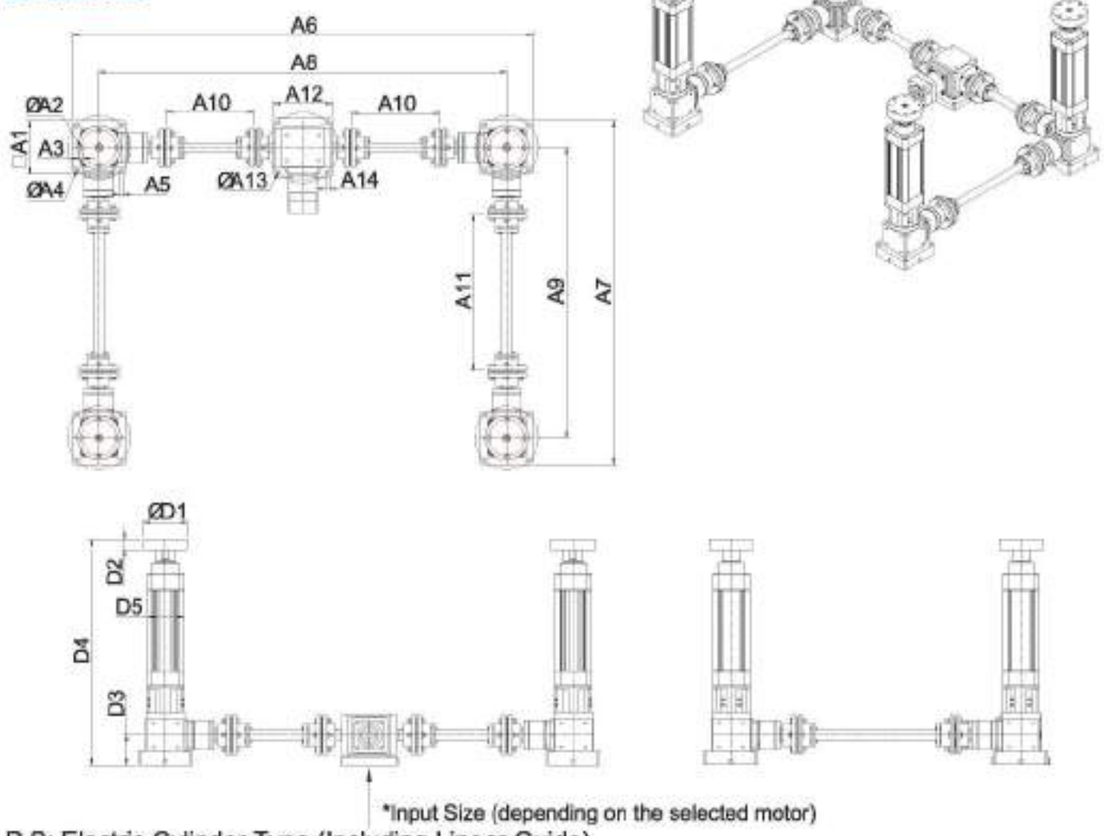
unit: mm

Specification	D1	D2	D3	D4	D5	A1	A2	A3	A4	A5	A6	A7	A8
RB080AS-G2-JDT75	90	23	61.5	Depends on actual stroke (mm)	75	110	74	4-M10	130	4-φ 8.5	*Depends on screw span		
RB110AS-G2-JDT97	90	23	61.5/65		97	142	74	4-M10	170	4-φ 8.5			

RB-G4U-A-JDT

4-axis screw jack cylinder type

Dimensions:



P.S: Electric Cylinder Type (Including Linear Guide)

1. Ball screw diameter (16/20/25/32).
2. Ball screw guide (5/10/20/25/32).
3. Correct size according to 2D/3D standard.

Specifications:

unit: mm

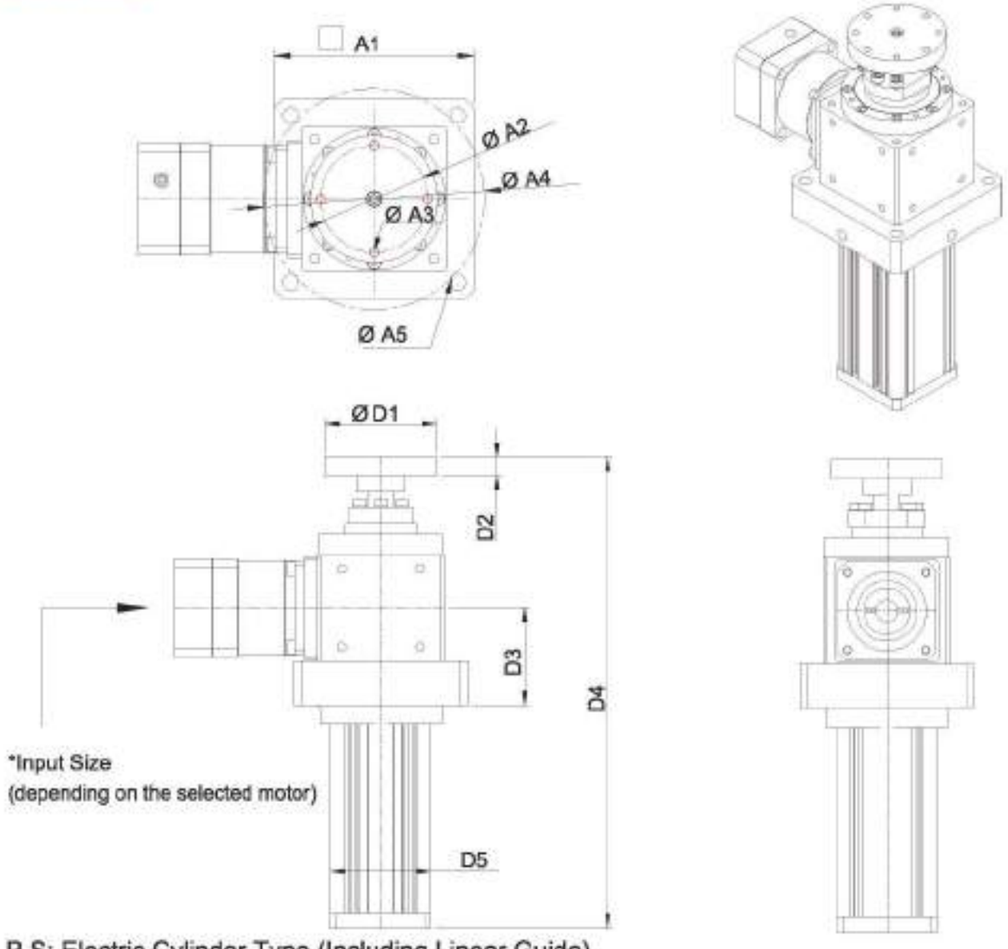
Specification	D1	D2	D3	D4	D5	A1	A2	A3	A4	A5	A6	A7	A8
RB080AS-G4U-JDT75	90	23	61.5	Depends on actual stroke (mm)	75	110	74	4-M10	130	4-φ 8.5	*Depends on screw span		
RB110AS-G4U-JDT97	90	23	61.5/65		97	142	74	4-M10	170	4-φ 8.5			

Specification	D9	D10	D11	D12	D13	A14
RB080AS-G4U-JDT75	*Depends on screw span			120	145	4-φ 8.5
RB110AS-G4U-JDT97				142	170	4-φ 8.5

RB-G1-AHT

Single shaft screw jack piston type

Dimensions:



P.S: Electric Cylinder Type (Including Linear Guide)

1. Ball screw diameter (16/20/25/32).
2. Ball screw guide (5/10/20/25/32).
3. Correct size according to 2D/3D standard.

Specifications:

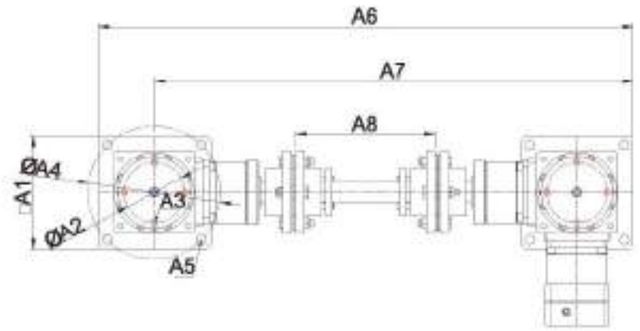
unit: mm

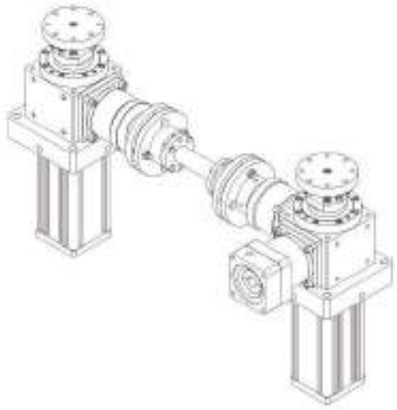
Specification	D1	D2	D3	D4	D5	A1	A2	A3	A4	A5
RB080AS-G1-AHT	70	12	61.5	Depends on actual stroke (mm)	63	110	59	4-M6	130	4-φ 8.5
RB110AS-G1-AHT	90	23	61.5/65		75	142	74	4-M10	170	4-φ 8.5

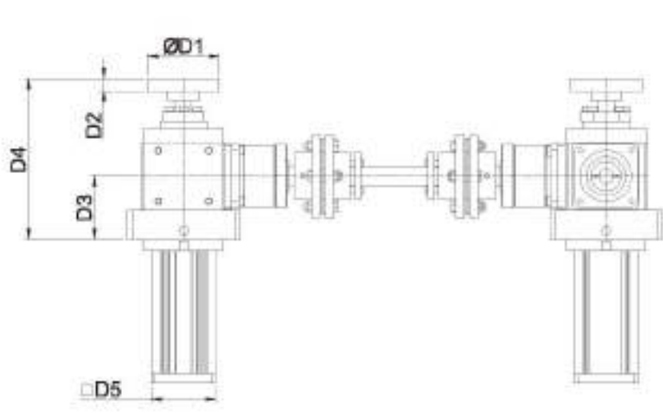
RB-G2-AHT

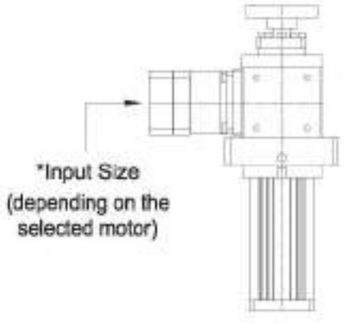
2-axis screw jack piston type

Dimensions:









P.S: Electric Cylinder Type (Including Linear Guide)

1. Ball screw diameter (16/20/25/32).
2. Ball screw guide (5/10/20/25/32).
3. Correct size according to 2D/3D standard.

Specifications:

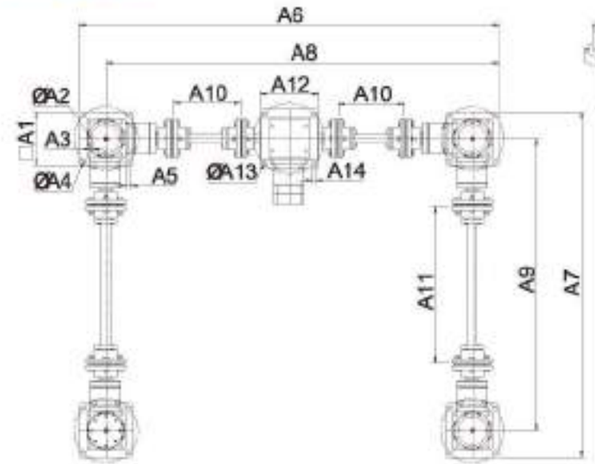
unit: mm

Specification	D1	D2	D3	D4	D5	A1	A2	A3	A4	A5	A6	A7	A8
RB080AS-G2-AHT	70	12	61.5	Depends on actual stroke (mm)	63	110	59	4-M6	130	4-φ 8.5	*Depends on screw span		
RB110AS-G2-AHT	90	23	61.5/65		75	142	74	4-M10	170	4-φ 8.5			

RB-G4U-AHT

4-Axis Screw Jack Piston Type

Dimensions:



(Depends on the selected motor)

P.S: Piston type (with linear guide)

1. Ball screw diameter(16/20/25)。
2. Ball screw lead(5/10/20/25)。
3. Correct size according to 2D/3D。

Specifications:

unit: mm

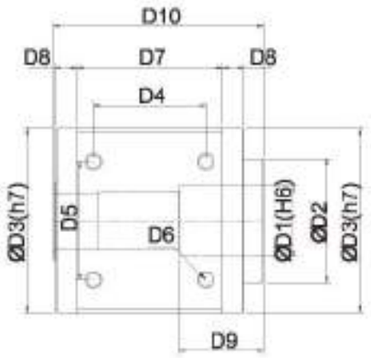
Specification	D1	D2	D3	D4	D5	A1	A2	A3	A4	A5	A6	A7	A8
RB080AS-G4U-AHT	70	12	61.5	Depends on actual stroke	63	110	59	4-M6	130	4-φ 8.5	*Dependent on screw span		
RB110AS-G4U-AHT	90	23	61.5/55	(mm)	75	142	74	4-M10	170	4-φ 8.5			

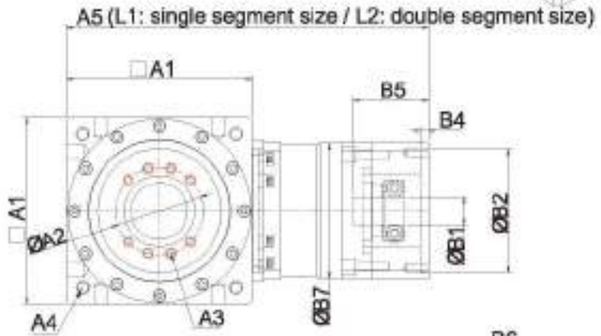
Specification	D9	D10	D11	D12	D13	A14
RB080AS-G4U-AHT	*Dependent on screw span			120	145	4-φ 8.5
RB110AS-G4U-AHT				142	170	4-φ 8.5

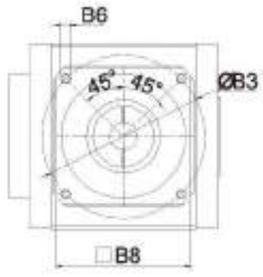
RB-BS Single shaft screw reducer type

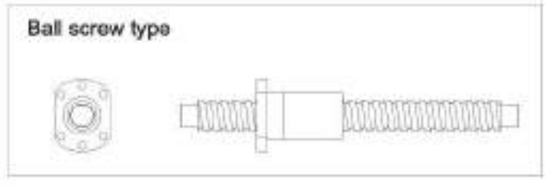
Reduction ratio： 1/2~1/50(Without screw)

Dimensions:









P.S: Hollow shaft with ball screws of various brands.

1. Screw Diameter(16/20/25/32/40/50)。
2. Screw guide(5/10/20/25/32/40/50)。
3. Actual dimensions are subject to 2D/3D.。

Specifications:

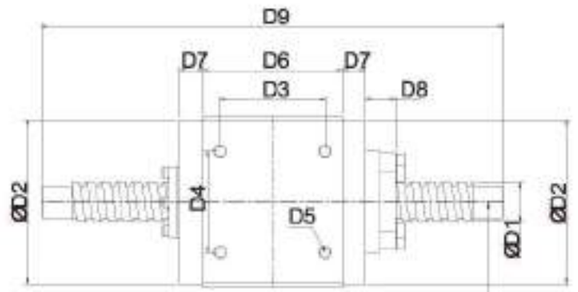
unit: mm

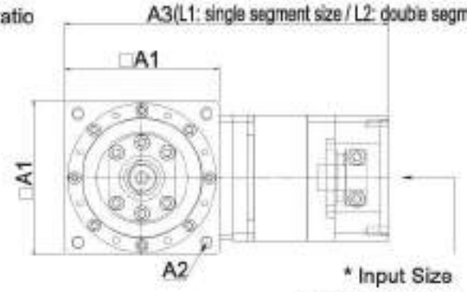
Specification	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	A1	A2	A3	A4	A5
RXW080AS	28/36	45	78	49.5	49.5	4-M6	67	13	Depends on screw size		80	Depends on screw size		4-M6	Depends on the selected motor
RXW110AS	40	65	106	68	65	4-M8	90	15			110			4-M8	
RXW135BS	50	85	133	78	83	4-M10	102	19			135			4-M10	
RXW165BS	63	110	163	100	105	4-M14	130	19			165			4-M12	
RXW200BS	75	140	195	129	130	4-M14	155	22			200			4-M16	

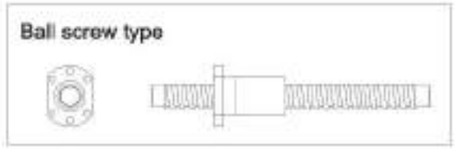
RB-BS Single-axis screw reducer type

Reduction ratio：1/2~1/50(with ball screw)

Dimensions:







Specifications:

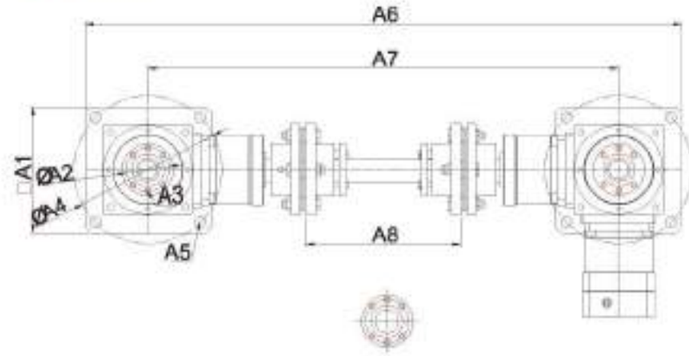
unit: mm

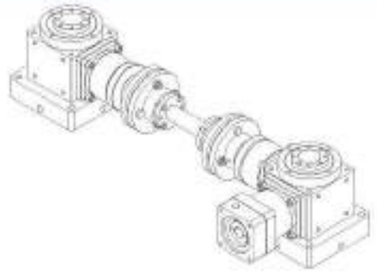
Specification	D1	D2	D3	D4	D5	D6	D7	D8	D9	A1	A2	Input shaft/ flange
RXW080AS	16/20	78	49.5	49.5	4-M6	67	13	Depends on selected screw size		80	4-M6	Depends on the selected motor
RXW110AS	25	106	68	65	4-M8	90	15			110	4-M8	
RXW135BS	32	133	78	83	4-M10	102	19			135	4-M10	
RXW165BS	40	163	100	105	4-M14	130	19			165	4-M12	
RXW200BS	50	195	129	130	4-M14	155	22			200	4-M16	

RB-G2-BS Screw Jack

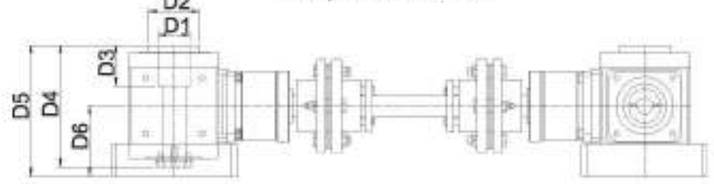
Reduction ratio：1/2~1/50(Without screw) Type

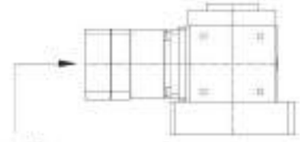
Dimensions:





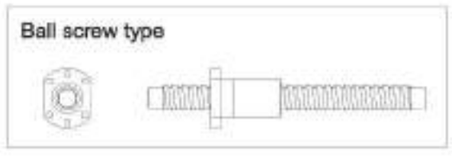
* Depends on nut size





* Input Size

(Depends on the selected motor)



P.S:(2-axis lift - with various brands of screws)

1. Ball screw diameter(16/20/25)。
2. Ball screw lead(5/10/20/25)。
3. Correct size according to 2D/3D。

Specifications:

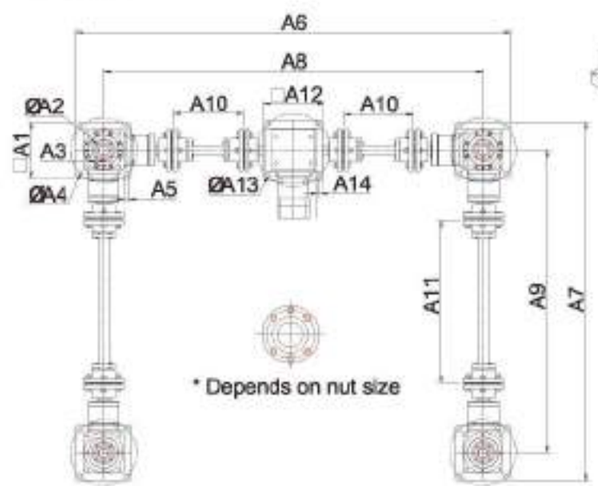
unit: mm

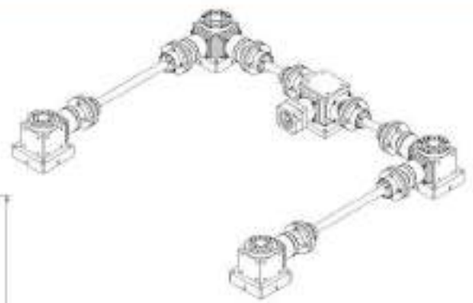
Specification	D1(H6)	D2	D3	D4	D5	D6	A1	A2	A3	A4	A5	A6	A7	A8
RB080AS-G2	28/36	45	Depends on screw size			61.5	110	Depends on screw size		130	4-φ 8.5	Depends on the span selected by the customer		
RB110AS-G2	40	65				61.5/65	142			170	4-φ 8.5			

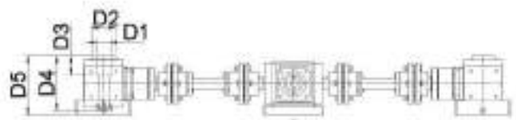
RB-G4U-A-BS Screw Jacks

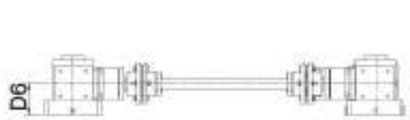
Reduction ratio：1/2~1/50(Without screw) Type

Dimensions:



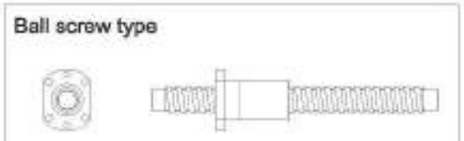






P.S:(4-axis screw lifting and lowering - with various brands of screws)
1. Ball screw diameter (16/20/25).
2.Ball screw lead(5/10/20/25).
3.Correct size according to 2D/3D.

Ball screw type



Specifications:

unit: mm

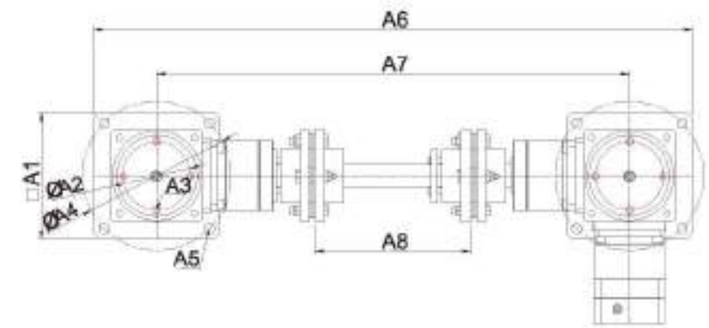
Specification	D1(H6)	D2	D3	D4	D5	D6	A1	A2	A3	A4	A5	A6	A7
RB080AS-G4U	28/36	45	Depends on screw size			61.5	110	Depends on nut size		130	4-φ 8.5	* Dependent on screw span	
RB110AS-G4U	40	65				61.5/65	142			170	4-φ 8.5		

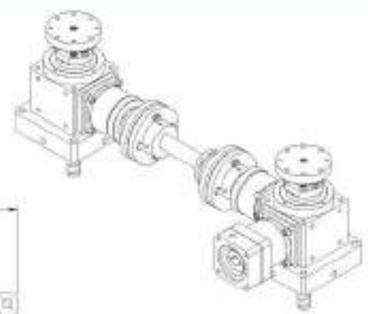
Specification	A8	A9	A10	A11	A12	A13	A14
RB080AS-G4U	* Dependent on screw span				120	145	4-φ 8.5
RB110AS-G4U					142	170	4-φ 8.5

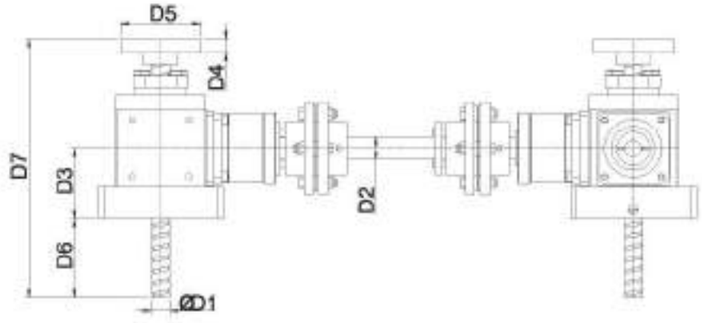
RB-G2-BST

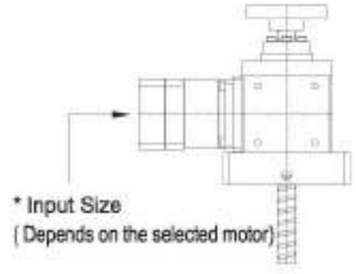
Reduction ratio：1/2~1/50 2-Axis Screw Jack Type

Dimensions:









P.S:2 -Axis Screw Lifter
1. Ball screw diameter(16/20/25)。
2. Ball screw lead(5/10/20/25)。
3. Custom-made products: additional expansion tube (sleeve)。
4. Correct size according to 2D/3D。

Specifications:

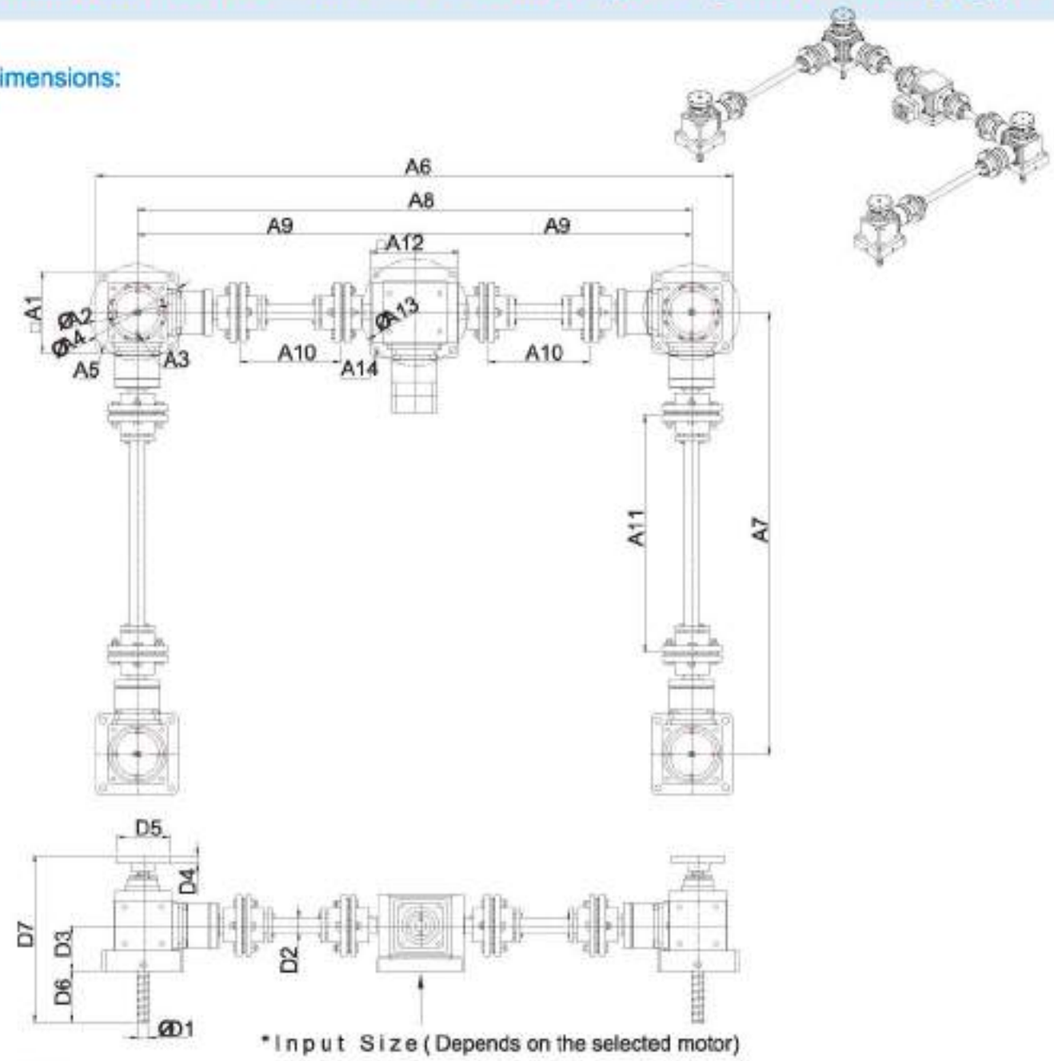
unit: mm

Specification	D1	D2	D3	D4	D5	D6	D7	A1	A2	A3	A4	A5	A6	A7	A8
RB080AS-G2	16/20	20/25	61.5	12	70	Effective length of screw	Total length	110	59	4-M6	130	4-φ 8.5	Depends on the span selected by the customer		
RB110AS-G2	25	20/30	61.5/65	23	90			142	74	4-M10	170	4-φ 8.5			

RB-G4U-A-BST

Reduction ratio：1/2~1/50 4-axis, 4-point (hollow shaft) type

Dimensions:



Specifications:

unit: mm

Specification	D1	D2	D3	D4	D5	D6	D7	A1	A2	A3	A4	A5	A6	A7	A8
RB080AS-G4U	16/20	20/25	61.5	12	70	Effective length of screw	Total length	110	59	4-M6	130	4-φ 8.5	Depends on the span selected by the customer		
RB110AS-G4U	25	25/30	61.5/65	23	90			142	74	4-M10	170	4-φ 8.5			

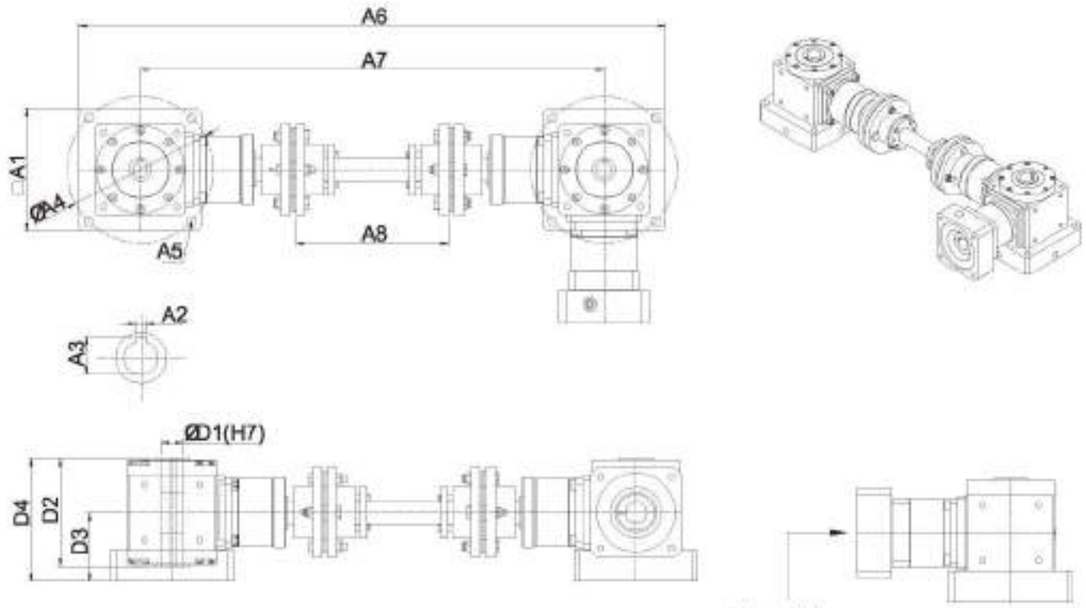
Specification	D9	D10	D11	D12	D13	A14
RB080AS-G4U	Depends on the span selected by the customer			120	145	4-φ 8.5
RB110AS-G4U				142	170	4-φ 8.5

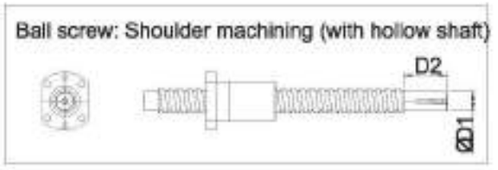
P.S:4-Axis Screw Lifter
1. Ball screw diameter(16/20/25)。
2. Ball screw lead(5/10/20/25)。
3. Custom-made products: additional expansion tube (sleeve).
4. Correct size according to 2D/3D

RB-G2-CR

Reduction ratio：1/2~1/50 2-axis, 2-point hollow shaft type

Dimensions:





P.S:(2-axis 2-point lift - hollow shaft)
1. Ball screw diameter(16/20/25/32/40/50)。
2. Ball screw lead(5/10/20/25/30/32/40/50)。
3. Correct size according to 2D/3D。

Specifications:

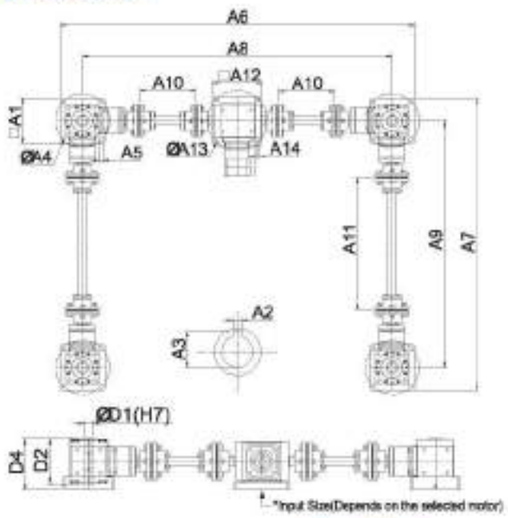
unit: mm

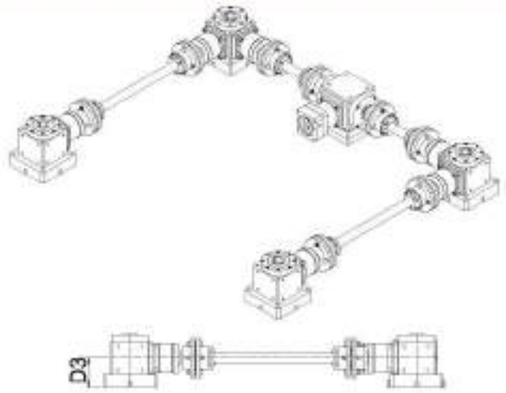
Specification	D1	D2	D3	D4	A1	A2	A3	A4	A5	A6	A7	A8
RB080AS-G2	12~20	96	61.5	109.75	110	Depends on the actual screw shoulder machining axis diameter		130	4-φ 8.5	Depends on the span selected by the customer		
RB110AS-G2	20~30	124	61.5/65	123.5	142			170	4-φ 8.5			
RB135AS-G2	32~40	146	94	158	180			215	4-φ 13			

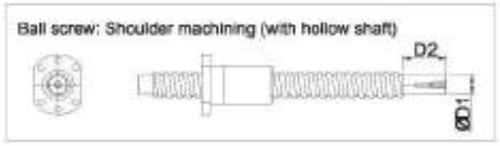
RB-G4U-A-CR

Reduction ratio: 1/2~1/50 4-axis, 4-point (hollow-axis) type

Dimensions:







P.S:(4-axis 4-point lift - hollow shaft)
1.Ball screw diameter (16/20/25/32).
2.Ball screw lead(5/10/20/25).
3.Correct size according to 2D/3D.

Specifications: unit: mm

Specification	D1	D2	D3	D4	A1	A2	A3	A4	A5	A6~A11	A12	A13	A14
RB080AS-G4	12~20	98	81.5	109.75	110	Depends on the actual screw shoulder machining axis diameter		130	4-φ 8.5	Depends on the gear selected by the customer	120	130	4-φ 8.5
RB110AS-G4	20~30	124	81.5/85	123.5	142			170	4-φ 8.5		142	170	4-φ 8.5
RB135AS-G4	32~40	148	94	158	180			215	4-φ 13		180	215	4-φ 13

Installation Instructions for Precision Gearbox and Motor

Step 1: Confirm the specification of the motor gearbox and clean the mounting surfaces of the motor and gearbox.

Step 2: Remove the original key from the motor.

Step 3: Add a shaft bushing if necessary.

Step 4: Load the motor vertically, use 5% of the recommended torque value of the screw torque value table (Table —) in the order of 1~4, and gently lock the screws with spacers by using the palm hand.

Step 5: Place the motor and gearbox in an upright position, refer to the recommended torque values in Table 2 and tighten the bolts with a torque wrench.

Step 6: Place the motor and gearbox in an upright position and tighten the screws with a torque plate in the order of 1 to 4 using the torque values suggested in the screw torque table (Table 1).

Table 1	Suggested Torque Table for Motor Locking Screws						
Screw Size	Hexagonal head size	Strength 8.8 Screw Clamping Force		Strength 10.9 Screw Clamping Force		Strength 12.9 Screw Clamping Force	
	[mm]	[Nm]	[In-lbs]	[Nm]	[In-lbs]	[Nm]	[In-lbs]
M3×0.5P	2.5	1.3	12	1.8	16	2.1	19
M4×0.7P	3	3	27	4.1	37	4.9	44
M5×0.8P	4	6.1	55	8.2	73	9.8	87
M6×1P	5	11	98	14	124	17	151
M8×1.25P	6	25	222	34	302	41	364
M10×1.5P	8	49	434	67	594	80	709
M12×1.75P	10	85	753	116	1028	139	1232
M14×2P	12	137	1214	186	1648	223	1976
M16×2P	14	210	1860	286	2534	343	3038

PT–A / PAW–A Series

90 Degree Precision Speed Reducer

Multiple Output Shaft Type Reduction Ratio 1:1-1:100

Applicable Servo Motor Capacity: 0.1kw-15kw

Hollow shaft + conical tightening ring: applied in heavy load situations.
Application: roller mechanism, conveying and transporting mechanism,cam mechanism, LCD panel turnover mechanism, rack and gear mechanism and other industrial institutions.

Hollow shaft rotation flange : applied in heavy load situations.
Application: rotary mechanism, Turnover mechanism of CNC lathe mechanical arm

Hollow shaft (clamping type), single hollow shaft and double hollow shaft.
Application: conveying and transporting mechanism.

Hollow shaft clamping type with keyway: suitable for heavy load occasions.
Application: roller mechanism, conveying and transporting mechanism, cam mechanism, LCD panel turnover mechanism, rack and gear mechanism.

Hollow shaft with keyway: new type with socket set screws.
General conveying mechanism.

Steering gear

PT–A Standard input with shaft steering

Ratio =1/1

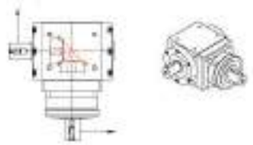
PT045A – 2AX – 01 – P – L – F01

- **Model (Input solid shaft type)**: PT045A / PT070A / PT085A / PT105A / PT125A / PT150A / PT180A
- **2AX / 3AX / Unmarked / 2AX-Z / 3AX-Z / 4AX-Z**: 2AX: 2 Input shaft type; 3AX: 3 Input shaft type; Unmarked: 1 Input shaft type; 2AX-Z: 2 Input shaft type; 3AX-Z: 3 Input shaft type; 4AX-Z: 4 Input shaft type
- **01 – Gear Ratio**: 1/1
- **P – Output shaft type**: P:Single solid shaft with keyway; 2P:Double solid shaft with keyway; CR:Hollow shaft with keyway; RF:Hollow Rotary Flange; BS:For Ball Screws; P.S:RT045A(P/2P only)
- **L – Rotation direction of output axis**: As shown in Fig. 2 (L left / R right)
- **F01 – Base plate**

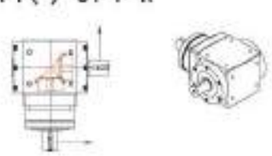
Performance Data Sheet: PT–A Series Spiral Bevel Gear – (Gear Ratio) 1/1

	Gear type	Gear Ratio	PT045A	PT070A	PT085A	PT105A	PT125A	PT150A	PT180A
Rated Output Rotation(Nm)	Spiral Bevel Gear	1:1	20	30	85	215	370	680	900
Maximun Acceleration Distance (Nm)			1.5 times rated output (Nm)						
Input Speed(rpm)			2000	2000	1500	1000	1000	1000	1000
Standard backlash (arc-min)			≦ 10						
Allowable radial force (N)			1100	3250	3250	5850	9100	14300	19500
Allowable axial force (N)			650	1625	1625	2925	4550	14300	19500
Efficiency (%)			90%						
Weight (kg)			1.5	3.2	5.2	10.5	17.0	31	37.5
Operating Temperature(C)			-10°C~ +80°C						
Lubricant			Fully synthetic lubricant (TOTAL CERAN HV)						
Installation Direction			Any direction						
Noise level (db)			≦ 65	≦ 70	≦ 72	≦ 73	≦ 74	≦ 76	≦ 78

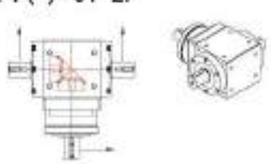
*PT( )-01-P-L



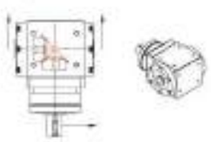
*PT( )-01-P-R



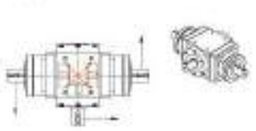
*PT( )-01-2P



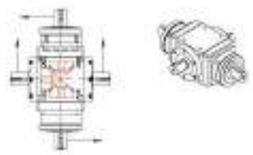
*PT( )-01-CR



*PT( )-2AX-01-P



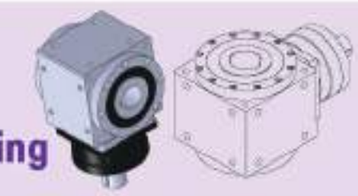
*PT( )-2AX-01-2P



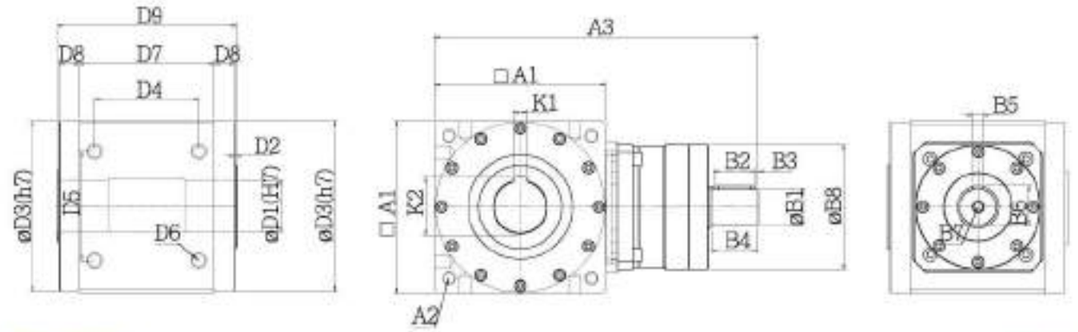
* Chart 2

PT–CR Hollow shaft with keyway

Ratio: 1/1 Standard input with shaft steering



Dimensions:



Specifications:

unit: mm

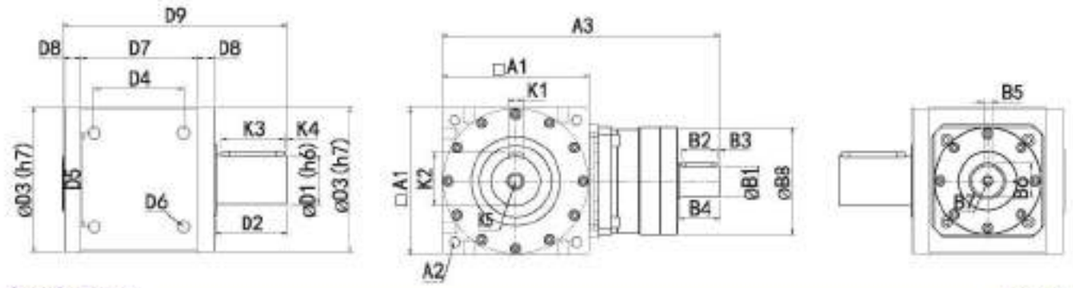
Specification	PT045A	PT070A	PT085A	PT105	PT125A	PT150A	PT180A
D1		13	15	22	28	35	*40/50
D2		2	2	2	2	2	2
D3		66	82	100	120	135	165
D4		54	68	80	100	120	141.42
D5		50	52	60	80	100	141.42
D6		4-M5*P0.8	4-M6*P1.0	4-M8*P1.25	4-M8*P1.25	4-M10*P1.5	4-M12*P1.75
D7		70	85	105	125	142	180
D8		16.5	15.5	18.5	19.5	20	21
D9		107	120	146	168	194	226
A1		70	85	105	125	142	180
A2		P.C.Dφ 86 4-M5*P0.8	P.C.Dφ 100 4-M6*P1.0	P.C.Dφ 118 4-M8*P1.25	P.C.Dφ 145 4-M8*P1.25	P.C.Dφ 185 4-M10*P1.5	P.C.Dφ 200 4-M12*P1.75
A3 (Total Length)		159	180	214	279	350	375
K1		4	5	6	8	10	14
K2		14.7	17.3	22.5	31.3	38.3	53.8
B1		16	20	28	35	50	50
B2		20	20	35	40	50	50
B3		3	3	3	3	3	3
B4		27	30	40	45	65	65
B5		5	6	8	10	14	14
B6		18	22.5	31	38	53.5	53.5
B7		M5	M6	M8	M10	M12	M12
B8		62	62	95	120	147	147

1. (*) New hollow shaft hole diameter (mm).
2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

PT–P Single output shaft type

Ratio: 1/1 Standard input with shaft steering

Dimensions:



Specifications: unit: mm

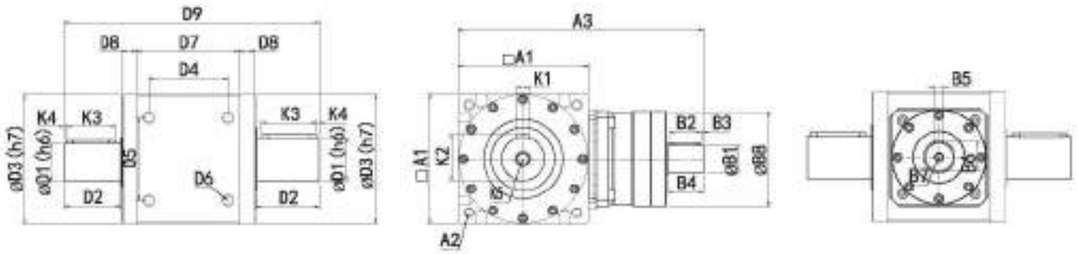
Specification	PT045A	PT070A	PT085A	PT105	PT125A	PT150A	PT180A
D1	13	16	20	28	32	40	50
D2	20	30	35	40	50	63	73
D3	43.2	66	82	100	120	135	165
D4	36	54	68	80	100	120	141.42
D5	26	50	52	60	80	100	141.42
D6	4-M4*P0.7	4-M5*P0.8	4-M6*P1.0	4-M8*P1.25	4-M8*P1.25	4-M10*P1.5	4-M12*P1.75
D7	54	70	85	105	125	142	180
D8	10.5	16.5	15.5	18.5	19.5	20	21
D9	98	137	155	186	218	257	299
A1	46	70	85	105	125	142	180
A2	P.C.Dφ53 4-M5*P0.8	P.C.Dφ86 4-M5*P0.8	P.C.Dφ100 4-M6*P1.0	P.C.Dφ118 4-M8*P1.25	P.C.Dφ145 4-M8*P1.25	P.C.Dφ185 4-M10*P1.5	P.C.Dφ200 4-M12*P1.75
A3 (Total Le	141	159	180	214	279	350	375
K1	4	5	6	8	10	10	14
K2	14.5	18	22.5	31	35	43	53.5
K3	15	20	25	30	40	50	60
K4	2.5	3	3.5	3.5	3	3	3
K5	M4	M5	M6	M8	M8	M12	M12
B1	13	16	20	28	35	50	50
B2	15	20	20	35	40	50	50
B3	2	3	3	3	3	3	3
B4	20	27	30	40	45	65	65
B5	4	5	6	8	10	14	14
B6	14.5	18	22.5	31	38	53.5	53.5
B7	M4	M5	M6	M8	M10	M12	M12
B8	49	62	62	95	120	147	147

1. Actual dimensions are based on 2D/3D drawings. 2. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

PT–2P Double output shaft type

Ratio: 1/1 Standard input with shaft steering

Dimensions:



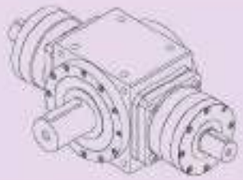
Specifications: unit: mm

Specification	PT045A	PT070A	PT085A	PT105	PT125A	PT150A	PT180A
D1	13	16	20	28	32	40	50
D2	20	30	35	40	50	63	73
D3	43.2	66	82	100	120	135	165
D4	36	54	68	80	100	120	141.42
D5	26	50	52	60	80	100	141.42
D6	4-M4*P0.7	4-M5*P0.8	4-M6*P1.0	4-M8*P1.25	4-M8*P1.25	4-M10*P1.5	4-M12*P1.75
D7	54	70	85	105	125	142	180
D8	10.5	16.5	15.5	18.5	19.5	20	21
D9	118	167	190	226	268	320	372
A1	46	70	85	105	125	142	180
A2	P.C.Dφ53 4-M5*P0.8	P.C.Dφ86 4-M5*P0.8	P.C.Dφ100 4-M6*P1.0	P.C.Dφ118 4-M8*P1.25	P.C.Dφ145 4-M8*P1.25	P.C.Dφ185 4-M10*P1.5	P.C.Dφ200 4-M12*P1.75
A3 (Total Le	141	159	180	214	279	350	375
K1	4	5	6	8	10	10	14
K2	14.5	18	22.5	31	35	43	53.5
K3	15	20	25	30	40	50	60
K4	2.5	3	3.5	3.5	3	3	3
K5	M4	M5	M6	M8	M8	M12	M12
B1	13	16	20	28	35	50	50
B2	15	20	20	35	40	50	50
B3	2	3	3	3	3	3	3
B4	20	27	30	40	45	65	65
B5	4	5	6	8	10	14	14
B6	14.5	18	22.5	31	38	53.5	53.5
B7	M4	M5	M6	M8	M10	M12	M12
B8	49	62	62	95	120	147	147

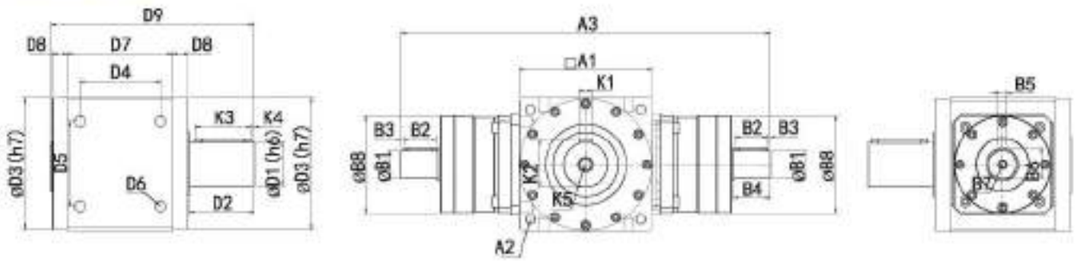
1. Actual dimensions are based on 2D/3D drawings. 2. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

PT–2AX–P Single output shaft type

Ratio: 1/1 (Three directional outputs)



Dimensions:



Specifications: unit: mm

Specification	PT045A	PT070A	PT085A	PT105	PT125A	PT150A	PT180A
D1	13	16	20	28	32	40	50
D2	20	30	35	40	50	63	73
D3	43.2	66	82	100	120	135	165
D4	36	54	68	80	100	120	141.42
D5	26	50	52	60	80	100	141.42
D6	4–M4*P0.7	4–M5*P0.8	4–M6*P1.0	4–M8*P1.25	4–M8*P1.25	4–M10*P1.5	4–M12*P1.75
D7	54	70	85	105	125	142	180
D8	10.5	16.5	15.5	18.5	19.5	20	21
D9	98	137	155	186	218	257	299
A1	46	70	85	105	125	142	180
A2	P.C.Dφ 53 4–M5*P0.8	P.C.Dφ 86 4–M5*P0.8	P.C.Dφ 100 4–M6*P1.0	P.C.Dφ 118 4–M8*P1.25	P.C.Dφ 145 4–M8*P1.25	P.C.Dφ 185 4–M10*P1.5	P.C.Dφ 200 4–M12*P1.75
A3 (Total Length)	209	251.7	275.2	322.5	433	550	570
K1	4	5	6	8	10	12	14
K2	14.5	18	22.5	31	35	43	53.5
K3	15	20	25	25	40	50	60
K4	2.5	3	3.5	3.5	3	3	3
K5	M4	M5	M6	M6	M8	M12	M12
B1	13	16	20	28	35	50	50
B2	15	20	20	35	40	50	50
B3	2	3	3	3	3	3	3
B4	20	27	30	40	45	65	65
B5	4	5	6	8	10	14	14
B6	14.5	18	22.5	31	38	53.5	53.5
B7	M4	M5	M6	M8	M10	M12	M12
B8	49	62	62	95	120	147	147

1. Actual dimensions are based on 2D/3D drawings.
2. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

PAW–A Standard type

Input with planetary right–angle reducer

Ratio(1/3 ~ /100)

PAW125A – L2 – 25 – p – B1 – d – B – C – G

Model No.
PAW045A / PAW070A / PAW085A
PAW085B / PAW105A / PAW125A
PAW125B / PAW150A / PAW150B
PAW180A / PAW180B

Number of gear rato segments
L1ratio=1/3~1/10
L2ratio=1/12~1/100

Gear ratios
Refer to the performance table Gear Ratio (1/3 to 1/100)

Accuracy backlash level:
No mark: represents the standard backlash
L1≦10 arcuate L2≦15 arcuate
Precision backlash B1
L1≦3 arcuate L2≦5 arcuate
Precision backlash B2
L1≦5 arcuate L2≦8 arcuate

Input Flange
Shaft diameter(φd)
As shown in Fig. 1

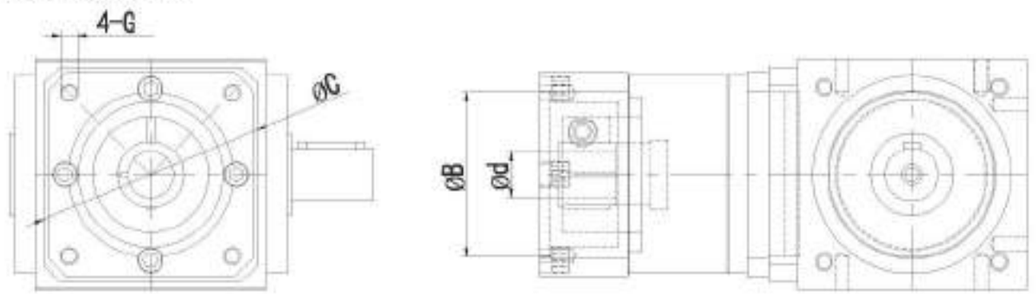
Input Flange
lead(φB)
As shown in Fig. 1

Input Flange
Threaded Hole(G)
As shown in Fig. 1

Output shaft form
C:Single hollow shaft without key (clamping ring)
2C:Double hollow shaft without key (clamping ring)
C-K:Single hollow shaft with keyway (clamping ring)
2C+K:Double hollow shaft with keyway (clamping ring)
P:Single solid shaft with keyway
2P:Double solid shaft with keyway
CR:Hollow shaft with keyway
P.S:RXW045A(P/2P only)

Input Flange
Thread Pitch (φC)
As shown in Fig. 1

Input Flange Size:



* Chart 1

Performance meter: PAW-A

Input with planetary right-angle reducer

Ratio(1/3 ~ /100)

	Number of Segments	Gear Ratio	PAW045A	PAW070A	PAW085A	PAW085B	PAW105A	PAW125A	PAW125B	PAW150A	PAW150B	PAW180A	PAW180B
Rated Output Rotation (Nm)	length L1	3, 10	13	30	110	35	160	330	160	650	330	1200	650
		4, 5	20	35	110	50	160	330	160	650	330	1200	650
		6			110		140	280	140	550	280	1100	550
		7	13	35	110	35	140	280	140	500	280	1100	500
		8			110		115	230	115	450	230		450
		9						230		400	230		400
	Second paragraph L2	12, 15, 40 50, 60, 70 0, 90, 100	13	35	110	35	115	230	115	400	230	900	400
		16, 20, 25	20	35	110	50	160	330	160	650	330	1200	650
		28, 30 35, 49	13	35	110	42	140	280	140	500	280	1100	500
		P.S: 1.(RXW045A/055A) Ratio without production:(3,6,9,30,60,80,90,100) 2.(RXW070A/RXW085A/RXW180A) Ratio without production:1/6,1/8 3.(RXW055A/RXW070A/RXW085A/RXW085AY/RXW105A/RXW180A) Ratio without production:1/9											
Maximum Acceleration Rotation (Nm)	L1, L2	3~100	1.5 times rated output (Nm)										
Instantaneous Output Rotation (Nm) (within 3 seconds)	L1, L2	3~100	3 times rated output (Nm)										
Input Speed (rpm)	L1, L2	3~100	3000	3000	3000	3000	3000	3000	3000	2000	2000	2000	2000
Standard backlash (arc-min)	L1	3~10	≦ 10	≦ 10	≦ 10	≦ 10	≦ 10	≦ 10	≦ 10	≦ 10	≦ 10	≦ 10	≦ 10
	L2	12~100	≦ 15	≦ 15	≦ 15	≦ 15	≦ 15	≦ 15	≦ 15	≦ 15	≦ 15	≦ 15	≦ 15
Precision backlash B2(arc-min)	L1	3~10	≦ 8	≦ 5	≦ 5	≦ 5	≦ 5	≦ 5	≦ 5	≦ 5	≦ 5	≦ 5	≦ 5
	L2	12~100	≦ 10	≦ 8	≦ 8	≦ 8	≦ 8	≦ 8	≦ 8	≦ 8	≦ 8	≦ 8	≦ 8
Precision backlash B1(arc-min)	L1	3~10		≦ 3	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3	≦ 3
	L2	12~100		≦ 5	≦ 5	≦ 5	≦ 5	≦ 5	≦ 5	≦ 5	≦ 5	≦ 5	≦ 5
Allowable radial force(N)	L1, L2	3~100	1100	3250	3250	3250	5850	9100	9100	14300	14300	19500	19500
Allowable axial force (N)	L1, L2	3~100	650	1625	1625	1625	2925	4550	4550	7150	7150	9750	9750
Efficiency (%)	L1	3~10	90%										
	L2	12~100	85%										
Weight (kg)	L1	3~10	1.5	3.2	7.6	5.2	10.5	17.0	13.5	31	25.5	56.5	37.5
	L2	12~100	1.8	4.0	8.6	5.8	11.2	19.5	14.2	35.5	28.5	63.5	42.0
Working Temperature(℃)	L1, L2	3~100	-10℃ ~+80℃										
Lubricant	L1, L2	3~100	Fully synthetic lubricant (TOTAL CERAN HV)										
Installation Direction	L1, L2	3~100	Any direction										
Noise level (dB)	L1, L2	3~100	≦ 63	≦ 68	≦ 68	≦ 70	≦ 70	≦ 72	≦ 70	≦ 73	≦ 72	≦ 75	≦ 73

(1) Noise level measurement (decibel meter at 1M position from gearbox/2000RPM): (Noise level above 2000RPM will increase)
(2) Measurement of backlash value (measured at a force distance of 2% of the rated rotation distance)
(3) Continuous use over (12 hours/day) will reduce the life expectancy by 1/2 (selected according to P3)

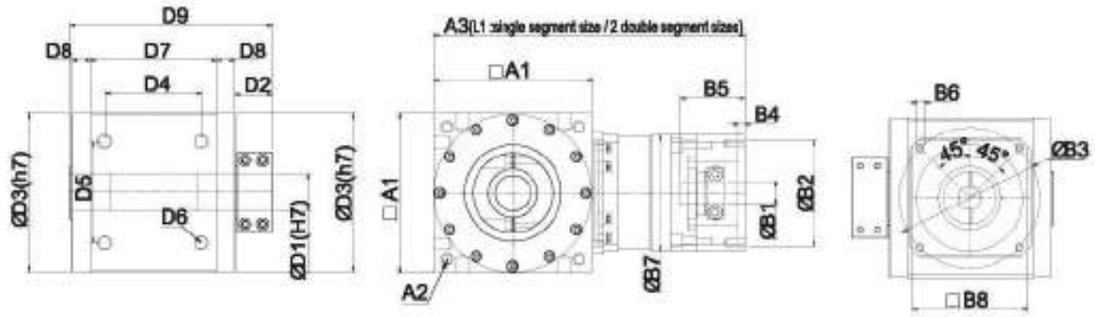
Reducer moment of inertia:

Paragraph	Unit of inertia	Gear Ratio	PAW045A	PAW070A	PAW085A	PAW085B	PAW105A	PAW125A	PAW125B	PAW150A	PAW150B	PAW180A	PAW180B
1paragraph ratio (L1)	(kg-cm²)	3	0. 042	0. 69	4. 52	0. 69	4. 52	6. 35	4. 52	13. 15	6. 35	38. 96	13. 15
		4, 5, 6	0. 032	0. 56	3. 82	0. 56	3. 82	5. 28	3. 82	12. 62	5. 28	37. 68	12. 62
		7, 8	0. 028	0. 45	3. 75	0. 45	3. 75	4. 98	3. 75	12. 06	4. 98	37. 24	12. 06
		9, 10	0. 027	0. 44	3. 72	0. 44	3. 72	4. 87	3. 72	11. 88	4. 87	36. 65	11. 88
2paragraph ratio (L2)	(kg-cm²)	12, 15, 16 20, 25, 30	0. 032	0. 56	3. 82	0. 56	3. 82	5. 28	3. 82	12. 62	5. 28	12. 62	12. 62
		28, 35, 49	0. 028	0. 45	3. 75	0. 45	3. 75	4. 98	3. 75	12. 06	4. 98	12. 06	12. 06
		40, 50, 60 70, 80, 90 100	0. 027	0. 44	3. 72	0. 44	3. 72	4. 87	3. 72	11. 88	4. 87	11. 88	11. 88

PAW-C Single hollow shaft (clamping ring) type

Ratio(1/3 ~ /100) Input with planetary right-angle reducer

Dimensions:



Specifications:

unit: mm

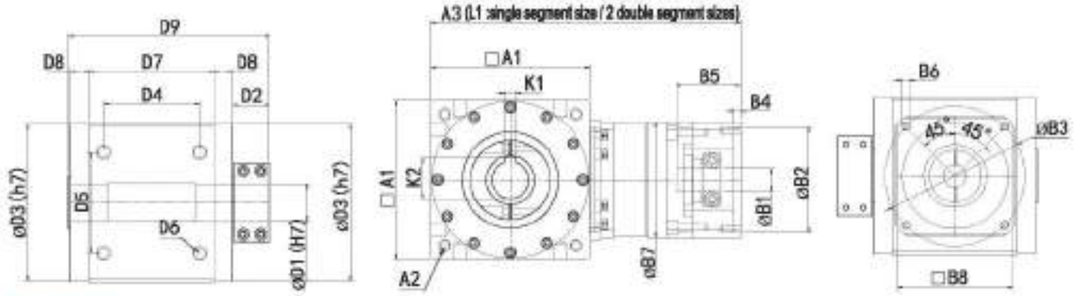
Specification	PAW045A	PAW070A	PAW085A	PAW085B	PAW105A	PAW125A	PAW125B	PAW150A	PAW150B	PAW180A	PAW180B
D1		13	15	15	25	30	30	40	40	*40/50	*40/50
D2		20	26	26	27	26	26	35	35	40. 5	40. 5
D3		66	82	82	100	120	120	135	135	165	165
D4		54	68	68	80	100	100	120	120	141. 42	141. 42
D5		50	52	52	60	80	80	100	100	141. 42	141. 42
D6		4-M5*P0. 8	4-M6*P1. 0	4-M6*P1. 0	4-M8*P1. 25	4-M8*P1. 25	4-M8*P1. 25	4-M10*P1. 5	4-M10*P1. 5	4-M12*P1. 75	4-M12*P1. 75
D7		70	85	85	105	125	125	142	142	180	180
D8		16. 5	15. 5	15. 5	18. 5	19. 5	19. 5	20	20	21	21
D9		125	144	144	171	192	192	227	227	264. 5	264. 5
A1		70	85	85	105	125	125	142	142	180	180
A2		P. C. D φ 86 4-M5*P0. 8	P. C. D φ 100 4-M6*P1. 0	P. C. D φ 100 4-M6*P1. 0	P. C. D φ 118 4-M8*P1. 25	P. C. D φ 145 4-M8*P1. 25	P. C. D φ 145 4-M8*P1. 25	P. C. D φ 185 4-M10*P1. 5	P. C. D φ 185 4-M10*P1. 5	P. C. D φ 200 4-M12*P1. 75	P. C. D φ 200 4-M12*P1. 75
A3 (L1:single segment size)		159	210	177	232	290	266	342	322	409	367
A3 (L2:single segment size)		180	237	198	259	321	293	388	353	455	413
B1		6. 35, 8, 9 11, 14	14, 16, 19 22, 24, 28 32, 35	6. 35, 8, 9 11, 14, 16, 19	14, 16, 19 22, 24, 28 32, 35	19, 22, 24 28, 32, 35 38, 42	11, 14, 16 19, 22, 24	19, 22, 24 28, 32 35, 38	16, 19, 22 24, 28, 32 35, 38	19, 22, 24 28, 32, 35 38, 42, 55	19, 22, 24 32, 35 38, 42
B2		30, 38. 1, 40, 50, 60	70, 80, 95 110, 114. 3 130	30, 36, 38. 1 40, 50 60, 70	70, 80, 95 110, 114. 3 130	95, 110 114. 3, 130 180	50, 60, 70 80, 95, 110	95, 110 114. 3, 130 180	70, 80, 95 110, 114. 3 130	110, 114. 3 130, 180 200	95, 110 114. 3, 130 180
B3		45, 46, 66. 7 70, 70. 7, 75	90, 115, 130 145, 165 200	45, 46, 66. 7 70, 70. 7 75, 90	90, 115, 130 145, 165 200	115, 130 145, 165 200, 215	70, 75, 90 100, 115 130, 145	115, 130 145, 165 200, 215	90, 100, 115 130, 145 166, 200	130, 145 165, 200 215, 235	115, 130 145, 165 200, 215
B4		4	6	4, 5	6	7	6	7	7	7	7
B5		≦31	≦62	≦41	≦62	≦80	≦62	≦80	≦80	≦86	≦81
B6		M3, M4 M5	M4, M5 M6, M8	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M5, M6 M8	M6, M8 M10, M12	M6, M8 M10, M12	M8, M10 M12	M6, M8 M10, M12
B7		60	90	60	90	120	90	142	120	182	142
B8		62	90, 115, 120	62, 80, 90	90, 115, 120	120, 140, 178	90, 115, 120	120, 142 178, 192	120, 140, 178	182, 200, 220	120, 142 178, 192

1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

PAW-C-K Single hollow shaft with keyway (clamping ring) type

Ratio(1/3 ~ /100) Input with planetary right-angle reducer

Dimensions:



Specifications:

unit: mm

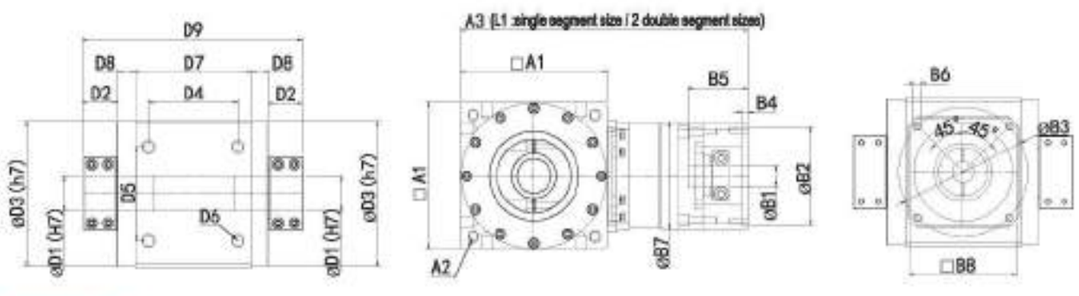
Specification	PAW045A	PAW070A	PAW085A	PAW085B	PAW105A	PAW125A	PAW125B	PAW150A	PAW150B	PAW180A	PAW180B
D1		13	15	15	22	28	28	35	35	*40/50	*40/50
D2		20	26	26	27	26	26	35	35	40. 5	40. 5
D3		66	82	82	100	120	120	135	135	165	165
D4		54	68	68	80	100	100	120	120	141. 42	141. 42
D5		50	52	52	60	80	80	100	100	141. 42	141. 42
D6		4-M5*P0. 8	4-M5*P1. 0	4-M6*P1. 0	4-M8*P1. 25	4-M8*P1. 25	4-M8*P1. 25	4-M10*P1. 5	4-M10*P1. 5	4-M12*P1. 75	4-M12*P1. 75
D7		70	85	85	105	125	125	142	142	180	180
D8		16. 5	15. 5	15. 5	18. 5	19. 5	19. 5	20	20	21	21
D9		125	144	144	171	192	192	227	227	264. 5	264. 5
A1		70	85	85	105	125	125	142	142	180	180
A2		P. C. Dφ 86 4-M5*P0. 8	P. C. Dφ 100 4-M5*P1. 0	P. C. Dφ 100 4-M6*P1. 0	P. C. Dφ 118 4-M8*P1. 25	P. C. Dφ 145 4-M8*P1. 25	P. C. Dφ 145 4-M8*P1. 25	P. C. Dφ 185 4-M10*P1. 5	P. C. Dφ 185 4-M10*P1. 5	P. C. Dφ 200 4-M12*P1. 75	P. C. Dφ 200 4-M12*P1. 75
A3 (L1:single segment size)		159	210	177	232	290	266	342	322	409	367
A3 (L2:single segment size)		180	237	198	259	321	293	388	353	455	413
K1		4	5	5	6	8	8	10	10	12/14	12/14
K2		14. 7	17. 3	17. 3	24. 8	31. 3	31. 3	38. 3	38. 3	43. 3/53. 5	43. 3/53. 5
B1		6, 35, 8, 9 11, 14	14, 16, 19 22, 24, 28 32, 35	6, 35, 8, 9 11, 14, 16, 19	14, 16, 19 22, 24, 28 32, 35	19, 22, 24 28, 32, 35 38, 42	11, 14, 16 19, 22, 24	19, 22, 24 28, 32 35, 38	16, 19, 22 24, 28, 32 35, 38	19, 22, 24 28, 32, 35 38, 42, 55	19, 22, 24 32, 35 38, 42
B2		30, 38. 1, 40, 50, 60	70, 80, 95 110, 114. 3 130	30, 35, 38, 1 40, 50 60, 70	70, 80, 95 110, 114. 3 130	95, 110 114. 3, 130 180	50, 60, 70 80, 95, 110	95, 110 114. 3, 130 180	70, 80, 95 110, 114. 3 130	110, 114. 3 130, 180 200	95, 110 114. 3, 130 180
B3		45, 46, 66. 7 70, 70. 7, 75	90, 115, 130 145, 165 200	45, 46, 66. 7 70, 70. 7 75, 90	90, 115, 130 145, 165 200	115, 130 145, 165 200, 215	70, 75, 90 100, 115 130, 145	115, 130 145, 165 200, 215	90, 100, 115 130, 145 165, 200	130, 145 165, 200 215, 235	115, 130 145, 165 200, 215
B4		4	6	4, 5	6	7	6	7	7	7	7
B5		≦ 31	≦ 62	≦ 41	≦ 62	≦ 80	≦ 62	≦ 80	≦ 80	≦ 86	≦ 81
B6		M3, M4 M5	M4, M5 M6, M8	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M5, M6 M8	M6, M8 M10, M12	M6, M8 M10, M12	M8, M10 M12	M6, M8 M10, M12
B7		60	90	60	90	120	90	142	120	182	142
B8		62	90, 115, 120	62, 80, 90	90, 115, 120	120, 140, 178	90, 115, 120	120, 142 178, 192	120, 140, 178	182, 200, 220	120, 142 178, 192

1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

PAW-2C Double hollow shaft (clamping ring) type

Ratio(1/3 ~ /100) Input with planetary right-angle reducer

Dimensions:



Specifications:

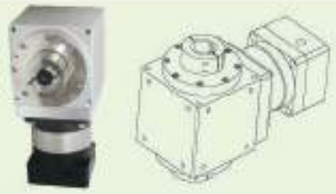
unit: mm

Specification	PAW045A	PAW070A	PAW085A	PAW085B	PAW105A	PAW125A	PAW125B	PAW150A	PAW150B	PAW180A	PAW180B
D1		13	15	15	25	30	30	40	40	*40/50	*40/50
D2		20	26	26	27	26	26	35	35	40. 5	40. 5
D3		66	82	82	100	120	120	135	135	165	165
D4		54	68	68	80	100	100	120	120	141. 42	141. 42
D5		50	52	52	60	80	80	100	100	141. 42	141. 42
D6		4-M5*P0. 8	4-M5*P1. 0	4-M6*P1. 0	4-M8*P1. 25	4-M8*P1. 25	4-M8*P1. 25	4-M10*P1. 5	4-M10*P1. 5	4-M12*P1. 75	4-M12*P1. 75
D7		70	85	85	105	125	125	142	142	180	180
D8		16. 5	15. 5	15. 5	18. 5	19. 5	19. 5	20	20	21	21
D9		143	168	168	196	216	216	260	260	305	305
A1		70	85	85	105	125	125	142	142	180	180
A2		P. C. Dφ 86 4-M5*P0. 8	P. C. Dφ 100 4-M5*P1. 0	P. C. Dφ 100 4-M6*P1. 0	P. C. Dφ 118 4-M8*P1. 25	P. C. Dφ 145 4-M8*P1. 25	P. C. Dφ 145 4-M8*P1. 25	P. C. Dφ 185 4-M10*P1. 5	P. C. Dφ 185 4-M10*P1. 5	P. C. Dφ 200 4-M12*P1. 75	P. C. Dφ 200 4-M12*P1. 75
A3 (L1:single segment size)		159	210	177	232	290	266	342	322	409	367
A3 (L2:single segment size)		180	237	198	259	321	293	388	353	455	413
B1		6. 35, 8, 9 11, 14	14, 16, 19 22, 24, 28 32, 35	6. 35, 8, 9 11, 14, 16, 19	14, 16, 19 22, 24, 28 32, 35	19, 22, 24 28, 32, 35 38, 42	11, 14, 16 19, 22, 24	19, 22, 24 28, 32 35, 38	16, 19, 22 24, 28, 32 35, 38	19, 22, 24 28, 32, 35 38, 42, 55	19, 22, 24 32, 35 38, 42
B2		30, 38. 1, 40, 50, 60	70, 80, 95 110, 114. 3 130	30, 36, 38. 1 40, 50 60, 70	70, 80, 95 110, 114. 3 130	95, 110 114. 3, 130 180	50, 60, 70 80, 95, 110	95, 110 114. 3, 130 180	70, 80, 95 110, 114. 3 130	110, 114. 3 130, 180 200	95, 110 114. 3, 130 180
B3		45, 46, 66. 7 70, 70. 7, 75	90, 115, 130 145, 165 200	45, 46, 66. 7 70, 70. 7 75, 90	90, 115, 130 145, 165 200	115, 130 145, 165 200, 215	70, 75, 90 100, 115 130, 145	115, 130 145, 165 200, 215	90, 100, 115 130, 145 165, 200	130, 145 165, 200 215, 235	115, 130 145, 165 200, 215
B4		4	6	4, 5	6	7	6	7	7	7	7
B5		≦ 31	≦ 62	≦ 41	≦ 62	≦ 80	≦ 62	≦ 80	≦ 80	≦ 86	≦ 81
B6		M3, M4 M5	M4, M5 M6, M8	M3, M4 M5, M6	M4, M5 M6, M8	M5, M6 M8	M6, M8 M10, M12	M6, M8 M10, M12	M6, M8 M10, M12	M8, M10 M12	M6, M8 M10, M12
B7		60	90	60	90	120	90	142	120	182	142
B8		62	90, 115, 120	62, 80, 90	90, 115, 120	120, 140, 178	90, 115, 120	120, 142 178, 192	120, 140, 178	182, 200, 220	120, 142 178, 192

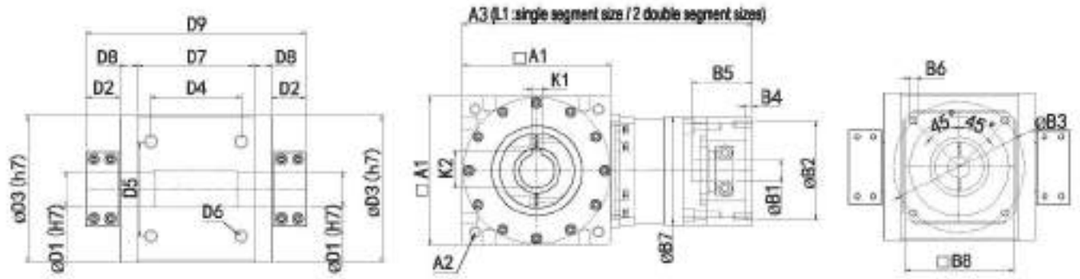
1. (*) New hollow shaft hole diameter (mm). 2. Actual dimensions are based on 2D/3D drawings.
3. Life expectancy will be shortened by 1/2 after 12 hours/day of continuous use.

PAW-2C-K Double hollow shaft with keyway (clamping ring)

Ratio(1/3 ~ /100) Input with planetary right-angle reducer



Dimensions:



Specifications:

unit: mm

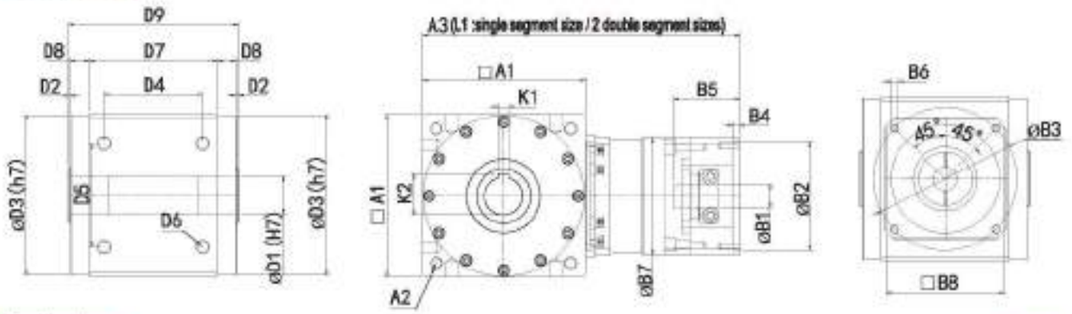
Specification	PAW045A	PAW070A	PAW085A	PAW085B	PAW105A	PAW125A	PAW125B	PAW150A	PAW150B	PAW180A	PAW180B
D1		13	15	15	22	28	28	35	35	*40/50	*40/50
D2		20	26	26	27	26	26	35	35	40. 5	40. 5
D3		66	82	82	100	120	120	135	135	165	165
D4		54	68	68	80	100	100	120	120	141. 42	141. 42
D5		50	52	52	60	80	80	100	100	141. 42	141. 42
D6		4-M5*P0. 8	4-M6*P1. 0	4-M6*P1. 0	4-M8*P1. 25	4-M8*P1. 25	4-M8*P1. 25	4-M10*P1. 5	4-M10*P1. 5	4-M12*P1. 75	4-M12*P1. 75
D7		70	85	85	105	125	125	142	142	180	180
D8		16. 5	15. 5	15. 5	18. 5	19. 5	19. 5	20	20	21	21
D9		143	168	168	196	216	216	260	260	305	305
A1		70	85	85	105	125	125	142	142	180	180
A2		P. C. Dφ 86 4-M5*P0. 8	P. C. Dφ 100 4-M6*P1. 0	P. C. Dφ 100 4-M6*P1. 0	P. C. Dφ 118 4-M8*P1. 25	P. C. Dφ 145 4-M8*P1. 25	P. C. Dφ 145 4-M8*P1. 25	P. C. Dφ 185 4-M10*P1. 5	P. C. Dφ 185 4-M10*P1. 5	P. C. Dφ 200 4-M12*P1. 75	P. C. Dφ 200 4-M12*P1. 75
A3 (L1:single segment size)		159	210	177	232	290	266	342	322	409	367
A3 (L2:single segment size)		180	237	198	259	321	293	388	353	455	413
K1		4	5	5	6	8	8	10	10	12/14	12/14
K2		14. 7	17. 3	17. 3	24. 8	31. 3	31. 3	38. 3	38. 3	43. 3/53. 5	43. 3/53. 5
B1		6. 35, 8, 9 11, 14	14, 16, 19 22, 24, 28 32, 35	6. 35, 8, 9 11, 14, 16, 19	14, 16, 19 22, 24, 28 32, 35	19, 22, 24 28, 32, 35 38, 42	11, 14, 16 19, 22, 24	19, 22, 24 28, 32 35, 38	16, 19, 22 24, 28, 32 35, 38	19, 22, 24 28, 32, 35 38, 42, 55	19, 22, 24 32, 35 38, 42
B2		30, 38. 1, 40, 50, 60	70, 80, 95 110, 114. 3 130	30, 36, 38. 1 40, 50 60, 70	70, 80, 95 110, 114. 3 130	95, 110 114. 3, 130 180	50, 60, 70 80, 95, 110	95, 110 114. 3, 130 180	70, 80, 95 110, 114. 3 130	110, 114. 3 130, 180 200	95, 110 114. 3, 130 180
B3		45, 46, 66. 7 70, 70. 7, 75	90, 115, 130 145, 165 200	45, 46, 66. 7 70, 70. 7 75, 90	90, 115, 130 145, 165 200	115, 130 145, 165 200, 215	70, 75, 90 100, 115 130, 145	115, 130 145, 165 200, 215	90, 100, 115 130, 145 165, 200	130, 145 165, 200 215, 235	115, 130 145, 165 200, 215
B4		4	6	4, 5	6	7	6	7	7	7	7
B5		≦31	≦62	≦41	≦62	≦80	≦62	≦80	≦80	≦86	≦81
B6		M3, M4 M5	M4, M5 M6, M8	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M5, M6 M8	M6, M8 M10, M12	M6, M8 M10, M12	M8, M10 M12	M6, M8 M10, M12
B7		60	90	60	90	120	90	142	120	182	142
B8		62	90, 115, 120	62, 80, 90	90, 115, 120	120, 140, 178	90, 115, 120	120, 142 178, 192	120, 140, 178	182, 200, 220	120, 142 178, 192

1. Actual dimensions are based on 2D/3D drawings.
2. Life expectancy will be shortened by 1/2 if used continuously for more than 12 hours/day.

PAW-CR Hollow shaft with keyway

Ratio(1/3 ~ /100) Input with planetary right-angle reducer

Dimensions:



Specifications:

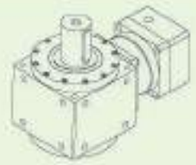
unit: mm

Specification	PAW045A	PAW070A	PAW085A	PAW085B	PAW105A	PAW125A	PAW125B	PAW150A	PAW150B	PAW180A	PAW180B
D1		13	15	15	22	28	28	35	35	*40/50	*40/50
D2		2	2	2	2	2	2	2	2	2	2
D3		66	82	82	100	120	120	135	135	165	165
D4		54	68	68	80	100	100	120	120	141. 42	141. 42
D5		50	52	52	60	80	80	100	100	141. 42	141. 42
D6		4-M5*P0. 8	4-M5*P1. 0	4-M5*P1. 0	4-M8*P1. 25	4-M8*P1. 25	4-M8*P1. 25	4-M10*P1. 5	4-M10*P1. 5	4-M12*P1. 75	4-M12*P1. 75
D7		70	85	85	105	125	125	142	142	180	180
D8		16. 5	15. 5	15. 5	18. 5	19. 5	19. 5	20	20	21	21
D9		107	120	120	146	168	168	194	194	226	226
A1		70	85	85	105	125	125	142	142	180	180
A2		P. C. Dφ 86 4-M5*P0. 8	P. C. Dφ 100 4-M5*P1. 0	P. C. Dφ 100 4-M5*P1. 0	P. C. Dφ 118 4-M8*P1. 25	P. C. Dφ 145 4-M8*P1. 25	P. C. Dφ 145 4-M8*P1. 25	P. C. Dφ 185 4-M10*P1. 5	P. C. Dφ 185 4-M10*P1. 5	P. C. Dφ 200 4-M12*P1. 75	P. C. Dφ 200 4-M12*P1. 75
A3 (L1:single segment size)		159	210	177	232	290	266	342	322	409	367
A3 (L2:single segment size)		180	237	198	259	321	293	388	353	455	413
K1		4	5	5	6	8	8	10	10	12/14	12/14
K2		14. 7	17. 3	17. 3	24. 8	31. 3	31. 3	38. 3	38. 3	43. 3/53. 5	43. 3/53. 5
B1		6. 35, 8, 9 11, 14	14, 16, 19 22, 24, 28 32, 35	6. 35, 8, 9 11, 14, 16, 19	14, 16, 19 22, 24, 28 32, 35	19, 22, 24 28, 32, 35 38, 42	11, 14, 16 19, 22, 24	19, 22, 24 28, 32 35, 38	16, 19, 22 24, 28, 32 35, 38	19, 22, 24 28, 32, 35 38, 42, 55	19, 22, 24 32, 35 38, 42
B2		30, 38. 1, 40, 50, 60	70, 80, 95 110, 114. 3 130	30, 36, 38. 1 40, 50 60, 70	70, 80, 95 110, 114. 3 130	95, 110 114. 3, 130 180	50, 60, 70 80, 95, 110	95, 110 114. 3, 130 180	70, 80, 95 110, 114. 3 130	110, 114. 3 130, 180 200	95, 110 114. 3, 130 180
B3		45, 46, 66. 7 70, 70. 7, 75	90, 115, 130 145, 165 200	45, 46, 66. 7 70, 70. 7 75, 90	90, 115, 130 145, 165 200	115, 130 145, 165 200, 215	70, 75, 90 100, 115 130, 145	115, 130 145, 165 200, 215	90, 100, 115 130, 145 165, 200	130, 145 165, 200 215, 235	115, 130 145, 165 200, 215
B4		4	6	4, 5	6	7	6	7	7	7	7
B5		≦ 31	≦ 62	≦ 41	≦ 62	≦ 80	≦ 62	≦ 80	≦ 80	≦ 86	≦ 81
B6		M3, M4 M5	M4, M5 M6, M8	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M5, M6 M8	M6, M8 M10, M12	M6, M8 M10, M12	M8, M10 M12	M6, M8 M10, M12
B7		60	90	60	90	120	90	142	120	182	142
B8		62	90, 115, 120	62, 80, 90	90, 115, 120	120, 140, 178	90, 115, 120	120, 142 178, 192	120, 140, 178	182, 200, 220	120, 142 178, 192

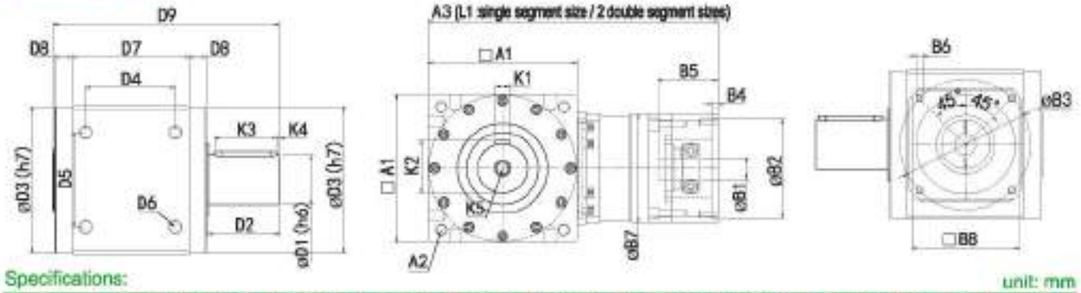
1. Actual dimensions are based on 2D/3D drawings.
2. Life expectancy will be shortened by 1/2 if used continuously for more than 12 hours/day.

PAW–P Single output shaft type

Ratio(1/3 ~ /100) Input with planetary right-angle reducer



Dimensions:



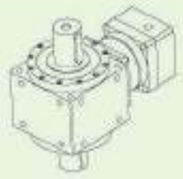
Specifications: unit: mm

Specification	PAW045A	PAW070A	PAW085A	PAW085B	PAW105A	PAW125A	PAW125B	PAW150A	PAW150B	PAW180A	PAW180B
D1	13	16	20	20	28	32	32	40	40	50	50
D2	20	30	35	35	40	50	50	63	63	73	73
D3	43. 2	66	82	82	100	120	120	135	135	165	165
D4	36	54	68	68	80	100	100	120	120	141. 42	141. 42
D5	26	50	52	52	60	80	80	100	100	141. 42	141. 42
D6	4-M4*P0. 7	4-M5*P0. 8	4-M6*P1. 0	4-M6*P1. 0	4-M8*P1. 25	4-M8*P1. 25	4-M8*P1. 25	4-M10*P1. 5	4-M10*P1. 5	4-M12*P1. 75	4-M12*P1. 75
D7	54	70	85	85	105	125	125	142	142	180	180
D8	10. 5	16. 5	15. 5	15. 5	18. 5	19. 5	19. 5	20	20	21	21
D9	98	137	155	155	186	218	218	257	257	229	229
A1	46	70	85	85	105	125	125	142	142	180	180
A2	P. C. Dφ 53 4-M5*P0. 8	P. C. Dφ 86 4-M5*P0. 8	P. C. Dφ100 4-M6*P1. 0	P. C. Dφ 100 4-M6*P1. 0	P. C. Dφ 118 4-M8*P1. 25	P. C. Dφ 145 4-M8*P1. 25	P. C. Dφ 145 4-M8*P1. 25	P. C. Dφ 185 4-M10*P1. 5	P. C. Dφ 185 4-M10*P1. 5	P. C. Dφ 200 4-M12*P1. 75	P. C. Dφ 200 4-M12*P1. 75
A3 (L1:single segment size)	121	159	210	177	232	290	266	342	322	409	367
A3 (L2:single segment size)	141	180	237	198	259	321	293	388	353	455	413
K1	4	5	6	6	8	10	10	12	12	14	14
K2	14. 5	18	22. 5	22. 5	31	35	35	43	43	53. 5	53. 5
K3	15	20	25	25	30	40	40	50	50	60	60
K4	2. 5	3	3. 5	3. 5	3. 5	3	3	3	3	3	3
K5	M4	M5	M6	M6	M8	M8	M8	M12	M12	M12	M12
B1	5, 6. 35, 8	6. 35, 8, 9 11, 14	14, 16, 19 22, 24, 28 32, 35	6. 35, 8, 9 11, 14, 16, 19	14, 16, 19 22, 24, 28 32, 35	19, 22, 24 28, 32, 35 38, 42	11, 14, 16 19, 22, 24	19, 22, 24 28, 32 35, 38	16, 19, 22 24, 28, 32 35, 38	19, 22, 24 28, 32, 35 38, 42, 55	19, 22, 24 32, 35 38, 42
B2	22, 30, 38. 1	30, 38. 1, 40, 50, 60	70, 80, 95 110, 114. 3 130	30, 36, 38. 1 40, 50 60, 70	70, 80, 95 110, 114. 3 130	95, 110 114. 3, 130 180	50, 60, 70 80, 95, 110	95, 110 114. 3, 130 180	70, 80, 95 110, 114. 3 130	110, 114. 3 130, 180 200	95, 110 114. 3, 130 180
B3	43. 8, 45, 46 66. 7, 70. 7	45, 46, 66. 7 70, 70. 7, 75	90, 115, 130 145, 165 200	45, 46, 66. 7 70, 70. 7 75, 90	90, 115, 130 145, 165 200	115, 130 145, 165 200, 215	70, 75, 90 100, 115 130, 145	115, 130 145, 165 200, 215	90, 100, 115 130, 145 165, 200	130, 145 165, 200 215, 235	115, 130 145, 165 200, 215
B4	3	4	6	4, 5	6	7	6	7	7	7	7
B5	≦ 28	≦ 31	≦ 62	≦ 41	≦ 62	≦ 80	≦ 62	≦ 80	≦ 80	≦ 86	≦ 81
B6	M3, M4	M3, M4 M5	M4, M5 M6, M8	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M5, M6 M8	M6, M8 M10, M12	M6, M8 M10, M12	M8, M10 M12	M6, M8 M10, M12
B7	46	60	90	60	90	120	90	142	120	182	142
B8	46	62	90, 115, 120	62, 80, 90	90, 115, 120	120, 140, 178	90, 115, 120	120, 142 178, 192	120, 140, 178	182, 200, 220	120, 142 178, 192

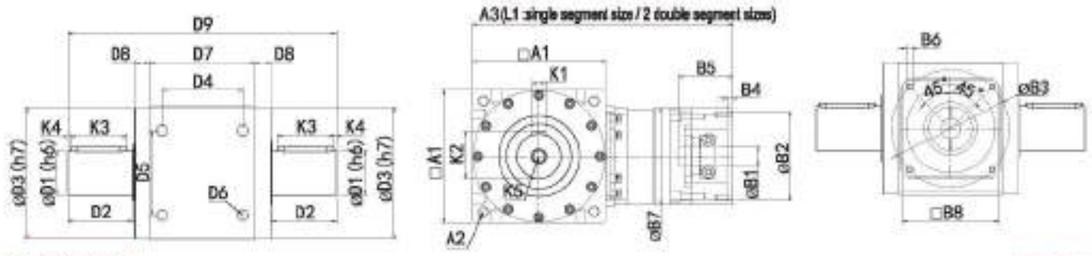
1. Actual dimensions are based on 2D/3D drawings.
2. Life expectancy will be shortened by 1/2 if used continuously for more than 12 hours/day.

PAW–2P Double output shaft type

Ratio(1/3 ~ /100) Input with planetary right-angle reducer



Dimensions:

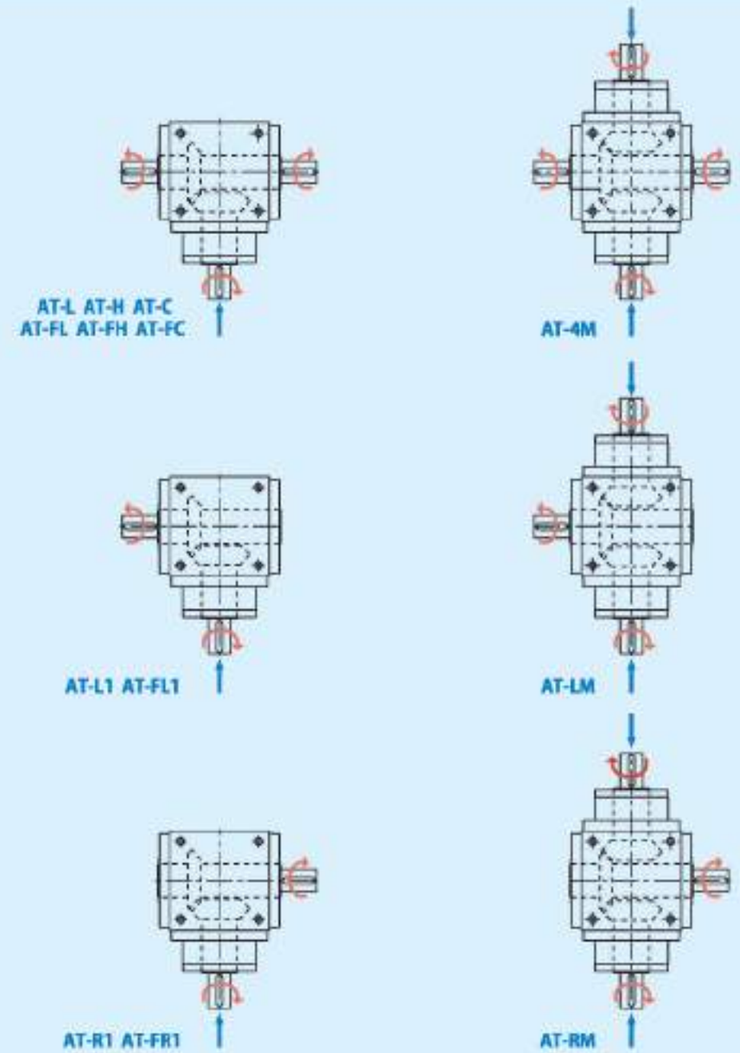


Specifications: unit: mm

Specification	PAW045A	PAW070A	PAW085A	PAW085B	PAW105A	PAW125A	PAW125B	PAW150A	PAW150B	PAW180A	PAW180B
D1	13	16	20	20	28	32	32	40	40	50	50
D2	20	30	35	35	40	50	50	63	63	73	73
D3	43. 2	66	82	82	100	120	120	135	135	165	165
D4	36	54	68	68	80	100	100	120	120	141. 42	141. 42
D5	26	50	52	52	60	80	80	100	100	141. 42	141. 42
D6	4-M4*P0. 7	4-M5*P0. 8	4-M6*P1. 0	4-M6*P1. 0	4-M8*P1. 25	4-M8*P1. 25	4-M8*P1. 25	4-M10*P1. 5	4-M10*P1. 5	4-M12*P1. 75	4-M12*P1. 75
D7	54	70	85	85	105	125	125	142	142	180	180
D8	10. 5	16. 5	15. 5	15. 5	18. 5	19. 5	19. 5	20	20	21	21
D9	118	167	190	190	226	268	268	320	320	302	302
A1	46	70	85	85	105	125	125	142	142	180	180
A2	P. C. Dφ 53 4-M5*P0. 8	P. C. Dφ 86 4-M5*P0. 8	P. C. Dφ 100 4-M6*P1. 0	P. C. Dφ 100 4-M6*P1. 0	P. C. Dφ 118 4-M8*P1. 25	P. C. Dφ 145 4-M8*P1. 25	P. C. Dφ 165 4-M8*P1. 25	P. C. Dφ 185 4-M10*P1. 5	P. C. Dφ 185 4-M10*P1. 5	P. C. Dφ 200 4-M12*P1. 75	P. C. Dφ 200 4-M12*P1. 75
A3 (L1:single segment size)	121	159	210	177	232	290	266	342	322	409	367
A3 (L2:single segment size)	141	180	237	198	259	321	293	388	353	455	413
K1	4	5	6	6	8	10	10	12	12	14	14
K2	14. 5	18	22. 5	22. 5	31	35	35	43	43	53. 5	53. 5
K3	15	20	25	25	30	40	40	50	50	60	60
K4	2. 5	3	3. 5	3. 5	3. 5	3	3	3	3	3	3
K5	M4	M5	M6	M6	M8	M8	M8	M12	M12	M12	M12
B1	5, 6. 35, 8	6. 35, 8, 9 11, 14	14, 16, 19 22, 24, 28 32, 35	6. 35, 8, 9 11, 14, 16, 19	14, 16, 19 22, 24, 28 32, 35	19, 22, 24 28, 32, 35 38, 42	11, 14, 16 19, 22, 24	19, 22, 24 28, 32 35, 38	16, 19, 22 24, 28, 32 35, 38	19, 22, 24 28, 32, 35 38, 42, 55	19, 22, 24 32, 35 38, 42
B2	22, 30, 38. 1	30, 38. 1, 40, 50, 60	70, 80, 95 110, 114. 3 130	30, 36, 38. 1 40, 50 60, 70	70, 80, 95 110, 114. 3 130	95, 110 114. 3, 130 180	50, 60, 70 80, 95, 110	95, 110 114. 3, 130 180	70, 80, 95 110, 114. 3 130	110, 114. 3 130, 180 200	95, 110 114. 3, 130 180
B3	43. 8, 45, 46 66. 7, 70. 7	45, 46, 66. 7 70, 70. 7, 75	90, 115, 130 145, 165 200	45, 46, 66. 7 70, 70. 7 75, 90	90, 115, 130 145, 165 200	115, 130 145, 165 200, 215	70, 75, 90 100, 115 130, 145	115, 130 145, 165 200, 215	90, 100, 115 130, 145 165, 200	130, 145 165, 200 215, 235	115, 130 145, 165 200, 215
B4	3	4	6	4, 5	6	7	6	7	7	7	7
B5	≦ 28	≦ 31	≦ 62	≦ 41	≦ 62	≦ 80	≦ 62	≦ 80	≦ 80	≦ 86	≦ 81
B6	M3, M4	M3, M4 M5	M4, M5 M6, M8	M3, M4 M5, M6	M4, M5 M6, M8	M6, M8 M10, M12	M5, M6 M8	M6, M8 M10, M12	M6, M8 M10, M12	M8, M10 M12	M6, M8 M10, M12
B7	46	60	90	60	90	120	90	142	120	182	142
B8	46	62	90, 115, 120	62, 80, 90	90, 115, 120	120, 140, 178	90, 115, 120	120, 142 178, 192	120, 140, 178	182, 200, 220	120, 142 178, 192

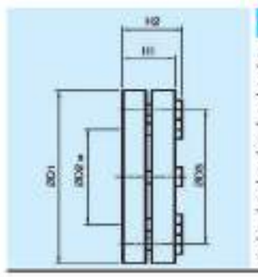
1. Actual dimensions are based on 2D/3D drawings.
2. Life expectancy will be shortened by 1/2 if used continuously for more than 12 hours/day.

Diagram of Rotate Direction



Selection of Shrink Disc Accesseries

Unit: mm



C / FC Series	D1	D2	D3	H1	H2
SSD-d16xdw14	41	16	26	15	18.5
SSD-d22xdw18	50	22	36	19.5	23
SSD-d25xdw22	50	25	38	19.5	23
SSD-d44xdw32	80	44	61	25.5	29.5
SSD-d50xdw40	90	50	70	27.5	31.5
SSD-d62xdw50	110	62	86	30.5	34.5
SSD-d68xdw55	115	68	86	30.5	34.5
SSD-d75xdw60	138	75	100	32.5	38

German Standard DIN
Japanese Standard JIS
apanese Standard CP-JIS
Non-standard customized sizes

For servo motor / precision gearbox linear driving

Precision Rack . Pinion

Taiwan technology/precision transmission solutions expert

FAMED®

Fenghua Transmission Technology (Jiangsu) Co.,Ltd.

Precision Rack . Pinion series

Rack 264–276

German Standard accuracy grade DIN

Model	DIN 3962	Material	Type	Teeth Treatment	Hardness	Mounted Holes	Module
CSGH	DIN6	S45C	Spur	Teeth Ground	Hardened HRC 50°-55°	Holes	1.5, 2, 2.5, 3, 4, 5, 6, 8
CSMQ	DIN7	S45C		Milled	HRC18°-22° Quenched & Tempered		1.5, 2, 2.5, 3, 4, 5, 6, 8
CSMH	DIN8	S45C		Milled	Hardened HRC 50°-55°		1.5, 2, 2.5, 3, 4, 5, 6, 8
MSGH	DIN6	42CrMo		Teeth Ground	Hardened HRC 50°-55°		1.5, 2, 3, 4, 5, 6, 8
MSMQ	DIN7	42CrMo		Milled	HRC18°-22° Quenched & Tempered		1.5, 2, 3, 4, 5, 6, 8
MSMH	DIN8	42CrMo		Milled	Hardened HRC 50°-55°		1.5, 2, 3, 4, 5, 6, 8
CHGH	DIN6	S45C	Helical Right Hand 19°31'42"	Teeth Ground	Hardened HRC 50°-55°		2, 3, 4, 5
CHMQ	DIN7	S45C		Milled	HRC18°-22° Quenched & Tempered		1.5, 2, 2.5, 3, 4, 5, 6, 8
CHMH	DIN8	S45C		Milled	Hardened HRC 50°-55°		1.5, 2, 3, 4, 5, 6, 8
MHGH	DIN6	42CrMo		Teeth Ground	Hardened HRC 50°-55°		1.5, 2, 3, 4, 5, 6, 8
MHMQ	DIN7	42CrMo		Milled	HRC18°-22° Quenched & Tempered		1.5, 2, 3, 4, 5, 6, 8
MHMH	DIN8	42CrMo		Milled	Hardened HRC 50°-55°		1.5, 2, 3, 4, 5, 6, 8

Gear 277–286

German Standard accuracy grade DIN

Model	DIN 3962	Material	Type	Teeth Treatment	Hardness	Module
GSGH	DIN6	20CrMnTi	Spur	Teeth Ground	Hardened HRC 50°-55°	1.5, 2, 2.5, 3, 4, 5, 6, 8
GHGH	DIN6	20CrMnTi	Helical Left Hand	Teeth Ground	Hardened HRC 55°-62°	1.5, 2, 2.5, 3, 4, 5, 6, 8

Lubrication components 287–288

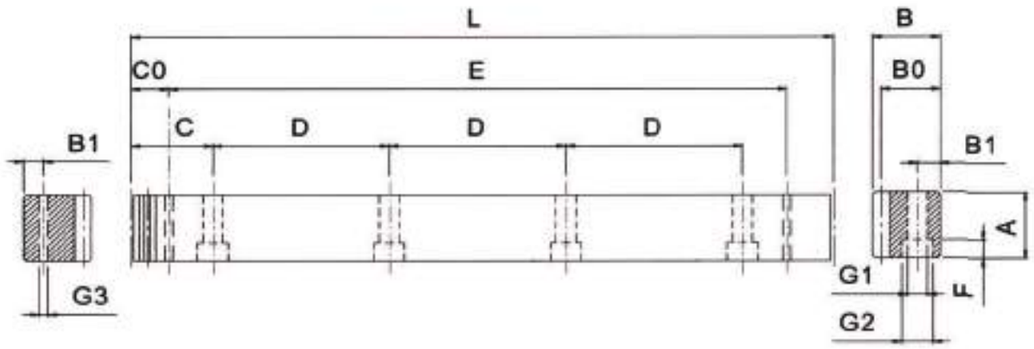
Rack Code Instruction

1st	2nd	3th	4th	5th	6th	7th
Material	Type	Teeth Treatment	Hardness	Module	Length	Grade
C	S	G	H	020	10	DIN JIS
C= Carbon Steel = S45C M= Alloy Steel = 42CrMo	S=Straight H=Helical	M=Milled G=Ground	H=Hardened Q=Quenched & Tempered	M1.5~M10	05=500mm 10=1000mm 15=1500mm 20=2000mm	DIN 5-10

Remarks: Lengths, holes,materials,surface treaments (sandblasted, phosphated,Black-coated, sides ground) and other requirements all could be customized.

CSGH-DIN6 Series Spur gear grinding racks

CSGH-DIN6 Specifications			
Precision grade	DIN6	Tooth hardness	50~55HRC
Type	Spur	Surface treatment	Grinding
Pressure angle	20°	Treatment of Tooth	Grinding
Material	S45C	Heat treatment	Tooth surface induction hardened

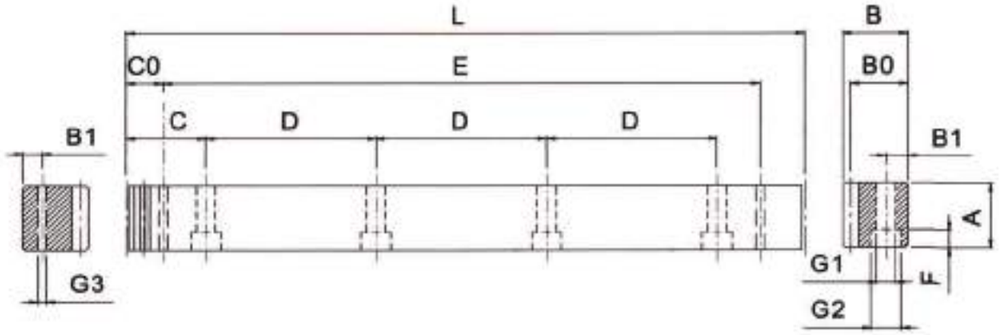


Dimension : mm

Catalog NO.	Module	L	Tooth NO.	A	B	B0	C	D	Hole NO.	B1	G1	G2	F	C0	E	G3	PitchError /300mm	KG
CSGH015-050	1.5	499.51	106	17	17	15.5	62.44	124.88	4	7	6	9.5	7	29.0	441.5	5.7	0.021	1.3
CSGH015-100	1.5	999.03	212	17	17	15.5	62.44	124.88	8	7	6	9.5	7	29.0	941.0	5.7	0.021	2.6
CSGH020-050	2	502.64	80	24	24	22	62.83	125.66	4	8	7	11	7	31.3	440.1	5.7	0.022	2.1
CSGH020-100	2	1005.28	160	24	24	22	62.83	125.66	8	8	7	11	7	31.3	942.7	5.7	0.022	4.1
CSGH030-050	3	508.95	54	29	29	26	63.62	127.23	4	9	10	15	9	34.4	440.1	7.7	0.024	3.0
CSGH030-100	3	1017.9	108	29	29	26	63.62	127.23	8	9	10	15	9	34.4	949.1	7.7	0.024	6.1
CSGH040-050	4	502.64	40	39	39	35	62.83	125.66	4	12	10	15	9	37.5	427.7	7.7	0.025	5.4
CSGH040-100	4	1005.28	80	39	39	35	62.83	125.66	8	12	10	15	9	37.5	930.3	7.7	0.025	10.9
CSGH050-050	5	502.65	32	49	39	34	62.83	125.66	4	12	14	20	13	30.1	442.4	11.7	0.025	6.8
CSGH050-100	5	1005.31	64	49	39	34	62.83	125.66	8	12	14	20	13	30.1	945	11.7	0.025	13.7
CSGH060-050	6	508.95	27	59	49	43	63.62	127.23	4	16	18	26	17	31.4	446.1	15.7	0.026	10.5
CSGH060-100	6	1017.9	54	59	49	43	63.62	127.23	8	16	18	26	17	31.4	955.0	15.7	0.026	20.9
CSGH080-050	8	502.64	20	79	79	71	62.83	125.66	4	25	22	33	21	26.6	449.5	19.7	0.027	22.3
CSGH080-100	8	1005.28	40	79	79	71	62.83	125.66	8	25	22	33	21	26.6	952	19.7	0.027	44.6

CSMQ-DIN7 Series Spur gear milling racks

CSMQ-DIN7 Specifications			
Precision grade	DIN7	Tooth hardness	15~20HRC
Type	Spur	Surface treatment	Grinding
Pressure angle	20°	Treatment of Tooth	Finish cutting
Material	S45C	Heat treatment	Tooth surface induction hardened



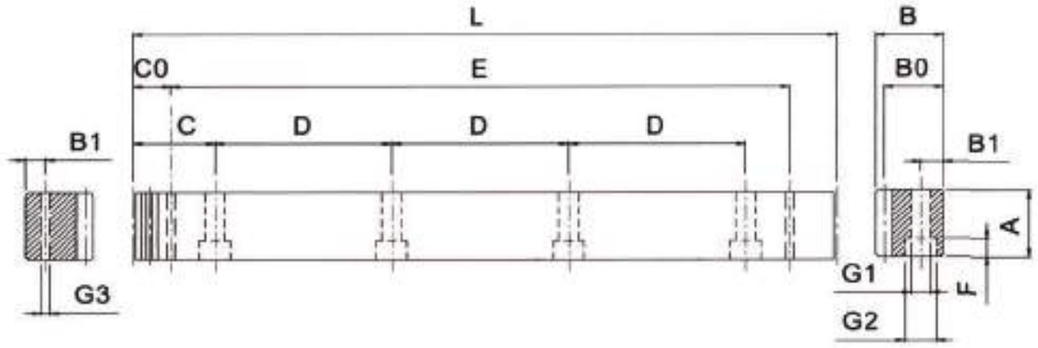
Dimension : mm

Catalog NO.	Module	L	Tooth NO.	A	B	B0	C	D	Hole NO.	B1	G1	G2	F	C0	E	G3	PitchError /300mm	KG
CSMQ015-050	1.5	499.51	106	17	17	15.5	62.44	124.88	4	7	6	9.5	7	29.0	441.5	5.7	0.042	1.3
CSMQ015-100	1.5	999.03	212	17	17	15.5	62.44	124.88	8	7	6	9.5	7	29.0	941.0	5.7	0.042	2.6
CSMQ020-050	2	502.64	80	25	24	22	62.83	125.66	4	8	7	11	7	31.3	440.1	5.7	0.044	2.1
CSMQ020-100	2	1005.28	160	25	24	22	62.83	125.66	8	8	7	11	7	31.3	942.7	5.7	0.044	4.1
CSMQ030-050	3	508.95	54	30	29	26	63.62	127.23	4	9	10	15	9	34.4	440.1	7.7	0.046	3.0
CSMQ030-100	3	1017.9	108	30	29	26	63.62	127.23	8	9	10	15	9	34.4	949.1	7.7	0.046	6.1
CSMQ040-050	4	502.64	40	40	39	35	62.83	125.66	4	12	10	15	9	37.5	427.7	7.7	0.048	5.4
CSMQ040-100	4	1005.28	80	40	39	35	62.83	125.66	8	12	10	15	9	37.5	930.3	7.7	0.048	10.9
CSMQ050-050	5	502.65	32	49	39	34	62.83	125.66	4	12	14	20	13	30.1	442.4	11.7	0.050	6.8
CSMQ050-100	5	1005.31	64	49	39	34	62.83	125.66	8	12	14	20	13	30.1	945	11.7	0.050	13.7
CSMQ060-050	6	508.95	27	59	49	43	63.62	127.23	4	16	18	26	17	31.4	446.1	15.7	0.055	10.5
CSMQ060-100	6	1017.9	54	59	49	43	63.62	127.23	8	16	18	26	17	31.4	955.0	15.7	0.055	20.9
CSMQ080-050	8	502.64	20	79	79	71	62.83	125.66	4	25	22	33	21	26.6	449.5	19.7	0.060	22.3
CSMQ080-100	8	1005.28	40	79	79	71	62.83	125.66	8	25	22	33	21	26.6	952	19.7	0.060	44.6

CSMH-DIN8 Series Spur gear milling racks

CSMH–DIN8 Specifications

Precision grade	DIN8	Tooth hardness	50~55HRC
Type	Spur	Surface treatment	Grinding
Pressure angle	20°	Treatment of Tooth	Finish cutting
Material	S45C	Heat treatment	Tooth surface induction hardened



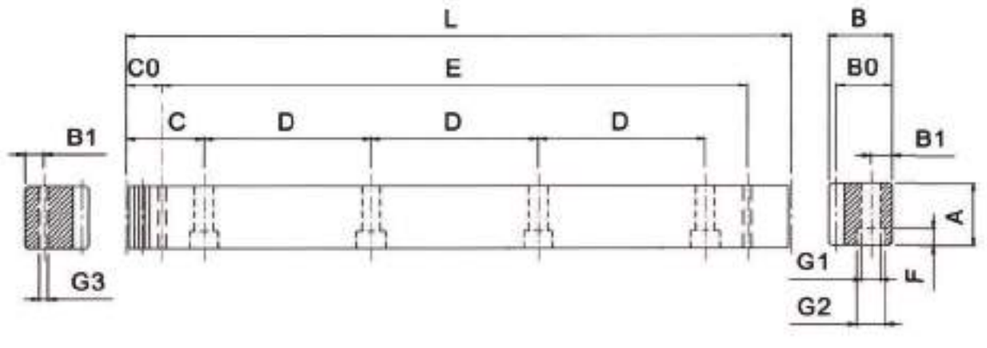
Dimension : mm

Catalog NO	Module	L	Tooth NO	A	B	B0	C	D	Hole NO	B1	G1	G2	F	C0	E	G3	PichError /300mm	KG
CSMH015-050	1.5	499.51	106	17	17	15.5	62.44	124.88	4	7	6	9.5	7	29.0	441.5	5.7	0.058	1.3
CSMH015-100	1.5	999.03	212	17	17	15.5	62.44	124.88	8	7	6	9.5	7	29.0	941.0	5.7	0.058	2.6
CSMH020-050	2	502.64	80	24	24	22	62.83	125.66	4	8	7	11	7	31.3	440.1	5.7	0.059	2.1
CSMH020-100	2	1005.28	160	24	24	22	62.83	125.66	8	8	7	11	7	31.3	942.7	5.7	0.061	4.1
CSMH030-050	3	508.95	54	29	29	26	63.62	127.23	4	9	10	15	9	34.4	440.1	7.7	0.065	3.0
CSMH030-100	3	1017.9	108	29	29	26	63.62	127.23	8	9	10	15	9	34.4	949.1	7.7	0.065	6.1
CSMH040-050	4	502.64	40	39	39	35	62.83	125.66	4	12	10	15	9	37.5	427.7	7.7	0.068	5.4
CSMH040-100	4	1005.28	80	39	39	35	62.83	125.66	8	12	10	15	9	37.5	930.3	7.7	0.068	10.9
CSMH050-050	5	502.65	32	49	39	34	62.83	125.66	4	12	14	20	13	30.1	442.4	11.7	0.070	6.8
CSMH050-100	5	1005.31	64	49	39	34	62.83	125.66	8	12	14	20	13	30.1	945	11.7	0.070	13.7
CSMH060-050	6	508.95	27	59	49	43	63.62	127.23	4	16	18	26	17	31.4	446.1	15.7	0.072	10.5
CSMH060-100	6	1017.9	54	59	49	43	63.62	127.23	8	16	18	26	17	31.4	955.0	15.7	0.072	20.9
CSMH080-050	8	502.64	20	79	79	71	62.83	125.66	4	25	22	33	21	26.6	449.5	19.7	0.075	22.3
CSMH080-100	8	1005.28	40	79	79	71	62.83	125.66	8	25	22	33	21	26.6	952	19.7	0.075	44.6

MSGH-DIN6 Series Spur gear grinding racks

MSGH–DIN6 Specifications

Precision grade	DIN6	Tooth hardness	50~55HRC
Type	Spur	Surface treatment	Grinding
Pressure angle	20°	Treatment of Tooth	Grinding
Material	S45C	Heat treatment	Tooth surface induction hardened

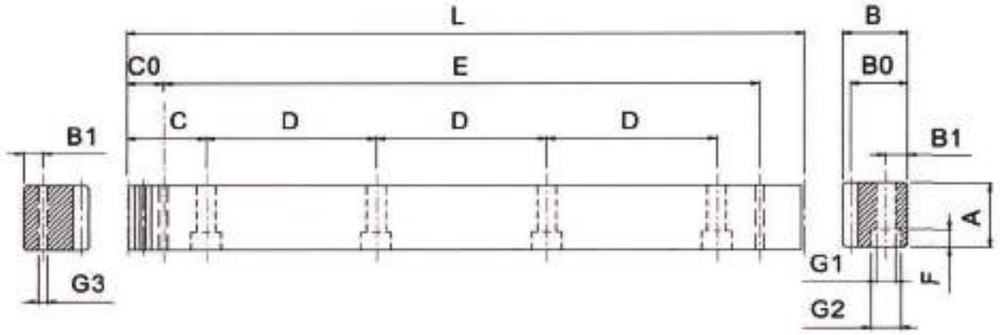


Dimension : mm

Catalog NO	Module	L	Tooth NO	A	B	B0	C	D	Hole NO	B1	G1	G2	F	C0	E	G3	PichError /300mm	KG
MSGH015-050	1.5	499.51	106	17	17	15.5	62.44	124.88	4	7	6	9.5	7	29.0	441.5	5.7	0.020	1.3
MSGH015-100	1.5	999.03	212	17	17	15.5	62.44	124.88	8	7	6	9.5	7	29.0	941.0	5.7	0.025	2.6
MSGH020-050	2	502.64	80	24	24	22	62.83	125.66	4	8	7	11	7	31.3	440.1	5.7	0.020	2.1
MSGH020-100	2	1005.28	160	24	24	22	62.83	125.66	8	8	7	11	7	31.3	942.7	5.7	0.025	4.1
MSGH030-050	3	508.95	54	29	29	26	63.62	127.23	4	9	10	15	9	34.4	440.1	7.7	0.022	3.0
MSGH030-100	3	1017.9	108	29	29	26	63.62	127.23	8	9	10	15	9	34.4	949.1	7.7	0.025	6.1
MSGH040-050	4	502.64	40	39	39	35	62.83	125.66	4	12	10	15	9	37.5	427.7	7.7	0.025	5.4
MSGH040-100	4	1005.28	80	39	39	35	62.83	125.66	8	12	10	15	9	37.5	930.3	7.7	0.025	10.9
MSGH050-050	5	502.65	32	49	39	34	62.83	125.66	4	12	14	20	13	30.1	442.4	11.7	0.025	6.8
MSGH050-100	5	1005.31	64	49	39	34	62.83	125.66	8	12	14	20	13	30.1	945	11.7	0.028	13.7
MSGH060-050	6	508.95	27	59	49	43	63.62	127.23	4	16	18	26	17	31.4	446.1	15.7	0.025	10.5
MSGH060-100	6	1017.9	54	59	49	43	63.62	127.23	8	16	18	26	17	31.4	955.0	15.7	0.028	20.9
MSGH080-050	8	502.64	20	79	79	71	62.83	125.66	4	25	22	33	21	26.6	449.5	19.7	0.030	22.3
MSGH080-100	8	1005.28	40	79	79	71	62.83	125.66	8	25	22	33	21	26.6	952	19.7	0.033	44.6

MSMQ Series Spur gear milling racks

MSMQ-DIN7 Specifications			
Precision grade	DIN7	Tooth hardness	15~20HRC
Type	Spur	Surface treatment	Grinding
Pressure angle	20°	Treatment of Tooth	Finish cutting
Material	42CrMo	Heat treatment	Tooth surface induction hardened

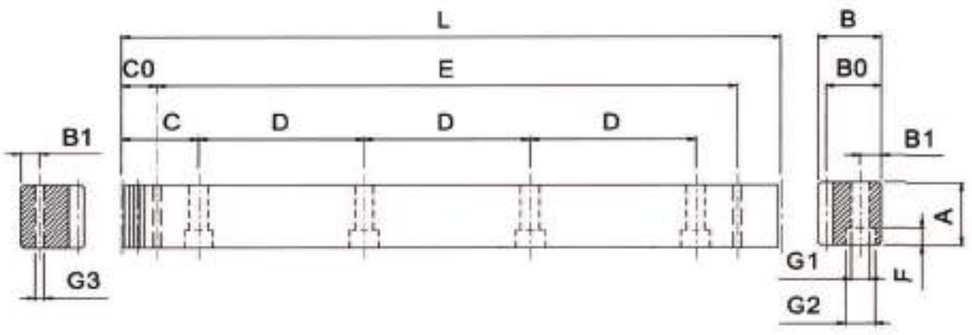


Dimension : mm

Catalog NO.		L	Tooth NO.	A	B	B0	C	D	Hole NO.	B1	G1	G2	F	C0	E	G3	PitchError /300mm	KG
MSMQ015-050	1.5	499.51	106	17	17	15.5	62.44	124.88	4	7	6	9.5	7	29.0	441.5	5.7	0.042	1.3
MSMQ015-100	1.5	999.03	212	17	17	15.5	62.44	124.88	8	7	6	9.5	7	29.0	941.0	5.7	0.042	2.6
MSMQ020-050	2	502.64	80	24	24	22	62.83	125.66	4	8	7	11	7	31.3	440.1	5.7	0.044	2.1
MSMQ020-100	2	1005.28	160	24	24	22	62.83	125.66	8	8	7	11	7	31.3	942.7	5.7	0.044	4.1
MSMQ030-050	3	508.95	54	29	29	26	63.62	127.23	4	9	10	15	9	34.4	440.1	7.7	0.046	3.0
MSMQ030-100	3	1017.9	108	29	29	26	63.62	127.23	8	9	10	15	9	34.4	949.1	7.7	0.046	6.1
MSMQ040-050	4	502.64	40	39	39	35	62.83	125.66	4	12	10	15	9	37.5	427.7	7.7	0.048	5.4
MSMQ040-100	4	1005.28	80	39	39	35	62.83	125.66	8	12	10	15	9	37.5	930.3	7.7	0.048	10.9
MSMQ050-050	5	502.65	32	49	39	34	62.83	125.66	4	12	14	20	13	30.1	442.4	11.7	0.050	6.8
MSMQ050-100	5	1005.31	64	49	39	34	62.83	125.66	8	12	14	20	13	30.1	945	11.7	0.050	13.7
MSMQ060-050	6	508.95	27	59	49	43	63.62	127.23	4	16	18	26	17	31.4	446.1	15.7	0.055	10.5
MSMQ060-100	6	1017.9	54	59	49	43	63.62	127.23	8	16	18	26	17	31.4	955.0	15.7	0.055	20.9
MSMQ080-050	8	502.64	20	79	79	71	62.83	125.66	4	25	22	33	21	26.6	449.5	19.7	0.060	22.3
MSMQ080-100	8	1005.28	40	79	79	71	62.83	125.66	8	25	22	33	21	26.6	952	19.7	0.060	44.6

MSMH Series Spur gear milling racks

MSMH-DIN8 Specifications			
Precision grade	DIN8	Tooth hardness	50~55HRC
Type	Spur	Surface treatment	Grinding
Pressure angle	20°	Treatment of Tooth	Finish cutting
Material	42CrMo	Heat treatment	Tooth surface induction hardened



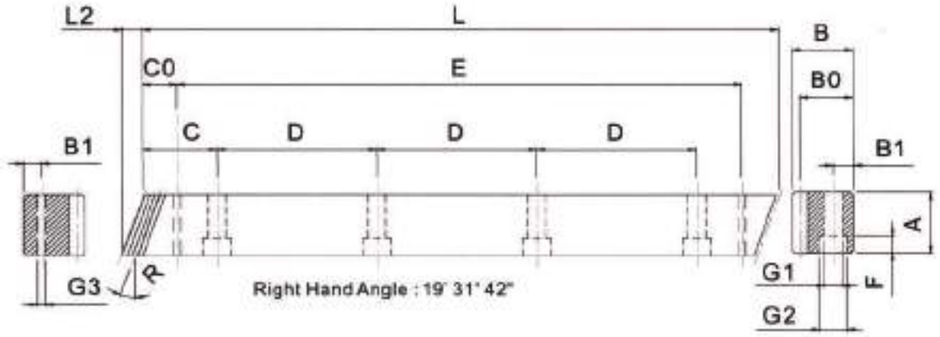
Dimension : mm

Catalog NO.	Module	L	Tooth NO.	A	B	B0	C	D	Hole NO.	B1	G1	G2	F	C0	E	G3	PitchError /300mm	KG
MSMH015-050	1.5	499.51	106	17	17	15.5	62.44	124.88	4	7	6	9.5	7	29.0	441.5	5.7	0.058	1.3
MSMH015-100	1.5	999.03	212	17	17	15.5	62.44	124.88	8	7	6	9.5	7	29.0	941.0	5.7	0.058	2.6
MSMH020-050	2	502.64	80	24	24	22	62.83	125.66	4	8	7	11	7	31.3	440.1	5.7	0.059	2.1
MSMH020-100	2	1005.28	160	24	24	22	62.83	125.66	8	8	7	11	7	31.3	942.7	5.7	0.061	4.1
MSMH030-050	3	508.95	54	29	29	26	63.62	127.23	4	9	10	15	9	34.4	440.1	7.7	0.065	3.0
MSMH030-100	3	1017.9	108	29	29	26	63.62	127.23	8	9	10	15	9	34.4	949.1	7.7	0.065	6.1
MSMH040-050	4	502.64	40	39	39	35	62.83	125.66	4	12	10	15	9	37.5	427.7	7.7	0.068	5.4
MSMH040-100	4	1005.28	80	39	39	35	62.83	125.66	8	12	10	15	9	37.5	930.3	7.7	0.068	10.9
MSMH050-050	5	502.65	32	49	39	34	62.83	125.66	4	12	14	20	13	30.1	442.4	11.7	0.070	6.8
MSMH050-100	5	1005.31	64	49	39	34	62.83	125.66	8	12	14	20	13	30.1	945	11.7	0.070	13.7
MSMH060-050	6	508.95	27	59	49	43	63.62	127.23	4	16	18	26	17	31.4	446.1	15.7	0.072	10.5
MSMH060-100	6	1017.9	54	59	49	43	63.62	127.23	8	16	18	26	17	31.4	955.0	15.7	0.072	20.9
MSMH080-050	8	502.64	20	79	79	71	62.83	125.66	4	25	22	33	21	26.6	449.5	19.7	0.075	22.3
MSMH080-100	8	1005.28	40	79	79	71	62.83	125.66	8	25	22	33	21	26.6	952	19.7	0.075	44.6

CHGH-DIN6 Series Helical gear grinding racks

CHGH–DIN6 Specifications

Precision grade	DIN6	Tooth hardness	50~55HRC
Type	Helical	Surface treatment	Grinding
Pressure angle	20°	Treatment of Tooth	Grinding
Material	S45C	Heat treatment	Tooth surface induction hardened
Right hand angle	19° 31' 42"		



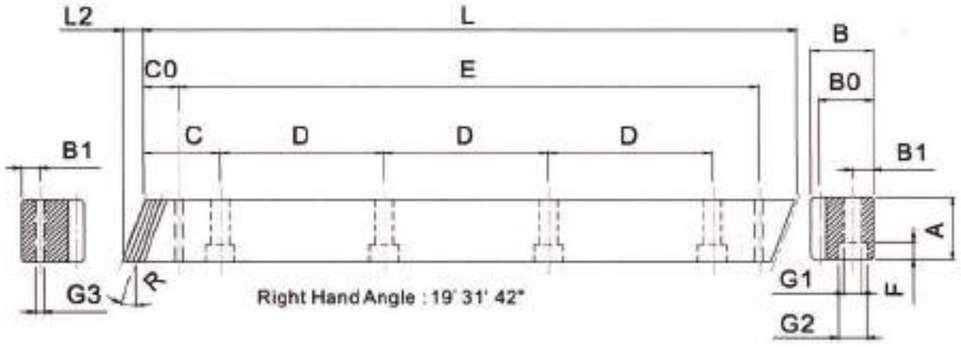
Dimension : mm

Catalog NO.	Module	L	L2	Tooth NO.	A	B	B0	C	D	Hole NO.	B1	G1	G2	F	C0	E	G3	PichError /300mm	KG
CHGH015-050	1.5	500.00	6	100	17	17	15.5	62.50	125	4	7	6	9.5	7	31.7	436.6	5.7	0.021	1.3
CHGH015-100	1.5	1000.0	6	200	17	17	15.5	62.50	125	8	7	6	9.5	7	31.7	936.6	5.7	0.021	2.6
CHGH020-050	2	500.00	8.5	75	24	24	22	62.50	125	4	8	7	11	7	31.7	436.6	5.7	0.022	2.1
CHGH020-100	2	1000.0	8.5	150	24	24	22	62.50	125	8	8	7	11	7	31.7	936.6	5.7	0.022	4.1
CHGH030-050	3	500.00	10.3	50	29	29	26	62.50	125	4	9	10	15	9	35.0	430.0	7.7	0.024	3.0
CHGH030-100	3	1000.0	10.3	100	29	29	26	62.50	125	8	9	10	15	9	35.0	930.0	7.7	0.024	6.1
CHGH040-050	4	506.67	13.8	38	39	39	35	62.50	125	4	12	10	15	9	33.3	433.0	7.7	0.024	5.4
CHGH040-100	4	1000.0	13.8	75	39	39	35	62.50	125	8	12	10	15	9	33.3	933.4	7.7	0.024	10.9
CHGH050-050	5	500.00	17.4	30	49	39	34	62.50	125	4	12	14	20	13	37.5	425.0	11.7	0.025	6.8
CHGH050-100	5	1000.0	17.4	60	49	39	34	62.50	125	8	12	14	20	13	37.5	925.0	11.7	0.025	13.7
CHGH060-050	6	500.00	20.9	25	59	49	43	62.50	125	4	16	18	26	17	37.5	425.0	15.7	0.026	10.5
CHGH060-100	6	1000.0	20.9	50	59	49	43	62.50	125	8	16	18	26	17	37.5	925.0	15.7	0.026	20.9
CHGH080-050	8	480.00	28.0	18	79	79	71	60.00	120	4	25	22	33	21	120.0	240.0	17.7	0.027	22.3
CHGH080-100	8	960.00	28.0	36	79	79	71	60.00	120	8	25	22	33	21	120.0	720.0	17.7	0.027	44.6

CHMQ-DIN7 Series Helical gear grinding racks

CHMQ–DIN7 Specifications

Precision grade	DIN6	Tooth hardness	15~20HRC
Type	Helical	Surface treatment	Grinding
Pressure angle	20°	Treatment of Tooth	Finish cutting
Material	S45C	Heat treatment	Quenched
Right hand angle	19° 31' 42"		

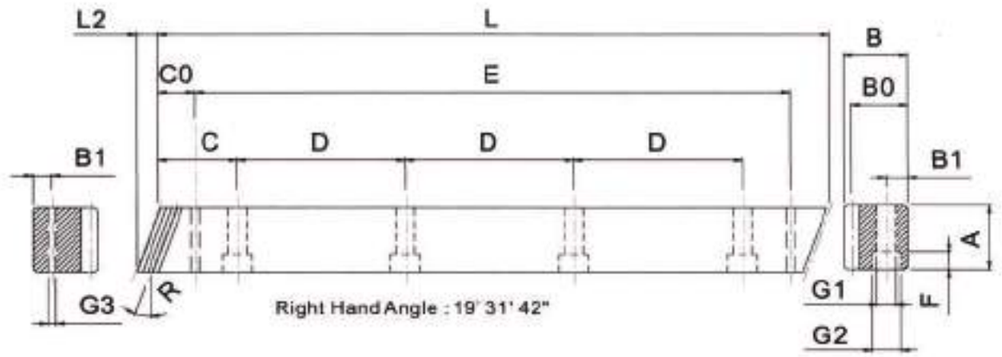


Dimension : mm

Catalog NO.	Module	L	L2	Tooth NO.	A	B	B0	C	D	Hole NO.	B1	G1	G2	F	C0	E	G3	PichError /300mm	KG
CHMQ015-050	1.5	500.00	6	100	17	17	15.5	62.50	125	4	7	6	9.5	7	31.7	436.6	5.7	0.042	1.3
CHMQ015-100	1.5	1000.0	6	200	17	17	15.5	62.50	125	8	7	6	9.5	7	31.7	936.6	5.7	0.042	2.6
CHMQ020-050	2	500.00	8.9	75	25	24	22	62.50	125	4	8	7	11	7	31.7	436.6	5.7	0.044	2.1
CHMQ020-100	2	1000.0	8.9	150	25	24	22	62.50	125	8	8	7	11	7	31.7	936.6	5.7	0.044	4.1
CHMQ030-050	3	500.00	10.6	50	30	29	26	62.50	125	4	9	10	15	9	35.0	430.0	7.7	0.046	3.0
CHMQ030-100	3	1000.0	10.6	100	30	29	26	62.50	125	8	9	10	15	9	35.0	930.0	7.7	0.046	6.1
CHMQ040-050	4	506.67	14.2	38	40	39	35	62.50	125	4	12	10	15	9	33.3	433.0	7.7	0.048	5.4
CHMQ040-100	4	1000.0	14.2	75	40	39	35	62.50	125	8	12	10	15	9	33.3	933.4	7.7	0.048	10.9
CHMQ050-050	5	500.00	17.7	30	50	39	34	62.50	125	4	12	14	20	13	37.5	425.0	11.7	0.050	6.8
CHMQ050-100	5	1000.0	17.7	60	50	39	34	62.50	125	8	12	14	20	13	37.5	925.0	11.7	0.050	13.7
CHMQ060-050	6	500.00	20.9	25	59	49	43	62.50	125	4	16	18	26	17	37.5	425.0	15.7	0.055	10.5
CHMQ060-100	6	1000.0	20.9	50	59	49	43	62.50	125	8	16	18	26	17	37.5	925.0	15.7	0.055	20.9
CHMQ080-050	8	480.00	28.0	18	79	79	71	60.00	120	4	25	22	33	21	120.0	240.0	17.7	0.060	22.3
CHMQ080-100	8	960.00	28.0	36	79	79	71	60.00	120	8	25	22	33	21	120.0	720.0	17.7	0.060	44.6

CHMH-DIN8 Series Helical gear grinding racks

CHMH-DIN8 Specifications			
Precision grade	DIN8	Tooth hardness	50~55HRC
Type	Helical	Surface treatment	Grinding
Pressure angle	20°	Treatment of Tooth	Finish cutting
Material	S45C	Heat treatment	Tooth surface induction hardened
Right hand angle	19° 31' 42"		

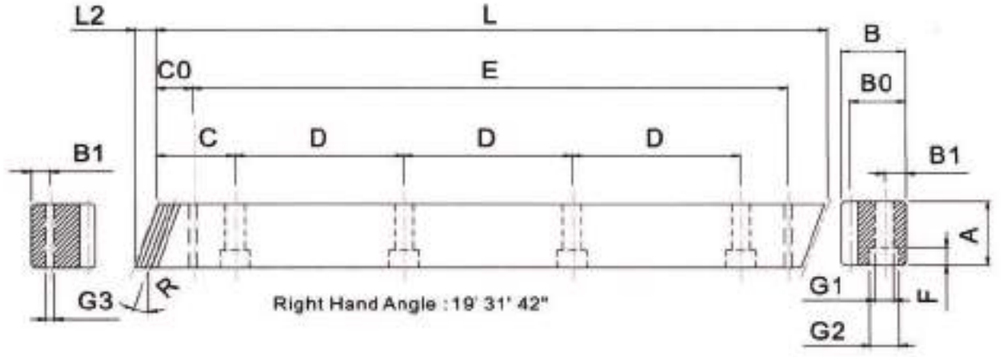


單位 / Dimension : mm

Catalog NO.	Module	L	L2	Tooth NO.	A	B	B0	C	D	Hole NO.	B1	G1	G2	F	C0	E	G3	PitchError /300mm	KG
CHMH015-050	1.5	500.00	6	100	17	17	15.5	62.50	125	4	7	6	9.5	7	31.7	436.6	5.7	0.059	1.3
CHMH015-100	1.5	1000.0	6	200	17	17	15.5	62.50	125	8	7	6	9.5	7	31.7	936.6	5.7	0.059	2.6
CHMH020-050	2	500.00	9.2	75	24	24	22	62.50	125	4	8	7	11	7	31.7	436.6	5.7	0.061	2.1
CHMH020-100	2	1000.0	9.2	150	24	24	22	62.50	125	8	8	7	11	7	31.7	936.6	5.7	0.061	4.1
CHMH030-050	3	500.00	11.0	50	29	29	26	62.50	125	4	9	10	15	9	35.0	430.0	7.7	0.065	3.0
CHMH030-100	3	1000.0	11.0	100	29	29	26	62.50	125	8	9	10	15	9	35.0	930.0	7.7	0.065	6.1
CHMH040-050	4	506.67	14.5	38	39	39	35	62.50	125	4	12	10	15	9	33.3	433.0	7.7	0.068	5.4
CHMH040-100	4	1000.0	14.5	75	39	39	35	62.50	125	8	12	10	15	9	33.3	933.4	7.7	0.068	10.9
CHMH050-050	5	500.00	17.7	30	49	39	34	62.50	125	4	12	14	20	13	37.5	425.0	11.7	0.070	6.8
CHMH050-100	5	1000.0	17.7	60	49	39	34	62.50	125	8	12	14	20	13	37.5	925.0	11.7	0.070	13.7
CHMH060-050	6	500.00	21.3	25	59	49	43	62.50	125	4	16	18	26	17	37.5	425.0	15.7	0.072	10.5
CHMH060-100	6	1000.0	21.3	50	59	49	43	62.50	125	8	16	18	26	17	37.5	925.0	15.7	0.072	20.9
CHMH080-050	8	480.00	28.7	18	79	79	71	60.00	120	4	25	22	33	21	120.0	240.0	17.7	0.075	22.3
CHMH080-100	8	960.00	28.7	36	79	79	71	60.00	120	8	25	22	33	21	120.0	720.0	17.7	0.075	44.6

MHGH-DIN6 Series Helical gear grinding racks

MHGH-DIN6 Specifications			
Precision grade	DIN6	Tooth hardness	50~55HRC
Type	Helical	Surface treatment	Grinding
Pressure angle	20°	Treatment of Tooth	Grinding
Material	42CrMo	Heat treatment	Tooth surface induction hardened
Right hand angle	19° 31' 42"		



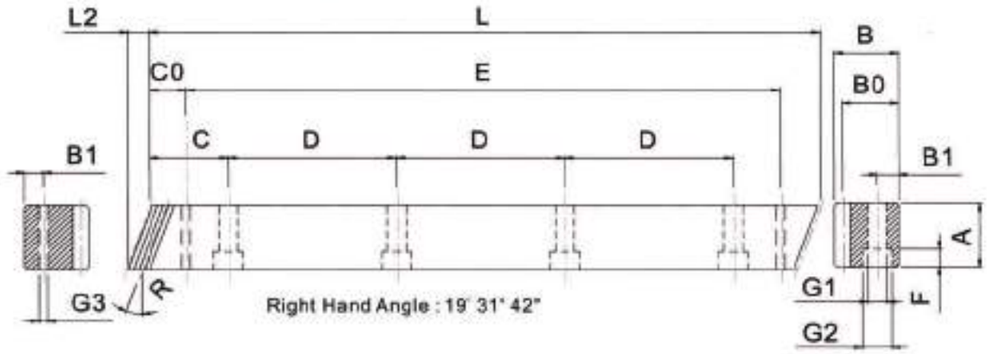
單位 / Dimension : mm

Catalog NO.	Module	L	L2	Tooth NO.	A	B	B0	C	D	Hole NO.	B1	G1	G2	F	C0	E	G3	PitchError /300mm	KG
MHGH015-050	1.5	500.00	6	100	17	17	15.5	62.50	125	4	7	6	9.5	7	31.7	436.6	5.7	0.021	1.3
MHGH015-100	1.5	1000.0	6	200	17	17	15.5	62.50	125	8	7	6	9.5	7	31.7	936.6	5.7	0.021	2.6
MHGH020-050	2	500.00	8.5	75	24	24	22	62.50	125	4	8	7	11	7	31.7	436.6	5.7	0.022	2.1
MHGH020-100	2	1000.0	8.5	150	24	24	22	62.50	125	8	8	7	11	7	31.7	936.6	5.7	0.022	4.1
MHGH030-050	3	500.00	10.3	50	29	29	26	62.50	125	4	9	10	15	9	35.0	430.0	7.7	0.024	3.0
MHGH030-100	3	1000.0	10.3	100	29	29	26	62.50	125	8	9	10	15	9	35.0	930.0	7.7	0.024	6.1
MHGH040-050	4	506.67	13.8	38	39	39	35	62.50	125	4	12	10	15	9	33.3	433.0	7.7	0.024	5.4
MHGH040-100	4	1000.0	13.8	75	39	39	35	62.50	125	8	12	10	15	9	33.3	933.4	7.7	0.024	10.9
MHGH050-050	5	500.00	17.4	30	49	39	34	62.50	125	4	12	14	20	13	37.5	425.0	11.7	0.025	6.8
MHGH050-100	5	1000.0	17.4	60	49	39	34	62.50	125	8	12	14	20	13	37.5	925.0	11.7	0.025	13.7
MHGH060-050	6	500.00	20.9	25	59	49	43	62.50	125	4	16	18	26	17	37.5	425.0	15.7	0.026	10.5
MHGH060-100	6	1000.0	20.9	50	59	49	43	62.50	125	8	16	18	26	17	37.5	925.0	15.7	0.026	20.9
MHGH080-050	8	480.00	28.0	18	79	79	71	60.00	120	4	25	22	33	21	120.0	240.0	17.7	0.027	22.3
MHGH080-100	8	960.00	28.0	36	79	79	71	60.00	120	8	25	22	33	21	120.0	720.0	17.7	0.027	44.6

MHMQ-DIN7 Series Helical gear milling racks

MHMQ-DIN7 Specifications

Precision grade	DIN7	Tooth hardness	15~20HRC
Type	Helical	Surface treatment	Grinding
Pressure angle	20°	Treatment of Tooth	Finish cutting
Material	42CrMo	Heat treatment	Tooth surface induction hardened
Right hand angle	19° 31' 42"		



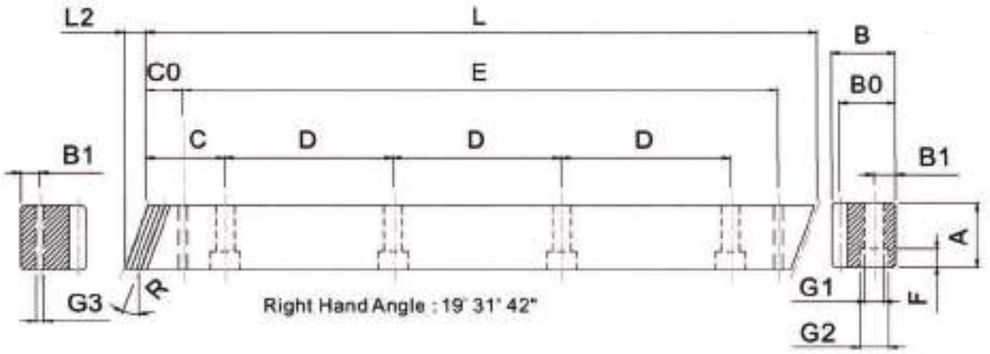
Dimension : mm

Catalog NO	Module	L	L2	Tooth NO	A	B	B0	C	D	Hole NO	B1	D1	G2	F	C0	E	G3	PitchError /300mm	KG
MHMQ015-050	1.5	500.00	6	100	17	17	15.5	62.50	125	4	7	6	9.5	7	31.7	436.6	5.7	0.042	1.3
MHMQ015-100	1.5	1000.0	6	200	17	17	15.5	62.50	125	8	7	6	9.5	7	31.7	936.6	5.7	0.042	2.6
MHMQ020-050	2	500.00	8.9	75	25	24	22	62.50	125	4	8	7	11	7	31.7	436.6	5.7	0.044	2.1
MHMQ020-100	2	1000.0	8.9	150	25	24	22	62.50	125	8	8	7	11	7	31.7	936.6	5.7	0.044	4.1
MHMQ030-050	3	500.00	10.6	50	30	29	26	62.50	125	4	9	10	15	9	35.0	430.0	7.7	0.046	3.0
MHMQ030-100	3	1000.0	10.6	100	30	29	26	62.50	125	8	9	10	15	9	35.0	930.0	7.7	0.046	6.1
MHMQ040-050	4	506.67	14.2	38	40	39	35	62.50	125	4	12	10	15	9	33.3	433.0	7.7	0.048	5.4
MHMQ040-100	4	1000.0	14.2	75	40	39	35	62.50	125	8	12	10	15	9	33.3	933.4	7.7	0.048	10.9
MHMQ050-050	5	500.00	17.7	30	50	39	34	62.50	125	4	12	14	20	13	37.5	425.0	11.7	0.050	6.8
MHMQ050-100	5	1000.0	17.7	60	50	39	34	62.50	125	8	12	14	20	13	37.5	925.0	11.7	0.050	13.7
MHMQ060-050	6	500.00	20.9	25	59	49	43	62.50	125	4	16	18	26	17	37.5	425.0	15.7	0.055	10.5
MHMQ060-100	6	1000.0	20.9	50	59	49	43	62.50	125	8	16	18	26	17	37.5	925.0	15.7	0.055	20.9
MHMQ080-050	8	480.00	28.0	18	79	79	71	60.00	120	4	25	22	33	21	120.0	240.0	17.7	0.060	22.3
MHMQ080-100	8	960.00	28.0	36	79	79	71	60.00	120	8	25	22	33	21	120.0	720.0	17.7	0.060	44.6

MHMH-DIN8 Series Helical gear milling racks

MHMH-DIN8 Specifications

Precision grade	DIN8	Tooth hardness	50~55HRC
Type	Helical	Surface treatment	Grinding
Pressure angle	20°	Treatment of Tooth	Finish cutting
Material	42CrMo	Heat treatment	Tooth surface induction hardened
Right hand angle	19° 31' 42"		



Dimension : mm

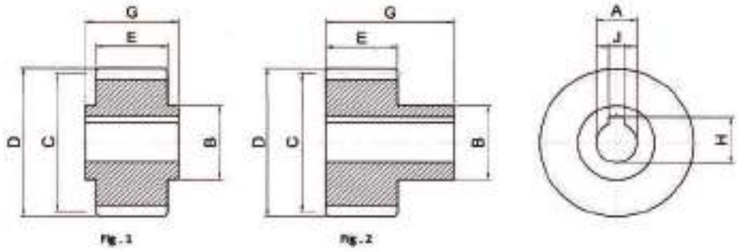
Catalog NO	Module	L	L2	Tooth NO	A	B	B0	C	D	Hole NO	B1	G1	G2	F	C0	E	G3	PitchError /300mm	KG
MHMH015-050	1.5	500.00	6	100	17	17	15.5	62.50	125	4	7	6	9.5	7	31.7	436.6	5.7	0.059	1.3
MHMH015-100	1.5	1000.0	6	200	17	17	15.5	62.50	125	8	7	6	9.5	7	31.7	936.6	5.7	0.059	2.6
MHMH020-050	2	500.00	9.2	75	24	24	22	62.50	125	4	8	7	11	7	31.7	436.6	5.7	0.061	2.1
MHMH020-100	2	1000.0	9.2	150	24	24	22	62.50	125	8	8	7	11	7	31.7	936.6	5.7	0.061	4.1
MHMH030-050	3	500.00	11.0	50	29	29	26	62.50	125	4	9	10	15	9	35.0	430.0	7.7	0.065	3.0
MHMH030-100	3	1000.0	11.0	100	29	29	26	62.50	125	8	9	10	15	9	35.0	930.0	7.7	0.065	6.1
MHMH040-050	4	506.67	14.5	38	39	39	35	62.50	125	4	12	10	15	9	33.3	433.0	7.7	0.068	5.4
MHMH040-100	4	1000.0	14.5	75	39	39	35	62.50	125	8	12	10	15	9	33.3	933.4	7.7	0.068	10.9
MHMH050-050	5	500.00	17.7	30	49	39	34	62.50	125	4	12	14	20	13	37.5	425.0	11.7	0.070	6.8
MHMH050-100	5	1000.0	17.7	60	49	39	34	62.50	125	8	12	14	20	13	37.5	925.0	11.7	0.070	13.7
MHMH060-050	6	500.00	21.3	25	59	49	43	62.50	125	4	16	18	26	17	37.5	425.0	15.7	0.072	10.5
MHMH060-100	6	1000.0	21.3	50	59	49	43	62.50	125	8	16	18	26	17	37.5	925.0	15.7	0.072	20.9
MHMH080-050	8	480.00	28.7	18	79	79	71	60.00	120	4	25	22	33	21	120.0	240.0	17.7	0.075	22.3
MHMH080-100	8	960.00	28.7	36	79	79	71	60.00	120	8	25	22	33	21	120.0	720.0	17.7	0.075	44.6

Pinion Model Instruction

1st Material	2nd Type	3th Teeth Treatment	4th Hardness	5th Module Circular Pitch	6th No of Teeth	7th Inner aperture	8th Fig.	9th Grade
G	S	G	H	M2	030	22	1	DIN6
G=20CrMnTi Alloy Steel	S=Straight H=Helical F=Flange	G=Ground M=Milled	H=Hardening treatment	M1.5~M10	12~96	15~75	Fig. 1 Fig. 2	DIN 6-10

GSGH-DIN6 Series Spur gear Grinding Pinions

Precision grade	DIN6
Type	Standard full depth
Pressure angle	20°
Material	20CrMnTi
Heat treatment	Induction hardened
Tooth hardness	55~60HRC
Treatment of Tooth	Grinding
Datum reference	Bore



Module 2

This inner diameter size is general size
Can be customized according to customer requirements

Dimension : mm

Product Model	Fig.	Number teeth	Inner diameter	Hub diameter	Pitch circle diameter	Outer diameter	Tooth amplitude	Total length	J	H
			Ah7	B	C	D	E	G		
GSGH-M2-16-15-1	1	16	15	25	32	36	28	30	5	17.3
GSGH-M2-18-15-1	1	18	15	30	36	40	28	30	5	17.3
GSGH-M2-18-20-1	1	18	20	25	36	40	28	30	6	22.8
GSGH-M2-20-15-1	1	20	15	25	40	44	28	30	5	17.3
GSGH-M2-20-20-1	1	20	20	30	40	44	28	30	6	22.8
GSGH-M2-22-15-1	1	22	15	25	44	48	28	30	5	17.3
GSGH-M2-22-25-1	1	22	25	36	44	48	28	30	8	28.3
GSGH-M2-25-22-2	2	25	22	36	50	54	28	56	6	24.8
GSGH-M2-25-30-1	1	25	30	45	50	54	28	30	8	33.3
GSGH-M2-28-30-2	2	28	30	50	56	60	28	60	8	33.3
GSGH-M2-28-35-1	1	28	35	48	56	60	28	30	10	38.3
GSGH-M2-32-16-2	2	32	16	30	64	68	28	54	5	18.3
GSGH-M2-32-22-2	2	32	22	36	64	68	28	56	6	24.8
GSGH-M2-32-25-1	1	32	25	36	64	68	28	30	8	28.3
GSGH-M2-32-32-2	2	32	32	55	64	68	28	65	10	35.3
GSGH-M2-36-25-1	1	36	25	36	72	76	28	30	8	28.3
GSGH-M2-36-40-2	2	36	40	62	72	76	28	65	12	43.3
GSGH-M2-40-25-1	1	40	25	36	80	84	28	30	8	28.3
GSGH-M2-40-32-2	2	40	32	55	80	84	28	65	10	35.3
GSGH-M2-40-45-2	2	40	45	68	80	84	28	65	14	48.8

GSGH-DIN6 Series Spur gear Grinding Pinions

Precision grade	DIN6
Type	Standard full depth
Pressure angle	20°
Material	20CrMnTi
Heat treatment	Induction hardened
Tooth hardness	55~60HRC
Treatment of Tooth	Grinding
Datum reference	Bore

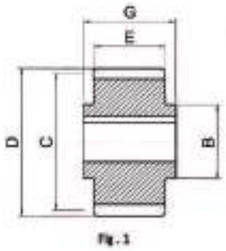


Fig.1

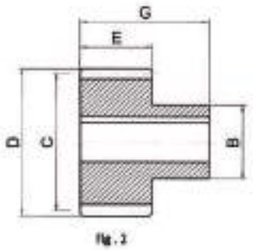
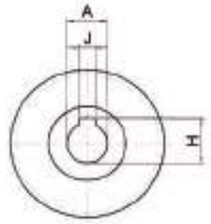


Fig.2



Module 3

This inner diameter size is general size
Can be customized according to customer requirements

Dimension : mm

Product Model	Fig.	Number teeth	Inner diameter	Hub diameter	Pitch circle diameter	Outer diameter	Tooth amplitude	Total length	J	H
			Ah7	B	C	D	E	G		
GSGH-M3-18-25-1	1	18	25	36	54	60	28	30	8	28.3
GSGH-M3-20-25-1	1	20	25	36	60	66	28	30	8	28.3
GSGH-M3-20-35-1	1	20	35	48	60	66	28	30	10	38.3
GSGH-M3-22-22-2	2	22	22	36	66	72	28	56	6	24.8
GSGH-M3-22-25-2	2	22	25	44	66	72	28	60	8	28.3
GSGH-M3-22-30-1	1	22	30	45	66	72	28	30	8	33.3
GSGH-M3-22-32-2	2	22	32	55	66	72	28	65	10	35.3
GSGH-M3-25-25-1	1	25	25	36	75	81	28	30	8	28.3
GSGH-M3-25-40-2	2	25	40	62	75	81	28	65	12	43.3
GSGH-M3-25-45-1	1	25	45	58	75	81	28	30	14	48.3
GSGH-M3-28-22-2	2	28	22	36	84	90	28	56	6	24.8
GSGH-M3-28-30-1	1	28	30	45	84	90	28	30	8	33.3
GSGH-M3-28-32-2	2	28	32	55	84	90	28	65	10	35.3
GSGH-M3-28-35-2	2	28	35	55	84	90	28	65	10	38.3
GSGH-M3-28-45-2	2	28	45	68	84	90	28	65	14	48.8
GSGH-M3-32-25-1	1	32	25	36	96	102	28	30	8	28.3
GSGH-M3-32-40-2	2	32	40	62	96	102	28	65	12	43.3
GSGH-M3-42-45-1	1	32	45	58	96	102	28	30	14	48.8
GSGH-M3-36-35-1	1	36	35	48	108	114	28	30	10	38.3
GSGH-M3-36-45-2	2	36	45	68	108	114	28	65	14	48.8

GSGH-DIN6 Series Spur gear Grinding Pinions

Precision grade	DIN6
Type	Standard full depth
Pressure angle	20°
Material	20CrMnTi
Heat treatment	Induction hardened
Tooth hardness	55~60HRC
Treatment of Tooth	Grinding
Datum reference	Bore

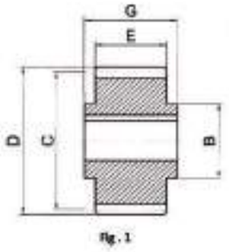


Fig.1

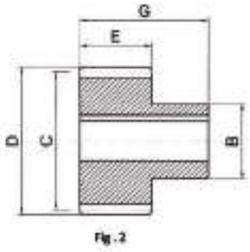
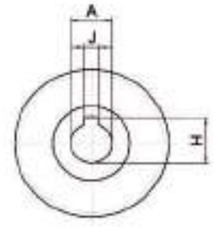


Fig.2



Module 4

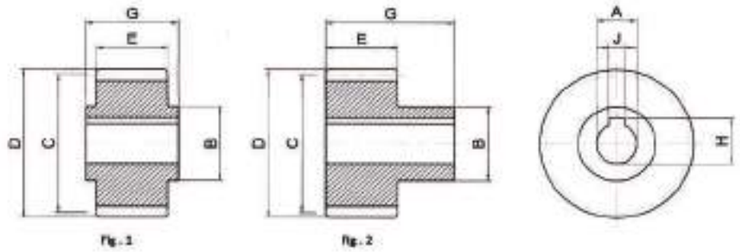
This inner diameter size is general size
Can be customized according to customer requirements

Dimension : mm

Product Model	Fig.	Number teeth	Inner diameter	Hub diameter	Pitch circle diameter	Outer diameter	Tooth amplitude	Total length	J	H
			Ah7	B	C	D	E	G		
GSGH-M4-20-32-2	2	20	32	55	80	88	40	75	10	35.3
GSGH-M4-20-35-1	1	20	35	52	80	88	40	50	10	38.3
GSGH-M4-20-40-2	2	20	40	62	80	88	40	75	12	43.3
GSGH-M4-20-45-1	1	20	45	65	80	88	40	50	14	48.8
GSGH-M4-22-35-1	1	22	35	52	88	96	40	50	10	38.3
GSGH-M4-22-45-2	2	22	45	68	88	96	40	75	14	48.8
GSGH-M4-25-32-2	2	25	32	55	100	108	40	75	10	35.3
GSGH-M4-22-35-2	2	25	35	55	100	108	40	75	10	38.3
GSGH-M4-25-40-2	2	25	40	62	100	108	40	75	12	43.3
GSGH-M4-25-45-1	1	25	45	65	100	108	40	50	14	48.8
GSGH-M4-25-55-2	2	25	55	80	100	108	40	80	16	59.3
GSGH-M4-28-35-1	1	28	35	52	112	120	40	50	10	38.3
GSGH-M4-28-45-2	2	28	45	68	112	120	40	75	14	48.8
GSGH-M4-32-35-1	1	32	35	52	128	136	40	50	10	38.3
GSGH-M4-32-45-1	1	32	45	65	128	136	40	50	14	48.8
GSGH-M4-32-55-2	2	32	55	80	128	136	40	80	16	59.3
GSGH-M4-32-75-2	2	32	75	110	128	136	40	100	20	80.4
GSGH-M4-40-45-1	1	40	45	65	160	168	40	50	14	48.8
GSGH-M4-40-60-1	1	40	60	80	160	168	40	50	18	64.4
GSGH-M4-40-75-2	2	40	75	110	160	168	40	100	20	80.4

GSGH-DIN6 Series Spur gear Grinding Pinions

Precision grade	DIN6
Type	Standard full depth
Pressure angle	20°
Material	20CrMnTi
Heat treatment	Induction hardened
Tooth hardness	55~60HRC
Treatment of Tooth	Grinding
Datum reference	Bore



Module 5

This inner diameter size is general size
Can be customized according to customer requirements

Dimension : mm

Product Model	Fig.	Number teeth	Inner diameter	Hub diameter	Pitch circle diameter	Outer diameter	Tooth amplitude	Total length	J	H
			Ah7	B	C	D	E	G		
GSGH-M5-21-45-2	2	21	45	68	105	115	50	85	14	48.8
GSGH-M5-21-55-2	2	21	55	80	105	115	50	90	16	59.3
GSGH-M5-25-45-2	2	25	45	68	125	135	50	85	14	48.8
GSGH-M5-25-55-2	2	25	55	80	125	135	50	90	16	59.3
GSGH-M5-25-75-2	2	25	75	110	125	135	50	110	20	80.4

Module 6

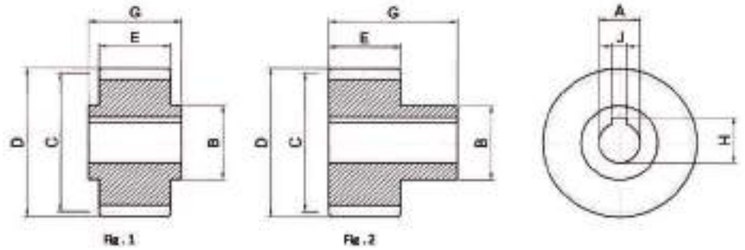
This inner diameter size is general size
Can be customized according to customer requirements

Dimension : mm

Product Model	Fig.	Number teeth	Inner diameter	Hub diameter	Pitch circle diameter	Outer diameter	Tooth amplitude	Total length	J	H
			Ah7	B	C	D	E	G		
GSGH-M6-21-55-2	2	21	55	80	126	138	60	100	16	59.3
GSGH-M6-21-75-2	2	21	75	110	126	138	60	120	20	79.9
GSGH-M6-25-55-2	2	25	55	80	150	162	60	100	16	59.3
GSGH-M6-25-75-2	2	25	75	110	150	162	60	120	20	79.9

GHGH-DIN6 Series Helical gear Grinding Pinions

Precision grade	DIN6
Type	Standard full depth
Pressure angle	20°
Left hand angle	19° 31' 42"
Material	20CrMnTi
Heat treatment	Induction hardened
Tooth hardness	55~60HRC
Treatment of Tooth	Grinding
Datum reference	Bore



Module 2

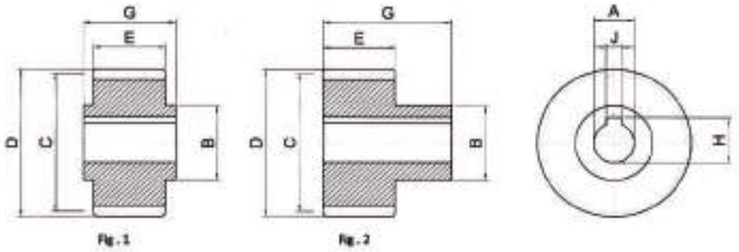
This inner diameter size is general size
Can be customized according to customer requirements

Dimension : mm

Product Model	Fig.	Number teeth	Inner diameter	Hub diameter	Pitch circle diameter	Outer diameter	Tooth amplitude	Total length	J	H
			Ah7	B	C	D	E	G		
GHGH-M2-20-20-1	1	20	20	30	42.44	46.4	28	30	6	22.8
GHGH-M2-20-22-1	1	20	22	30	42.44	46.4	28	30	6	24.8
GHGH-M2-21-16-1	1	21	16	25	44.56	48.6	28	30	5	18.3
GHGH-M2-21-22-2	2	21	22	36	44.56	48.6	28	56	6	24.8
GHGH-M2-25-20-1	1	25	20	30	53.05	57.1	28	30	6	22.8
GHGH-M2-25-25-1	1	25	25	36	53.05	57.1	28	30	8	28.3
GHGH-M2-28-35-1	1	28	35	48	59.42	63.4	28	30	10	38.3
GHGH-M2-30-16-1	1	30	16	25	63.66	67.7	28	30	5	18.3
GHGH-M2-30-20-1	1	30	20	30	63.66	67.7	28	30	6	22.8
GHGH-M2-30-22-2	2	30	22	36	63.66	67.7	28	56	6	24.8
GHGH-M2-30-25-1	1	30	25	36	63.66	67.7	28	30	6	28.3
GHGH-M2-30-30-2	2	30	30	50	63.66	67.7	28	60	6	33.3
GHGH-M2-30-32-2	2	30	32	55	63.66	67.7	28	65	10	35.3
GHGH-M2-32-20-1	1	32	20	30	67.91	71.9	28	30	6	22.8
GHGH-M2-32-25-1	1	32	25	36	67.91	71.9	28	30	8	28.3
GHGH-M2-32-32-2	2	32	32	50	67.91	71.9	28	51	10	35.3
GHGH-M2-32-35-1	1	32	35	48	67.91	71.9	28	30	10	38.3
GHGH-M2-36-35-1	1	36	35	48	76.39	80.4	28	30	10	38.3
GHGH-M2-39-32-2	2	39	32	55	82.76	86.8	28	65	10	35.3
GHGH-M2-40-35-1	1	40	35	48	84.88	88.9	28	30	10	38.3

GHGH-DIN6 Series Helical gear Grinding Pinions

Precision grade	DIN6
Type	Standard full depth
Pressure angle	20°
Left hand angle	19° 31' 42"
Material	20CrMnTi
Heat treatment	Induction hardened
Tooth hardness	55~60HRC
Treatment of Tooth	Grinding
Datum reference	Bore



Module 3

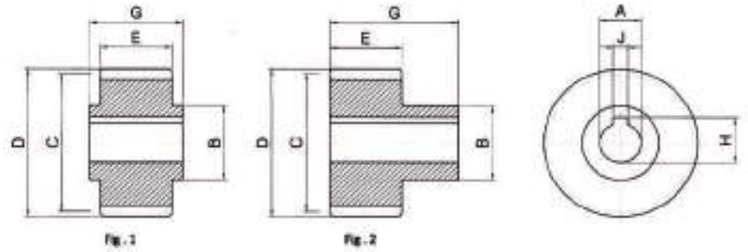
This inner diameter size is general size
Can be customized according to customer requirements

Dimension : mm

Product Model	Fig.	Number teeth	Inner diameter	Hub diameter	Pitch circle diameter	Outer diameter	Tooth amplitude	Total length	J	H
			Ah7	B	C	D	E	G		
GHGH-M3-20-22-2	2	20	22	36	63.66	69.7	28	56	6	24.8
GHGH-M3-20-25-2	2	20	25	44	63.66	69.7	28	60	8	28.3
GHGH-M3-20-30-1	1	20	30	45	63.66	69.7	28	30	8	33.3
GHGH-M3-20-30-2	2	20	30	50	63.66	69.7	28	60	8	33.3
GHGH-M3-20-32-2	2	20	32	55	63.66	69.7	28	65	10	35.3
GHGH-M3-20-35-1	1	20	35	48	63.66	69.7	28	30	10	38.3
GHGH-M3-22-25-1	1	22	25	36	70.03	76	28	30	8	28.3
GHGH-M3-22-30-1	1	22	30	45	70.03	76	28	30	8	33.3
GHGH-M3-22-35-1	1	22	35	48	70.03	76	28	30	10	38.3
GHGH-M3-25-22-2	2	25	22	36	79.58	85.6	28	56	6	24.8
GHGH-M3-25-25-1	1	25	25	36	79.58	85.6	28	30	8	28.3
GHGH-M3-25-25-2	2	25	25	44	79.58	85.6	28	60	8	28.3
GHGH-M3-25-30-1	1	25	30	45	79.58	85.6	28	30	8	33.3
GHGH-M3-25-30-2	2	25	30	50	79.58	85.6	28	60	8	33.3
GHGH-M3-25-32-2	2	25	32	55	79.58	85.6	28	65	10	35.3
GHGH-M3-25-35-1	1	25	35	48	79.58	85.6	28	30	10	38.3
GHGH-M3-25-40-1	1	25	40	70	79.58	85.6	28	50	12	43.3
GHGH-M3-25-40-2	2	25	40	70	79.58	85.6	28	70	12	43.3
GHGH-M3-30-32-2	2	30	32	55	95.5	101.5	28	60	10	35.3
GHGH-M3-30-40-2	2	30	40	70	95.5	101.5	28	70	12	43.3

GHGH-DIN6 Series Helical gear Grinding Pinions

Precision grade	DIN6
Type	Standard full depth
Pressure angle	20°
Left hand angle	19° 31' 42"
Material	20CrMnTi
Heat treatment	Induction hardened
Tooth hardness	55~60HRC
Treatment of Tooth	Grinding
Datum reference	Bore



Module 4

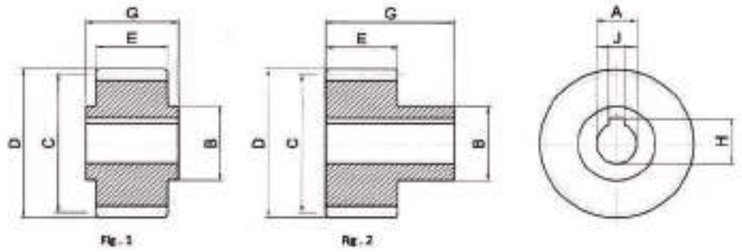
This inner diameter size is general size
Can be customized according to customer requirements

Dimension : mm

Product Model	Fig.	Number teeth	Inner diameter	Hub diameter	Pitch circle diameter	Outer diameter	Tooth amplitude	Total length	J	H
			Ah7	B	C	D	E	G		
GHGH-M4-15-35-1	1	15	35	52	63.66	71.7	40	50	10	38.3
GHGH-M4-18-32-2	2	18	32	55	76.39	84.4	40	75	10	35.3
GHGH-M4-20-35-1	1	20	35	52	84.88	92.9	40	50	10	38.3
GHGH-M4-20-45-1	1	20	45	65	84.88	92.9	40	50	14	48.8
GHGH-M4-21-32-2	2	21	32	55	89.13	97.1	40	75	10	35.3
GHGH-M4-21-35-2	2	21	35	55	89.13	97.1	40	75	10	38.3
GHGH-M4-21-40-2	2	21	40	62	89.13	97.1	40	75	12	43.3
GHGH-M4-21-45-2	2	21	45	68	89.13	97.1	40	75	14	48.8
GHGH-M4-22-35-1	1	22	35	52	93.37	101.4	40	50	10	38.3
GHGH-M4-22-45-1	1	22	45	65	93.37	101.4	40	50	14	48.8
GHGH-M4-24-32-2	2	24	32	55	101.86	109.9	40	75	10	35.3
GHGH-M4-24-35-2	2	24	35	55	101.86	109.9	40	75	10	38.3
GHGH-M4-24-40-2	2	24	40	62	101.86	109.9	40	75	12	43.3
GHGH-M4-24-45-2	2	24	45	68	101.86	109.9	40	75	14	48.8
GHGH-M4-24-55-2	2	24	55	80	101.86	109.9	40	80	16	59.3
GHGH-M4-25-35-1	1	25	35	52	106.1	114.1	40	50	10	38.3
GHGH-M4-25-45-1	1	25	45	65	106.1	114.1	40	50	14	48.8
GHGH-M4-27-40-2	2	27	40	75	114.6	122.6	40	80	12	43.3
GHGH-M4-30-40-2	2	30	40	80	127.33	135.33	40	80	12	43.3
GHGH-M4-30-45-2	2	30	45	80	127.33	135.33	40	80	15	48.8

GHGH-DIN6 Series Helical gear Grinding Pinions

Precision grade	DIN6
Type	Standard full depth
Pressure angle	20°
Left hand angle	19° 31' 42"
Material	20CrMnTi
Heat treatment	Induction hardened
Tooth hardness	55~60HRC
Treatment of Tooth	Grinding
Datum reference	Bore



Module 5

This inner diameter size is general size
Can be customized according to customer requirements

Dimension : mm

Product Model	Fig.	Number teeth	Inner diameter	Hub diameter	Pitch circle diameter	Outer diameter	Tooth amplitude	Total length	J	H
			Ah7	B	C	D	E	G		
GHGH-M5-18-45-2	2	18	45	68	95.49	105.5	50	85	14	48.8
GHGH-M5-24-45-2	2	24	45	68	127.32	137.0	50	85	14	48.8
GHGH-M5-24-55-2	2	24	55	80	127.32	137.3	50	90	16	59.3
GHGH-M5-24-75-2	2	24	75	110	127.32	137.3	50	110	20	79.9

Module 6

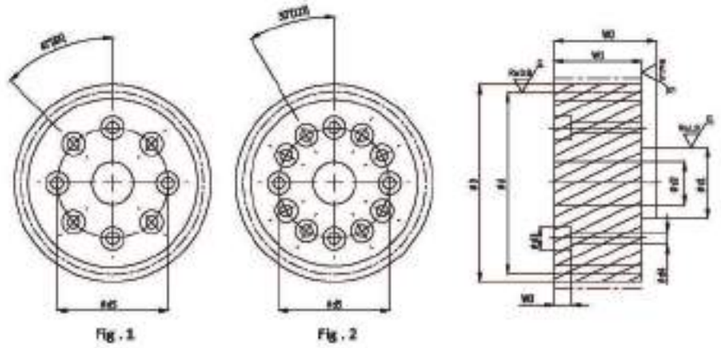
This inner diameter size is general size
Can be customized according to customer requirements

Dimension : mm

Product Model	Fig	Number teeth	Inner diameter	Hub diameter	Pitch circle diameter	Outer diameter	Tooth amplitude	Total length	J	H
			Ah7	B	C	D	E	G		
GHGH-M6-20-55-2	2	20	55	80	127.32	139.3	60	100	16	59.3
GHGH-M6-20-75-2	2	20	75	110	127.32	139.3	60	120	20	79.9
GHGH-M6-25-55-2	2	25	55	80	159.16	171.2	60	100	16	59.3
GHGH-M6-25-75-2	2	25	75	110	159.16	171.2	60	120	20	79.9

GFGH-DIN6 Series Helical flange gear Grinding Pinions

Precision grade	DIN6
Type	Standard full depth
Pressure angle	20°
Left hand angle	19° 31' 42"
Material	20CrMnTi
Heat treatment	Induction hardened
Tooth hardness	55~60HRC
Treatment of Tooth	Grinding
Datum reference	Bore



Dimension : mm

Code	Fig.	DIN	No. of Teeth	Shift Coefficient	D	Pitch Dia.	Working Pitch Dia.	d1	d5	W1	W2	d4	d3	W3	d2
Module 2															
GFGH-M2-26-1	1	-DIN6	26	0.407	60.800	55.174	56.800	20.0	31.5	26	29	5.5	9.5	12.0	16.2
GFGH-M2-27-1	1	-DIN6	27	0.000	61.296	57.296	57.296	20.0	31.5	30	33	5.5	9.5	11.0	16.2
GFGH-M2-29-1	1	-DIN6	29	0.415	67.200	61.540	63.200	20.0	31.5	26	29	5.5	9.5	12.0	16.2
GFGH-M2-35-1	1	-DIN6	35	0.382	79.800	74.272	75.800	20.0	31.5	26	29	5.5	9.5	12.0	16.2
GFGH-M2-29-1	1	-DIN6	29	0.415	67.200	61.540	63.200	25.0	40	26	29	6.6	11.0	10.5	20.3
GFGH-M2-33-1	1	-DIN6	33	0.393	75.599	70.028	71.599	31.5	50	26	29	6.6	11.0	14.0	23.7
GFGH-M2-36-1	1	-DIN6	36	0.000	80.394	76.394	76.394	31.5	50	30	33	6.6	11.0	8.0	23.7
GFGH-M2-37-1	1	-DIN6	37	0.421	84.200	78.517	80.200	31.5	50	26	29	6.6	11.0	14.0	23.7
GFGH-M2-37-1	2	-DIN6	37	0.421	84.200	78.517	80.200	31.5	50	26	29	6.6	11.0	14.0	23.7
Module 3															
GFGH-M3-31-2	2	-DIN6	31	0.354	106.800	98.676	100.800	31.5	50	31	35	6.6	11.0	14.0	23.7
GFGH-M3-35-2	2	-DIN6	35	0.365	119.600	111.409	113.600	50.0	80	31	35	9.0	14.0	10.5	32.2
GFGH-M3-40-2	2	-DIN6	40	0.379	135.599	127.324	129.599	50.0	80	31	35	9.0	14.0	10.5	32.2
Module 4															
GFGH-M4-30-2	2	-DIN6	30	0.000	135.324	127.324	127.324	50.0	80	45	49	9.0	14.0	9.5	32.2
GFGH-M4-38-2	2	-DIN6	38	0.240	171.200	161.277	163.200	80.0	125	41	45	11.0	17.5	10.5	56.1
Module 5															
GFGH-M5-21-2	2	-DIN6	21	0.000	121.109	111.409	111.409	50.0	80	59	64	9.0	14.0	11.5	32.2
GFGH-M5-36-2	2	-DIN6	36	0.000	200.986	190.986	190.986	80.0	125	55	60	11.0	17.5	12.5	56.1

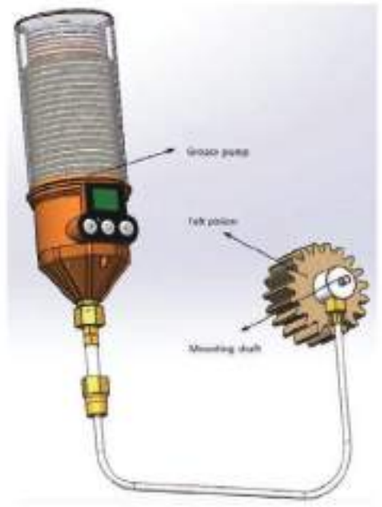
Weight only for reference. Actual scale should be Weighing.

Oil pot

It is suggested that at the same time when the gear transmission is used Use the correct lubricating parts

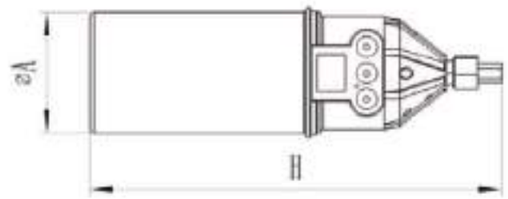
Lubricator

We can provide the following two types of oil injectors that are not reusable. The product use cycle is usually 12 (1, 3, 6) months. The product has the periodic setting of the product. The cycle can be set according to the specific application. After the end of a cycle, the user needs to repurchase the same specifications of the product. . A repeatable oil injector, the product use cycle is usually 12 (1, 3, 6) months. The product has the appropriate cycle setting. It can set the cycle according to the specific application. After the end of the one month period, the user needs to inject a proper amount of lubrication (oil product specification and purchase time) into the product according to the operation description. The same product is injected into the product, so we can continue to use the product.



Grease pump

Code	A	H
RH250	86	233
RH500	86	291



Install

The lubricating oil / grease is supplied by the center hole of the installation shaft. The center hole is connected to the injector through the catheter. The oil is exported from the oil cup to the felt gear and flows to the lubricating point. The grease lubricants the outer diameter of the pipeline is 8mm, and the proposed length is not more than 1m.

Felt gear

Felt gear is suitable for rack or other tooth type transmission, effective contact lubrication of transmission parts, installation position is not limited. Attention should be paid to the matching of engagement angles when helical teeth are lubricated.

Felt pinion, straight-tooth

Code	Fig.	Module	Z	d	d_K	d_1	b_1	m (g)
MZ1526S	1	1.5	26	39.0	42	12	15	7.2
MZ2019S	1	2	19	38.0	42	12	25	11
MZ2522S	1	2.5	22	55.0	60	12	25	25
MZ3019S	1	3	19	57.0	63	12	30	37
MZ4019S	1	4	19	76.0	84	12	40	98
MZ5018S	1	5	18	90.0	100	20	50	133
MZ6018S	1	6	18	108.0	120	20	60	234

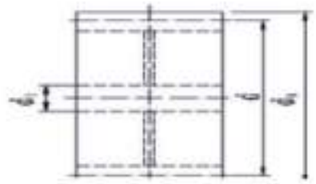


Fig.1

Felt pinion, helical-tooth, RH

Code	Fig.	Module	Z	d	d_K	d_1	b_1	m (g)
MZ1524RH	2	1.5	24	38.2	42	12	25	7.0
MZ2018RH	2	2	18	38.2	42	12	25	11
MZ3018RH	2	3	18	57.3	63	12	30	36
MZ4018RH	2	4	18	76.5	84	12	40	97
MZ5017RH	2	5	17	90.2	100	20	50	133
MZ6017RH	2	6	17	106.2	120	20	60	234

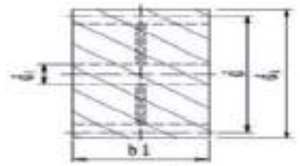
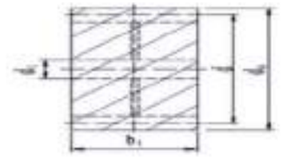


Fig.2

Felt pinion, helical-tooth, LH

Code	Fig.	Module	Z	d	d_K	d_1	b_1	m (g)
MZ1524LH	3	1.5	24	38.2	42	12	25	7.0
MZ2018LH	3	2	18	38.2	42	12	25	11
MZ3018LH	3	3	18	57.3	63	12	30	36
MZ4018LH	3	4	18	76.5	84	12	40	97
MZ5017LH	3	5	17	90.2	100	20	50	133
MZ6017LH	3	6	17	106.2	120	20	60	234



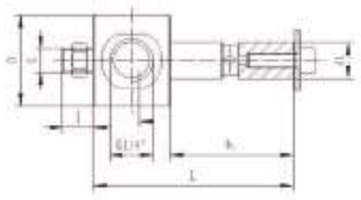


Fig.4

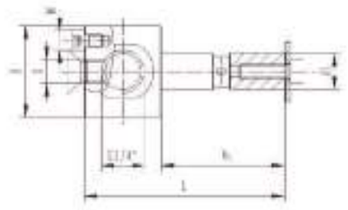


Fig.5
图5 Fig.5

Mounting shaft

Code	Fig.	Module	d_1	D	b_1	L	l	G	m (g)
MS1544G	4	1.5	12	30	15	40	10	M8	155
MS2045G	4	2	12	30	25	50	10	M8	143
MS2055G	5	2	12	30	25	50	-	M8	140
MS2062G	5	2	12	30	25	62	-	M8	150
MS3045G	4	3	12	30	30	55	10	M8	147
MS3055G	5	3	12	30	30	55	-	M8	145
MS3066G	5	3	12	30	30	66	-	M8	155
MS4046S	4	4	12	30	40	65	10	M8	154
MS4056S	5	4	12	30	40	65	-	M8	150
MS4072S	5	4	12	30	40	72	-	M8	160
MS5047S	4	5	20	50	50	75	15	M12	520
MS5057S	5	5	20	40	50	75	-	M8	510
MS5058S	5	5	20	40	50	85	-	M8	520
MS6048S	4	6	20	50	60	85	15	M12	545
MS6058S	5	6	20	40	60	85	-	M8	535
MS6059T	5	6	20	40	60	97	-	M8	550

Stepper / servo motor driving (for robot industry)

Harmonic Reducer

High cost-effective/perfectly match and replace the sizes of Japanes harmonic reducers

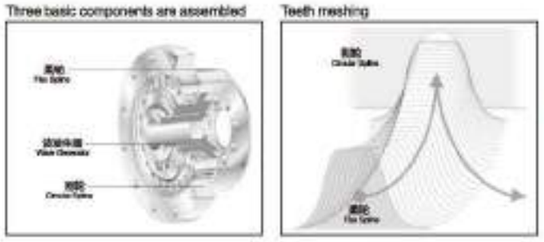
3F FAMED®

Fenghua Transmission Technology (Jiangsu) Co.,Ltd.

Harmonic reducer series

Structure of harmonic reducer

Wave Generator Flex Spline Circular Spline



Wave Generator

A ball bearing with thin-walled construction is fitted onto the outer circumference of an oval cam. The entire structure is oval. The inner ring of the bearing is fixed onto the oval cam and the outer ring elastically deforms through a ball. The wave generator can be mounted on a motor shaft.

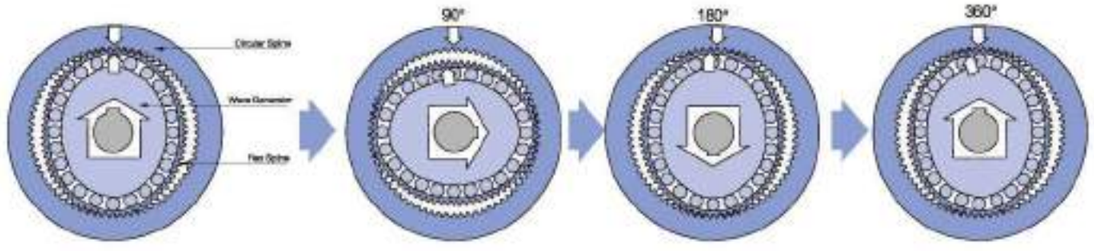
Flex Spline

The inner gear of the rigid body, with teeth of equivalent size to those on the flex spline cut into the inner circumference. The circular spline has two more teeth than the flex spline and is normally fixed onto the gear casing.

Flex Spline

A cup-like elastic metal part with thin wall thickness. Teeth are cut into the outer circumference of the opening of the cup, from where the output is usually extracted.

Working principle of harmonic reducer



The flex spline is bent into an oval shape by the wave generator. Teeth on the long axis of the oval therefore mesh with the circular spline, while the teeth on the short axis of the oval perfectly detach from the circular spline.

Fixing the circular spline and rotating the wave generator clockwise will elastically deform the flex spline, sequentially moving the tooth meshing positions with the circular spline.

Rotating the wave generator through 180° in a clockwise direction will move the flex spline counterclockwise by one tooth as a difference in the number of teeth.

When the wave generator rotates through one turn (360°), the flex spline movescounterclockwise by two teeth based on the differences in the number of teeth because the flex spline has two teeth fewer than the

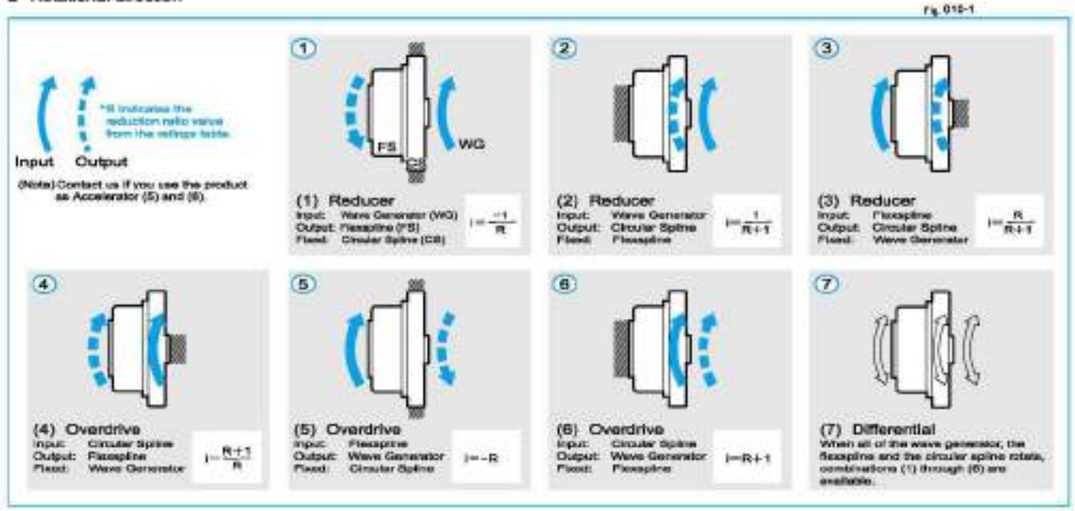
Rotational direction and reduction ratio

Cup Style

Series: CSG, CSF, CSD, CSF-mini

■ Rotational direction

Fig. 010-1

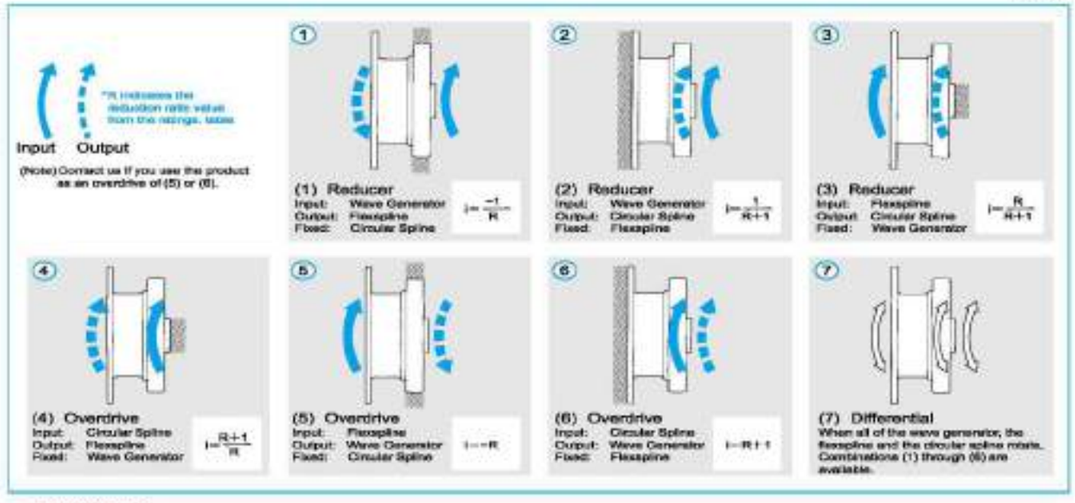


Silk hat

Series: SHG, SHF, SHD

■ Rotational direction

Fig. 010-2



■ Reduction ratio

The reduction ratio is determined by the number of teeth of the Flexspline and the Circular Spline

Number of teeth of the Flexspline: Zf
Number of teeth of the Circular Spline: Zc

▶ Input: Wave Generator
Output: Flexspline
Fixed: Circular Spline
Reduction ratio $i_1 = \frac{1}{R_1} = \frac{Zf-Zc}{Zf}$

▶ Input: Wave Generator
Output: Circular Spline
Fixed: Flexspline
Reduction ratio $i_2 = \frac{1}{R_2} = \frac{Zc-Zf}{Zc}$

Example
Number of teeth of the Flexspline: 200
Number of teeth of the Circular Spline: 202

▶ Input: Wave Generator
Output: Flexspline
Fixed: Circular Spline
Reduction ratio $i_1 = \frac{1}{R_1} = \frac{200-202}{200} = \frac{-1}{100}$

▶ Input: Wave Generator
Output: Circular Spline
Fixed: Flexspline
Reduction ratio $i_2 = \frac{1}{R_2} = \frac{202-200}{202} = \frac{1}{101}$

■ Ri indicates the reduction ratio value from the ratings table.

Lubrication

Component Sets: CSD-2A, CSF-2A, CSG-2A, FB-2, FB-0, FR-2, SHF-2A, SHG-2A and SHD and SHG/SHF -2SO and -2SH gear units: Grease lubricant and oil lubricant are available for lubricating the component sets and SHD gear unit. It is extremely important to properly grease your component sets and SHD gear unit. Proper lubrication is essential for high performance and reliability. Harmonic Drive® component sets are shipped with a rust- preventative oil. The characteristics of the lubricating grease and oil types approved by Harmonic Drive are not changed by mixing with the preservation oil. It is therefore not necessary to remove the preservation oil completely from the gear components. However, the mating surfaces must be degreased before the assembly.

Gear Units: CSG/CSF 2UH and 2UH-LW; CSD-2UF and -2UH; SHG/SHF-2UH and 2UH- LW; SHG/SHF-2UJ; CSF Supermini, CSF Mini, and CSF-2UP.
Grease lubricant is standard for lubricating the gear units. You do not need to apply grease during assembly as the product is lubricated and shipped.
See Page 19 for using lubricant beyond the temperature range in table 16-2.
* Contact us if you want consistency zero (NLGI No.0) for maintenance reasons.

Name of lubricant — Table 016-1

Grease	Harmonic Grease® SK-1A
	Harmonic Grease® SK-2
	Harmonic Grease® 4B No.2
Oil	Industrial gear oil class-2 (extreme pressure) ISO VG68

Temperature — Table 016-2

Grease	SK-1A 0°C to + 40°C
	SK-2 0°C to + 40°C
	4B No.2 –10°C to + 70°C
Oil	ISO VG68 0°C to + 40°C

* The hottest section should not be more than 40° above the ambient temperature.

Note: The three basic components of the gear - the Flexspline, Wave Generator and Circular Spline - are matched and serialized in the factory. Depending on the product they are either greased or prepared with preservation oil. Thus the individual components are assembled. If you receive several units, please be careful not to mix the matched components. This can be avoided by verifying that the serial numbers of the assembled gear components are identical.

Grease lubricant

■ Types of lubricant

Harmonic Grease® SK-1A
This grease was developed for Harmonic Drive® gears and features good durability and efficiency.

Harmonic Grease® SK-2
This grease was developed for small sized Harmonic Drive® gears and features smooth rotation of the Wave Generator since high pressure additive is liquefied.

Harmonic Grease® 4B No.2
This has been developed exclusively for the CSF and CSG and features long life and can be used over a wide range of temperature.

(Note)
1. Grease lubrication must have proper sealing, this is essential for 4B No.2.
   Rotating part: Oil seal with spring is needed.
   Mating part: O ring or seal adhesive is needed.
2. The grease has the highest deterioration rate in the region where the grease is subjected to the greatest shear (near wave generator).
   Its viscosity is between JIS No.0 and No.00 depending on the operation.

Table 016-3

NLGI consistency No.	Mixing consistency range
0	355 to 385
00	400 to 430

Grease specification — Table 016-4

Grease	SK-1A	SK-2	4B No.2
Base oil	Refined oil	Refined oil	Composite hydrocarbon oil
Base Viscosity cSt (25°C)	255 to 295	255 to 295	290 to 320
Thickening agent	Lithium soap base	Lithium soap base	Urea
NLGI consistency No.	No. 2	No. 2	No. 1.5
Additive	Extreme-pressure additive, others	Extreme-pressure additive, others	Extreme-pressure additive, others
Drop Point	197°C	198°C	247°C
Appearance	Yellow	Green	Light yellow
Storage life	5 years in sealed condition	5 years in sealed condition	5 years in sealed condition

■ Compatible grease by size

Compatible grease varies depending on the size and reduction ratio. See the following compatibility table. We recommend SK-1A and SK-2 for general use.

Ratios 30:1 — Table 016-5

Size	8	11	14	17	20	25	32
SK-1A	—	—	—	—	○	○	○
SK-2	○	○	○	○	—	—	—
4B No.2	△	△	△	△	□	□	□

Ratios 50:1* and above — Table 016-6

Size	8	11	14	17	20	25	32
SK-1A	—	—	—	—	○	○	○
SK-2	○	○	○	○	△	△	△
4B No.2	—	—	□	□	□	□	□

Size	40	45	50	58	65	80	90	100
SK-1A	○	○	○	○	○	○	○	○
SK-2	△	—	—	—	—	—	—	—
4BNo.2	□	□	□	□	□	□	□	□

○ : Standard grease
△: Semi-standard grease
□ : Recommended grease for long life and high load
* Oil lubrication is required for component-sets size 50 or larger with a reduction ratio of 50:1.

Grease characteristics — Table 016-7

Grease	SK-1A	SK-2	4B No.2
Durability	○	○	◎
Fretting resistance	○	○	◎
Low-temperature performance	△	△	◎
Grease leakage	◎	◎	△

Excellent : ◎
Good : ○
Use Caution: △

■ When to replace grease

The wear characteristics of the gear are strongly influenced by the condition of the grease lubrication. The condition of the grease is affected by the ambient temperature. The graph 017-1 shows the maximum number of input rotations for various temperatures. This graph applies to applications where the average load torque does not exceed the rated torque.

Calculation formula when the average load torque exceeds the rated torque — Formula 017-1

$$L_{ar} = L_{arn} \times \left(\frac{Tr}{Tav}\right)^3$$

Formula Symbols — Table 017-1

L_{ar}	Grease change (if average load torque exceeds rated torque)	Input revolutions	———
L_{arn}	Grease change (if average load torque is equal to or less than rated torque)	Input revolutions (From Graph)	See the Graph 017-1.
Tr	Rated torque	Nm	See the "Ratings Table" of each series.
Tav	Average load torque	Nm	Calculation formula: See Page 014.

■ Other precautions

1. Avoid mixing different kinds of grease. The gear should be in an individual case when installed.
2. Please contact us when you use HarmonicDrive® gears at constant load or in one direction continuously, as it may cause lubrication problems.
3. Grease leakage. A sealed structure is needed to maintain the high durability of the gear and prevent grease leakage.

■ See the corresponding pages of the design guide of each series for "Recommended minimum housing clearance," Application guide" and "Application quantity."

Oil lubricant

■ Types of oil

The specified standard lubricant is "Industrial gear oil class-2 (extreme pressure) ISO VG68."
We recommend the following brands as a commercial lubricant.

Table 018-1

Standard	Mobil Oil	Exxon	Shell	COSMO Oil	Japan Energy	NIPPON Oil	Idemitsu Kosan	General Oil	Klüber
Industrial gear oil class-2 (extreme pressure) ISO VG68	Mobilgear 600XP68	Spartan EP68	Omala Oil 68	Cosmo gear SE68	ES gear G68	Bonock M68, Bonock AW68	Daphne super gear LW68	General Oil SP gear roil 68	Syntheso D-68EP

■ When to replace oil

First time ---------- 100 hours after starting operation
Second time or after ------ Every 1000 operation hours or every 6 months
Note that you should replace the oil earlier than specified if the operating condition is demanding.

■ See the corresponding pages of the design guide of each series for specific details.

Lubricant for special environments

When the ambient temperature is special (other than the "temperature range of the operating environment" on Page 016-2), you should select a lubricant appropriate for the operating temperature range.

High temperature lubricant — Table 019-2

Type of lubricant	Lubricant and manufacturer	Available temperature range
Grease	Mobil grease 28: Mobil Oil	–5°C to + 160°C
Oil	Mobil SHC-626: Mobil Oil	–5°C to + 140°C

Low temperature lubricant — Table 019-3

Type of lubricant	Lubricant and manufacturer	Available temperature range
Grease	Multemp SH-KII: Kyodo Oil	–30°C to + 50°C
	Isoflex LDS-18 special A: KLÜBER	–25°C to + 80°C
Oil	SH-200-100CS: Toray Silicon	–40°C to + 140°C
	Synthseo D-32EP: KLÜBER	–25°C to + 90°C

As the available temperature range indicates the temperature of the independent lubricant, restriction is added on operating conditions (such as load torque, rotational speed and operating cycle) of the gear. When the ambient temperature is very high or low, materials of the parts of the gear need to be reviewed for suitability. Contact us if operating in high temperature.

Harmonic Grease 4B No.2 can be used in the available temperature range shown in table 019-1. However, input running torque will increase at low temperatures, and grease life will be decreased at high temperatures due to oxidation and lubricant degradation.

Torque Limits

■ Strength of flexspline

The Flexspline is subjected to repeated deflections, and its strength determines the torque capacity of the Harmonic Drive® gear. The values given for Rated Torque at Rated Speed and for the allowable Repeated Peak Torque are based on an infinite fatigue life for the Flexspline.
The torque that occurs during a collision must be below the momentary peak torque (impact torque). The maximum number of occurrences is given by the equation below.

■ Buckling torque

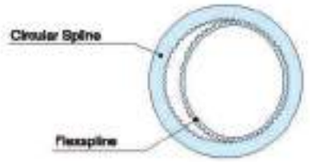
When a highly excessive torque (16 to 17 times rated torque) is applied to the output with the input stationary, the flexspline may experience plastic deformation. This is defined as buckling torque.

* See the corresponding pages of each series for buckling torque values.

■ Ratcheting torque

When excessive torque (8 to 9 times rated torque) is applied while the gear is in motion, the teeth between the Circular Spline and Flexspline may not engage properly.
This phenomenon is called ratcheting and the torque at which this occurs is called ratcheting torque. Ratcheting may cause the Flexspline to become non-concentric with the Circular Spline. Operating in this condition may result in shortened life and a Flexspline fatigue failure.

Figure 013-1



"Dedoidal" condition.

Positional Accuracy

Positional Accuracy values represent the difference between the theoretical angle and the actual angle of output for any given input. The values shown in the table are maximum values.

■ See the corresponding pages of each series for transmission accuracy values.

Example of measurement

Graph 021-1

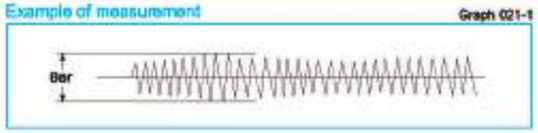


Table 021-1

θ er	Transmission accuracy
θ_i	Input angle
θ_o	Actual output angle
R	Reduction ratio

Formula 021-1

$$\theta er = \theta_i - \frac{\theta_o}{R}$$

Vibration

The primary frequency of the transmission error of the HarmonicDrive® gear may cause a vibration of the load inertia . This can occur when the driving frequency of the servo system including the HarmonicDrive® gear is at, or close to the resonant frequency of the system. Refer to the design guide of each series.

The primary component of the transmission error occurs twice per input revolution of the input. Therefore, the frequency generated by the transmission error is 2x the input frequency (rev / sec).

If the resonant frequency of the entire system, including the HarmonicDrive® gear, is F=15 Hz, then the input speed (N) which would generate that frequency could be calculated with the formula below.

Formula 021-2

$$N = \frac{15}{2} \cdot 60 = 450 \text{ rpm}$$

The resonant frequency is generated at an input speed of 450 rpm.

How to the calculate resonant frequency of the system

Formula 021-3

$$f = \frac{1}{2\pi} \sqrt{\frac{K}{J}}$$

Formula variables

Table 021-2

f	The resonant frequency of the system	Hz	
K	Spring constant	Nm/rad	See pages of each series
J	Load inertia	kgm²	

Design Guidelines

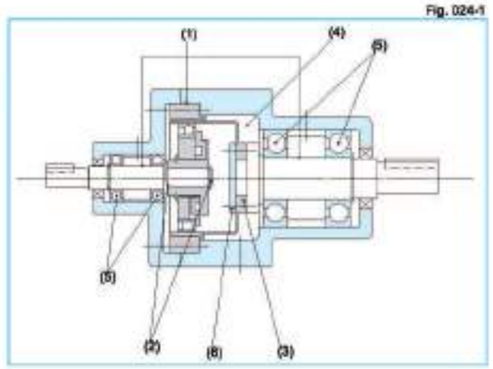
Design guideline

The relative perpendicularity and concentricity of the three basic Harmonic Drive® elements have an important influence on accuracy and service life.

Misalignments will adversely affect performance and reliability. Compliance with recommended assembly tolerances is essential in order for the advantages of Harmonic Drive® gearing to be fully realized. Please consider the following when designing:

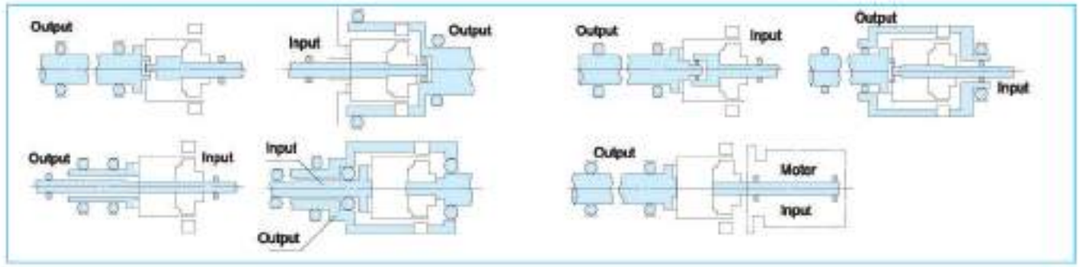
(1) Input shaft, Circular Spline and housing must be concentric.
(2) When operating, an axial force is generated on the wave generator. Input bearings must be selected to accommodate this axial load. See page 27.
(3) Even though a HarmonicDrive® gear is compact, it transmits large torques. Therefore, assure that all required bolts are used to fastened the circular spline and flexspline and that they are tightened to the recommended torque.
(4) As the flexspline is subject to elastic deformation, the A minimal clearance between the flexspline and housing is required. Refer to "Minimum Housing Clearance" on the drawing dimension tables.
(5) The input shaft and output shaft are supported by anti-friction bearings. As the wave generator and flexspline elements are meant to transmit pure torque only, the bearing arrangement needs to isolate the harmonic gearing from external forces applied to either shaft. A common bearing arrangement is depicted in the diagram.
(6) A clamping plate is recommended (item 6). Its purpose is to spread fastening forces and to avoid any chance of making physical contact with the thin section of the flexspline diaphragm. The clamping plate shall not exceed the diaphragm's boss diameter and is to be designed in accordance with catalog recommendations.

Fig. 024-1



Bearing support for the input and output shafts

For the component sets, both input and output shafts must be supported by two adequately spaced bearings in order to withstand external radial and axial forces without excessive deflection. In order to avoid damage to the component set when limited external loads are anticipated, both input and output shafts must be axially fixed. Bearings must be selected whose radial play does not exceed ISO-standard C 2 class or "normal" class. The bearings should be axially and radially preloaded to eliminate backlash.
Examples of correct bearing arrangements are shown in fig 025-1.



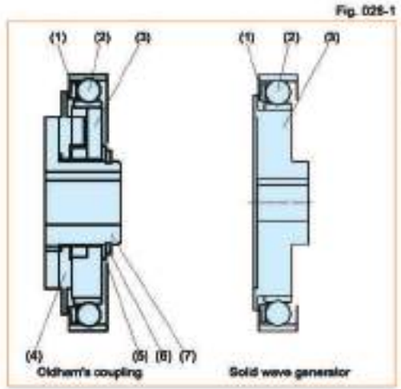
Wave generator

■ Structure of the wave generator

The wave generator includes an Oldham's coupling type with a self-aligning structure and an integrated solid wave generator without a self-aligning structure, and which is used depends on the series.

See the diagram of each series for details. The basic structure of the wave generator and the shape are shown below.

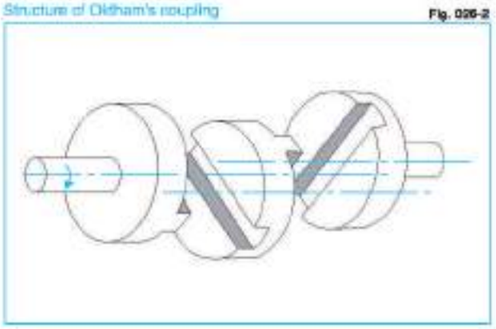
Fig. 026-1



(1) Ball Separator
(2) Wave generator bearing
(3) Wave generator plug
(4) Insert
(5) Rubwasher
(6) Snap ring
(7) Wave generator hub

Structure of Oldham's coupling

Fig. 026-2



■ Maximum hole diameter of wave generator

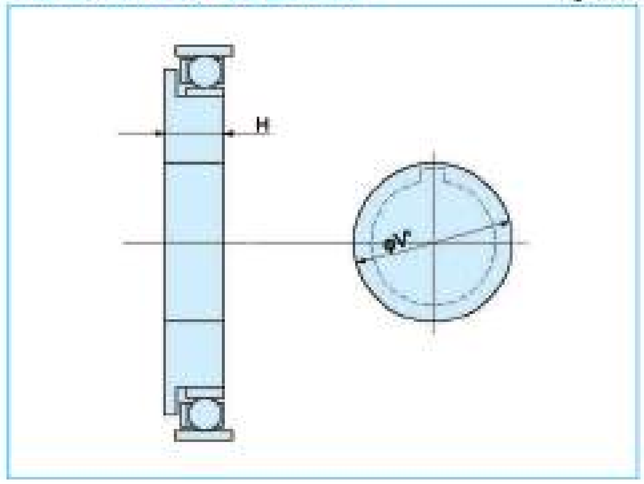
The standard hole dimension of the wave generator is shown for each size. The dimension can be changed within a range up to the maximum hole dimension. We recommend the dimension of keyway based on JIS standard. It is necessary that the dimension of keyways should sustain the transmission torque.

* Tapered holes are also available.

In cases where a larger hole is required, use the wave generator without the Oldham coupling. The maximum diameter of the hole should be considered to prevent deformation of the Wave Generator plug by load torque. The dimension is shown in the table below and includes the dimension of depth of keyway.
(This is the value including the dimension of the depth of keyway.)

Hole diameter of the wave generator

Fig. 027-1



Hole diameter of the wave generator hub with Oldham coupling

Table 027-1
Unit: mm

Size	8	11	14	17	20	25	32	40	45	50	58	65	80	90	100
Standard dim. (H7)	3	5	6	8	9	11	14	14	19	19	22	24	28	28	28
Minimum hole dim.	—	—	3	4	5	6	6	10	10	10	13	16	16	19	22
Maximum hole dim.	—	—	8	10	13	15	15	20	20	20	25	30	35	37	40

Maximum hole diameter without Oldham Coupling

Table 027-2
Unit: mm

Size	8	11	14	17	20	25	32	40	45	50	58	65	80	90	100
Max. hole dia. φV	10	14	17	20	23	28	36	42	47	52	60	67	72	84	95
Min. plug thick. H^{0}_{-1}	5.7	6.7	7.2	7.6	11.3	11.3	13.7	15.9	17.8	19	21.4	23.5	28.5	31.3	34.9

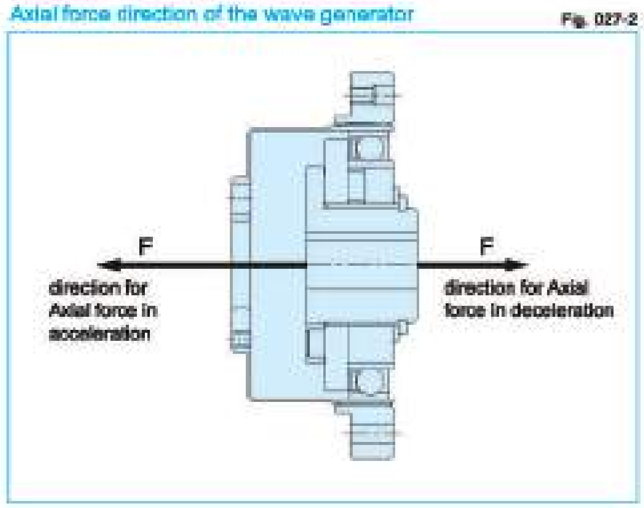
■ Axial Force of Wave Generator

When the gear is used to accelerate a load, the deflection of t he Flexspline leads to an axial force acting on the Wave Generator. This axial force, which acts in the direction of the closed end of the Flexspline, must be supported by the bearings of the input shaft (motor shaft). When the gear is used to decelerate a load, an axial force acts to push the Wave Generator out of the Flexspline cup. Maximum axial force of the Wave Generator can be calculated by the equation shown below. The axial force may vary depending on its operating condition. The value of axial force tends to be a larger number when using high torque, extreme low speed and constant operation. The force is calculated (approximately) by the equation. In all cases, the Wave Generator must be axially (in both directions), as well as torsionally, fixed to the input shaft.

(Note)
Please contact us for further information on attaching the Wave Generator to the input (motor) shaft.

Axial force direction of the wave generator

Fig. 027-2



Formula for Axial Force

Table 027-3

Reduction ratio	Calculation formula
30	$F=2\times\frac{T}{D}\times0.07\times\tan 32°$
50	$F=2\times\frac{T}{D}\times0.07\times\tan 30°$
80 or more	$F=2\times\frac{T}{D}\times0.07\times\tan 20°$

Symbols for Formula

Table 027-4

F	Axial force	N	See Figure 027-2
D	Size	m	
T	Output torque	Nm	

Calculation example

Formula 027-1

Model name: CSF series
Size: 32
Reduction ratio: 50
Output torque: 382 Nm
(maximum allowable momentary torque)

$$F=2\times\frac{382}{(32\times0.00254)}\times0.07\times\tan 30°$$

F=380N

Assembly Precautions

Sealing

Sealing is needed to maintain the high durability of the gear and prevent grease leakage. Recommended for all mating surfaces, if the o-ring is not used. Flanges provided with o-ring grooves must be sealed when a proper seal cannot be achieved using the o-ring alone.

- Rotating Parts .... Oil seal with spring is needed.
- Mating flange .... O-ring or seal adhesive is needed.
- Screw hole area .... Screws should have a thread lock (LOCTITE® 242 is recommended) or seal adhesive.

(Note) If you use Harmonic Grease 4BNo.2, strict sealing is required.

Sealing recommendations for gear units

Table 028-1

Area requiring sealing		Recommended sealing method
Output side	Holes which penetrate housing	Use O-ring (supplied with the product)
	Installation screw / bolt	Screw lock adhesive which has effective seal (LOCTITE® 242 is recommended)
Input side	Flange surfaces	Use O-ring (supplied with the product)
	Motor output shaft	Please select a motor which has an oil seal on the output shaft.

Assembly precautions

The wave generator is installed after the flexspline and circular spline. If the wave generator is not inserted into the flexspline last, gear teeth scuffing damage or improper eccentric gear mesh may result. Installation resulting in an eccentric tooth mesh (Dedoidal) will cause noise and vibration, and can lead to early failure of the gear. For proper function, the teeth of the flexspline and Circular Spline mesh symmetrically.

■ Precautions on the wave generator

1. Avoid applying undue axial force to the wave generator during installation. Rotating the wave generator bearing while inserting it is recommended and will ease the process.
2. If the wave generator does not have an Oldham coupling, extra care must be given to ensure that concentricity and inclination are within the specified limits

■ Precautions on the circular spline

The circular Spline must not be deformed in any way during the assembly. It is particularly important that the mounting surfaces are prepared correctly

1. Mounting surfaces need to have adequate flatness, smoothness, and no distortion.
2. Especially in the area of the screw holes, burrs or foreign matter should not be present.
3. Adequate relief in the housing corners is needed to prevent interference with the corner of the circular spline.
4. The circular spline should be rotatable within the housing. Be sure there is not interference and that it does not catch on anything.
5. When a bolt is inserted into a bolt hole during installation, make sure that the bolt fits securely and is not in an improper position or inclination.
6. Do not apply torque at recommended torque all at once. First, apply torque at about half of the recommended value to all bolts, then tighten at recommended torque. Order of tightening bolts must be diagonal.
7. Avoid pinning the circular spline if possible as it can reduce the rotational precision and smoothness of operation.

■ Precautions on the flexspline

1. Mounting surfaces need to have adequate flatness, smoothness, and no distortion.
2. Especially in the area of the screw holes, burrs or foreign matter should not be present.
3. Adequate clearance with the housing is needed to ensure no interference especially with the major axis of flexspline
4. Bolts should rotate freely when installing through the mounting holes of the flexspline and should not have any irregularity due to the shaft bolt holes being misaligned or oblique.
5. Do not tighten the bolts with the specified torque all at once. Tighten the bolts temporarily with about half the specified torque, and then tighten them to the specified torque. Tighten them in an even, crisscross pattern.
6. The flexspline and circular spline are concentric after assembly. After installing the wave generator bearing, if it rotates in unbalanced way, check the mounting for dedoidal or non-concentric installation.
7. Care should be taken not to damage the flexspline diaphragm or gear teeth during assembly.

   Avoid hitting the tips of the flexpline teeth and circular spline teeth. Avoid installing the CS from the open side of the flexspline after the wave generator has been installed.

■ Rust prevention

Although the Harmonic Drive® gears come with some corrosion protection, the gear can rust if exposed to the environment. The gear external surfaces typically have only a temporary corrosion inhibitor and some oil applied. If an anti-rust product is needed,please contact us to review the options.

"Dedoidal" state

It is normal for the flexspline to engage with the circular spline symmetrically as shown in Figure 029-1. However, if the ratcheting phenomenon, which is described on Page 013, is caused or if the three parts are forcibly inserted and assembled, engagement of the teeth may be out of alignment as shown in Figure 029-2. This is called "dedoidal". Note: Early failure of the gear will occur.

■ How to check "dedoidal"

By performing the following methods, check whether the gear engagement is "dedoidal".

(1) Judging by the irregular torque generated when the wave generator turns

1) Slowly turn the input shaft with your hand in a no-load condition. If you can turn it with average force, it is normal. If it turns irregularly, it may be "dedoidal".

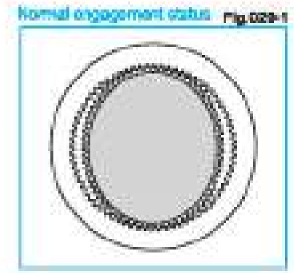
2) Turn the wave generator in a no-load condition if it is attached to a motor. If the average current value of the motor is about 2 to 3 times the normal value, it may be "dedoidal".

(2) Judging by measuring vibration on the body of the flexspline

The scale deflection of the dial gauge draws a sine wave as shown by the solid line in Graph 029-3 when it is normally assembled. When "dedoidal" occurs, the gauge draws a deflected wave shown by the dotted line as the flexspline is out of alignment.

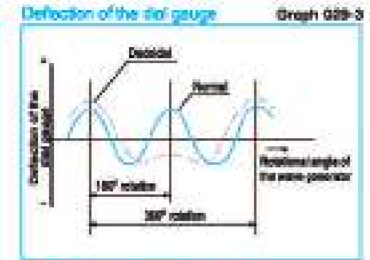
Normal engagement status

Fig. 029-1



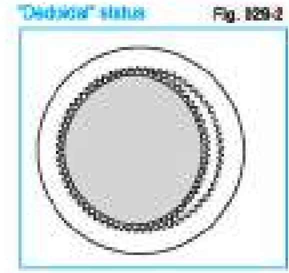
Deflection of the dial gauge

Graph 029-3



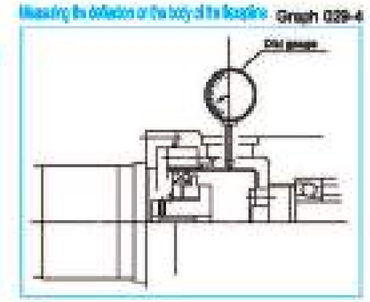
"Dedoidal" status

Fig. 029-2



Measuring the deflection of the body of the flexspline

Graph 029-4



Life of the output bearing

Calculate life of the output bearing by Formula 032-1.
You can calculate the dynamic equivalent radial load (Pc) by Formula 032-2.

Formula 032-1

(Cross roller bearing)

$$L_H = \frac{10^6}{60 \times N_{av}} \times \left(\frac{C}{f_w \cdot P_c}\right)^{10/3}$$

(4-point contact ball bearing)

$$L_H = \frac{10^6}{60 \times N_{av}} \times \left(\frac{C}{f_w \cdot P_c}\right)^{3}$$

Symbols for Formula 032-1

Table 032-1

L_H	Life	hour	——
N_{av}	Average output rated load speed	rpm	See "How to calculate the average load."
C	Basic dynamic rated load	N(kgf)	See "Specification of the output bearing" of each series.
Pc	Dynamic equivalent	N(kgf)	See Formula 032-2.
f_w	Load coefficient	——	See Table 032-3.

Load coefficient

Table 032-3

Load status	f_w
Steady operation without impact and vibration	1 to 1.2
Normal operation	1.2 to 1.5
Operation with impact and vibration	1.5 to 3

Formula 032-2

$$P_c = X \cdot \left(F_{rav} + \frac{2(F_{av}(L_r+R) + F_{av} \cdot L_a)}{d_p}\right) + Y \cdot F_{aav}$$

Symbols for Formula 032-2

Table 032-2

F_{rav}	Average radial load	N(kgf)	See "How to calculate the average load." See Formula 031-1.
F_{aav}	Average axial load	N(kgf)	See "How to calculate the average load." See Formula 031-2.
d_p	Pitch circle diameter	m	See Fig. 030-1 and "Specification of the output bearing" of each series.
X	Radial load coefficient	——	See Formula 031-4.
Y	Axial load coefficient	——	See Formula 031-4.
Lr, La	——	m	See Figure 030-1.
R	Offset	m	See Fig. 030-1 and "Specification of the output bearing" of each series.
M_{ave}	Average moment load	Nm	

How to calculate life during oscillating motion

Calculate the life of the cross roller bearing during oscillating motion by Formula 033-1.

Formula 033-1

(Cross roller bearing)

$$L_{OC} = \frac{10^6}{60 \times n1} \times \frac{90}{\theta} \times \left(\frac{C}{f_w \cdot P_c}\right)^{10/3}$$

(4-point contact ball bearing)

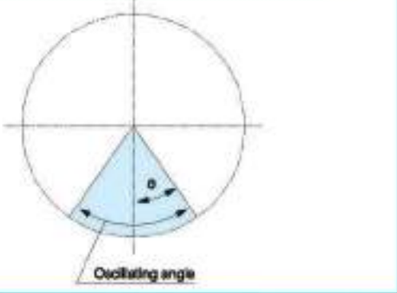
$$L_{OC} = \frac{10^6}{60 \times n1} \times \frac{90}{\theta} \times \left(\frac{C}{f_w \cdot P_c}\right)^{3}$$

Symbols for Formula 033-1

Table 033-1

Loc	Rated life for oscillating motion	hour	——
n1	Round trip oscillation each minute	cpm	——
C	Basic dynamic rated load	N(kgf)	——
Pc	Dynamic equivalent radial load	N(kgf)	See Formula 032-2.
f_w	Load coefficient	——	See Table 032-3.
θ	Oscillating angle /2	Degree	See Fig. 033-1.

Fig. 033-1



(Note) A small angle of oscillation (less than 5 degrees) may cause fretting corrosion to occur since lubrication may not circulate properly. Contact us if this happens.

How to calculate the static safety coefficient

Basic static rated load is an allowable limit for static load, but its limit is determined by usage. In this case, static safety coefficient of the cross roller bearing can be calculated by Formula 034-2.

Formula 034-1

$$f_s = \frac{C_o}{P_o}$$

Formula 034-2

$$P_o = F_{rmax} + \frac{2M_{max}}{d_p} + 0.44F_{amax}$$

Symbols for Formula 034-1

Table 034-1

Co	Basic static rated load	N(kgf)	See "Specification of the output bearing" of each series.
Po	Static equivalent radial load	N(kgf)	See Formula 034-2.

Static Safety Coefficient

Table 034-3

Operating condition of the roller bearing	f_s
When high rotation precision is required	≧3
When shock and vibration are expected	≧2
Under normal operating condition	≧1.5

Symbols for Formula 034-2

Table 034-2

F_{rmax}	Max. radial load	N(kgf)	See "How to calculate the maximum moment load" on Page 030.
F_{amax}	Max. axial load	N(kgf)	
M_{max}	Max. moment load	Nm(kgfm)	
d_p	Pitch circle diameter of a roller	m	See Fig. 030-1 and "Specification of the output bearing" of each series.

Features

CSG/CSF Gear Unit

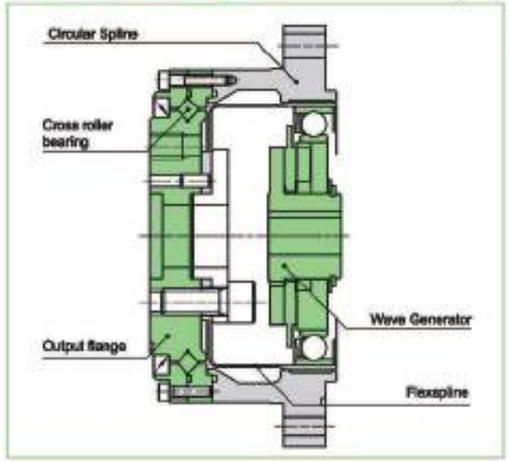
CSF/CSG are housed component gear sets combined with a precision cross roller output bearing & flange. A highly rigid cross roller bearing is built in to directly support (output bearing) the external load. They are a very compact, robust and easy to use gearhead solution. CSF and CSG are also available in lightweight versions.

Features

- Zero backlash
- Compact design
- High-torque capacity
- High stiffness
- High-positional and rotational accuracies

Structure of CSG/CSF series gear unit

Fig. 124-1



CSF v. CSG

CSG high torque
- 30% Higher torque than CSF series.
- The life has been improved by 43% (10,000 hours) compared to CSF.

CSF: standard torque
- Reduction ratio of 30:1 included for high-speed

CSF/CSG-LW series: Lightweight (sizes 14 to 45)
- 30% average lower weight than Standard Series.
- Same performance as CSF/CSG series.

Main markets

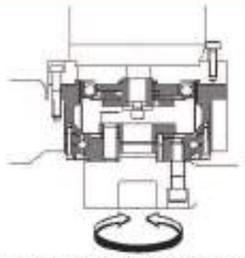
Industrial robot | Various mechanical equipment

Vertical multi-joint robot

Bending and twisting drive of the wrist of vertical multi joint robot

* In accordance with this assembly example, a seal structure is needed to prevent grease leakage

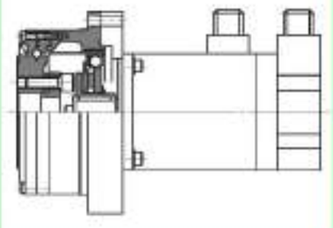
Horizontal multi-joint robot



Robotic arm drive of horizontal multi joint robot

* In accordance with this assembly example, a seal structure is needed to prevent grease leakage

Example of direct-connected servo motor



Ordering Code

CSG - 25 - 100 - 2UH - SP

Table 128-1

Series	Size	Ratio *1				
CSG	14	50	80	100	—	—
	17	50	80	100	120	—
	20	50	80	100	120	160
	25	50	80	100	120	160
	32	50	80	100	120	160
	40	50	80	100	120	160
	45	50	80	100	120	160
	50	—	80	100	120	160
	58	—	80	100	120	160
	65	—	80	100	120	160

Model	Special specification
2A= Component type 2UH= Unit type 2UJ = Unit type with input shaft *2	LW= Lightweight SP= Special specification code Blank= Standard product

*1 The reduction ratio value is based on the following configuration: Input: wave generator, fixed: circular spline, output: flexspline
*2 Contact us for details.

Rating table

■ CSG Series

Table 128-1

Size	Ratio	Rated Torque at 2000rpm		Limit for Repeated Peak Torque		Limit for Average Torque		Limit for Momentary Peak Torque		Maximum Input Speed (rpm)		Limit for Average Input Speed (rpm)		Moment of Inertia	
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	Oil lubricant	Grease lubricant	Oil lubricant	Grease lubricant	I ×10⁻⁴ kgm²	J ×10⁻⁴ kgfms²
14	50	7.0	0.7	23	2.3	9	0.9	46	4.7	14000	8500	6500	3500	0.033	0.034
	80	10	1.0	30	3.1	14	1.4	58 *3	5.9 *3						
	100	10	1.0	36	3.7	14	1.4	58 *3	5.9 *3						
17	50	21	2.1	44	4.5	34	3.4	91	9	10000	7300	6500	3500	0.079	0.081
	80	29	2.9	56	5.7	35	3.6	109 *3	11 *3						
	100	31	3.2	70	7.2	51	5.2	109 *3	11 *3						
	120	31	3.2	70	7.2	51	5.2	109 *3	11 *3						
20	50	33	3.3	73	7.4	44	4.5	127	13	10000	6500	6500	3500	0.193	0.197
	80	44	4.5	96	9.8	61	6.2	165	17						
	100	52	5.3	107	10.9	64	6.5	191	20						
	120	52	5.3	113	11.5	64	6.5	191	20						
	160	52	5.3	120	12.2	64	6.5	191	20						
25	50	51	5.2	127	13	72	7.3	242	25	7500	5600	5600	3500	0.413	0.421
	80	82	8.4	178	18	113	12	332	34						
	100	87	8.9	204	21	140	14	369	38						
	120	87	8.9	217	22	140	14	*4	*4						
	160	87	8.9	229	23	140	14	*4	*4						
32	50	99	10	281	29	140	14	497	51	7000	4800	4800	3500	1.69	1.72
	80	153	16	395	40	217	22	738	75						
	100	178	18	433	44	281	29	841	86						
	120	178	18	459	47	281	29	892	91						
	160	178	18	484	49	281	29	892	91						
40	50	178	18	523	53	255	26	892	91	5600	4000	3600	3000	4.50	4.59
	80	266	27	675	68	369	38	1270	130						
	100	345	35	738	75	484	49	1400	143						
	120	382	39	802	82	586	60	1510 *3	154 *3						
	160	382	39	841	86	586	60	1510 *3	154 *3						
45	50	229	23	650	66	345	35	1235	126	5000	3800	3300	3000	8.68	8.86
	80	407	41	918	94	507	52	1651	168						
	100	459	47	982	100	650	66	2041	208						
	120	523	53	1070	109	806	82	2288	233						
	160	523	53	1147	117	819	84	2483	253						
50	80	484	49	1223	125	675	69	2418	247	4500	3500	3000	2500	12.5	12.8
	100	611	62	1274	130	866	88	2678	273						
	120	688	70	1404	143	1057	108	2678	273						
	160	688	70	1534	156	1096	112	3185	325						
58	80	714	73	1924	196	1001	102	3185	325	4000	3000	2700	2200	27.3	27.9
	100	906	92	2067	211	1378	141	4134	422						
	120	969	99	2236	228	1547	158	4329	441						
	160	969	99	2392	244	1573	160	4459	455						
65	80	960	99	2743	280	1362	138	4836	493	3500	2800	2400	1900	46.6	47.6
	100	1238	126	2990	305	1976	202	6175	630						
	120	1238	126	3263	333	2041	208	6175	630						
	160	1238	126	3419	349	2041	208	6175	630						

(Note) 1. Moment of inertia: $I = \frac{1}{4} GD^2$
2. See "Engineering data" on Page 12 for details of the terms.
3. The value of allowable max momentary torque is limited by the transmission torque of the unit. (See table 128-1, 2 on p.128.)
4. When using LW series, see the transmission torque of the unit (Table 128-3, 4 on p.128) for the allowable maximum momentary torque.

Ordering Code

CSF - 25 - 100 - 2UH - SP

Table 126-2

Series	Size	Ratio *1						Model	Special specification
CSF	14	30	50	80	100	—	—	2A= Component type 2UH= Unit type 2UJ = Unit type with input shaft *1	LW= Lightweight (sizes 14 to 45) SP= Special specification code Blank= Standard product
	17	30	50	80	100	120	—		
	20	30	50	80	100	120	160		
	25	30	50	80	100	120	160		
	32	30	50	80	100	120	160		
	40	—	50	80	100	120	160		
	45	—	50	80	100	120	160		
	50	—	50	80	100	120	160		
	58	—	50	80	100	120	160		
	65	—	50	80	100	120	160		

*1 The reduction ratio value is based on the following configuration: Input: wave generator, fixed: circular spline, output: flexspline
*2 Contact us for details.

Rating table

■ CSF Series

Table 127-1

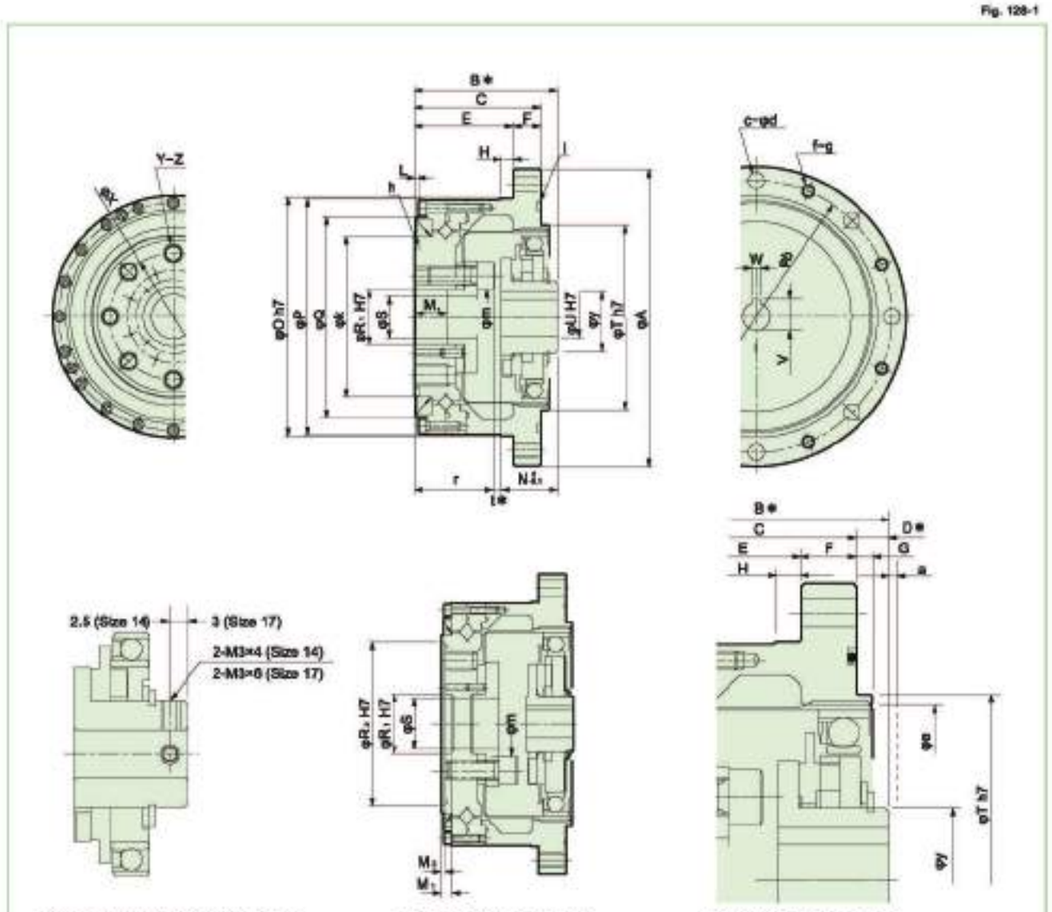
Size	Ratio	Rated Torque at 2000rpm		Limit for Repeated Peak Torque		Limit for Average Torque		Limit for Momentary Peak Torque		Maximum Input Speed (rpm)		Limit for Average Input Speed (rpm)		Moment of Inertia	
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	Oil lubricant	Grease lubricant	Oil lubricant	Grease lubricant	I ×10⁻⁴ kgm²	J ×10⁻⁴ kgfms²
14	30	4.0	0.41	9.0	0.92	6.8	0.69	17	1.7	14000	8500	6500	3500	0.033	0.034
	50	5.4	0.55	16	1.6	6.9	0.70	35	3.6						
	80	7.8	0.80	23	2.4	11	1.1	47	4.8						
	100	7.8	0.80	28	2.9	11	1.1	54	5.5						
17	30	6.6	0.90	16	1.6	12	1.2	30	3.1	10000	7300	6500	3500	0.079	0.081
	50	16	1.6	34	3.5	26	2.6	70	7.1						
	80	22	2.2	43	4.4	27	2.7	87	8.9						
	100	24	2.4	54	5.5	39	4.0	108	11						
	120	24	2.4	54	5.5	39	4.0	86	8.8						
20	30	15	1.5	27	2.8	20	2.0	50	5.1	10000	6500	6500	3500	0.193	0.197
	50	25	2.5	56	5.7	34	3.5	98	10						
	80	34	3.5	74	7.5	47	4.8	127	13						
	100	40	4.1	82	8.4	49	5.0	147	15						
	120	40	4.1	87	8.9	49	5.0	147	15						
	160	40	4.1	92	9.4	49	5.0	147	15						
25	30	27	2.8	50	5.1	36	3.9	95	9.7	7500	5600	5600	3500	0.413	0.421
	50	39	4.0	98	10	55	5.6	186	19						
	80	63	6.4	137	14	67	6.9	255	26						
	100	67	6.8	157	16	106	11	284	29						
	120	67	6.8	157	17	106	11	304	31						
	160	67	6.8	176	18	106	11	314	32						
32	30	54	5.5	100	10	75	7.7	200	20	7000	4800	4800	3500	1.69	1.72
	50	76	7.8	216	22	106	11	382	39						
	80	118	12	304	31	167	17	568	58						
	100	137	14	333	34	216	22	647	66						
	120	137	14	353	36	216	22	686	70						
	160	137	14	372	38	216	22	686	70						
40	50	137	14	402	41	196	20	686	70	5600	4000	3600	3000	4.50	4.59
	80	206	21	519	53	284	29	980	100						
	100	265	27	588	58	372	38	1080	110						
	120	294	30	617	63	451	46	1160	120						
	160	294	30	647	66	451	46	1160	120						
45	50	176	18	500	51	265	27	950	97	5000	3800	3300	3000	8.68	8.86
	80	313	32	706	72	390	40	1270	130						
	100	353	36	755	77	500	51	1570	160						
	120	402	41	823	84	620	63	1760	180						
	160	402	41	882	90	630	64	1910	195						
50	80	245	25	716	73	350	36	1430	146	4500	3500	3000	2500	12.5	12.8
	80	372	38	941	96	519	53	1860	190						
	100	470	48	980	100	666	68	2060	210						
	120	529	54	1080	110	813	83	2060	210						
	160	529	54	1180	120	843	86	2450	250						
58	50	176	18	1020	104	18	27	1960	200	4000	3000	2700	2200	27.3	27.9
	80	549	56	1480	151	770	79	2450	250						
	100	696	71	1590	162	1060	108	3180	325						
	120	745	76	1720	176	1190	121	3330	340						
	160	745	76	1840	188	1210	123	3430	350						
65	50	245	25	1420	145	360	27	2830	289	3500	2800	2400	1900	46.6	47.6
	80	745	76	2110	215	1040	106	3720	380						
	100	951	97	2300	235	1520	155	4750	485						
	120	951	97	2510	256	1570	160	4750	485						
	160	951	97	2630	268	1570	160	4750	485						

(Note) 1. Moment of inertia: $I = \frac{1}{4} GD^2$
2. See "Engineering data" on Page 12 for details of the terms.

Outline Dimensions

You can download the CAD files from our website: www.3fgearbox.com

Fig. 128-1



Shape of the wave generator hub for size 14 and 17 (no keyhole)

The shape on the output side of size 65

Enlarged view of the input side

(Note) Note that the length of the path of contact of the bolt will be within the depth of the female screw. If the length exceeds the size indicated by the symbol, Z, it will damage the flexspline.

* The shape of the output flange may vary depending on the size. Contact us for details. * Check the confirmation drawing for de tails of the sizes.
* See Fig. 040-3 on Page 40 for the shapes of the wave generator. The dimension tolerances that are not specified vary depending on the manufacturing method. Please check the confirmation drawing or contact us for dime nsion tolerances not shown on the drawing.

Dimensions

Table 128-1
Unit: mm

Symbol \ Size		14	17	20	25	32	40	45	50	58	65
φA		73	79	93	107	138	160	180	190	226	260
B*		41 $^{0}_{-0.2}$	45 $^{0}_{-0.2}$	45.5 $^{0}_{-0.2}$	52 $^{0}_{-0.2}$	62 $^{0}_{-0.3}$	72.5 $^{0}_{-0.3}$	79.5 $^{0}_{-0.3}$	90 $^{0}_{-0.3}$	104.5 $^{0}_{-0.4}$	115 $^{0}_{-0.4}$
C		34	37	38	46	57	66.5	74	85	97	108.5
D*	CSG Series	7 $^{0}_{-0.2}$	8 $^{0}_{-0.2}$	7.5 $^{0}_{-0.2}$	6 $^{0}_{-0.2}$	5 $^{0}_{-0.2}$	6 $^{0}_{-0.2}$	5.5 $^{0}_{-0.2}$	5 $^{0}_{-0.2}$	7.5 $^{0}_{-0.3}$	6.5 $^{0}_{-0.3}$
	CSG-LW Series										
	CSF Series	7 $^{0}_{-0.2}$	8 $^{0}_{-0.2}$	7.5 $^{0}_{-0.2}$	6 $^{0}_{-0.2}$	5 $^{0}_{-0.2}$	6 $^{0}_{-0.2}$	5.5 $^{0}_{-0.2}$	5 $^{0}_{-0.2}$	7.5 $^{0}_{-0.3}$	6.5 $^{0}_{-0.3}$
	CSF-LW Series										
E		27	29	28	36	45	50.5	58	69	77	84.5
F		7	8	10	10	12	16	16	16	20	24
G		2	2	3	3	3	4	4	4	5	5
H	CSG Series	3.5	4	5	5	5	5	6	6	6	6
	CSG-LW Series	4	4	5	5	4.5	4.5	6	6	6	6
	CSF Series	3.5	4	5	5	5	5	6	6	6	6
	CSF-LW Series	4	4	5	5	4.5	4.5	6	6	6	6
L	CSG Series	0.5	0.5	0.5	0.5	1	1.5	1	1	1.5	1.5
	CSG-LW Series	1.1	1.1	1.1	1.1	1.2	1.6	1.6	1	1.5	1.5
	CSF Series	0.5	1.1	1.1	1.1	1.2	1.6	1.6	1	1.5	1.5
	CSF-LW Series	1.1	1.1	1.1	1.1	1.2	1.6	1.6	1	1.5	1.5
M1		9.4	9.5	9	2	15	5	6	8	10	10
M2		-	-	-	-	-	-	-	-	-	4
N $^{0}_{-0.1}$	CSG Series	18.5	20.7	21.8	21.8	23.6	29.7	30.6	34.8	38.3	44.6
	CSG-LW Series										
	CSF Series	17.6	19.5	20.1	20.2	22	27.5	27.9	32	34.9	40.9
	CSF-LW Series										
φO h7		56	63	72	86	113	127	148	158	186	212
φP	CSG Series	56	62	70	85	112	123	147	157	185	210
	CSG-LW Series	54.6	61.6	69.8	85	110	124.5	143	155	183.4	208.4
	CSF Series	55	62	70	85	112	123	147	157	185	210
	CSF-LW Series	54.6	61.6	69.8	85	110	124.5	143	155	183.4	208.4
φQ	CSG Series	42.5	49.5	58	73	96	109	127	137	161	186
	CSG-LW Series	40.5	47.5	55.5	71	91.1	103	123	130	155	180
	CSF Series	42.5	49.5	58	73	96	109	127	137	161	186
	CSF-LW Series	40.5	47.5	55.5	71	91.1	103	123	130	155	180
φR1 H7		11	10	14	20	26	32	32	40	46	52
φR2 H7		-	-	-	-	-	-	-	-	-	142
φS		8	7	10	15	20	24	25	32	38	44
φT h7		38	48	56	67(68)	90	110	124	135	156	177
φU H7		6	8	12	14	14	14	19	19	22	24
V		-	-	13.8 $^{+0.1}_{0}$	16.3 $^{+0.1}_{0}$	16.3 $^{+0.1}_{0}$	16.3 $^{+0.1}_{0}$	21.8 $^{+0.1}_{0}$	21.8 $^{+0.1}_{0}$	24.8 $^{+0.1}_{0}$	27.3 $^{+0.1}_{0}$
W Js9		-	-	4	5	5	5	6	6	6	8
φX		23	27	32	42	55	68	82	84	100	110
Y		6	6	8	8	8	8	8	8	8	8
Z		M4×6	M5×10	M6×9	M8×12	M10×15	M10×15	M12×18	M14×21	M16×24	M16×24
a		1	1	1.6	1.6	1.6	2	2	2	2.5	2.5
φb		65	71	82	96	125	144	164	174	206	236
c	CSG Series	8	8	8	10	12	10	12	14	12	8
	CSG-LW Series	6	8	8	10	12	10	16	18	16	12
	CSF Series	6	6	6	8	12	8	12	12	12	8
	CSF-LW Series	6	8	8	10	12	10	16	18	16	12
φd		4.5	4.5	5.5	5.5	6.6	9	9	9	11	14
φe		38	45	53	66	86	106	119	133	154	172
f	CSG Series	8	8	8	10	12	10	12	14	12	8
	CSG-LW Series	6	8	8	10	12	10	16	18	16	12
	CSF Series	6	6	6	8	12	8	12	12	12	8
	CSF-LW Series	6	8	8	10	12	10	16	18	16	12
g		M4	M4	M5	M5	M6	M8	M8	M8	M10	M12
h		29.0×0.53	34.5×0.80	40.64×1.14	53.28×0.99	S71	AS568-042	S100	S105	S125	S135
i		S50	S56	S67	S80	S105	S125	S145	S155	S180	S205
φk		31	38	45	58	78	90	107	112	135	155
φm		10	10.5	15.5	20	27	34	38	39	46	56
r		21.4	23.5	23	29	37	39.5	46.5	53	62.8	68.5
t*	CSG Series	1.1	0.8	1	1.4	1.4	3.3	3.5	2.2	3.4	3.9
	CSG-LW Series										
	CSF Series	2	2	2.4	2.8	3	5.5	6.1	5	6.8	7.6
	CSF-LW Series										
φv		14	18	21	26	26	32	32	32	40	48
Mass (kg)	CSG Series	0.52	0.68	0.96	1.5	3.2	5.0	7.0	8.9	14.6	20.9
	CSG-LW Series	0.32	0.46	0.64	1.1	2.2	3.5	5.1	7	11.3	16.2
	CSF Series	0.52	0.68	0.96	1.5	3.2	5.0	7.0	8.9	14.6	20.9
	CSF-LW Series	0.32	0.46	0.64	1.1	2.2	3.5	5.1	7	11.3	16.2

(note1) the dimension in parenthesis is for reduction ratio 30.

- *The B, D, and t values indicate relative position of individual gearing components (wave generator, flexspline, circular spline). Please strictly adhere to these values when designing your housing and mating parts.
- Wave generator is removed when the product is delivered.
- CSF & CSG-LW available in sizes 14 to 45.

Positioning accuracy

See "Engineering data" for a description of terms.

Table 150-1
Unit: X10^{-4}rad (arc·min)

Ratio	Specification \ Size	14	17	20	25	32	40 to 65
30	Standard product	5.8 (2)	4.4 (1.5)	4.4 (1.5)	4.4 (1.5)	4.4 (1.5)	—
	Special product	—	—	2.9 (1)	2.9 (1)	2.9 (1)	—
50 or more	Standard product	4.4 (1.5)	4.4 (1.5)	2.9 (1)	2.9 (1)	2.9 (1)	2.9 (1)
	Special product	2.9 (1)	2.9 (1)	1.5 (0.5)	1.5 (0.5)	1.5 (0.5)	1.5 (0.5)

Hysteresis loss

See "Engineering data" for a description of terms.

Table 150-2

Ratio \ Size		14	17	20	25	32	40 or more
30	×10^{-4}rad	8.7	8.7	8.7	8.7	8.7	—
	arc min	3.0	3.0	3.0	3.0	3.0	—
50	×10^{-4}rad	5.8	5.8	5.8	5.8	5.8	5.8
	arc min	2.0	2.0	2.0	2.0	2.0	2.0
80 or more	×10^{-4}rad	2.9	2.9	2.9	2.9	2.9	2.9
	arc min	1.0	1.0	1.0	1.0	1.0	1.0

Max. backlash quantity

See "Engineering data" for a description of terms.

Table 150-3

Ratio \ Size		14	17	20	25	32	40	45	50	58	65
30	×10^{-4}rad	29.1	16.0	13.6	13.6	11.2	—	—	—	—	—
	arc sec	60	33	28	28	23	—	—	—	—	—
50	×10^{-4}rad	17.5	9.7	8.2	8.2	6.8	6.8	5.8	5.8	4.8	4.8
	arc sec	36	20	17	17	14	14	12	12	10	10
80	×10^{-4}rad	11.2	6.3	5.3	5.3	4.4	4.4	3.9	3.9	2.9	2.9
	arc sec	23	13	11	11	9	9	8	8	6	6
100	×10^{-4}rad	8.7	4.8	4.4	4.4	3.4	3.4	2.9	2.9	2.4	2.4
	arc sec	18	10	9	9	7	7	6	6	5	5
120	×10^{-4}rad	—	3.9	3.9	3.9	2.9	2.9	2.4	2.4	1.9	1.9
	arc sec	—	8	8	8	6	6	5	5	4	4
160	×10^{-4}rad	—	—	2.9	2.9	2.4	2.4	1.9	1.9	1.5	1.5
	arc sec	—	—	6	6	5	5	4	4	3	3

Torsional Stiffness

See "Engineering data" for a description of terms.

Table 150-4

Symbol \ Size			14	17	20	25	32	40	45	50	58	65
T_1		Nm	2.0	3.9	7.0	14	29	54	76	108	168	235
		kgfm	0.20	0.40	0.70	1.4	3.0	5.5	7.8	11	17	24
T_2		Nm	6.9	12	25	48	108	196	275	382	598	843
		kgfm	0.7	1.2	2.5	4.9	11	20	28	39	61	86
Reduction ratio 30	K_1	×10^{4}Nm/rad	0.19	0.34	0.57	1.0	2.4	—	—	—	—	—
		kgfm/arc min	0.056	0.10	0.17	0.30	0.70	—	—	—	—	—
	K_2	×10^{4}Nm/rad	0.24	0.44	0.71	1.3	3.0	—	—	—	—	—
		kgfm/arc min	0.07	0.13	0.21	0.40	0.89	—	—	—	—	—
	K_3	×10^{4}Nm/rad	0.34	0.67	1.1	2.1	4.9	—	—	—	—	—
		kgfm/arc min	0.10	0.20	0.32	0.62	1.5	—	—	—	—	—
	θ	×10^{-4}rad	10.5	11.5	12.3	14	12.1	—	—	—	—	—
		arc min	3.6	4.0	4.1	4.7	4.3	—	—	—	—	—
	θ	×10^{-4}rad	31	30	38	40	38	—	—	—	—	—
		arc min	10.7	10.2	12.7	13.4	13.3	—	—	—	—	—
Reduction ratio 50	K_1	×10^{4}Nm/rad	0.34	0.81	1.3	2.5	5.4	10	15	20	31	44
		kgfm/arc min	0.1	0.24	0.38	0.74	1.6	3.0	4.3	5.9	9.3	13
	K_2	×10^{4}Nm/rad	0.47	1.1	1.8	3.4	7.8	14	20	28	44	61
		kgfm/arc min	0.14	0.32	0.52	1.0	2.3	4.2	5.0	8.2	13	18
	K_3	×10^{4}Nm/rad	0.57	1.3	2.3	4.4	9.8	18	26	34	54	78
		kgfm/arc min	0.17	0.4	0.67	1.3	2.9	5.3	7.6	10	16	23
	θ	×10^{-4}rad	5.8	4.9	5.2	5.6	5.6	5.2	5.2	5.6	5.2	5.2
		arc min	2.0	1.7	1.8	1.9	1.9	1.8	1.8	1.9	1.8	1.8
	θ	×10^{-4}rad	16	12	15.4	15.7	15.7	15.4	15.1	15.4	15.1	15.1
		arc min	5.6	4.2	5.3	5.4	5.4	5.3	5.2	5.3	5.2	5.2

* The values in this table are reference values. The minimum value is approximately 60% of the displayed value.

Table 151-1

Symbol \ Size			14	17	20	25	32	40	45	50	58	65
T_1		Nm	2.0	3.9	7.0	14	29	54	76	108	168	235
		kgfm	0.20	0.40	0.70	1.4	3.0	5.5	7.8	11	17	24
T_2		Nm	6.9	12	25	48	108	196	275	382	598	843
		kgfm	0.7	1.2	2.5	4.9	11	20	28	39	61	86
Reduction ratio 80 or more	K_1	×10^{4}Nm/rad	0.47	1	1.6	3.1	6.7	13	18	25	40	54
		kgfm/arc min	0.14	0.3	0.47	0.92	2.0	3.8	5.4	7.4	12	16
	K_2	×10^{4}Nm/rad	0.61	1.4	2.5	5.0	11	20	29	40	61	88
		kgfm/arc min	0.18	0.4	0.75	1.5	3.2	6.0	8.5	12	18	26
	K_3	×10^{4}Nm/rad	0.71	1.6	2.9	5.7	12	23	33	44	71	98
		kgfm/arc min	0.21	0.46	0.85	1.7	3.7	6.8	9.7	13	21	29
	θ	×10^{-4}rad	4.1	3.9	4.4	4.4	4.4	4.1	4.1	4.4	4.1	4.4
		arc min	1.4	1.3	1.5	1.5	1.5	1.4	1.4	1.5	1.4	1.5
	θ	×10^{-4}rad	12	9.7	11.3	11.1	11.6	11.1	11.1	11.1	11.1	11.3
		arc min	4.2	3.3	3.9	3.8	4.0	3.8	3.8	3.8	3.8	3.9

* The values in this table are reference values. The minimum value is approximately 60% of the displayed value.

Starting torque

See "Engineering data" for a description of terms. As the values in the table below vary depending on the use conditions, use them as reference values.

■ CSG Series

Table 151-2
Unit: Ncm

Ratio \ Size	14	17	20	25	32	40	45	50	58	65
50	4.5	6.7	8.6	17	34	61	86	—	—	—
80	3.1	4.4	5.4	10	21	39	54	73	108	154
100	2.8	3.7	4.7	8.8	20	34	47	64	97	132
120	—	3.4	4.2	8.0	17	31	43	57	88	121
160	—	—	3.8	8.9	15	26	38	50	75	102

■ CSF Series

Table 151-3
Unit: Ncm

Ratio \ Size	14	17	20	25	32	40	45	50	58	65
30	6.4	9.3	15	25	54	—	—	—	—	—
50	4.1	6.1	7.8	15	31	55	77	110	160	220
80	2.8	4	4.9	9.2	19	35	49	66	98	140
100	2.5	3.4	4.3	8	18	31	43	58	88	120
120	—	3.1	3.8	7.3	15	28	39	52	80	110
160	—	—	3.3	6.3	14	24	33	45	68	93

Backdriving torque

See "Engineering data" for a description of terms. As the values in the table below vary depending on the use conditions, use them as reference values.

■ CSG Series

Table 151-4
Unit: Ncm

Ratio \ Size	14	17	20	25	32	40	45	50	58	65
50	1.8	3.3	5.2	9.9	20	36	52	—	—	—
80	1.8	3.3	5.3	10	21	36	53	69	106	154
100	2	3.6	5.6	11	22	40	58	75	121	165
120	—	3.9	6.1	12	24	43	61	80	121	176
160	—	—	7	14	29	51	70	94	143	198

■ CSF Series

Table 151-5
Unit: Ncm

Ratio \ Size	14	17	20	25	32	40	45	50	58	65
30	2.4	3.8	6.2	11	23	—	—	—	—	—
50	1.6	3	4.7	9	18	33	47	62	95	130
80	1.6	3	4.8	9.1	19	33	48	63	96	140
100	1.8	3.3	5.1	9.8	20	36	51	68	110	150
120	—	3.5	5.5	11	22	39	56	73	110	160
160	—	—	6.4	13	26	46	64	85	130	180

Ratcheting torque

See "Engineering data" for a description of terms.

■ CSG Series

Table 132-1
Unit: Nm

Ratio \ Size	14	17	20	25	32	40	45	50	58	65
50	110	190	280	580	1200	2300	3500	—	—	—
80	140	260	450	880	1800	3600	5000	7000	10000	14000
100	100	200	330	650	1300	2700	4000	5300	8300	12000
120	—	150	310	610	1200	2400	3600	4900	7500	10000
160	—	—	280	580	1200	2300	3300	4600	7200	10000

■ CSF Series

Table 132-2
Unit: Nm

Ratio \ Size	14	17	20	25	32	40	45	50	58	65
30	59	100	170	340	720	—	—	—	—	—
50	88	150	220	450	980	1800	2700	3700	5800	7800
80	110	200	350	680	1400	2800	3900	5400	8200	11000
100	84	160	260	500	1000	2100	3100	4100	6400	9400
120	—	120	240	470	980	1900	2800	3800	5800	8300
160	—	—	220	450	980	1800	2600	3600	5600	8000

Buckling torque

See "Engineering data" for a description of terms.

■ CSG Series

Table 132-3
Unit: Nm

Size	14	17	20	25	32	40	45	50	58	65
Total reduction ratio	260	500	800	1700	3500	6700	8900	12200	19000	26600

■ CSF Series

Table 132-4
Unit: Nm

Size	14	17	20	25	32	40	45	50	58	65
Total reduction ratio	190	330	560	1000	2200	4300	5600	8000	12000	17000

No-load running torque

No load running torque indicates the torque which is needed to rotate input of the gear, "Wave Generator", with no load on the output side (low speed side).

Measurement condition

Table 132-5

Ratio			
Lubricant	Grease lubrication	Name	Harmonic Grease SK-1A
			Harmonic Grease SK-2
		Quantity	Recommended quantity
Torque value is measured after 2 hours at 2000rpm input.			

* Contact us for oil lubrication.

■ Compensation Value in Each Ratio

No-load running torque of the gear varies with ratio.
The graphs indicate a value for ratio 100.
For other gear ratios, add the compensation values from table on the right.

Compensation value for no-load running torque

Table 132-6
Unit: Ncm

Size \ Ratio	30	50	80	120	160
14	2.5	1.1	0.2	—	—
17	3.8	1.6	0.3	-0.2	—
20	5.4	2.3	0.5	-0.3	-0.8
25	8.8	3.8	0.7	-0.5	-1.2
32	16	7.1	1.3	-0.9	-2.2
40	—	12	2.1	-1.5	-3.5
45	—	16	2.9	-2.1	-4.9
50	—	21	3.7	-2.8	-6.2
58	—	30	5.3	-3.8	-8.9
65	—	41	7.2	-5.1	-12

Checking output bearing

A precision cross roller bearing is built in the unit type to directly support the external load (output flange).
Check the maximum moment load, life of the bearing and static safety coefficient to fully bring out the performance of the uni t type.
See Pages 30 to 34 of "Engineering data" for each calculation formula.

■ Checking procedure

(1) Checking the maximum moment load (Mmax)

Calculate maximum moment load (Mmax). → Maximum moment load (Mmax) ≦ allowable moment (Mc)

(2) Checking the life

Calculate the radial load (Fravj and the average axial load (Faav) → Calculate the radial load coefficient (x) and the axial load coefficient (y). → Calculate the lifetime

(3) Checking the static safety coefficient

Calculate the static equivalent radial load coefficient (Po). → Check the static safety coefficient. (fs)

■ Output bearing specifications

The specifications of the cross roller are shown in Table 136-1.

Specifications CSG Series/CSF Series

Table 136-1

Size	Pitch circle dia. of a roller dp	Offset R	Basic rated load C		Basic static rated load Co		Allowable moment load Mc		Moment stiffness	
	m	m	×10 ^{3}N	kgf	×10 ^{3}N	kgf	Nm	kgfm	×10 ^{4} Nm/rad	kgfm/ arc min
14	0.035	0.0095	47	480	60.7	620	41	4.2	4.38	1.3
17	0.0425	0.0095	52.9	540	75.5	770	64	6.5	7.75	2.3
20	0.050	0.0095	57.8	590	90.0	920	91	9.3	12.8	3.8
25	0.062	0.0115	96.0	980	151	1540	156	16	24.2	7.2
32	0.080	0.013	150	1530	250	2550	313	32	53.9	16
40	0.098	0.0145	213	2170	365	3720	450	46	91.0	27
45	0.111	0.0155	230	2350	426	4340	686	70	141	42
50	0.119	0.018	348	3550	602	6140	759	77	171	51
58	0.141	0.0205	518	5290	904	9230	1160	120	283	84
65	0.160	0.0225	556	5670	1030	10500	1860	190	404	120

* Basic dynamic rated load is a constant radial load where the basic dynamic rated life of CRB is 1 x 106 rotations.
* Basic static rated load is a static load where the value of moment rigidity is the average value.
* The value of the moment stiffness is the average value.

Recommended Tolerances for Assembly

Recommended tolerances for assembly

Fig. 137-1

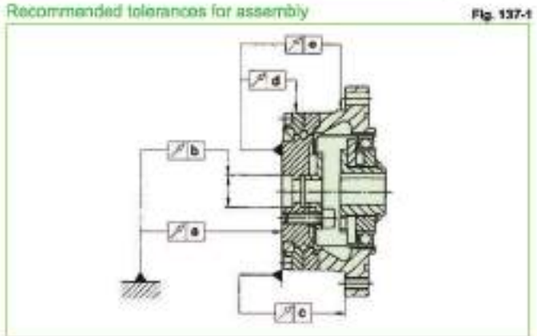


Table 137-1
Unit: mm

Symbol \ Size	14	17	20	25	32	40	45	50	58	65
a	0.010	0.010	0.010	0.015	0.015	0.015	0.018	0.018	0.018	0.018
b	0.010	0.012	0.012	0.013	0.013	0.015	0.015	0.015	0.017	0.017
c	0.024	0.026	0.038	0.045	0.056	0.060	0.068	0.069	0.076	0.085
d	0.010	0.010	0.010	0.010	0.010	0.015	0.015	0.015	0.015	0.015
e	0.038	0.038	0.047	0.049	0.054	0.060	0.065	0.067	0.070	0.075

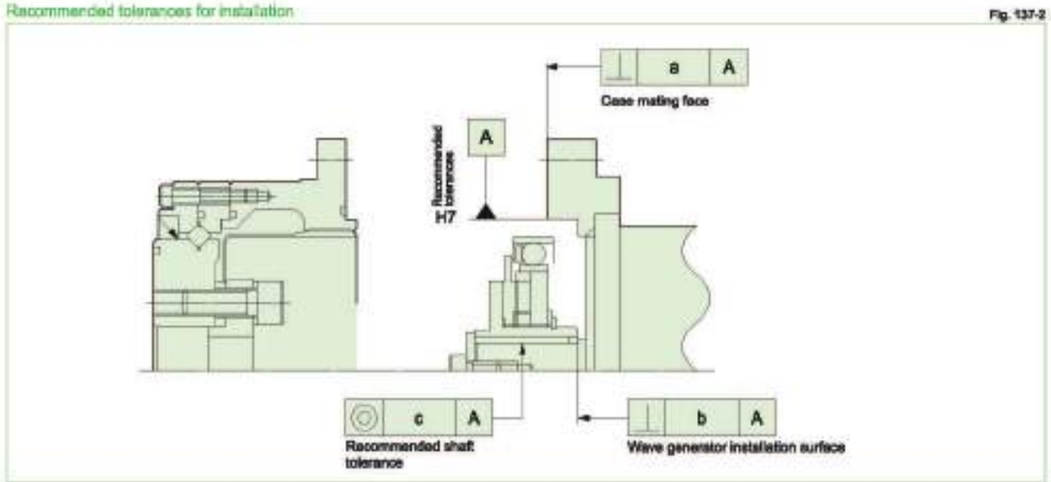
Design Guide

Installation accuracy

For peak performance of your gear, maintain the recommended tolerances shown in Figure 137-1 and Table 137-1.

Recommended tolerances for installation

Fig. 137-2



Recommended Tolerances for Assembly

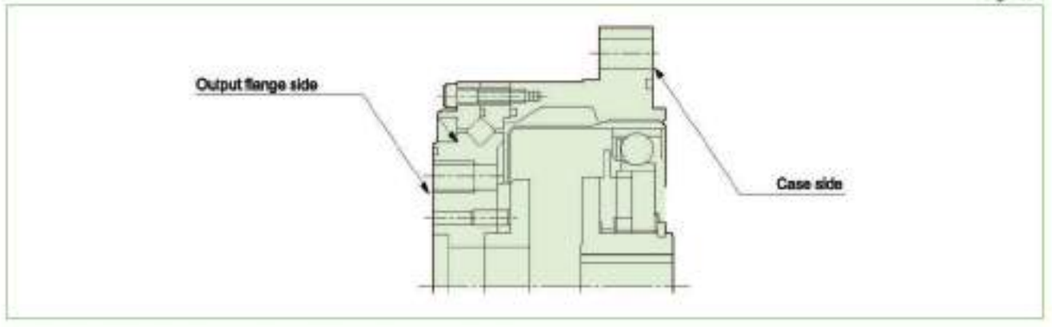
Table 137-2
Unit: mm

Symbol \ Size	14	17	20	25	32	40	45	50	58	65
a	0.011	0.015	0.017	0.024	0.026	0.026	0.027	0.028	0.031	0.034
b	0.017	0.020	0.020	0.024	0.024	0.032	0.032	0.032	0.032	0.032
	(0.008)	(0.010)	(0.010)	(0.012)	(0.012)	(0.012)	(0.013)	(0.015)	(0.015)	(0.015)
c	0.030	0.034	0.044	0.047	0.050	0.063	0.065	0.066	0.068	0.070
	(0.016)	(0.018)	(0.019)	(0.022)	(0.022)	(0.024)	(0.027)	(0.030)	(0.033)	(0.035)

* The value in the parentheses indicates that input (wave generator) is a solid wave generator.

Installation and transmission torque

Fig. 138-1



CSG series: Installation of output flange side and transmission torque

Table 138-1

Item \ Size		14	17	20	25	32	40	45	50	58	65
Number of bolts		6	6	8	8	8	8	8	8	8	8
Bolt size		M4	M5	M6	M8	M10	M10	M12	M14	M16	M16
Pitch circle	mm	23	27	32	42	55	68	82	84	100	110
Clamp torque	Nm	5.4	10.8	18.4	45	89	89	154	246	383	383
Torque transmission capacity (bolt only)	Nm	58	109	245	580	1220	1510	2624	3690	5991	6579

CSG series: Installation of case side and transmission torque

Table 138-2

Item \ Size		14	17	20	25	32	40	45	50	58	65
Number of bolts		8	8	8	10	12	10	12	14	12	8
Bolt size		M4	M4	M5	M5	M6	M8	M8	M8	M10	M12
Pitch circle	mm	65	71	82	96	125	144	164	174	206	236
Clamp torque	Nm	4.5	4.5	9.0	9.0	15.3	37	37	37	74	128
Torque transmission capacity (bolt only)	Nm	182	196	365	538	1200	2100	2844	3251	5717	6293

(Table 138-1, 138-2/Notes)
1. The material of the thread must withstand the clamp torque.
2. Recommended bolt: JIS B 1176 socket head cap screw / Strength range: JIS B 1051 over 12.9.
3. Torque coefficient: K=0.2
4. Clamp coefficient: A=1.4
5. Tightening friction coefficient μ=0.15

CSF series: Bolt connection to output flange and resulting transmission torque

Table 139-1

Item \ Size		14	17	20	25	32	40	45	50	58	65
Number of bolts		6	6	8	8	8	8	8	8	8	8
Bolt size		M4	M5	M6	M8	M10	M10	M12	M14	M16	M16
Pitch circle	mm	23	27	32	42	55	68	82	84	100	110
Clamp torque	Nm	4.5	9	15.3	37	74	74	128	205	319	319
Torque transmission capacity (bolt only)	Nm	49	91	204	486	1108	1258	2200	3070	4960	5480

CSF series: Bolt connection to output flange and resulting transmission torque

Table 139-2

Item \ Size		14	17	20	25	32	40	45	50	58	65
Number of bolts		6	6	6	8	12	8	12	12	12	8
Bolt size		M4	M4	M5	M5	M6	M8	M8	M8	M10	M12
Pitch circle	mm	65	71	82	96	125	144	164	174	206	236
Clamp torque	Nm	4.5	4.5	9.0	9.0	15.3	37	37	37	74	128
Torque transmission capacity (bolt only)	Nm	137	147	274	431	1200	1680	2860	3040	5670	6310

(Table 139-1, 139-2/Notes)
1. The material of the thread must withstand the clamp torque.
2. Recommended bolt: JIS B 1176 socket head cap screw / Strength range: JIS B 1051 over 12.9.
3. Torque coefficient: K=0.2
4. Clamp coefficient: A=1.4
5. Tightening friction coefficient μ=0.15

■ Precautions on installing the load to the output flange (Sizes 14 to 25)

As the distance (see the size symbol "L" in Figure 128-1 on Page 128) between the oil seal on the output flange periphery and the edge output flange (rotor) is short for the gear units sizes 14, 17, 20 and 25, the load may interfere with the oil seal. Produce a design so that the load cannot be applied to the oil seal.

Installation of a motor

■ Motor mounting flange

A motor mounting flange is required for installing a motor. The recommended size and precision of the basic part of the motor mounting flange is shown in Table 140-1.

Fig. 140-1

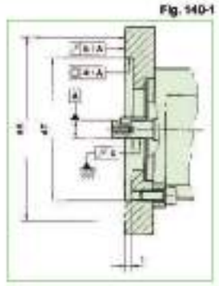


Table 140-1
Unit: mm

Symbol \ Size	14	17	20	25	32	40	45	50	58	65
a	0.03	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05
b	0.03	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05
c	0.015	0.015	0.018	0.018	0.018	0.018	0.021	0.021	0.021	0.021
φA	73	79	93	107	138	160	180	190	226	260
l	3	3	4.5	4.5	4.5	6	6	6	7.5	7.5
φT	38H7	48H7	56H7	67H7	90H7	110H7	124H7	135H7	156H7	177H7

■ Installation procedure

As shown in Figures 141-1 and 141-2, there are two basic procedures to install a motor. Select the installation procedure by the diameter of the pilot hole on the motor mounting surface. Table 141-1 shows the selection standard by the diameter of the pilot hole on the motor mounting surface.

Table 141-1
Unit: mm

Size	14	17	20	25	32	40	45	50	58	65	Reference drawing for installation
The dia. of the pilot hole on the motor mounting surface	<35.5	<43.5	<50.0	<62.5	<81.5	<100.0	<113.5	<124.5	<147	<167	Installation procedure-1 (Fig. 141-1)
	≥35.5	≥43.5	≥50.0	≥62.5	≥81.5	≥100.0	≥113.5	≥124.5	≥147	≥167	Installation procedure-2 (Fig. 141-2)

Fig. 141-1

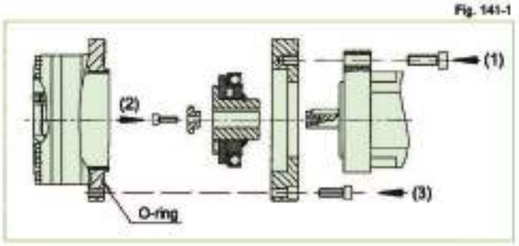
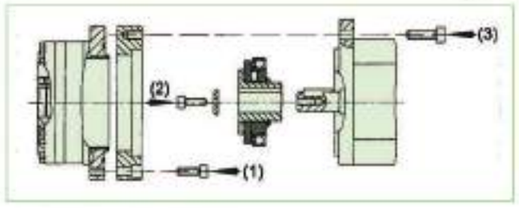


Fig. 141-2



■ Precautions on assembly

It is extremely important to assemble the gear accurately, in proper sequence. Perform assembly based on the following precautions.

Precautions regarding the wave generator

1. Avoid applying undue axial force to the wave generator during installation. Rotating the wave generator bearing while insert ing it is recommended and will ease the process.
2. If the wave generator does not have an Oldham coupling, ext ra care must be given to ensure that concentricity and inclination are within the specified limits (see "Installation accuracy" of each series on Page 137).

Other precautions

1. Is the flatness of the mounting surface poor or distorted?
2. Is any embossment of the screw hole area, burr or trapped foreign matter found?
3. Have chamfering and relief working of the corner been performed to prevent interference with the area of installation of the unit?

Installation procedure-1

(1) Install the mounting flange on the motor mounting surface.
(2) Install a wave generator on the motor output shaft.
(3) Install the main unit.

Installation procedure-2

(1) Install the mounting flange on the main unit.
(2) Install a wave generator on the motor output shaft.
(3) Install the mounting flange (main unit) on the motor mounting surface.

Rust-prevention

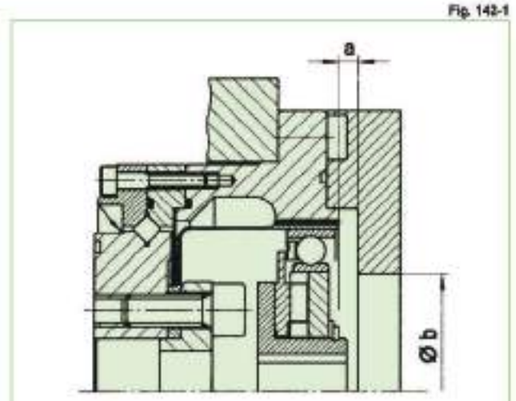
Although Harmonic Drive® gears come with some corrosion protection, the gear can rust if exposed to the environment. The gear external surfaces typically have only a temporary corrosion inhibitor and some oil applied. If an anti-rust product is needed, please contact us to review the options.

Lubrication

Grease lubrication is standard for the CSF/CSG gear units. Harmonic Grease SK-2 is for sizes 14 and 17, and Harmonic Grease SK-1A is for sizes 20 to 65 (Harmonic Grease 4B No.2 for the cross roller bearing). Harmonic Grease 4B No.2 is also available for long-life and for use in a wide temperature range. (see "Engineering data" for the specifications of the grease).

See table below for recommended housing dimensions. These dimensions must be maintained to prevent damage to the gear and to maintain a proper grease cavity.

Fig. 142-1



Recommended housing dimensions

Table 142-1
Unit: mm

Symbol \ Size	14	17	20	25	32	40	45	50	58	65
a*	1	1	1.5	1.5	1.5	2	2	2	2.5	2.5
a**	3	3	4.5	4.5	4.5	6	6	6	7.5	7.5
φb	18	28	30	37	37	45	45	45	58	62

* Horizontal and vertical: when the wave generator is below
** Vertical: when the wave generator is above

■ Other precautions

Fill the gap between the wave generator and the input cover (motor flange) with grease to use the wave generator facing upward or downward (see Figure 048-3 on Page 48).

Sealing

Sealing is needed to maintain the high durability of the gear and prevent grease leakage

- Rotating Parts ..... Oil seal (with a spring). Surface should be smooth (no scratches)
- Mating flange ..... O-ring and seal adhesive. Take care regarding distortion on the plane and how the O-ring is engaged.
- Screw hole area ..... Screws should have a thread lock (LOCKTITE 242 is recommended) or seal adhesive.

(Note) If you use Harmonic Grease 4BNo.2, strict sealing is required.

Sealing area and the recommended sealing method for the unit type

Table 142-2

Area requiring sealing		Recommended sealing method
Output side	Pass-through hole in the center of the output flange and the output flange mating face	Use O-ring (supplied with product)
	Spanner screw area	Screw lock agent with sealing effect (LOCTITE® 242 is recommended)
Input side	Flange mating face	Use O-ring (supplied with product)
	Motor output shaft	Please select a motor which has an oil seal on the output shaft.

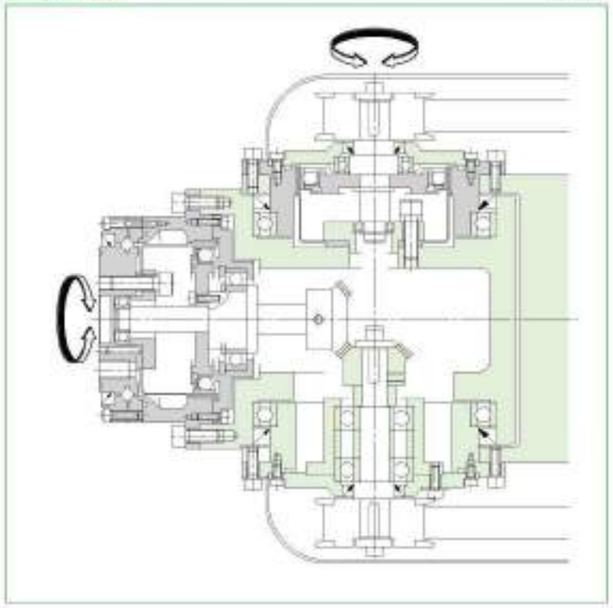
Rust prevention

Although Harmonic Drive® gears come with some corrosion protection, the gear can rust if exposed to the environment. The gear external surfaces typically have only a temporary corrosion inhibitor and some oil applied. If an anti-rust product is needed, please contact us to review the options.

Application

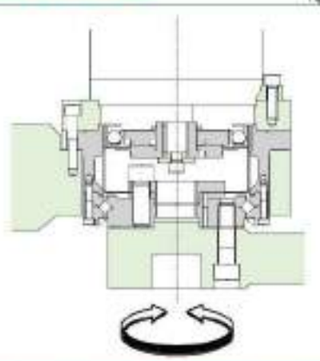
Multi-joint Robot

Fig. 143-1



Horizontal Multi Arm Robot

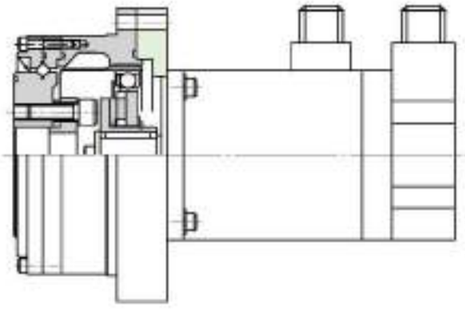
Fig. 144-1



* For usage as this installation example, sealing is required to prevent grease leakage.

Direct Connection to a Servomotor

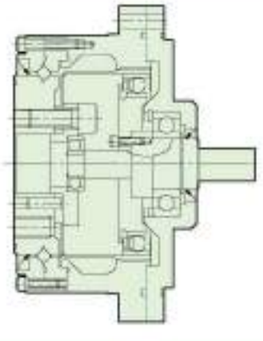
Fig. 144-2



Optional Input Shaft

Fig. 144-3

CSF/CSG-2UJ with optional input shaft



* Contact us for details

Features

SHG/SHF series gear units

The SHG/SHF series gear unit is an easy-to-use gearhead solution. An accurate, highly rigid cross roller bearing is built in to directly support the external load.

Features

- Zero backlash
- Large bore with hollow through hole
- Input shaft option available
- Flat shape, compact and simple design
- High-torque capacity
- High stiffness
- High-positional and rotational accuracies
- Coaxial input and output

Configurations

The SHG/SHF gearheads are available in 4 variations allowing the customer to choose the best configuration for their application.

- Large-diameter hollow shaft: (2UH)
- Input shaft (2UJ)
- Easier to use: Simplicity unit (2SO)
  Hollow shaft simplicity unit (2SH)

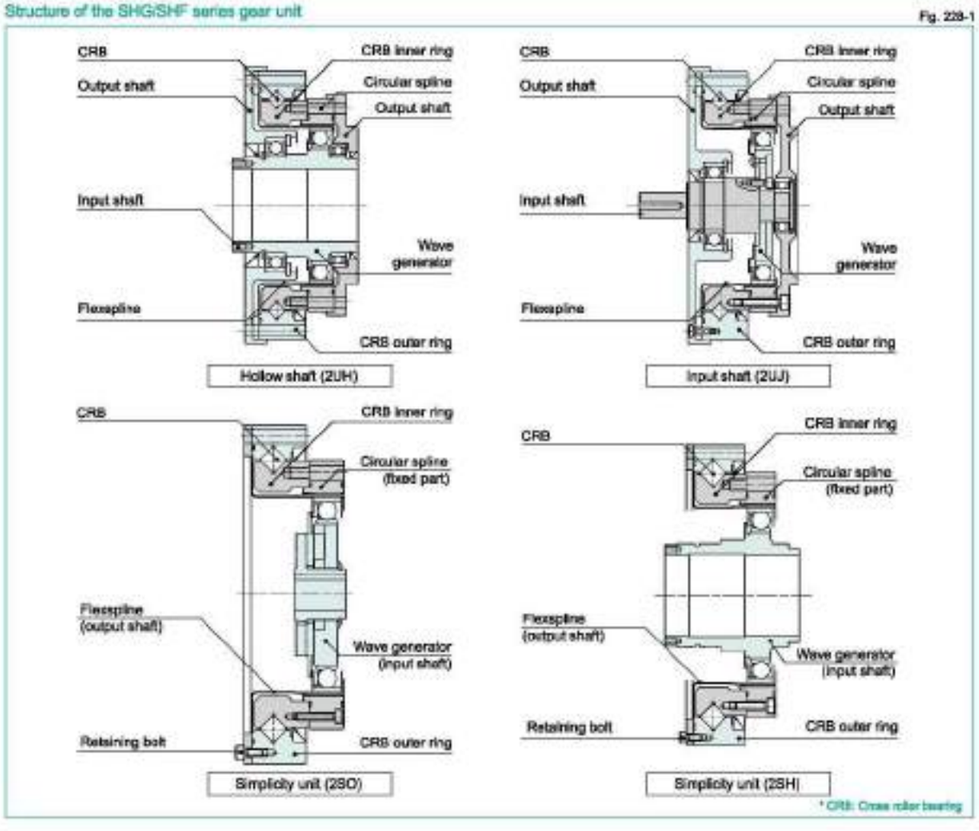
Series

SHG: high torque
- Torque capacity has been improved by 30% compared to the SHF series.
- The life has been improved by 43% (10,000 hours) compared to the SHF series.

SHF: standard torque
- Reduction ratio of 30:1 added for high speed.

Structure of the SHG/SHF series gear unit

Fig. 228-1



* CRB: Cross roller bearing

Ordering Code

SHG - 25 - 100 - 2UH - SP

Table 229-1

Series	Size	Ratio *1					Model	Special specification
SHG	14	50	80	100	—	—	2A-GR = Component set (2A-R for sizes 14, 17) 2UH = Hollow shaft 2UJ = Input shaft 2SO = Simplicity unit (Std. structure) 2SH = Simplicity unit (Hollow shaft)	LW = Lightweight SP = Special specification code Blank = Standard product
	17	50	80	100	120	—		
	20	50	80	100	120	160		
	25	50	80	100	120	160		
	32	50	80	100	120	160		
	40	50	80	100	120	160		
	45	50	80	100	120	160		
	50	—	80	100	120	160		
	58	—	80	100	120	160		
	65	—	80	100	120	160		

*1: The reduction ratio value is based on the following configuration: Input: wave generator, fixed: circular spline, output: flexspline

Technical Data

Rating table

■ SHG series

Table 230-1

Size	Ratio	Rated torque at 2000rpm		Limit for repeated peak torque		Limit for average torque		Limit for momentary peak torque		Maximum input speed (rpm)		Limit for average input speed (rpm)	
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	Oil lubricant	Grease lubricant	Oil lubricant	Grease lubricant
14	50	7.0	0.7	23	2.3	9	0.9	46	4.7	14000	8500	6500	3500
	80	10	1.0	30	3.1	14	1.4	61	6.2				
	100	10	1.0	36	3.7	14	1.4	70	7.2				
17	50	21	2.1	44	4.5	34	3.4	91	9	10000	7300	6500	3500
	80	29	2.9	56	5.7	35	3.6	113	12				
	100	31	3.2	70	7.2	51	5.2	143	15				
	120	31	3.2	70	7.2	51	5.2	112	11				
20	50	33	3.3	73	7.4	44	4.5	127	13	10000	6500	6500	3500
	80	44	4.5	96	9.8	61	6.2	165	17				
	100	52	5.3	107	10.9	64	6.5	191	20				
	120	52	5.3	113	11.5	64	6.5	191	20				
	160	52	5.3	120	12.2	64	6.5	191	20				
25	50	51	5.2	127	13	72	7.3	242	25	7500	5600	5600	3500
	80	82	8.4	178	18	113	12	332	34				
	100	87	8.9	204	21	140	14	389	38				
	120	87	8.9	217	22	140	14	395	40				
	160	87	8.9	229	23	140	14	408	42				
32	50	98	10	281	29	140	14	497	51	7000	4800	4800	3500
	80	153	16	395	40	217	22	738	75				
	100	178	18	433	44	281	29	841	86				
	120	178	18	459	47	281	29	892	91				
	160	178	18	484	49	281	29	892	91				
40	50	178	18	523	53	255	26	892	91	5600	4000	3600	3000
	80	268	27	675	69	369	38	1270	130				
	100	345	35	738	75	484	49	1400	143				
	120	382	39	802	82	586	60	1530	156				
	160	382	39	841	86	586	60	1530	156				
45	50	229	23	650	66	345	35	1235	126	5000	3800	3300	3000
	80	407	41	918	94	507	52	1651	168				
	100	459	47	982	100	650	66	2041	208				
	120	523	53	1070	109	806	82	2288	233				
	160	523	53	1147	117	819	84	2483	253				
50	80	484	49	1220	125	875	89	2418	247	4500	3500	3000	2500
	100	611	62	1274	130	886	88	2678	273				
	120	688	70	1404	143	1057	108	2678	273				
	160	688	70	1534	156	1096	112	3185	325				
58	80	714	73	1924	196	1001	102	3185	325	4000	3000	2700	2200
	100	905	92	2067	211	1378	141	4134	422				
	120	969	99	2236	228	1547	158	4329	441				
	160	969	99	2392	244	1573	160	4459	455				
65	80	969	99	3743	280	1352	138	4838	493	3500	2800	2400	1900
	100	1236	126	3990	305	1976	202	6175	630				
	120	1236	126	3263	333	2041	208	6175	630				
	160	1236	126	3419	349	2041	208	6175	630				

(Note) 1. Moment of inertia : $I = \frac{1}{4}GD^2$
2. See Rating Table Definitions on Page 12 for details of the terms.

Ordering Code

SHF - 25 - 100 - 2UH - SP

Table 229-2

Series	Size	Ratio *1						Model	Special specification
SHF	11*2	—	50	—	100	—	—	2A-GR = Component set (2A-R for sizes 14, 17) 2UH = Hollow shaft 2UJ = Input shaft 2SO = Simplicity unit (Std. structure) 2SH = Simplicity unit (Hollow shaft)	LW = Lightweight SP = Special specification code Blank = Standard product
	14	30	50	80	100	—	—		
	17	30	50	80	100	120	—		
	20	30	50	80	100	120	160		
	25	30	50	80	100	120	160		
	32	30	50	80	100	120	160		
	40	—	50	80	100	120	160		
	45	—	50	80	100	120	160		
	50	—	50	80	100	120	160		
	58	—	50	80	100	120	160		

*1: The reduction ratio value is based on the following configuration: Input: wave generator, fixed: circular spline, output: flexspline
*2: Size 11 is only available in SHF-2UH

Rating table

■ SHF series

Table 231-1

Size	Ratio	Rated torque at 2000rpm		Limit for repeated peak torque		Limit for average torque		Limit for momentary peak torque		Maximum input speed (rpm)		Limit for average input speed (rpm)	
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	Oil lubricant	Grease lubricant	Oil lubricant	Grease lubricant
11	50	3.5	0.36	8.3	0.85	5.5	0.56	17	1.73	14000	8500	6500	3500
	100	5	0.51	11	1.12	8.9	0.91	25	2.55				
14	30	4.0	0.41	9.0	0.92	6.8	0.69	17	1.7	14000	8500	6500	3500
	50	5.4	0.55	16	1.6	6.9	0.70	35	3.6				
	80	7.6	0.80	23	2.4	11	1.1	47	4.8				
	100	7.8	0.80	28	2.9	11	1.1	54	5.5				
17	30	8.8	0.90	16	1.6	12	1.2	30	3.1	10000	7300	6500	3500
	50	16	1.6	34	3.5	26	2.6	70	7.1				
	80	22	2.2	43	4.4	27	2.7	87	8.9				
	100	24	2.4	54	5.5	39	4.0	110	11				
	120	24	2.4	54	5.5	39	4.0	86	8.8				
20	30	15	1.5	27	2.8	20	2.0	50	5.1	10000	6500	6500	3500
	50	25	2.5	56	5.7	34	3.5	98	10				
	80	34	3.5	74	7.5	47	4.8	127	13				
	100	40	4.1	82	8.4	48	5.0	147	15				
	120	40	4.1	87	8.9	48	5.0	147	15				
	160	40	4.1	92	9.4	48	5.0	147	15				
25	30	27	2.8	50	5.1	38	3.9	95	9.7	7500	5600	5600	3500
	50	39	4.0	98	10	55	5.6	186	19				
	80	63	6.4	137	14	87	8.9	255	26				
	100	67	6.8	167	16	108	11	284	29				
	120	67	6.8	167	17	108	11	304	31				
	160	67	6.8	176	18	108	11	314	32				
32	30	54	5.5	100	10	75	7.7	200	20	7000	4800	4800	3500
	50	76	7.8	216	22	108	11	382	39				
	80	118	12	304	31	167	17	588	58				
	100	137	14	333	34	216	22	647	66				
	120	137	14	363	36	216	22	686	70				
	160	137	14	372	38	216	22	686	70				
40	50	137	14	402	41	196	20	686	70	5600	4000	3600	3000
	80	206	21	519	53	284	29	980	100				
	100	265	27	568	58	372	38	1080	110				
	120	294	30	617	63	451	46	1180	120				
	160	294	30	647	66	451	46	1180	120				
45	50	176	18	500	51	265	27	950	97	5000	3800	3300	3000
	80	313	32	706	72	390	40	1270	130				
	100	353	36	755	77	500	51	1570	160				
	120	402	41	823	84	620	63	1760	180				
	160	402	41	862	90	630	64	1910	195				
50	50	122	12	715	73	175	18	1430	146	4500	3500	3000	2500
	80	372	38	941	96	519	53	1860	190				
	100	470	48	980	100	666	68	2060	210				
	120	529	54	1060	110	813	83	2060	210				
	160	529	54	1180	120	843	86	2450	250				
58	50	176	18	1020	104	260	27	1960	200	4000	3000	2700	2200
	80	549	56	1480	151	770	79	2450	250				
	100	696	71	1590	162	1060	108	3180	325				
	120	745	76	1720	176	1190	121	3330	340				
	160	745	76	1840	188	1210	123	3430	350				

(Note) 1. Oil lubrication is standard for gear units size 50 or larger with a reduction ratio of 50. Use grease lubrication within half the rated torque.
2. Moment of inertia : $I = \frac{1}{4}GD^2$ 3. See Rating Table Definitions on Page 12 for details of the terms. 4. Size 11 is only available in 2UH.

Positional accuracy

See "Engineering data" for a description of terms.

Table 232-1

Ratio	Specification	Size	11	14	17	20	25	32	40 or more
30	Standard product	× 10⁻⁴rad	—	5.8	4.4	4.4	4.4	4.4	—
		arc min	—	2	1.5	1.5	1.5	1.5	—
	Special product	× 10⁻⁴rad	—	—	—	2.9	2.9	2.9	—
		arc min	—	—	—	1	1	1	—
50 or more	Standard product	× 10⁻⁴rad	5.8(4.4)	4.4	4.4	2.9	2.9	2.9	2.9
		arc min	2(1.5)	1.5	1.5	1	1	1	1
	Special product	× 10⁻⁴rad	—	2.9	2.9	1.5	1.5	1.5	1.5
		arc min	—	1	1	0.5	0.5	0.5	0.5

Note 1: * The parenthesized value of size 11 indicates the value for reduction ratio 100.

Hysteresis loss

See "Engineering data" for a description of terms.

Table 232-2

Ratio	Size / Unit	11	14	17	20	25	32	40 or more
30	× 10⁻⁴rad	—	8.7	8.7	8.7	8.7	8.7	—
	arc min	—	3.0	3.0	3.0	3.0	3.0	—
50	× 10⁻⁴rad	5.8	5.8	5.8	5.8	5.8	5.8	5.8
	arc min	2.0	2.0	2.0	2.0	2.0	2.0	2.0
80 or more	× 10⁻⁴rad	5.8	2.9	2.9	2.9	2.9	2.9	2.9
	arc min	2.0	1.0	1.0	1.0	1.0	1.0	1.0

Backlash

See "Engineering data" for a description of terms.

Table 232-3

Ratio	Size	11	14	17	20	25	32	40	45	50	58	65
30	× 10⁻⁴rad	—	29.1	16.0	13.6	13.6	11.2	—	—	—	—	—
	arc sec	—	60	33	28	28	23	—	—	—	—	—
50	× 10⁻⁴rad	Note 1	17.5	9.7	8.2	8.2	6.8	6.8	5.8	5.8	4.8	—
	arc sec	Note 1	36	20	17	17	14	14	12	12	10	—
80	× 10⁻⁴rad	—	11.2	6.3	5.3	5.3	4.4	4.4	3.9	3.9	2.9	2.9
	arc sec	—	23	13	11	11	9	8	8	8	6	6
100	× 10⁻⁴rad	Note 1	8.7	4.8	4.4	4.4	3.4	3.4	2.9	2.9	2.4	2.4
	arc sec	Note 1	18	10	9	9	7	7	6	6	5	5
120	× 10⁻⁴rad	—	—	3.9	3.9	3.9	2.9	2.9	2.4	2.4	1.9	1.9
	arc sec	—	—	8	8	8	6	6	5	5	4	4
160	× 10⁻⁴rad	—	—	—	2.9	2.9	2.4	2.4	1.9	1.9	1.5	1.5
	arc sec	—	—	—	6	6	5	5	4	4	3	3

Note 1: For size 11, the wave generator is a solid wave generator. See "Engineering data" for details.

Torsional stiffness

See "Engineering data" for a description of terms.

Table 232-4

Symbol		Size	11	14	17	20	25	32	40	45	50	58	65
T_1		Nm	0.8	2.0	3.9	7.0	14	29	54	76	108	168	235
		kgfm	0.082	0.2	0.4	0.7	1.4	3.0	5.5	7.8	11	17	24
T_2		Nm	2.0	6.9	12	25	48	108	196	275	382	598	843
		kgfm	0.2	0.7	1.2	2.5	4.9	11	20	28	39	61	86
Reduction ratio 30	K_1	× 10⁴Nm/rad	—	0.19	0.34	0.57	1.0	2.4	—	—	—	—	—
		kgfm/arc min	—	0.056	0.10	0.17	0.30	0.70	—	—	—	—	—
	K_2	× 10⁴Nm/rad	—	0.24	0.44	0.71	1.3	3.0	—	—	—	—	—
		kgfm/arc min	—	0.07	0.13	0.21	0.40	0.89	—	—	—	—	—
	K_3	× 10⁴Nm/rad	—	0.34	0.57	1.1	2.1	4.9	—	—	—	—	—
		kgfm/arc min	—	0.10	0.20	0.32	0.62	1.5	—	—	—	—	—
	θ_1	× 10⁻⁴rad	—	10.5	11.5	12.3	14	12.1	—	—	—	—	—
		arc min	—	3.6	4.0	4.1	4.7	4.3	—	—	—	—	—
	θ_2	× 10⁻⁴rad	—	31	30	38	40	38	—	—	—	—	—
		arc min	—	10.7	10.2	12.7	13.4	13.3	—	—	—	—	—
Reduction ratio 50	K_1	× 10⁴Nm/rad	0.22	0.34	0.61	1.3	2.5	5.4	10	15	20	31	—
		kgfm/arc min	0.066	0.1	0.24	0.38	0.74	1.6	3.0	4.3	5.9	9.3	—
	K_2	× 10⁴Nm/rad	0.3	0.47	1.1	1.8	3.4	7.8	14	20	28	44	—
		kgfm/arc min	0.09	0.14	0.32	0.52	1.0	2.3	4.2	6.0	8.2	13	—
	K_3	× 10⁴Nm/rad	0.32	0.57	1.3	2.3	4.4	9.8	18	26	34	54	—
		kgfm/arc min	0.096	0.17	0.4	0.67	1.3	2.9	5.3	7.6	10	16	—
	θ_1	× 10⁻⁴rad	3.8	5.8	4.9	5.2	5.5	5.5	5.2	5.2	5.5	5.2	—
		arc min	1.2	2.0	1.7	1.8	1.9	1.9	1.8	1.8	1.9	1.8	—
	θ_2	× 10⁻⁴rad	8.0	16	12	15.4	15.7	15.7	15.4	15.1	15.4	15.1	—
		arc min	2.8	5.6	4.2	5.3	5.4	5.4	5.3	5.2	5.3	5.2	—

* The values in this table are reference values. The minimum value is approximately 80% of the displayed value.

Table 233-1

Symbol		Size	11	14	17	20	25	32	40	45	50	58	65
T_1		Nm	0.8	2.0	3.9	7.0	14	29	54	76	108	168	235
		kgfm	0.82	0.2	0.4	0.7	1.4	3.0	5.5	7.8	11	17	24
T_2		Nm	2	6.9	12	25	48	108	196	275	382	598	843
		kgfm	0.2	0.7	1.2	2.5	4.9	11	20	28	39	61	86
Reduction ratio 80 or more	K_1	× 10⁴Nm/rad	0.27	0.47	1	1.6	3.1	6.7	13	18	25	40	54
		kgfm/arc min	0.08	0.14	0.3	0.47	0.92	2.0	3.8	5.4	7.4	12	16
	K_2	× 10⁴Nm/rad	0.34	0.61	1.4	2.5	5.0	11	20	29	40	61	88
		kgfm/arc min	0.1	0.18	0.4	0.75	1.5	3.2	6.0	8.5	12	18	26
	K_3	× 10⁴Nm/rad	0.44	0.71	1.6	2.9	5.7	12	23	33	44	71	96
		kgfm/arc min	0.13	0.21	0.48	0.85	1.7	3.7	6.8	9.7	13	21	29
	θ_1	× 10⁻⁴rad	3	4.1	3.9	4.4	4.4	4.4	4.1	4.1	4.4	4.1	4.4
		arc min	1	1.4	1.3	1.5	1.5	1.5	1.4	1.4	1.5	1.4	1.5
	θ_2	× 10⁻⁴rad	6	12	9.7	11.3	11.1	11.6	11.1	11.1	11.1	11.1	11.3
		arc min	2.2	4.2	3.3	3.9	3.8	4.0	3.8	3.8	3.8	3.8	3.9

* The values in this table are reference values. The minimum value is approximately 80% of the displayed value.

Ratcheting torque

See "Engineering data" for a description of terms.

■ SHG series

Table 233-2
Unit:Nm

Ratio \ Size	14	17	20	25	32	40	45	50	58	65
50	110	190	280	580	1200	2300	3500	—	—	—
80	140	260	450	880	1800	3600	5000	7000	10000	14000
100	100	200	330	650	1300	2700	4000	5300	8300	12000
120	—	150	310	610	1200	2400	3600	4900	7500	10000
160	—	—	280	580	1200	2300	3300	4600	7200	10000

■ SHF series

Table 233-3
Unit:Nm

Ratio \ Size	11	14	17	20	25	32	40	45	50	58
30	—	59	100	170	340	720	—	—	—	—
50	34	88	150	220	450	980	1800	2700	3700	5800
80	—	110	200	350	680	1400	2800	3900	5400	8200
100	43	84	160	260	500	1000	2100	3100	4100	6400
120	—	—	120	240	470	980	1900	2800	3800	5800
160	—	—	—	220	450	980	1800	2600	3600	5600

Buckling torque

See "Engineering data" for a description of terms.

■ SHG series

Table 233-4
Unit: Nm

Size	14	17	20	25	32	40	45	50	58	65
Total reduction ratio	210	420	700	1300	2800	5200	7600	10400	16200	22800

■ SHF series

Table 233-5
Unit: Nm

Size	11	14	17	20	25	32	40	45	50	58
Total reduction ratio	90	140	270	440	890	1750	3750	5400	7500	11800

Checking output bearing

A precision cross roller bearing is built in the unit type to directly support the external load (output flange).
Please calculate maximum moment load, life of cross roller bearing,
and static safety factor to fully maximize the performance of housed unit (gearhead).

See Pages 030 to 034 of "Engineering data" for each calculation formula.

■ Checking procedure

(1) Checking the maximum moment load (Mmax)

Calculate the maximum moment load (Mmax). → Maximum moment load (Mmax) ≤ allowable moment (Mc)

(2) Checking the life

Calculate the radial load (Fav) and the average axial load (Faav). → Calculate the radial load coefficient (x) and the axial load coefficient (y). → Calculate the lifetime

(3) Checking the static safety coefficient

Calculate the static equivalent radial load coefficient (Po). → Check the static safety coefficient. (ls)

■ Output bearing specifications

The specifications of the cross roller are shown in Table 234-1.

Specifications

Table 234-1

Size	Pitch circle dp	Offset R	Basic rated load: Basic dynamic rated load C		Basic rated load: Basic static rated load Co		Allowable moment load Mc		Moment stiffness Km	
	m	m	×10 ^{3}N	kgf	×10 ^{3}N	kgf	Nm	kgfm	×10 ^{4} Nm/rad	kgfm/ arc min
11	0.043	0.018	52.9	540	75.5	770	74	7.6	6.5	1.8
14	0.050	0.0217	58	590	86	880	≒ 74	7.6	8.5	2.5
17	0.060	0.0239	104	1060	163	1670	≒ 124	12.6	15.4	4.6
20	0.070	0.0255	146	1490	220	2250	≒ 187	19.1	25.2	7.5
25	0.085	0.0296	218	2230	358	3660	258	26.3	39.2	11.6
32	0.111	0.0364	382	3900	654	6680	580	59.1	100	29.6
40	0.133	0.044	433	4410	816	8330	849	86.6	179	53.2
45	0.154	0.0475	776	7920	1350	13800	1127	115	257	76.3
50	0.170	0.0525	816	8330	1490	15300	1487	152	351	104
58	0.195	0.0622	874	8920	1710	17500	2180	222	531	158
65	0.218	0.072	1300	13300	2230	22700	2740	280	741	220

* The basic dynamic rated load means a certain static radial load so that the basic dynamic rated life of the roller bearing is a million rotations. The basic static rated load means a static load that gives a certain level of contact stress (4 kN/mm^2) in the center of the contact area between the rolling element receiving the maximum load and the orbit.

* The value of the moment stiffness is the average value.

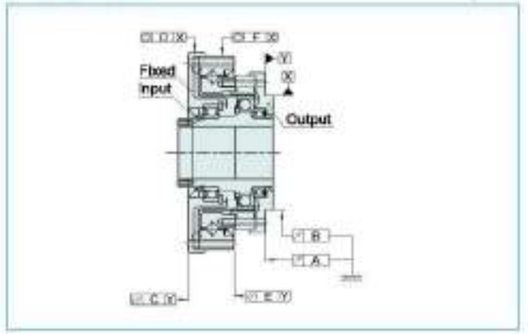
Recommended tolerances for assembly

Recommended tolerances for assembly shown below.

■ Flexspline fixed

Input: Wave generator
Output: Circular spline
Fixed: Flexspline

Hollow Shaft (2UH) Fig. 235-1



Input shaft (2UJ) Fig. 235-2

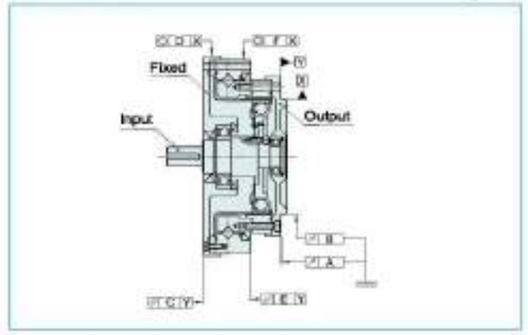


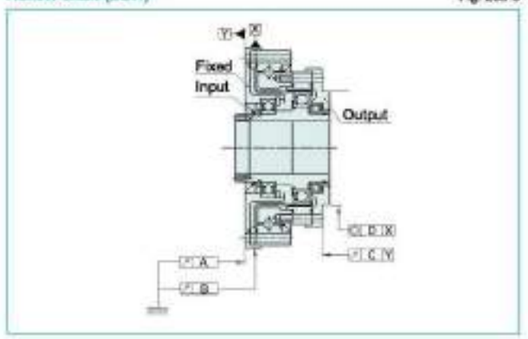
Table 235-1
Unit: mm

Symbol \ Size	11	14	17	20	25	32	40	45	50	58	65
A	0.033	0.033	0.038	0.040	0.046	0.054	0.057	0.057	0.063	0.063	0.067
B	0.035	0.035	0.035	0.039	0.041	0.047	0.050	0.053	0.060	0.063	0.063
C	0.053	0.064	0.071	0.079	0.085	0.104	0.111	0.118	0.121	0.121	0.131
D	0.053	0.053	0.050	0.059	0.061	0.072	0.075	0.078	0.085	0.088	0.089
E	0.039	0.040	0.045	0.051	0.057	0.065	0.071	0.072	0.076	0.076	0.082
F	0.038	0.038	0.038	0.047	0.049	0.054	0.060	0.065	0.067	0.070	0.072

■ Circular spline fixed

Input: Wave generator
Output: Flexspline
Fixed: Circular spline

Hollow shaft (2UH) Fig. 235-3



Input shaft (2UJ) Fig. 235-4

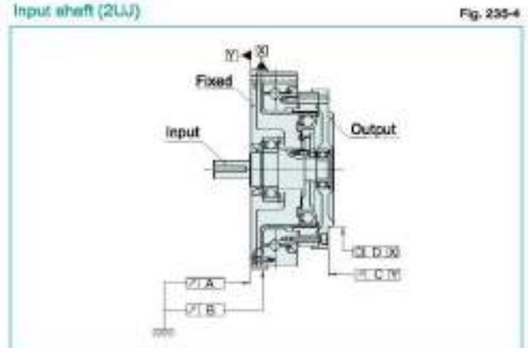


Table 171-2
Unit: mm

Symbol \ Size	11	14	17	20	25	32	40	45	50	58	65
A	0.027	0.037	0.039	0.046	0.047	0.059	0.060	0.070	0.070	0.070	0.076
B	0.031	0.031	0.031	0.038	0.038	0.045	0.048	0.050	0.050	0.050	0.054
C	0.053	0.064	0.071	0.079	0.085	0.104	0.111	0.118	0.121	0.121	0.131
D	0.053	0.053	0.053	0.059	0.061	0.072	0.075	0.078	0.085	0.088	0.089

Rotational direction and reduction ratio of a unit type

The rotational direction and the reduction ratio vary depending on the flange to be fixed for the unit type.

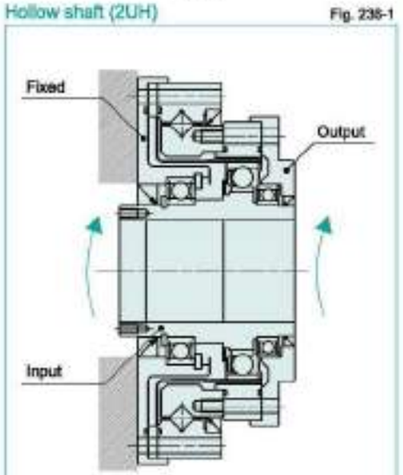
■ Flexspline fixed

Input: Wave generator
Output: Circular spline
Fixed: Flexspline

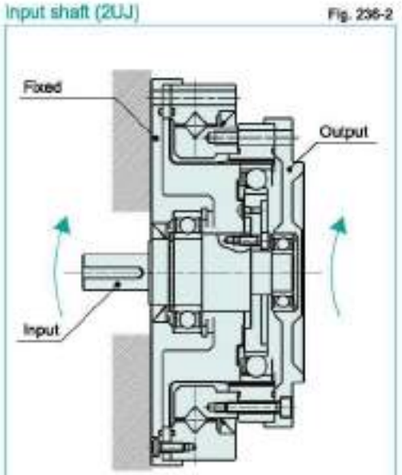
Output rotational direction: Same rotational direction as the input

Reduction ratio (i): $i = \frac{1}{R \div 1}$

Hollow shaft (2UH) Fig. 236-1



Input shaft (2UJ) Fig. 236-2



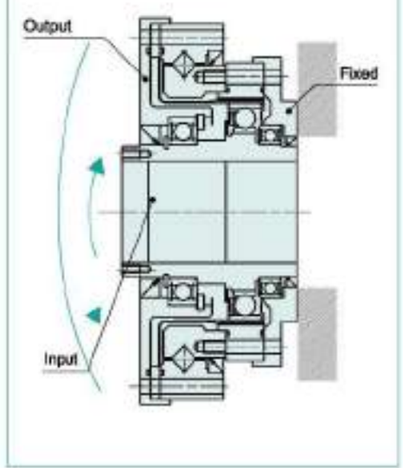
■ Circular spline fixed

Input: Wave generator
Output: Flexspline
Fixed: Circular spline

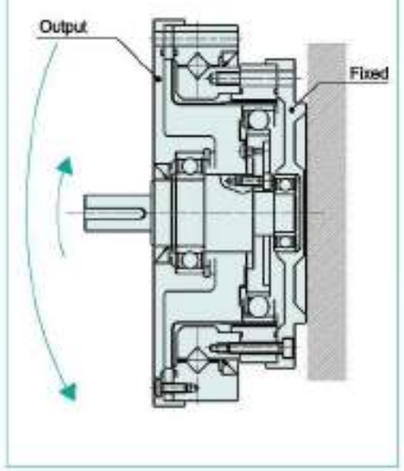
Output rotational direction: Opposite rotational direction to the input

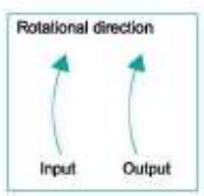
Reduction ratio (i): $i = \frac{-1}{R}$

Hollow shaft (2UH) Fig. 236-3



Input shaft (2UJ) Fig. 236-4





Design Guide

Lubrication

The standard lubricant for Harmonic Drive® gear units is Harmonic Grease SK-1A and SK-2 (Harmonic Grease 4B No.2 for the cross roller bearing). Harmonic Grease 4B No.2 is also available for long-life. The specifications of the grease are described on Page 016.

■ Sealing mechanism

- Rotating and sliding area ..... Oil seal (with a spring). Take care regarding flaws on the shaft.
- Flange mating face and mating ..... O-ring and seal adhesive, distortion on the plane and how the O-ring is engaged.
- Screw hole area ..... Use a screw lock agent (LOCKTITE 242 is recommended) or seal tape.

(Note) If you use Harmonic Grease 4BNo.2, strict sealing is required.

Rust prevention

Although Harmonic Drive® gears come with some corrosion protection, the gear can rust if exposed to the environment. The gear external surfaces typically have only a temporary corrosion inhibitor and some oil applied. If an anti-rust product is needed, please contact us to review the options.

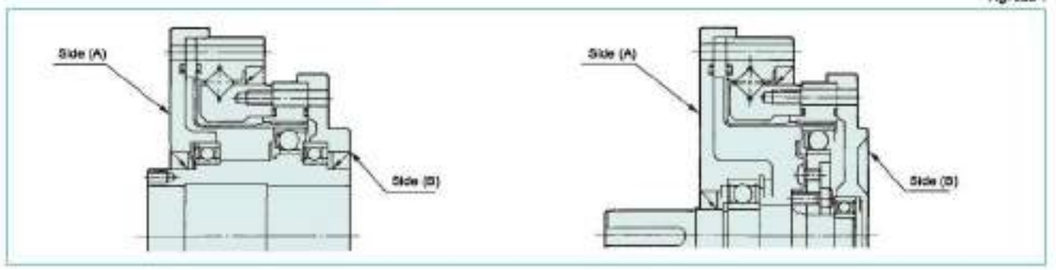
Installation accuracy

For peak performance of the gear, it is essential that the following tolerances be observed when assembly is complete.
Pay careful attention to the following points and maintain the recommended assembly tolerances.
In addition, perform the appropriate installation according to each series, because the torque capacity of SHG series is larger than SHF series.

- Warp and deformation on the mounting surface
- Blocking of foreign matter
- Problems caused by burrs, raised surfaces and location around the tap area of the mounting holes
- Insufficient chamfering on the housing mount
- Insufficient radii on the housing mount

Installation and transmission torque

Fig. 238-1



SHG series: (A) Side-installation and Torque Transmission Capacity

Table 238-1

Item \ Size		14	17	20	25	32	40	45	50	58	65
Number of bolts		8	12	12	12	12	12	18	12	16	16
Bolt size		M3	M3	M3	M4	M5	M6	M6	M8	M8	M10
Pitch circle	mm	64	74	84	102	132	158	180	200	226	258
Clamp torque	Nm	2.4	2.4	2.4	5.4	10.8	18.4	18.4	44	44	74
Transmission torque	Nm	128	222	252	516	1069	1813	3098	4163	6272	9546

SHF series: (A) Side-installation and Torque Transmission Capacity

Table 238-2

Item \ Size		11	14	17	20	25	32	40	45	50	58
Number of bolts		4	8	12	12	12	12	12	18	12	16
Bolt size		M3	M3	M3	M3	M4	M5	M6	M6	M8	M8
Pitch circle	mm	56.4	64	74	84	102	132	158	180	200	226
Clamp torque	Nm	2.0	2.0	2.0	2.0	4.5	9.0	15.3	15.3	37	37
Transmission torque	Nm	47	108	186	206	431	892	1509	2578	3489	5236

(Tables 238-1, 238-2/Notes)
1. The material of the thread must withstand the clamp torque.
2. Recommended bolt: JIS B 1176 socket head cap screw / Strength Range: JIS B 1051 12.9 or more
3. Torque coefficient: K=0.2
4. Clamp coefficient: A=1.4
5. Friction coefficient on the surface contacted: μ=0.15
6. Use washers for SHG/SHF-LW.

SHG series: (B) Side-installation and Torque Transmission Capacity

Table 239-1

Item \ Size		14	17	20	25	32	40	45	50	58	65
Number of bolts		8	16	16	16	16	16	12	16	12	16
Bolt size		M3	M3	M3	M4	M5	M6	M8	M8	M10	M10
Pitch circle	mm	44	54	62	77	100	122	140	154	178	195
Clamp torque	Nm	2.4	2.4	2.4	5.4	10.8	18.36	44	44	89	89
Transmission torque	Nm	88	216	248	520	1080	1867	2914	4274	5927	8658

SHF series: (B) Side-installation and Torque Transmission Capacity

Table 239-2

Item \ Size		11	14	17	20	25	32	40	45	50	58
Number of bolts		8	8	16	16	16	16	16	12	16	12
Bolt size		M3	M3	M3	M3	M4	M5	M6	M8	M8	M10
Pitch circle	mm	37	44	54	62	77	100	122	140	154	178
Clamp torque	Nm	2	2.0	2.0	2.0	4.5	9.0	15.3	37	37	74
Transmission torque	Nm	46	72	176	206	431	902	1558	2440	3587	4910

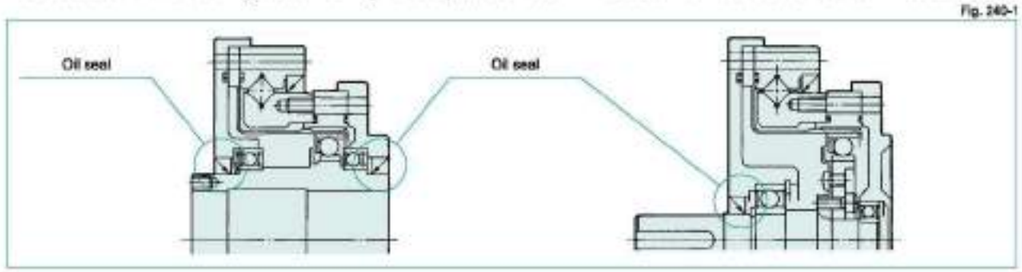
(Table 239-1, 239-2/Notes)
1. The material of the thread must withstand the clamp torque.
2. Recommended bolt: JIS B 1176 hexagonal bolt / Strength: JIS B 1051 12.9 or more
3. Torque coefficient: K=0.2
4. Clamp coefficient A=1.4
5. Friction coefficient on the surface contacted: μ=0.15

Installation Recommendations

■ Installation on the periphery of the oil seal

Install an oil seal on the mounting face so that they have a space of at least 1 mm between them to avoid interference with each other.

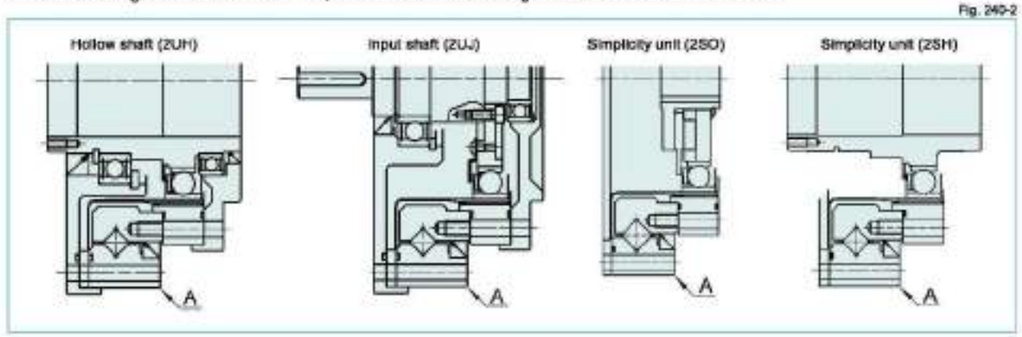
Fig. 240-1



■ Manufacturing for Mating Part and Housing

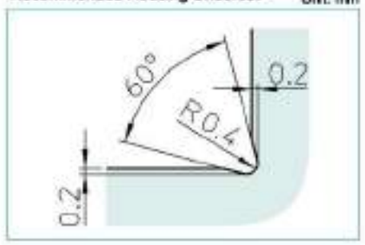
When the housing interferes with corner "A", an undercut in the housing is recommended as shown below.

Fig. 240-2



Recommended Housing Undercut

Fig. 240-3
Unit: mm



Main markets

Industrial robot | Various mechanical equipment

Vertical multi-joint robot

Multi-joint robot

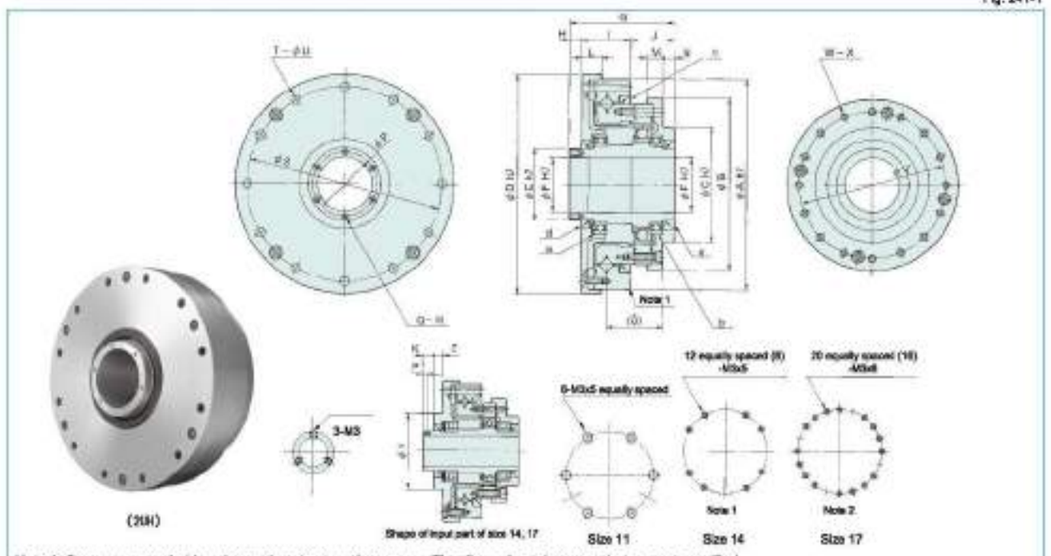
Wafer adsorption handling device

Outline Dimensions (2UH)

Outline dimensions (2UH)

You can download the CAD files from our website: www.3fgearbox.com

Fig. 241-1



Note 1: See recommended housing undercut on previous page. The dimension tolerances that are not specified vary depending on the manufacturing method. Please check the co nfirmation drawing or contact us for dimension tolerances not shown on the drawing.

* Please refer to the confirmation drawing for detailed dimensions.

Dimensions (2UH)

Table 241-1 Unit: mm

Symbol \ Size		11	14	17	20	25	32	40	45	50	58	65
φ A h7		62	70	80	90	110	142	170	190	214	240	276
φ B	SHG/SHF Series	45.3	54	64	75	90	115	140	160	175	201	221
	SHG/SHF-LW Series	—	52	62	73	88	115	140	160	168	195	213
φC h7		30.5	36	45	50	60	85	100	120	130	150	160
φD h7		64	74	84	95	115	147	175	195	220	248	284
φE h7		18	20	25	30	38	45	59	64	74	84	96
φF H7		14	14	19	21	29	36	46	52	60	70	80
G		48	52.5	58.5	51.5	55.5	65.5	79	85	93	106	128
H		14	12	12	5	6	7	8	8	9	10	14
I		19	20.5	23	25	26	32	38	42	45	52	56.5
J		15	20	21.5	21.5	23.5	26.5	33	35	39	44	57.5
K		6.5	6.5	6.5	—	—	—	—	—	—	—	—
L		8	9	10	10.5	10.5	12	14	15	16	17	18
M	SHG/SHF Series	6.5	8	8.5	9	8.5	9.5	13	12	12	15	19.5
	SHG/SHF-LW Series	—	11.5	12	13.5	15.5	20.5	25	27	30	35	42.5
N		6.5	7.5	8.5	7	6	5	7	7	7	7	12
O		17.5	21.7	23.9	25.5	29.6	36.4	44	47.5	52.5	62.2	72
φP (P)		—	(2.5)	(2.5)	25.5	33.5	40.5	52	58	67	77	88
Q		—	3	3	6	6	6	6	6	6	8	6
R		—	M3	M3	M3×6	M3×6	M3×6	M4×8	M4×8	M4×8	M4×8	M5×10
φS		56.4	64	74	84	102	132	158	180	200	226	258
T		4	8	12	12	12	12	12	18	12	16	16
φU		3.5	3.5	3.5	3.5	4.5	5.5	6.6	6.6	9	9	11
φV		37	44	54	62	77	100	122	140	154	178	195
W		6	12 E.A. 8	20 E.A. 16	16	16	16	16	12	16	12	16
X	SHG/SHF Series	M3X5	M3×5	M3×6	M3×6	M4×7	M5×8	M6×10	M8×10	M8×11	M10×15	M10×15
		φ3.4X4	φ3.5×11.5	φ3.5×12	φ3.5×13.5	φ4.5×15.5	φ5.5×20.5	φ6.6×25	φ9×28	φ9×30	φ11×35	φ11×42.5
	SHG/SHF-LW Series	—	M3×5	M3×6	M3×6	M4×7	M5×8	M6×10	M8×10	M8×11	M10×15	M10×15
		—	φ3.5×11.5	φ3.5×12	φ3.5×13.5	φ5×15.5	φ6×20.5	φ7×25	φ9×27	φ9×30	φ11×35	φ11×42.5
φY		36	36	45	—	—	—	—	—	—	—	—
Z		7.5	5.5	5.5	—	—	—	—	—	—	—	—
a		6804 ZZ	6804 ZZ	6806 ZZ	6806 ZZ	6808 ZZ	6809 ZZ	6812 ZZ	6813 ZZ	6815 ZZ	6817 ZZ	6820 ZZ
b	SHG/SHF Series	6704 ZZ	6804 ZZ	6805 ZZ	6806 ZZ	6808 ZZ	6809 ZZ	6812 ZZ	6813 ZZ	6815 ZZ	6817 ZZ	6820 ZZ
	SHG/SHF-LW Series	—	6804 ZZ	6805 ZZ	6806 ZZ	6808 ZZ	6809 ZZ	6812 ZZ	6813 ZZ	6815 ZZ	6817 ZZ	6820 ZZ
c		D41.960.95	D49585	D59685	D59785	D64945	D1101226	D1321467	D1521707	D1681868	D1932129	D21823811
d	SHG/SHF Series	S18274	S20304.5	S25356	S30405	S38475	S45607	S60789	S658510	S759510	S8511012	S10012513
	SHG/SHF-LW Series	—	S20304.5	S25356	S30405	S38475	S45607	S60789	S658510	S759510	S8511012	S10012513
e	SHG/SHF Series	S18274	S20304.5	S25356	S30405	S38475	S45555	S59685	S59685	S69785	S84945	S861128
	SHG/SHF-LW Series	—	S20304.5	S25356	S30405	S38475	S45555	S59685	S59685	S69785	S84945	S861128

Mass (2UH)

Table 242-1 Unit: kg

Symbol \ Size	11	14	17	20	25	32	40	45	50	58	65
2UH	0.53	0.71	1.00	1.38	2.1	4.5	7.7	10.0	14.5	20.0	28.5
2UH-LW (Lightweight)	—	0.55	0.8	1.1	1.6	3.6	6.2	8	11.8	16.4	23.3

Moment of Inertia (2UH)

Table 242-2

Symbol \ Size			11	14	17	20	25	32	40	45	50	58	65
Moment of Inertia	I	× 10⁻⁴kgm²	0.080	0.091	0.193	0.404	1.070	2.85	9.26	13.8	25.2	49.5	94.1
	J	× 10⁻⁴kgfms²	0.082	0.093	0.197	0.412	1.090	2.91	9.47	14.1	25.7	50.5	96.0

Starting torque (2UH)

See "Engineering data" for a description of terms. Please use as reference values; the values vary based on use conditions.

Table 242-3 Unit: Ncm

Ratio \ Size	11	14	17	20	25	32	40	45	50	58	65
30	—	11	30	43	64	112	—	—	—	—	—
50	7.1	8.8	27	36	56	85	136	165	216	297	—
80	—	7.5	25	33	50	74	117	138	179	244	314
100	5.9	6.9	24	32	49	72	112	131	171	231	297
120	—	—	24	31	48	68	110	126	165	223	287
160	—	—	—	31	47	67	105	122	156	213	276

Backdriving torque (2UH)

See "Engineering data" for a description of terms. Please use as reference values; the values vary based on use conditions.

Table 242-4 Unit: Nm

Ratio \ Size	11	14	17	20	25	32	40	45	50	58	65
30	—	5.4	17	23	35	57	—	—	—	—	—
50	4.6	5.3	16	22	34	51	82	99	129	178	—
80	—	7.2	24	31	48	70	112	133	172	234	301
100	7.6	6.2	29	38	59	86	134	156	205	278	356
120	—	—	34	45	69	97	158	182	237	322	413
160	—	—	—	59	90	128	201	233	299	406	530

Continuous Operating Time (2UH)

The internal temperature rises due to the effect of the oil seal and the supporting bearing used for the input shaft (high-speed rotation side) for SHF-2UH. Observe the operating time shown in Table 246-2 for continuous operation.
The operating time shown in Table 246-2 is calculated based on the time required for the temperature inside the unit to rise to 80°C and for the oil seal temperature to rise to 100°C. Take care not to exceed the temperature given above in conducting continuous operation. The following review will be necessary if the temperature exceeds the value given above.
Contact us in such an event.

- Change of timing to replace lubricant
- Change of lubricant
- Measures against lubricant leakage accompanied by the pressure rise inside the unit
- Measures against deterioration due to heat on the oil seal area

Continuous operating time

Table242-5

Size \ Operating time	Continuous operating time at no-load operation (min)	Continuous operating time at the rated load (min)
11	90	80
14	90	60
17	90	60
20	90	60
25	60	45
32	45	35
40	40	30
45	35	25
50	30	20
58	20	15
65	15	10

* Contact us as the continuous operating time may vary significantly depending on the operating condition.

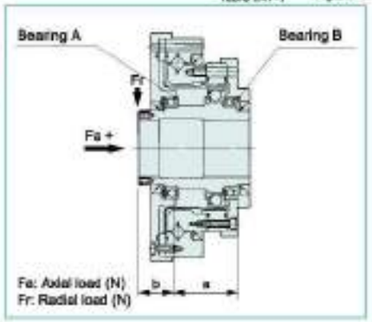
Performance Data for the Input Bearing for Hollow Shaft (2UH)

The internal temperature rises due to the effect of the oil seal and the supporting bearing used for the input shaft (high-speed rotation side) for SHF-2UH. Observe the operating time shown in Table 246-2 for continuous operation. The operating time shown in Table 246-2 is calculated based on the time required for the temperature inside the unit to rise to 80°C and for the oil seal temperature to rise to 100°C. Take care not to exceed the temperature given above in conducting continuous operation. The following review will be necessary ifthe temperature exceeds the value given above. Contact us insuch an event.

Input bearing specifications

Table 247-1 Fig 247-1

Size	Bearing A			Bearing B			a	b	Maximun radial load
	Model	Basic dynamic rated load Cr(N)	Basic static rated load Cor(N)	Model	Basic dynamic rated load Cr(N)	Basic static rated load Cor(N)	(mm)	(mm)	Fr(N)
11	6804ZZ	4000	2470	6704ZZ	1400	720	25.7	15.5	—
14	6804ZZ	4000	2470	6804ZZ	4000	2470	27	16.5	230
17	6805ZZ	4300	2950	6805ZZ	4300	2950	29	17.5	250
20	6806ZZ	4500	3450	6806ZZ	4500	3450	27	15.5	275
25	6808ZZ	4900	4350	6808ZZ	4900	4350	29.5	16.5	250
32	6809ZZ	14100	10900	6809ZZ	5350	5250	33	23	770
40	6812ZZ	19400	16300	6812ZZ	11500	10900	39.5	27.5	1060
45	6813ZZ	17400	16100	6813ZZ	11900	12100	44	28.5	900
50	6815ZZ	24400	22600	6815ZZ	12500	13900	49	31.5	1370
58	6817ZZ	32000	29600	6817ZZ	18700	20000	56.2	36.5	1720
65	6820ZZ	42600	36500	6820ZZ	19600	21200	67	44.5	2300

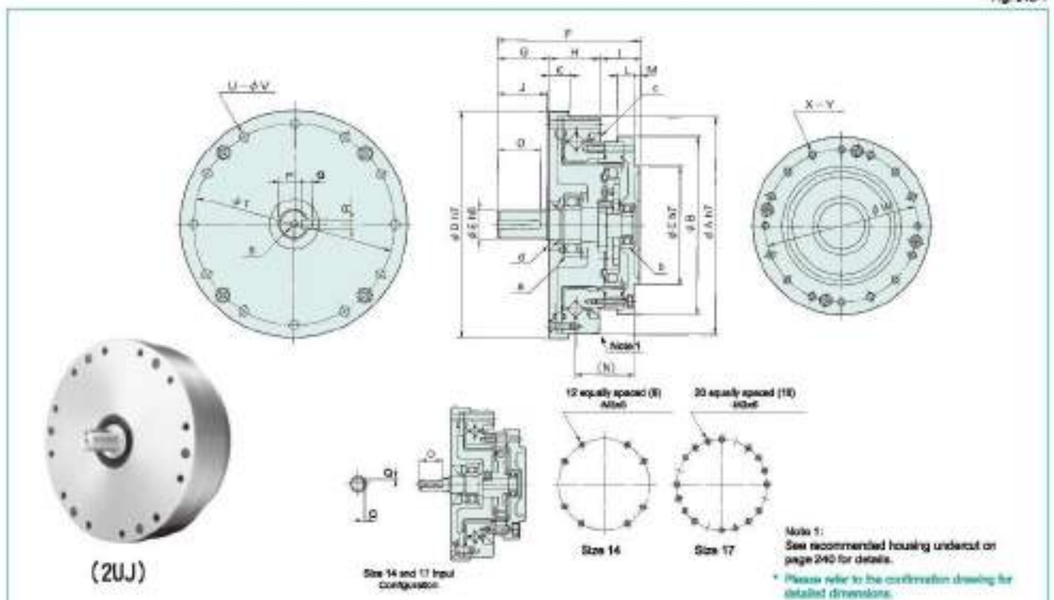


Outline Dimensions (2UJ)

Outline Dimensions (2UJ)

You can downlcad the CAD files from our website: www.shfgearbox.com

Fig. 248-1



Note 1:
See recommended housing undercut on page 240 for details.

* Please refer to the confirmation drawing for detailed dimensions.

Dimensions (2UJ)

Table 248-1 Unit: mm

Symbol \ Size	14	17	20	25	32	40	45	50	58	65
φA h7	70	80	90	110	142	170	190	214	240	276
φB	54	64	75	90	115	140	160	175	201	221
φC h7	36	46	50	60	85	100	120	130	150	160
φD h7	74	84	95	115	147	175	195	220	246	284
φE h6	6	8	10	14	14	16	19	22	22	25
F	50.5	56	63.5	72.5	84.5	100	108	121	133	156
G	15	17	21	26	26	31	31	37	37	42
H	20.5	23	25	26	32	38	42	45	52	56.5
I	15	16	17.5	20.5	26.5	31	35	39	44	57.5
J	14	16	20	25	25	30	30	35	35	40
K	9	10	10.5	10.5	12	14	15	16	17	18
L	6	8.5	9	8.5	9.5	13	12	12	15	19.5
M	2.5	3	3	3	5	5	7	7	7	12
N	21.7	23.9	25.5	29.6	36.4	44	47.5	52.5	62.2	72
O	11	12	16.5	22.5	22.5	27.5	28	33	33	39
P	—	—	8.2 $^{+0.3}_{0}$	11 $^{+0.3}_{0}$	11 $^{+0.3}_{0}$	13 $^{+0.3}_{0}$	15.5 $^{+0.3}_{0}$	18.5 $^{+0.3}_{0}$	18.5 $^{+0.3}_{0}$	21 $^{+0.3}_{0}$
Q	0.5	0.5	3 $^{+0.05}_{+0.03}$	5 $^{+0.05}_{+0.03}$	5 $^{+0.05}_{+0.03}$	5 $^{+0.05}_{+0.03}$	6 $^{+0.05}_{+0.03}$	6 $^{+0.05}_{+0.03}$	6 $^{+0.05}_{+0.03}$	7 $^{+0.05}_{+0.03}$
R	—	—	3 $^{+0.05}_{+0.03}$	5 $^{+0.05}_{+0.03}$	5 $^{+0.05}_{+0.03}$	5 $^{+0.05}_{+0.03}$	6 $^{+0.05}_{+0.03}$	6 $^{+0.05}_{+0.03}$	6 $^{+0.05}_{+0.03}$	8 $^{+0.05}_{+0.03}$
S	—	—	M3×6	M5×10	M5×10	M5×10	M6×12	M6×12	M6×12	M8×16
φT	64	74	84	102	132	158	180	200	226	258
U	8	12	12	12	12	12	18	12	16	16
φV	3.5	3.5	3.5	4.5	5.5	6.6	6.6	9	9	11
φW	44	54	62	77	100	122	140	154	178	195
X	12 E.A. 8	20 E.A. 16	16	16	16	16	12	16	12	16
Y	M3×5	M3×6	M3×6	M4×7	M5×8	M6×10	M8×10	M8×11	M10×15	M10×15
	φ3.5×11.5	φ3.5×12	φ3.5×13.5	φ4.5×15.5	φ5.5×20.5	φ6.8×25	φ9×28	φ9×30	φ11×35	φ11×42.5
a	698 ZZ	6900 ZZ	6902 ZZ	6002 ZZ	6004 ZZ	6006 ZZ	6205 ZZ	6207 ZZ	6208 ZZ	6209 ZZ
b	695 ZZ	697 ZZ	698 ZZ	6900 ZZ	6902 ZZ	6003 ZZ	6004 ZZ	6005 ZZ	6006 ZZ	6007 ZZ
c	D49585	D59685	D69785	D84945	D1101226	D1321467	D1521707	D1681868	D1932129	D21823811
d	G8184	D10205	D15255	D15255	D20355	D30457	D30457	D35557	D40607	D45807

Mass (2UJ)

Table 249-1
Unit: kg

Symbol \ Size	14	17	20	25	32	40	45	50	58	65
Mass (kg)	0.66	0.94	1.38	2.1	4.4	7.3	9.8	13.9	19.4	26.5

Moment of Inertia (2UJ)

Table 249-2

Symbol \ Size			14	17	20	25	32	40	45	50	58	65
Moment of inertia	I	×10⁻⁴kgm²	0.025	0.059	0.137	0.320	1.20	3.41	5.80	9.95	20.5	35.5
	J	×10⁻⁴kgfms²	0.026	0.060	0.140	0.327	1.22	3.48	5.92	10.2	20.9	36.2

Starting torque (2UJ)

See "Engineering data" for a description of terms. Please use as reference values; the values vary based on use conditions.

Table 249-3
Unit: Ncm

Ratio \ Size	14	17	20	25	32	40	45	50	58	65
30	6.8	11	19	26	53	—	—	—	—	—
50	5.7	9.7	14	22	41	72	94	125	176	—
80	4.4	7.2	11	15	29	52	68	88	125	163
100	3.7	6.5	9.9	14	27	47	60	80	113	147
120	—	6.2	9.3	13	24	44	55	74	105	137
160	—	—	8.6	12	23	39	50	66	94	122

Backdriving torque (2UJ)

See "Engineering data" for a description of terms. Please use as reference values; the values vary based on use conditions.

Table 249-4
Unit: Nm

Ratio \ Size	14	17	20	25	32	40	45	50	58	65
30	3.5	5.9	10	16	31	—	—	—	—	—
50	3.4	5.8	8.4	13	25	43	56	75	107	—
80	4.2	6.9	10	15	28	50	65	85	120	154
100	4.5	7.8	12	17	33	56	72	96	135	176
120	—	8.9	13	19	34	63	79	106	151	198
160	—	—	17	23	43	75	96	126	181	235

Performance Data for the Input bearing (2UJ)

The input shaft of the 2UJ is supported by two single-row deep-groove bearings. For peak performance of the SHF-2UJ it is essential that the following Specification for Input Bearing be observed -Figure 254-1 shows the points of application of forces. See Table 254-1 for the dimensions (a) and (b). Graphs 254-1 and 254-2 show the Maximum Allowable Radial and Axial Loads. The values in Graph 254-1 and 254-2 are based on an average input speed of 2,000 rpm and a mean bearing life of L10=7,000h.

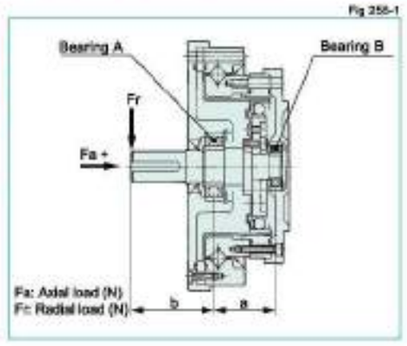
Example: If the input shaft of a SHF-40-2UJ unit is subjected to an axial load (Fa) of 500 N. The maximum allowable radial force will be 400 N.

Input bearing specifications

Table 254-1

Size	Bearing A			Bearing B			a	b	Maximum radial load
	Model	Basic dynamic rated load Cr(N)	Basic static rated load Cor(N)	Model	Basic dynamic rated load Cr(N)	Basic static rated load Cor(N)	(mm)	(mm)	Fr(N)
14	696ZZ	2240	910	695ZZ	1080	430	20	14	110
17	6900ZZ	2700	1270	697ZZ	1610	710	23.5	21	135
20	6902ZZ	4350	2260	698ZZ	2240	910	26.5	23.3	210
25	6002ZZ	5600	2830	6900ZZ	2700	1270	28	28	270
32	6004ZZ	9400	5000	6902ZZ	4350	2260	38	27	490
40	6006ZZ	13200	8300	6003ZZ	6000	3250	43	32.5	660
45	6205ZZ	19500	11300	6004ZZ	9400	5000	47.5	34.5	1030
50	6207ZZ	25700	15300	6005ZZ	10100	5850	53	39	1330
58	6208ZZ	29100	17800	6006ZZ	13200	8300	62.5	40	1600
65	6209ZZ	32500	20600	6007ZZ	16000	10300	79	63	1690

Fig 258-1

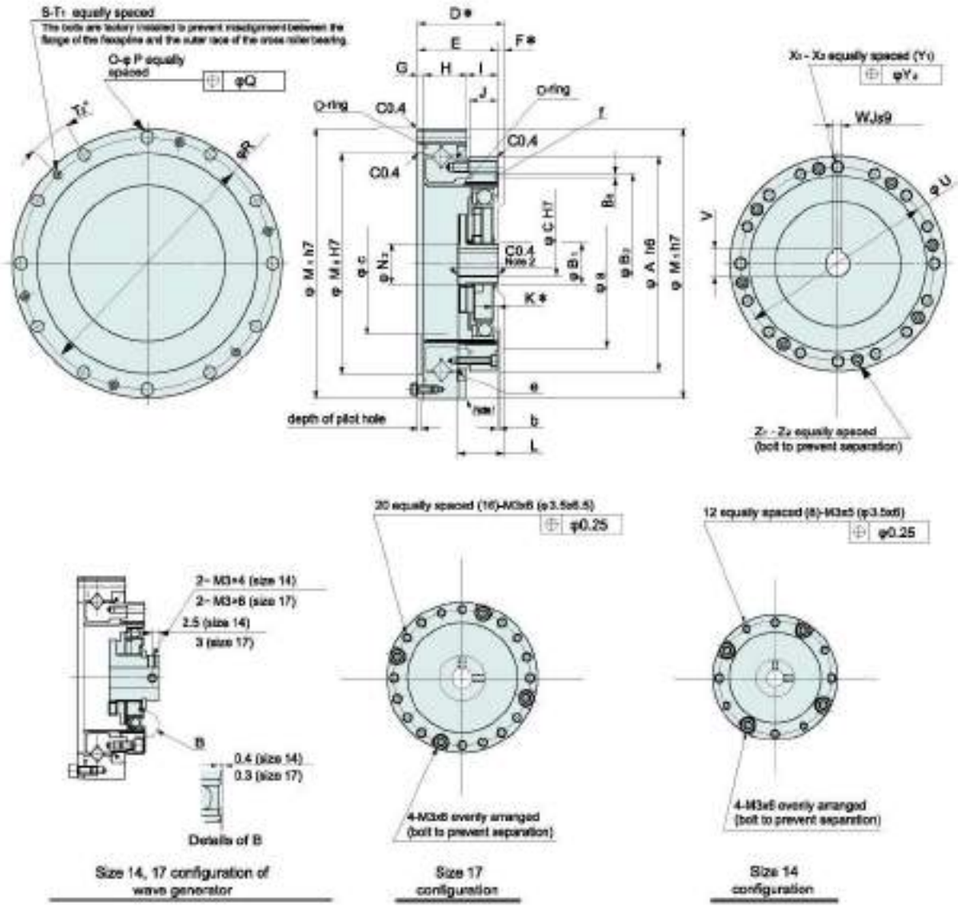


Outline Dimensions(2SO、2SH)

Outline Dimensions (2SO)

You can download the CAD files from our website: www.3fgearbox.com

Fig. 255-1



Size 14, 17 configuration of wave generator

Size 17 configuration

Size 14 configuration

(2SO/2SH)

Note 1: See undercutting the housing on Page 240 for details.
Note 2: For size 14, C0.5.

* Refer to the confirmation drawing for detailed dimensions.
* See Fig. 084-2 on Page 084 for the configurations of the wave generator.

Dimensions (2SO)

Table 256-1
Unit : mm

Symbol \ SIZE		14	17	20	25	32	40	45	50	58	65
φA h6		50	60	70	85	110	135	155	170	195	215
φB₁		14	18	21	26	26	32	32	32	40	48
φB₂		—	—	—	—	—	—	128	141	163	180.4
φB₃		—	—	—	—	—	—	2.7	2.7	2.7	2.7
φC	Standard (H7)	6	8	9	11	14	14	19	19	22	24
	Max. dimen.	8	10	13	15	15	20	20	20	25	30
D*	SHF Series	28.5 $^{0}_{-0.2}$	32.5 $^{0}_{-0.2}$	33.5 $^{0}_{-0.2}$	37 $^{0}_{-0.2}$	44 $^{0}_{-0.2}$	53 $^{0}_{-0.2}$	58 $^{0}_{-0.2}$	64 $^{0}_{-0.2}$	75.5 $^{0}_{-0.2}$	—
	SHG Series	28.5 $^{0}_{-0.2}$	32.5 $^{0}_{-0.2}$	33.5 $^{0}_{-0.2}$	37 $^{0}_{-0.2}$	44 $^{0}_{-0.2}$	53 $^{0}_{-0.2}$	58 $^{0}_{-0.2}$	64 $^{0}_{-0.2}$	75.5 $^{0}_{-0.2}$	83 $^{0}_{-0.2}$
E		23.5	26.5	29	34	42	51	56.5	63	73	81.5
F*		5	6	4.5	3	2	2	1.5	1	2.5	1.5
G		2.4	3	3	3.3	3.6	4	4.5	5	5.8	6.5
H		14.1	16	17.5	18.7	23.4	29	32	34	40.2	43
I		7	7.5	8.5	12	15	18	20	24	27	32
J		6	6.5	7.5	10	14	17	19	22	25	29
K*	SHF Series	0.4	0.3	0.1	2.1	2.5	3.3	3.7	4.2	4.8	—
	SHG Series	1.4	1.8	1.5	3.5	4.2	5.6	6.3	7	8.2	9.5
L	SHF Series	17.6 $^{0}_{-0.2}$	19.5 $^{0}_{-0.2}$	20.1 $^{0}_{-0.2}$	20.2 $^{0}_{-0.2}$	22 $^{0}_{-0.2}$	27.5 $^{0}_{-0.2}$	27.9 $^{0}_{-0.2}$	32 $^{0}_{-0.2}$	34.9 $^{0}_{-0.2}$	—
	SHG Series	18.5 $^{0}_{-0.2}$	20.7 $^{0}_{-0.2}$	21.5 $^{0}_{-0.2}$	21.5 $^{0}_{-0.2}$	23.6 $^{0}_{-0.2}$	29.7 $^{0}_{-0.2}$	30.5 $^{0}_{-0.2}$	34.8 $^{0}_{-0.2}$	38.3 $^{0}_{-0.2}$	44.6 $^{0}_{-0.2}$
φM₁ h7		70	80	90	110	142	170	190	214	240	276
φM₂ H7		48	60	70	88	114	140	158	176	203	232
φN₂		—	—	—	—	—	32	—	32	—	48
O		8	12	12	12	12	12	18	12	16	16
φP		3.5	3.5	3.5	4.5	5.5	6.6	6.6	9	9	11
φQ		0.25	0.25	0.25	0.25	0.25	0.3	0.3	0.5	0.5	0.5
φR		64	74	84	102	132	158	180	200	226	258
S		2	4	4	4	4	6	6	6	8	8
T₁		M3×6	M3×6	M3× 8	M3× 8	M4× 8	M4× 10	M4× 8	M5× 12	M5× 12	M6× 16
T₂(angle)		22.5°	15°	15°	15°	15°	15°	10°	15°	11.25°	11.25°
φU		44	54	62	77	100	122	140	154	178	196
V		—	—	10.4	12.8	16.3	16.3	21.8	21.8	24.8	27.3
W Js9		—	—	3	4	5	5	6	6	6	8
X₁		12 E. A. 8	12E. A. 16	16	16	16	16	12	16	12	16
X₂		M3×5	M3×6	M3× 6	M4× 7	M5× 8	M6× 10	M8× 10	M8× 11	M10× 15	M10× 15
Y₁		φ3.5×6	φ3.5×6.5	φ 3.5× 7.5	φ 4.5× 10	φ 5.5× 14	φ 6.6× 17	φ 9× 19	φ 9× 22	φ 11× 25	φ 11× 29
Y₂		0.25	0.25	0.25	0.25	0.25	0.3	0.5	0.5	0.5	0.5
Z₁		4	4	4	4	4	4	4	8	6	8
Z₂		M3×6	M3×6	M3× 8	M3× 10	M4× 16	M5× 20	M5× 20	M5× 25	M6× 25	M6× 30
Minimum housing clearance	φa	38	45	53	66	86	106	119	133	154	172
	b	1	1	1.5	1.5	1.5	2	2	2	2.5	2.5
	φc	31	38	45	56	73	90	101	113	131	150
	d	1.7	2.1	2	2	2	2	2.3	2.5	2.9	3.5
	e	D49585	D59665	D69785	D84945	D1101225	D1321467	D1521707	D1681865	D1932129	D21023811
	f	—	—	—	—	—	—	d1 121.5 d2 2.0	S135	d1 157.0 d2 2.0	S175

- The following dimensions can be modified to accommodate customer-specific requirements.

  Wave Generator : C
  Flexspline : O and P
  Circular Spline : X1 and X2

- *The D, F and K values indicate relative position of individual gearing components (wave generator, flexpline, circular spline). Please strictly adhere to these values when designing your housing and mating parts.
- Please note that the circular spline face of sizes 14 through 40 does not incorporate an O-ring groove. Please provide alternate sealing arrangements.
- Due to the deformation of the Flexspline during operation, it is necessary to provide a minimum housing clearance, dimensions φa, b, c.

Wave generator is removed when the product is delivered.

Mass (2SO)

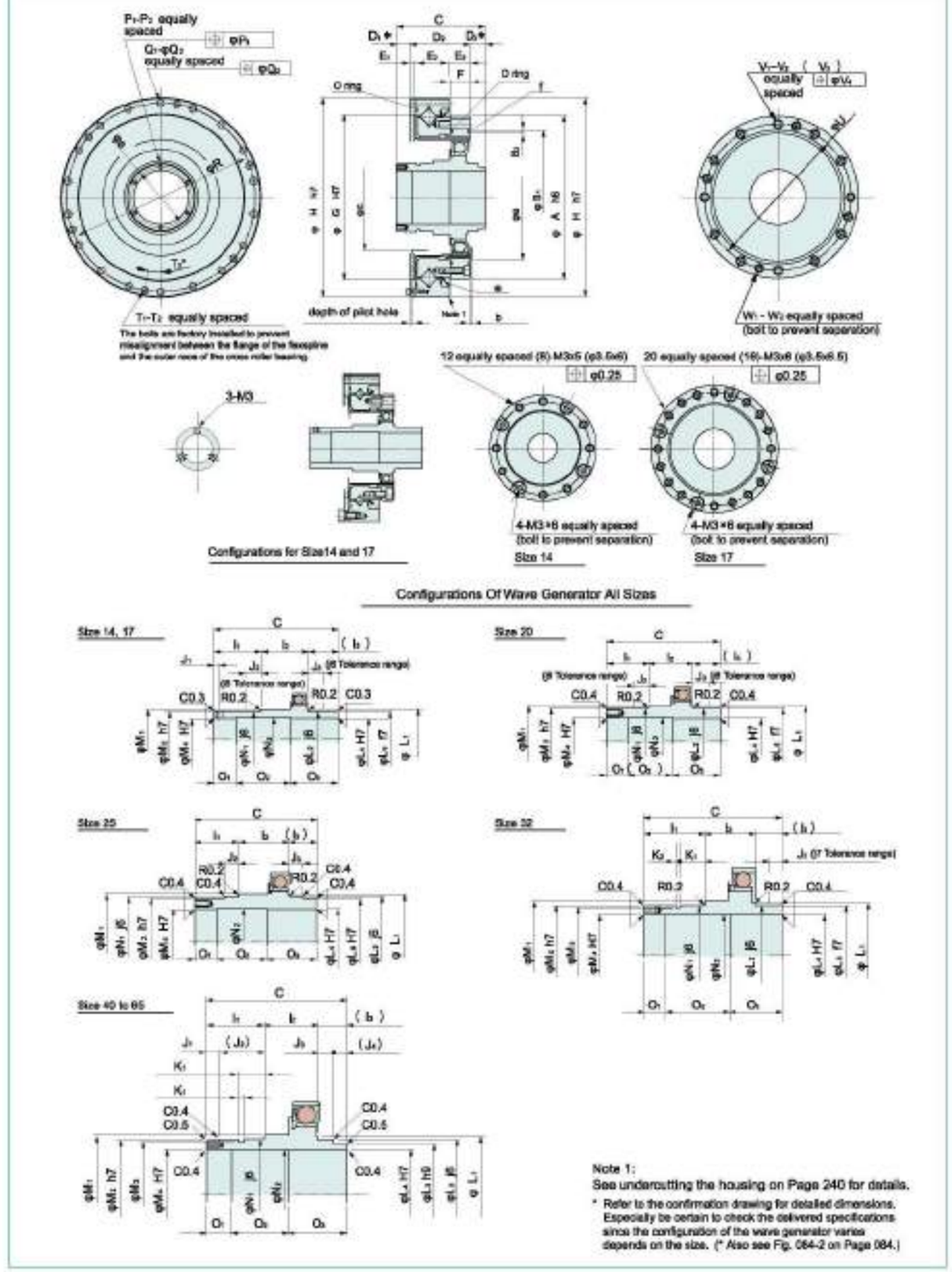
Table 256-2
Unit: kg

Symbol \ Size	14	17	20	25	32	40	45	50	58	65
Mass (kg)	0.41	0.57	0.81	1.31	2.94	5.1	6.5	9.6	13.5	19.5

Outline Dimensions (2SH)

You can download the CAD files from our website: www.hfgearbox.com

Fig. 257-1



Note 1:
See undercutting the housing on Page 240 for details.

* Refer to the confirmation drawing for detailed dimensions. Especially be certain to check the delivered specifications since the configuration of the wave generator varies depends on the size. (* Also see Fig. 084-2 on Page 084.)

Dimensions (2SH)

Table 258-1
Unit : mm

Symbol	Size	14	17	20	25	32	40	45	50	58	65
	φA h6	50	60	70	85	110	135	155	170	195	215
	φB1	—	—	—	—	—	—	128	141	163	180.4
	B3	—	—	—	—	—	—	2.7	2.7	2.7	2.7
	C	52.5 ±0.1	56.5 ±0.1	51.5 ±0.1	55.5 ±0.1	65.5 ±0.1	79 ±0.1	85 ±0.1	93 ±0.1	108 ±0.1	128 ±0.1
	D1* SHF	16 +0.07 +0.02	16 +0.08 +0.03	9.5 +0.05 +0.01	10 +0.1 +0.1	12 +0.1 +0.1	13 +0.1 +0.1	13.5 +0.1 +0.1	15 +0.1 +0.1	16 +0.1 +0.1	21 +0.1 +0.1
	D1* SHG	16 +0.04 +0.01	16 +0.05 +0.02	9.5 +0.04 +0.01	10 +0.05 +0.05	12 +0.05 +0.05	13 +0.05 +0.05	13.5 +0.05 +0.05	15 +0.05 +0.05	16 +0.05 +0.05	21 +0.05 +0.05
	D2	23.6	26.6	29	34	42	51	58.5	63	73	81.5
	D3*	13	14	13	11.5	11.5	15	15	15	17	25.5
	E1	2.4	3	3	3.3	3.6	4	4.5	5	5.8	6.5
	E2	14.1	16	17.5	18.7	23.4	29	32	34	40.2	43
	E3	7	7.5	8.5	12	15	18	20	24	27	32
	F	6	6.5	7.5	10	14	17	19	22	25	29
	φG H6	48	60	70	88	114	140	158	175	203	232
	φH h8	70	80	90	110	142	170	190	214	240	276
Wave generator dimensions	J1	20 ±0.1	21.5 ±0.1	19 ±0.1	20 ±0.1	29 ±0.1	34 ±0.1	35 ±0.1	39.5 ±0.1	45.3 ±0.1	54.5 ±0.1
	J2	20 ±0.1	21.5 ±0.1	20 ±0.1	22.5 ±0.1	23.5 ±0.1	28 ±0.1	32.5 ±0.1	36 ±0.1	40.7 ±0.1	—
	J3	(12.5)	(13.5)	(12.5)	(13)	(13)	(17)	(17.5)	(17.5)	(20)	—
	J4	2.5	2.5	—	—	—	—	6	6	10	14
	J5	7	7	7	6.5	—	—	(27)	(30.5)	(35.3)	(40.5)
	J6	7	7	7	6.5	—	9.5	9.5	9.5	12.5	11.5
	J7	—	—	—	—	—	(7.5)	(8)	(8)	(7.5)	(11.5)
	K1	—	—	—	—	13.9	15.1	15.6	18.6	21.1	23.1
	K2	—	—	—	—	1.9	2.2	2.7	2.7	3.2	3.1
	φL1	22	27	32	42	47	62	69	79	90	106
	φL2 j8	20	25	30	40	45	60	65	75	85	100
	φL3 h9	—	—	—	38	—	59	59	69	84	96
	φL4 H7	14	19	21	29	36	46	52	60	70	80
	φL5 f7	20	25	30	—	45	—	—	—	—	—
	φM1	22	27	32	42	49	65	70	80	91.5	111
	φM2 h7	20	25	30	38	45	59	64	74	84	96
	φM3	—	—	—	—	42.5	57	62	72	81.5	96.5
	φM4 H7	14	19	21	29	36	46	52	60	70	80
	φN1 j6	20	25	30	40	45	60	65	75	85	100
	φN2	14.5	19.5	21.5	29.5	36.5	46.5	52.5	60.5	70.5	80.5
	O1	10	10	10	10	10	12	15	15	15	20
	O2	22.5	24.5	(19.5)	22.5	(30.5)	(35)	35	41	48	54
	O3	20	22	22	23	25	32	35	37	43	54
	P1	3	3	6	6	6	6	6	6	8	6
	P2	M3	M3	M3×6	M3×6	M3×5	M4×8	M4×8	M4×8	M4×8	M5×10
	φP3	—	—	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
	Q1	8	12	12	12	12	12	16	12	16	16
	φQ2	3.5	3.5	3.5	4.5	5.5	6.6	6.6	9	9	11
	φQ3	0.25	0.25	0.25	0.25	0.25	0.3	0.3	0.5	0.5	0.5
	φR	64	74	84	102	132	158	180	200	228	258
	φS	—	—	25.5	33.5	40.5	52	58	67	77	88
	T1	2	4	4	4	4	6	6	6	8	8
	T2	M3×6	M3×6	M3×6	M3×6	M4×6	M4×10	M4×10	M5×12	M5×12	M6×16
	T3 (angle)	22.5°	15°	15°	15°	15°	15°	10°	15°	11.25°	11.25°
	φU	44	54	62	77	100	122	140	154	178	195
	V1	12 E.A.8	20 E.A.16	16	16	16	16	12	16	12	16
	V2	M3×5	M3×6	M3×6	M4×7	M5×8	M6×10	M8×10	M8×11	M10×15	M10×15
	V3	φ3.5×6	φ3.5×6.5	φ3.5×7.5	φ4.5×10	φ5.5×14	φ6.6×17	φ9×19	φ9×22	φ11×25	φ11×29
	V4	0.25	0.25	0.25	0.25	0.25	0.3	0.5	0.5	0.5	0.5
	W1	4	4	4	4	4	4	4	8	6	8
	W2	M3×6	M3×6	M3×3	M3×10	M4×16	M5×20	M5×20	M5×25	M6×25	M6×30
Minimum housing clearance	φa	38	45	53	66	86	106	119	133	154	172
	b	1	1	1.5	1.5	1.5	2	2	2	2.5	2.5
	φc	31	38	45	56	73	90	101	113	131	150
	d	1.7	2.1	2	2	2	2	2.3	2.5	2.9	3.5
	e	D49585	D59685	D69785	D84945	D1101226	D1321467	D1521707	D1681868	D1932129	D21623811
	f	—	—	—	—	—	—	d1 121.5±2.20	S135	d1 157.0±2.20	S175

- As the flexspline is subject to elastic deformation, the housing clearance should be φa, b, c or more and it should not exceed.
- *The D1 and D3 sizes indicated by an asterisk are the mounting positions in the shaft direction and allowance of the three parts (wave generator, flexspline, circular spline). Strictly observe these tolerances.
- The circular spline of sizes 14 to 40 does not have an O-ring groove (symbol: f) for sealing. Account for sealing during design and installation.

Mass (2SH)

Table 259-1
Unit: kg

Symbol / Size	14	17	20	25	32	40	45	50	58	65
Mass	0.45	0.83	0.89	1.44	3.1	5.4	6.9	10.2	14.1	20.9

Lubrication

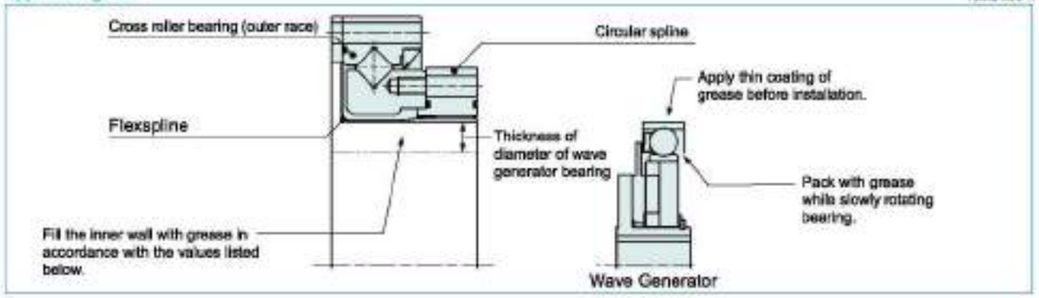
Standard lubrication for SHG/SHF series is grease.
See "Engineering data" on Page 016 for details of the lubricant.

Application guide

As the gear unit is shipped with the outer race of the cross roller bearing and the flexspline temporarily bolted together, grease is not applied other than the gear teeth. Refer to the following application guide for grease application instructions

Application guide

Table 259-1



Application quantity

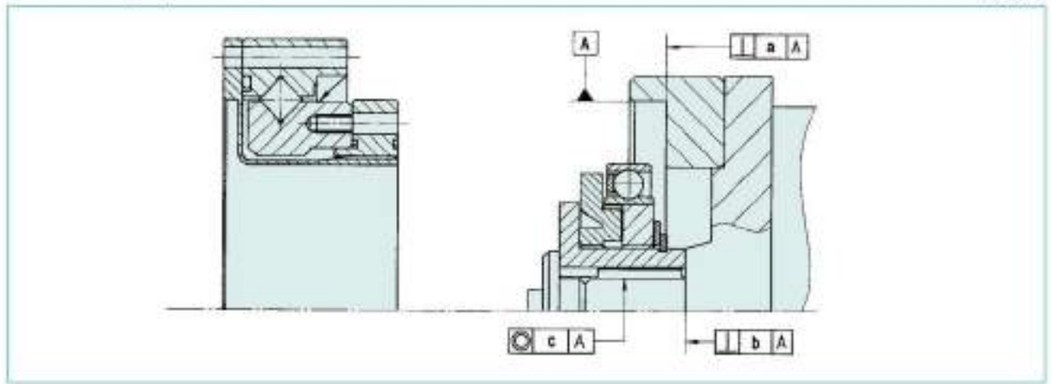
Table 259-2
Unit: g

Application / Size		14	17	20	25	32	40	45	50	58	65
Horizontal use		5.6	11	16	32	64	120	185	235	385	495
Vertical use	Output shaft facing up	7.5	13	19	37	74	130	200	255	400	530
	Output shaft facing down	8.9	15	22	42	84	150	230	290	480	630

Installation accuracy

Maintain the recommended tolerances shown in Figure 260-1 and Table 260-1 for peak performance.

Fig. 260-1



Unit: mm

Size	14	17	20	25	32	40	45	50	58
a	0.011	0.015	0.017	0.024	0.026	0.026	0.027	0.028	0.031
b	0.017 (0.008)	0.020 (0.010)	0.020 (0.010)	0.024 (0.012)	0.024 (0.012)	0.024 (0.012)	0.032 (0.012)	0.032 (0.015)	0.032 (0.015)
c	0.030 (0.016)	0.034 (0.018)	0.044 (0.019)	0.047 (0.022)	0.047 (0.022)	0.050 (0.022)	0.063 (0.024)	0.066 (0.030)	0.066 (0.033)

* The value in the parentheses indicates that Wave Generator does not have an Oldham coupling.

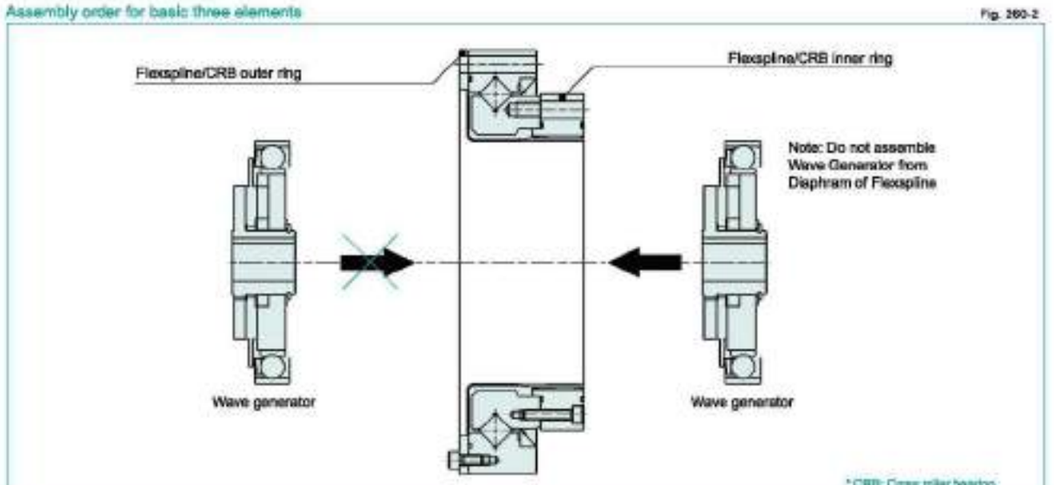
Installation Recommendations

■ Installation sequence

The wave generator is installed after the flexspline and circular spline. If the wave generator is not inserted into the flexspline last, gear teeth scuffing damage or improper eccentric gear mesh may result. Installation resulting in an eccentric tooth mesh (Dedoidal) will cause noise and vibration, and can lead to early failure of the gear. For proper function, the teeth of the flexspline and Circular Spline mesh symmetrically.

Assembly order for basic three elements

Fig. 260-2



▪ Precautions on assembly

It is extremely important to assemble the gear accurately and in proper sequence. For each of the three components, utilize the following precautions.

Wave generator

1. Avoid applying undue axial force to the wave generator during installation. Rotating the wave generator bearing while inserting it is recommended and will ease the process.
2. Extra care must be given to ensure that concentricity and inclination are within the specified limits (see page 253).
3. Installation bolts on the Wave Generator and Flexspline should not interfere each other.

Circular spline

The circular Spline must not be deformed in any way during the assembly. It is particularly important that the mounting surfaces are prepared correctly.

1. Mounting surfaces need to have adequate flatness, smoothness, and no distortion.
2. Especially in the area of the screw holes, burrs or foreign matter should not be present.
3. Adequate relief in the housing corners is needed to prevent interference with the corner of the circular spline.
4. The circular spline should be rotatable within the housing. Be sure there is not interference and that it does not catch on anything.
5. Bolts should not rotate freely when tightening and should not have any irregularity due to the bolt hole being misaligned or oblique.
6. Do not tighten the bolts with the specified torque all at once. Tighten the bolts temporarily with about half the specified torque, and then tighten them with the specified torque. Tighten them in an even, crisscross pattern.
7. Avoid pinning the circular spline if possible as it can reduce the rotational precision and smoothness of operation.

Flexspline

1. Mounting surfaces need to have adequate flatness, smoothness, and no distortion.
2. Especially in the area of the screw holes, burrs or foreign matter should not be present.
3. Adequate clearance with the housing is needed to ensure no interference especially with the major axis of flexspline
4. Bolts should rotate freely when installing through the mounting holes of the flexspline and should not have any irregularity due to the shaft bolt holes being misaligned or oblique.
5. Do not tighten the bolts with the specified torque all at once. Tighten the bolts temporarily with about half the specified torque, and then tighten them to the specified torque. Tighten them in an even, crisscross pattern.
6. The flexspline and circular spline are concentric after assembly. After installing the wave generator bearing, if it rotates in unbalanced way, check the mounting for dedoidal or non-concentric installation.
7. Care should be taken not to damage the flexspline diaphragm or gear teeth during assembly.

   Avoid hitting the tips of the flexpline teeth and circular spline teeth. Avoid installing the CS from the open side of the flexspline after the wave generator has been installed.

Rust prevention

Although Harmonic Drive® gears come with some corrosion protection, the gear can rust if exposed to the environment. The gear external surfaces typically have only a temporary corrosion inhibitor and some oil applied. If an anti-rust product is needed, please contact us to review the options.

Features

CSD Gear Units

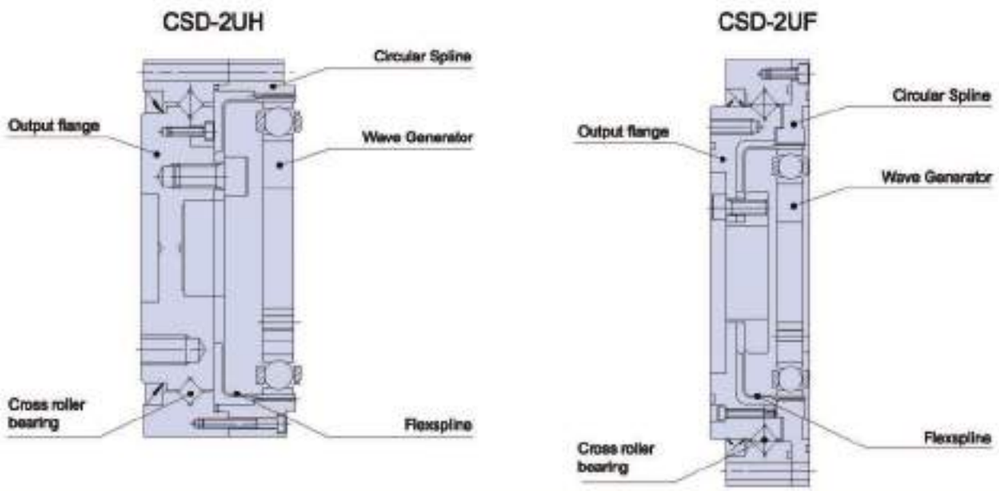
Available in two form factors, the CSD series gear units offer zero backlash while remaining lightweight and compact. These units are ideal for humanoid robots, aerospace, semiconductor equipment and many other critical applications. Ratios available are from 50:1 to 160:1.

Features

- Zero backlash
- Compact design
- Hollow shaft (2UF only)
- High-load capacity
- Lightweight

Structure of CSD Gear Unit

Fig. 210-1



Ordering Code

CSD - 20 - 100 - 2UH - SP

Table 211-1

Series	Size	Ratio*			Model	Special specification
CSD	14	50	100	—	2UH= Unit type (Size 14 to 50) 2UF= Hollow shaft (Size 14 to 40)	Blank= Standard product SP = Special specification code
	17	50	100	—		
	20	50	100	160		
	25	50	100	160		
	32	50	100	160		
	40	50	100	160		
	50	50	100	160		

* The reduction ratio value is based on the following configuration: input: wave generator, fixed: circular spline, output: flexspline

Technical Data

Rating table

■ CSD-2UH

Table 211-2

Size	Ratio	Rated Torque at 2000rpm		Limit for Repeated Peak Torque		Limit for Average Torque		Limit for Momentary Peak Torque		Maximum Input Speed (rpm)	Limit for Average Input Speed (rpm)	Moment of Inertia	
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	Grease lubricant	Grease lubricant	$J\times10^{-4}kgm^2$	$J\times10^{-4}kgfms^2$
14	50	3.7	0.38	12	1.2	4.8	0.49	24	2.4	8500	3500	0.021	0.021
	100	5.4	0.55	19	1.9	7.7	0.79	35	3.6				
17	50	11	1.1	23	2.3	18	1.9	48	4.9	7300	3500	0.054	0.055
	100	16	1.6	37	3.8	27	2.8	71	7.2				
20	50	17	1.7	39	4.0	24	2.4	69	7.0	6500	3500	0.090	0.092
	100	28	2.9	57	5.8	34	3.5	95	9.7				
	160	28	2.9	64	6.5	34	3.5	95	9.7				
25	50	27	2.8	69	7.0	38	3.9	127	13	5600	3500	0.282	0.288
	100	47	4.8	110	11	75	7.6	184	19				
	160	47	4.8	123	13	75	7.6	204	21				
32	50	53	5.4	151	15	75	7.6	268	27	4800	3500	1.09	1.11
	100	96	10	233	24	151	15	420	43				
	160	96	10	281	27	151	15	445	45				
40	50	96	10	281	29	137	14	480	49	4000	3000	2.85	2.91
	100	185	19	398	41	260	27	700	71				
	160	206	21	453	46	316	32	765	78				
50	50	172	18	200	51	247	25	1000	102	3500	2500	8.61	8.78
	100	329	34	686	70	466	48	1440	147				
	160	370	38	823	84	590	60	1715	175				

(Note) Moment of inertia: $I=\frac{1}{4}GD^2$

■ CSD-2UF

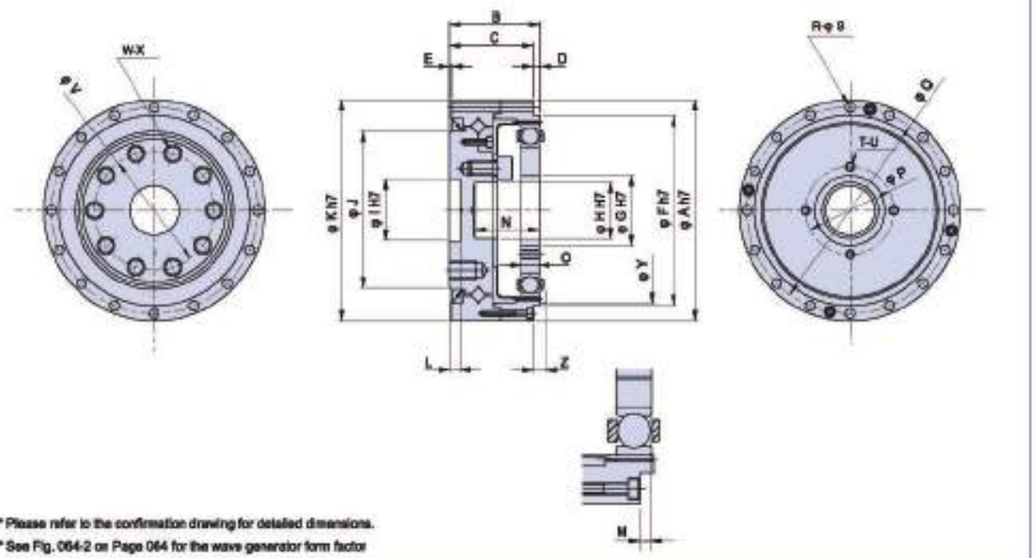
Table 211-3

Size	Ratio	Rated Torque at 2000rpm		Limit for Repeated Peak Torque		Limit for Average Torque		Limit for Momentary Peak Torque		Maximum Input Speed (rpm)	Limit for Average Input Speed (rpm)	Moment of Inertia	
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	Grease lubricant	Grease lubricant	$J\times10^{-4}kgm^2$	$J\times10^{-4}kgfms^2$
14	50	3.7	0.38	12	1.2	4.8	0.49	24	2.4	8500	3500	0.021	0.021
	100	5.4	0.55	19	1.9	7.7	0.79	35	3.6				
17	50	11	1.1	23	2.3	18	1.9	48	4.9	7300	3500	0.054	0.055
	100	16	1.6	37	3.8	27	2.8	71	7.2				
20	50	17	1.7	39	4.0	24	2.4	69	7.0	6500	3500	0.090	0.092
	100	28	2.9	57	5.8	34	3.5	95	9.7				
	160	28	2.9	64	6.5	34	3.5	95	9.7				
25	50	27	2.8	69	7.0	38	3.9	127	13	5600	3500	0.282	0.288
	100	47	4.8	110	11	75	7.6	184	19				
	160	47	4.8	123	13	75	7.6	204	21				
32	50	53	5.4	151	15	75	7.6	268	27	4800	3500	1.09	1.11
	100	96	10	233	24	151	15	420	43				
	160	96	10	281	27	151	15	445	45				
40	50	96	10	281	29	137	14	480	49	4000	3000	2.85	2.91
	100	185	19	398	41	260	27	700	71				
	160	206	21	453	46	316	32	765	78				

(Note) Moment of inertia: $I=\frac{1}{4}GD^2$

Outline dimensions CSD-2UH

Fig. 212-1



* Please refer to the confirmation drawing for detailed dimensions.
* See Fig. 064-2 on Page 064 for the wave generator form factor

Dimensions CSD-2UH

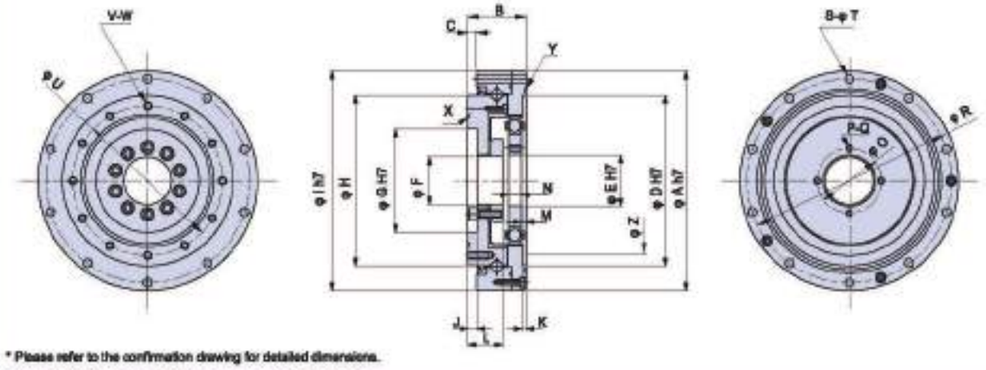
Table 212-1
Unit : mm

Symbol \ Size	14	17	20	25	32	40	50
φA h7	55	62	70	85	112	126	157
B	25	26.5	29.7	37.1	43	51.7	62.5
C	23	24.5	27.7	34.1	40	47.7	58.5
D	2	2	2	3	3	4	4
E	0.5	0.5	0.5	0.5	1	1	1
φF h7	42.5	49.5	58	73	96	108.5	136
φG H7	11	15	20	24	32	40	50
φH H7	11	11	16	20	30	32	44
φI H7	12	14	18	24	32	36	48
φJ	31	38	45	56	78	90	112
φK h7	55	62	70	85	112	126	157
L	5	5	5	5.5	5.5	6	7
M	1.7 $^{+0.2}_{0}$	1.7 $^{+0.2}_{0}$	1.7 $^{+0.2}_{0}$	2.6 $^{+0.2}_{0}$	2.5 $^{+0.2}_{0}$	3.4 $^{+0.2}_{0}$	3.2 $^{+0.2}_{0}$
N	14.8	16.3	18.8	23.7	30.6	36.5	44.3
O	4 $^{0}_{-0.1}$	5 $^{0}_{-0.1}$	5.2 $^{0}_{-0.1}$	6.3 $^{0}_{-0.1}$	8.6 $^{0}_{-0.1}$	10.3 $^{0}_{-0.1}$	12.7 $^{0}_{-0.1}$
φP(PCD)	17	21	26	30	40	50	60
φQ(PCD)	49	56	64	79	104	117.5	147
R	6	10	12	16	16	16	22
φS	3.4	3.4	3.4	3.4	4.5	5.5	6.6
T	4	4	4	4	4	4	4
U	M3	M3	M3	M3	M4	M5	M6
φV(PCD)	25	27	34	42	57	72	88
W	10	8	8	8	10	10	10
X	M3×7	M5×8	M6×9	M8×12	M8×12	M10×15	M12×18
φY	38	45	53	66	86	106	133
Z	3	3	3.5	4.5	5	6.5	7.5
Mass (kg)	0.35	0.46	0.65	1.2	2.4	3.6	6.9

● Due to different manufacturing methods (casting, machining) of components, tolerances also vary. For dimensions without specified tolerances, please consult our company or authorized agents for the tolerance range

Outline dimensions CSD-2UF

Fig. 213-1



* Please refer to the confirmation drawing for detailed dimensions.
* See Fig. 064-2 on Page 064 for the wave generator form factor

Dimensions CSD-2UF

Table 213-1
Unit : mm

Symbol \ Size	14	17	20	25	32	40
φA h7	70	80	90	110	142	170
B	22	22.7	26.8	31.5	37	45
C	0.5	0.5	2.3	2.1	2.8	6.5
φD H7	48	58	64	80	106	132
φE H7	11	15	20	24	32	40
φF	9	9	18	22	29	37
φG H7	30	34	40	52	70	80
φH	49	59	69	84	110	132
φI h7	70	80	90	110	142	170
J	4.9	5.4	4.8	5.5	6	7
K	2.5	2.5	2.5	3	3	3
L	12.9	13.4	16.8	19.5	22	27
M	2.8 $^{+0.2}_{0}$	2.8 $^{+0.2}_{0}$	2.8 $^{+0.2}_{0}$	3.4 $^{+0.2}_{0}$	3.5 $^{+0.2}_{0}$	3.5 $^{+0.2}_{0}$
N	4 $^{0}_{-0.1}$	5 $^{0}_{-0.1}$	5.2 $^{0}_{-0.1}$	6.3 $^{0}_{-0.1}$	8.6 $^{0}_{-0.1}$	10.3 $^{0}_{-0.1}$
φO(PCD)	17	21	26	30	40	50
P	4	4	4	4	4	4
Q	M3	M3	M3	M3	M4	M5
φR(PCD)	64	74	84	102	132	158
S	6	8	8	10	10	10
φT	3.4	3.4	3.4	4.5	5.5	6.6
φU(PCD)	42	50	60	73	96	116
V	8	10	8	8	8	12
W	M3×5	M3×6	M4×8	M5×8	M6×10	M8×10
X	34.5×0.80	38.0×1.50	S48	S60	S80	S100
Y	49.0×1.50	59.4×1.20	S70	S85	S115	S140
φZ	38	45	53	66	86	106
Mass (kg)	0.50	0.66	0.94	1.7	3.3	5.7

●由于零部件的制造方法（铸造、机械加工）不同，公差也存在差异。关于没有注明公差的尺寸，如需了解公差范围，请咨询本公司或授权代理商。

Positional accuracy

See "Engineering data" for a description of terms.

Table 214-1

Size		14	17	20	25	32	40	50
Positional Accuracy	×10^{-4} rad	4.4	4.4	2.9	2.9	2.9	2.9	2.9
	arc min	1.5	1.5	1.0	1.0	1.0	1.0	1.0

Hysteresis loss

See "Engineering data" for a description of terms.

Table 214-2

Ratio	Unit \ Size	14	17	20	25	32	40	50
50	×10^{-4} rad	7.3	4.4	4.4	4.4	4.4	4.4	4.4
	arc min	2.5	1.5	1.5	1.5	1.5	1.5	1.5
100 or more	×10^{-4} rad	5.8	2.9	2.9	2.9	2.9	2.9	2.9
	arc min	2.0	1.0	1.0	1.0	1.0	1.0	1.0

Torsional stiffness

See "Engineering data" for a description of terms.

Table 214-3

Item		Unit / Size	14	17	20	25	32	40	50
	T_1	Nm	2.0	3.9	7.0	14	29	54	108
		kgfm	0.2	0.4	0.7	1.4	3.0	5.5	11
	T_2	Nm	6.9	12	25	48	108	196	382
		kgfm	0.7	1.2	2.5	4.9	11	20	39
Reduction ratio 50	K_1	×10⁴ Nm/rad	0.29	0.67	1.1	2.0	4.7	8.8	17
		kgfm/arc min	0.085	0.2	0.32	0.6	1.4	2.6	5.0
	K_2	×10⁴ Nm/rad	0.37	0.88	1.3	2.7	6.1	11	21
		kgfm/arc min	0.11	0.26	0.4	0.8	1.8	3.4	6.3
	K_3	×10⁴ Nm/rad	0.47	1.2	2.0	3.7	8.4	15	30
		kgfm/arc min	0.14	0.34	0.6	1.1	2.5	4.5	9.0
	θ_1	×10⁻⁴ rad	6.9	5.8	6.4	7.0	6.2	6.1	6.4
		arc min	2.4	2.0	2.2	2.4	2.1	2.1	2.2
	θ_2	×10⁻⁴ rad	19	14	19	18	18	18	18
		arc min	6.4	4.6	6.6	6.1	6.1	5.9	6.2
Reduction ratio 100 or more	K_1	×10⁴ Nm/rad	0.4	0.84	1.3	2.7	6.1	11	21
		kgfm/arc min	0.12	0.25	0.4	0.8	1.8	3.2	6.3
	K_2	×10⁴ Nm/rad	0.44	0.94	1.7	3.7	7.8	14	29
		kgfm/arc min	0.13	0.28	0.5	1.1	2.3	4.2	8.5
	K_3	×10⁴ Nm/rad	0.61	1.3	2.5	4.7	11	20	37
		kgfm/arc min	0.18	0.39	0.75	1.4	3.3	5.8	11
	θ_1	×10⁻⁴ rad	5.0	4.6	5.4	5.2	4.8	4.9	5.1
		arc min	1.7	1.6	1.8	1.8	1.7	1.7	1.7
	θ_2	×10⁻⁴ rad	16	13	15	13	14	14	13
		arc min	5.4	4.3	5.0	4.5	4.8	4.8	4.6

* The values in this table are reference values. The minimum value is approximately 80% of the displayed value.

Starting torque

See "Engineering data" for a description of terms. The values in the table below vary depending on the use conditions, use them as reference values.

■ CSD-2UH

Table 214-4 Unit: Ncm

Ratio \ Size	14	17	20	25	32	40	50
50	4.4	6.7	8.9	16	32	55	102
100	2.8	3.8	5.1	9.1	20	32	60
160	—	—	3.9	7.2	15	26	47

■ CSD-2UF

Table 214-5 Unit: Ncm

Ratio \ Size	14	17	20	25	32	40
50	5.3	7.5	9.7	17	34	58
100	3.2	4.2	5.5	9.6	21	33
160	—	-	4.1	7.4	16	27

Backdriving torque

See "Engineering data" for a description of terms. The values in the table below vary depending on the use conditions, use them as reference values.

■ CSD-2UH

Table 215-1 Unit: Nm

Ratio \ Size	14	17	20	25	32	40	50
50	2.9	4.3	5.2	9.5	19	33	61
100	3.5	4.8	6.0	11	23	38	71
160	—	—	7.4	13	30	48	89

■ CSD-2UF

Table 215-2 Unit: Nm

Ratio \ Size	14	17	20	25	32	40
50	3.3	4.7	5.8	10	20	34
100	3.9	5.0	6.4	11	24	39
160	—	-	7.8	14	31	49

Ratcheting torque

See "Engineering data" for a description of terms.

Table 215-3 Unit: Nm

Ratio \ Size	14	17	20	25	32	40	50
50	88	150	220	450	980	1800	3700
100	84	160	260	500	1000	2100	4100
160	—	—	220	450	980	1800	3600

Buckling torque

See "Engineering data" for a description of terms.

Table 215-4 Unit: Nm

Size	14	17	20	25	32	40	50
Total reduction ratio	190	330	560	1000	2200	4300	8000

Checking output bearing

A precision cross roller bearing is built in the gear unit to directly support the external load (output flange).Check the maximum moment load, life of the bearing and static safety coefficient to fully bring out the performance of the unit type. See Page 030 to 034 of "Engineering data" for each calculation formula.

■ Checking procedure

(1) Checking the maximum moment load (Mmax)

(2) Checking the life

(3) Checking the static safety coefficient

■ Output bearing specifications

The specifications of the cross roller bearing are shown in Table 220-1 and -2.

■ CSD-2UH

Table 220-1

Size	Pitch circle dia. of a roller dp (m)	Offset R (m)	Basic rated load: Basic dynamic rated load C (×10³N)	Basic rated load: Basic dynamic rated load C (kgf)	Basic rated load: Basic static rated load Co (×10³N)	Basic rated load: Basic static rated load Co (kgf)	Allowable moment load Mc (Nm)	Allowable moment load Mc (kgfm)	Moment stiffness Km (×10⁴ Nm / rad)	Moment stiffness Km (kgfm / arc-min)	Allowable axial load Fa (×10³N)	Allowable radial load Fr (×10³N)
14	0.035	0.0095	47	480	60.7	620	41	4.2	4.36	1.3	10.1	6.74
17	0.0425	0.0099	52.9	540	75.5	770	64	6.5	7.75	2.3	11.3	7.56
20	0.050	0.0102	57.8	590	90	920	91	9.3	12.8	3.8	12.4	8.28
25	0.062	0.0130	98.0	980	151	1540	156	16	24.2	7.2	20.5	13.8
32	0.080	0.0144	150	1530	250	2550	313	32	53.9	16	32.1	2.15
40	0.096	0.0151	213	2170	365	3720	450	46	91	27	45.6	3.05
50	0.119	0.0162	348	3550	602	6140	759	77	171	51	74.4	4.99

■ CSD-2UF

Table 220-2

Size	Pitch circle dia. of a roller dp (m)	Offset R (m)	Basic rated load: Basic dynamic rated load C (×10³N)	Basic rated load: Basic dynamic rated load C (kgf)	Basic rated load: Basic static rated load Co (×10³N)	Basic rated load: Basic static rated load Co (kgf)	Allowable moment load Mc (Nm)	Allowable moment load Mc (kgfm)	Moment stiffness Km (×10⁴ Nm / rad)	Moment stiffness Km (kgfm / arc-min)	Allowable axial load Fa (×10³N)	Allowable radial load Fr (×10³N)
14	0.050	0.0116	57.8	590	90	920	91	9.3	12.8	3.8	12.4	8.28
17	0.060	0.0123	104	1060	163	1670	124	12.6	15.4	4.6	22.2	14.9
20	0.070	0.0128	146	1490	220	2250	187	19.1	25.2	7.5	31.2	20.9
25	0.085	0.0134	218	2230	358	3660	258	26.3	39.2	11.6	46.6	31.2
32	0.111	0.0168	382	3900	654	6680	580	59.1	100	29.6	81.7	54.7
40	0.133	0.0215	433	4410	815	8330	849	86.6	179	53.2	92.6	62.0

(Note)
* The basic dynamic rated load means a certain static radial load so that the basic dynamic rated life of the roller bearing is one million rotations.
* The basic static rated load means a static load that gives a certain level of contact stress (4 kN/mm²) in the center of the contact area between the rolling element receiving the maximum load and the orbit.
* The value of the moment stiffness is the average value.
* Allowable moment load is the maximum moment load that may be applied to the output shaft. Please adhere to these values for optimum performance. The value of the moment stiffness is the reference value. The lower-limit value is approximate 80% of the displayed value.
Allowable axial or radial load is the value that satisfies the reducer life when either a genuine radial load or an axial load is applied to the main shaft. (When radial load is Lr+R=0mm, and axial load is La=0mm)

Recommended tolerances for assembly

Recommended tolerances for assembly
Input: Wave generator
Output: Circular spline
Fixed: Flexspline

■ CSD-2UH

Table 221-1 Unit: mm

Symbol \ Size	14	17	20	25	32	40	50
a	0.010	0.010	0.010	0.015	0.015	0.015	0.018
b	0.010	0.012	0.012	0.013	0.013	0.015	0.015
c	0.007	0.007	0.007	0.007	0.007	0.007	0.007
d	0.010	0.010	0.010	0.010	0.010	0.015	0.015
e	0.025	0.025	0.025	0.035	0.037	0.037	0.040

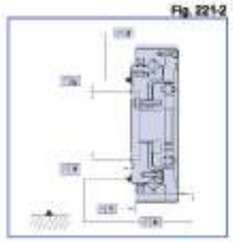
■ CSD-2UF

Table 221-2 Unit: mm

Symbol \ Size	14	17	20	25	32	40
a	0.010	0.010	0.010	0.015	0.015	0.015
b	0.010	0.010	0.010	0.010	0.013	0.013
c	0.010	0.010	0.010	0.010	0.013	0.013
d	0.010	0.010	0.010	0.010	0.013	0.013
e	0.031	0.031	0.031	0.041	0.047	0.047

Fig. 221-1

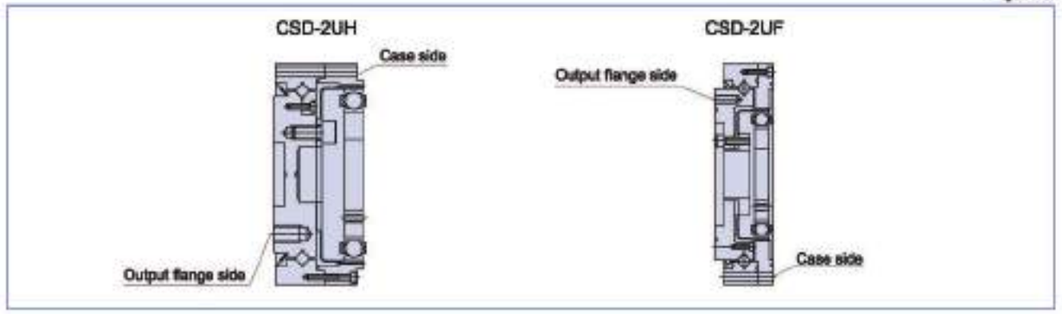
Fig. 221-2



Design Guide

Installation and transmission torque

Fig. 223-1



■ Installation on output flange side and resulting transmission torque

■ CSD-2UH

Table 223-1

Item \ Size		14	17	20	25	32	40	50
Number of bolts		10	8	8	8	10	10	10
Bolt size		M3	M5	M6	M8	M8	M10	M12
Pitch circle	mm	25	27	34	42	57	72	88
Bolt tightening torque	Nm	2.4	10.8	18.4	44	44	74	128
Torque transmission capacity (bolt only)	Nm	50	122	217	486	824	1685	2933

■ CSD-2UF

Table 223-2

Item \ Size		14	17	20	25	32	40
Number of bolts		8	10	8	8	8	12
Bolt size		M3	M3	M4	M5	M6	M6
Pitch circle	mm	42	50	60	73	96	116
Bolt tightening torque	Nm	2.4	2.4	5.4	10.8	18.4	18.4
Torque transmission capacity (bolt only)	Nm	70	104	167	329	766	1109

■ Bolt connection to housing and resulting transmission torque

■ CSD-2UH

Table 223-3

Item \ Size		14	17	20	25	32	40	50
Number of bolts		6	10	12	18	18	18	22
Bolt size		M3	M3	M3	M3	M4	M5	M6
Pitch circle	mm	49	56	64	79	104	117.5	147
Bolt tightening torque	Nm	2.4	2.4	2.4	2.4	5.4	10.8	18.4
Torque transmission capacity (bolt only)	Nm	43	82	112	207	461	833	1804

■ CSD-2UF

Table 223-4

Item \ Size		14	17	20	25	32	40
Number of bolts		6	8	8	10	10	10
Bolt size		M3	M3	M3	M4	M5	M6
Pitch circle	mm	64	74	84	102	132	158
Bolt tightening torque	Nm	2.4	2.4	2.4	5.4	10.8	18.4
Torque transmission capacity (bolt only)	Nm	80	123	140	359	743	1259

(Table 223-1 to 223-4/Notes)
1. The material of the thread must withstand the clamp torque.
2. Recommended bolt: JIS B 1176 socket head cap screw / Strength range : JIS B 1051 over 12.9
3. Torque coefficient: K=0.2
4. Clamp coefficient: A=1.4
5. Tightening friction coefficient μ=0.15

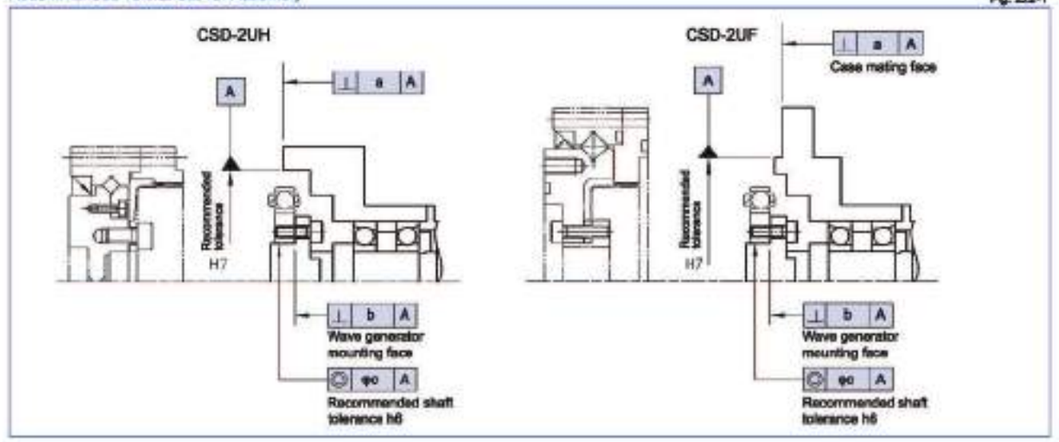
Recommended tolerances for assembly

For peak performance of the gear, it is essential that the following tolerances be observed when assembly is complete.
Pay careful attention to the following points and maintain the recommended assembly tolerances to avoid grease leakage.

- Warp and deformation on the mounting surface
- Blocking of foreign matter
- Problems caused by burrs, raised surfaces and location around the tap area of the mounting holes
- Insufficient chamfering on the housing mount
- Insufficient radii on the housing mount

Recommended Tolerances for Assembly

Fig. 222-1



Tolerances for Assembly CSD-2UH

Table 222-1 Unit: mm

Symbol \ Size	14	17	20	25	32	40	50
a	0.011	0.015	0.017	0.024	0.026	0.026	0.026
b	0.008	0.010	0.012	0.012	0.012	0.012	0.015
φc	0.016	0.018	0.019	0.022	0.022	0.024	0.030

Tolerances for Assembly CSD-2UF

Table 222-2 Unit: mm

Symbol \ Size	14	17	20	25	32	40
a	0.011	0.015	0.017	0.024	0.026	0.026
b	0.008	0.010	0.012	0.012	0.012	0.012
φc	0.016	0.018	0.019	0.022	0.022	0.024

Lubrication

Grease lubrication is standard for the CSD-2UH and CSD-2UF.
There is no need to add or apply grease upon installation since the products are shipped with the grease applied.
See table below for recommended housing dimensions. These dimensions must be maintained to prevent damage to the gear and to maintain a proper grease cavity.

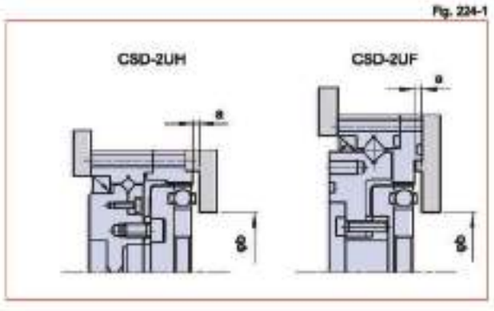
■ Recommended housing dimensions

Table 224-1 Unit: mm

Symbol \ Size	14	17	20	25	32	40	50
a*	1	1	1.5	1.5	2	2.5	3.5
a**	3	3	4.5	4.5	6	7.5	10.5
φb $^{+0.2}_{+0.1}$	16	20	30	37	37	45	45

* For the wave generator facing downward
** For the wave generator facing upward

Fig. 224-1



Sealing

The following sealing mechanism is required to prevent grease leakage and maintain the high durability of the gear.

- Rotating Parts ..... Oil seal (with a spring).
  Surface should be smooth (no scratches)
- Mating flange ..... O-ring and seal adhesive.
  Take care regarding distortion on the plane and how the O-ring is engaged.
- Screw hole area..... Screws should have a thread lock (Locktite 242 is recommended) or seal adhesive.

(Note) If you use Harmonic Grease® 4B No.2 lubrication, strict sealing is required.

Sealing area and the recommended sealing method for the unit type

Table 224-3

Area requiring sealing		Recommended sealing method
Output side	Pass-through hole in the center of the output flange and the output flange mating face	Use O-ring (supplied with the product)
	Mounting screw area	Screw lock agent with sealing effect (Locktite 242 is recommended)
Input side	Flange mating face	Use O-ring (supplied with the product)
	Motor output shaft	Please select a motor which has an oil seal on the output shaft.

Features

SHD series

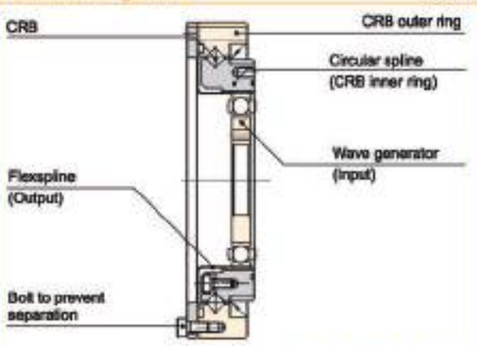
Axially compact, these gear units feature a large hollow input shaft and a robust cross roller bearing so loads can be mounted directly to the unit without the need for additional support bearings

Features of SHD series

- Zero Backlash
- Ultra-flat design - 15% thinner than the SHF Series
- Large Hollow Input Shaft
- Accuracy <1 arc-min (most sizes)
- Rigid cross roller output bearing
- Lightweight - 30% lower weight than Standard SHF Series

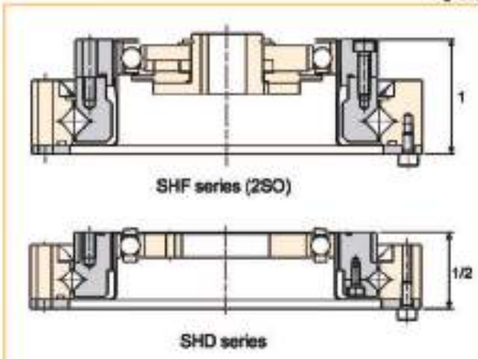
Structure of SHD gear unit

Fig. 268-1



Shaft thickness

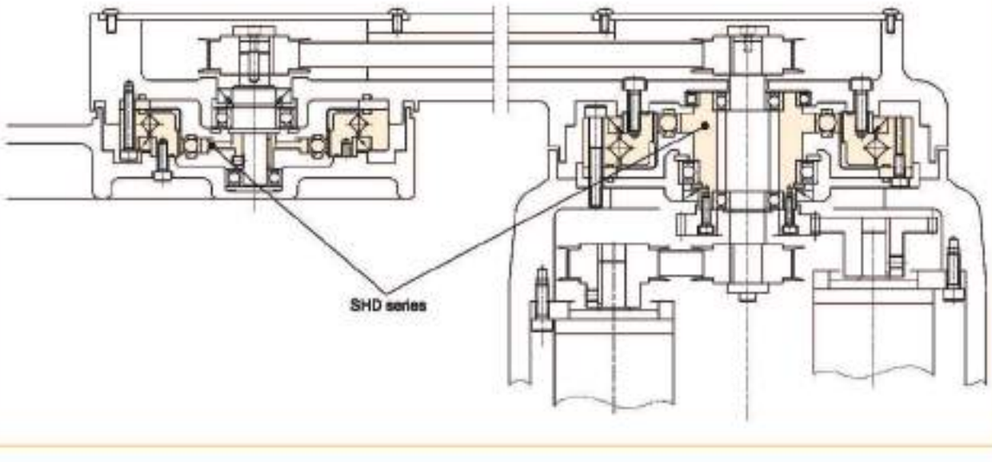
Fig. 268-2



Application example, SHD series

Fig. 269-1

SCARA robot
SHD is ideal when space is limited.



Ordering Code

SHD - 20 - 100 - 2SH - SP

Table 269-1

Series	Size	Ratio*1			Model	Special specification
SHD	14	50	100	—	2SH = Simplicity Unit 2UH = Gear Unit	LW = Lightweight SP= Special specification code Blank=Standard product
	17	50	100	—		
	20	50	100	160		
	25	50	100	160		
	32	50	100	160		
	40	50	100	160		

*1 The reduction ratio value is based on the following configuration:
Input: wave generator, fixed: circular spline, output: flexspline

Technical Data

Rating table

Table 270-1

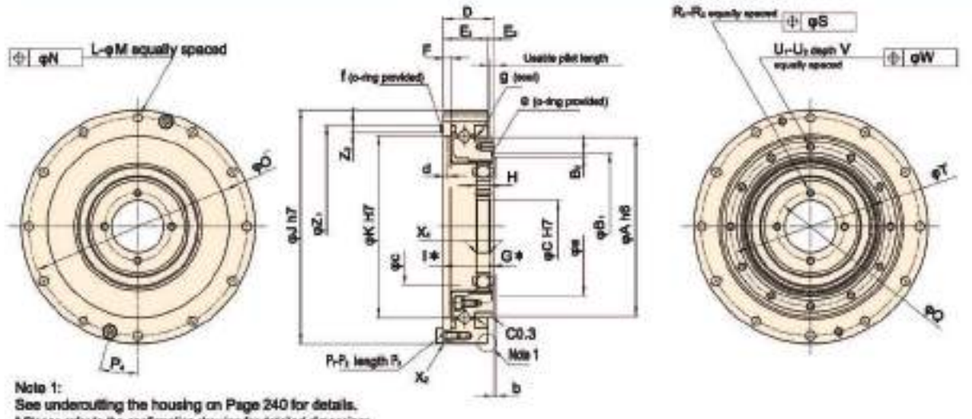
Size	Ratio	Rated Torque at 2000rpm		Limit for Repeated Peak Torque		Limit for Average Torque		Limit for Momentary Peak Torque		Maximum Input Speed (rpm)	Limit for Average Input Speed (rpm)	Moment of Inertia	
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	Grease lubricant	Grease lubricant	J1 ×10⁻⁴kgm²	J2 ×10⁻⁴kgm²
14	50	3.7	0.38	12	1.2	4.8	0.49	23	2.3	8500	3500	0.021	0.021
	100	5.4	0.55	19	1.9	7.7	0.79	35	3.6				
17	50	11	1.1	23	2.3	18	1.9	48	4.9	7300	3500	0.054	0.055
	100	16	1.6	37	3.8	27	2.8	71	7.2				
20	50	17	1.7	39	4.0	24	2.4	69	7.0	6500	3500	0.090	0.092
	100	28	2.9	57	5.8	34	3.5	95	10				
	160	28	2.9	64	6.5	34	3.5	95	10				
25	50	27	2.8	69	7.0	38	3.9	127	13	5600	3500	0.282	0.288
	100	47	4.8	110	11	75	7.6	184	19				
	160	47	4.8	123	13	75	7.6	204	21				
32	50	53	5.4	151	15	75	7.6	268	27	4800	3500	1.09	1.11
	100	96	10	233	24	151	15	420	43				
	160	96	10	261	27	151	15	445	45				
40	50	96	10	281	29	137	14	490	49	4000	3000	2.85	2.91
	100	185	19	398	41	260	27	700	71				
	160	206	21	453	46	316	32	765	78				

(Note) 1. Moment of Inertia: $I = \frac{1}{4}GD^2$
2. See Rating Table Definitions on Page 12 for details of the terms.

Outline Dimensions SHD-2SH

You can download the CAD files from our website: www.3fgearbox.com

Fig. 275-1



Note 1:
See undercutting the housing on Page 240 for details.
* Please refer to the confirmation drawing for detailed dimensions.
* See Fig. 040-3 on Page 040 for the shapes of the wave generator

Dimensions SHD-2SH

Table 271-1 Unit : mm

Symbol \ Size		14	17	20	25	32	40
φA h6		49 $^{0}_{-0.016}$	59 $^{0}_{-0.019}$	69 $^{0}_{-0.019}$	84 $^{0}_{-0.022}$	110 $^{0}_{-0.022}$	132 $^{0}_{-0.025}$
φB1		39.13'	46'2'	56.8'1'	70.5'1'	92'1'	112.4'1'
B1		0.8'1'$^{+0.4}$	1.1'2'$^{+0.5}$	1.4'2'$^{+0.5}$	1.7'2'$^{+0.5}$	2'2'$^{+0.5}$	2.2'2'$^{+0.5}$
φC H7		14'1'$^{+0.018}$	15'1'$^{+0.018}$	26'1'$^{+0.021}$	24'1'$^{+0.021}$	32'1'$^{+0.025}$	40'1'$^{+0.025}$
D		17.5 $^{+0.1}$	18.5 $^{+0.1}$	19 $^{+0.1}$	22 $^{+0.1}$	27.9 $^{+0.1}$	33 $^{+0.1}$
E1		15.5	16.5	17	20	23.6	28
E2		2	2	2	2	4.3	5
F		2.4	3	3	3.3	3.6	4
G*		1.8	1.6	1.2	0.4	0.6	0.8
H		4 $^{0}_{-0.1}$	5 $^{0}_{-0.1}$	5.2 $^{0}_{-0.1}$	6.35 $^{0}_{-0.1}$	8.6 $^{0}_{-0.1}$	10.3 $^{0}_{-0.1}$
I*		15.7 $^{0}_{-0.1}$	16.9 $^{0}_{-0.1}$	17.8 $^{0}_{-0.1}$	21.8 $^{0}_{-0.1}$	27.3 $^{0}_{-0.1}$	32.2 $^{0}_{-0.1}$
φJ h7		70 $^{0}_{-0.030}$	80 $^{0}_{-0.030}$	90 $^{0}_{-0.035}$	110 $^{0}_{-0.035}$	142 $^{0}_{-0.040}$	170 $^{0}_{-0.040}$
φK H7		50'1'$^{+0.025}$	61'1'$^{+0.030}$	71'1'$^{+0.030}$	88'1'$^{+0.035}$	114'1'$^{+0.035}$	140'1'$^{+0.040}$
L		6	12	12	12	12	12
φM		3.5	3.5	3.5	4.5	5.5	6.6
φN		0.25	0.25	0.25	0.25	0.25	0.3
φO		64	74	84	102	132	158
P1		2	2	2	4	4	4
P2		M3	M3	M3	M3	M4	M4
P3		6	6	6	8	10	10
P4		22.5°	15°	15°	15°	15°	15°
φQ		17	21	26	30	40	50
R1		4	4	4	4	4	4
R2		M3	M3	M3	M3	M4	M5
φS		0.25	0.25	0.25	0.25	0.25	0.25
φT		43	52	61.4	76	99	120
U1		8	12	12	12	12	12
U2		M3	M3	M3	M4	M5	M6
V		4.5	4.5	4.5	5	6	9
φW		0.25	0.25	0.25	0.25	0.25	0.3
X1		C0.4	C0.4	C0.5	C0.5	C0.5	C0.5
X2		C0.4	C0.4	C0.5	C0.5	C0.5	C0.5
Z1		57'1'	66.1'1'	76'1'	94.8'1'	123'1'	148'1'
Z2		2'1'$^{0}_{-0.25}$	2'1'$^{0}_{-0.25}$	2.7'1'$^{0}_{-0.25}$	2.4'1'$^{0}_{-0.25}$	2.7'1'$^{0}_{-0.25}$	2.7'1'$^{0}_{-0.25}$
Minimum housing clearance	φa	38.5	45	53	66	86	106
	b	1	1	1.5	1.5	2	2.5
	φc	31	38	46	56	73	90
	d	1.4	1.8	1.7	1.8	1.8	1.8
	e	d37.1d0.6	d46.4d0.8	d53.28d0.99	d66.5d1.3	d87.5d1.5	d107.5d1.6
	f	d54.36d1.19	d64.0d1.5	d72.0d2.0	d88.62d1.78	d117.0d2.0	d142d2.0
	g	D49585	D59685	D69785	D89945	D1101226	D1321467
	h	1.5	1.5	1.5	1.5	3.3	4
	Mass (kg)	0.33	0.42	0.52	0.91	1.87	3.09

- The following dimensions can be modified to accommodate:
  Wave Generator: C
  Flexspline: O and P
  Circular Spline: X1 and X2
- *The G and I sizes indicated by an asterisk are the mounting positions in the shaft direction and allowance of the three parts (wave generator, flexspline, circular spline). Strictly observe these sizes as they affect the performance and strength.
- As the flexspline is subject to elastic deformation, the inner wall should be φa, b, c or more and it should not exceed φd to prevent possible contact with the housing.

Positional Accuracy

See "Engineering data" for a description of terms.

Table 273-1
Unit: X10^{-4}rad (arc-min)

Size		14	17	20	25	32	40
Positional Accuracy	×10^{-4}rad	4.4	4.4	2.9	2.9	2.9	2.9
	arc min	1.5	1.5	1.0	1.0	1.0	1.0

Hysteresis loss

See "Engineering data" for a description of terms.

Table 273-2

Ratio \ Size		14	17	20	25	32	40
50	×10^{-4}rad	7.3	5.8	5.8	5.8	5.8	5.8
	arc min	2.5	2.0	2.0	2.0	2.0	2.0
100 or more	×10^{-4}rad	5.8	2.9	2.9	2.9	2.9	2.9
	arc min	2.0	1.0	1.0	1.0	1.0	1.0

Torsional Stiffness

See "Engineering data" for a description of terms.

Table 273-3

Symbol \ Size			14	17	20	25	32	40
	T_1	Nm	2.0	3.9	7.0	14	29	54
		kgfm	0.2	0.4	0.7	1.4	3.0	5.5
	T_2	Nm	6.9	12	25	48	108	196
		kgfm	0.7	1.2	2.5	4.9	11	20
Ratio 50	K_1	×10^{4}Nm/rad	0.29	0.67	1.1	2.0	4.7	8.6
		kgfm/arc min	0.085	0.2	0.32	0.6	1.4	2.6
	K_2	×10^{4}Nm/rad	0.37	0.88	1.3	2.7	6.1	11
		kgfm/arc min	0.11	0.26	0.4	0.8	1.8	3.4
	K_3	×10^{4}Nm/rad	0.47	1.2	2.0	3.7	8.4	15
		kgfm/arc min	0.14	0.34	0.6	1.1	2.5	4.5
	B_1	×10^{-4}rad	6.9	5.8	6.4	7.0	6.2	6.1
		arc min	2.4	2.0	2.2	2.3	2.1	2.1
	B_2	×10^{-4}rad	19	14	19	18	18	18
		arc min	6.4	4.6	6.3	6.1	6.1	5.9
Ratio 100 or more	K_1	×10^{4}Nm/rad	0.4	0.84	1.3	2.7	6.1	11
		kgfm/arc min	0.12	0.25	0.4	0.8	1.8	3.2
	K_2	×10^{4}Nm/rad	0.44	0.94	1.7	3.7	7.8	14
		kgfm/arc min	0.13	0.28	0.5	1.1	2.3	4.2
	K_3	×10^{4}Nm/rad	0.61	1.3	2.5	4.7	11	20
		kgfm/arc min	0.18	0.39	0.75	1.4	3.3	5.8
	B_1	×10^{-4}rad	5.0	4.6	5.4	5.2	4.8	4.9
		arc min	1.7	1.6	1.8	1.8	1.7	1.7
	B_2	×10^{-4}rad	16	13	15	13	14	14
		arc min	5.4	4.3	5.0	4.5	4.8	4.8

* The values in this table are reference values. The minimum value is approximately 60% of the displayed value.

Simplicity unit (2SH) Starting torque

See "Engineering data" for a description of terms. The values are reference values.

Table 274-1
Unit: Ncm

Ratio \ Size	14	17	20	25	32	40
50	6.2	18	25	39	60	95
100	4.8	17	22	34	50	78
160	—	—	22	33	47	74

Simplicity unit (2SH) Backdriving torque

See "Engineering data" for a description of terms. The values are reference values.

Table 274-3
Unit: Ncm

Ratio \ Size	14	17	20	25	32	40
50	3.7	11	15	24	38	57
100	5.8	21	27	41	60	94
160	—	—	42	64	91	143

Ratcheting torque

See "Engineering data" for a description of terms.

Table 274-5
Unit: Nm

Ratio \ Size	14	17	20	25	32	40
50	88	150	220	450	980	1800
100	84	160	280	500	1000	2100
160	—	—	220	450	980	1800

Buckling torque

See "Engineering data" for a description of terms.

Table 274-6
Unit: Nm

Size	14	17	20	25	32	40
Total reduction ratio	130	260	470	850	1600	3000

Checking output bearing

A precision cross roller bearing is built in the unit type to directly support the external load (output flange).
Check the maximum moment load, life of the cross roller bearing and static safety coefficient to fully bring out the performance of the unit type.
See page 030 to 034 of "Engineering data" for each calculation formula.

■ Checking procedure

(1) Checking the maximum moment load (M_{max})

Calculate the maximum moment load (Mmax). → Maximum moment load (Mmax) ≤ allowable moment (Mc)

(2) Checking the life

Calculate the average radial load (Frav) and the average axial load (Faav). → Calculate the radial load coefficient (x) and the axial load coefficient (y). → Calculate the lifetime

(3) Checking the static safety coefficient

Calculate the static equivalent radial load coefficient (Po). → Check the static safety coefficient. (fs)

■ Output bearing specifications

The specifications of the cross roller are shown in Table 280-1.

Specifications

Table 280-1

Size	Pitch circle dia. of a roller dp	Offset R	Basic rated load: Basic dynamic rated load C		Basic rated load: Basic static rated load Co		Allowable moment load Mc		Moment stiffness Km: ×10⁴ Nm/rad	Moment stiffness Km: kgfm/arc min
	m	m	×10³N	kgf	×10³N	kgf	Nm	kgfm		
14	0.0503	0.0111	29	298	43	438	37	3.8	7.08	2.1
17	0.061	0.0115	52	530	81	826	62	6.3	12.7	3.8
20	0.079	0.011	73	744	110	1122	93	9.5	21	6.2
25	0.086	0.0121	109	1111	179	1825	129	13.2	31	9.2
32	0.112	0.0173	191	1948	327	3334	290	29.6	82.1	24.4
40	0.133	0.0195	216	2203	408	4160	424	43.2	145	43.0

(Note) * The basic dynamic rated load means a certain static radial load so that the basic dynamic rated life of the roller bearing is one million rotations.
* The basic static rated load means a static load that gives a certain level of contact stress (4 kN/mm ²) in the center of the contact area between the rolling element receiving the maximum load and the orbit.
* The value of the moment stiffness is the average value.

* As the life of the cross roller bearing of the unit of the reduction ratio corresponding to the table below (Table 280-3) is shorter than that of the gear during operation under the allowable moment load, consideration should be made in designing the load condition and the lifetime.

(Note) The life of the gear indicates the life (L_{50} =7000 hours) of the wave generator bearing when it operates at 2000rpm input rotational speed and the rated torque (see "Life of the wave generator" on Page 012).

Design Guide

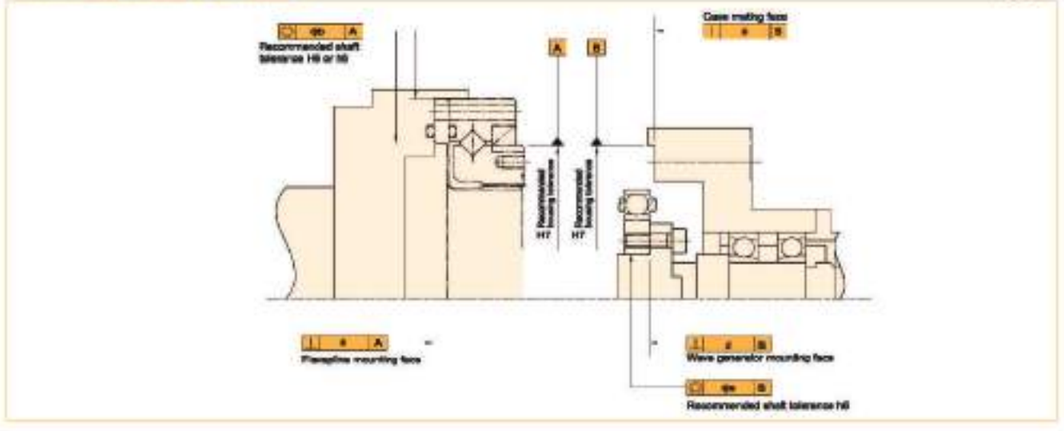
Installation accuracy

For peak performance of the gear, it is essential that the following tolerances be observed when assembly is complete.
Pay careful attention to the following points and maintain the recommended assembly tolerances to avoid grease leakage.

- Warp and deformation on the mounting surface
- Blocking of foreign matter
- Problems caused by burrs, raised surfaces and location around the tap area of the mounting holes
- Insufficient chamfering on the housing mount
- Insufficient radii on the housing mount

Recommended tolerances for assembly

Fig. 214-1



Recommended tolerances for assembly

Unit: mm

Symbol \ Size	14	17	20	25	32	40
a	0.016	0.021	0.027	0.035	0.042	0.048
φb	0.015	0.018	0.019	0.022	0.022	0.024
c	0.011	0.012	0.013	0.014	0.016	0.016
d	0.008	0.010	0.012	0.012	0.012	0.012
φe	0.016	0.018	0.019	0.022	0.022	0.024

Installation and transmission torque

Installation and transmission torque on (A) side

Table 282-2

Item \ Size		14	17	20	25	32	40
Number of bolts		8	12	12	12	12	12
Bolt size		M3	M3	M3	M4	M5	M6
Pitch Circle Diameter		64	74	84	102	132	158
Clamp torque	Nm	2.0	2.0	2.0	4.5	9.0	15.3
	kgfm	0.20	0.20	0.20	0.46	0.92	1.56
Transmission torque	Nm	108	186	210	431	892	1509
	kgfm	11	19	21	44	91	154

(Notes) 1. The material of the thread must withstand the clamp torque.
2. Recommended bolt: JIS B 1176 socket head cap screw.
Strength range : JIS B 1051 over 12.9.
3. Torque coefficient: K=0.2
4. Tightening coefficient: A=1.4
5. Tightening friction coefficient μ=0.15

Installation and transmission torque on (B) side

Item \ Size		14	17	20	25	32	40
Number of bolts		8	12	12	12	12	12
Bolt size		M3	M3	M3	M4	M5	M6
Pitch Circle Diameter		43	52	61.4	76	99	120
Effective depth of screw part		4.5	4.5	4.5	6	8	9
Clamp torque	Nm	2.0	2.0	2.0	4.5	9.0	15.3
	kgfm	0.20	0.20	0.20	0.46	0.92	1.56
Transmission torque	Nm	72	130	154	321	668	1148
	kgfm	7.3	13.3	15.7	32.7	68.2	117

(Notes) 1. The material of the thread must withstand the clamp torque.
2. Recommended bolt: JIS B 1176 socket head cap screw.
Strength range : JIS B 1051 over 12.9.
3. Torque coefficient: K=0.2
4. Tightening coefficient: A=1.4
5. Tightening friction coefficient μ =0.15

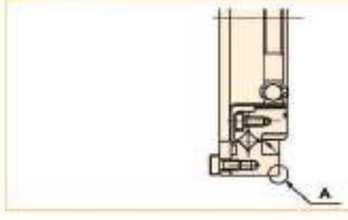
* Since the flange material on the case side is AL (aluminum), be sure to tighten the bolt to the specified torque as described above.
If the tightening torque exceeds the above value, the correct transmission torque may not be secured or the bolt may be loosened.
Use washers instead of putting the aluminum directly on the bolt bearing surface when tightening with the bolt from the A side.

Recessing of the mounting pilot

When the housing interferes with corner "A" shown below, an undercut in the housing is recommended.

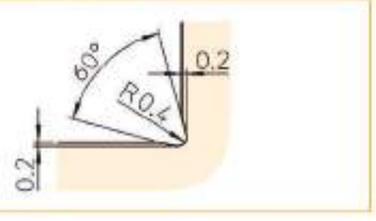
Mounting pilot

Fig. 283-1



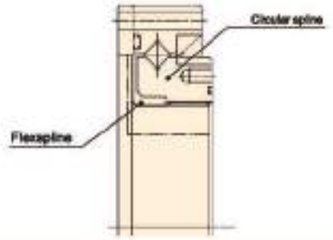
Recommended housing undercut

Fig. 283-2



Output part and fixed part

The output part of SHD series varies from the fixed position.
In addition, the reduction ratio and direction of rotation also change, and the relationship is shown in the following figure



Fixed part	Output part	Rotary direction and ratio
Flexspline	Circular spline	② on page 9
Circular spline	Flexspline	① on page 9

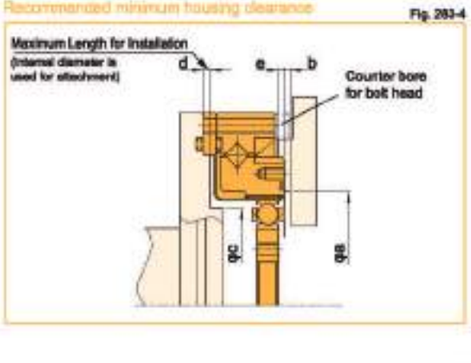
Lubrication

Standard lubrication for SHD series is grease lubrication.
See "Engineering data" on Page 016 for details of the lubricent .

Recommended minimum housing clearance

These dimensions must be maintained to prevent damage to the gear and to maintain a proper grease cavity.

Recommended minimum housing clearance — Fig. 283-4



Minimum housing clearance — Table 283-5 Unit: mm

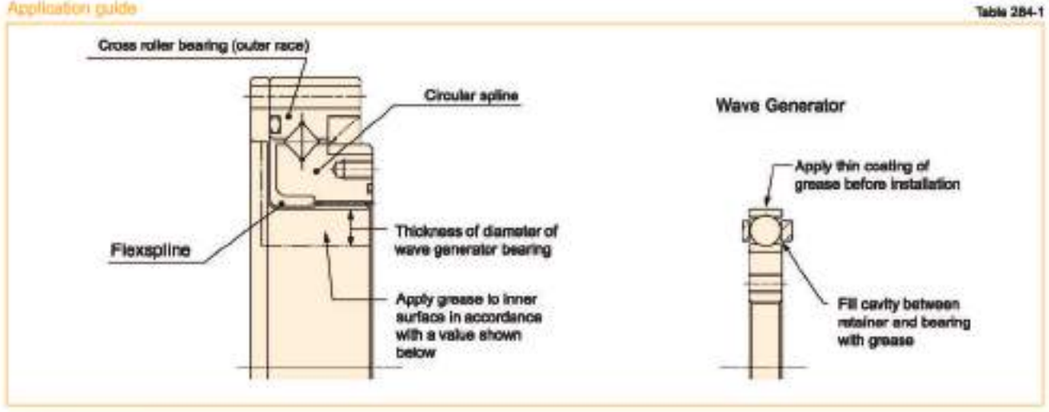
Size / Symbol	14	17	20	25	32	40
φa	36.5	45	53	66	86	106
b	1(3)	1(3)	1.5(4.5)	1.5(4.5)	2(6)	2.5(7.5)
φc	31	38	45	56	73	90
d	1.4	1.8	1.7	1.8	1.8	1.8
e	1.5	1.5	1.5	1.5	3.3	4

(Note) The value in parenthesis is the value when the wave generator is facing upward.

Application guide

As the SHD series is shipped with the outer race of the cross roller bearing and the flexspline temporarily bolted together, grease is applied to the gear teeth, the periphery of the flexspline and the tooth groove of the circular spline. Refer to the following application guide for grease application instructions.

Application guide — Table 284-1



Application quantity

Table 284-1 Unit: g

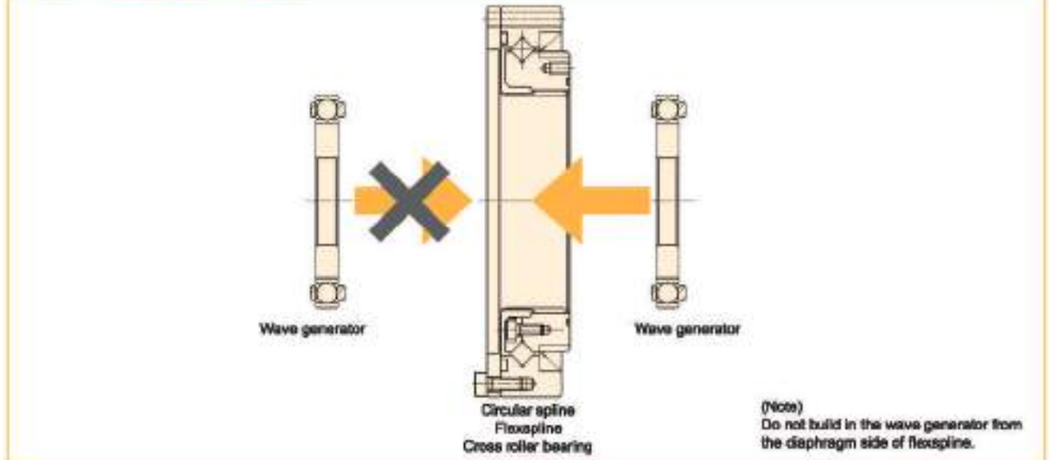
Size	14	17	20	25	32	40
Application qty	5	9	13	24	51	99

Precautions on installation

■ Assembly order of the three basic elements

The wave generator is installed after the flexspline and circular spline. If the wave generator is not inserted into the flexspline last, gear teeth scuffing damage or improper eccentric gear mesh may result. Installation resulting in an eccentric tooth mesh (Dedoidal) will cause noise and vibration, and can lead to early failure of the gear. For proper function, the teeth of the flexspline and Circular Spline mesh symmetrically.

Assembly order for basic three elements — Fig. 285-1



■ Precautions on assembly

It is extremely important to assemble the gear accurately and in proper sequence. For each of the three components, utilize the following precautions.

Wave generator

1. Avoid applying undue axial force to the wave generator during installation. Rotating the wave generator bearing while inserting it is recommended and will ease the process.
2. Extra care must be given to ensure that concentricity and inclination are within the specified limits (see page 281).
3. Installation bolts on the Wave Generator and Flexspline should not interfere each other.

Circular spline

The circular Spline must not be deformed in any way during the assembly. It is particularly important that the mounting surfaces are prepared correctly.

1. Mounting surfaces need to have adequate flatness, smoothness, and no distortion.
2. Especially in the area of the screw holes, burrs or foreign matter should not be present.
3. Adequate relief in the housing corners is needed to prevent interference with the corner of the circular spline.
4. The circular spline should be rotatable within the housing. Be sure there is not interference and that it does not catch on anything.
5. Bolts should not rotate freely when tightening and should not have any irregularity due to the bolt hole being misaligned or oblique.
6. Do not tighten the bolts with the specified torque all at once. Tighten the bolts temporarily with about half the specified torque, and then tighten them with the specified torque. Tighten them in an even, crisscross pattern.
7. Avoid pinning the circular spline if possible as it can reduce the rotational precision and smoothness of operation.

Flexspline

1. Mounting surfaces need to have adequate flatness, smoothness, and no distortion.
2. Especially in the area of the screw holes, burrs or foreign matter should not be present.
3. Adequate clearance with the housing is needed to ensure no interference especially with the major axis of flexspline
4. Bolts should rotate freely when installing through the mounting holes of the flexspline and should not have any irregularity due to the shaft bolt holes being misaligned or oblique.
5. Do not tighten the bolts with the specified torque all at once. Tighten the bolts temporarily with about half the specified torque, and then tighten them to the specified torque. Tighten them in an even, crisscross pattern.
6. The flexspline and circular spline are concentric after assembly. After installing the wave generator bearing, if it rotates in unbalanced way, check the mounting for dedoidal or non-concentric installation.
7. Care should be taken not to damage the flexspline diaphragm or gear teeth during assembly.

   Avoid hitting the tips of the flexpline teeth and circular spline teeth. Avoid installing the CS from the open side of the flexspline after the wave generator has been installed.

Rust prevention

Although Harmonic Drive® gears come with some corrosion protection, the gear can rust if exposed to the environment. The gear external surfaces typically have only a temporary corrosion inhibitor and some oil applied. If an anti-rust product is needed, please contact us to review the options.

Stepper/servo motor driving (for robot industry)

Cycloidal pin-Wheel RV Reducer

High cost-effective/perfectly match and replace the sizes of Japanes harmonic reducers

3F FAMED®

Fenghua Transmission Technology (Jiangsu) Co.,Ltd.

RV robot joint reducer series

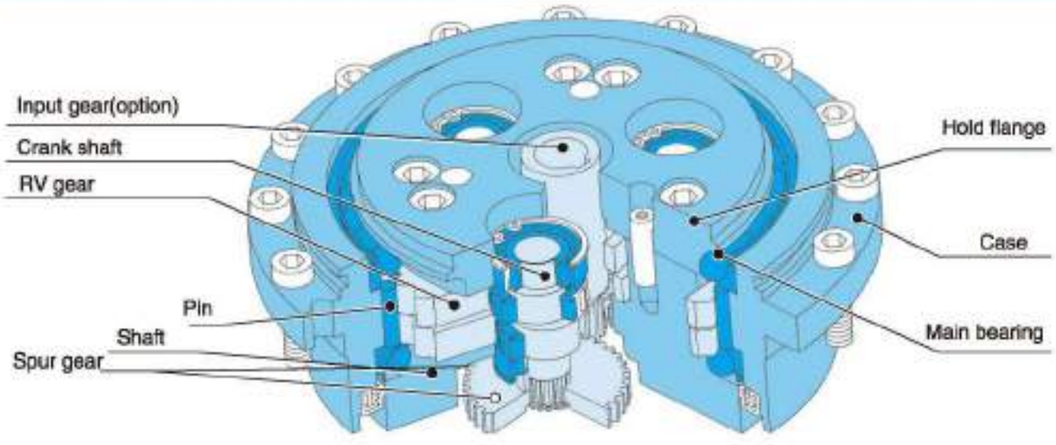
Low noise internal helical gear design

High Precision Customized Service

Innovative R & D Quality Assurance

Professional Processing 20 Years of Experience

RV-E series Features and construction



Integrated angular ball bearings

Benefits:
- Increases reliabilty
- Reduces overall cost

Attributed to:
- Built-in angular ball bearing construction improves the ability to support external loads, increases moment rigidity and maximum allowable moment.
- Reduces the number of components required.
- Simplifies installation.

2-stage reduction

Benefits:
- Reduces vibration
- Reduces inertia $(GD)^2$

Attributed to:
- Low speed rotation of the RV gear reduces vibration.
- Reduced size of the motor coupling part (input gear) lowers intertia.

Pin & gear structure

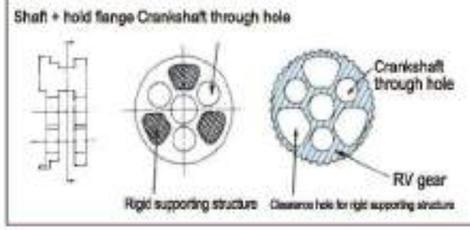
Benefits:
- Very low backlash (1 arc. min.)
- Higher shock load capability(5 times rated torque)

Attributed to:
- Synchromeshing of many RV gear teeth and pins.

All main elements are supported on both sides

Benefits:
- Higher torsional stiffness
- Less vibration
- High shock load capability (5 times rated torque)

Detail:
- Crankshafts are supported on both sides of the reduction gear as shown below.



Rolling contact elements

Benefits:
- Excellent starting efficiency
- Low wear and longer life
- Low backlash (1 arc. min.)

Attributed to: • Use of roller bearings throughout.

RV-E Series Precision Robot Joints

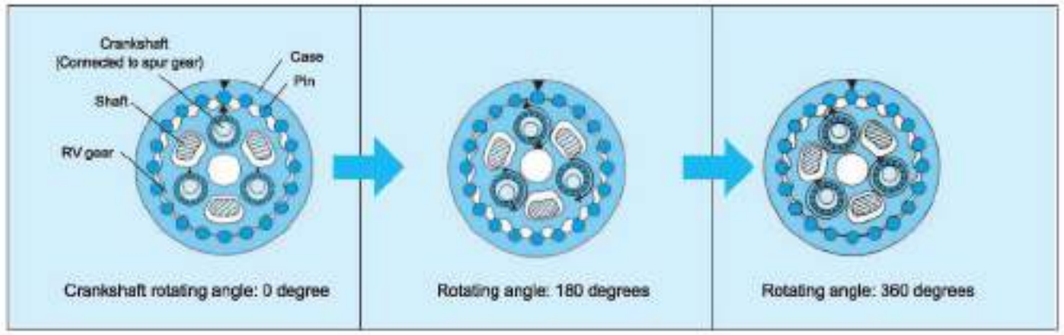
Principle of Speed Reduction

1st stage ...Spur gear reduction

- An input gear engages with and rotates spur gears that are coupled to crankshafts. Several overall gear ratios can be provided by selecting various first stage ratios.

2nd stage ...Epicyclic gear reduction

- Crankshafts driven by the spur gears cause an eccentric motion of two epicyclic gears called RV gears that are offset 180 degrees from one another to provide a balanced load.
- The eccentric motion of the RV gears causes engagement of the cycloidal shaped gear teeth with cylindrically shaped pins located around the inside edge of the case.
- In the course of one revolution of the crankshafts the teeth of the RV gear move the distance of one pin in the opposite direction of the rotating cranks. The motion of the RV gear is such that the teeth remain in close contact with the pins and multiple teeth share the load simultaneously.
- The output can be either the shaft or the case. If the case is fixed, the shaft is the output. If the shaft is fixed, the case is the output.



RV-E series instruction

•When placing an order or making an inquiry, please use the following codes to specify the appropriate model.

RV- 80 E - 121 - A - B - Motor

Model code	Frame number	Series code	Ratio code	Input gear code Input spline code	Output shaft clamp code	Motor
RV	6	E: Main bearing built-in type	31, 43, 53.5, 59, 79, 103	A: Standard gear A B: Standard gear B Z: No gear	B: Bolt-clamping output shaft type P: Pin/bolt clamping output shaft type	Motor Model
	20		57, 81, 105, 121, 141, 161			
	40		57, 81, 105, 121, 153			
	80		57, 81, 101, 121, 153			
	110		81, 111, 161, 175			
	160		81, 101, 129, 145, 171			
	320		81, 101, 118.5, 129, 141, 171, 185			
	450		81, 101, 118.5, 129, 154.8, 171, 192.4			

RV-E series Rating Table

Output speed (rpm)		5	10	15	20	25	30	40	50	60
Type	Ratio code	R Speed ratio		Output torque (Nm) / Input capacity (kW)								
		Shaft rotation	Case rotation									
RV-6E	31	31	30	101 / 0.07	81 / 0.11	72 / 0.15	66 / 0.19	62 / 0.22	58 / 0.25	54 / 0.30	50 / 0.35	47 / 0.40
	43	43	42									
	53.5	53.5	52.5									
	59	59	58									
	79	79	78									
	103	103	102									
RV-20E	57	57	56	231 / 0.16	188 / 0.26	167 / 0.35	153 / 0.43	143 / 0.50	135 / 0.57	124 / 0.70	115 / 0.81	110 / 0.92
	81	81	80									
	105	105	104									
	121	121	120									
	141	141	140									
	161	161	160									
RV-40E	57	57	56	572 / 0.40	465 / 0.65	412 / 0.86	377 / 1.05	353 / 1.23	334 / 1.40	307 / 1.71	287 / 2.00	271 / 2.27
	81	81	80									
	105	105	104									
	121	121	120									
	153	153	152									
RV-80E	57	57	56	1,088 / 0.76	885 / 1.24	784 / 1.64	719 / 2.01	672 / 2.35	637 / 2.67	584 / 3.26	546 / 3.81	517 / 4.33
	81	81	80									
	101	101	100									
	121	121	120									
	153	*1 (153)	*1 (152)									
RV-110E	81	81	80	1,499 / 1.05	1,215 / 1.70	1,078 / 2.26	990 / 2.76	925 / 3.23	875 / 3.67	804 / 4.49		
	111	111	110									
	161	161	160									
	175	1227/7	1220/7									
RV-160E	81	81	80	2,176 / 1.52	1,774 / 2.48	1,568 / 3.28	1,441 / 4.02	1,343 / 4.69	1,274 / 5.34			
	101	101	100									
	129	129	128									
	145	145	144									
	171	171	170									
RV-320E	81	81	80	4,361 / 3.04	3,538 / 4.94	3,136 / 6.57	2,881 / 8.05	2,695 / 9.41	2,548 / 10.7			
	101	101	100									
	118.5	118.5	117.5									
	129	129	128									
	141	141	140									
	171	171	170									
	185	185	184									
RV-450E	81	81	80	6,135 / 4.28	4,978 / 6.95	4,410 / 9.24	4,047 / 11.3	3,783 / 13.2				
	101	101	100									
	118.5	118.5	117.5									
	129	129	128									
	154.8	2013/13	2000/13									
	171	171	170									
	192	1347/7	1340/7									

Note: 1. The allowable output speed will differ depending upon the duty ratio, load, and ambient temperature. Contact us regar ding use above the allowable output speed Ns1.

2. The input capacity (kW) is calculated according to the following calculation formula:

$$\text{Input capacity (kW)} = \frac{2\pi \cdot N \cdot T}{60 - \frac{\eta}{100} \cdot 10^3}$$

N: Output speed (rpm)
T : Output torque (Nm)
η =75: Reduction gear efficiency (%)

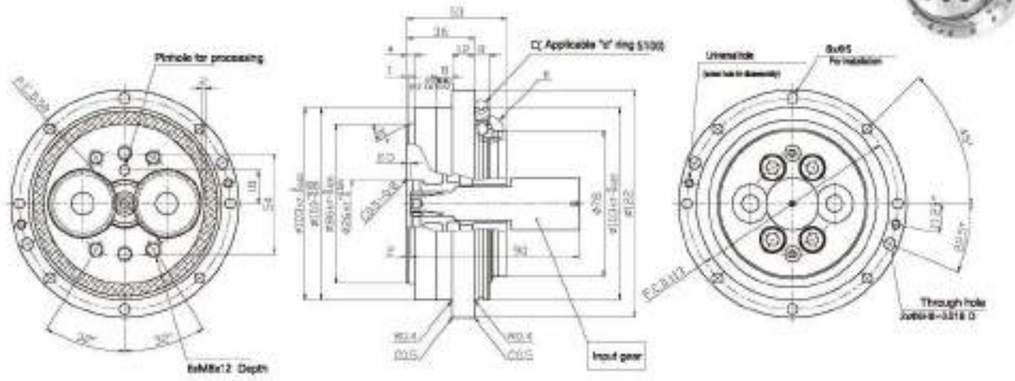
Note: The input capacity is a reference value.

3. When the reduction gear is used at low temperatures, there will be a larger no-load running torque. Note this characteristi c when selecting a motor. (Refer to "Low temperature characteristic" on page 93)

Tr Rated torque (Note 7)	Nr Rated output Speed	K Rated service life	Trs Allowable acceleration deceleration torque	Tsr Momentary maximum allowable torque	Nm Maximum allowable output speed (Note 1)	Backlash	MAX. Lost motion MAX.	MAX. Angular transmission error MAX.	Startup efficiency (Typical value)	Mcr Allowable moment (Note 4)	Mco Momentary allowable moment (Max.)	Wr Allowable radial load (Note 10)	I Reduced value of the inertia moment for the input shaft (Note 5)	Weight
(Nm)	(rpm)	(h)	(Nm)	(Nm)	(r/min)	(arc.sec.)	(arc.min.)	(arc.sec.)	(%)	(Nm)	(Nm)	(N)	(kgm²)	(kg)
58	30	6,000	117	294	100	1.5	1.5	80	70	196	392	2,140	2.63×10^{-4}	2.5
													2.00×10^{-4}	
													1.53×10^{-4}	
													1.39×10^{-4}	
													1.09×10^{-5}	
													0.74×10^{-5}	
167	15	6,000	412	833	75	1.0	1.0	70	75	882	1,764	7,785	9.66×10^{-4}	4.7
													6.07×10^{-4}	
													4.32×10^{-4}	
													3.56×10^{-4}	
													2.88×10^{-4}	
													2.39×10^{-5}	
412	15	6,000	1,029	2,058	70	1.0	1.0	60	85	1,666	3,332	11,594	3.25×10^{-4}	9.3
													2.20×10^{-4}	
													1.63×10^{-4}	
													1.37×10^{-5}	
													1.01×10^{-5}	
784	15	6,000	1,960	Bolt joint 3,920	70	1.0	1.0	50	85	Bolt joint 2,156	Bolt joint 4,312	Bolt joint 12,988	8.16×10^{-5}	Bolt joint 13.1
													6.00×10^{-4}	
				Pin/bolt joint 3,185						Pin/bolt joint 1,735	Pin/bolt joint 2,156	Pin/bolt joint 10,452	4.82×10^{-5}	Pin/bolt joint 12.7
													3.96×10^{-5}	
													2.98×10^{-5}	
1,078	15	6,000	2,695	5,390	50	1.0	1.0	50	85	2,940	5,880	16,648	9.88×10^{-5}	17.4
													6.96×10^{-5}	
													4.36×10^{-5}	
													3.89×10^{-5}	
1,568	15	6,000	3,920	Bolt joint 7,840	45	1.0	1.0	50	85	3,920	Bolt joint 7,840	18,587	1.77×10^{-5}	26.4
													1.40×10^{-5}	
				Pin/bolt joint 6,615							Pin/bolt joint 6,762		1.06×10^{-5}	
													0.87×10^{-5}	
													0.74×10^{-5}	
3,136	15	6,000	7,840	Bolt joint 15,680	35	1.0	1.0	50	80	Bolt joint 7,056	Bolt joint 14,112	Bolt joint 28,057	4.83×10^{-4}	44.3
													3.79×10^{-4}	
													3.15×10^{-4}	
				Pin/bolt joint 12,250						Pin/bolt joint 6,174	Pin/bolt joint 10,976	Pin/bolt joint 24,558	2.84×10^{-4}	
													2.54×10^{-4}	
													1.97×10^{-4}	
													1.77×10^{-4}	
4,410	15	6,000	11,025	Bolt joint 22,050	25	1.0	1.0	50	85	8,820	Bolt joint 17,640	30,133	8.75×10^{-4}	66.4
													6.91×10^{-4}	
													5.75×10^{-4}	
				Pin/bolt joint 18,620							Pin/bolt joint 13,524		5.20×10^{-4}	
													4.12×10^{-4}	
													3.61×10^{-4}	
													3.07×10^{-4}	

Note:
4. The allowable moment will differ depending on the thrust load. Check the allowable moment diagram (p. 91).
5. The inertia moment value is for the reduction gear. It does not include the inertia moment for the input gear.
6. For the moment rigidity and torsional rigidity, refer to the calculation of tilt angle and the torsion angle (p. 99).
7. The rated torque is the value that produces the rated service life based on operation at the rated output speed; it does not indicate the maximum load. Refer to the"Glossary" (p.81) and the "Product selection flowchart" (p.62).
8. Contact us regarding speed ratios other than those listed above.
9. The specifications above are based on Nabtesco evaluation methods; this product should only be used after confirming that it is appropriate for the operatingconditions of your system.
10. When radial load b is applied within dimension b, use the reduction gear within the allowable radial load.
11. *1 The R=153 for the RV-80E is only for the bolt-clamping output shaft type (page 20, 21).

RV-6E Output Shaft Bolt-on Type External Dimensions

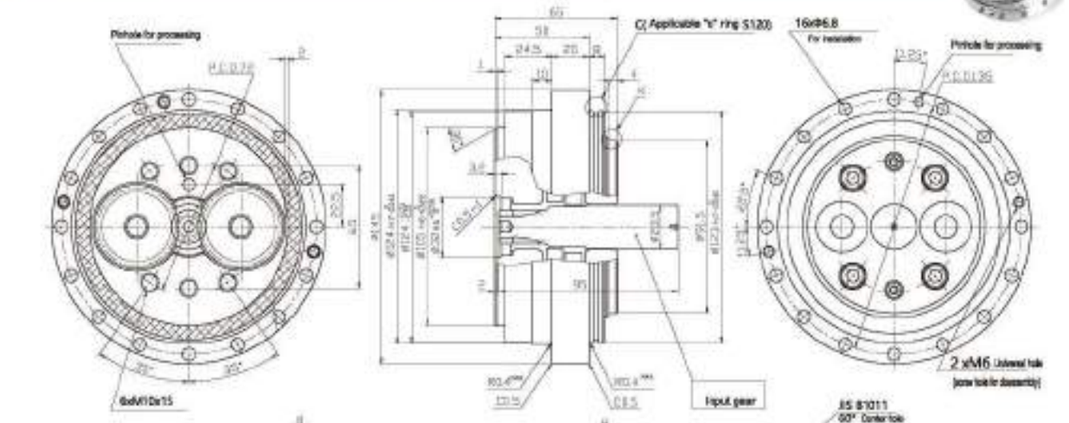


Allowable transmission torque

	Screw bolt	Taper pin	Amount
Shaft side	627.2Nm		627.2Nm
Shaft side	607.6Nm		607.6Nm

Note: 1) "O" type ring and screw bolt , washer for installation are to be provided by customer.
2) Please forgive not to inform in advance for the anytime changes of specifications, sizes.

RV-20E Output Shaft Bolt-on Type External Dimensions

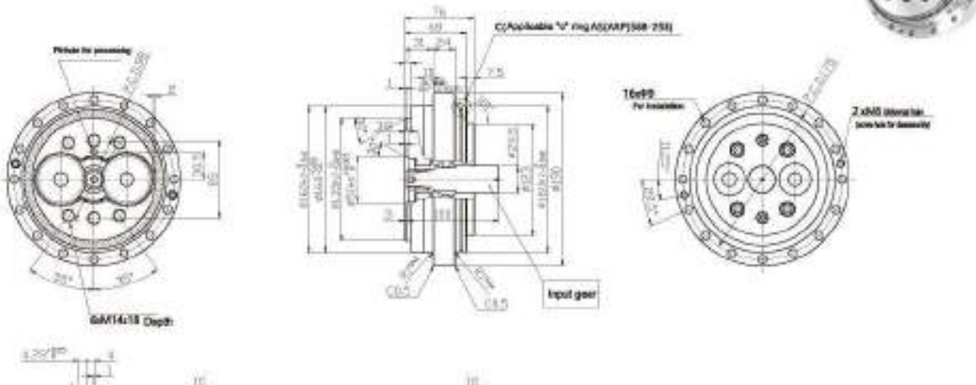


Allowable transmission torque

	Screw bolt	Taper pin	JIS B1011 Amount
Shaft side	2136.4Nm		2136.4Nm
Shaft side	1195.6Nm		1195.6Nm

Note: 1) "O" type ring and screw bolt , washer for installation are to be provided by customer.
2) Please forgive not to inform in advance for the anytime changes of specifications, sizes.

RV-40E Output Shaft Bolt-on Type External Dimensions

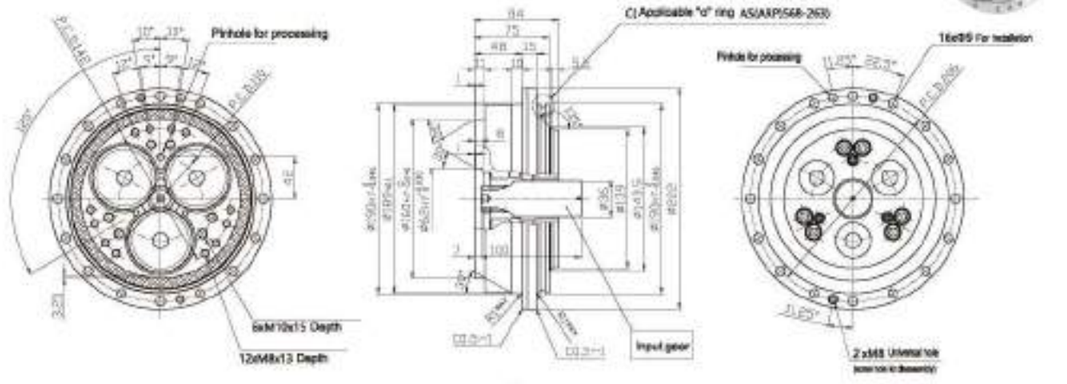


Allowable transmission torque

	Screw bolt	Taper pin	Amount
Shaft side	5027.4Nm		5027.4Nm
Shaft side	3204.6Nm		3204.6Nm

Note: 1) "O" type ring and screw bolt , washer for installation are to be provided by customer.
2) Please forgive not to inform in advance for the anytime changes of specifications, sizes.

RV-80E Output Shaft Bolt-on Type External Dimensions

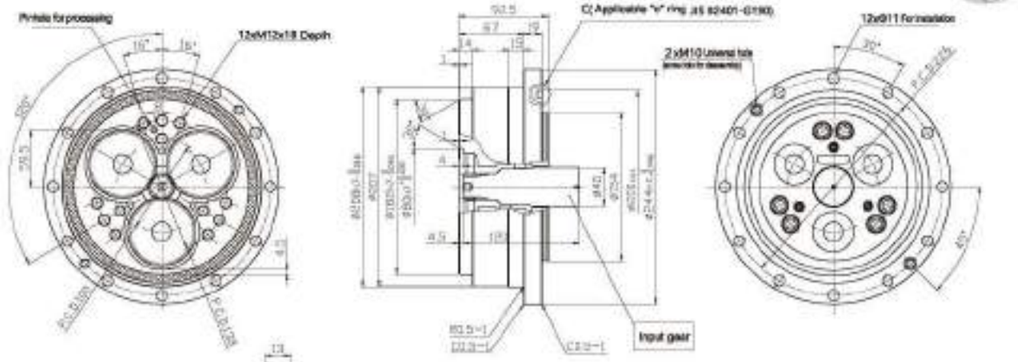


Allowable transmission torque

	Screw bolt	Taper pin	Amount
Shaft side	5919.2Nm		5919.2Nm
Shaft side	4939.2Nm		4939.2Nm

Note: 1) "O" type ring and screw bolt , washer for installation are to be provided by customer.
2) Please forgive not to inform in advance for the anytime changes of specifications, sizes.

RV-110E Output Shaft Bolt-on Type External Dimensions

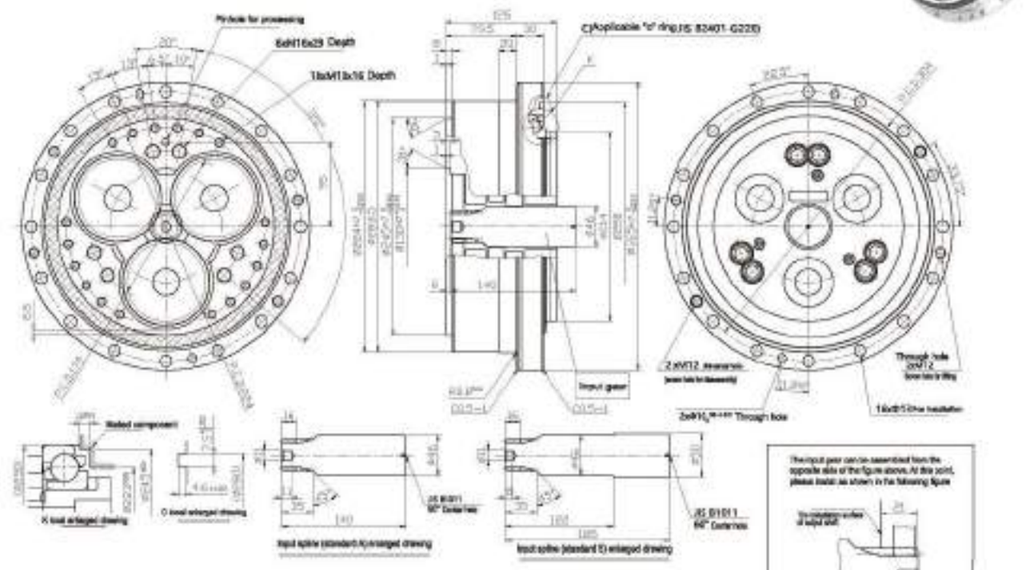


Allowable transmission torque

	Screw bolt	Taper pin	Amount
Shell side	7742Nm		7742Nm
Shaft side	6370Nm		6370Nm

Note: 1) "O" type ring and screw bolt , washer for installation are to be provided by customer.
2) Please forgive not to inform in advance for the anytime changes of specifications, sizes.

RV-320E Output Shaft Bolt-on Type External Dimensions

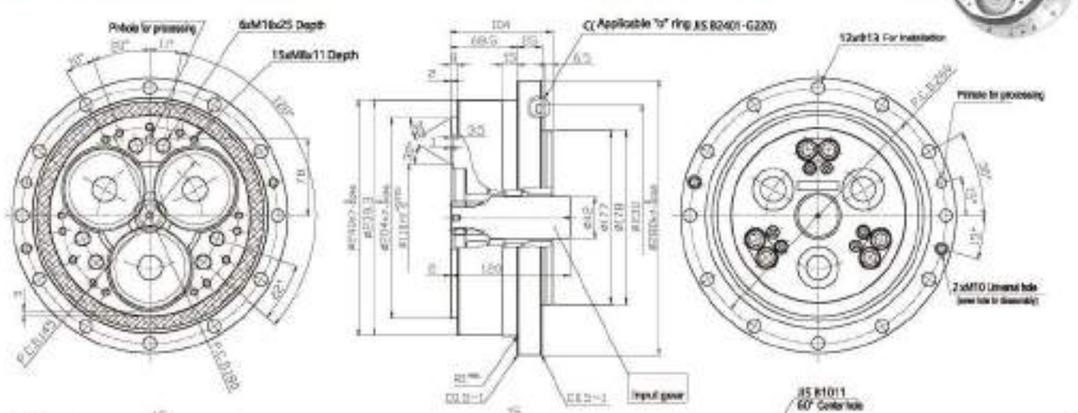


Allowable transmission torque

	Screw bolt	Taper pin	Amount
Shell side	20099.8Nm		20099.8Nm
Shaft side	19521.6Nm		19521.6Nm

Note: 1) "O" type ring and screw bolt , washer for installation are to be provided by customer.
2) Please forgive not to inform in advance for the anytime changes of specifications, sizes.

RV-160E Output Shaft Bolt-on Type External Dimensions

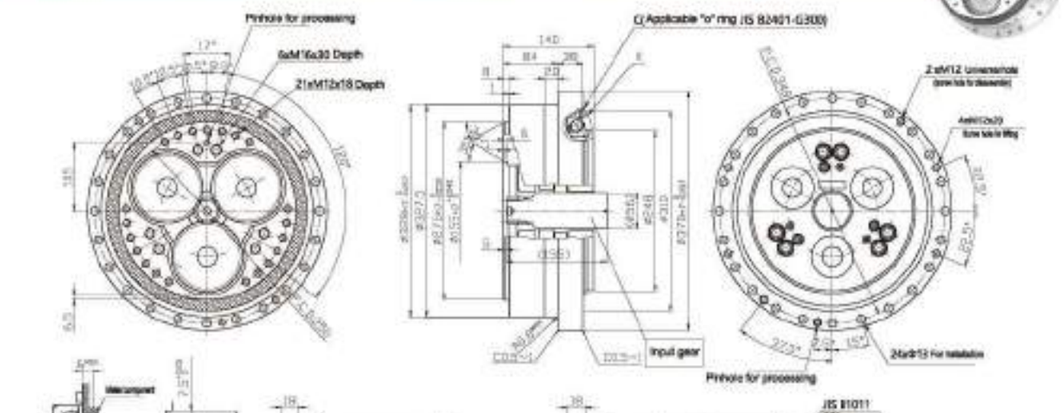


Allowable transmission torque

	Screw bolt	Taper pin	Amount
Shell side	12887Nm		12887Nm
Shaft side	11593.4Nm		11593.4Nm

Note: 1) The shape of input gear will be different on the low-speed condition (i=166)
2) "O" type ring and screw bolt , washer for installation are to be provided by customer.
3) Please forgive not to inform in advance for the anytime changes of specifications, sizes.

RV-450E Output Shaft Bolt-on Type External Dimensions



Allowable transmission torque

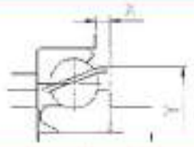
	Screw bolt	Taper pin	Amount
Shell side	34515Nm		34515Nm
Shaft side	30536Nm		30536Nm

Note: 1) "O" type ring and screw bolt , washer for installation are to be provided by customer.
2) Please forgive not to inform in advance for the anytime changes of specifications, sizes.

RV-E Series Design Points Installation Components

Design of the motor mounting flange

In order to avoid contact with gearbox components, refer to the sizes indicated in the "External Dimensions" drawings when designing the motor mounting flange.
Note: The size and number of bolts for the motor mounting flange should be determined with the torque and moment taken into consideration, and should be positioned in line with the gearbox's case mounting holes.
After installing the gearbox, we recommend installing an adding and draining grease fitting to enable grease replacement. An installation example is shown below.
Use the specified tightening torque to uniformly tighten the hexagon socket head cap screws (with corresponding conical spring washers)
To obtain maximum performance from the E series, it is important to optimally design the assembly, installation, lubrication, and sealing.
Be sure to read the following precautions before designing. As angular ball bearings are used as the main bearings, designing the mating component dimensions according to the table on the right to make sure that the bearing retainer does not come in contact with the motor mounting flange.



	X	Y
RV-6E	MAX1.9	MAXφ 85
RV-320E	MAX3.2	MAXφ222.2
RV-450E	MAX5.5	MAXφ285

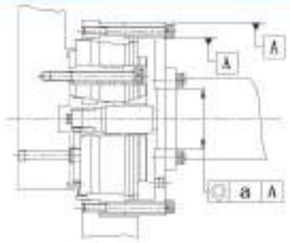
With other models, the retainer does not stick out from the casing, so no special attention is needed.

RV-E Series Assembly accuracy

Design the motor mounting flange according to the following accuracy.
Poor assembly accuracy easily causes vibration and noise.

(Unit : mm)

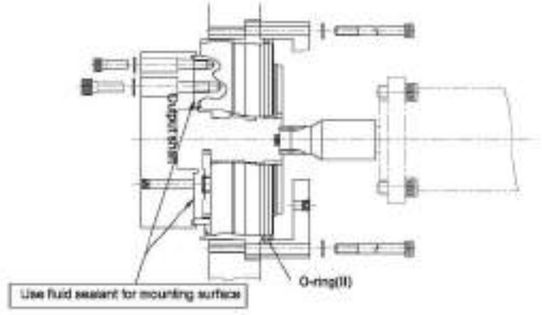
Model	Concentricity tolerance a	Model	Concentricity tolerance a
RV-6E	MAX0.03	RV-110E	MAX0.03
RV-20E	MAX0.03	RV-160E	MAX0.05
RV-40E	MAX0.03	RV-320E	MAX0.05
RV-80E	MAX0.03	RV-450E	MAX0.05



RV-E Series Installation procedure

- Typical installation examples for gearboxes to be mounted on the mating components are shown below. Be sure to apply the specified amount of the specified grease during assembly.
  Refer to the O-ring seals shown to make a seal design for the mounting side.
  If O-ring (II) cannot be used due to the structure, apply the appropriate liquid sealant from the table on the right.
  If a seal cannot be formed by applying liquid sealants due to the structure, use O-ring (I) and (III) on page 22.

- Bolt clamping output shaft type
  Note: The sizes of bolts for tightening the output shaft are not all the same. Make sure that each bolt is tightened with the specified torque after assembling.



Recommended liquid sealant

Manufacturer	Characteristics and applications
Three Bond 1211 (Three Bond)	• Silicone-based, solventless type • Semi-dry gasket
HERMESERL SS-60F (Nihon-Hermetics)	• One-part, non-solvent elastic sealant • Metal contact side (flange surface) seal • Three Bond1211 Any product basically equivalent to ThreeBond 1211
Locktite515 (Henkel)	• Anaerobic flange sealant • Metal contact side (flange surface) seal

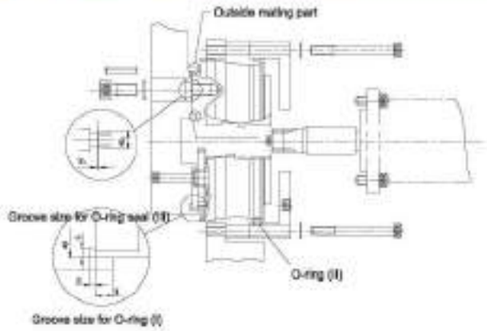
Notes 1. Do not use these sealants for copper material or copper alloy material.
2. If these sealants need to be used under special conditions such as concentrated alkali, pressurized steam, etc., please contact us.

O-ring(II)

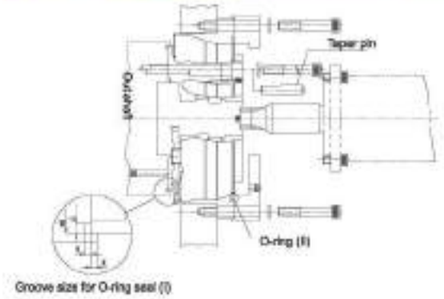
	Applicable O-ring
RV-6E	S100
RV-20E	S120
RV-40E	AS568-258
RV-80E	AS568-263
RV-110E	G190
RV-160E	G220
RV-320E	G270
RV-450E	G300

- Pin/bolt clamping output shaft type
  Note: The prepared pinhole and the output shaft need to be reamed jointly with a reamer before knocking in the taper pin.
  The gearbox needs to be appropriately masked during reaming to prevent chips from entering inside.

RV-20E、40E Installation example

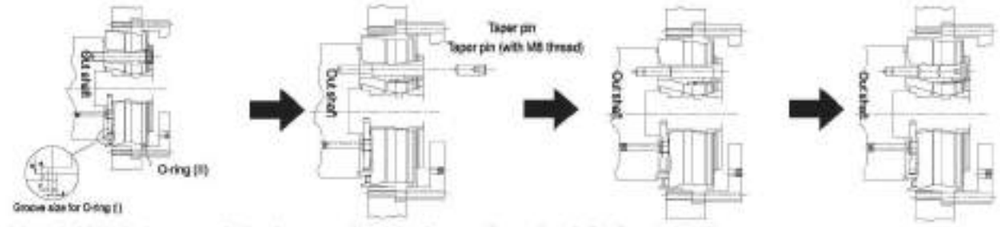


RV-160E、320E、450E Installation example



RV-80E Installation example

A different method is used on RV-80E to knock in the taper pin, so follow the next procedure for assembling.



1. Loosely tighten the hexagon socket head cap screw to temporarily secure the gearbox shaft to the output shaft.
2. Remove the taper pin (with M8 screw) installed in the gearbox.
3. From the hole of the removed taper pin, drill a hole for the taper pin (10 mm. dia.) in the output shaft. (At this time, masking is needed to prevent chips from entering the gearbox.)
4. After reaming, remove the bolt to remove the gearbox, then remove any chips and burns.
5. Install the gearbox and knock in the taper pin for fixing the output shaft.
6. Tighten the hexagon socket head cap screw securely to fix the gearbox to the output shaft.
7. Be sure to knock in the taper pin (with M8 screw) embedded in the gearbox. Use a taper pin with screw.

Dimensions for O-ring (I) seal

(Unit : mm)

		RV-20E (A)	RV-20E (B)	RV-40E	RV-80E	RV-110E	RV-160E	RV-320E	RV-450E
Dimensions	O-ring	ID No.	AS568-045	S100	S132	AS568-163	AS568-167	AS568-265	AS568-271	AS568-275
		Wire dia.	φ1.78 ±0.07	φ2.0 ±0.1	φ2.0 ±0.1	φ2.62 ±0.07	φ2.62 ±0.07	φ3.53 ±0.1	φ3.53 ±0.1	φ3.53 ±0.1
		I. D.	φ101.32 ±0.38	φ 99.5 ±0.4	φ131.5 ±0.6	φ152.07 ±0.58	φ177.47 ±0.58	φ196.44 ±0.76	φ234.54 ±0.76	φ266.29 ±0.76
	Groove dimensions	Outside dia. D	φ 105	φ105	φ135	φ160	φ182	φ204	φ243	φ273
		Depth H	1.27 ±0.05	1.5 $^{-0.1}_{-0.3}$	1.5 $^{-0.1}_{-0.3}$	2.06 ±0.05	2.06 ±0.05	2.82 ±0.05	2.82 ±0.0 5	2.82 ±0.05
		Width G	2.39 $^{+0.25}_{0}$	2.7 $^{+0.25}_{0}$	2.7 $^{+0.25}_{0}$	3.58 $^{+0.25}_{0}$	3.58 $^{+0.25}_{0}$	4.78 $^{+0.25}_{0}$	4.78 $^{+0.25}_{0}$	4.78 $^{+0.25}_{0}$
		Height tolerance K	3	3	3	3	3	4	4	4

Dimensions for O-ring (II) seal

(单位 Unit : mm)

	RV-20E	RV-40E	RV-80E	RV-160E	RV-320E	RV-450E
ID No.	S120	AS568-258	AS568-263	G220	G270	G300

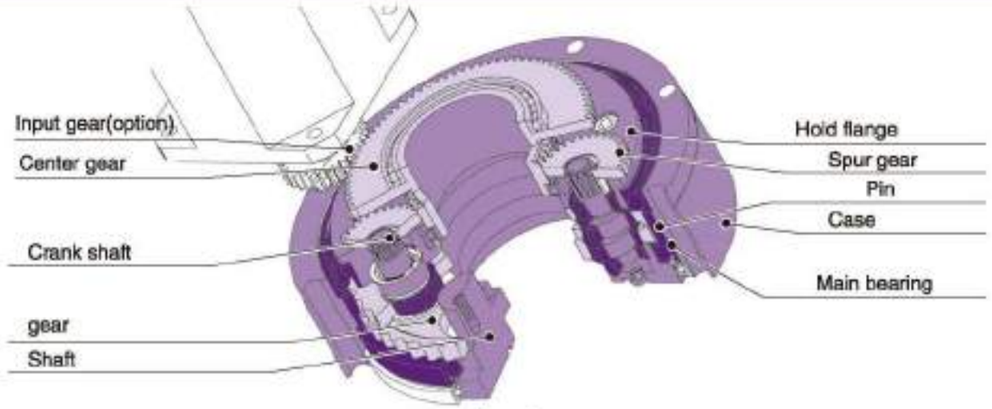
Dimensions for O-ring (III) seal

(Unit : mm)

		RV-20E	RV-40E
Dimensions	O-ring	ID No.	S12.5	S14
		Wire dia.	φ1.5±0.1	φ 1.5±0.1
		I. D.	φ 12	φ 13.5
	Groove dimensions	Outside dia. D_1	φ14.8±0.1	φ 16.3±0.1
		Depth H_1	1-$^{0}_{0.1}$	1.$^{0}_{0.1}$

Notes 1. Use O-ring seal of either type (A) or type (B).
2. The S type ID number is the manufacturer's own standard.

RV-C series Features and construction



Hollow shaft structure

- Cables and other lines can pass through the reduction gear
- Allows space saving design

Integrated angular ball bearings

Benefits:
- Increases reliabilty
- Reduces overall cost

Attributed to:
- Built-in angular ball bearing construction improves the ability to support external loads and increases moment rigidity and maximum allowable moment. As a result, this model can be used for the rotary axis.
- Reduces the number of components required.
- Simplifies installation.

2-stage reduction

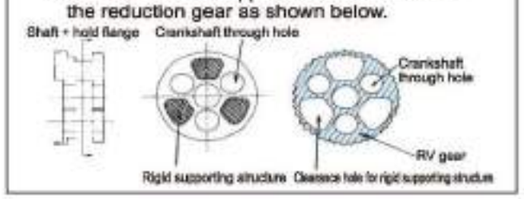
Benefits:
- Reduces vibration
- Reduces inertia (GD^2)

Attributed to:
- Low speed rotation of the RV gear reduces vibration.
- Reduced size of the motor coupling part (input gear) lowers intertia.

All main elements are supported from both sides

Benefits:
- Higher torsional stiffness
- Less vibration
- High shock load capability (5 times rated torque)

Detail:
- Crankshafts are supported on both sides of the reduction gear as shown below.



Rolling contact elements

Benefits:
- Excellent starting efficiency
- Low wear and longer life
- Low backlash (1 arc. min.)

Attributed to:
- Use of roller bearings throughout.

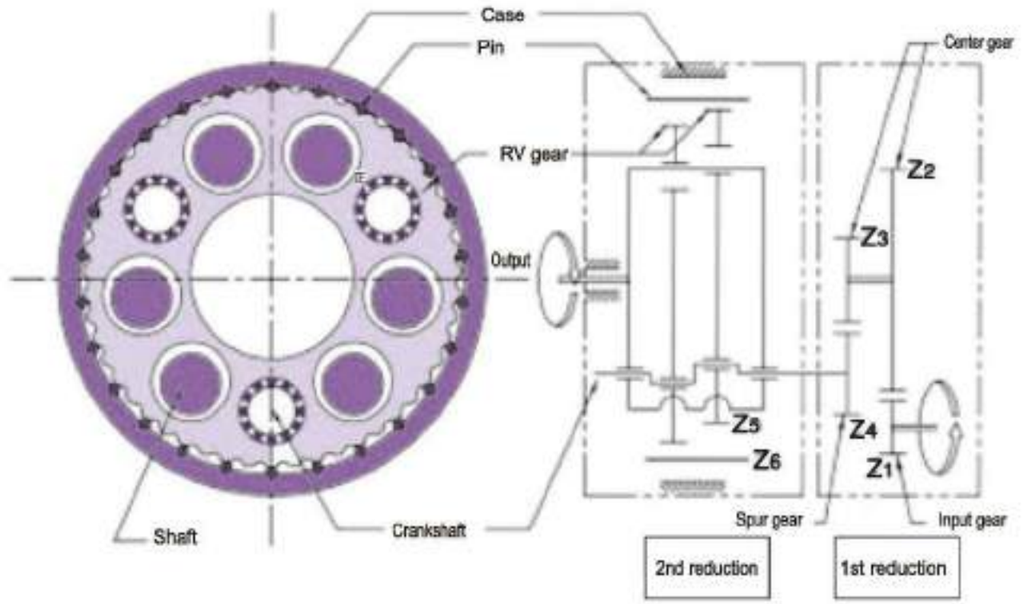
Pin & gear structure

Benefits:
- Very low backlash (1 arc. min.)
- Higher shock loadcapability (5 times rated torque)

Attributed to:
- Synchromeshing of many RV gear teeth and pins.

RV-C Ratio

Mechanism block drawing



The overall reduction ratio i (of the First and Second reduction stages) will differ depending on the use, and can be calculated using the speed ratio values displayed in the table below.

With the shaft as output;

$$R = R_1 \times \frac{Z_2}{Z_1}$$

$$i = -\frac{1}{R}$$

$$(R_1 = 1 + \frac{Z_4}{Z_3} \cdot Z_6)$$

R : Overall speed ratio
R_1 : Speed ratio of a discrete reduction gear
Z_1 : Number of teeth on input gear
Z_2 : Number of teeth on large center gear
Z_3 : Number of teeth on small center gear
Z_4 : Number of teeth on spur gear
Z_5 : Number of teeth on RV gear
Z_6 : Number of pins
i : Reduction ratio

Note: The speed ratio values and rotation directions shown above indicate when the motor (motor fixing component) is installed on the case side of the reduction gear.

RV–C Series Precision Robot Joints

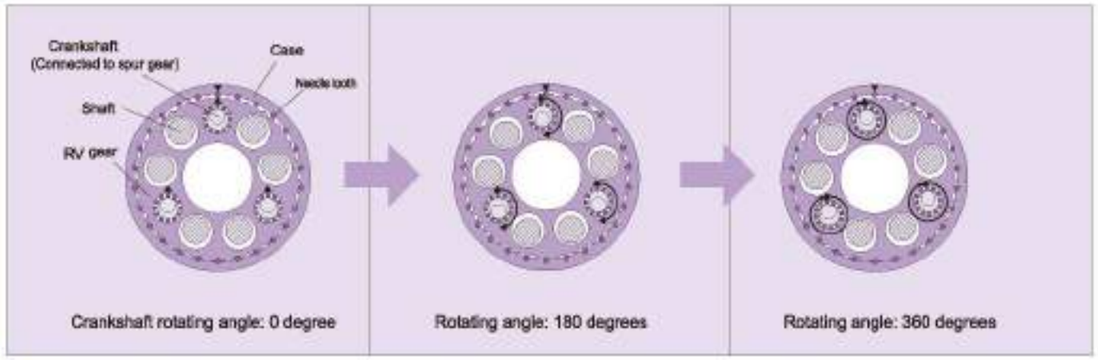
Principle of Speed Reduction

1st stage …Spur gear reduction

- An input gear engages with and rotates spur gears that are coupled to crankshafts. Several overall gear ratios can be provided by selecting various first stage ratios.

2nd stage …Epicyclic gear reduction

- Crankshafts driven by the spur gears cause an eccentric motion of two epicyclic gears called RV gears that are offset 180 degrees from one another to provide a balanced load.
- The eccentric motion of the RV gears causes engagement of the cycloidal shaped gear teeth with cylindrically shaped pins located around the inside edge of the case.• In the course of one revolution of the crankshafts the teeth of the RV gear move the distance of one pin in the opposite direction of the rotating cranks. The motion of the RV gear is such that the teeth remain in close contact with the pins and multiple teeth share the load simultaneously.
- The output can be either the shaft or the case. If the case is fixed, the shaft is the output. If the shaft is fixed, the case is the output.



RV–C Series Model Indication

- When placing an order or making an inquiry, please use the following codes to specify the appropriate model.

RV – 80 C – 36.75 – A – B – Motor

Model code	Frame number	Series code	Ratio code	Center gear code	Output shaft clamp code	Motor
RV	10	C: Hollow shaft type	27	A: Standard gear A Z: No gear	B : Bolt-clamping output shaft type T : Through-bolt clamping output shaft type	Motor
	27		36.57			
	50		32.54			
	100		36.75			
	200		34.86			
	320		35.61			
	500		37.34			

Technical note

Rated service life

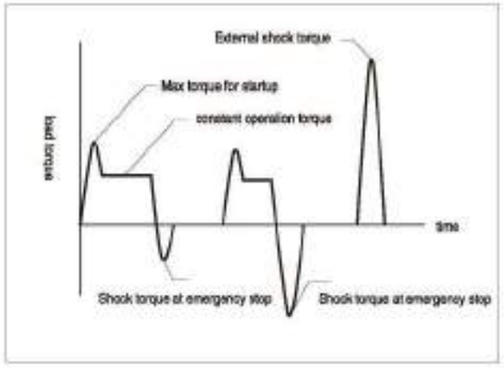
The lifetime resulting from the operation with the rated torque and the rated output speed is referred to as the "rated service life"

Allowable acceleration/deceleration torque

When the machine starts or stops, the load torque to be applied to the gearbox is larger than the constant–speed load torque due to the effect of the inertia torque of the rotating part.
In such a situation, the allowable torque during acceleration/deceleration is referred to as "allowable acceleration/deceleration torque".
Note: Be careful that the load torque, which is applied at startup and stop, does not exceed the allowable acceleration/deceleration torque.

Momentary maximum allowable torque

When the machine results from emergency stop or external impact, the larger torque to be applied to gearbox. In such a situation, the allowable torque is referred to as momentary maximum allowable torque.
A large torque may be applied to the gearbox due to execution of emergency stop or by an external shock. In such a situation, the allowable value of the momentary applied torque is referred to as "momentary maximum allowable torque".
Note: Be careful that the momentary excessive torque does not exceed the momentary maximum allowable torque.



Allowable output speed

The allowable value for the gearbox' s output speed during operation without a load is referred to as the "allowable output speed".

Notes: Depending on the conditions of use (duty ratio, load, ambient temperature), the gearbox temperature may exceed 60° C even when the speed is under the allowable output speed. In such a case, either take cooling measures or use the gearbox at a speed that keeps the surface temperature at 60° C or lower.

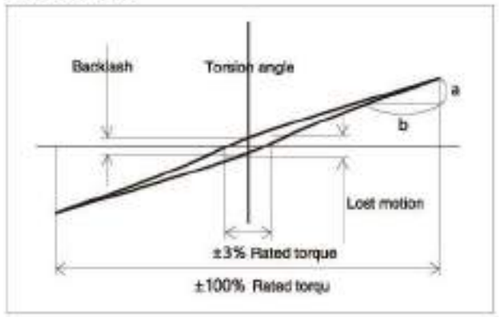
Duty ratio

The duty ratio is defined as the ratio of the sum total time of acceleration, constant, and deceleration to the cycle time of the gearbox.

Torsional rigidity, lost motion, backlash

When a torque is applied to the output shaft while the input shaft is fixed, torsion is generated according to the torque value. The torsion can be shown in the hysteresis curves.
The value of b/a is referred to as "torsional rigidity".
The torsion angle at the mid point of the hysteresis curve width within ±3% of the rated torque is referred to as "lost motion".
The torsion angle when the torque indicated by the hysteresis curve is equal to zero is referred to as "backlash".

<Hysteresis curve>



Startup efficiency

The efficiency of the moment when the gearbox starts up is referred to as "startup efficiency".

No–load running torque (input shaft)

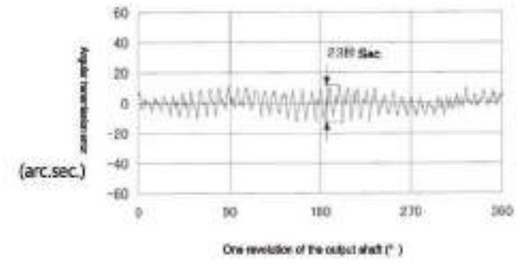
The torque for the input shaft that is required to run the gearbox without load is referred to as "no–load running torque".

Allowable moment and maximum thrust load

The external load moment may be applied to the gearbox during normal operation. The allowable values of the external moment and the external axial load at this time are each referred to as "allowable moment" and "maximum thrust load".

Angular transmission error

The angular transmission error is defined as the difference between the theoretical output angle of rotation (when there are input instructions for an arbitrary rotation angle) and the actual output angle of rotation.



RV–C series Rating Table

Output speed (rpm)				5	10	15	20	25	30	40	50	60
Type	Ratio code	i Speed ratio		Output torque (Nm) / Input capacity (kW)								
		Shaft rotation	Case rotation									
RV-10C	27	27	26	136 / 0.09	111 / 0.16	98 / 0.21	90 / 0.25	84 / 0.29	80 / 0.34	73 / 0.41	68 / 0.47	65 / 0.54
RV-27C	36.57	1,390/38	1352/38	368 / 0.26	299 / 0.42	265 / 0.55	243 / 0.68	227 / 0.79	215 / 0.90	197 / 1.10	184 / 1.29	174 / 1.46
RV-50C	32.54	1,985/61	1924/61	681 / 0.48	554 / 0.77	490 / 1.05	450 / 1.26	420 / 1.47	398 / 1.67	366 / 2.04	341 / 2.38	
RV-100C	36.75	36.75	35.75	1,362 / 0.95	1,107 / 1.55	980 / 2.05	899 / 2.51	841 / 2.94	796 / 3.33	730 / 4.08		
RV-200C	34.86	1,499/43	1456/43	2,724 / 1.90	2,215 / 3.09	1,960 / 4.11	1,803 / 5.04	1,686 / 5.88	1,597 / 6.69			
RV-320C	35.61	2,778/78	2700/78	4,361 / 3.04	3,538 / 4.94	3,136 / 6.57	2,881 / 8.05	2,690 / 9.41				
RV-500C	37.34	3,099/83	3016/83	6,811 / 4.75	5,537 / 7.73	4,900 / 10.26	4,498 / 12.56					

Note: 1. The allowable output speed will differ depending upon the duty ratio, load, and ambient temperature. Contact us regar ding use above the allowable output speed Ns1.

2. The input capacity (kW) is calculated according to the following calculation formula:

$$\text{Input capacity (kW)} = \frac{2\pi \cdot N \cdot T}{60 \cdot \frac{\eta}{100} \cdot 10^3}$$

N: Output speed (rpm)
T : Output torque (Nm)
η =75: Reduction gear efficiency (%)

Note: The input capacity is a reference value.

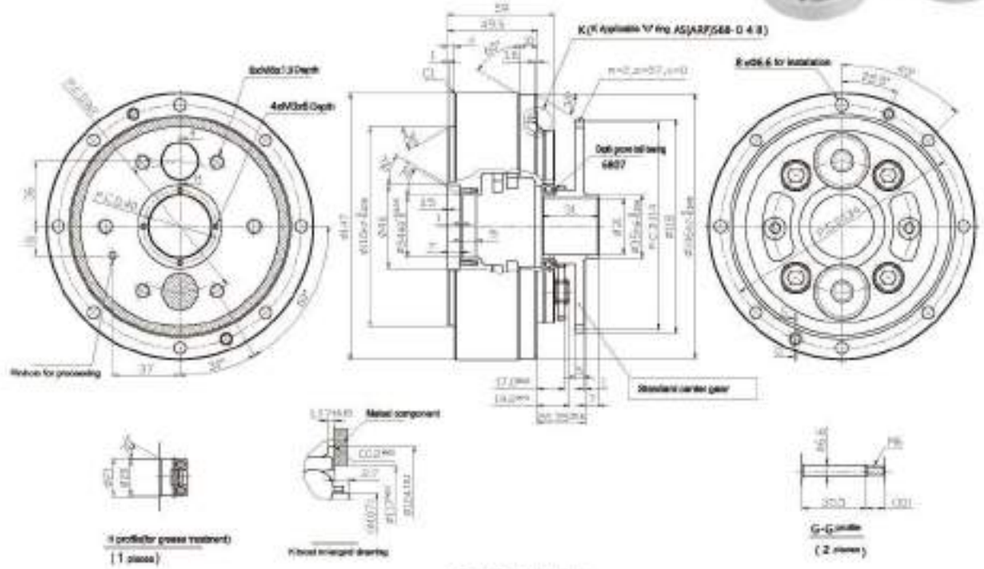
3. When the reduction gear is used at low temperatures, there will be a larger no-load running torque. Note this characterist c when selecting a motor. (Refer to "Low temperature characteristic" on page 93)

T_R Rated torque (Note 7)	N_R Rated output Speed	K Rated service life	T_{1A} Allowable acceleration/deceleration torque	T_{2M} Momentary maximum allowable torque	N_{2M} Maximum allowable output speed (Note 7)	Backlash	Lost motion KA4	Angular transmission error MAX.	Starting efficiency (Typical value)	Mom Allowable moment (Note 4)	Mac Momentary allowable moment (Mac)	Wr Allowable radial load (Note 9)	I Reduced value of the inertia moment for the input shaft (Note 5)	$I(\alpha=90°)$ Inertia of center gear	Weight
(Nm)	(rpm)	(h)	(Nm)	(Nm)	(r/min)	(arcsec)	(arcmin)	(arcsec)	(%)	(Nm)	(Nm)	(N)	(kgm^2)	(kgm²)	(kg)
98	15	6,000	245	490	80	1.0	1.0	70	75	686	1,372	5,755	1.38×10^{-4}	0.678×10^{-3}	4.6
264.6	15	6,000	662	1,323	60	1.0	1.0	70	80	980	1,960	6,520	0.550×10^{-4}	0.563×10^{-3}	8.5
490	15	6,000	1,225	Bolt joint 2,450 / Through-bolt clamping 1,960	50	1.0	1.0	60	75	1,764	3,528	9,428	1.82×10^{-4}	0.363×10^{-3}	14.6
980	15	6,000	2,450	Bolt joint 4,900 / Through-bolt clamping 3,430	40	1.0	1.0	50	80	2,450	4,900	11,802	0.475×10^{-3}	0.953×10^{-3}	19.5
1,960	15	6,000	4,900	Bolt joint 9,800 / Through-bolt clamping 7,350	30	1.0	1.0	50	80	8,820	17,640	31,455	1.39×10^{-3}	1.94×10^{-3}	55.6
3,136	15	6,000	7,840	15,680	25	1.0	1.0	50	85	20,580	39,200	57,087	0.516×10^{-2}	0.405×10^{-1}	79.5
4,900	15	6,000	12,250	24,500	20	1.0	1.0	50	80	34,300	78,400	82,970	0.996×10^{-2}	1.014×10^{-1}	154

Note:

4. The allowable moment will differ depending on the thrust load. Check the allowable moment diagram (p. 91).
5. The inertia moment value is for the reduction gear. It does not include the inertia moment for the input gear.
6. For the moment rigidity and torsional rigidity, refer to the calculation of tilt angle and the torsion angle (p. 99).
7. The rated torque is the value that produces the rated service life based on operation at the rated output speed; it does not indicate the maximum load. Refer to the"Glossary" (p.81) and the "Product selection flowchart" (p.82).
8. Contact us regarding speed ratios other than those listed above.
9. The specifications above are based on Nabtesco evaluation methods; this product should only be used after confirming that it is appropriate for the operatingconditions of your system.
10. When radial load b is applied within dimension b, use the reduction gear within the allowable radial load.
11. *1 The R=153 for the RV-80E is only for the bolt-clamping output shaft type (page 20, 21).

RV-10C Output Shaft Bolt-on Type External Dimensions

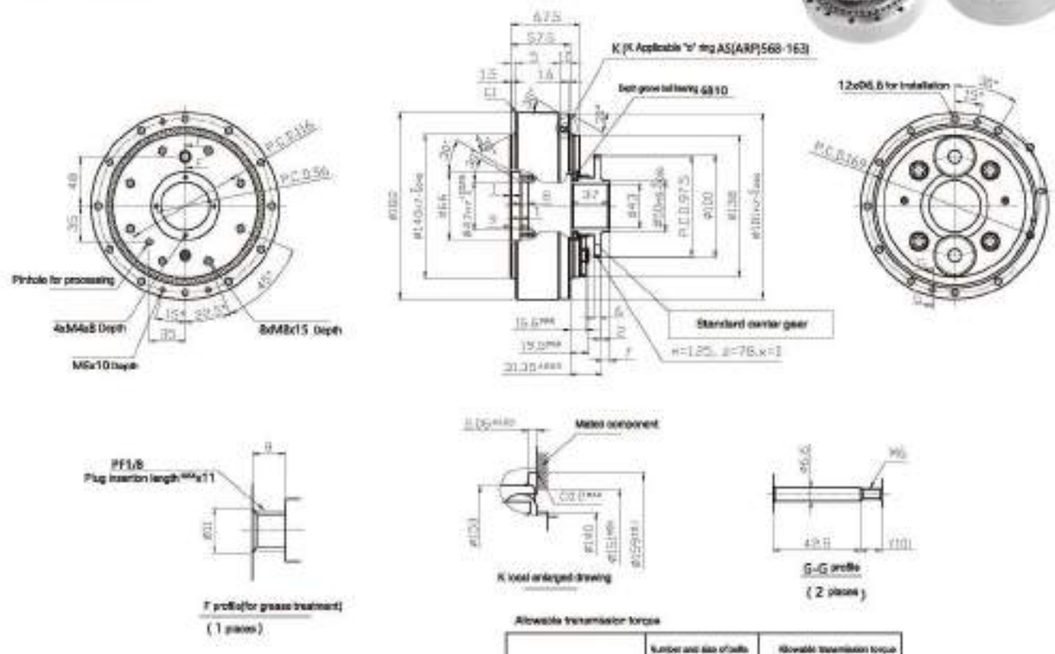


Allowable transmission torque

	Number and size of bolts	Allowable transmission torque
Shell side	8-M6	1058.4Nm
Shaft side	6-M6	882Nm

Note: 1) "O" type ring and screw bolt , washer for installation are to be provided by customer.
2) Please forgive not to inform in advance for the anytime changes of specifications, sizes.

RV-27C Output Shaft Bolt-on Type External Dimensions

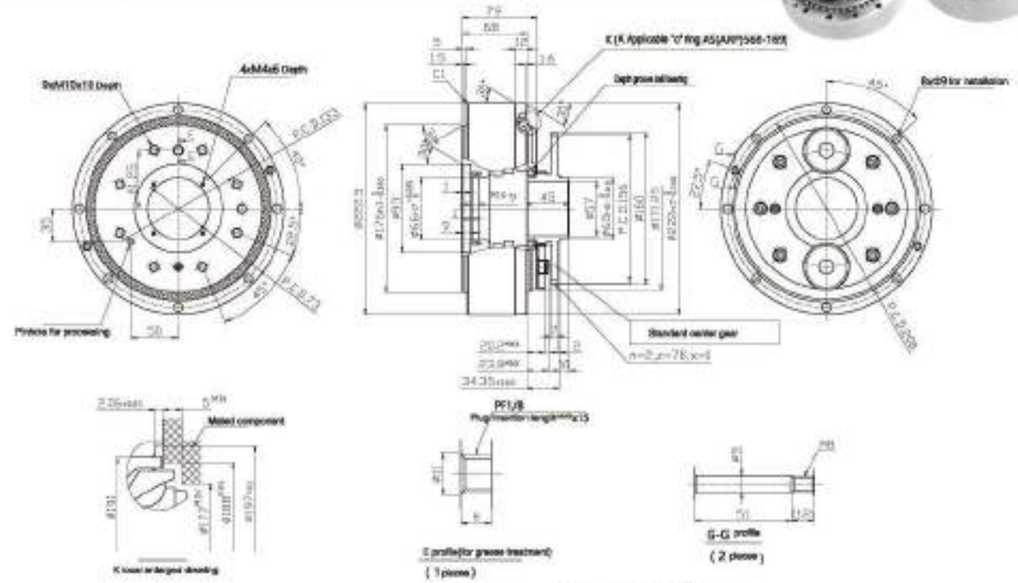


Allowable transmission torque

	Number and size of bolts	Allowable transmission torque
Shell side	12-M6	1999.2Nm
Shaft side	6-M6	1666Nm

Note: 1) "O" type ring and screw bolt , washer for installation are to be provided by customer.
2) Please forgive not to inform in advance for the anytime changes of specifications, sizes.

RV-50 Output Shaft Bolt-on Type External Dimensions

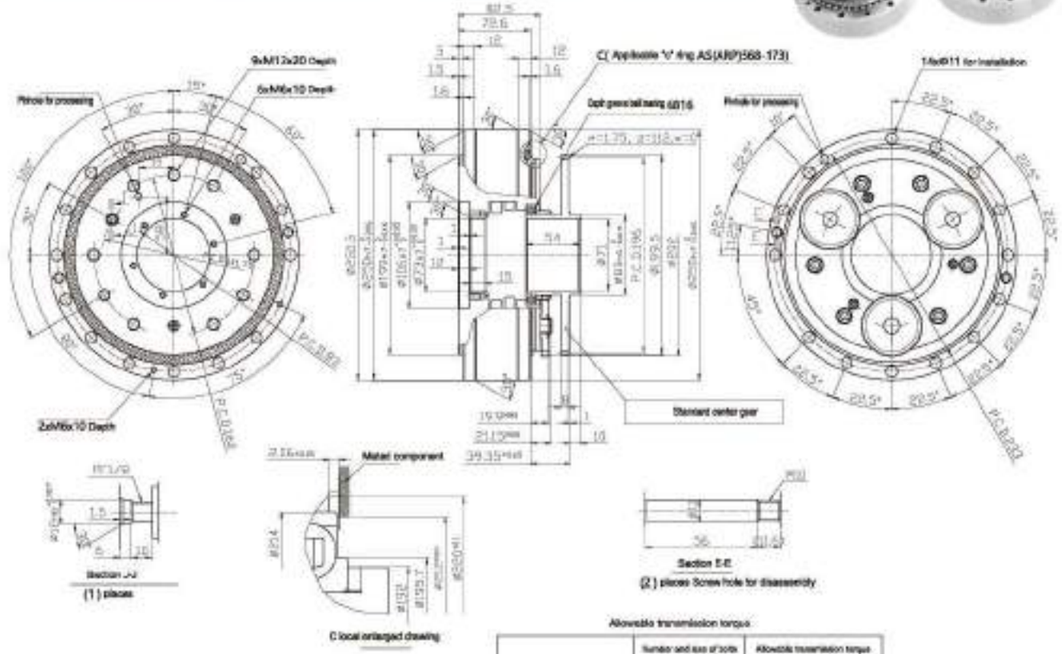


Allowable transmission torque

	Number and size of bolts	Allowable transmission torque
Shell side	8-M8	2989Nm
Shaft side	9-M10	3410.4Nm

Note: 1) "O" type ring and screw bolt , washer for installation are to be provided by customer.
2) Please forgive not to inform in advance for the anytime changes of specifications, sizes.

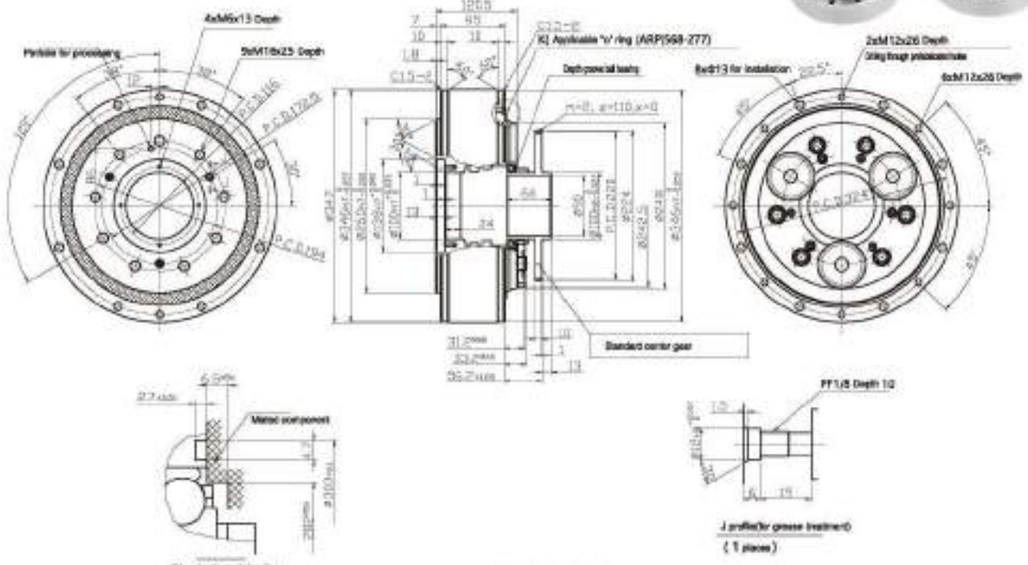
RV-100C Output Shaft Bolt-on Type External Dimensions



Allowable transmission torque

	Number and size of bolts	Allowable transmission torque
Shell side	14-M10	9310Nm
Shaft side	9-M12	5948.6Nm

RV-200C Output Shaft Bolt-on Type External Dimensions

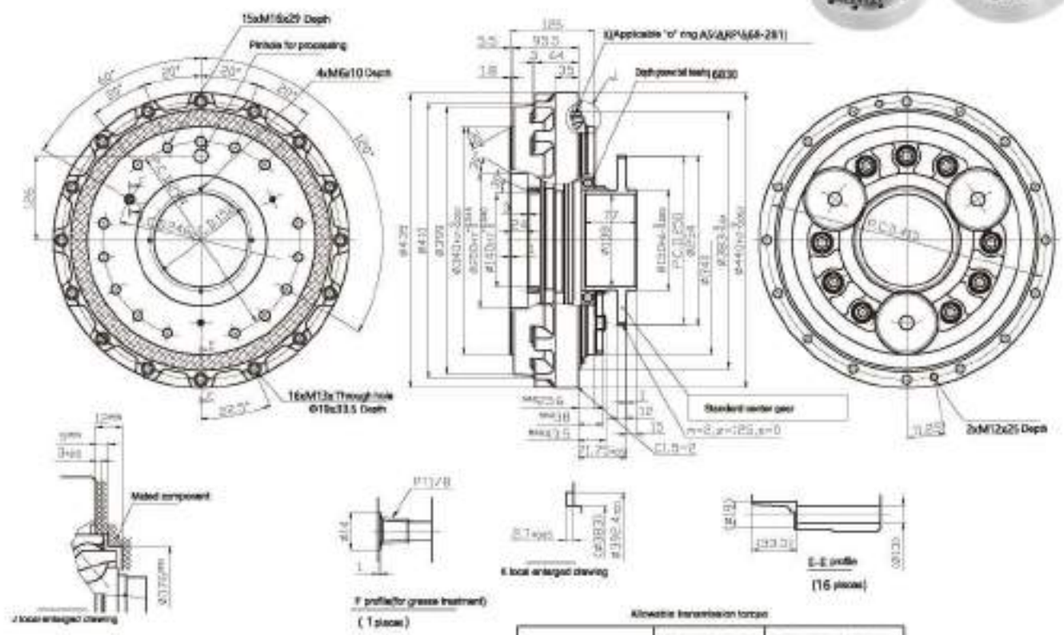


Note: 1)"O" type ring and screw bolt , washer for installation are to be provided by customer.
2)Please forgive not to inform in advance for the anytime changes of specifications, sizes.

Allowable transmission torque

	Number and size of bolts	Allowable transmission torque
Shell side	8-M12	10701.6Nm
Shaft side	9-M16	13543Nm

RV-320C Output Shaft Bolt-on Type External Dimensions

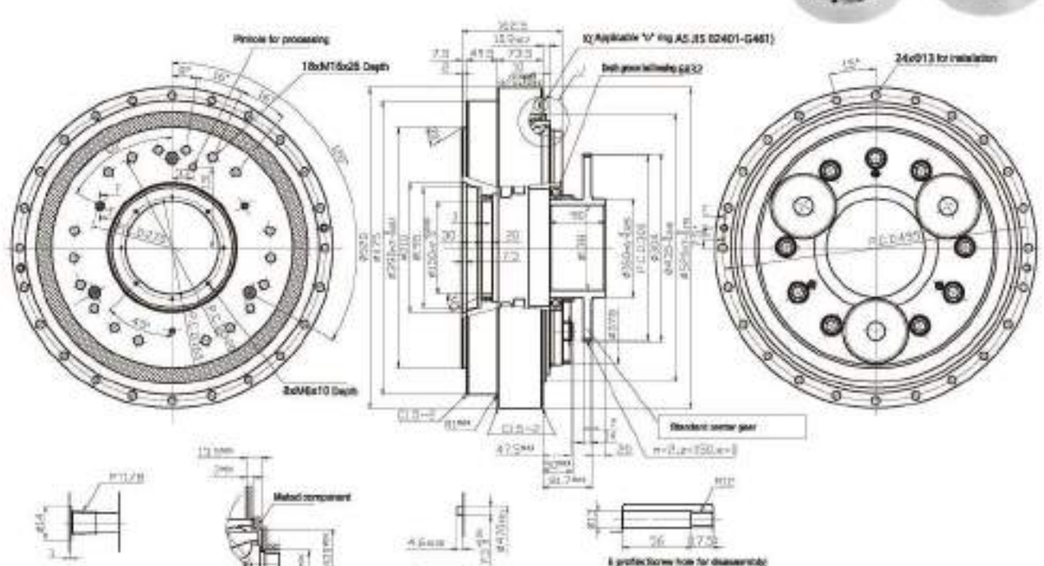


Note: 1) "O" type ring and screw bolt , washer for installation are to be provided by customer.
2) Please forgive not to inform in advance for the anytime changes of specifications, sizes.

Allowable transmission torque

	Number and size of bolts	Allowable transmission torque
Shell side	16-M12	27640Nm
Shaft side	15-M16	34202Nm

RV-500 Output Shaft Bolt-on Type External Dimensions



Note: 1)"O" type ring and screw bolt , washer for installation are to be provided by customer.
2) Please forgive not to inform in advance for the anytime changes of specifications, sizes.

Allowable transmission torque

	Number and size of bolts	Allowable transmission torque
Shell side	24-M12	49088.2Nm
Shaft side	18-M16	44668.4Nm

RV-C Series Design Points Installation Components

Design of the motor mounting flange

In order to avoid contact with reduction gear components, refer to the sizes indicated in the "External Dimensions"drawings when designing the motor mounting flange.

Note: The size and number of bolts for the motor mounting flange should be determined with the torque and moment taken into consideration, and should be positioned in line with the reduction gear's case mounting holes.
After installing the reduction gear, we recommend installing an add/drain grease fitting to enable grease replacement. An installation example is shown below.
Use the specified tightening torque to uniformly tighten the hexagon socket head cap screws (with corresponding conical spring washers).

To obtain maximum performance from the C series, it is important to optimally design the assembly, installation,lubrication, and sealing. Be sure to read the following precautions before designing the above.
As angular ball bearings are used as the main bearings, design the mating component dimensions according to the dimensions shown in the "External Dimensions" drawings to make sure that the bearing retainer does not come in contact with the motor mounting flange.

Note: Two types of C series are available: bolt clamping output shaft type (refer to pages 40 to 46 for "External Dimensions" drawings, and through bolt clamping output shaft type (refer to pages 47 to 52 for "External Dimensions" drawings excluding RV-500C). Please be sure to specify when ordering.

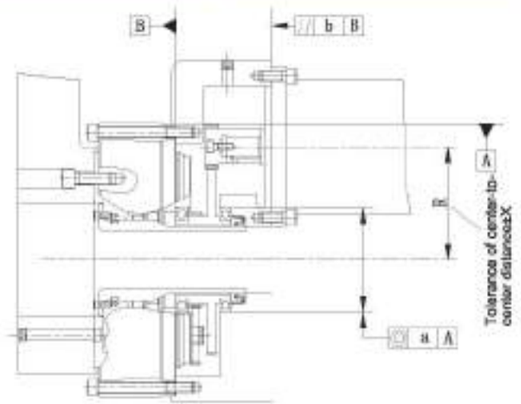
RV-C Series Assembly accuracy

Design the mounting side components of the C series according to the following.
Poor assembly accuracy causes vibration and particularly noise or backlash.

•Assembly accuracy of RV-10C, 27C, 50C, 100C, 200C, 320C, and 500C

(Unit : mm)

Type	Tolerance of center to-center distance X	Concentricity tolerance a	Tolerance of parallelism b
RV-10C	±0.03	MAX0.03	MAX0.03
RV-27C			
RV-50C			
RV-100C			
RV-200C			
RV-320C			
RV-500C			



R indicates distance from center of reduction gear to center of motor.

RV-C Series Design Points Installation Components

Installation procedure

• Typical installation examples for gearboxes to be mounted on the mating components are shown below. Be sure to apply the specified amount of the specified grease during assembly. Seals are required for the mounting surfaces of the center tube and gearbox.
• Refer to the O-ring seals shown to make a seal design of the mounting side.
• If O-ring (II) cannot be used due to the structure, apply the appropriate liquid sealant from the table on the right.
• If a seal cannot be formed by applying liquid sealants due to the structure, use O-ring (III) and (IV) .

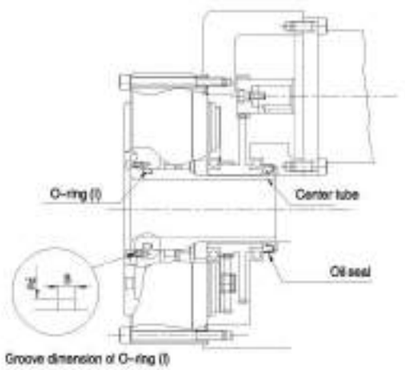
Recommended liquid sealant

Manufacturer	Characteristics and applications
Three Bond 1211 (Three Bond)	• Silicone-based, solventless type • Semi-dry gasket
HERME SERL SS-60F (Nihon-Hermetics)	• One-part, non-solvent elastic sealant • Metal contact side (flange surface) seal • Three Bond1211 Any product basically equivalent to ThreeBond 1211
Locktite515 (Henkel)	• Anaerobic flange sealant • Metal contact side (flange surface) seal

Notes 1. Do not use these sealants for copper material or copper alloy material.
2. If these sealants need to be used under special conditions such as concentrated alkali, pressurized steam, etc., please contact us.

Assembly example of center tube

Centre tube is used to protect the grease passing through the hollow part and sealing the inside of the reducer. The following figure shows an example of an assembly reference for a centre tube.



Dimensions for O-ring (I) seal(for reference) (単位 Unit : mm)

		RV-10C	RV-27C	RV-50C
Dimensions	O-ring	ID No.	CO 0625	CO 0634	CO 0643
		Wire dia.	φ 2.4 ±0.07	←	φ 3.5 ±0.1
		I.D.	φ 29.7	φ 42.2	φ 59.6
	Groove dimensions	I.D. c	φ 30.2	φ 43.2	φ 60.3
		Width B	3.2	←	4.7

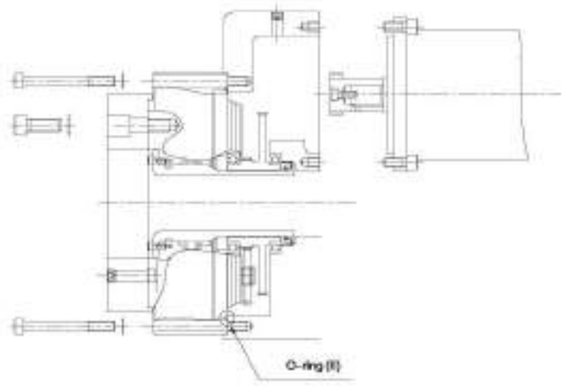
(単位 Unit : mm)

		RV-100C	RV-200C	RV-320C	RV-500C
Dimensions	O-ring	ID No.	S70	G95	G135	G145
		Wire dia.	φ 2.0 ±0.1	φ 3.1 ±0.1	←	←
		I.D.	φ 69.5	φ 94.4	φ 134.4	φ 144.4
	Groove dimensions	I.D. c	φ 70.0	φ 95.0	φ 135.0	φ 145.0
		Width B	2.7	4.1	←	←

Assembly example with the output shaft bolt clamping type

(RV-10C、27C、50C、100C、200C、320C、500C)

If center tube, oil seal and O-ring (I) are used together, the seal on the mounting surface of output shaft side is not required.



O-ring (II)

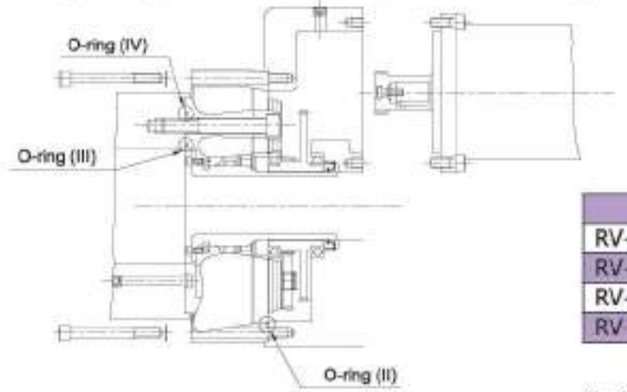
	Applicable to O-ring
RV-10C	AS568-048
RV-27C	AS568-163
RV-50C	AS568-169
RV-100C	AS568-173
RV-200C	AS568-277
RV-320C	AS568-281
RV-500C	G460

The O-ring (II) can be applied to both bolt clamping and through-bolt clamping output shaft types.

Assembly example of through-bolt clamping output shaft type

(RV-27C、RV-50C、100C、200C)

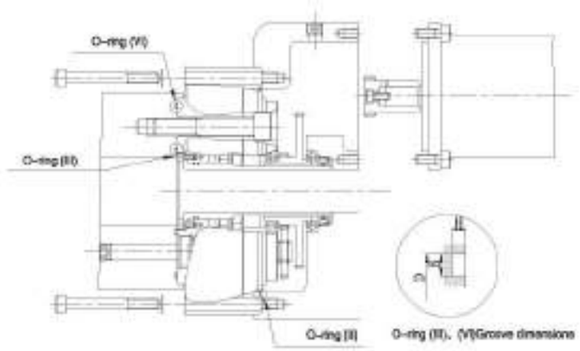
The O-ring groove is provided at the end face of output shaft of the reduction gear. Use O-rings as shown below.



	Applicable to O-ring (III)	Applicable to O-ring (VI)
RV-27C	S75	S120
RV-50C	S100	S150
RV-100C	G115	AS568-165
RV-200C	S150	AS568-271

● Assembly example of through-bolt clamping output shaft type (RV-10C、320C)

Provide the O-ring groove on the counterpart component. Dimensions of O-rings are shown below for reference.



Dimensions for O-ring (I) seal(for reference) (Unit : mm)

		RV-10C	RV-320C
Dimensions	O-ring	ID No.	AS568-032	G210
		Wire dia.	φ 1.78 ±0.07	φ 5.7 ±0.13
		I.D.	φ 47.35 ±0.38	φ 209.3
	Groove dimensions	Outside dia D	φ 51.0	φ 220.0
		Depth H	1.27 ±0.05	5.5 ±0.05
		Width B	2.39	7.5

Note: The S type ID number is the manufacturer's own standard.

Dimensions for O-ring (VI) seal(for reference) (Unit : mm)

		RV-10C	RV-320C
Dimensions	O-ring	ID No.	S100	G290
		Wire dia.	φ 2.0 ±0.1	φ 5.7 ±0.13
		I.D.	φ 99.5 ±0.4	φ 289.3
	Groove dimensions	Outside dia D	φ 103.0	φ 300.0
		Depth H	1.5	5.5 ±0.05
		Width B	2.7	7.5

RV-EM Series model Indication

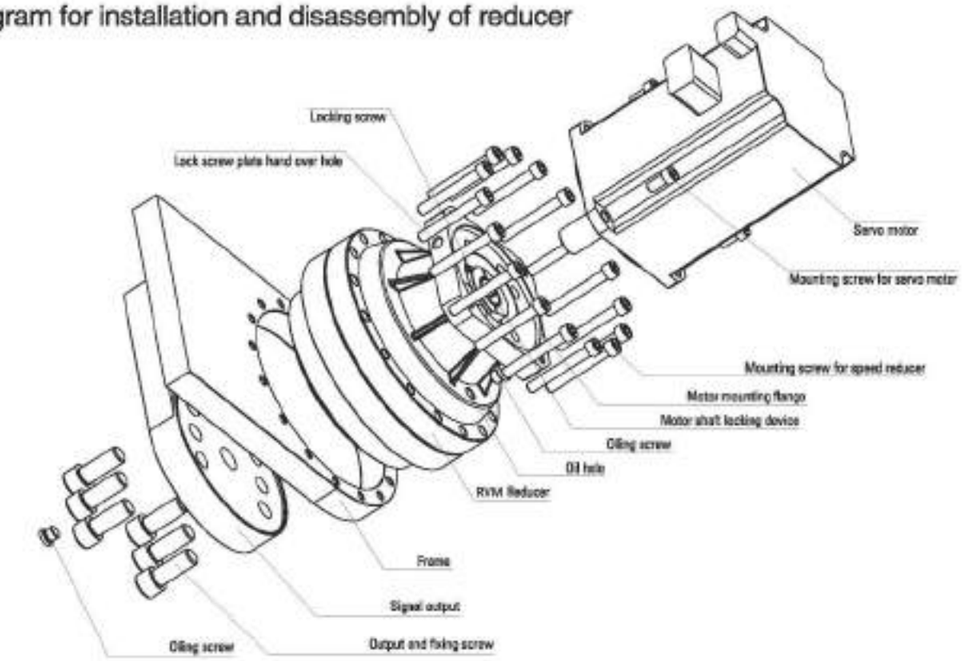
•When placing an order or making an inquiry, please use the following codes to specify the appropriate model.

RV – 80 EM – 121 – A – B – Motor

Model code	Frame number	Series code	Ratio code	Input gear code Input spline code	Output shaft clamp code	Motor
RV	6	E: Main bearing built-in type	31, 43, 53.5, 59, 79, 103	A: Standard gear A B: Standard gear B Z: No gear	B: Bolt-clamping output shaft type P: Pin/bolt clamping output shaft type	Motor Model
	20		57, 81, 105, 121, 141, 161			
	40		57, 81, 105, 121, 153			
	80		57, 81, 101, 121, 153			
	110		81, 111, 161, 175			
	160		81, 101, 129, 145, 171			
	320		81, 101, 118.5, 129, 141, 171, 185			
	450		81, 101, 118.5, 129, 154.8, 171, 192.4			

RV-EM Series

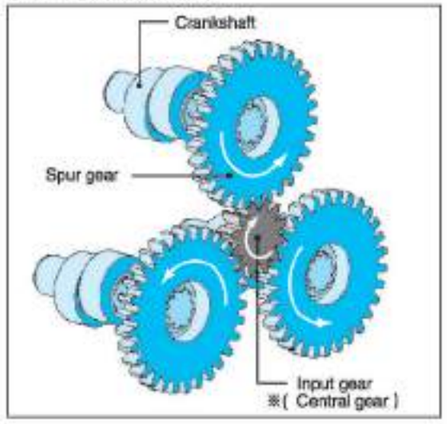
Diagram for installation and disassembly of reducer



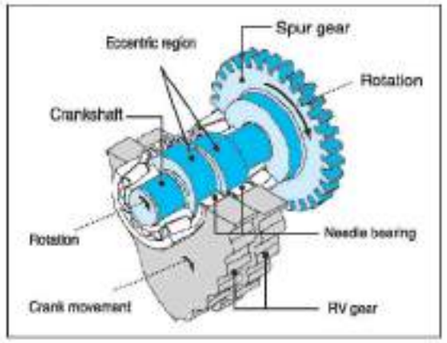
RV-EM Series working principle

1. Rotation of the servomotor is transmitted through the input gear to the spur gears, and the speed is reduced
   accordingly with the gear ratio between the input gear and the spur gears <Fig. 1>.
※ The hollow series is transmitted from the input gear to the spur gear through the central gear.
2. Since they are directly connected, the crankshafts have the same rotational speed as the spur gears <Fig. 1>.
3. Two RV gears are mounted around the needle bearings on the eccentric region of the crankshaft. (In order to
   balance the equal amount of force, two RV gears are mounted) <Fig. 2>.
4. When the crankshafts rotate, the RV gears mounted on the eccentric sections also revolve eccentrically
   around the input axis (crank movement) <Fig. 2>.
5. Pins are arrayed in a constant pitch in the grooves inside the case. The number of pins is just one larger than
   the number of RV teeth <Fig. 3>.
6. As the crankshafts revolve one complete rotation, the RV gears revolve eccentrically one pitch of a pin (crank
   movement). As a result of this, the RV gears rotate one tooth in the direction opposite to the rotation of the
   crankshafts <Fig. 3>.
7. The rotation is then transmitted to the shaft (output shaft) via the crankshaft. At this time, the shaft rotation
   speed can be reduced in proportion to the number of pins against the crankshaft. This is the second reduction
   section <Fig. 3>.
8. The total reduction ratio is the product of the first reduction ratio multiplied by the second reduction ratio.
※ Hollow series include reduction ratio of the centre gear section.

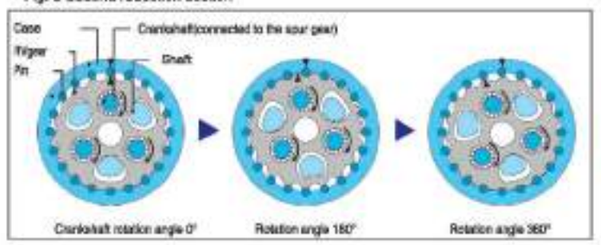
■ Fig. 1 First reduction section



■ Fig.2 Crankshaft section

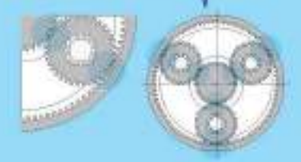


■ Fig. 3 Second reduction section



■ Standard planetary gear

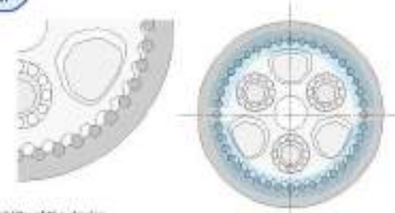
Low meshing rate and weak impact resistance



Gearbox is damaged when subjected to impact

■ RV-EM series

Using pin gear mechanism, meshing rate and impact resistance are improved.



High reliability of the device

RV-EM Series Rating Table

Output speed (rpm)				5	10	15	20	25	30	40	50	60
Type	Ratio code	R Speed ratio		Output torque (Nm) / Input capacity (kW)								
		Shaft rotation	Case rotation									
RV-6EM	31	31	30	101 / 0.07	81 / 0.11	72 / 0.15	66 / 0.19	62 / 0.22	58 / 0.25	54 / 0.30	50 / 0.35	47 / 0.40
	43	43	42									
	53.5	53.5	52.5									
	59	59	58									
	79	79	78									
	103	103	102									
RV-20EM	57	57	56	231 / 0.16	188 / 0.26	167 / 0.35	153 / 0.43	143 / 0.50	135 / 0.57	124 / 0.70	115 / 0.81	110 / 0.92
	81	81	80									
	105	105	104									
	121	121	120									
	141	141	140									
	161	161	160									
RV-40EM	57	57	56	372 / 0.40	465 / 0.65	412 / 0.86	377 / 1.05	353 / 1.23	334 / 1.40	307 / 1.71	287 / 2.00	271 / 2.27
	81	81	80									
	105	105	104									
	121	121	120									
	153	153	152									
RV-80EM	57	57	56	1,088 / 0.76	885 / 1.24	784 / 1.64	719 / 2.01	672 / 2.35	637 / 2.67	584 / 3.26	546 / 3.81	517 / 4.33
	81	81	80									
	101	101	100									
	121	121	120									
	153	*1 (153)	*1 (152)									
RV-110EM	81	81	80	1,499 / 1.05	1,215 / 1.70	1,078 / 2.25	990 / 2.76	925 / 3.23	875 / 3.67	804 / 4.49		
	111	111	110									
	161	161	160									
	175	1227/7	1220/7									
RV-160EM	81	81	80	2,176 / 1.52	1,774 / 2.48	1,568 / 3.28	1,441 / 4.02	1,343 / 4.69	1,274 / 5.34			
	101	101	100									
	129	129	128									
	145	145	144									
	171	171	170									
RV-320EM	81	81	80	4,361 / 3.04	3,538 / 4.94	3,136 / 6.57	2,881 / 8.05	2,695 / 9.41	2,548 / 10.7			
	101	101	100									
	118.5	118.5	117.5									
	129	129	128									
	141	141	140									
	171	171	170									
	185	185	184									
RV-450EM	81	81	80	6,135 / 4.28	4,978 / 6.95	4,410 / 9.24	4,047 / 11.3	3,783 / 13.2				
	101	101	100									
	118.5	118.5	117.5									
	129	129	128									
	154.8	2013/13	2000/13									
	171	171	170									
	192	1347/7	1340/7									

Note: 1. The allowable output speed will differ depending upon the duty ratio, load, and ambient temperature. Contact us regar ding use above the allowable output speed Ns1.

2. The input capacity (kW) is calculated according to the following calculation formula:

$$\text{Input capacity (kW)} = \frac{2\pi \cdot N \cdot T}{60 \cdot \frac{\eta}{100} \cdot 10^3}$$

N: Output speed (rpm)
T : Output torque (Nm)
η =75: Reduction gear efficiency (%)

Note: The input capacity is a reference value.

3. When the reduction gear is used at low temperatures, there will be a larger no-load running torque. Note this characteristi c when selecting a motor. (Refer to "Low temperature characteristic" on page 93)

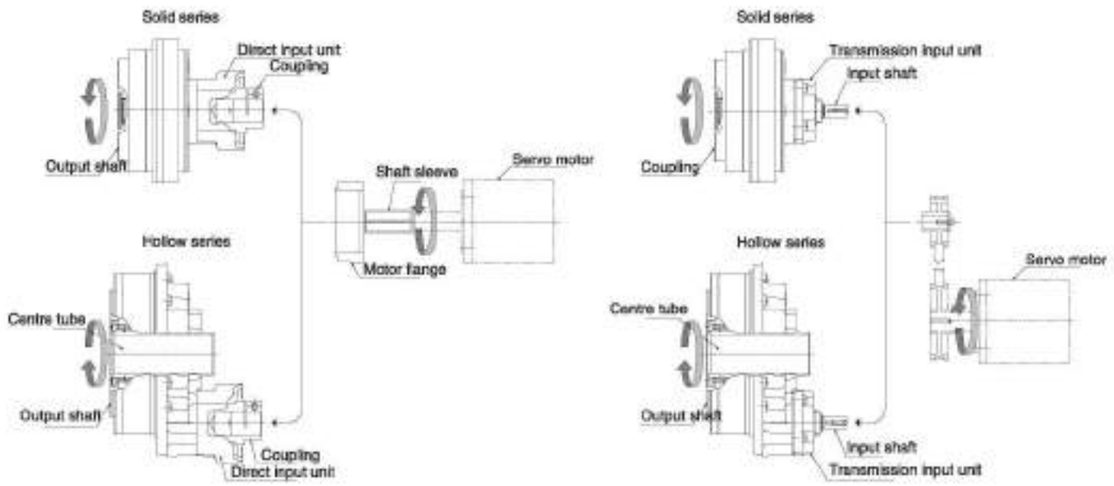
Tr Rated torque (Note 7)	Nr Rated output Speed	E Rated service life	Tri Allowable acceleration/deceleration torque	Tro Momentary maximum allowable torque	Nro Maximum allowable output speed (Note 1)	Backlash	Load motion MAX.	Angular transmission error MAX.	Startup eff ciency (Typical value)	Mcr Allowable moment [Note 4]	Mco Momentary allowable moment [Max.]	Wr Allowable radial load (Note 10)	I Reduced value of the inertia moment for the input shaft (Note 5)	Weight
(Nm)	(rpm)	(h)	(Nm)	(Nm)	(r/min)	(arc.sec.)	(arc.min)	(arc.sec)	(%)	(Nm)	(Nm)	(N)	(kgm²)	(kg)
58	30	6,000	117	294	100	1.5	1.5	80	70	196	392	2,140	2.63×10^{-4}	2.5
													2.00×10^{-4}	
													1.53×10^{-4}	
													1.39×10^{-4}	
													1.09×10^{-4}	
													0.74×10^{-4}	
167	15	6,000	412	833	75	1.0	1.0	70	75	882	1,764	7,785	9.66×10^{-4}	4.7
													6.07×10^{-4}	
													4.32×10^{-4}	
													3.56×10^{-4}	
													2.88×10^{-4}	
													2.39×10^{-4}	
412	15	6,000	1,029	2,058	70	1.0	1.0	60	85	1,666	3,332	11,594	3.25×10^{-3}	9.3
													2.20×10^{-3}	
													1.63×10^{-3}	
													1.37×10^{-3}	
													1.01×10^{-3}	
784	15	6,000	1,960	Bolt joint 3,920 / Pin/bolt joint 3,185	70	1.0	1.0	50	85	Bolt joint 2,156 / Pin/bolt joint 1,735	Bolt joint 4,312 / Pin/bolt joint 2,156	Bolt joint 12,988 / Pin/bolt joint 10,452	8.16×10^{-3}	Bolt joint 13.1 / Pin/bolt joint 12.7
													6.00×10^{-3}	
													4.82×10^{-3}	
													3.96×10^{-3}	
													2.98×10^{-3}	
1,078	15	6,000	2,695	5,390	50	1.0	1.0	50	85	2,940	5,880	16,648	9.88×10^{-3}	17.4
													6.96×10^{-3}	
													4.36×10^{-3}	
													3.89×10^{-3}	
1,568	15	6,000	3,920	Bolt joint 7,840 / Pin/bolt joint 6,615	45	1.0	1.0	50	85	3,920	Bolt joint 7,840 / Pin/bolt joint 6,762	18,587	1.77×10^{-4}	26.4
													1.40×10^{-4}	
													1.06×10^{-4}	
													0.87×10^{-4}	
													0.74×10^{-4}	
3,136	15	6,000	7,840	Bolt joint 15,680 / Pin/bolt joint 12,250	35	1.0	1.0	50	80	Bolt joint 7,056 / Pin/bolt joint 6,174	Bolt joint 14,112 / Pin/bolt joint 10,976	Bolt joint 28,067 / Pin/bolt joint 24,558	4.83×10^{-4}	44.3
													3.79×10^{-4}	
													3.15×10^{-4}	
													2.84×10^{-4}	
													2.54×10^{-4}	
													1.97×10^{-4}	
													1.77×10^{-4}	
4,410	15	6,000	11,025	Bolt joint 22,050 / Pin/bolt joint 18,620	25	1.0	1.0	50	85	8,820	Bolt joint 17,640 / Pin/bolt joint 13,524	30,133	8.75×10^{-4}	66.4
													6.91×10^{-4}	
													5.75×10^{-4}	
													5.20×10^{-4}	
													4.12×10^{-4}	
													3.61×10^{-4}	
													3.07×10^{-4}	

Note:

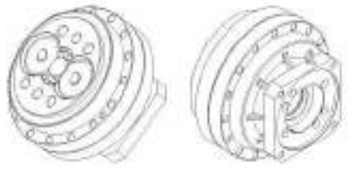
4. The allowable moment will differ depending on the thrust load. Check the allowable moment diagram (p. 91).
5. The inertia moment value is for the reduction gear. It does not include the inertia moment for the input gear.
6. For the moment rigidity and torsional rigidity, refer to the calculation of tilt angle and the torsion angle (p. 99).
7. The rated torque is the value that produces the rated service life based on operation at the rated output speed; it does not indicate the maximum load. Refer to the"Glossary" (p.81) and the "Product selection flowchart" (p.82).
8. Contact us regarding speed ratios other than those listed above.
9. The specifications above are based on Nabtesco evaluation methods; this product should only be used after confirming that it is appropriate for the operatingconditions of your system.
10. When radial load is applied within dimension b, use the reduction gear within the allowable radial load.
11. *1 The R=153 for the RV-80E is only for the bolt-clamping output shaft type (page 20, 21).

RV-EM Series

Reducer Installation Drawing



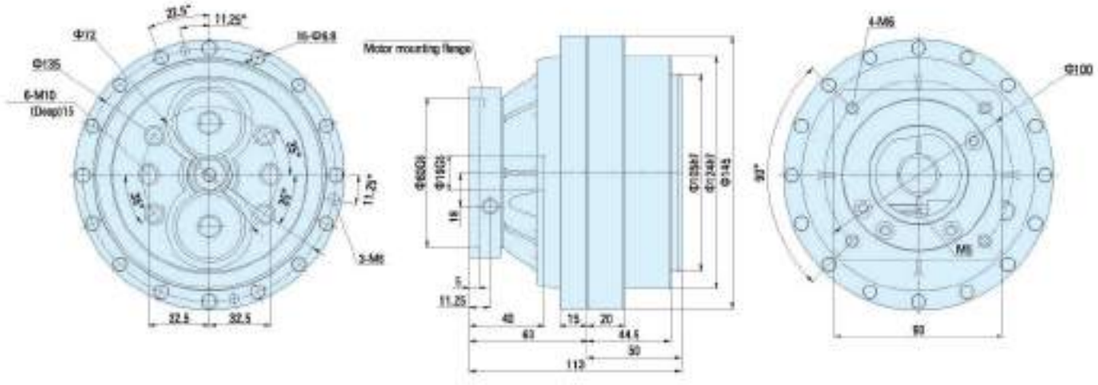
RV-20EM-(19 Shaft)



Overall Dimension Drawing

Output

Input



● Note:

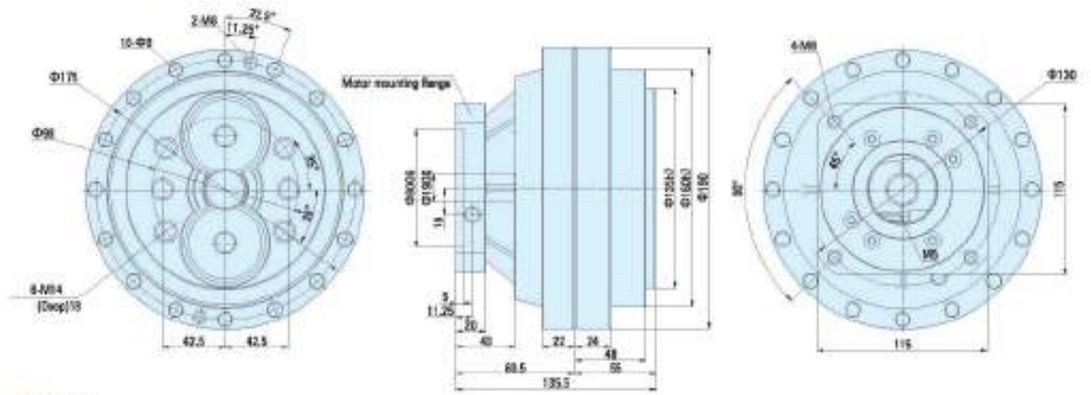
1. This figure applies to the motor shaft: <=19x40L; motor shaft lock use locker.
2. Motor mounting flange according to motor model.

RV-40EM-(19 Shaft)

Overall Dimension Drawing

Output

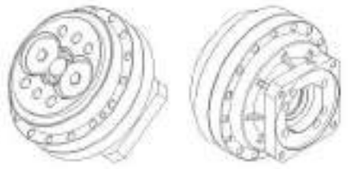
Input



● Note:

1. This figure applies to the motor shaft: <=19x40L; motor shaft lock use locker.
2. Motor mounting flange according to motor model.

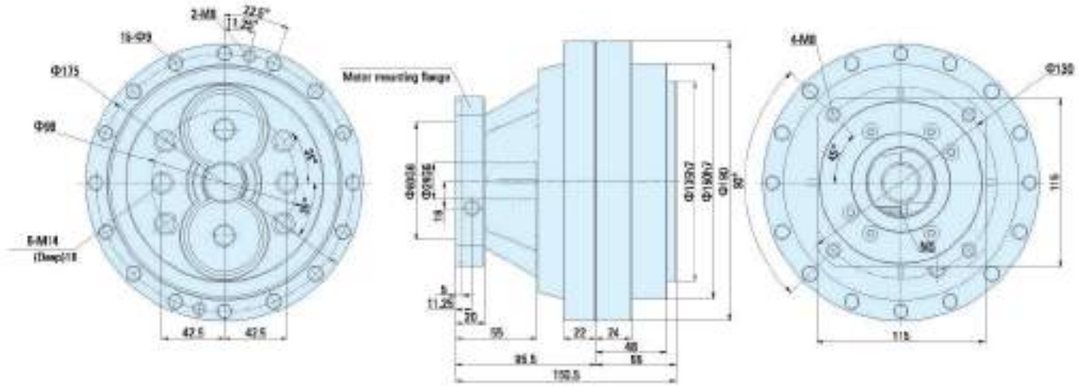
RV-40EM-(24 Shaft)



Overall Dimension Drawing

Output

Input



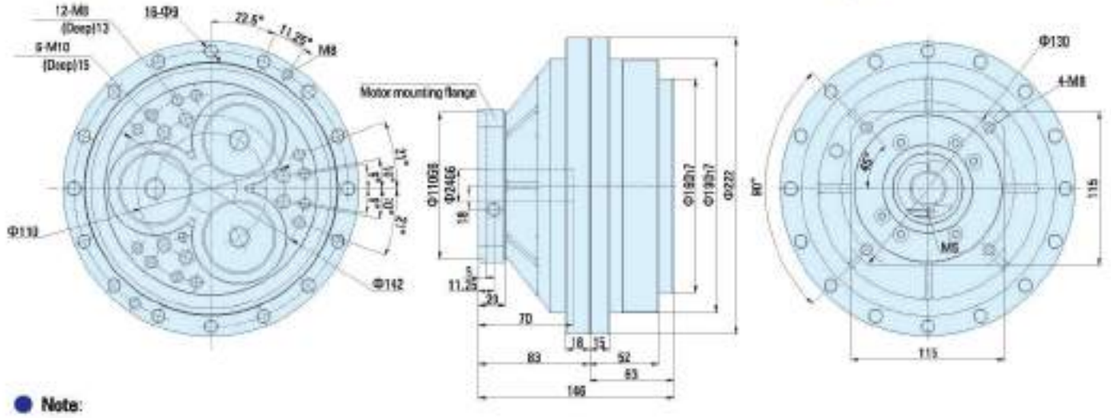
● Note:

1. This figure applies to the motor shaft: <=24x55L; motor shaft lock use locker.
2. Motor mounting flange according to motor model.

RV–80EM–(24 Shaft)

Overall Dimension Drawing

Output

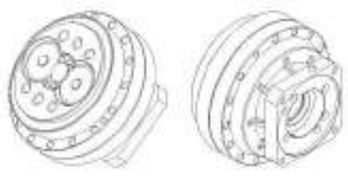


Input

● Note:

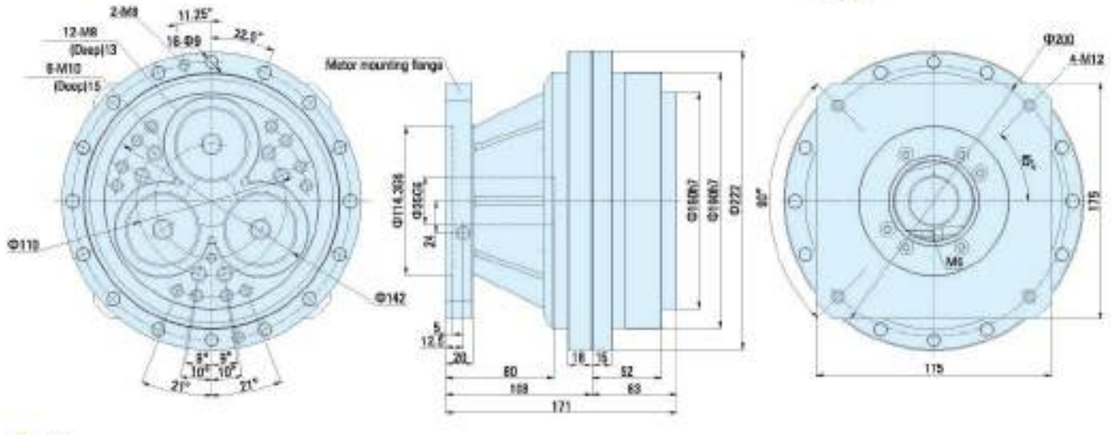
1. This figure applies to the motor shaft: <=24x70L; motor shaft lock use locker.
2. Motor mounting flange according to motor model.

RV–80EM–(35 Shaft)



Overall Dimension Drawing

Output



Input

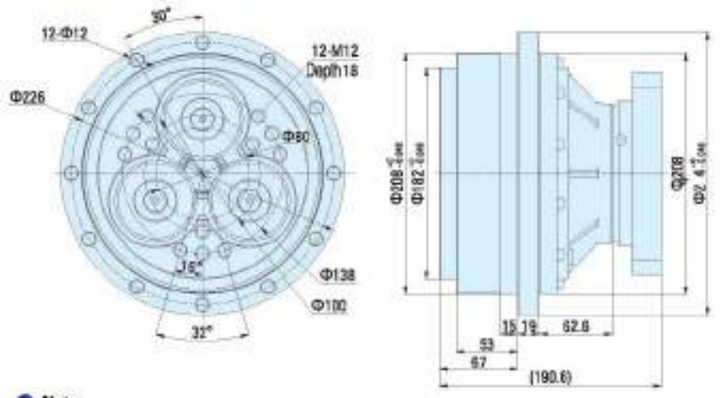
● Note:

1. This figure applies to the motor shaft: <=35x80L; motor shaft lock use locker.
2. Motor mounting flange according to motor model.

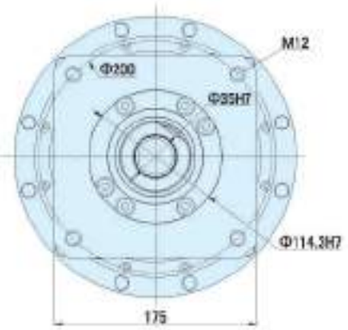
RV–110EM–(35 Shaft)

Overall Dimension Drawing

Output



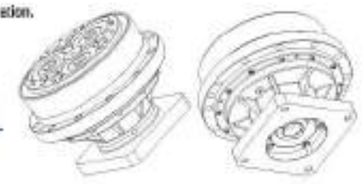
Input



● Note:

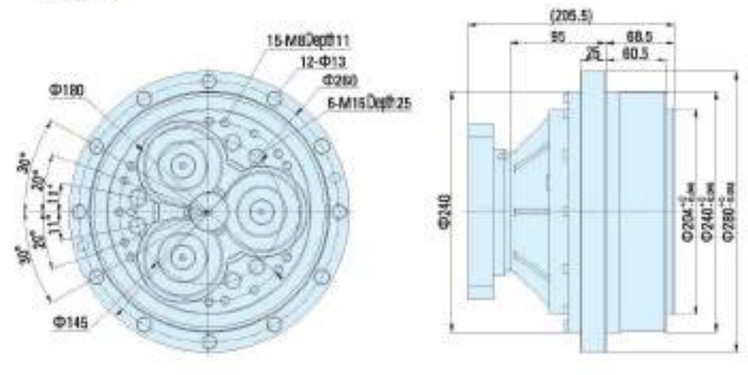
1. This figure applies to the motor shaft: <=35x70L; Motor shaft is locked by locker.
2. Speed reduction ratio: (81, 111, 161): 1 (shaft output).
3. Lubricants: VIGO GREASE REO or RE-00 (MOLYWHITE).
4. Rated output torque: 1100N.m (output speed: 15R/Min).
5. The motor mounting flange is supplied according to the motor type.
6. The output terminal must be sealed, please pay attention to the seal and concentricity position during the installation.

RV–160EM–(35 Shaft)



Overall Dimension Drawing

Output



Input

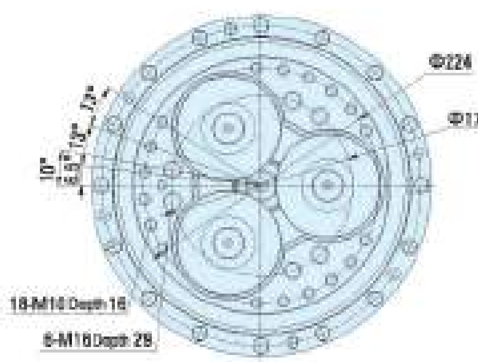
● Note:

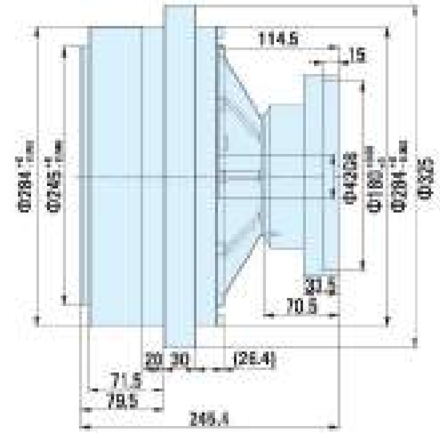
1. This figure applies to the motor shaft: <=35x70L; Motor shaft is locked by locker.
2. Speed reduction ratio: (81, 129, 171): 1 (shaft output).
3. Lubricants: VIGO GREASE REO or RE-00 (MOLYWHITE).
4. Rated output torque: 1570N.m (output speed: 15R/Min).
5. The motor mounting flange is supplied according to the motor type.
6. The output terminal must be sealed, please pay attention to the seal and concentricity position during the installation.

RV-320EM-(35 Shaft)

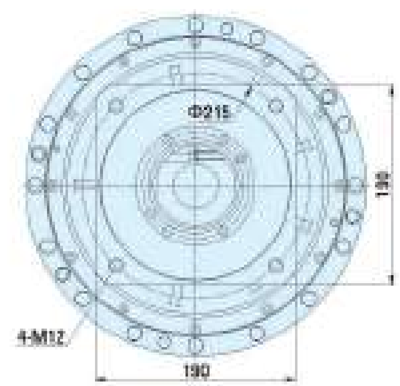
Overall Dimension Drawing

Output

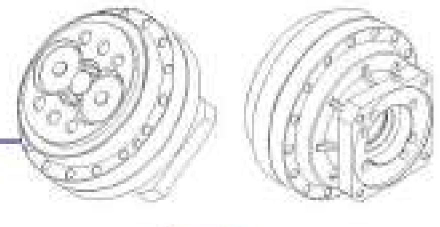




Input

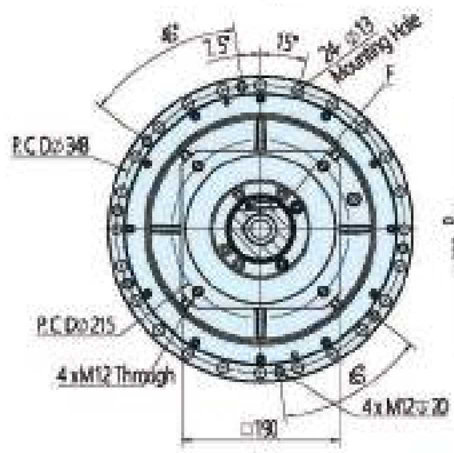


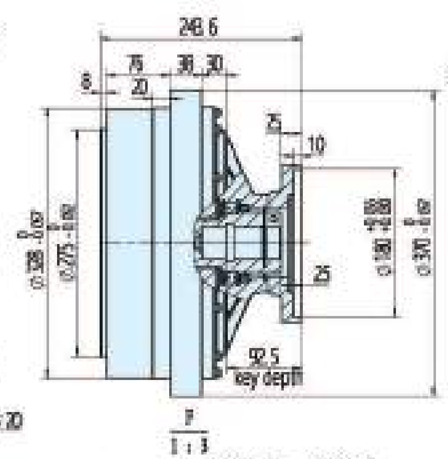
RV-500EM-(38 Shaft)



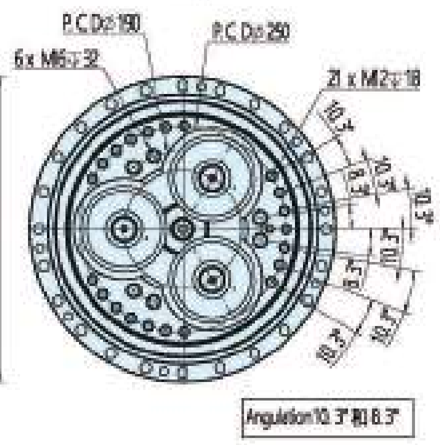
Overall Dimension Drawing

Output





Input



Notes:

1. 24–M12, torque 129 6.37 N.m, is used for the mounting screws of the chassis.
2. The output end flange connection screws adopt 21–M12, torque 129 ± 6.37 N.m; 6–M16, torque 319 ± 15.9 Nm.
3. The screws should be used with spring washers; use 12.9 grade strength screws;
4. Grease should be added with VIGOGREASE REO. 5;
5. Input shaft can be customized, please contact us for details;
6. The mass of the product is about 81kg.

Reducer technical parameter table			
Rated output torque	4410 Nm	Backlash	1 arc.min
Allowable start/stop torque	11020 Nm	Return differential	1 arc.min
Momentary maximum torque	22050 Nm	Transmission accuracy	1 arc.min
Rated output speed	15 rpm	Bending stiffness	7448 Nm/arc.min
Maximum output speed	25 rpm	Torsional rigidity	1176 Nm/arc.min
Ratio	192.4	Allowable bending moment of output shaft ①	8820 Nm
Input shaft diameter	⌀38	Maximum allowable axial force on output shaft ②	24500 N
Note: ① ② cannot be satisfied at the same time, please refer to our samples, or call us for more information.			

RV-CM Series model Indication

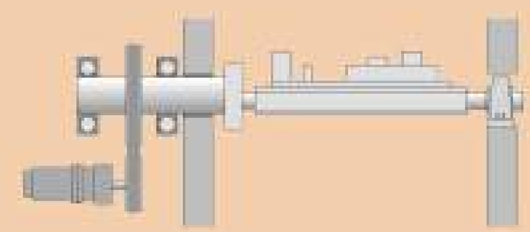
• When placing an order or making an inquiry, please use the following codes to specify the appropriate model.

RV – 80 CM – 36.75 – A – B – Motor

Model code	Frame number	Series code	Ratio code	Center gear code	Output shaft clamp code	Motor
RV	10	CM Input matching Motor flange	27	A: Standard gear A Z: No gear 76.3, 100.2 124.7, 151.6 214.3, 264.6	B: Bolt-clamping output shaft type T: Through-bolt clamping output shaft type	Motor
	27		36.57			
	50		32.54			
	100	CK	36.75			
	200		34.86			
	320	CW	35.61			
	500		37.34			

■ General equipment

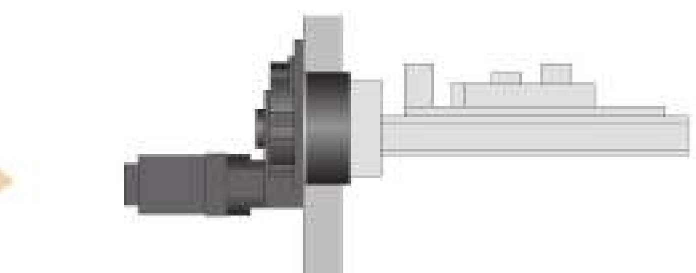
Need bearings + supplying platform



Large number of components, assembly and adjustment takes lots of time and efforts

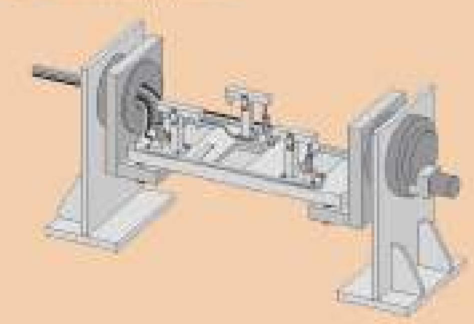
■ RV–CM series

Bearings with large capacity inside



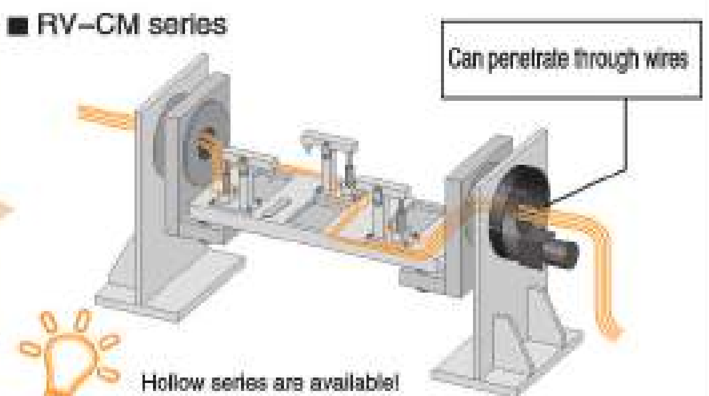
Less components, and less time of assembly and designing take

■ General equipment



Cable handling is troublesome

■ RV–CM series



Hollow series are available! Can improve layout!

RV-CM series Rating Table

Output speed (rpm)		5	10	15	20	25	30	40	50	60
Type	Ratio code	R Speed ratio: Shaft rotation	R Speed ratio: Case rotation	Output torque (Nm) / Input capacity (kW)						
RV-10CM	81, 108 153, 189 243	27	26	136 / 0.09	111 / 0.16	98 / 0.21	90 / 0.25	84 / 0.29	80 / 0.34	73 / 0.41	68 / 0.47	65 / 0.54
RV-27CM	79, 103 157, 177 231.5	1,350/38	1352/38	368 / 0.26	299 / 0.42	265 / 0.55	243 / 0.68	227 / 0.79	215 / 0.90	197 / 1.10	184 / 1.29	174 / 1.46
RV-50CM	80, 107 151, 177 234	1,985/61	1924/61	681 / 0.48	554 / 0.77	490 / 1.03	450 / 1.26	420 / 1.47	398 / 1.67	366 / 2.04	341 / 2.38	
RV-100CM	76.3, 100.2 124.7, 151.6 214.3, 264.6	36.75	35.75	1,352 / 0.95	1,107 / 1.55	980 / 2.05	899 / 2.51	841 / 2.94	796 / 3.33	730 / 4.08		
RV-200CM	34.86	1,499/43	1456/43	2,724 / 1.90	2,215 / 3.09	1,960 / 4.11	1,803 / 5.04	1,686 / 5.88	1,597 / 6.69			
RV-320CM	35.61	2,778/78	2700/78	4,351 / 3.04	3,538 / 4.94	3,136 / 6.57	2,881 / 8.05	2,690 / 9.41				
RV-500CM	37.34	3,099/83	3016/83	6,811 / 4.75	5,537 / 7.73	4,900 / 10.26	4,498 / 12.56					

Note: 1. The allowable output speed will differ depending upon the duty ratio, load, and ambient temperature.
Contact us regar ding use above the allowable output speed Na1.

2. The input capacity (kW) is calculated according to the following calculation formula:

$$\text{Input capacity (kW)} = \frac{2\pi \cdot N \cdot T}{60 - \frac{\eta}{100}} \cdot 10^{3}$$

N: Output speed (rpm)
T : Output torque (Nm)
η =75: Reduction gear efficiency (%)

Note: The input capacity is a reference value.

3. When the reduction gear is used at low temperatures, there will be a larger no-load running torque. Note this characteristi c when selecting a motor.
(Refer to "Low temperature characteristic' on page 93)

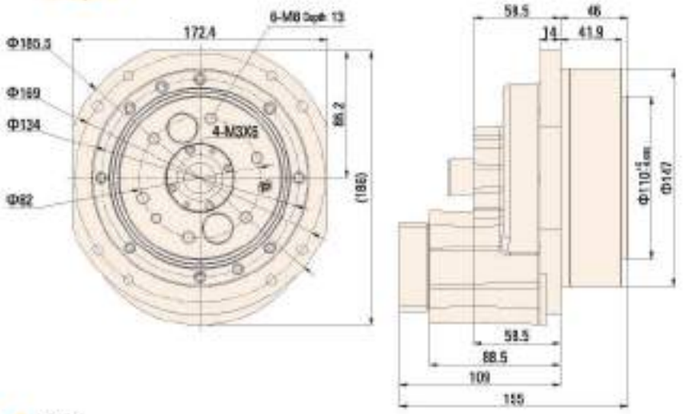
T_R Rated torque (Note 7)	N_R Rated output Speed	K Rated service life	T_P Allowable acceleration/deceleration torque	T_{CP} Momentary maximum allowable torque	N_{AP} Maximum allowable output speed (Note 1)	Backlash	Lost motion MAX.	Transmission error MAX.	Startup efficiency (Typical value)	M_{OY} Allowable moment (Note 4)	M_{OE} Momentary allowable moment (Max.)	Wr Allowable radial load (Note 9)	I Reduced value of the inertia moment for the input shaft (Note 5)	$I/(4\pi^2)$ Inertia of center gear	Weight
(Nm)	(rpm)	(h)	(Nm)	(Nm)	(r/min)	(arc.sec)	(arc.min)	(arc.sec)	(%)	(Nm)	(Nm)	(N)	(kgm^2)	(kgm^2)	(kg)
98	15	6,000	245	490	80	1.0	1.0	70	75	686	1,372	5,755	1.38×10^{-5}	0.678×10^{-3}	4.6
264.6	15	6,000	662	1,323	60	1.0	1.0	70	80	980	1,960	6,520	0.550×10^{-4}	0.563×10^{-3}	8.5
490	15	6,000	1,225	Bolt clamping 2,450 Through-bolt clamping 1,960	50	1.0	1.0	60	75	1,764	3,528	9,428	1.82×10^{-4}	0.363×10^{-2}	14.6
980	15	6,000	2,450	Bolt clamping 4,900 Through-bolt clamping 3,430	40	1.0	1.0	50	80	2,450	4,900	11,802	0.475×10^{-3}	0.953×10^{-2}	19.5
1,960	15	6,000	4,900	Bolt clamping 9,800 Through-bolt clamping 7,350	30	1.0	1.0	50	80	8,820	17,640	31,455	1.39×10^{-3}	1.94×10^{-1}	55.6
3,136	15	6,000	7,840	15,680	25	1.0	1.0	50	85	20,580	39,200	57,087	0.518×10^{-2}	0.405×10^{-1}	79.5
4,900	15	6,000	12,250	24,500	20	1.0	1.0	50	80	34,300	78,400	82,970	0.996×10^{-2}	1.014×10^{-1}	154

Note:
4. The allowable moment will differ depending on the thrust load. Check the allowable moment diagram (p. 91).
5. The inertia moment value is for the reduction gear. It does not include the inertia moment for the input gear.
6. For the moment rigidity and torsional rigidity, refer to the calculation of tilt angle and the torsion angle (p. 99).
7. The rated torque is the value that produces the rated service life based on operation at the rated output speed; it does not indicate the maximum load. Refer to the"Glossary" (p.81) and the "Product selection flowchart" (p.82).
8. Contact us regarding speed ratios other than those listed above.
9. The specifications above are based on Nabtesco evaluation methods; this product should only be used after confirming that it is appropriate for the operatingconditions of your system.
10. When radial load b is applied within dimension b, use the reduction gear within the allowable radial load.
11. *1 The R=153 for the RV-80E is only for the bolt-clamping output shaft type (page 20, 21).

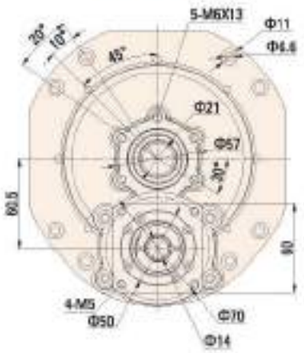
RV-10CM-(14 Shaft)

Overall Dimension Drawing

Output



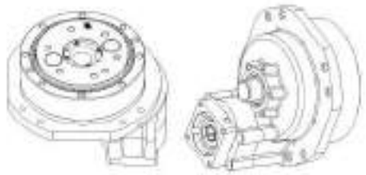
Input



Note:

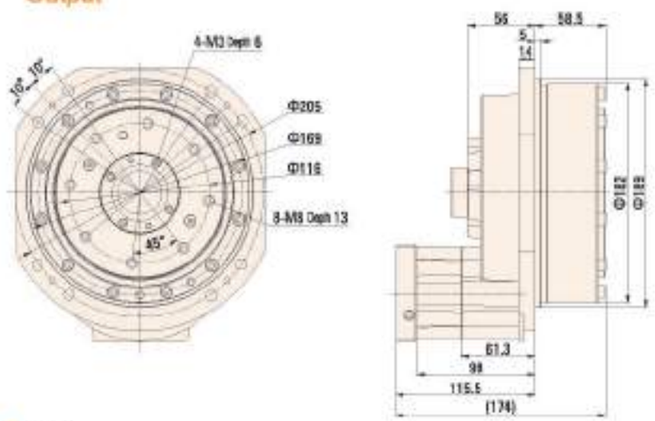
1. **This figure applies to the motor shaft: <=14x30L; Motor shaft is locked by locker.**
2. Speed reduction ratio: (81, 108, 153, 189, 243): 1 (shaft output).
3. Lubricants: VIGO GREASE RE0 or RE-00 (MOLYWHITE).
4. Rated output torque: 98N.m (output speed: 15R/Min).
5. The motor mounting flange is supplied according to the motor type.

RV-27CM-(19 Shaft)

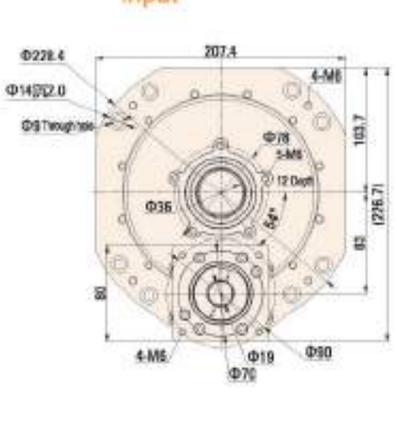


Overall Dimension Drawing

Output



Input



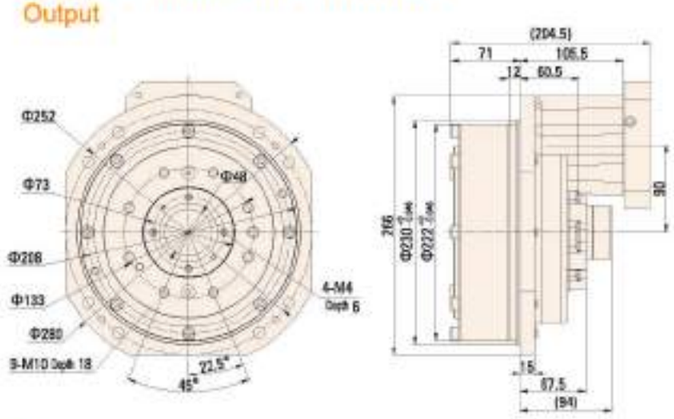
Note:

1. **This figure applies to the motor shaft: <=19x35L; Motor shaft is locked by locker**
2. Speed reduction ratio: (79, 99, 140, 189, 231.6): 1 (shaft output).
3. Lubricants: VIGO GREASE RE0 or RE-00 (MOLYWHITE).
4. Rated output torque: 270N.m (output speed: 15R/Min).
5. he motor mounting flange is supplied according to the motor type.

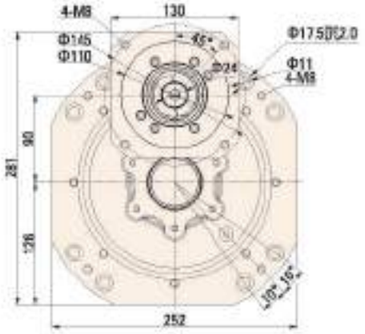
RV-50CM-(24 Shaft)

Overall Dimension Drawing

Output



Input



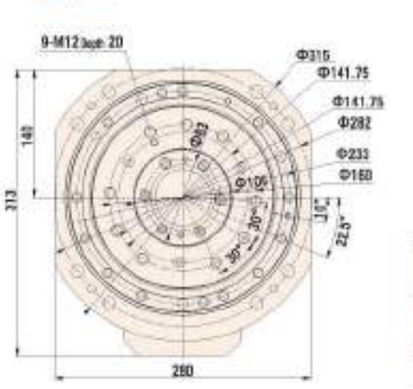
Note:

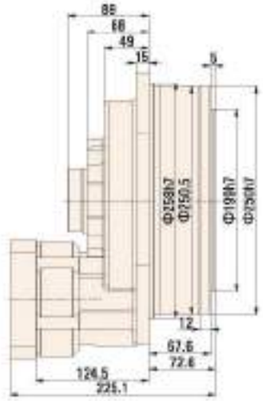
1. **This figure applies to the motor shaft: <=24x55L; Motor shaft is locked by locker.**
2. Speed reduction ratio: (49, 107, 125, 150, 193, 234): 1 (shaft output).
3. Lubricants: VIGO GREASE RE0 or RE-00 (MOLYWHITE).
4. Rated output torque: 498N.m (output speed: 15R/Min).
5. The motor mounting flange is supplied according to the motor type.

RV-100CM-(24 Shaft)

Overall Dimension Drawing

Output





Input

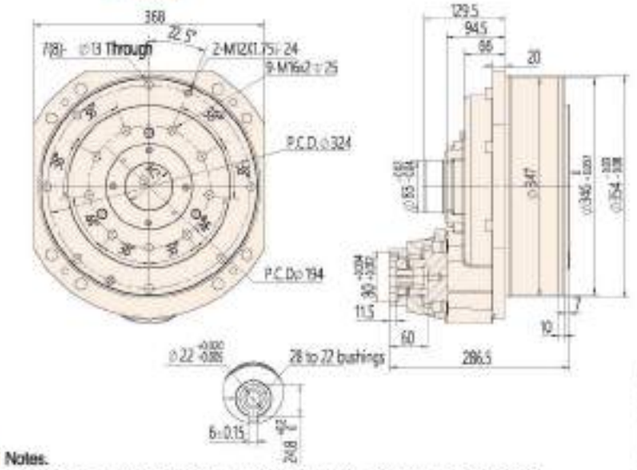
Note:

1. This figure applies to motor shaft: = 22x55L; motor shaft is locked with lock;
2. Reducer speed ratio: (76.3,100.2,124.7,151.6,214.3,264.6|: 1 (shaft output);
3. Grease: VIGO GREASE RE0 or RE-00 (MOLYWHITE);
4. Rated output torque: 980N.m (output speed: 15R / Min);
5. Motor mounting flange according to the motor modal;

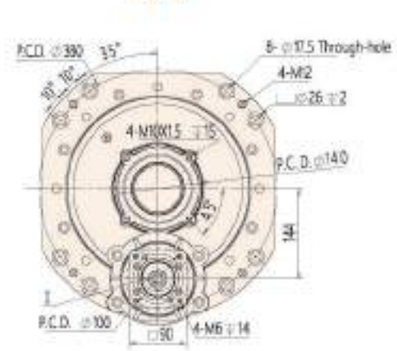
RV–200CM–(28 Shaft)

Overall Dimension Drawing

Output



Input



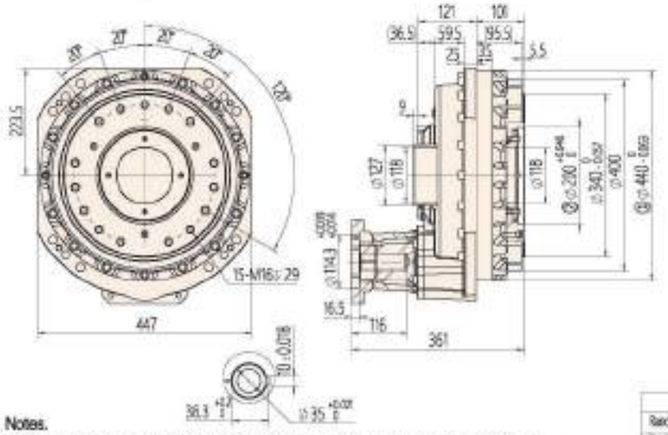
Reducer technical parameter table			
Rated output torque	1961 Nm	Backlash	1 arc.min
Allowable start/stop torque	4900 Nm	Return differential	1 arc.min
Instantaneous maximum torque	9800 Nm	Transmission accuracy	1 arc.min
Rated output speed	15 rpm	Bending stiffness	9800 Nm/arc.min
Maximum output speed	30 rpm	Torsional rigidity	980 Nm/arc.min
Ratio	122	Allowable bending moment of output shaft ①	8820 Nm
Input shaft diameter	∅22	Maximum allowable axial force on output shaft ②	19600 N
Note: ①②③ can not be satisfied at the same time, please refer to our samples, or call us for more information.			

- Notes.
  1. 8–M16, torque 319 ± 15.9 N.m, is used for the mounting screws of the chassis.
  2. Output end flange connection screws are 9–M16, torque 319 ± 15.9 N.m, and the screws should be used with spring washers.
  3. The screws should be used with spring washers;
  4. Grease has been added at the factory, please add VIGOGREASE REO when replacing by yourself;
  5. Applicable motor shaft diameter ϕ22, if you need other shaft diameter, please contact us.

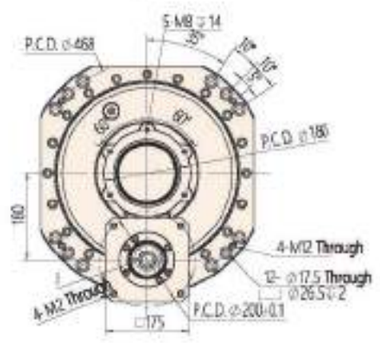
RV–320CM–(35 Shaft)

Overall Dimension Drawing

Output



Input



Reducer technical parameter table			
Rated output torque	3136 Nm	Backlash	1.5 arc.min
Allowable start/stop torque	7840 Nm	Return differential	1.5 arc.min
Instantaneous maximum torque	15680 Nm	Transmission accuracy	1.5 arc.min
Rated output speed	15 rpm	Bending stiffness	10740 Nm/arc.min
Maximum output speed	25 rpm	Torsional rigidity	1960 Nm/arc.min
Ratio	220.8	Allowable bending moment of output shaft ①	20580 Nm
Input shaft diameter	∅35	Maximum allowable axial force on output shaft ②	29400 N
Note: ①②③ can not be satisfied at the same time, please refer to our samples, or call us for more information.			

- Notes.
  1. 12–M16, torque 319 ± 15.9 N.m, is used for the mounting screws of the chassis.
  2. The output end flange connection screws are 15–M16, torque 319 ± 15.9 N.m, and the screws should be used with spring washers.
  3. The screws should be used with spring washers;
  4. Grease is added at the factory, please add VIGOGREASE REO when replacing by yourself;
  5. Please choose one of the mounting stops ① ② at the output end, and ① is recommended;
  6. Applicable motor shaft diameter ϕ35, if you need other shaft diameter, please contact us;

Product Application Industry

Palletizing robot / Rotary workenh

Gantry loader / ATC device

Various positioners

Horizontal multi-joint robot / Cylindrical coordinate robot

Vertical multi-joint robot (joint axis)

Glass substrate and wafer rotation axis

stepping motor.AC Servo Motor. DD motor
DC Servo Motor . DC Brushless Motor.Driver

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Comprehensive Motor Catalog

1 Open loop motor + closed loop motor + screw stepping motor (pulse and bus stepping driver can be equipped)

(acceleration and deceleration box + brake + waterproof + explosion-proof function can be used) 401–462

2 Stepper motor driver (open / closed loop) (pulse + bus + integrated driver)

PLC RS485 EtherCAT CANopen 463– 470

3 AC servo motor + AC servo driver (pulse + bus type)

PLC RS485 EtherCAT CANopen (acceleration and deceleration box + brake + waterproof + explosion-proof function can be used) 471–498

4 DC servo motor + DC servo driver (pulse + bus type) PLC RS485 EtherCAT CANopen

(acceleration and deceleration box + brake + waterproof + explosion-proof function can be used) 499–526

5 DC brushless motor and DC brushless driver PLC RS485 EtherCAT CANopen

(acceleration and deceleration box + brake + waterproof + explosion-proof function can be used) 527–556

6 Direct drive DD motor + linear motor PLC RS485 EtherCAT CANopen

557–570

7 PLC programmable controller / motion controller (card / vision operation control all-in-one machine)

EtherCAT CANopen Modbus 571–576

Stepper motor and stepper driver

Open loop stepping motor

2-phase open-loop stepper motors (standard type)
Three-phase open-loop stepper motors (standard type)
2-phase open-loop stepper motors (brake type)
Two Phase Open Loop Stepper Motors (IP65 Waterproof Type)
2-phase open-loop stepper motors (hollow type)
2-Phase Open Loop Stepper Motors with Gearboxes
2-Phase Open-Ring Stepper Motors with Planetary Reducer
Screw Stepper Motors
Ball Screw Stepper Motors

Closed loop stepping motor

Two Phase Closed Loop Stepper Motors (Standard Type)
2-phase closed-loop stepper motors (brake type)
2-phase closed-loop stepper motors (IP65 waterproof type)
2-Phase Closed Loop Stepper Motors with Planetary Reducer
2-Phase Closed Loop Stepper Motors with Gearboxes

Stepping motor driver series

Open Loop Pulse/IO General Purpose
Closed Loop Pulse/IO Control General Purpose
RS485 Bus Stepper Driver
Ether CAT Bus Stepper Driver
Integrated Stepper Driver

Selection guide for stepper motors in automation equipment

一 Stepper Motor Modeling:

Introduction to Stepper Motor

Stepper motor is also known as pulse motor or step motor. It advances a certain angle every time the excitation state is changed according to the input pulse signal, and keeps a certain position stationary when the excitation state remains unchanged [1]. Thus, the stepping motor can convert the input pulse signal into the corresponding angular displacement for output. By controlling the number of input pulses, the angular displacement of the output can be accurately determined to achieve the function of positioning; and by controlling the frequency of the input pulses, the angular velocity of the output can be accurately controlled to achieve the purpose of speed regulation. Therefore, stepper motors can be considered when accurate positioning or speed control is required. In the late 1960s, various practical stepping motors came into being, and they have developed rapidly in the past 40 years. Stepper motors have become a basic type of motors alongside DC motors, asynchronous motors, and synchronous motors. Since the mid-1980s, a lot of research work has been done on the precise model of stepper motors, and various hybrid stepper motors and drivers have been widely used in various industries. There are three types of stepper motors: reactive (VR type), permanent magnet (PM type), and hybrid (HB type). The hybrid stepping motor combines the advantages of the first two types of stepping motors. At present, the stepping motors used in the domestic equipment manufacturing industry are basically hybrid stepping motors. Therefore, the stepper motors described below are all referred to as "hybrid stepper motors".

① Structure of Stepper Motor (see Figure 1)

Stepper motor is composed of rotor (rotor core, permanent magnet, rotating shaft, ball bearing), stator (winding, stator core), front and rear end cover, etc. The stator of the most typical two-phase hybrid stepping motor has 8 big teeth, 40 small teeth, and the rotor has 50 small teeth. The stator of the three-phase motor has 9 big teeth, 45 small teeth, and the rotor has 50 small teeth.

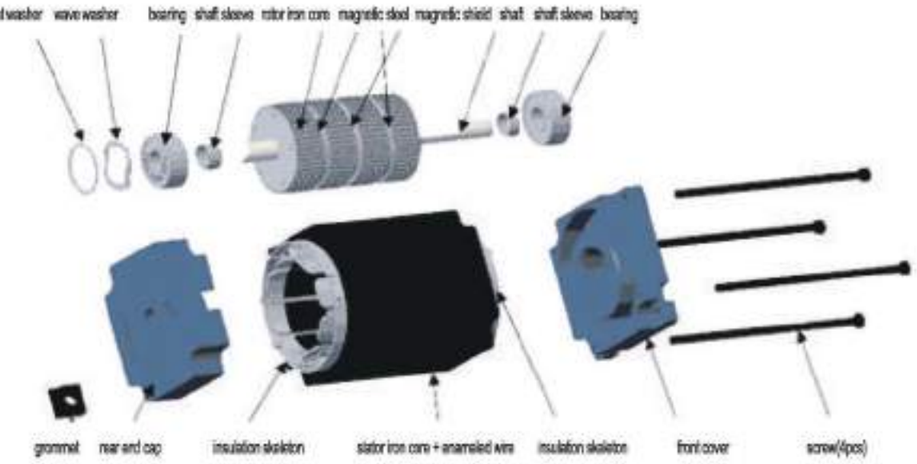


Figure 1 Schematic diagram of stepper motor structure

② Stepper Motor Control Principle

The stepper motor cannot directly connect to the power supply to work, nor can it directly receive electrical pulse signals. It must interact with the power supply and the controller through a special interface, the stepper motor driver. The stepper motor driver (see Figure 2) is generally composed of a ring distributor and a power amplifier circuit. The ring distributor receives control signals from the controller. The output of the ring distributor will be converted every time a pulse signal is received. Therefore, the presence or absence of the pulse signal and the frequency can determine the speed of the stepping motor, acceleration or deceleration, start or stop. The ring distributor must also monitor the direction signal of the controller to determine whether the transition of its output state is positive sequence or reverse sequence, thereby determining the direction of the stepper motor.

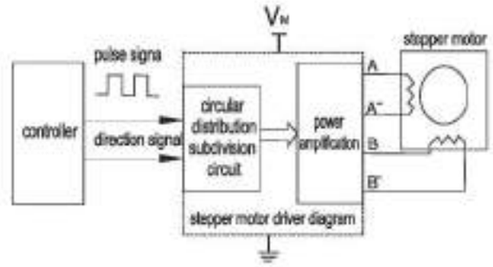


Figure 2 Stepper Motor Control Schematic

The main parameters of the stepper motor:

① Frame number: mainly 20, 28, 35, 42, 57, 60, 86, 110, 130, etc.

② Number of phases: the number of coils inside the stepping motor. The number of phases of the stepping motor generally includes two phases, three phases and five phases. The stepping motor used in China is mainly two-phase, and three-phase is also used in some applications. In Japan, five-phase stepping motors are used more.

③ Step angle: corresponding to a pulse signal, the angular displacement of the rotor of the motor. The formula for calculating the step angle of the stepper motor is as follows:

θb=360°÷(2*m*zr)

In this formula:

θb - the step angle of the stepper motor;

m - the number of phases of the stepper motor;

zr - the number of teeth on the rotor of the stepper motor.

According to the above calculation formula, the step angles of the two-phase, three-phase and five-phase stepper motors are 1.8°, 1.2° and 0.72° respectively.

④ Holding torque: refers to the torque at which the stator locks the rotor when the stator winding of the motor passes through the rated current, but the rotor does not rotate. Holding torque is the most important parameter of stepper motor, and it is the main basis for motor selection.

⑤ Positioning torque: refers to the torque required to rotate the rotor with external force when the motor has no current. This torque is one of the performance indicators for evaluating the motor. In the case of the same other parameters, the smaller the positioning torque is, the smaller the "cogging effect" is, and the more favorable it is for the stability of the motor at low speed.

⑥ Torque-frequency characteristic: mainly refers to the pulling-out torque-frequency characteristic, the maximum torque that the motor can bear without losing step when the motor runs stably at a certain speed. Moment-frequency curves are used to describe non-out-of-step. Relationship between maximum torque and rotational speed (frequency). The torque-frequency curve is an important parameter of the stepper motor, and it is one of the main basis for the selection of the motor.

⑦ Rated current: The rms value of the motor winding current required to maintain the rated torque.

Third, the shape of the stepper motor:

The speed of the stepper motor used in industrial applications is as high as 600~1500rpm, and the higher the speed, the closed-loop stepper motor drive can be considered, or the servo drive scheme is more suitable. Stepper motor selection steps (see Figure 3)

(1) Selection of step angle:

As mentioned in 1.1, according to the number of motor phases, there are three step angles: 1.80 (two-phase), 1.2° (three-phase), and 0.72° (five-phase). Of course, the five-phase step angle accuracy is the highest, but its motor and driver are expensive, so it is rarely used in China. In addition, the current mainstream stepper drivers all use subdivision drive technology. Below 4 subdivisions, the subdivision step angle accuracy can still be guaranteed, so if you consider the step angle accuracy index alone, five-phase stepping The motor can be replaced by a two-phase or three-phase stepper motor.

For example, in a lead screw load application with a lead of 5mm, if a two-phase stepper motor is used and the driver is set to 8 subdivisions, the number of pulses per revolution of the motor is 200X4=800, and the pulse equivalent is 5÷800 =0.00625mm=6.25μm, this accuracy can meet most application requirements.

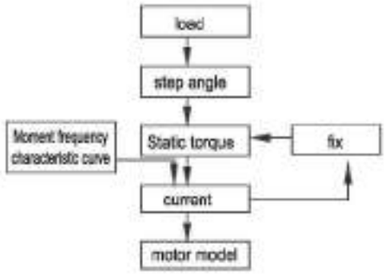


Figure 3 Steps for Stepper Motor Selection

(2) Static torque (holding torque) selection:

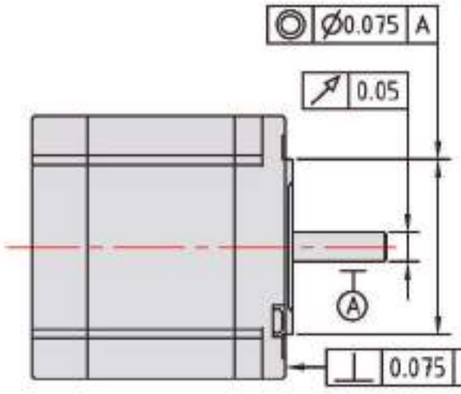
Commonly used load transmission mechanisms include synchronous belts, screw rods, racks and pinions, etc. Customers need to first calculate their machine load (mainly acceleration torque plus friction torque) into the required load torque on the motor shaft. Then, according to the maximum running speed required by the motor, a stepper motor with suitable holding torque is selected for the following two different use cases:

① For applications where the required motor speed is below 300rpm: if the machine load is converted to the required load torque on the motor shaft as T1, then the load torque is multiplied by a safety factor SF (generally 1.5~2.0), that is, The required holding torque Tn of the stepper motor.

② For applications where the required motor speed is above 300rpm: set the maximum speed Nmax, if the machine load is converted to the required load torque on the motor shaft as T1, then the load torque is multiplied by the safety factor SF (generally 2.5~3.5), that is, the holding torque Tn is obtained. Referring to Figure 4, a suitable model is initially selected. Then use the torque-frequency curve to check and compare: on the torque-frequency curve, the maximum speed Nmax required by the user, the maximum out-of-step torque corresponding to this maximum speed is T2, then the maximum out-of-step torque T2 needs to be 20 larger than T1 %above. Otherwise, it is necessary to re-select a motor with a larger holding torque, and re-check and compare according to the torque-frequency curve of the newly selected motor.

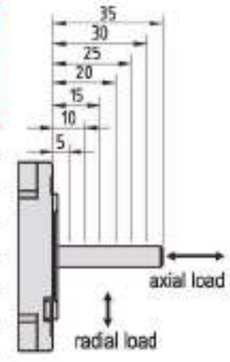
Motor general specifications

Specifications		Motor Features
Insulation class		B Class 130℃
Basic step angle accuracy		below ±0.09
Insulation withstand voltage		AC500V(1 minute)
Insulation voltage		above100M, 500VDC
Temperature rise		below 80℃
Radial runout		0.025mm Max. (Load 450g)
Axial runout		0.075mm Max. (Load 950g)
Service environment	Temperature	-10~+15℃(No condensation)
	Humidity	below 85%RH(No condensation)
	Medium	No corrosive gas,dust, N direct conatct with water, oil etc
Save condition	Temperature	0~+50℃(No condensation)
	Humidity	Below 85%RH(No condensation)
Service life		≥5000hours

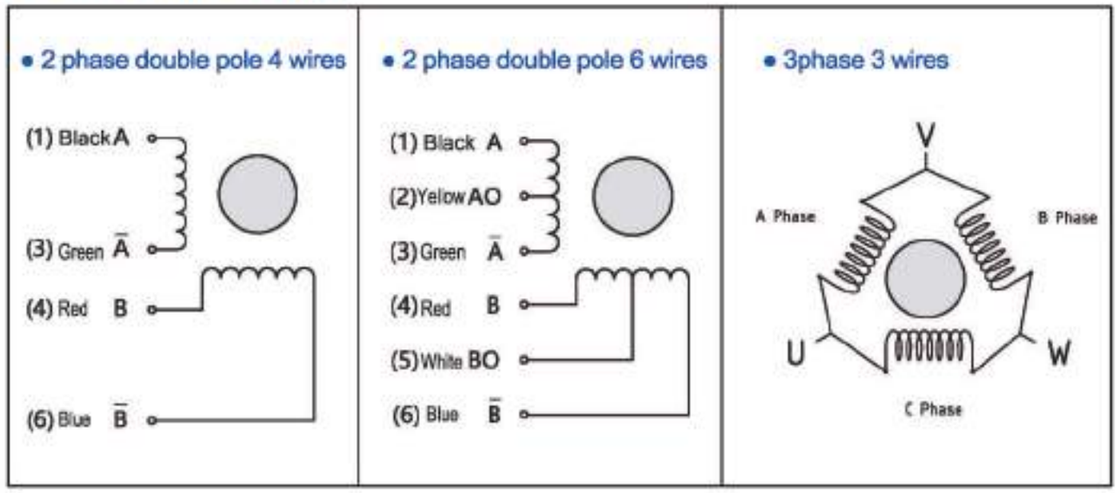


Allowable radial load·Allowable axial load

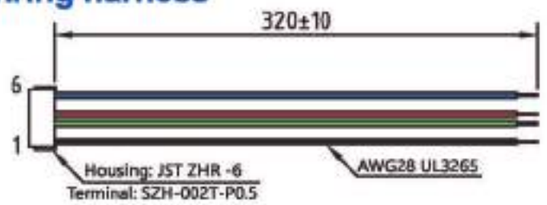
Installation dimensions	Dia(mm)	Allowable radial load (N) Distance from mounting surface (mm) 5	10	15	20	25	30	35	Allowable axial load (N)
20mm	4	15	12	—	—	—	—	—	3
28mm	5	50	35	25	—	—	—	—	5
35mm	5	50	35	25	20	—	—	—	10
42mm	5	50	35	25	20	—	—	—	15
57mm	8	270	180	130	100	90	—	—	20
60mm	8	200	135	100	82	58	—	—	30
86mm	14	620	550	480	390	340	290	260	60



■ Motor inner wiring



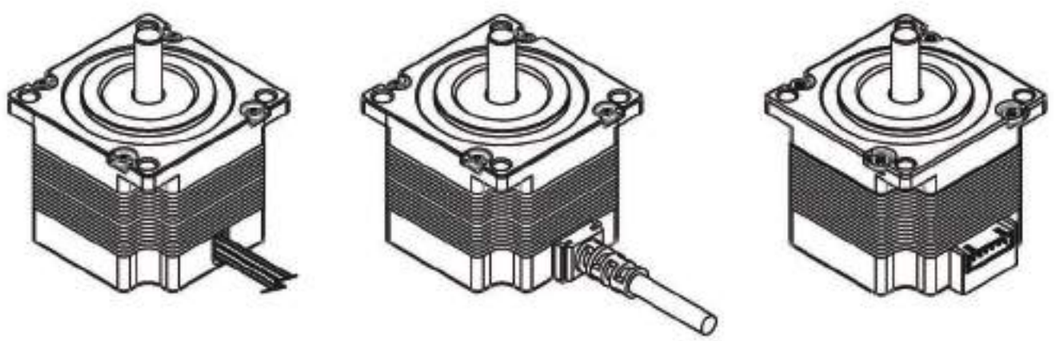
■ Supporting motor wiring harness



■ Motor outgoing wires options

• Conventional lead - out type • Tail card cable type • The connector type

□42、□57、□60、□86 adapt □57、□60、□86 adapt □20、□28、□35、□42、□57、□60 adapt



Note: The above wiring methods are only applicable to open-loop stepper motors.
The tail card cable has a unique outlet method, which can prevent the motor lead from falling off caused by pulling the motor lead.

Customization–Motor

According to the application needs, provide a variety of customized motor solutions, common customization includes: stator

- Corrosion resistant motor, suitable for outdoor applications, such as high humidity environment, temperature change environment, etc
- Sealed motor, suitable for dusty environment, small temperature change dirty environment, etc
- Special shaft, such as size, shape, etc
- Belt wheels, gears, couplings, etc
- Encoders and other feedback components
- Length of lead line and client use of terminal plug-in

Belt wheels, gears


Metal belt wheel


Plastic belt wheel


Gear

Output way of shaft


round shaft


Single flat wire


Double flat wire


Keyway


Knurled shaft


Hobbed shaft


throug–hole shaft


Hollow shaft


T type lead screw shaft


Ball screw shaft


Gear


Synchronous belt wheel

* Can be customized special shaft according to customer requirements

Open-loop stepping motor selection

■ Standard type

ABC 57 H 2 42 - 4 P 10 S

1 2 3 4 5 6 7 8 9

1 Series	2 Motor frame	3 Motor type	4 Step angle /phase	5 length	6 Wire	7 Wiring method	8 Rated current	9 Motor options
ABC-Standard type stepping motor ABS-Brake type stepping motor ABF-Waterproof stepping motor ABK-Hollow type stepping motor	20: NEMA 8; 20mm 28: NEMA 11; 28mm 35: NEMA 14; 35mm 42: NEMA 17; 42mm 57: NEMA 23; 57mm 60: NEMA 24; 60mm 86: NEMA 34; 86mm 110: NEMA 42; 110mm 130: NEMA 52; 130mm	H:Standard type IP:Waterproof type HS:Hollow type	2:2phase 1.8° 3:3phase1.2°	42=42mm	42:phase4wires 33:phase3wires (110,130)	P:Plug-in type L:lead wire type C:Tail cord cable type F:P6/PG connector type	30: 3A	S:Single shaft D:Double shaft M:Brake G:With Gearbox

■ **Brake type** ABS 57 H 2 55 - 4 L 40 M

■ **Waterproof type** ABF 57 IP 2 55 - 4 F 40 S

■ **Hollow type** ABK 57 HS 2 45 - 4 P 30 D

Closed-loop stepping motor selection

■ Standard type

BBC 57 H 2 55 E1K S

1 2 3 4 5 6 7

1 Series	2 Motor frame	3 Motor type	4 step angle/ phase	5 length	6 Encoder resolution	7 Motor options
With encoder BBC-Standard type stepping motor BBS-brake type stepping motor BBF-Waterproof type stepping motor	20: NEMA 8; 20mm 28: NEMA 11; 28mm 35: NEMA 14; 35mm 42: NEMA 17; 42mm 57: NEMA 23; 57mm 60: NEMA 24; 60mm 86: NEMA 34; 86mm	H:Standard type IP:Waterproof type HS:Hollow type	2:2phase 1.8° 3:3phase1.2° 4:2pehse0.9°	55=55mm	E1K:1000CPR E2K5z：2500CPR with pointer	S:Single shaft D:Double shaft M:Brake G:With Gearbox

■ **Brake type** BBS 57 H 2 55 - E1K M

■ **Waterproof type** BBF 57 IP 2 55 - E1K S

20mm Two phase open loop stepping motor (Standard)

NEMA8 □20mm 1.8° /step (Bipolar 4 wires)

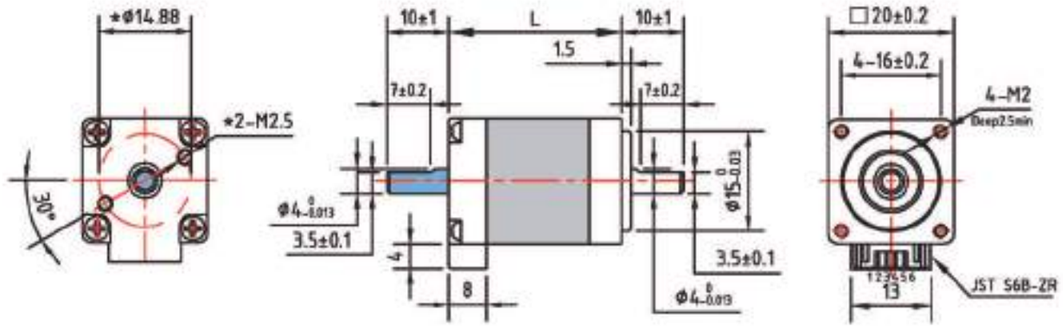
■ Specification

Model	Holding torque N.m	Rated current A/Phase	Resistence Ω/Phase	Inductance mH/Phase	Rotational inertia g.cm²	Weight kg	L mm	Drive model
ABC20H228-4P06□	0.2	0.6	6.5	2.2	1.6	0.04	28	DM432
ABC20H240-4P08□	0.036	0.8	6.5	2.5	2.9	0.06	40	

● Note:S-Single shaft; D: Double shaft

■ Dimensions (unit: mm)

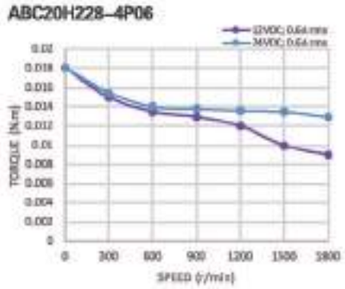
Model	L
ABC20H228	28
ABC20H240	40



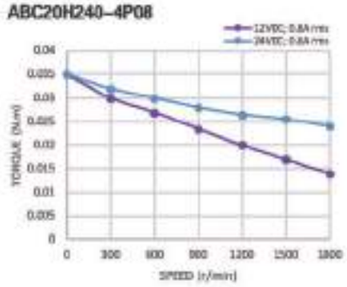
● This dimension is shown as double shaft. If single shaft is required, remove the blue part and the asterisk part

■ Dynamic torque curve(Reference)

ABC20H228-4P06



ABC20H240-4P08



Notice
- The curve is based on data from our test conditions. If the driving conditions change, the curve will also change
- The rated current in the specification is the effective current. Set the drive's current below the rated current of the motor

28mm Two phase open loop stepping motor (Standard)

NEMA11 □28mm 1.8° /step (Bipolar 4 wires)

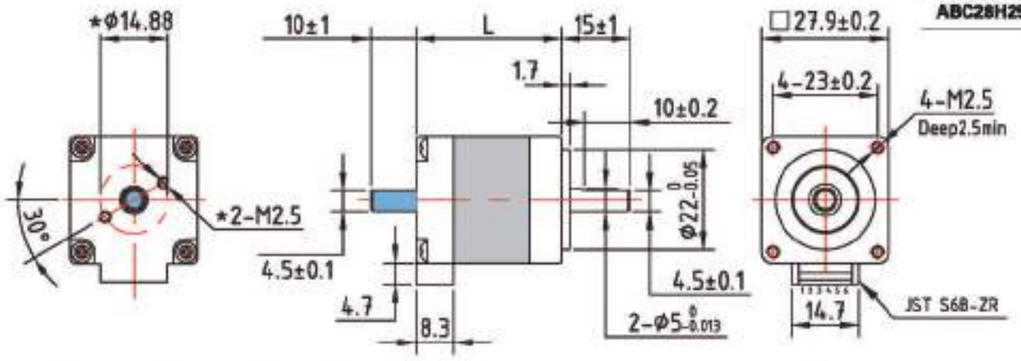
■ Specification

Model	Holding torque N.m	Rated current A/Phase	Resistence Ω/Phase	Inductance mH/Phase	Rotational inertia g.cm²	Weight kg	L mm	Drive model
ABC28H232-4P10□	0.08	1	5.7	3.5	9	0.1	32	DM432
ABC28H245-4P15□	0.12	1.5	3	3	12	0.15	45	
ABC28H251-4P15□	0.14	1.5	3.5	3.1	18	0.2	51	

● Note:S-Single shaft; D: Double shaft

■ Dimensions (unit: mm)

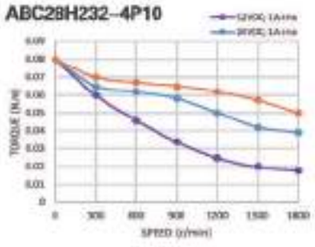
Model	L
ABC28H232	32
ABC28H245	45
ABC28H251	51



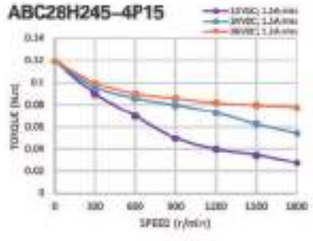
● This dimension is shown as double shaft. If single shaft is required, remove the blue part and the asterisk part

■ Dynamic torque curve(Reference)

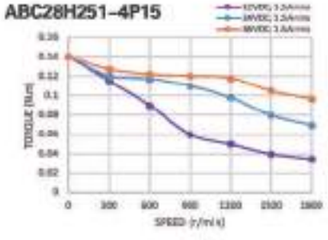
ABC28H232-4P10



ABC28H245-4P15



ABC28H251-4P15



Notice
- The curve is based on data from our test conditions. If the driving conditions change, the curve will also change
- The rated current in the specification is the effective current. Set the drive's current below the rated current of the motor

35mm Two phase open loop stepping motor (Standard)

NEMA14 □35mm 1.8° /step (Bipolar 4 wires)

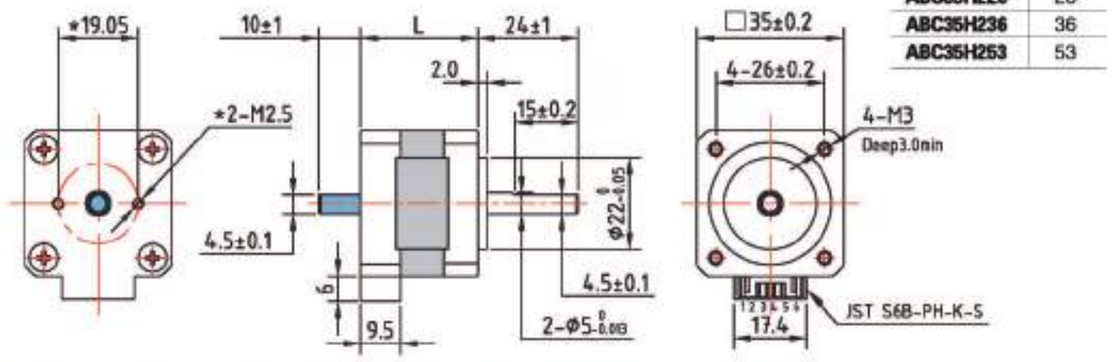
■ Specification

Model	Holding torque N.m	Rated current A/Phase	Resistence Ω/Phase	Inductance mH/Phase	Rotational inertia g.cm²	Weight kg	L mm	Drive model
ABC35H226-4P15□	0.07	1.5	1.4	0.9	12	0.15	26	DM432
ABC35H236-4P15□	0.18	1.5	2.1	2.1	20	0.21	36.5	
ABC35H253-4P20□	0.31	2	1.65	2.5	35	0.24	53	

● Note:S-Single shaft; D: Double shaft

■ Dimensions (unit: mm)

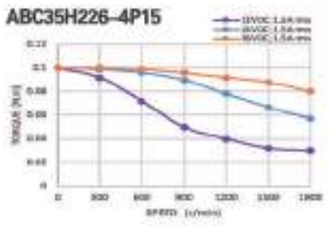
Model	L
ABC35H226	26
ABC35H236	36
ABC35H253	53



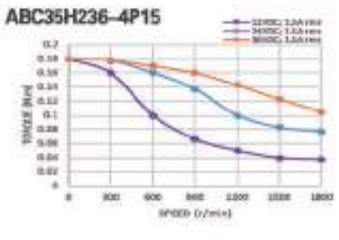
● This dimension is shown as double shaft. If single shaft is required, remove the blue part and the asterisk part

■ Dynamic torque curve(Reference)

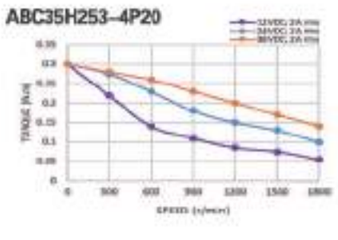
ABC35H226-4P15



ABC35H236-4P15



ABC35H253-4P20



Notice
- The curve is based on data from our test conditions. If the driving conditions change, the curve will also change
- The rated current in the specification is the effective current. Set the drive's current below the rated current of the motor

42mm Two phase open loop stepping motor (Standard)

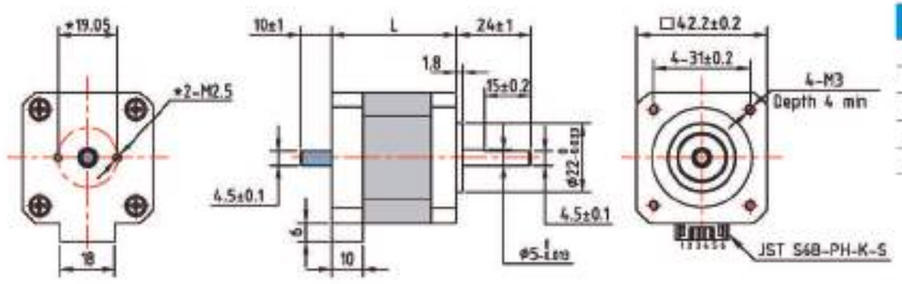
NEMA17 □42mm 1.8° /step (Bipolar 4 wires)

■ Specification

Model	Holding torque N.m	Rated current A/Phase	Resistence Ω/Phase	Inductance mH/Phase	Rotational inertia g.cm²	Weight kg	L mm	Drive model
ABC42H231-4P12□	0.16	1.2	1.8	2.4	23	0.2	31	DM432
ABC42H235-4P12□	0.25	1.2	2.1	3.9	35	0.24	35	
ABC42H241-4P20□	0.4	2	1.05	2	54	0.3	41	
ABC42H249-4P20□	0.48	2	1.35	2.9	77	0.36	49	
ABC42H261-4P20□	0.72	2	1.75	4	110	0.5	61	

● Note:S-Single shaft; D: Double shaft

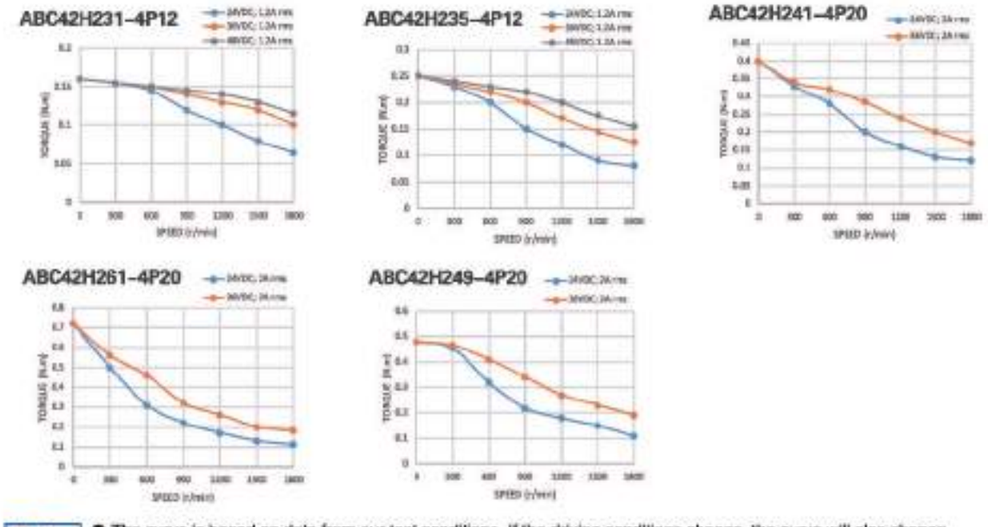
■ Dimensions (unit: mm)



Model	L
ABC42H231	31
ABC42H235	35
ABC42H241	41
ABC42H249	49
ABC42H261	61

● This dimension is shown as double shaft. If single shaft is required, remove the blue part and the asterisk part

■ Dynamic torque curve(Reference)



Notice
● The curve is based on data from our test conditions. If the driving conditions change, the curve will also change
● The rated current in the specification is the effective current. Set the drive's current below the rated current of the motor

57mm Two phase open loop stepping motor (Standard)

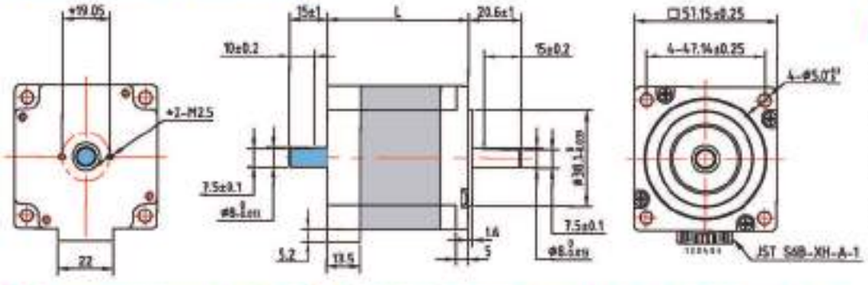
NEMA23 □57mm 1.8° /step (Bipolar 4 wires)

■ Specification

Model	Holding torque N.m	Rated current A/Phase	Resistence Ω/Phase	Inductance mH/Phase	Rotational inertia g.cm²	Weight kg	L mm	Drive model
ABC57H242-4P30□	0.6	3	0.51	1	140	0.46	42.5	DM542
ABC57H245-4P30□	0.8	3	0.57	1.2	180	0.52	45.5	
ABC57H251-4P30□	1	3	0.7	1.75	240	0.64	51.5	
ABC57H255-4L40□	1.2	4	0.45	1.4	280	0.72	55.5	
ABC57H265-4L40□	1.7	4	0.5	1.6	350	0.85	64.5	
ABC57H276-4L50□	2	5	0.37	1.8	480	1.1	76.5	
ABC57H280-4L50□	2.2	5	0.36	1.76	520	1.2	80.5	
ABC57H2100-4L50□	3	5	0.5	2.3	720	1.5	101	

● Note:S-Single shaft; D: Double shaft
● Wiring method:P:Plug-in type (rated current under 3A) L:lead wire type C:Tail card cable type

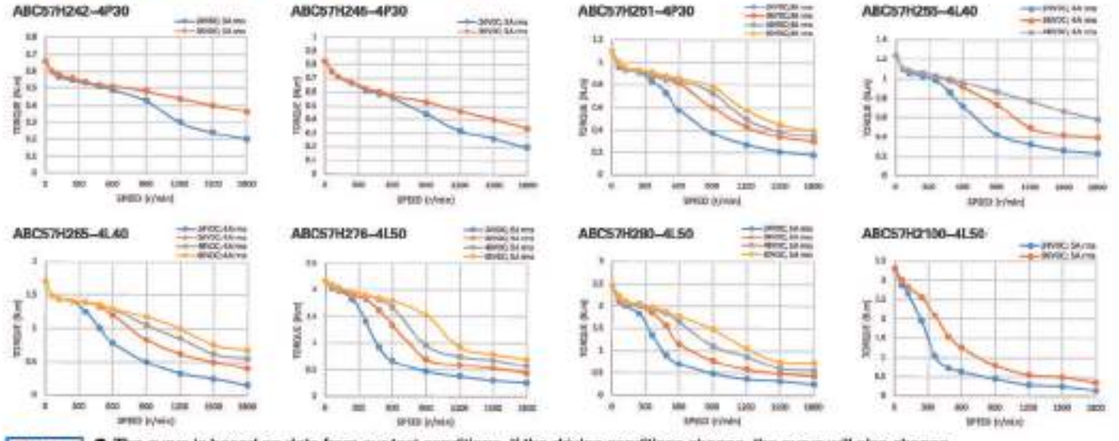
■ Dimensions (unit: mm)



Model	L
ABC57H242	42.5
ABC57H245	45.5
ABC57H251	51.5
ABC57H255	55.5
ABC57H265	64.5
ABC57H276	76.5
ABC57H280	80.5
ABC57H2100	101

● This dimension is shown as double shaft. If single shaft is required, remove the blue part and the asterisk part

■ Dynamic torque curve(Reference)



Notice
● The curve is based on data from our test conditions. If the driving conditions change, the curve will also change
● The rated current in the specification is the effective current. Set the drive's current below the rated current of the motor

60mm Two phase open loop stepping motor (Standard)

NEMA24 □60mm 1.8° /step (Bipolar 4 wires)

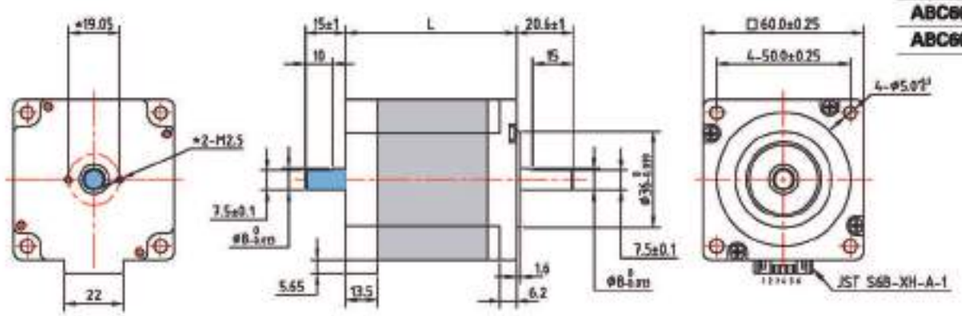
■ Specification

Model	Holding torque N.m	Rated current A/Phase	Resistence Ω/Phase	Inductance mH/Phase	Rotational inertia g.cm²	Weight kg	L mm	Drive model
ABC60H248-4L40□	1.1	4	0.38	0.78	240	0.6	47	DM542
ABC60H256-4L40□	1.5	4	0.44	1.1	340	0.8	56	
ABC60H269-4L50□	2.1	5	0.34	1.1	490	1	68	
ABC60H286-4L50□	3	5	0.43	1.7	690	1.3	85	

- Note:S-Single shaft; D: Double shaft
- Wiring method:P:Plug-in type (rated current under 3A) L:lead wire type C:Tail card cable type

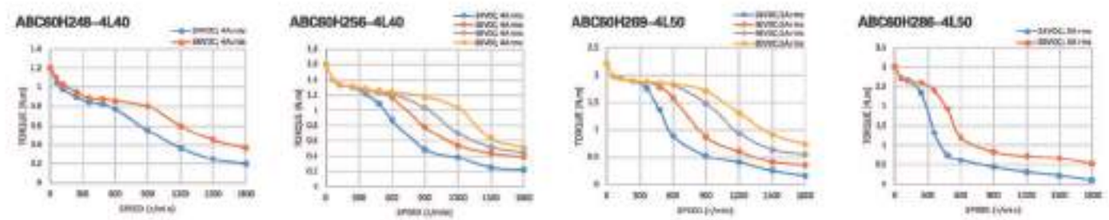
■ Dimensions (unit: mm)

Model	L
ABC60H248	47
ABC60H256	56
ABC60H269	68
ABC60H286	85



- This dimension is shown as double shaft. If single shaft is required, remove the blue part and the asterisk part

■ Dynamic torque curve(Reference)



Notice
- The curve is based on data from our test conditions. If the driving conditions change, the curve will also change
- The rated current in the specification is the effective current. Set the drive's current below the rated current of the motor

86mm Two phase open loop stepping motor (Standard)

NEMA34 □86mm 1.8° /step (Bipolar 4 wires)

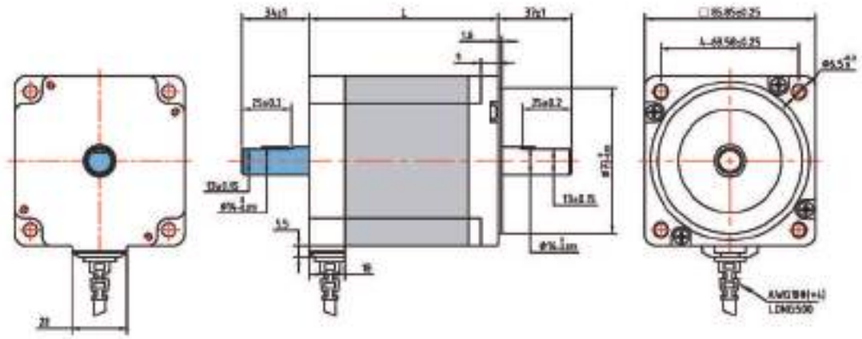
■ Specification

Model	Holding torque N.m	Rated current A/Phase	Resistence Ω/Phase	Inductance mH/Phase	Rotational inertia g.cm²	Weight kg	L mm	Drive model
ABC86H280-4C60□	4.5	6	0.34	2.4	1800	2.1	75	DM860H
ABC86H298-4C60□	7	6	0.45	3.5	2800	2.9	96.5	
ABC86H2120-4C60□	8.5	6	0.54	5	3600	3.6	113.5	
ABC86H2128-4C60□	10.2	6	0.6	5.5	4200	4.1	126	
ABC86H2160-4C60□	12	6	0.72	7.3	5400	5	151.5	

- Note:S-Single shaft; D: Double shaft
- Wiring method: L:lead wire type C:Tail card cable type

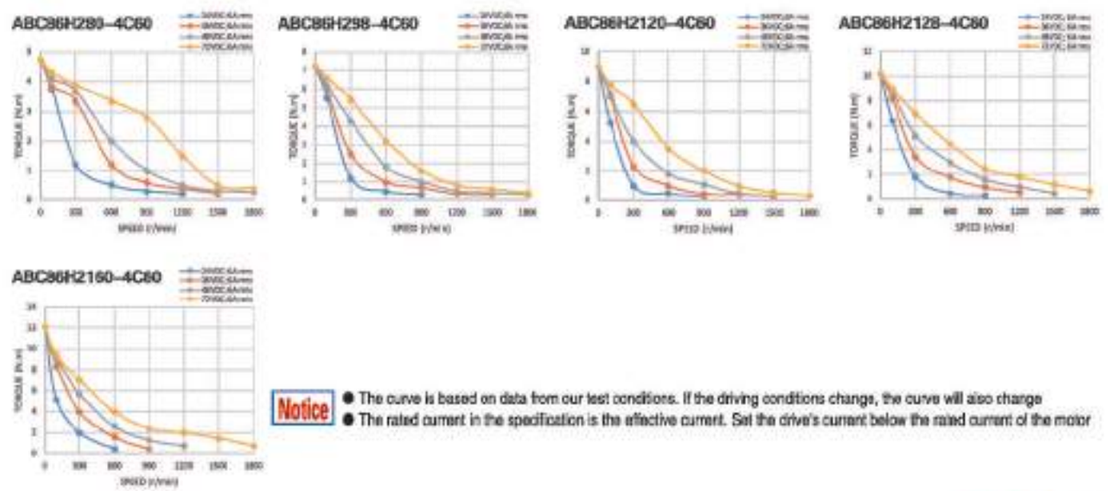
■ Dimensions (unit: mm)

Model	L
ABC86H280	75
ABC86H298	96.5
ABC86H2120	113.5
ABC86H2128	126
ABC86H2160	151.5



- This dimension is shown as double shaft. If single shaft is required, remove the blue part and the asterisk part

■ Dynamic torque curve(Reference)



Notice
- The curve is based on data from our test conditions. If the driving conditions change, the curve will also change
- The rated current in the specification is the effective current. Set the drive's current below the rated current of the motor

110mm Three phase open loop stepping motor(Standard)

NEMA42 □110mm 1.2° /step (Bipolar 4 wires)

■ General technical conditions

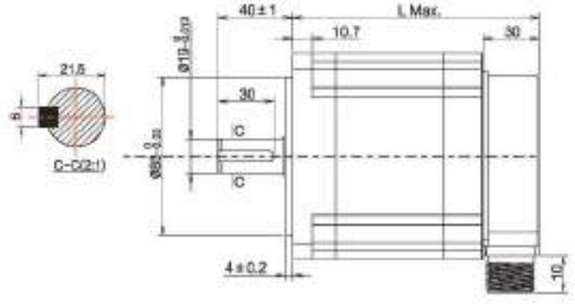
Step accuracy	resistance accuracy	inductance accuracy	temperature rise	ambient temperature	insulation resistance	Withstand voltage	Radial runout	Axial beating
±5%	±10%	±20%	80 ℃Max	-20℃~+50℃	100MΩ Min 500VDC	500V AC 1minute	0.06mm Max.(450g load)	0.08mm Max.(450g load)

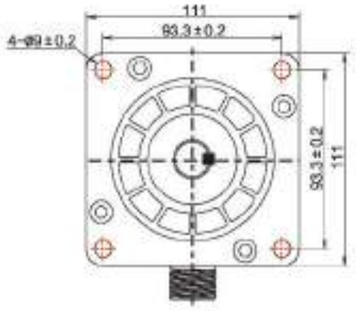
■ Specification

Model	Step (°)	Length (mm)	Current (A)	Resistance (Ω/phase)	Inductance (mH/phase)	Torque (N.m)	Inertia (g.cm²)	Axis (Stretch)	Leads	Weight (Kg)
ABC110H3128-3L-30	1.2	128	3	1.04	4.3	8	8000	平键6*30	3	5.2
ABC110H3151-3L-35		151	3.5	0.6	2.67	12	12000	平键6*30	3	6.6
ABC110H3185-3L-40		185	4	0.7	2.96	16	16000	平键6*30	3	8.9
ABC110H3220-3L-40		220	4	0.57	2.46	20	20000	平键6*30	3	11.2

● Support customization

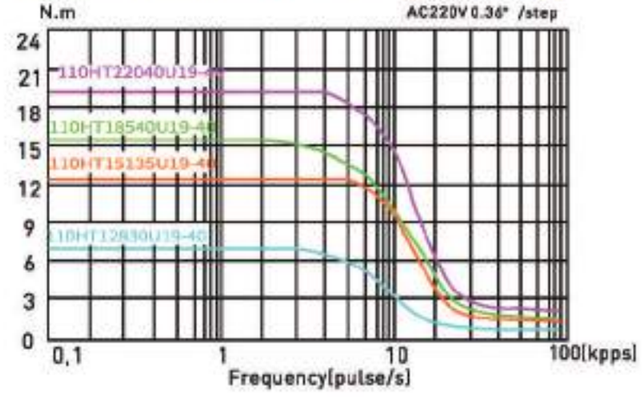
■ Dimensions (unit: mm)





● This dimension applies to double shaft type, ignore the dotted line for single shaft type

■ Moment frequency characteristic curve



■ Wiring diagram

serial number	1	2	3	4	remarks
phase sequence	U	V	W	GND	four-core socket

130mm Three phase open loop stepping motor(Standard)

NEMA52 □130mm 1.2° /step (Bipolar 4 wires)

■ General technical conditions

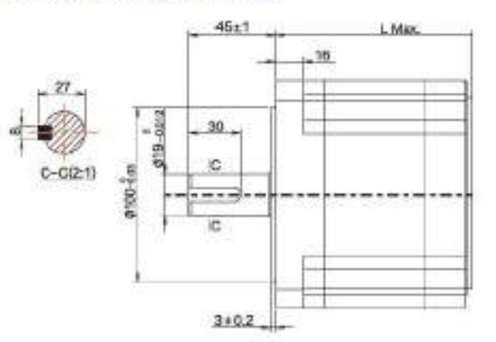
Step accuracy	resistance accuracy	inductance accuracy	temperature rise	ambient temperature	insulation resistance	Withstand voltage	Radial runout	Axial beating
±5%	±10%	±20%	80 ℃Max	-20℃~+50℃	100MΩ Min 500VDC	500V AC 1minute	0.06mm Max.(450g load)	0.08mm Max.(450g load)

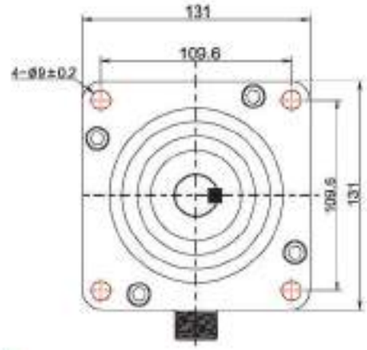
■ Specification

Model	Step (°)	Length (mm)	Current (A)	Resistance (Ω/phase)	Inductance (mH/phase)	Torque (N.m)	Inertia (g.cm²)	Axis (Stretch)	Leads	Weight (Kg)
ABC130H3182-3L-60	1.2	182	6	0.72	4.7	27	27000	平键8*30	3	16
ABC130H3232-3L-60		232	6	0.95	6.1	37	37000	平键8*30	3	19.5
ABC130H3282-3L-60		282	6	1.1	7.4	50	50000	平键8*30	3	24.5

● Support customization

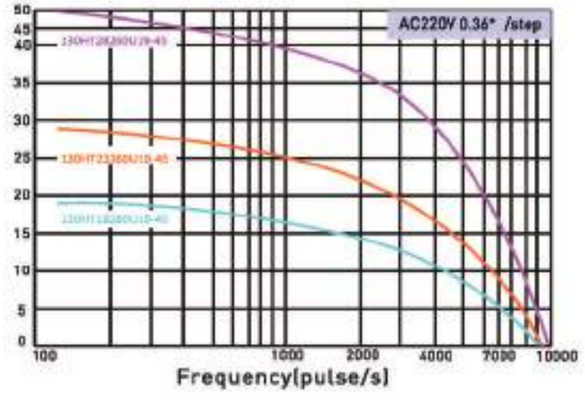
■ Dimensions (unit: mm)





● This dimension applies to double shaft type, ignore the dotted line for single shaft type

■ Moment frequency characteristic curve



■ Wiring diagram

serial number	1	2	3	4	remarks
phase sequence	U	V	W	GND	four-core socket

Two phase open loop stepping motor (Brake)

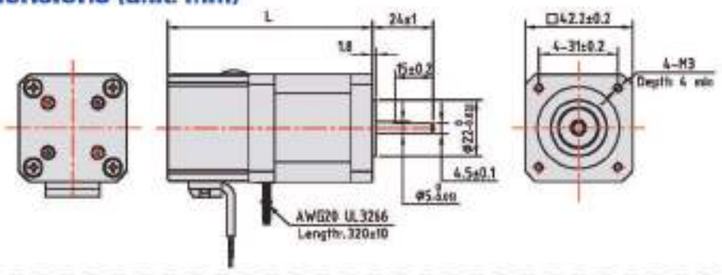
1.8° /step (Bipolar 4 wires)

■ Specification

Model	Holding torque N.m	Rated current A/Phase	Resistence Ω/Phase	Inductance mH/Phase	Rotational inertia g.cm²	Torque N.m	Weight kg
NEMA17 □42mm							
ABS42H241-4L20M	0.4	2	1.05	2	54	0.5	0.3
ABS42H249-4L20M	0.48		1.35	2.9	77		0.35
ABS42H261-4L20M	0.72		1.75	4	100		0.5
NEMA23 □57mm							
ABS57H255-4L40M	1.2	4	0.45	1.4	280	1.3	1.25
ABS57H276-4L50M	2	5	0.37	1.8	480		1.6
NEMA34 □86mm							
ABS86H280-4L80M	4.5	6	0.3	3.4	650	5	2.6
ABS86H2120-4L60M	8.5		0.5	6.5	1200		4.1
ABS86H2160-4L60M	12		0.7	9.2	1700		5.5

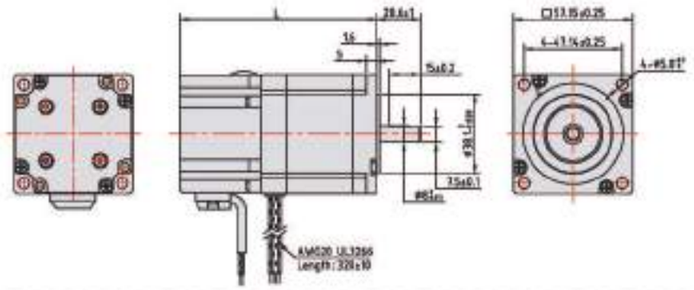
● M means with brake

■ Dimensions (unit: mm)



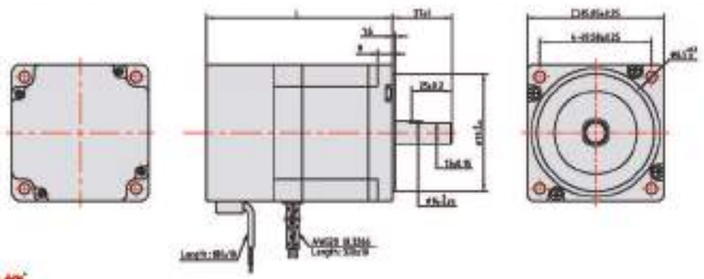
□42mm

Model	L
ABS42H241-4L20M	73mm
ABS42H249-4L20M	81mm
ABS42H261-4L20M	93mm



□57mm

Model	L
ABS57H255-4L40M	95mm
ABS57H276-4L50M	116mm



□86mm

Model	L
ABS86H280-4L60M	117mm
ABS86H2120-4L60M	168mm
ABS86H2160-4L60M	193mm

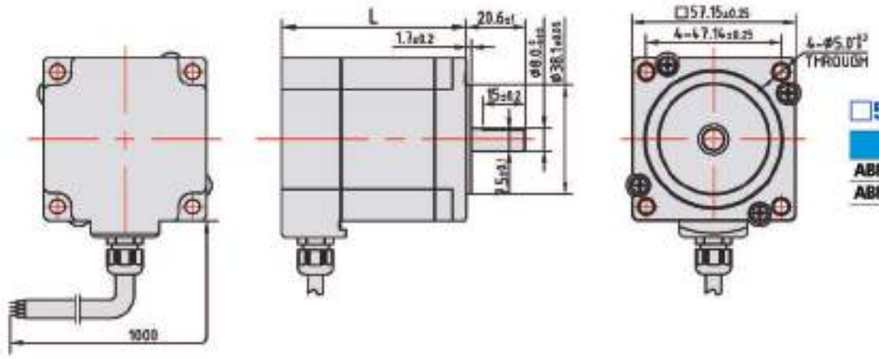
Two phase open loop stepping motor(IP65 Waterproof)

1.8° /step (Bipolar 4 wires)

■ Specification

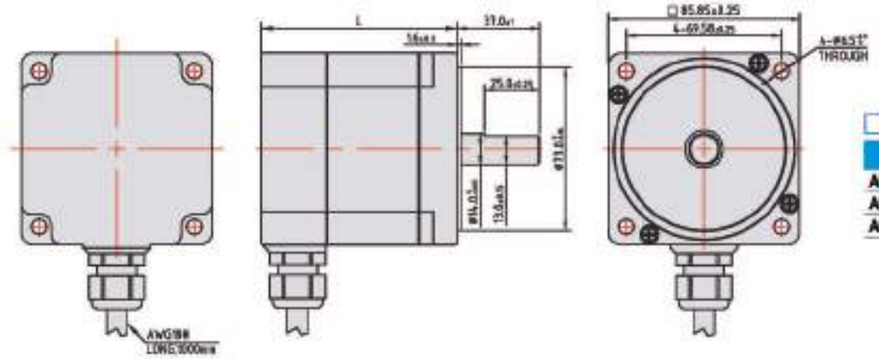
Model	Holding torque N.m	Rated current A/Phase	Resistence Ω/Phase	Inductance mH/Phase	Rotational inertia g.cm²	Torque N.m	Weight kg
NEMA23 □57mm							
ABF57IP255-4F40S	1.2	4	0.45	1.4	280	IP65	1.5
ABF57IP276-4F50S	2	5	0.37	1.8	480		2.4
NEMA34 □86mm							
ABF86IP280-4F60S	4.5	6	0.3	3.4	650	IP65	4.6
ABF86IP2120-4F60S	8.5		0.5	6.5	1200		7.9
ABF86IP2160-4F60S	12		0.7	9.2	1700		11

■ Dimensions (unit: mm)



□57mm

Model	L
ABF57IP255-4F40S	65mm
ABF57IP276-4F50S	86mm



□86mm

Model	L
ABF86IP280-4F60S	88mm
ABF86IP2120-4F60S	126mm
ABF86IP2160-4F60S	162mm

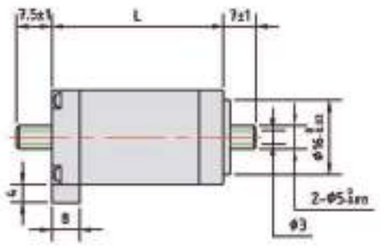
Two phase open loop stepping motor (Hollow)

1.8 ° / step

■ Specification

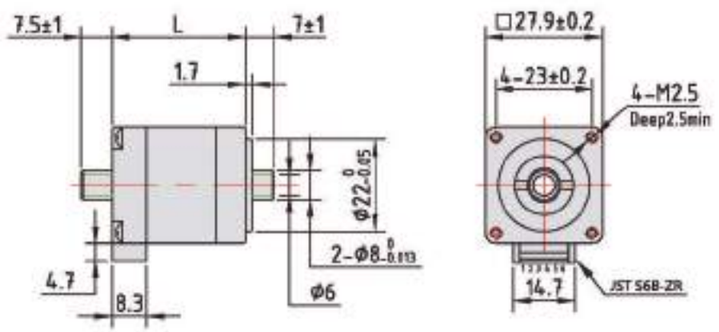
型号 Model	保持力矩 N.m	额定电流 A/相	线圈电阻 Ω/相	电感 mH/相	转动惯量 g.cm²	重量 kg	L mm	出线方式
NEMA8 / □20mm								
ABK20HS228-4P06D	0.02	0.6	6.5	2.2	1.6	0.04	28	P
ABK20HS240-4P06D	0.036		10.6	4.3	2.9	0.06	40	
NEMA11 / □28mm								
ABK28HS232-4P10D	0.08	1	5.7	3.5	9	0.1	32	P
ABK28HS245-4P15D	0.12	1.5	3	3	12	0.15	45	
ABK28HS251-4P15D	0.14		3.5	3.1	18	0.2	51	
NEMA14 / □35mm								
ABK35HS226-4P15D	0.07	1.5	1.4	0.9	12	0.15	26	P
ABK35HS236-4P15D	0.18		2.1	2.1	20	0.21	36.5	
NEMA17 / □42mm								
ABK42HS235-4P12D	0.07	1.2	2.1	3.9	35	0.24	35	P
ABK42HS249-4P20D	0.48	2	1.35	2.9	77	0.36	49	
NEMA23 / □57mm								
ABK57HS245-4P30D	0.8	3	0.57	1.2	180	0.52	45.5	P
ABK57HS265-4P30D	1.7		0.9	2.7	350	0.85	64.5	

■ Dimensions (unit: mm)



□20mm

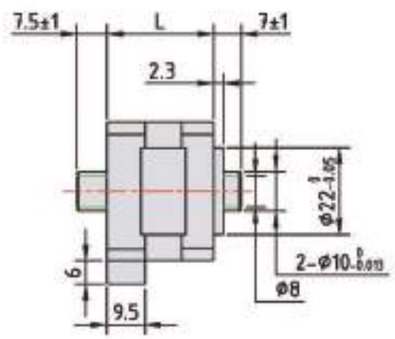
Model	L
ABK20HS228	28mm
ABK20HS240	40mm

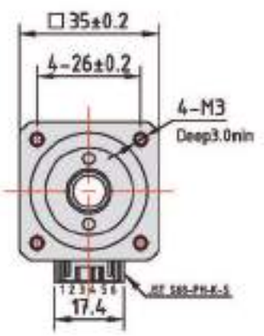


□28mm

Model	L
ABK28HS232	32mm
ABK28HS245	45mm
ABK28HS251	51mm

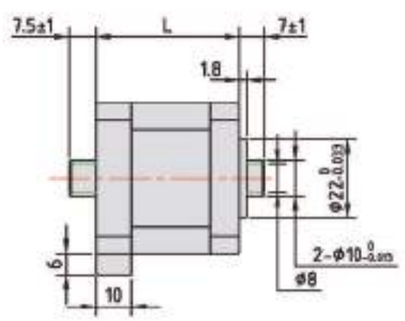
■ Dimensions (unit: mm)

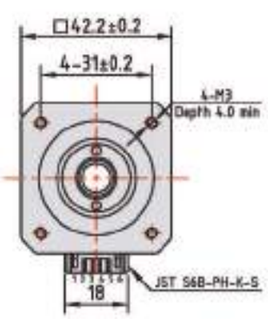




□35mm

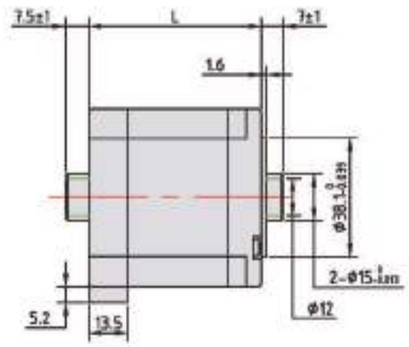
Model	L
ABK35HS226	26mm
ABK35HS236	36mm

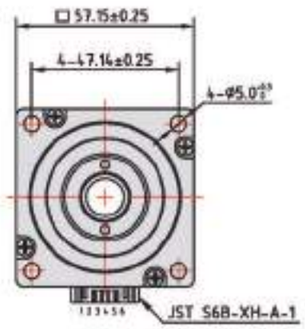




□42mm

Model	L
ABK42HS235	35mm
ABK42HS249	49mm



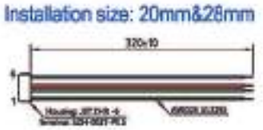


□57mm

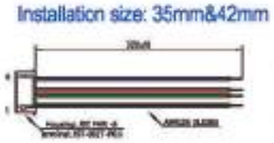
Model	L
ABK57HS245	45mm
ABK57HS265	65mm

■ Matching wire harness

Installation size: 20mm&28mm

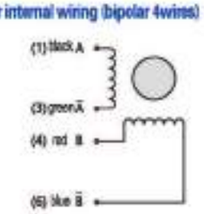


Installation size: 35mm&42mm



Installation size: 57mm

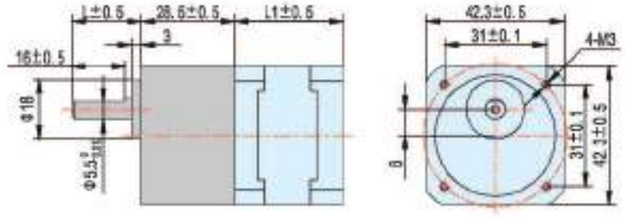
● Motor internal wiring (bipolar 4wires)



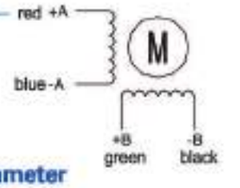
Two phase open-loop stepper motor with gearbox

□42mm (Bipolar 4 wires)

■ Dimensions (unit: mm)



Wiring diagram



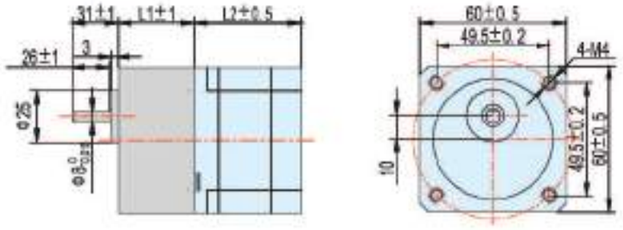
■ Technical parameter

ratio	3、3.6、5、6、7.5、10	12.5、15
stage	1	2
L(mm)	28.5	

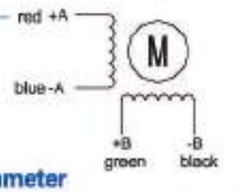
※ this outline drawing shows the stepping motor of eccentric gear reducer, which is an eccentric gear reducer.
※ we can formulate the electrical parameters of the stepping motor according to your needs, and we can also add planetary reducer, power-off brake, encoder, etc.
※ when installing the stepping motor, be sure to use the installation seam of the front cover of the motor for positioning, pay attention to the tolerance fit, and strictly ensure the concentricity of the output shaft of the stepping motor and the load.
※ for the performance parameters of the motor, please refer to the detailed motor parameters of the corresponding model in the previous sample.

□60mm (Bipolar 4 wires)

■ 外形图 (单位mm)



Wiring diagram



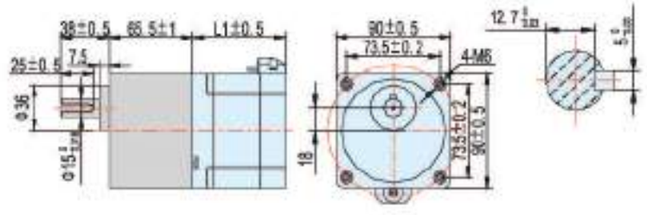
■ Technical parameter

ratio	3、3.6、5、6、7.5、10、12.5、15	20
stage	1	2
L(mm)	32	42

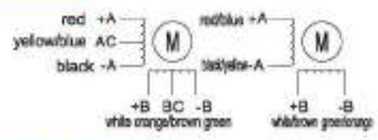
※ this outline drawing shows the stepping motor of eccentric gear reducer, which is an eccentric gear reducer.
※ we can formulate the electrical parameters of the stepping motor according to your needs, and we can also add planetary reducer, power-off brake, encoder, etc.
※ when installing the stepping motor, be sure to use the installation seam of the front cover of the motor for positioning, pay attention to the tolerance fit, and strictly ensure the concentricity of the output shaft of the stepping motor and the load.
※ for the performance parameters of the motor, please refer to the detailed motor parameters of the corresponding model in the previous sample.

□86mm (Bipolar 8 wires)

■ Dimensions (unit: mm)



Wiring diagram



■ Technical parameter

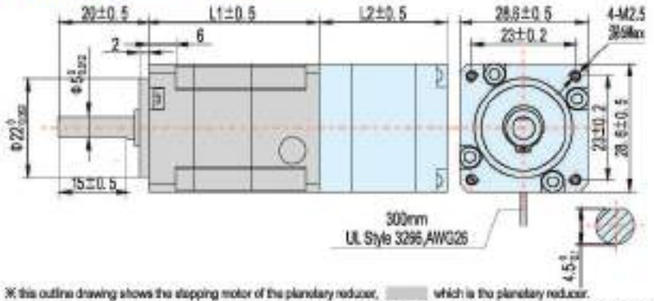
ratio	3、3.6、5、6、7.5、9、12.5、15、20
stage	1
L(mm)	65.5

※ this outline drawing shows the stepping motor of eccentric gear reducer, which is an eccentric gear reducer.
※ we can formulate the electrical parameters of the stepping motor according to your needs, and we can also add planetary reducer, power-off brake, encoder, etc.
※ when installing the stepping motor, be sure to use the installation seam of the front cover of the motor for positioning, pay attention to the tolerance fit, and strictly ensure the concentricity of the output shaft of the stepping motor and the load.
※ for the performance parameters of the motor, please refer to the detailed motor parameters of the corresponding model in the previous sample.

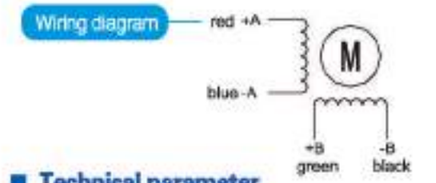
Two phase open loop stepper motor with planetary reducer

□28mm (Bipolar 4 wires)

■ Dimensions (unit: mm)



Wiring diagram



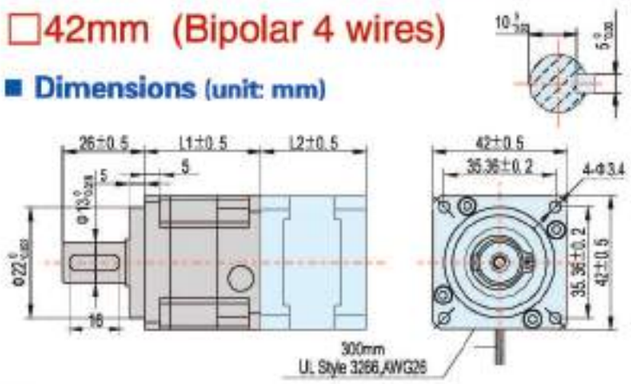
■ Technical parameter

ratio	4、5、7、10	16、20、25、35
stage	1	2
L(mm)	38	46.5
efficiency	≥96%	≥94%

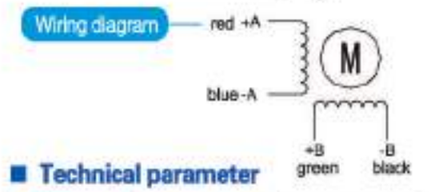
※ this outline drawing shows the stepping motor of the planetary reducer, which is the planetary reducer.
※ we can formulate the electrical parameters of the stepping motor according to your needs, and we can also add planetary reducer, power-off brake, encoder, etc.
※ when installing the stepping motor, be sure to use the installation seam of the front cover of the motor for positioning, pay attention to the tolerance fit, and strictly ensure the concentricity of the output shaft of the stepping motor and the load.
※ for the performance parameters of the motor, please refer to the detailed motor parameters of the corresponding model in the previous sample.

□42mm (Bipolar 4 wires)

■ Dimensions (unit: mm)



Wiring diagram



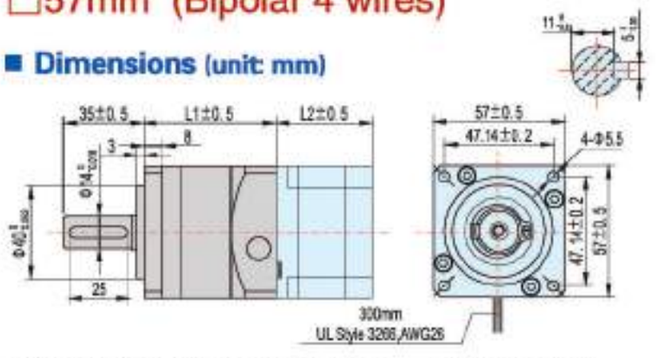
■ Technical parameter

ratio	4、5、7、10	16、20、25、35
stage	1	2
L(mm)	37	47.3
efficiency	≥96%	≥94%

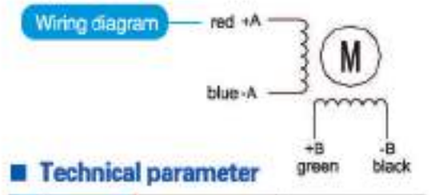
※ this outline drawing shows the stepping motor of the planetary reducer, which is the planetary reducer.
※ we can formulate the electrical parameters of the stepping motor according to your needs, and we can also add planetary reducer, power-off brake, encoder, etc.
※ when installing the stepping motor, be sure to use the installation seam of the front cover of the motor for positioning, pay attention to the tolerance fit, and strictly ensure the concentricity of the output shaft of the stepping motor and the load.
※ for the performance parameters of the motor, please refer to the detailed motor parameters of the corresponding model in the previous sample.

□57mm (Bipolar 4 wires)

■ Dimensions (unit: mm)



Wiring diagram



■ Technical parameter

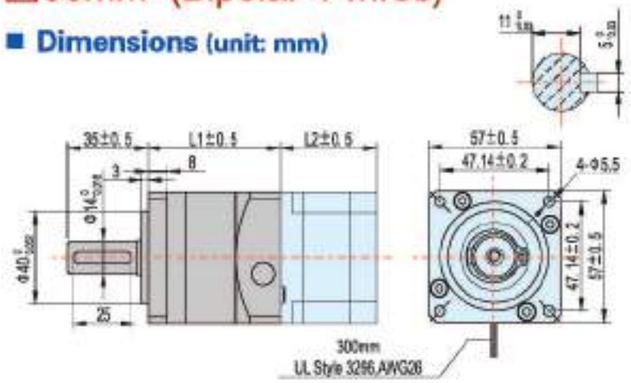
ratio	4、5、7、10	16、20、25、35
stage	1	2
L(mm)	67	69
efficiency	≥96%	≥94%

※ this outline drawing shows the stepping motor of the planetary reducer, which is the planetary reducer.
※ we can formulate the electrical parameters of the stepping motor according to your needs, and we can also add planetary reducer, power-off brake, encoder, etc.
※ when installing the stepping motor, be sure to use the installation seam of the front cover of the motor for positioning, pay attention to the tolerance fit, and strictly ensure the concentricity of the output shaft of the stepping motor and the load.
※ for the performance parameters of the motor, please refer to the detailed motor parameters of the corresponding model in the previous sample.

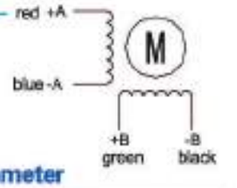
Two phase open loop stepper motor with planetary reducer

□60mm (Bipolar 4 wires)

■ Dimensions (unit: mm)



Wiring diagram



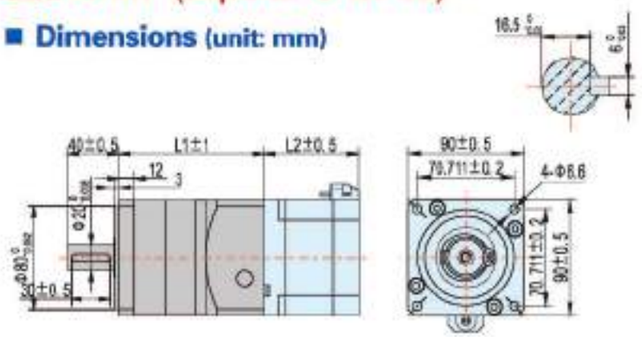
■ Technical parameter

ratio	4、5、7、10	16、20、25、35
stage	1	2
L(mm)	67	69
efficiency	≥96%	≥94%

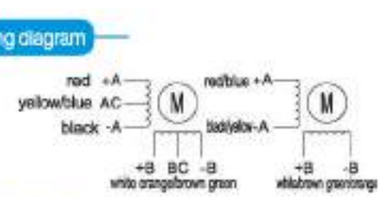
※ the outline drawing shows the stepping motor of the planetary reducer, which is the planetary reducer.
※ we can formulate the electrical parameters of the stepping motor according to your needs, and we can also add planetary reducer, power-off brake, encoder, etc.
※ when installing the stepping motor, be sure to use the installation seam of the front cover of the motor for positioning, pay attention to the tolerance fit, and strictly ensure the concentricity of the output shaft of the stepping motor and the load.
※ for the performance parameters of the motor, please refer to the detailed motor parameters of the corresponding model in the previous sample.

□86mm (Bipolar 8 wires)

■ Dimensions (unit: mm)



Wiring diagram



■ Technical parameter

ratio	4、5、7、10	16、20、25、35
stage	1	2
L(mm)	152	173
efficiency	≥96%	≥94%

※ this outline drawing shows the stepping motor of the planetary reducer, which is the planetary reducer.
※ we can formulate the electrical parameters of the stepping motor according to your needs, and we can also add planetary reducer, power-off brake, encoder, etc.
※ when installing the stepping motor, be sure to use the installation seam of the front cover of the motor for positioning, pay attention to the tolerance fit, and strictly ensure the concentricity of the output shaft of the stepping motor and the load.
※ for the performance parameters of the motor, please refer to the detailed motor parameters of the corresponding model in the previous sample.

Radiation resistant - high and low temperature - vacuum stepper motor

■ Product Features

Vacuum / High / Low Temperature Environments
vacuum: 1.0X10^{-7}Pa
-40°C~200°C
Radiation resistance10^{6}Gy

Vacuum stepper motors use a new design, choose the right materials, through the new production process to complete the manufacturing and testing of special motors. Temperature as low as -40°C~200°C, vacuum better than 1.0X10-7Pa. Standard design 28, 35, 42, 57, 86 frame number two-phase four-wire hybrid stepping motors, but also according to the need to customize other specifications of the motor, or customized radiation-resistant, mold-resistant, shock-resistant, out of the form of the shaft and other special requirements.

High cleanliness of the use of the environment is also optional. Special material selection and perfect back-end processing technology make it possible to excel in high-cleanliness environments. In response to customer demand, gearboxes of the appropriate class are jointly developed with third-party factories.

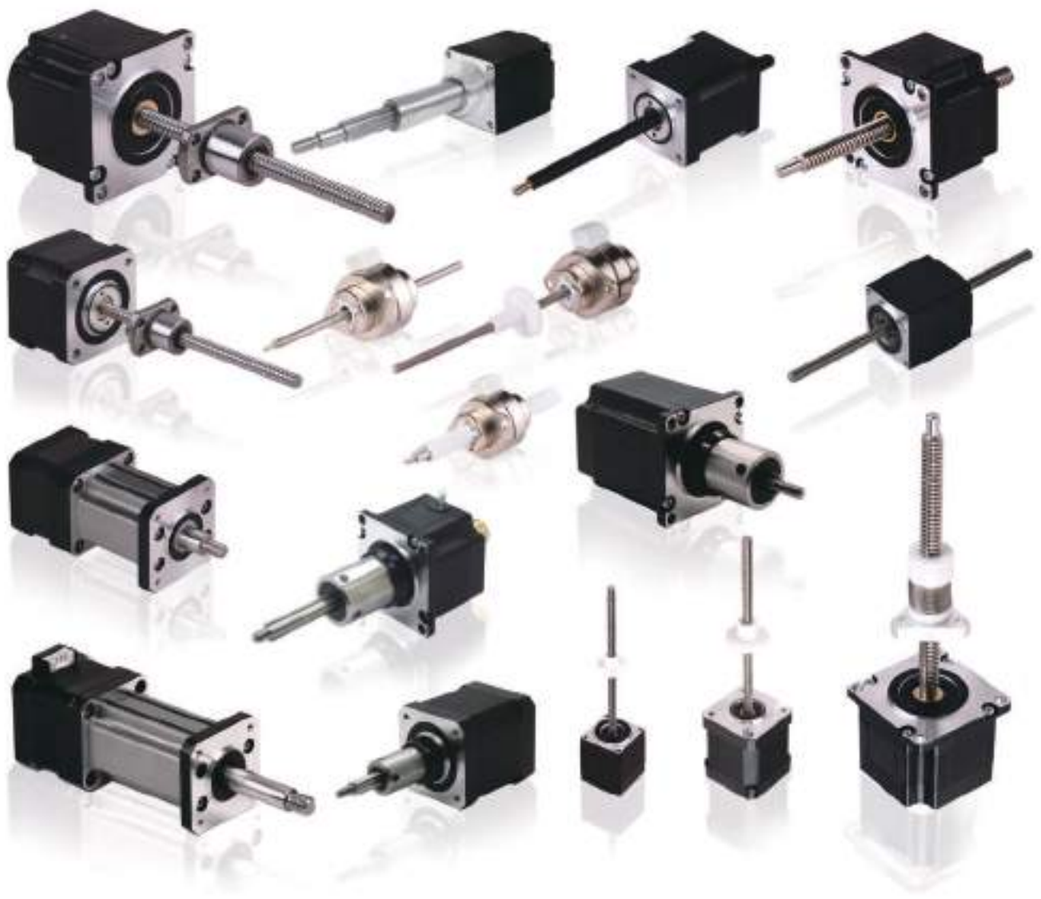
As people's health concerns more and more, previously used for artificial nuclear decommissioning or industrial production in the nuclear environment is no longer suitable, industrial automation development to today, there are already some equipment can replace the artificial to go in the nuclear radiation environment to perform the task, the nuclear environment on the automation product requirements and different, as the automation system of the source of power - motors, the first choice to withstand the radiation.

As the shell and motor shaft made of scratch-resistant stainless steel, the paint surface will not have corrosion or damage. The motors comply with protection class IP67 with a total radiation dose of up to 10 to the 6th power Grays.

Equipment used in nuclear reactors is subjected to a wide range of harsh conditions:
Not only are they subjected to thermo-mechanical and chemical stresses, but also to radiation.
In the case of motors: adhesives, enameled wires, cables, bearings and encoders must be treated to resist radiation.
Nuclear grade servo motor features:
(1) can work in a strong nuclear radiation environment (radiation intensity of 10 to the sixth power Gy)
(2) nuclear radiation and corrosion resistance, protection class IP67
3) Rated torque 0.6 N-m ~48N-m
4) High overload capacity, good dynamic response performance
5) Small cogging torque, small torque fluctuation
3. Nuclear servo motor application areas
1) Nuclear radiation environment
2) Food industry
3) Chemical industry
4) Pharmaceutical industry

Screw stepping motor

The screw stepping motor series products provide a simple and effective solution for linear motion, which simplifies theconversion process from rotary motion to linear motion.Racks, couplings and other mechanical parts to realize theconversion of rotary motion to linear motion, which greatly saves parts.The procurement cost of the parts and thesystem assembly time are effectively solved, the accuracy loss caused by multiple transfers is effectively solved,and the utilization rate of the structure space and the positioning accuracy are improved. Our products are simple and compact in structure, suitable for operation within 500mm stroke, the minimum step resolution is 0.0015mm, and the maximum thrust can reach more than 200 kg force.



Product Selection Guide

To reduce design complexity and cost considerations, it is important to select the right motor.
Here are 2 simple steps to choosing a motor

Step 1 Selection of motor size (force requirement)

The following chart describes the motor size and maximum thrust, and the upper limit of the load:

	Motor size(mm)	Maximum thrust(N)	Recommended load upper limit(N)
Sliding screw linear actuator	14	19	15
	20	70	45
	28	150	140
	35	300	230
	42	600	230
	57	1300	910
	60	1560	910
	86	2400	2270

As the size of the motor increases, the output thrust of the motor increases accordingly.

Step 2 lead selection (strength and speed needs)

After selecting the appropriate motor size based on thrust, choosing the appropriate lead also considers speed and acceleration.

The speed of the screw stepping motor is inversely proportional to the thrust, that is, increasing the running speed of the motor will correspondingly reduce the thrust of the motor.

To complete the motor/screw selection data, please refer to the speed/thrust curves for different motor sizes.
While these two steps provide a basis for motor/screw selection, other variables must also be considered:

- Working period·
- System life
- envirnmental factor
- Repetitive positioning accuracy
- acceptable backlash
- acceleration/deceleration needs
- driving conditions
- Horizontal or vertical installation

Since many variables will affect the motor selection, it is strongly recommended that users conduct actual tests before deciding on a solution.

Note: This catalog only provides a rough selection guide, to determine the final solution, please contact our sales engineer further.

Technology overview

Moving loads from point A to point B by means of screws and nuts is the most common form of linear motion.This chapter helps you understand the concepts of screw stepper motors and choose the best product for your application.

Some basic considerations are as follows:
1 What is the load on the system?
2. What is the speed requirement from point A to point B?
3. Stroke length?
4. What is the accuracy requirement of the system?
5 Time requirements from point A to point B?
6 Repeat positioning accuracy requirements of the system?
7. Horizontal or vertical load?

■ Screw stepping motor

- Screw stepper motor type

  E: External drive type

  N: Through shaft type

  NC: NC: Through-Fixed Shaft Type

  EC: External drive - fixed shaft type (electric cylinder)

E: External drive type　N: Through shaft type　NC: Through-Fixed Shaft Type　EC: External drive - fixed shaft type (electric cylinder)

- Lead
  Distance per turn. All screws are listed by lead, lead = pitch x number of threads

- pitch
  The distance between the gear. In multiple threads, pitch = lead ÷ number of threads

- Lead precision
  Deviation fluctuation of actual and theoretical position based on lead.

- position deviation
  How close the actual value is to the theoretical value.

- Repetitive positioning accuracy
  The degree of consistency with which a motor is directed to a range of positions of the same target under specified conditions.

- Horizontal or vertical application
  Under vertical load, it is necessary to consider the self-sliding phenomenon after the motor loses power. If necessary, it is necessary to consider installing brake device for protection. The weight of the load itself should also be considered in the load calculation under vertical load. Horizontal application screw cannot withstand suspension load.

- The screw is fully bouncing
  The motor is fixed with the installation stop as the benchmark, and the screw is slowly rotated to measure the radial runout of the whole length of the screw at any position. This definition applies only to externally driven motors.

- Tension or compression load
  The load with tensile action on the screw is the tension load. The load with extrusion action on the screw is the compression load. According to the size of the load to design the assembly screw.

- Vibration and noise
  When the motor operating frequency is close to the motor's inherent oscillation frequency, resonance will be generated and a large noise will be emitted. The resonance frequency of hybrid motor with 18 degree step Angle is generally about 200pps. Low frequency resonance can be improved by micro - step drive

- Positioning torque
  Torque of stator locking rotor when stepping motor is not energized

- Driver
  Refers to an electrical control device for running a stepping motor, including a power supply, a logic programmer, a switching element and a variable frequency pulse source for determining the stepping rate.

- Dynamic torque
  The torque produced by the motor at a given stepping rate. The dynamic torque can be expressed by PULLIN torque or PULLOUT torque.

- Holding torque
  Torque of stator locking rotor when stepping motor is running at rated current but not rotating.

- Inertia
  Inertial measurement of acceleration or deceleration of an object. Used here to refer to the inertia of the load to be moved by the motor, or the inertia of the rotor of the motor.

- Linear step increment (step length)
  Each rotor rotation of a step Angle, so that the screw produced by the linear stroke.

- Temperature rise
  Temperature rise is the temperature difference between the motor and the environment, which is caused by the motor heating. In operation, iron loss will occur when the motor core is in the alternating magnetic field, copper loss will occur when the windings are energized, and other stray losses will increase the motor temperature. It is an important index in motor design and operation

- Single step response
  The time required for the motor to perform a complete step.

- Stepping
  It refers to the rotation of the motor rotor from one single beat excitation position to the next single beat excitation position. For the dry rotary motor, the step is the Angle that the rotor turns, and for the dry linear motor, the step is the straight line distance.

- Step angle
  It refers to the angular displacement that can be turned by the shaft of a stepping motor running in step sequence when the adjacent two-phase windings of the stepping motor under no-load state are excited successively by a single beat. That is, the Angle of rotation of each step produced by the rotor, measured in degrees (°)

- Load torque
  Sum of torque of resistance and torque of inertia.

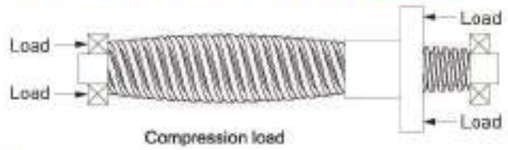
- PULL OUT torque
  Under the specified driving conditions, the stepper motor operates at a given pulse frequency, and the maximum load torque can be borne on the rotating shaft without losing step.

- PULLIN torque
  he acceleration torque of the inertia of the rotor must be overcome, as well as fixed external loads and various frictional torques during acceleration.Therefore, the pull in moment is usually less than the pull out moment.

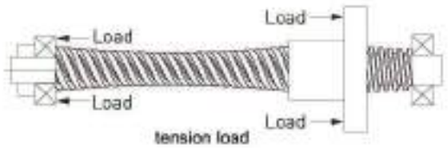
- Efficiency
  Ratio of useful power to driving power.

- Resolution
  Each motor receives a pulse motor shaft extension distance.

Technology overwise



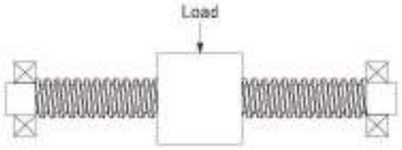
Compression load



tension load

- radial load

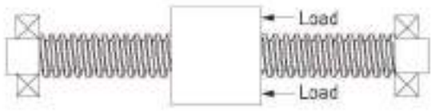
Radial load refers to the load perpendicular to the central axis of the screw. In general, please avoid such design, unless supported by wired guide rails.



Radial load (avoid or minimize)

- axial load

Axial load refers to the load parallel to the central axis of the screw.



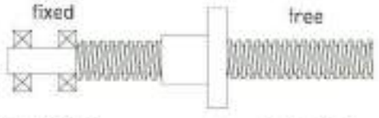
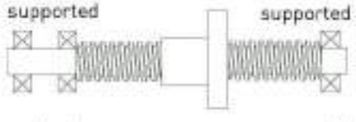
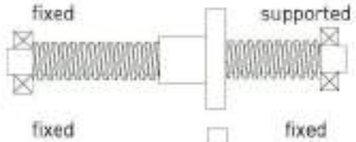
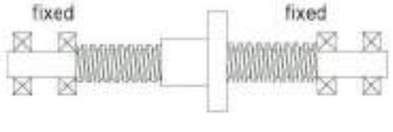
Axial load (best mode)

- Static load: the maximum thrust that the lead screw can withstand in a static state.
- Dynamic load: the maximum thrust that the lead screw can bear when it is in motion
- reverse driving force

  Back-driving force is the push-pull force that is applied axially to rotate the nut or lead screw. Generally speaking, if the screw efficiency is greater than 50%, reverse thrust may occur, and if the screw efficiency is lower than 35%, it can be self-locking. The vertical load system must consider self-locking (reverse thrust).
- Torque: The torque required to drive the screw system, including:

  1. Inertia torque 2. Frictional resistance torque 3 Load torque
- lubrication

  The nut material usually contains self-lubricating materials. The factory has been coated with special lubricants before leaving the factory, and users do not need to addother lubricants. Leadscrew systems coated with ironamine generally do not require lubricants.
- Screw end processing: standard metric and inch threads or customized according to customer requirements, please confirm with the company's technical support engineer for details.
- Screw end fixing method: The installation and fixing method of the screw end greatly affects the performance of the system.

end fixing type	end fixing type	Critical velocity coefficient	Critical load coefficient
	Weak	0.32	0.25
	Medium	1.0	1.0
	Better	1.55	2.0
	Best	2.24	4.0

- column strength

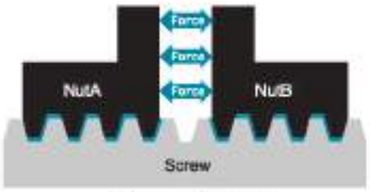
  When the lead screw is subjected to extrusion load, if the load is greater than the elastic support capacity of the lead screw, the lead screw will fail due to bending or expansion.
- critical speed

  The critical speed refers to the rotational speed of the lead screw when it reaches the first resonance frequency. At this speed, the lead screw will deform and twist, and the system will vibrate and become unstable. Several variables affect the critical speed of the system:
  1. Lead 2. Speed 3. End fixing method 4. Axial load 5. Screw diameter 6. Axial force method (tension or compression)
- Backlsh

  The backlash is the relative movable amount in the axial direction of the screw and the nut when they are stationary. With the increase of working time, the backlash will also increase due to wear. Compensation or correction of backlash can be achieved by anti-backlash nuts. Anti-backlash is a concern when bidirectional positioning is required.

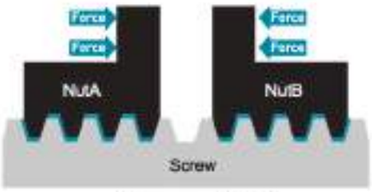
Standard Nut

Blue means backlash



Reverse thrust anti-backlash nut

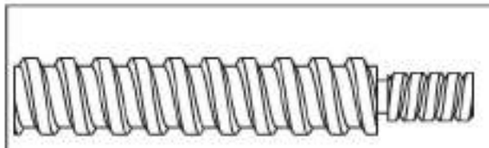
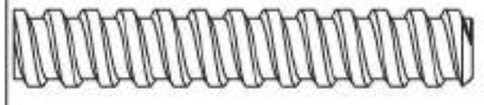
Blue means backlash



Compression Anti-Backlash Nut

Blue means backlash

■ Screw End Machining

	thread	Select end machining specifications according to the actual outer diameter of the lead screw. Contact technical support engineers for confirmation.
	optical axis	
	No processing	
	Customizatin	

Naming rules of screw stepping motor

The 28 series hybrid screw stepping motor is small in size and strong in performance, especially suitable for applications requiring high performance and long life in extremely limited space, with a maximum thrust of 140N.

E: External drive type　N: Through shaft type　NC: Through-Fixed Shaft Type　EC: External drive - fixed shaft type (electric cylinder)

TSG 02–E–2–48–T–0808–25–04–L100–A– XXX

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

1、Linear stepper motor structure type code

Code	Structure type
TSG	Screw motor series

2、Frame size code

Code	Frame
01	20mm
02	28mm
03	35mm
04	42mm
05	57mm
06	60mm
07	86mm

3、Motor type

Code	Structure type
E	External driven type
N	Through shaft type
NC	Through–Fixed shaft type
EC	External driven–Fixed shaft type(electric cylinder)

4、Motor step angle

Code	Motor step angle
2	2P 1.8°
3	3P 1.2°
4	4P 0.9°
5	5P 0.72°

5、Motor length

Motor	Length
20 motor	30
	42
28 motor	34
	45
35 motor	34
	47
42 motor	34
	40
	48
	60
57 motor	45
	55
	65
	75
	80
	84
	100
	112
86 motor	65
	76
	96
	114
	129
	152

6、Screw type

Code	Motor step angle
T	Metric screw specification
S	Inch screw specification

7、Screw specification

Code	Motor rated current
0808	Metric screw dia 8mm stroke 8mm

8、Motor rated current

Code	Motor rated current
26	2.6A

9、Motor polarity

Code	Motor polarity
04	Bio–polar
06	Single–polar

10、Telescopic stroke

Code	Telescopic stroke
L100	Telescopic stroke

11、Customization options

Code	Customization type
A	Anti–backlash nut
B	Brake
T	Screw teflon
P	Handwheel
O	Origin
G	High temperature
D	Low temperature
X	Rear axis
E	Encoder

12、Customization

Code	
XXX	Customization

Lead screw selection table

Screw type		20 motor		28 motor		35 motor		42 motor		57 motor		86 motor	
Dia* stroke	Step length	Through motor	External driver type	Through motor	External driver type	Through motor	External driver type	Through motor	External driver type	Through motor	External driver type	Through motor	External driver type
3.5 * 0.6096	0.003048		*	*									
3.5 * 1	0.005		*	*									
3.5 * 1.2192	0.006096		*	*									
3.5 * 2	0.01			*	*								
3.5 * 4	0.02			*	*								
4.76 * 0.635	0.003175			*	*								
4.76 * 1.27	0.00635			*	*								
4.76 * 2.54	0.0127			*	*								
4.76 * 5.08	0.0254			*	*								
5*1	0.005			*	*								
5*2	0.01			*	*								
5.54 * 0.6096	0.003048				*	*	*	*	*				
5.54 * 1.2192	0.006096				*	*	*	*	*				
5.54 * 2.4384	0.012192				*	*	*	*	*				
5.54 * 4.8768	0.024384				*	*	*	*	*				
5.54 * 9.7536	0.048768				*	*	*	*	*				
6*18	0.09				*	*	*	*	*				
6.35 * 1	0.005				*	*	*	*	*				
6.35 * 0.79375	0.00396875				*	*	*	*	*				
6.35 * 1.5875	0.0079375				*	*	*	*	*				
6.35 * 2	0.01				*	*	*	*	*				
6.35 * 2.4384	0.012192				*	*	*	*	*				
6.35 * 2.54	0.0127				*	*	*	*	*				
6.35 * 3	0.015				*	*	*	*	*				
6.35 * 3.175	0.015875				*	*	*	*	*				
6.35 * 5.08	0.0254				*	*	*	*	*				
6.35 * 6.35	0.03175				*	*	*	*	*				
6.35 * 8.4582	0.042291				*	*	*	*	*				
6.35 * 12.7	0.0635				*	*	*	*	*				
8 * 1	0.005					*	*	*	*	*	*		
8*1.25	0.00625					*	*	*	*	*	*		
8 * 2	0.01					*	*	*	*	*	*		
8 * 4	0.02					*	*	*	*	*	*		
8 * 5	0.025					*	*	*	*	*	*		
8 * 8	0.04					*	*	*	*	*	*		
8 * 16	0.08					*	*	*	*	*	*		
8 * 20	0.1					*	*	*	*	*	*		
8 * 24	0.12					*	*	*	*	*	*		
9.525 * 0.635	0.003175								*	*	*		
9.525 * 1.27	0.00635								*	*	*		
9.525 * 1.5875	0.0079375								*	*	*		
9.525 * 2.1167	0.01058								*	*	*		
9.525 * 2.54	0.0127								*	*	*		
9.525 * 3.175	0.015875								*	*	*		
9.525 * 4.232	0.02116								*	*	*		
9.525 * 5.08	0.0254								*	*	*		
9.525 * 6.35	0.03175								*	*	*		
9.525 * 9.525	0.047625								*	*	*		
9.525 * 10.16	0.0508								*	*	*		
9.525 * 12.7	0.0635								*	*	*		
9.525 * 25.4	0.127								*	*	*		
10 * 2	0.01									*	*		
10 * 4	0.02									*	*		
10 * 10	0.05									*	*		
12 * 2	0.01									*	*		
12 * 4	0.02									*	*		
12 * 6	0.03									*	*		
12 * 12	0.06									*	*		
12.5 * 25.4	0.127									*	*		
12.7 * 12.7	0.0635									*	*		
14 * 3	0.015										*	*	*
15.875 * 2.54	0.0127										*	*	*
15.875 * 3.175	0.015875										*	*	*
15.875 * 5.08	0.0254										*	*	*
15.875 * 6.35	0.03175										*	*	*
15.875 * 12.7	0.0635										*	*	*
15.875 * 25.4	0.127										*	*	*

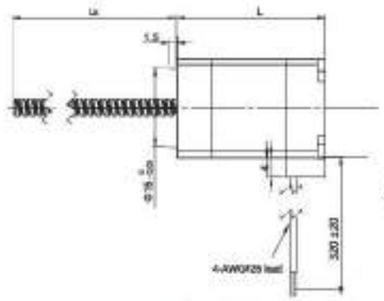
20 Series Stepping screw motor

20 series hybrid screw stepping motor is the smallest hybrid screw stepping motor in the product. It provides an effective solution for engineers to realize precise transmission in limited space. It has a maximum thrust of 45N.

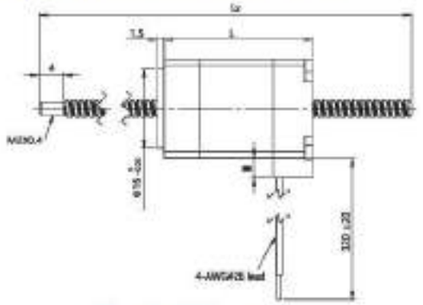
■ Motor specification

Motor type	Length(mm)	Holding torque(N.m)	Rated current(A)	Resistance(Ω)	Rated inductance(mH)	Rated voltage(V)
20	30mm	0.015*	0.5A	4.9Ω	1.7mH	2.45V
	42mm	0.03*	0.5A	9Ω	1.7mH	4.5V

■ External driven type motor and through shaft type motor dimensions

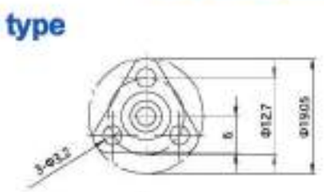


External driven type motor

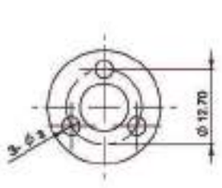


Through shaft type motor

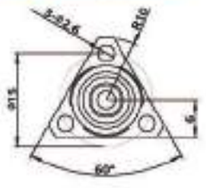
■ Nut type



Triangle nut



Round nut

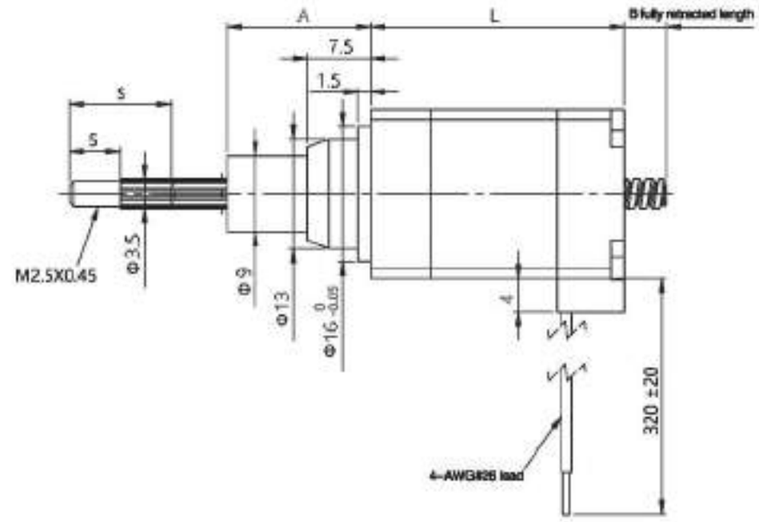


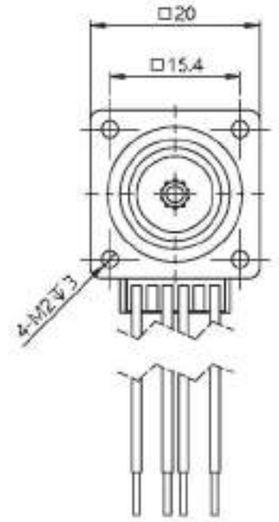
Anti-backlash nut

■ Screw dimensions

Screw type	Dia(mm)	Stroke(mm)	Step length 1.8(mm)	Thrust range(N)	Nut axial backlash(mm)	Power off self-locking force range(N)
S series Inch screw	3.5	0.6096	0.003048	55-18	0.03-0.05	40N
S series Inch screw	3.5	1	0.005	36-14		15N
S series Inch screw	3.5	1.2192	0.006096	30-12		15N
S series Inch screw	3.5	2	0.01	25-8		4-8N
S series Inch screw	3.5	4	0.02	15-4		1-2N

■ Fixed shaft type motor dimensions

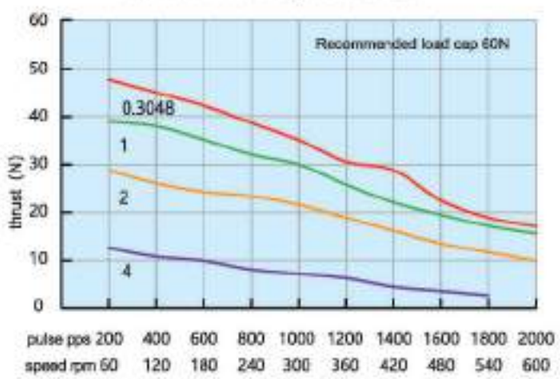




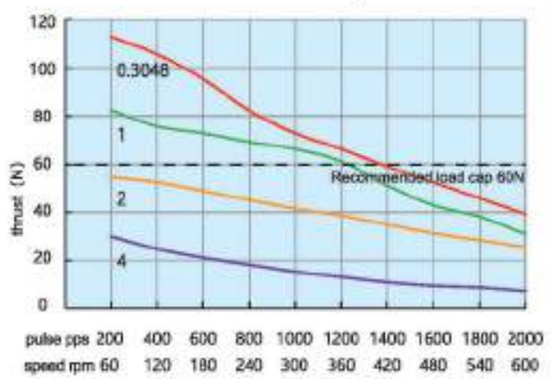
Stroke (mm)	Dimension A	Dimension B	
		L=30	L=42
9	11.1	1.58	0
12.7	14.81	5.28	0
19.1	21.16	11.63	0.3
25.4	27.51	17.98	6.6
31.8	33.86	24.33	13
38.1	40.21	30.68	19.3
50.8	52.91	43.38	32

■ Dynamic thrust curve

20series 30mm curve f speed and thrust



20 series 42mm curve of speed and thrust



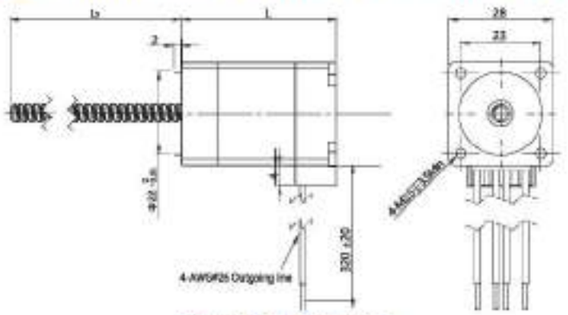
28 Series Stepping screw motor

The 28 series hybrid screw stepping motor is small in size and strong in performance, especially suitable for applications requiring high performance and long life in extremely limited space,with a maximum thrust of 140N.

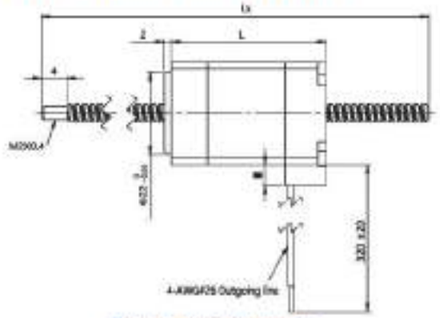
■ Motor specification

Motor type	Length(mm)	Holding torque(N.m)	Rated current(A)	Resistance(Ω)	Rated inductance(mH)	Rated voltage(V)
28	34mm	0.06	1A	2.1Ω	1.4mH	2.1V
	45mm	0.12	1A	3Ω	2.3mH	3V

■ External driven type motor and through shaft type motor dimensions

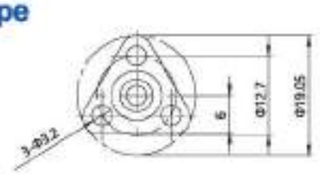


External driven type motor

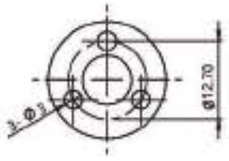


Through shaft type motor

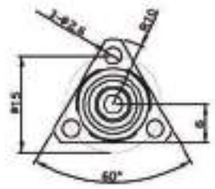
■ Nut type



Triangle nut



Round nut

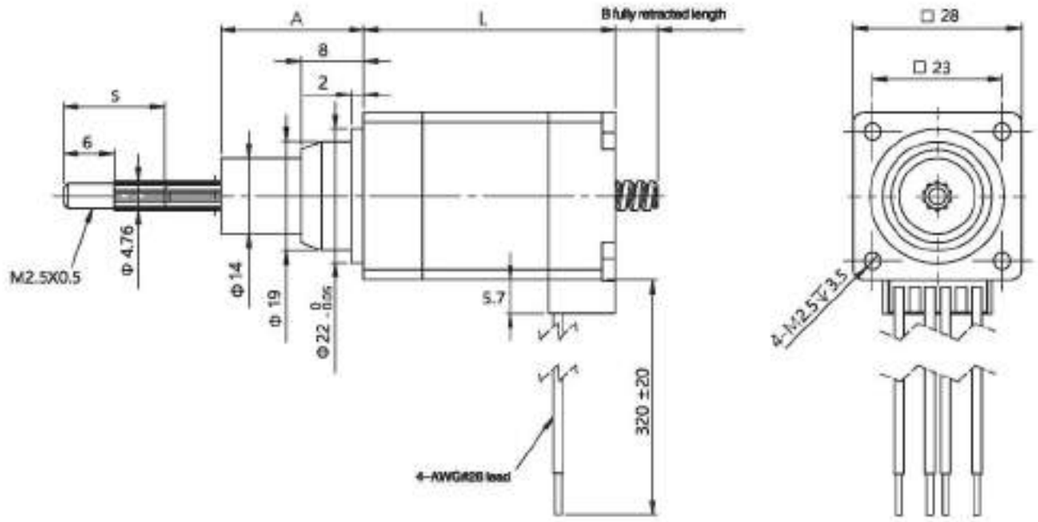


Anti-backlash nut

■ Screw dimensions

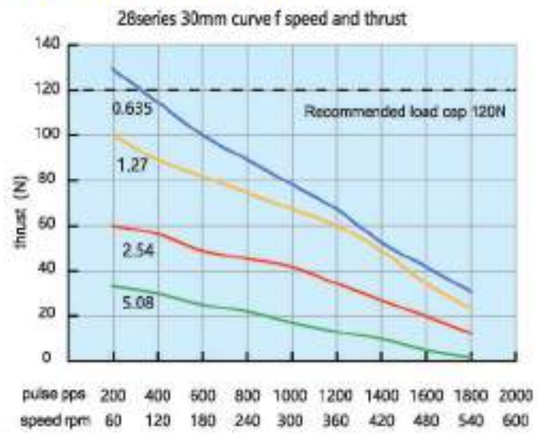
Dia(mm)	Screw dia(inch)	Stroke(mm)	Stroke(inch)	Step length 1.8(mm)	step length 0.9°(mm)	Nut axial backlash
4.77	0.188	0.635	0.025	0.0032	0.0016	0.02-0.03mm
4.77	0.188	1.27	0.05	0.0064	0.0032	0.02-0.03mm
4.77	0.188	2.54	0.1	0.0127	0.0064	0.02-0.03mm
4.77	0.188	5.08	0.2	0.0254	0.0127	0.02-0.03mm

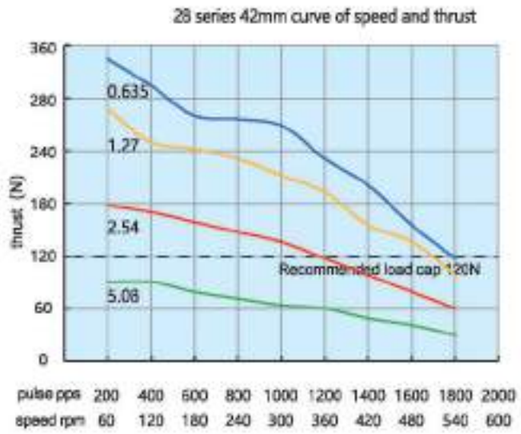
■ Fixed shaft type motor dimensions



Stroke (mm)	Dimension A	Dimension B	
		L=34	L=42
12.7	20.47	6.5	0
19.1	26.82	12.9	0
25.4	33.17	19.2	5.9
31.8	39.52	25.6	12.3
38.1	45.87	31.9	18.6
50.8	58.57	44.6	31.3
63.5	71.27	57.3	44

■ Dynamic thrust curve





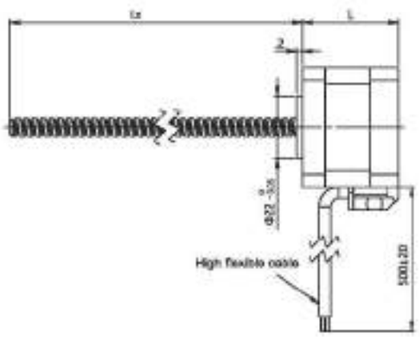
35 Series Stepping screw motor

The 35 series hybrid screw stepping motor has many patented designs, and the product performance is higher, providing a novel solution for many linear motion application fields, and the maximum thrust can reach 230N.

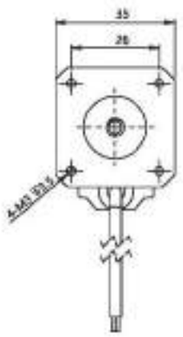
■ Motor specification

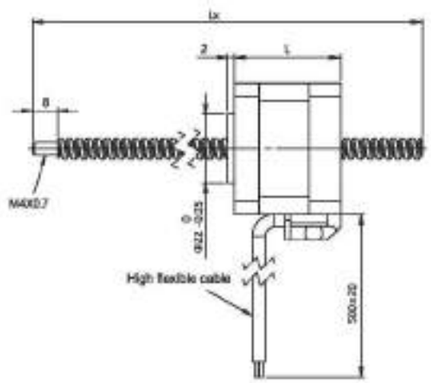
Motor type	Length(mm)	Holding torque(N.m)	Rated current(A)	Resistance(Ω)	Rated inductance(mH)	Rated voltage(V)
35	34mm	0.14	1A	2.3Ω	3.6mH	2.3V
	47mm	0.35	1.5A	1.7Ω	2.7mH	2.55V

■ External driven type motor and through shaft type motor dimensions



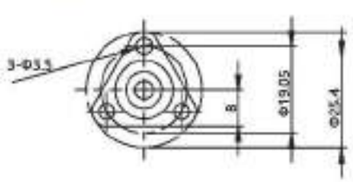
External driven type motor

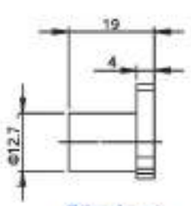




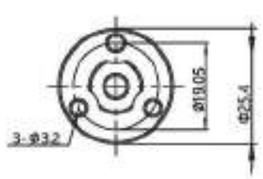
Through shaft type motor

■ Nut type

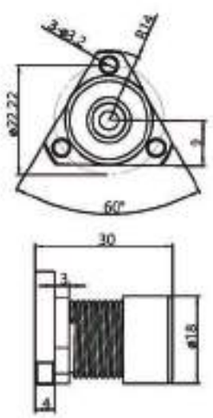




Triangle nut



Round nut

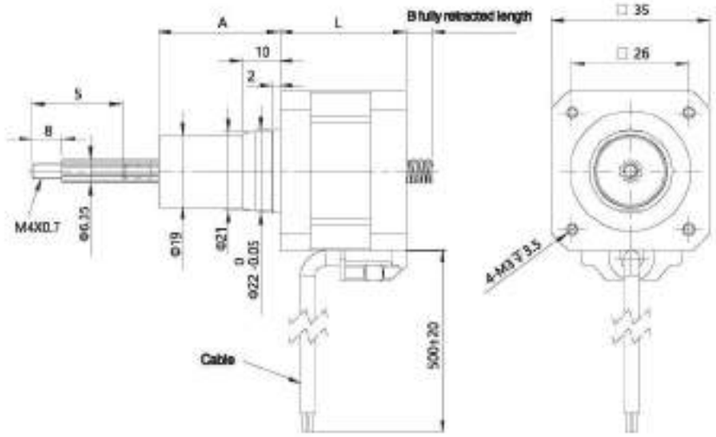


Anti-backlash nut

■ Screw dimensions

Dia(mm)	Screw dia(inch)	Stroke(mm)	Stroke(inch)	Step length 1.8(mm)	step length 0.9°(mm)	Nut axial backlash
6.35	0.25	0.79375	0.0313	0.0040	0.0020	0.02-0.03mm
6.35	0.25	1	0.0394	0.0050	0.0025	0.02-0.03mm
6.35	0.25	1.5875	0.0625	0.0079	0.0040	0.02-0.03mm
6.35	0.25	2	0.0787	0.0100	0.0050	0.02-0.03mm
6.35	0.25	2.4384	0.0960	0.0122	0.0061	0.02-0.03mm
6.35	0.25	2.54	0.1000	0.0127	0.0064	0.02-0.03mm
6.35	0.25	3	0.1181	0.0150	0.0075	0.02-0.03mm
6.35	0.25	3.175	0.1250	0.0159	0.0079	0.02-0.03mm
6.35	0.25	4.8768	0.1920	0.024384	0.012192	0.02-0.03mm
6.35	0.25	5.08	0.2000	0.0254	0.0127	0.02-0.03mm
6.35	0.25	6.35	0.2500	0.0318	0.0159	0.02-0.03mm
6.35	0.25	8.4582	0.3330	0.0423	0.0211	0.02-0.03mm
6.35	0.25	12.7	0.5000	0.0635	0.0318	0.02-0.03mm

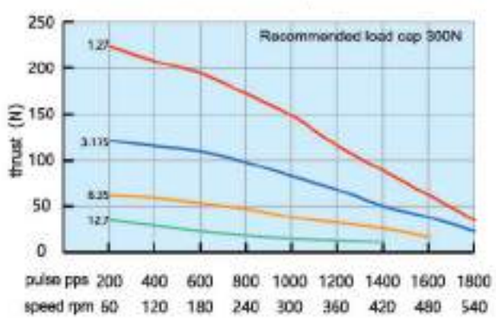
■ Fixed shaft type motor dimensions



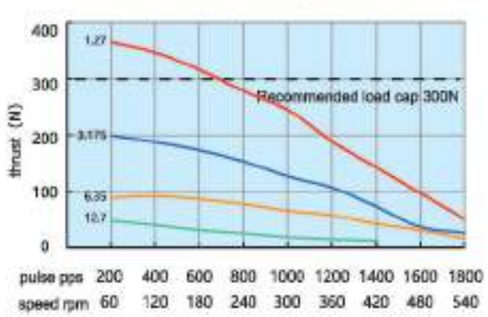
Stroke (mm)	Dimension A	Dimension B	
		L=34	L=47
12.7	20.8	8.4	0
19.1	27.2	14.8	0.8
25.4	33.5	21.1	7.1
31.8	39.9	27.5	13.5
38.1	46.2	33.8	19.8
50.8	58.9	46.5	32.5
63.5	71.6	59.2	45.2

■ Dynamic thrust curve

35 series 34mm curve f speed and thrust



35 series 47mm curve of speed and thrust



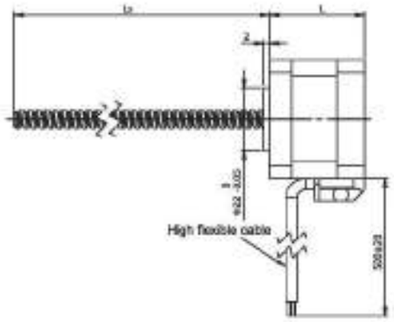
42 Series Stepping screw motor

The 42 series hybrid screw stepping motor has many patented designs, and the product performance is higher, providing a novel solution for many linear motion application fields, and the maximum thrust can reach 330N.

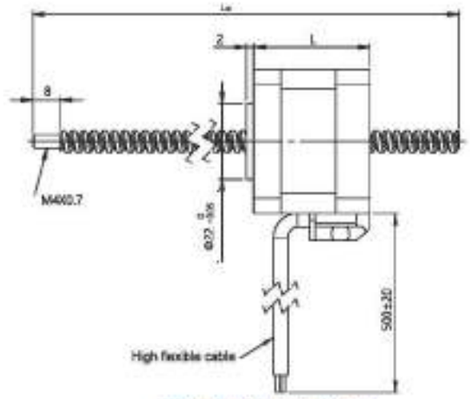
■ Motor specification

Motor type	Length(mm)	Holding torque(N.m)	Rated current(A)	Resistance(Ω)	Rated inductance(mH)	Rated voltage(V)
42	34mm	0.25	1.5A	1.73Ω	2.6mH	2.595V
	40mm	0.4	1.5A	2.1Ω	4.8mH	3.15V
	48mm	0.5	2.5A	2.4Ω	5mH	3.6V
	60mm	0.7	2.5A	0.95Ω	2.8mH	2.375V

■ External driven type motor and through shaft type motor dimensions

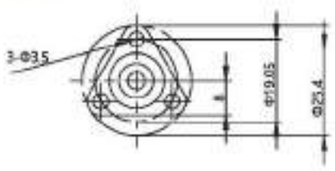


External driven type motor

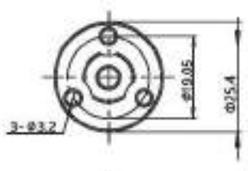


Through shaft type motor

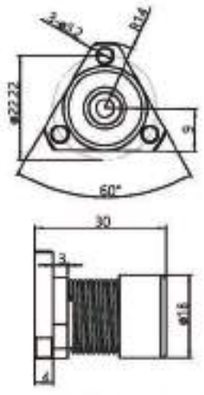
■ Nut type



Triangle nut



Round nut

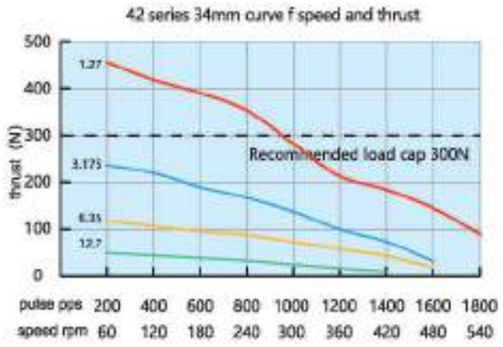


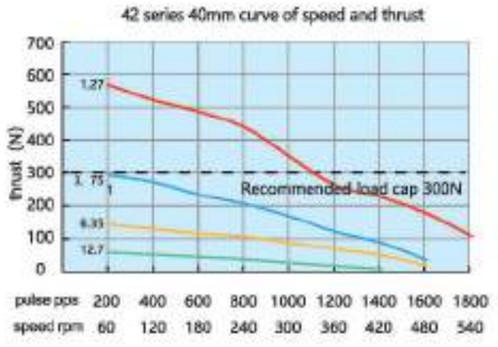
Anti-backlash nut

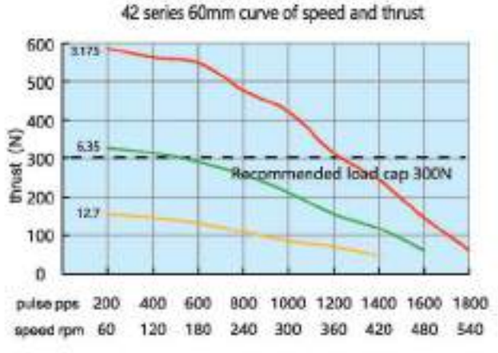
■ Screw dimensions

Dia(mm)	Screw dia(inch)	Stroke(mm)	Stroke(inch)	Step length 1.8(mm)	step length 0.9°(mm)	Nut axial backlash
6.35	0.25	0.79375	0.0313	0.0040	0.0020	0.02-0.03mm
6.35	0.25	1	0.0394	0.0050	0.0025	0.02-0.03mm
6.35	0.25	1.5875	0.0625	0.0079	0.0040	0.02-0.03mm
6.35	0.25	2	0.0787	0.0100	0.0050	0.02-0.03mm
6.35	0.25	2.4384	0.0960	0.0122	0.0061	0.02-0.03mm
6.35	0.25	2.54	0.1000	0.0127	0.0064	0.02-0.03mm
6.35	0.25	3	0.1181	0.0150	0.0075	0.02-0.03mm
6.35	0.25	3.175	0.1250	0.0159	0.0079	0.02-0.03mm
6.35	0.25	5.08	0.2000	0.0254	0.0127	0.02-0.03mm
6.35	0.25	6.35	0.2500	0.0318	0.0159	0.02-0.03mm
6.35	0.25	8.4582	0.3330	0.0423	0.0211	0.02-0.03mm
6.35	0.25	12.7	0.5000	0.0635	0.0318	0.02-0.03mm

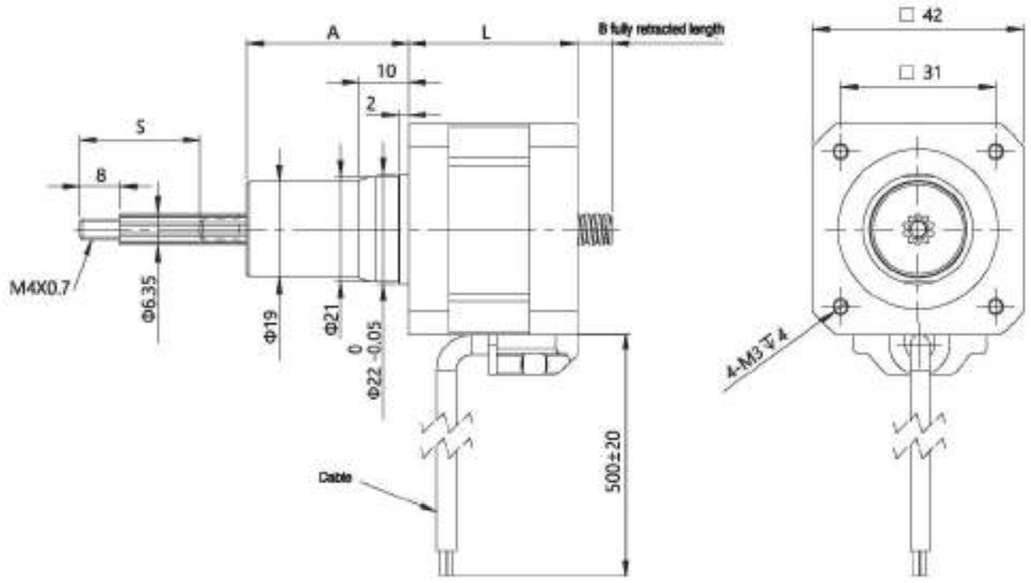
■ Dynamic thrust curve







■ Fixed shaft type motor dimensions



Stroke (mm)	Dimension A	Dimension B			
		L=34	L=40	L=48	L=60
12.7	19.8	6.4	0.4	0	0
19.1	26.2	12.8	6.8	0	0
25.4	32.5	19.1	13.1	5.1	0
31.8	38.9	25.5	19.5	11.5	0
38.1	45.2	31.8	25.8	17.8	5.8
50.8	57.9	44.5	38.5	30.5	18.5
63.5	70.6	57.2	51.2	43.2	31.2

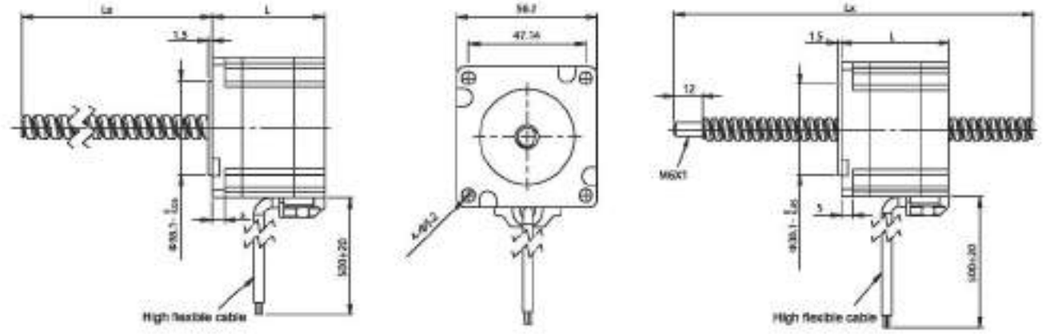
57 Series Stepping screw motor

57 series screw stepping motor with high performance and long life, can be used in higher thrust requirements of occasions, the maximum thrust up to 910N.

■ Motor specification

Motor type	Length(mm)	Holding torque(N.m)	Rated current(A)	Resistance(Ω)	Rated inductance(mH)	Rated voltage(V)
57	45mm	0.7	3A	0.75Ω	0.72mH	2.25V
	55mm	0.9	3A	0.92Ω	4.5mH	2.76V
	65mm	1.5	4A	0.78Ω	3.3mH	3.12V
	75mm	1.8	4A	0.95Ω	4.5mH	3.8V
	84mm	2.2	4A	0.97Ω	7mH	3.88V
	100mm	2.5	5A	0.7Ω	3.2mH	3.5V

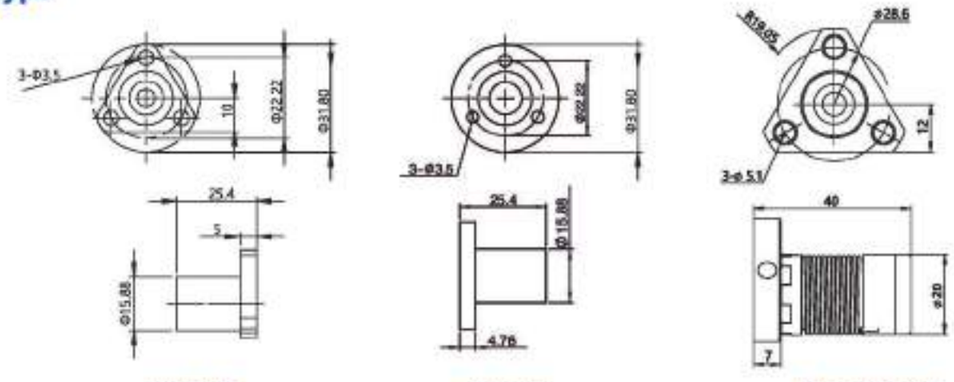
■ External driven type motor and through shaft type motor dimensions



External driven type motor

Through shaft type motor

■ Nut type



Triangle nut

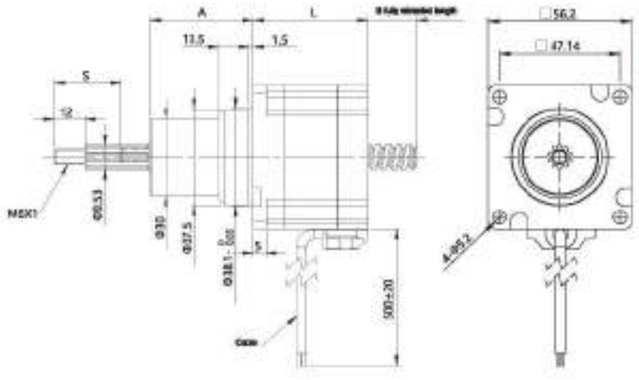
Round nut

Anti-backlash nut

■ Screw dimensions

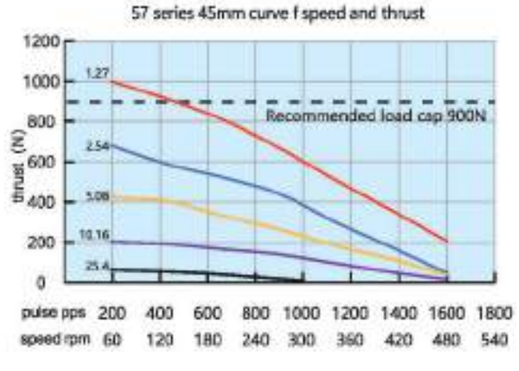
Dia(mm)	Screw dia(inch)	Stroke(mm)	Stroke(inch)	Step length 1.8(mm)	step length 0.9°(mm)	Nut axial backlash
9.525	0.375	0.635	0.025	0.003175	0.0016	0.02-0.03mm
9.525	0.375	1.27	0.05	0.00635	0.0032	0.02-0.03mm
9.525	0.375	1.5875	0.0625	0.0079375	0.0040	0.02-0.03mm
9.525	0.375	2.1167	0.083	0.0105835	0.0053	0.02-0.03mm
9.525	0.375	2.54	0.1	0.0127	0.0064	0.02-0.03mm
9.525	0.375	3.175	0.125	0.015875	0.0079	0.02-0.03mm
9.525	0.375	4.232	0.167	0.02116	0.0106	0.02-0.03mm
9.525	0.375	5.08	0.2	0.0254	0.0127	0.02-0.03mm
9.525	0.375	6.35	0.25	0.03175	0.0159	0.02-0.03mm
9.525	0.375	9.525	0.375	0.047625	0.0238	0.02-0.03mm
9.525	0.375	10.16	0.4	0.0508	0.0254	0.02-0.03mm
9.525	0.375	12.7	0.5	0.0635	0.0318	0.02-0.03mm
9.525	0.375	25.4	1	0.127	0.0635	0.02-0.03mm

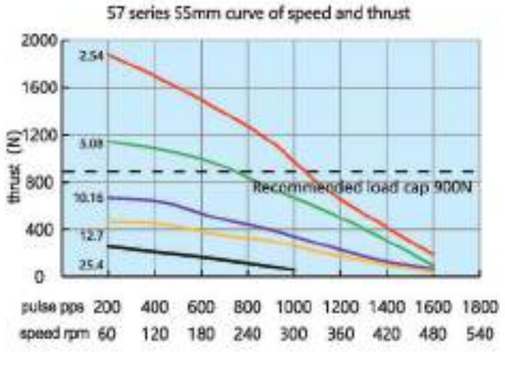
■ Fixed shaft type motor dimensions



Stroke (mm)	Dimension A	Dimension B			
		L=45	L=55	L=65	L=75
12.7	25.7	1.1	0	0	0
19.1	32	7.5	0	0	0
25.4	38.4	13.8	4.8	0	0
31.8	44.7	20.2	11.2	0.2	0
38.1	51.1	26.5	17.5	6.5	0
50.8	63.8	39.2	30.2	19.2	9.2
63.5	76.5	51.9	42.9	31.9	21.9

■ Dynamic thrust curve





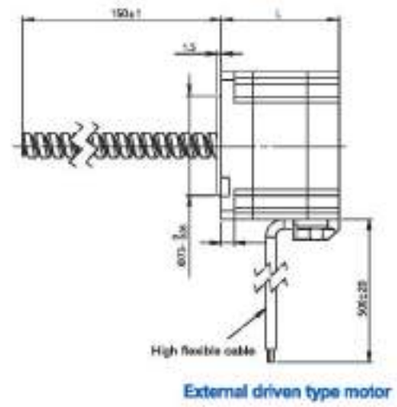
86 Series Stepping screw motor

The 86 series sliding screw linear actuator has a large shape,strong power, high performance and durability, and the maximum thrust can reach 2270N.

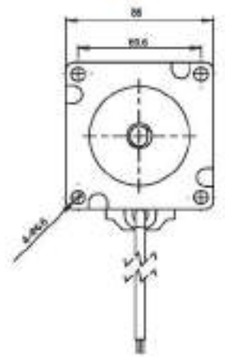
■ Motor specification

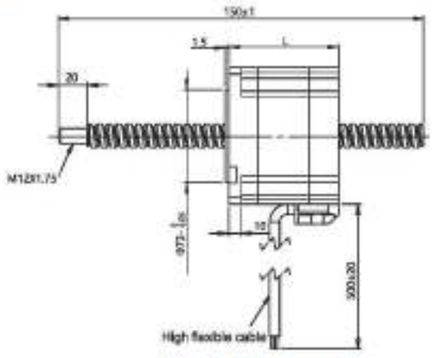
Motor type	Length(mm)	Holding torque(N.m)	Rated current(A)	Resistance(Ω)	Rated inductance(mH)	Rated voltage(V)
86	76mm	4	6A	0.5Ω	4mH	3V
	114mm	8	6A	0.79Ω	58mH	4.74V

■ External driven type motor and through shaft type motor dimensions



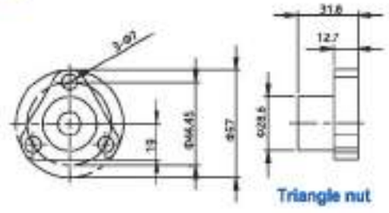
External driven type motor



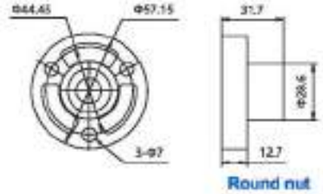


Through shaft type motor

■ Nut type



Triangle nut

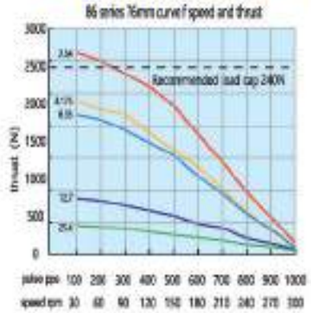


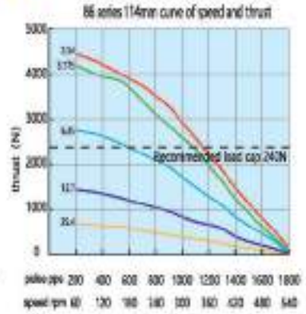
Round nut

■ Screw dimensions

Dia(mm)	Screw dia(inch)	Stroke(mm)	Stroke(inch)	Step length 1.8(mm)	step length 0.9°(mm)	Nut axial backlash
15.875	15.875	2.54	0.1	0.0005	0.0003	0.01-0.03mm
15.875	15.875	3.175	0.125	0.0006	0.0003	0.01-0.03mm
15.875	15.875	5.08	0.2	0.0010	0.0005	0.01-0.03mm
15.875	15.875	6.35	0.25	0.0013	0.0006	0.01-0.03mm
15.875	15.875	12.7	0.5	0.0025	0.0013	0.01-0.03mm
15.875	15.875	25.4	1	0.0050	0.0025	0.01-0.03mm

■ Dynamic thrust curve



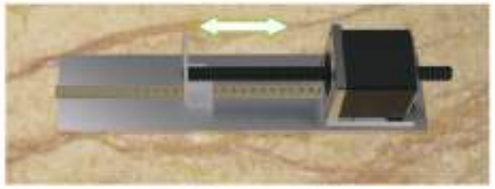


Instructions

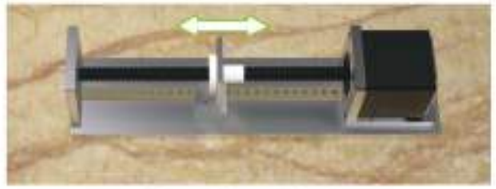
■ Attentions when using screw stepping motors

1·Several of the most common mounting structures

1) Screw stepping motor + guide rail structure



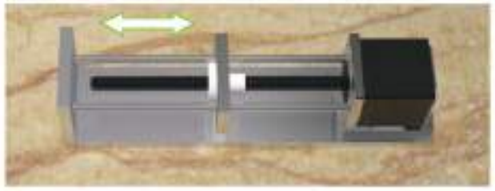
Through-shaft type + guide rail



External drive + guide rail

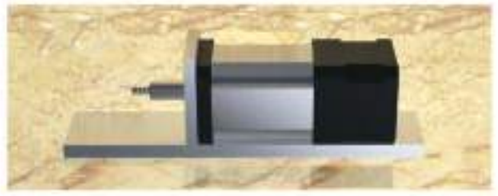
2) 丝杆步进电机+导柱结构

Through-shaft type + guide rail



External drive + guide rail

3) Fixed shaft type screw stepping motor, directly connected to the load structure



Fixed shaft type, directly load

2· Attentions

1) The disassembly of each part of the motor may lead to the entry of foreign objects or adversely affect the assembly accuracy of each part, please do not disassemble it by yourself;

2) Take care to protect the lead screw from radial force, and it is strictly forbidden to lift, pull and hold the lead screw by hand during the process of taking and installing the motor;

3) The lead screw has been coated with special grease before leaving the factory, and there is no need to add lubricating grease during use. When installing, pay attention to protect the grease from being wiped off, and it is forbidden to add lubricating grease not provided by the factory;

4) The screw motor is a precision part. In order to ensure the life of the nut, the surface of the screw should be protected from particles and dust;

5) It is forbidden to drop the motor and collide with the motor during the process of taking the motor;

6) Pay attention to the protection of the lead wire, do not pull the lead wire by force;

7) If it is a constant current drive, please set the RMS average current of the driver to be close to the rated current of the motor. It is recommended not to exceed the rated current. The overload current may cause the motor to overheat or even burn out;

8) Ambient temperature for motor use: -22℃55℃;

9) During the operation of the motor, try to avoid the phenomenon that the motor is out of step or top dead. In order to ensure the service life, the motor load should be lower than 50% of the motor thrust at the running speed. The fixed-axis motor needs to be limited to perform linear motion within the stroke range, and must not be used over travel, otherwise the internal nut will be damaged; please avoid shock load, emergency stop, and emergency start during the use of the motor, otherwise the service life of the motor will be affected. For specific application, please consult sales engineer;

10) Motor storage conditions: Store at room temperature, with relative air humidity not greater than 75%, clean, well ventilated, and free of corrosive gases.

Naming rules of ball screw stepping motor

Ball screw stepping motor has six sizes, external dimensions from 14mm to 86mm, ball screw motor for external drive type.From 0.005mm/ step to 0.1mm/ step, there are a variety of step sizes to choose from. Maximum thrust up to 1600N,the whole system can be optional encoder.

GSG 02-E-2-48-BS-0808-25-04-L100-A- XXX

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

1、Linear stepper motor structure type code

Code	Structure type
GSG	Screw motor series

2、Frame size code

Code	Frame
01	20mm
02	28mm
03	35mm
04	42mm
05	57mm
06	60mm
07	86mm

3、Motor type

Code	Structure type
E	External driven type

4、Motor step angle

Code	Motor step angle
2	2P 1.8°
3	3P 1.2°
4	4P 0.9°
5	5P 0.72°

5、Motor length

Motor	Length
20 motor	30
	42
28 motor	34
	45
35 motor	34
	47
42 motor	34
	40
	48
	60
57 motor	45
	55
	65
	75
	80
	84
	100
	112
86 motor	65
	76
	98
	114
	128
	152

6、Screw type

Code	Motor step angle
BS	Ball screw

7、Screw specification

Code	Motor rated current
0808	Metric screw dia 8mm stroke 8mm

8、Motor rated current

Code	Motor rated current
25	2.5A

9、Motor polarity

Code	Motor polarity
04	Bio-polar
08	Single-polar

10、Screw length

Code	Screw length
L100	Screw length

11、Customization options

Code	Customization type
A	Anti-backlash nut
B	Brake
T	Screw teflon
P	Handwheel
O	Origin
G	High temperature
D	Low temperature
X	Rear axis
E	Encoder

12、客户定制

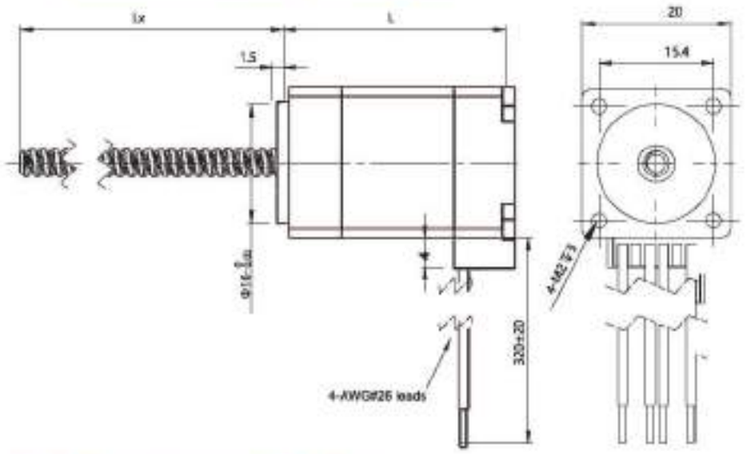
Code	
XXX	Customization

20 Series Ball screw stepping motor

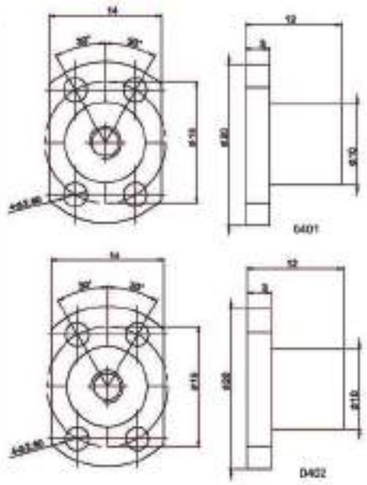
■ Motor specification

Motor type	Length(mm)	Holding torque(N.m)	Rated current(A)	Resistance(Ω)	Rated inductance(mH)	Rated voltage(V)
20	30mm	1.8°	0.5A	4.9Ω	1.7mH	2.45V
	42mm	1.8°	0.5A	9Ω	1.7mH	4.5V

■ Ball screw motor dimensions



■ Nut type

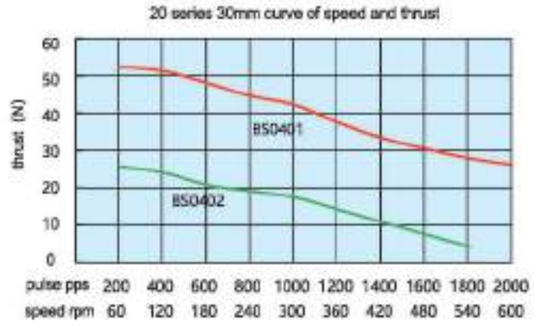


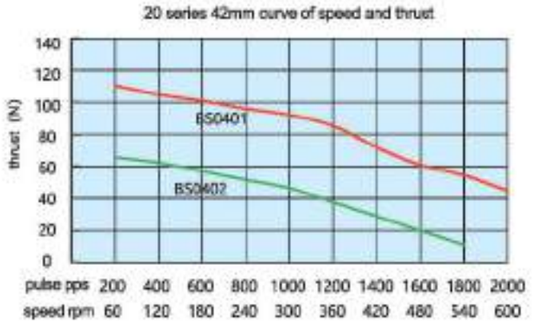
■ Ball screw specification

Motor type	Screw dia(mm)	Stroke(mm)	Cast-grade ball screw maximum axial backlash	Precision class	Ground-grade ball screw maximum axial backlash	Precision class
0401	4	1	0.02	C7	0.01	C5
0402	4	2	0.02	C7	0.01	C5

Note: 1·Above is standard nut, support customization
2·To meet customer needs, still KSS,THK,TBI brand options

■ Dynamic thrust curve



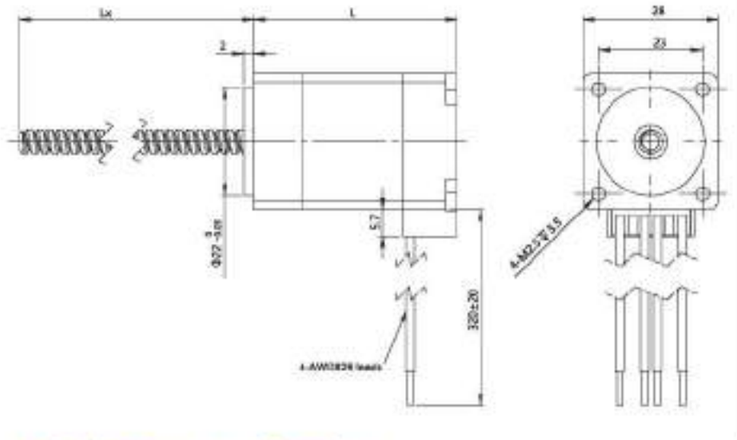


28 Series Ball screw stepping motor

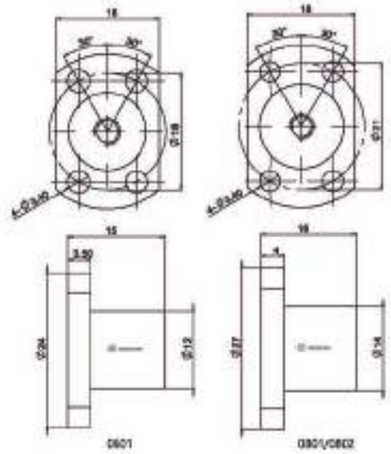
■ Motor specification

Motor type	Length(mm)	Holding torque(N.m)	Rated current(A)	Resistance(Ω)	Rated inductance(mH)	Rated voltage(V)
28	34mm	0.06	1A	2.1Ω	1.4mH	2.1V
	45mm	0.12	1A	3Ω	2.3mH	3V

■ Ball screw motor dimensions



■ Nut type

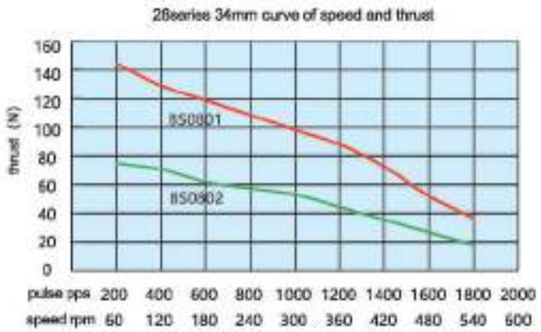


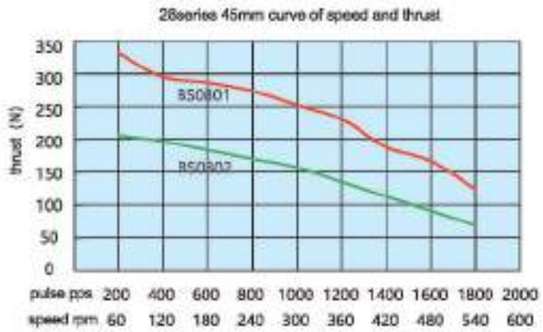
■ Ball screw specification

Motor type	Screw dia(mm)	Stroke(mm)	Cast-grade ball screw maximum axial backlash	Precision class	Ground-grade ball screw maximum axial backlash	Precision class
0601	6	1	0.02	C7	0.01	C5
0602	6	2	0.02	C7	0.01	C5
0801	8	1	0.02	C7	0.01	C5
0802	8	2	0.02	C7	0.01	C5

Note: 1·Above is standard nut, support customization
2·To meet customer needs, still KSS,THK,TBI brand options

■ Dynamic thrust curve



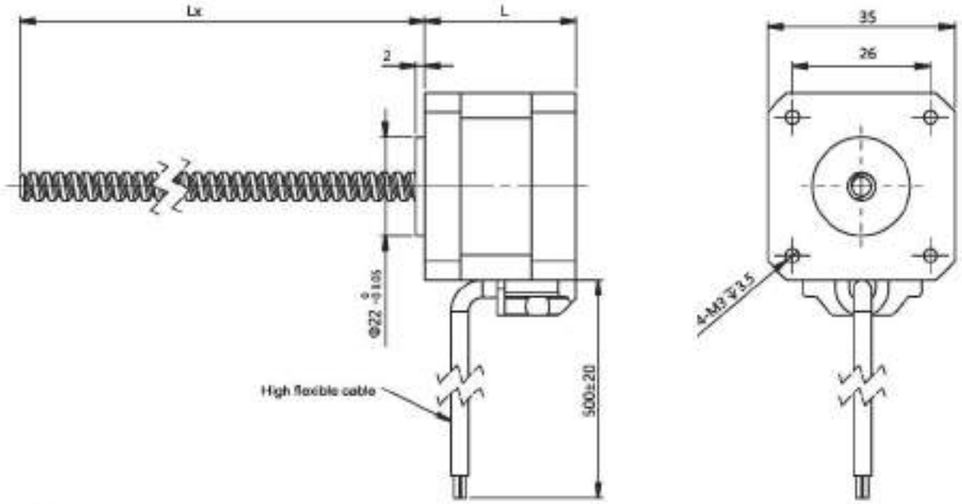


35 Series Ball screw stepping motor

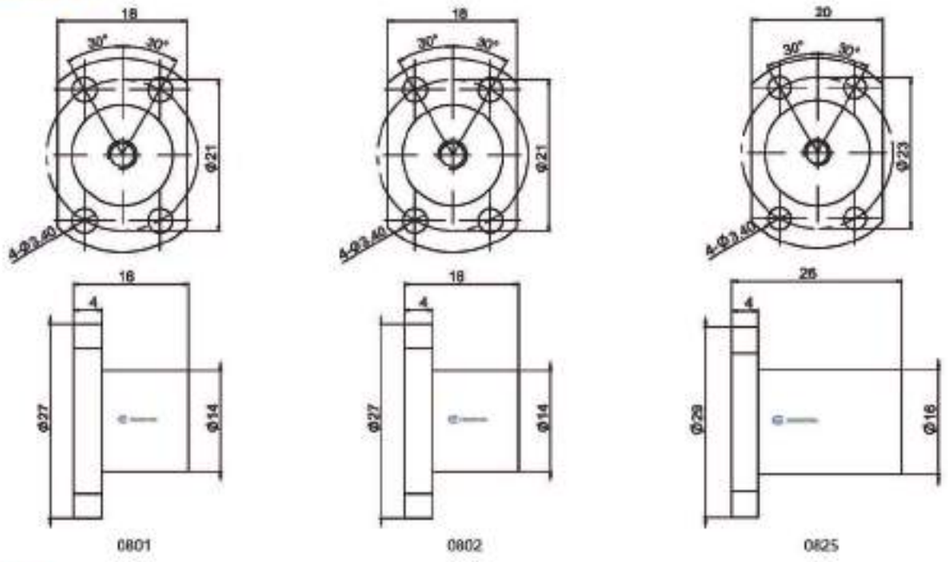
■ Motor specification

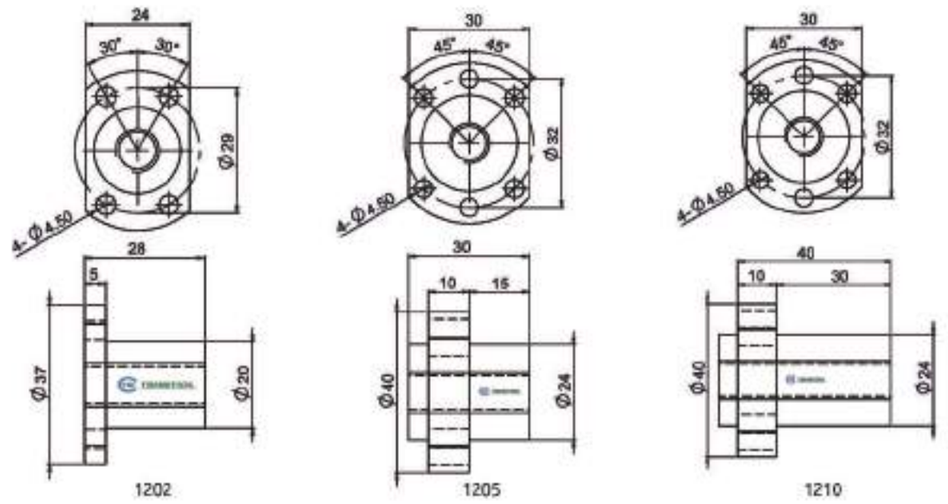
Motor type	Length(mm)	Holding torque(N.m)	Rated current(A)	Resistance(Ω)	Rated inductance(mH)	Rated voltage(V)
35	34mm	0.14	1A	2.3Ω	3.6mH	2.3V
	47mm	0.35	1.5A	1.7Ω	2.7mH	2.55V

■ Ball screw motor dimensions



■ Nut type



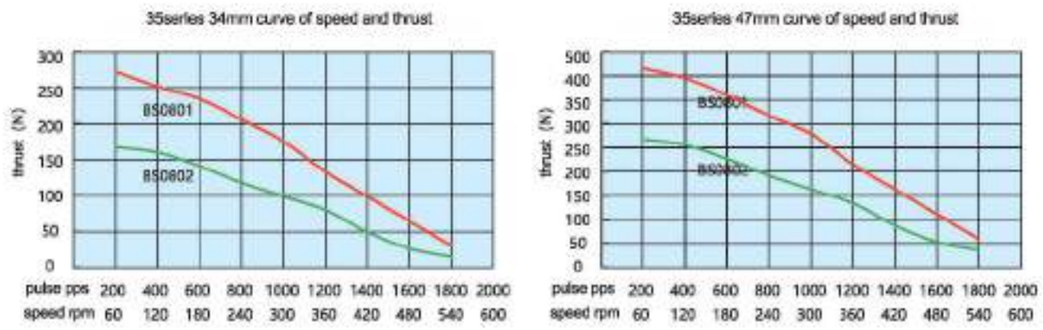


■ Ball screw specification

Motor type	Screw dia(mm)	Stroke(mm)	Cast-grade ball screw maximum axial backlash	Precision class	Ground-grade ball screw maximum axial backlash	Precision class
0801	8	1	0.02	C7	0.01	C5
0802	8	2	0.02	C7	0.01	C5
0825	8	2.5	0.02	C7	0.01	C5
0805	8	5	0.02	C7	0.01	C5
0808	8	8	0.02	C7	0.01	C5
1202	12	2	0.02	C7	0.01	C5
1204	12	4	0.02	C7	0.01	C5
1205	12	5	0.02	C7	0.01	C5
1210	12	10	0.02	C7	0.01	C5

Note: 1·Above is standard nut, support customization
2·To meet customer needs, still KSS,THK,TBI brand options

■ Dynamic thrust curve

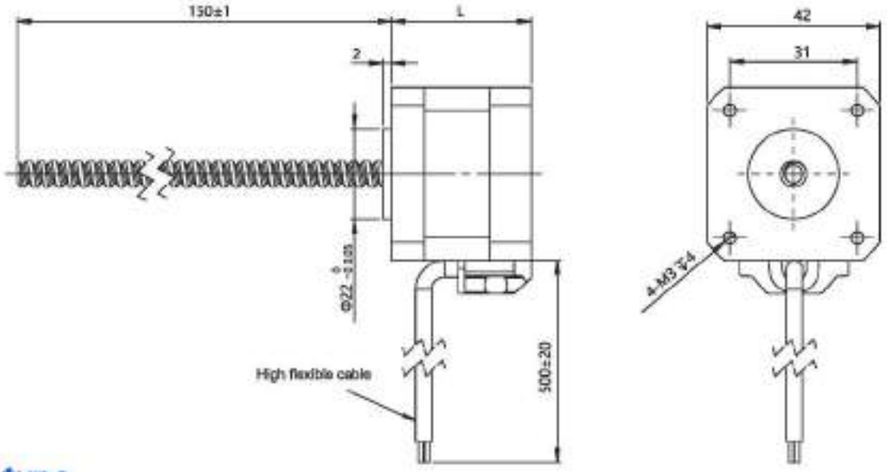


42 Series Ball screw stepping motor

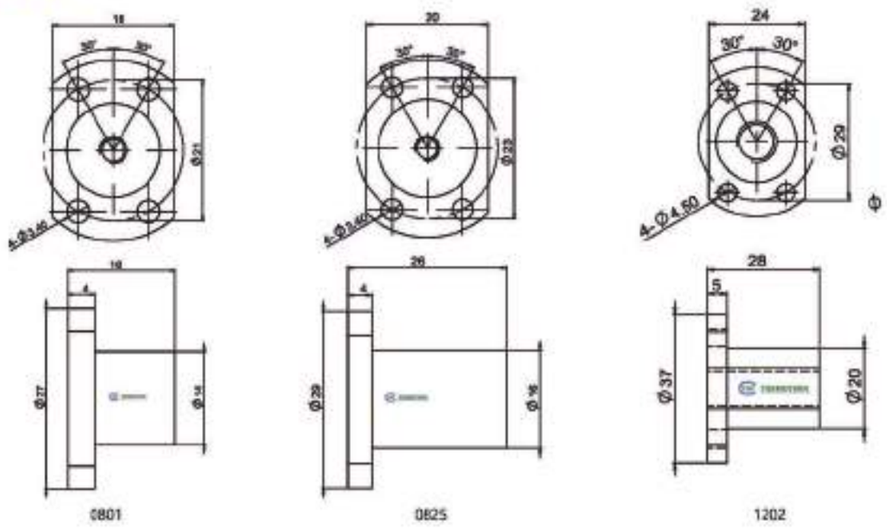
■ Motor specification

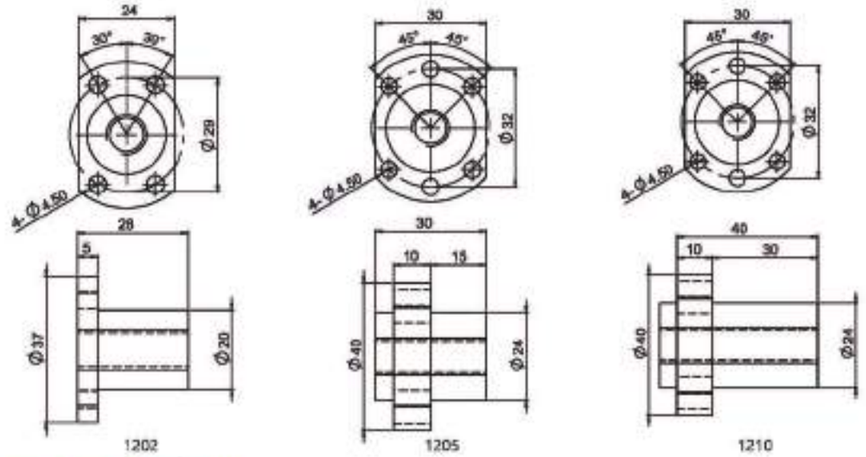
Motor type	Length(mm)	Holding torque(N.m)	Rated current(A)	Resistance(Ω)	Rated inductance(mH)	Rated voltage(V)
42	34mm	0.25	1.5A	1.73Ω	2.6mH	2.595V
	40mm	0.4	1.5A	2.1Ω	4.8mH	3.15V
	48mm	0.5	2.5A	2.4Ω	5mH	3.6V
	60mm	0.7	2.5A	0.95Ω	2.8mH	2.375V

■ Ball screw motor dimensions



■ Nut type



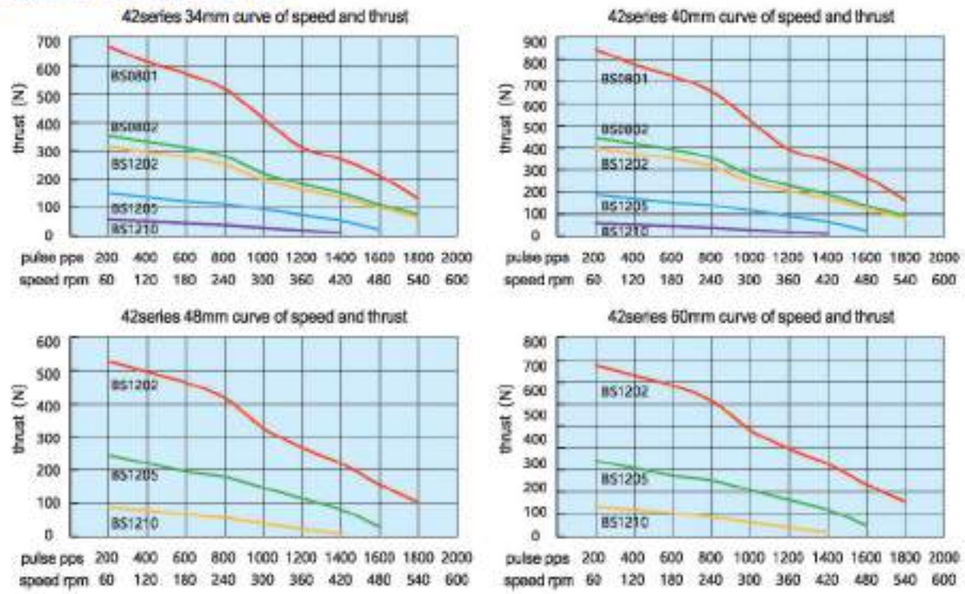


■ Ball screw specification

Motor type	Screw dia(mm)	Stroke(mm)	Cast-grade ball screw maximum axial backlash	Precision class	Ground-grade ball screw maximum axial backlash	Precision class
0801	8	1	0.02	C7	0.01	C5
0802	8	2	0.02	C7	0.01	C5
8025	8	2.5	0.02	C7	0.01	C5
0805	8	5	0.02	C7	0.01	C5
0808	8	8	0.02	C7	0.01	C5
1202	12	2	0.02	C7	0.01	C5
1204	12	4	0.02	C7	0.01	C5
1205	12	5	0.02	C7	0.01	C5
1210	12	10	0.02	C7	0.01	C5

Note: 1·Above is standard nut, support customization 2·To meet customer needs, still KSS,THK,TBI brand options

■ Dynamic thrust curve

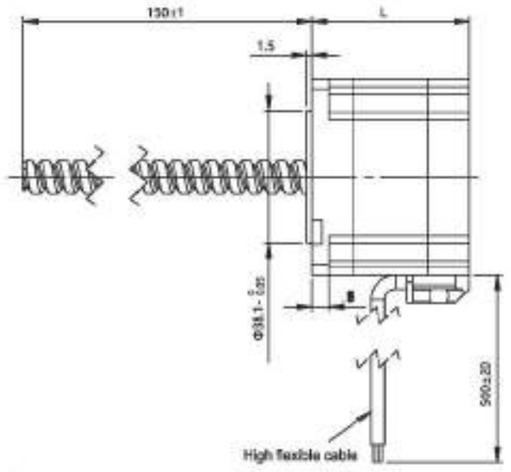


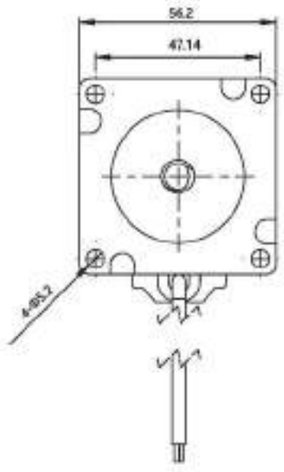
57 Series Ball screw stepping motor

■ Motor specification

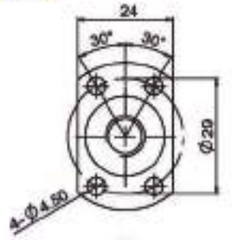
Motor type	Length(mm)	Holding torque(N.m)	Rated current(A)	Resistance(Ω)	Rated inductance(mH)	Rated voltage(V)
57	45mm	0.7	3A	0.75Ω	0.72mH	2.25V
	55mm	0.9	3A	0.92Ω	4.5mH	2.76V
	65mm	1.5	4A	0.78Ω	3.3mH	3.12V
	75mm	1.8	4A	0.95Ω	4.5mH	3.8V
	84mm	2.2	4A	0.97Ω	7mH	3.88V
	100mm	2.5	5A	0.7Ω	3.2mH	3.5V

■ Ball screw motor dimensions





■ Nut type



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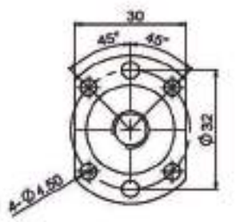

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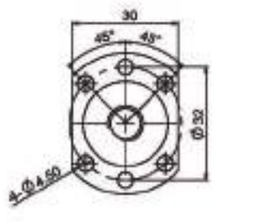
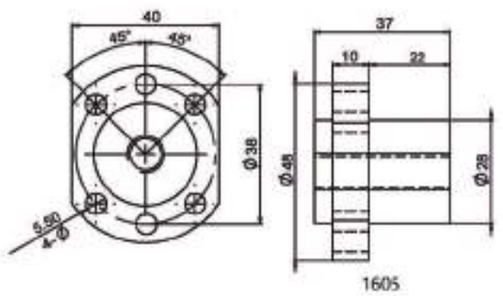


1210



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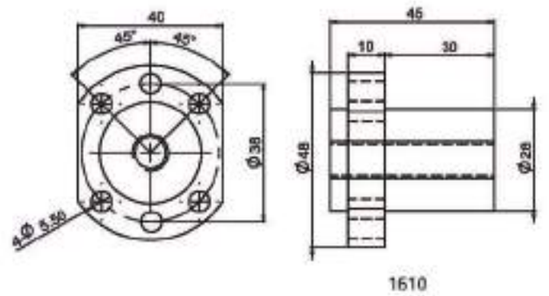


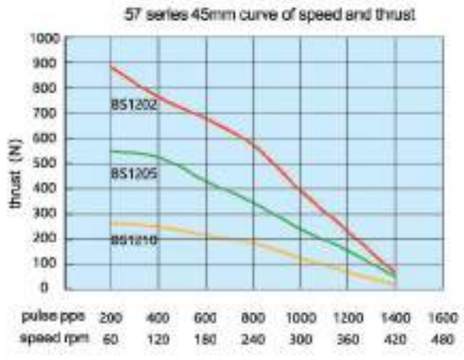
1610

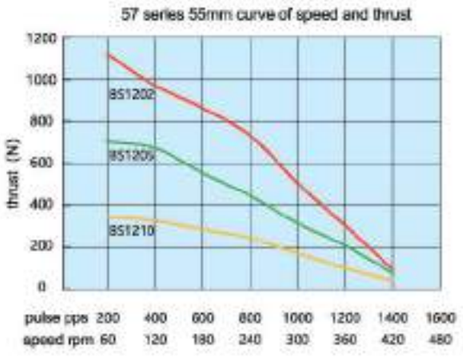
■ Ball screw specification

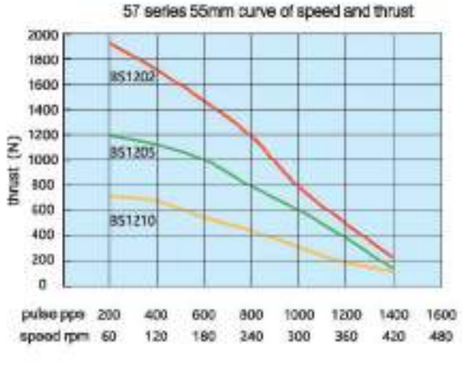
Motor type	Screw dia(mm)	Stroke(mm)	Cast-grade ball screw maximum axial backlash	Precision class	Ground-grade ball screw maximum axial backlash	Precision class
1202	12	2	0.02	C7	0.01	C5
1204	12	4	0.02	C7	0.01	C5
1205	12	5	0.02	C7	0.01	C5
1210	12	10	0.02	C7	0.01	C5
1605	16	5	0.02	C7	0.01	C5
1610	16	10	0.02	C7	0.01	C5
1620	16	20	0.02	C7	0.01	C5

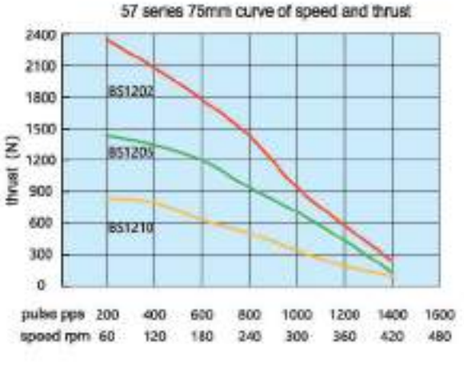
Note: 1·Above is standard nut, support customization 2·To meet customer needs, still KSS,THK,TBI brand options

■ Dynamic thrust curve







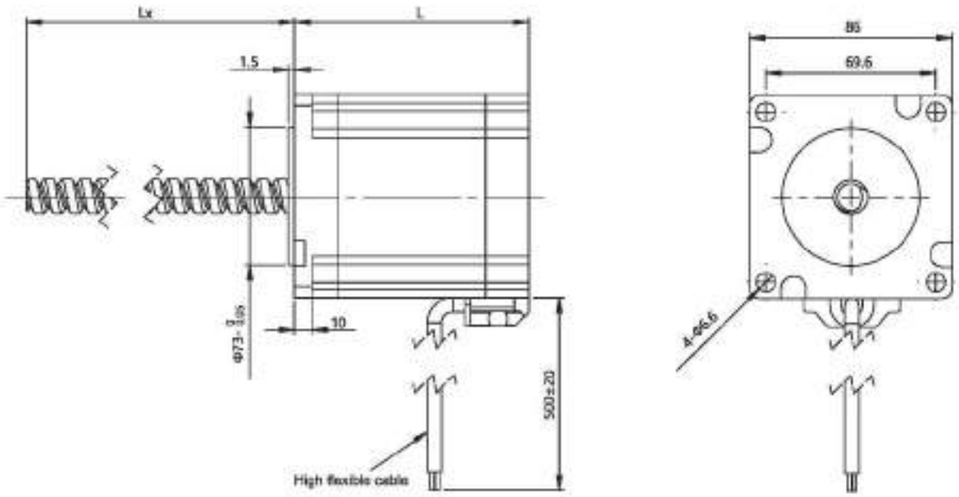


86 Series Ball screw stepping motor

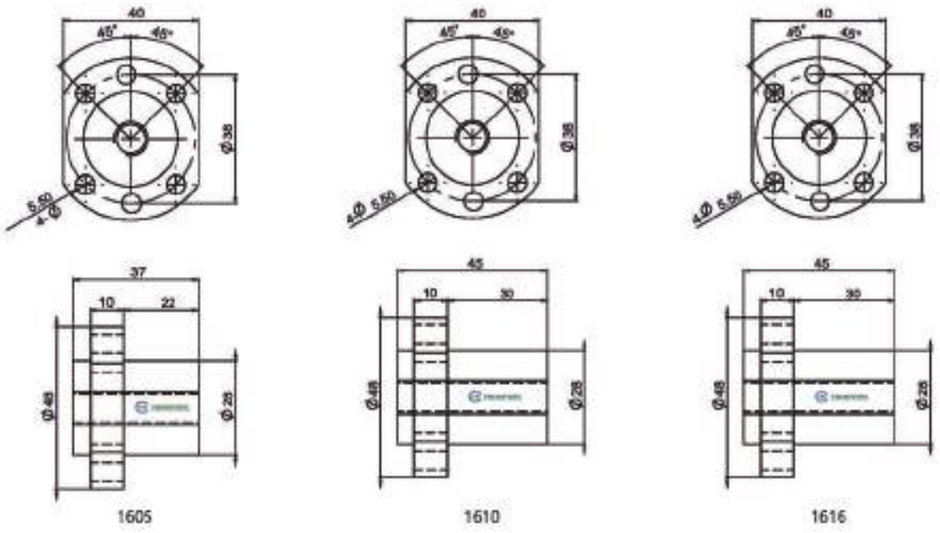
■ Motor specification

Motor type	Length(mm)	Holding torque(N.m)	Rated current(A)	Resistance(Ω)	Rated inductance(mH)	Rated voltage(V)
86	76mm	4	6A	0.5Ω	4mH	3V
	114mm	8	6A	0.79Ω	58mH	4.74V

■ Ball screw motor dimensions



■ Nut type



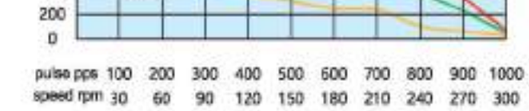
■ Ball screw specification

Motor type	Screw dia(mm)	Stroke(mm)	Cast-grade ball screw maximum axial backlash	Precision class	Ground-grade ball screw maximum axial backlash	Precision class
1605	16	5	0.02	C7	0.01	C5
1610	16	10	0.02	C7	0.01	C5
1616	16	16	0.02	C7	0.01	C5
1620	16	20	0.02	C7	0.01	C5
1632	16	32	0.02	C7	0.01	C5

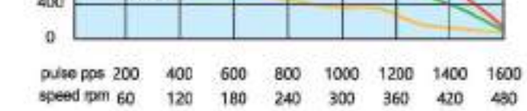
Note: 1·Above is standard nut, support customization
2·To meet customer needs, still KSS,THK,TBI brand options

■ Dynamic thrust curve

86series 76mm bio-polar Constant current chopper drive
100% Current pulse frequency and thrust curve



86series 76mm bio-polar Constant current chopper drive 1
00% Current pulse frequency and thrust curve



Common faults and solutions

Common faults	Analyze the causes	Solutions
Motor doesn't turn	Bad connection	Tighten all connections again
	Drive alarm	Power off and restart after checking
	Motor stuck	The load goes to zero and the external structure remains smooth
	Motor stator burned out	Contact us for repair
The motor runs unevenly after starting up	resonance occurs	Change the running speed, increase the number of subdivisions
	Screw bending	Contact us for repair
	Motor phase loss	Contact us for repair
Motor vibration abnormal sound	low frequency resonance region	Change the running speed, increase the number of subdivisionsAvoid the resonance zone
	Motor phase loss	Contact us for repair
Abnormal heating of motor	Excessive driver current	Adjust the current value within the rated range
	Supply voltage too high	reduce supply voltage
	Static time is too long	Static half traffic is halved or set to smaller
Motor out of step	Excessive load end	Reduce load or reselect
	Programming needs to do frequency up and down	Repair or change the drive
Motor weakness and output	Drive failure	Repair or replace the drive
	Reduce	Customer self-adjustment
	Nut wear seriously	Contact us for repair
Motor screw bending or end jump too much	Improper installation and use are caused during transportation	Contact us for repair
Others		Contact us

Precautions for operation and use

External drive ball screw motor is the motor shaft and screw shaft one body cross, so either screw shaft or motor shaft donated bad, can not be repaired. Please kindly understanding

• 一、Precautions for use

1. Read the instructions carefully and strictly observe the safety precautions.
2. Knock the product, fall or apply axial load or radial load exceeding the specified value, which will cause damage to the product, please operate with caution.
3. After unpacking, check whether the products are abnormal and consistent with the ordered products.
4. If the components are decomposed, foreign bodies will enter and the assembly accuracy will be reduced, so do not disassemble.
5. If foreign bodies enter, ball bearings may be damaged, shorten service life, or fail to function
6. Please smear lubricant when using, check once every 2-3 months, and supplement. Grease becomes dirty during use. Please wipe off old grease and apply new grease.
7. Do not use in the state of exceeding the specified load, allowable speed and other specifications.
8. When the ball screw nut exceeds the range, the ball will fall off, resulting in poor action. If the nut is out of range, we will provide paid maintenance.
9. Do not pull the motor wire. Motor wire is fixed by dry, do not use dry moving purpose.
10. The specification value of motor torque rate will be different depending on load conditions and drivers used.
11. Within the specification range, stepper motor has resonance. Please open the resonance to occupy the body.

• 二、Safety Precautions

1. Odor, abnormal sound, smoke, abnormal heat, vibration, please immediately stop the operation, cut off the power supply.
2. The current used should not exceed the rated current.
3. The motor may be abnormally hot due to load conditions and drivers in use. When using, please control the motor surface temperature below 80℃.
4. Confirm the wiring mode, driving mode, and phase sequence. Incorrect wiring will lead to abnormal motor action.
5. Do not forcibly bend, pull or clamp the motor wire. 6 Do not touch the active part during the movement.
7. Disconnect the motor from the controller for voltage test and insulation test.
8. Before the maintenance check, cut off the input power to the driver.

• 三、The use of environment:

1. Do not use it in the place where the ambient temperature exceeds 0-40℃, the ambient humidity exceeds 20-80%RH, there is condensation, corrosive gas, and flammable gas.
2. Do not use it in places where strong electric and magnetic fields are generated.
3. Do not use in the place where iron powder, dust, oil mist, cutting fluid, water, salt and organic solvent occur or disperse.
4 Do not use it in special environments such as shock and vacuum where vibration often occurs.

• 四、All screw maintenance:

1. Ball screw protective device

(1) During the use of ball screw pair, dust or debris is strictly prohibited to enter, so protective devices must be installed.

(2) Ball screw pair exposed on the machine tool, should be closed protective, such as the use of spiral spring steel belt sleeve, telescopic sleeve and folding sleeve. To install, connect one end of the guard to the side of the ball nut. The other end is fixed on the supporting seat of the ball screw.

(3) Ball screw pair is located in a hidden position and protected by sealing ring. The sealing ring is mounted at both ends of the nut. There are two kinds of contact and non-contact sealing rings.

2. Lubrication of ball screw pair

(1) The ball screw pair usually uses two kinds of lubricants, lithium-based grease and spindle oil. Grease is generally added to the threaded raceway and the shell space of the nut, and the spindle oil is injected into the space of the nut through the oil injection hole on the shell.

(2) During use, replace the grease every six months, clean the old grease, and apply new grease. The ball screw pair lubricated with spindle oil can be refueled once before each shift of the machine tool.

20mm Two phase closed loop stepping motor (Standard)

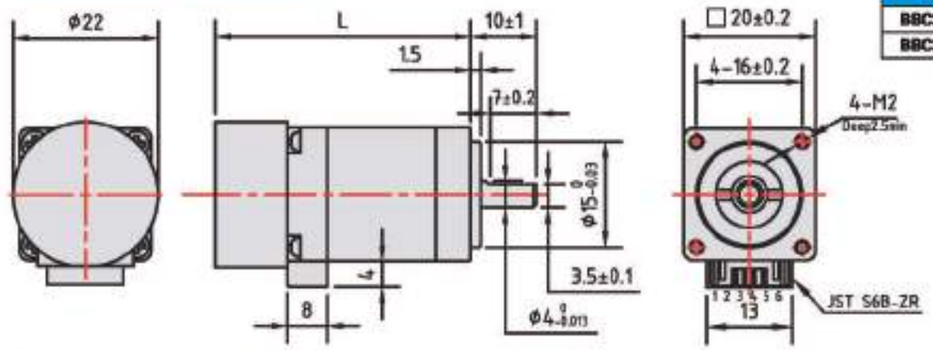
NEMA8 □20mm 1.8° /step(Bipolar 4 wires)

■ Specification

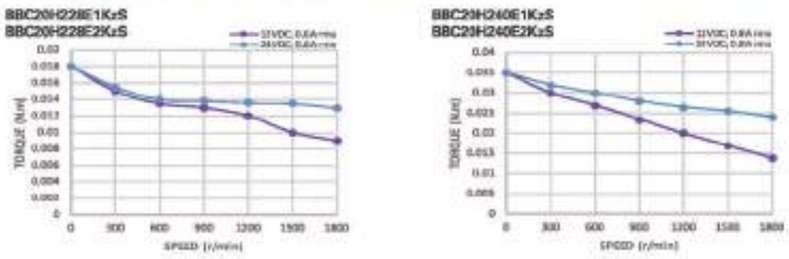
Model	Holding torque N.m	Rated current A/Phase	Resistence Ω/Phase	Inductance mH/Phase	Rotational inertia g.cm²	Weight kg	Encoder output circuit	Encoder resolution
BBC20H228E1KzS	0.02	0.6	6.5	2.2	1.6	✔	Differential output	1000CPR
BBC20H228E2KzS								2000CPR
BBC20H240E1KzS	0.036	0.8	6.5	2.5	2.9			1000CPR
BBC20H240E2KzS								2000CPR

■ Dimensions (unit: mm)

Model	L
BBC20H228	40mm
BBC20H240	52mm



■ Dynamic torque curve (reference value)

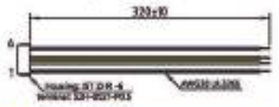


Notice
- The curve is based on data from our test conditions. If the driving conditions change, the curve will also change
- The rated current in the specification is the effective current. Set the drive's current below the rated current of the motor

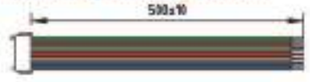
■ Encoder specification

Model	E1Kz	E2Kz
Resolving power	1000cpr/4000ppr	2000cpr/8000ppr
Output mode	Incremental mode	
Output circuit	Differential output	
Output signal	A+ A-; B+ B-; Z+ Z-	A+ A-; B+ B-; Z+ Z-
Input voltage	5VDC±5%	

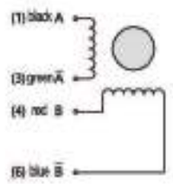
- Matching motor harness



- Matching encoder harness



- Internal wiring of motor (double pole 4-wire)



28mm Two phase closed loop stepping motor (Standard)

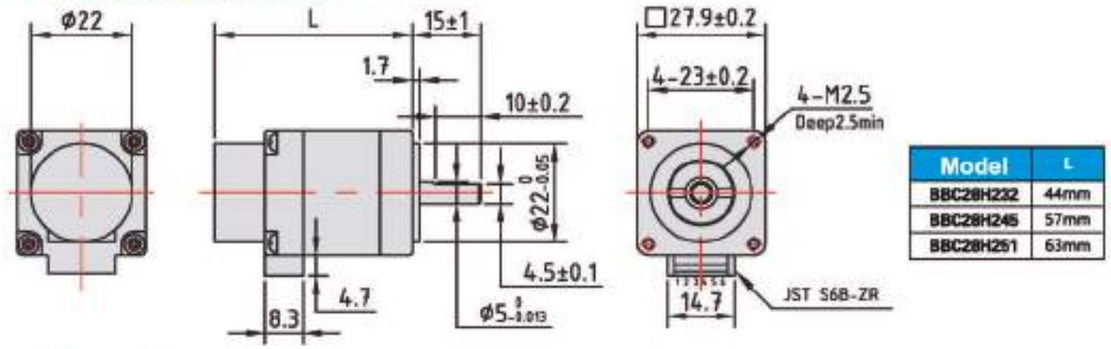
NEMA11 □28mm 1.8° /step(Bipolar 4 wires)

■ Specification

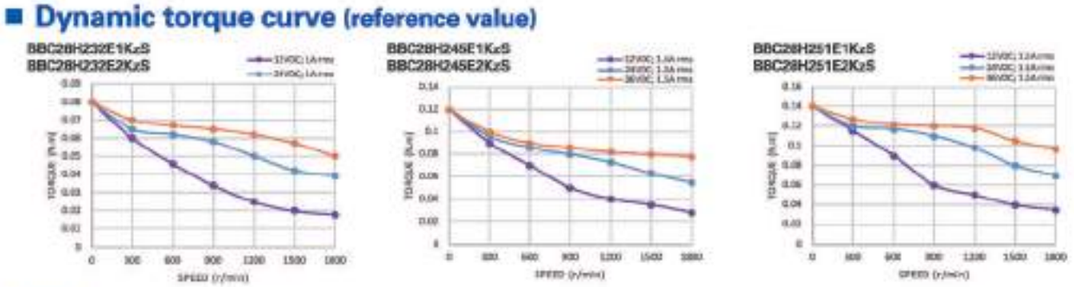
Model	Holding torque N.m	Rated current A/Phase	Resistence Ω/Phase	Inductance mH/Phase	Rotational inertia g.cm²	Weight kg	Encoder output circuit	Encoder resolution
BBC28H232E1KzS	0.08	1	5.7	3.5	9	✔	Differential output	1000CPR
BBC28H232E2KzS								2000CPR
BBC28H245E1KzS	0.12	1.5	3	3	12			1000CPR
BBC28H245E2KzS								2000CPR
BBC28H251E1KzS	0.14	1.5	3.5	3.1	18			1000CPR
BBC28H251E2KzS								2000CPR

■ Dimensions (unit: mm)

Model	L
BBC28H232	44mm
BBC28H245	57mm
BBC28H251	63mm



■ Dynamic torque curve (reference value)

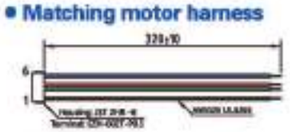


Notice
- The curve is based on data from our test conditions. If the driving conditions change, the curve will also change
- The rated current in the specification is the effective current. Set the drive's current below the rated current of the motor

■ Encoder specification

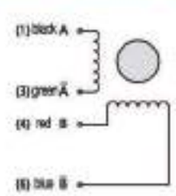
Model	E1Kz	E2Kz
Resolving power	1000cpr/4000ppr	2000cpr/8000ppr
Output mode	Incremental mode	
Output circuit	Differential output	
Output signal	A+ A-; B+ B-; Z+ Z-	A+ A-; B+ B-; Z+ Z-
Input voltage	5VDC±5%	

- Matching motor harness



- Matching encoder harness

- Internal wiring of motor (double pole 4-wire)



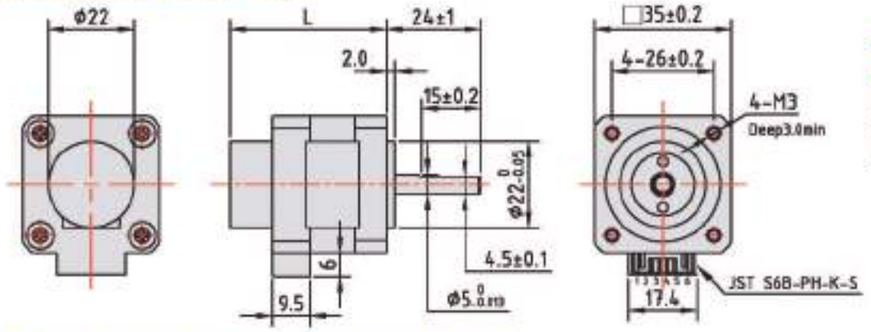
35mm Two phase closed loop stepping motor (Standard)

NEMA14 □35mm 1.8° /step(Bipolar 4 wires)

■ Specification

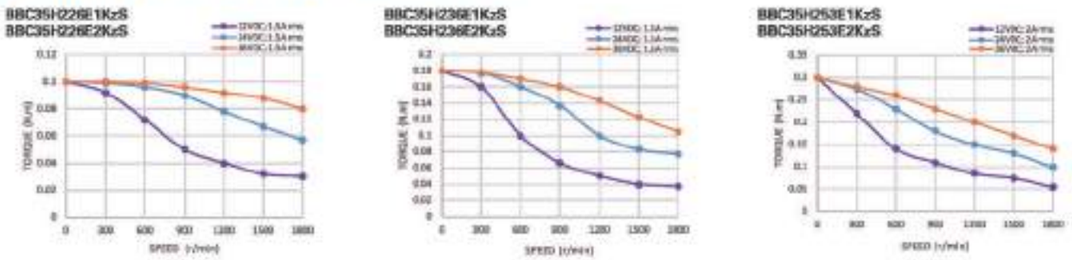
Model	Holding torque N.m	Rated current A/Phase	Resistence Ω/Phase	Inductance mH/Phase	Rotational inertia g.cm²	Weight kg	Encoder output circuit	Encoder resolution
BBC35H226E1KzS	0.07	1.5	1.4	0.9	12	✔	Differential output	1000CPR
BBC35H226E2KzS								2000CPR
BBC35H236E1KzS	0.18	1.5	2.1	2.1	20			1000CPR
BBC35H236E2KzS								2000CPR
BBC35H253E1KzS	0.31	2	1.65	2.5	35			1000CPR
BBC35H253E2KzS								2000CPR

■ Dimensions (unit: mm)



Model	L
BBC35H226	38mm
BBC35H236	49mm
BBC35H253	65mm

■ Dynamic torque curve (reference value)



Notice
- The curve is based on data from our test conditions. If the driving conditions change, the curve will also change
- The rated current in the specification is the effective current. Set the drive's current below the rated current of the motor

■ Encoder specification

Model	E1Kz	E2Kz
Resolving power	1000cpr/4000ppr	2000cpr/8000ppr
Output mode	Incremental mode	
Output circuit	Differential output	
Output signal	A+ A-; B+ B-; Z+ Z-	A+ A-; B+ B-; Z+ Z-
Input voltage	5VDC±5%	

- Matching motor harness

- Matching encoder harness

42mm Two phase closed loop stepping motor (Standard)

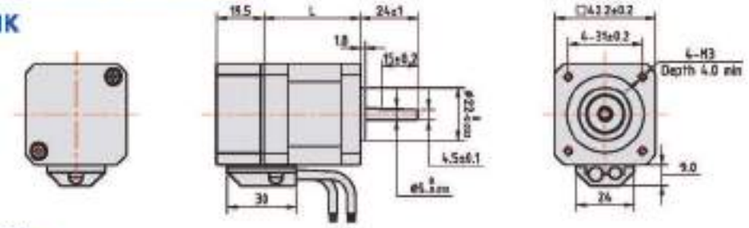
NEMA17 □42mm 1.8° /step(Bipolar 4 wires)

■ Specification

Model	Holding torque N.m	Rated current A/Phase	Resistence Ω/Phase	Inductance mH/Phase	Rotational inertia g.cm²	Weight kg	Encoder output circuit	Encoder resolution
BBC42H249E1KS	0.48	2	1.35	2.9	77	✗	Differential output	1000CPR
BBC42H249E2K5zS						✔		2500CPR
BBC42H261E1KS	0.72		1.75	4	100	✗		1000CPR
BBC42H261E2K5zS						✔		2500CPR

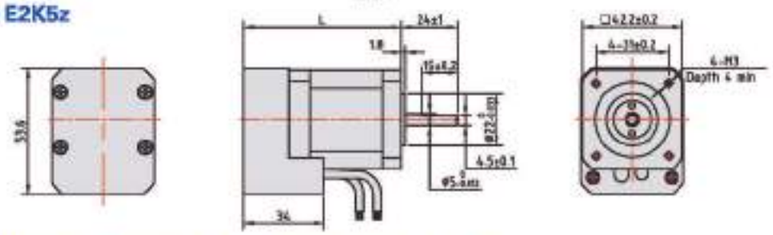
■ Dimensions (unit: mm)

- E1K



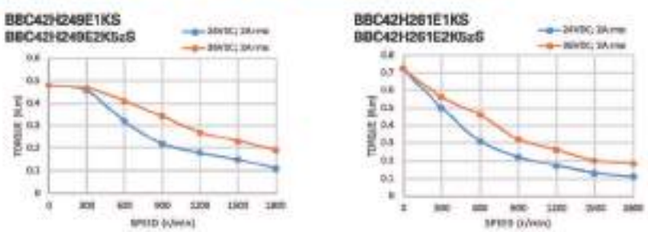
Model	L
BBC42H249	48mm
BBC42H261	61mm

- E2K5z



Model	L
BBC42H249	68mm
BBC42H261	80mm

■ Dynamic torque curve (reference value)

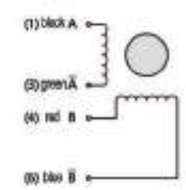


Notice
- The curve is based on data from our test conditions. If the driving conditions change, the curve will also change
- The rated current in the specification is the effective current. Set the drive's current below the rated current of the motor

■ Encoder specification

Model	E1K	E2K5z
Resolving power	1000cpr/4000ppr	2500cpr/10000ppr
Output mode	Incremental mode	
Output circuit	Differential output	
Output signal	A+ A-; B+ B-	A+ A-; B+ B-; Z+ Z-
Input voltage	5VDC±5%	

- Internal wiring of motor (double pole 4-wire)



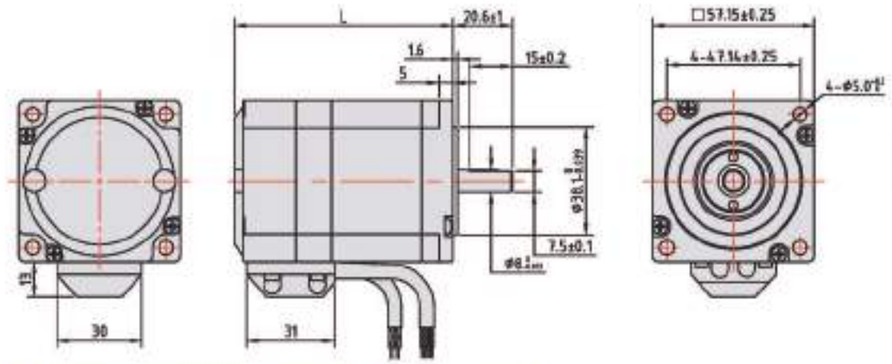
57mm Two phase closed loop stepping motor (Standard)

NEMA23 □57mm 1.8° /step(Bipolar 4 wires)

■ Specification

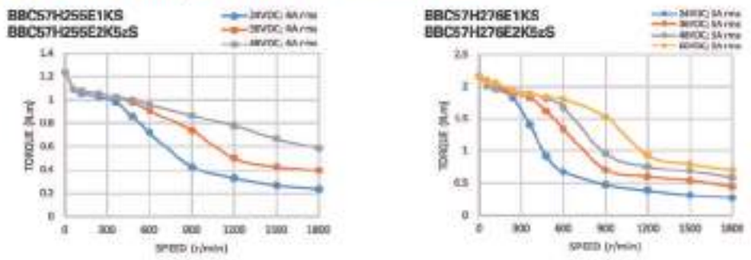
Model	Holding torque N.m	Rated current A/Phase	Resistence Ω/Phase	Inductance mH/Phase	Rotational inertia g.cm²	Weight kg	Encoder output circuit	Encoder resolution
BBC57H255E1KS	1.2	4	0.45	1.4	280	✗	Differential output	1000CPR
BBC57H255E2K5zS						✓		2500CPR
BBC57H276E1KS	2	5	0.37	1.8	480	✗		1000CPR
BBC57H276E2K5zS						✓		2500CPR

■ Dimensions (unit: mm)



Model	L
BBC57H255	77mm
BBC57H276	98mm

■ Dynamic torque curve (reference value)

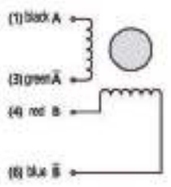


Notice
- The curve is based on data from our test conditions. If the driving conditions change, the curve will also change
- The rated current in the specification is the effective current. Set the drive's current below the rated current of the motor

■ Encoder specification

Model	E1K	E2K5z
Resolving power	1000cpr/4000ppr	2500cpr/10000ppr
Output mode	Incremental mode	
Output circuit	Differential output	
Output signal	A+ A-; B+ B-	A+ A-; B+ B-; Z+ Z-
Input voltage	5VDC±5%	

● Internal wiring of motor (double pole 4-wire)



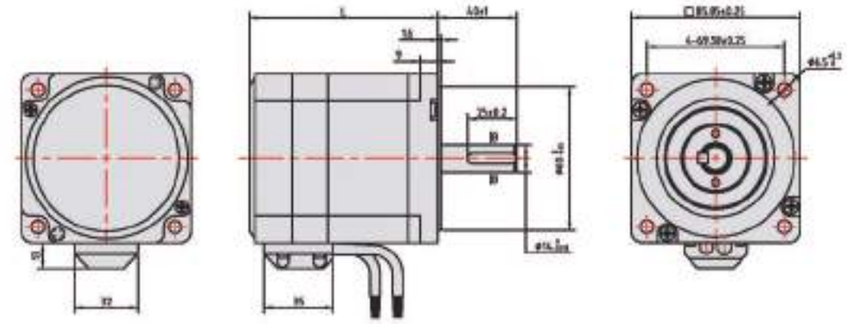
86mm Two phase closed loop stepping motor (Standard)

NEMA34 □86mm 1.8° /step(Bipolar 4 wires)

■ Specification

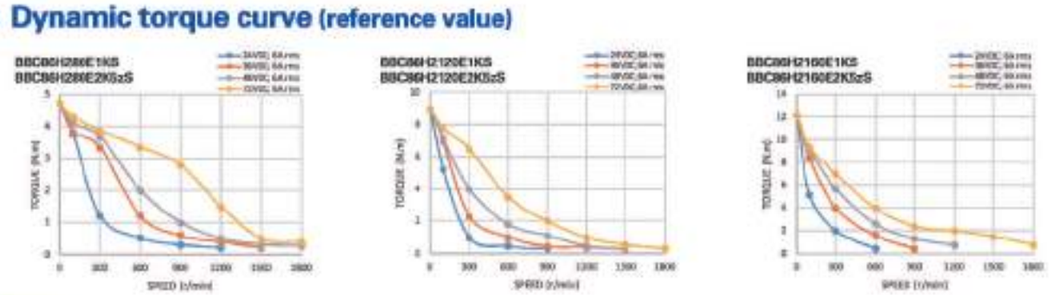
Model	Holding torque N.m	Rated current A/Phase	Resistence Ω/Phase	Inductance mH/Phase	Rotational inertia g.cm²	Weight kg	Encoder output circuit	Encoder resolution
BBC86H280E1KS	4.5	6	0.45	3.5	650	✗	Differential output	1000CPR
BBC86H280E2K5zS						✓		2500CPR
BBC86H2120E1KS	8.5		0.54	5	1200	✗		1000CPR
BBC86H2120E2K5zS						✓		2500CPR
BBC86H2160E1KS	12		0.72	7.3	1700	✗		1000CPR
BBC86H2160E2K5zS						✓		2500CPR

■ Dimensions (unit: mm)



Model	L
BBC86H280	116mm
BBC86H2120	135mm
BBC86H2160	176mm

■ Dynamic torque curve (reference value)

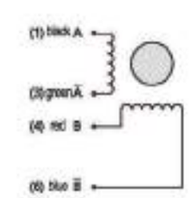


Notice
- The curve is based on data from our test conditions. If the driving conditions change, the curve will also change
- The rated current in the specification is the effective current. Set the drive's current below the rated current of the motor

■ Encoder specification

Model	E1K	E2K5z
Resolving power	1000cpr/4000ppr	2500cpr/10000ppr
Output mode	Incremental mode	
Output circuit	Differential output	
Output signal	A+ A-; B+ B-	A+ A-; B+ B-; Z+ Z-
Input voltage	5VDC±5%	

● Internal wiring of motor (double pole 4-wire)



Two phase closed loop stepping motor (Brake)

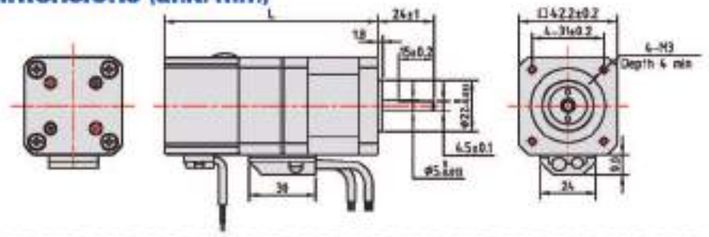
1.8° /step(Bipolar 4 wires)

■ Specification

Model	Holding torque N.m	Rated current A/Phase	Resistence Ω/Phase	Inductance mH/Phase	Rotational inertia g.cm²	Index	Encoder output circuit	Brake torque N.m	Weight kg
NEMA17 □42mm									
BBS42H241E1KM	0.4	2	1.05	2	54	✗	Differential output	0.5N.m	0.45
BBS42H249E1KM	0.48		1.35	2.9	77				0.5
BBS42H261E1KM	0.72		1.75	4	100				0.65
NEMA23 □57mm									
BBS57H255E1KM	1.2	4	0.45	1.4	280	✗	Differential output	1.3N.m	1.3
BBS57H255E2K5zM						✓			
BBS57H276E1KM	2	5	0.37	1.8	480	✗			1.6
BBS57H276E2K5zM						✓			
NEMA34 □86mm									
BBS86H280E1KM	4.5	6	0.34	2.4	1800	✗	Differential output	5N.m	3.1
BBS86H280E2K5zM						✓			
BBS86H2120E1KM	8.2		0.5	5.1	3600	✗			4.6
BBS86H2120E2K5zM						✓			
BBS86H2160E1KM	12		0.7	7.3	5400	✗			6.1
BBS86H2160E2K5zM						✓			

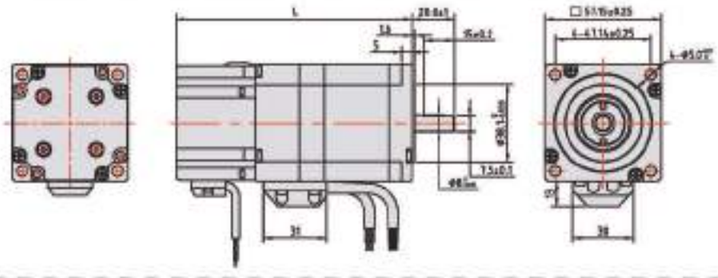
● M means with brake

■ Dimensions (unit: mm)



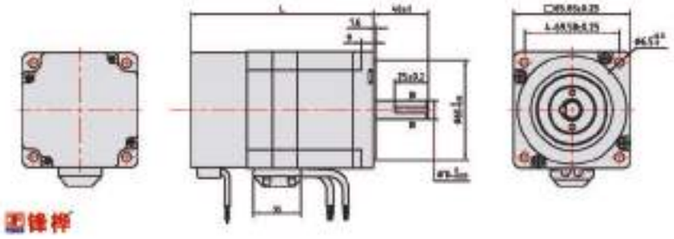
□42mm

Model	L
BBS42H241	93mm
BBS42H249	102mm
BBS42H261	113mm



□57mm

Model	L
BBS57H255	116mm
BBS57H276	137mm



□86mm

Model	L
BBS86H280	161mm
BBS86H2120	176mm
BBS86H2160	214mm

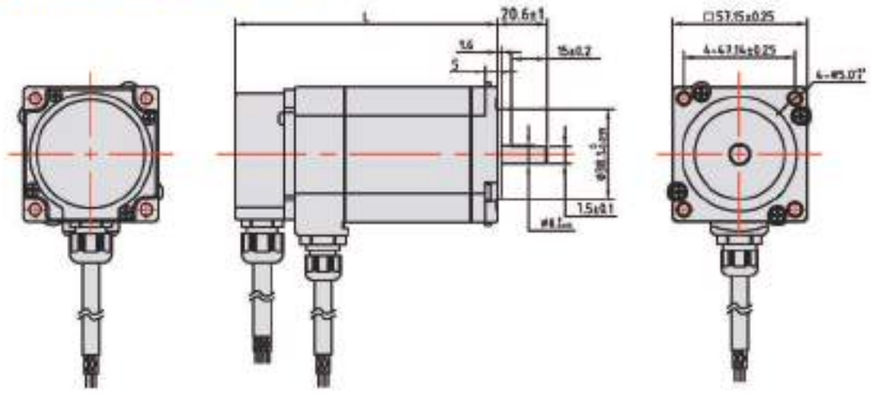
Two phase closed loop stepping motor(IP65 Waterproof)

1.8° /step(Bipolar 4 wires)

■ Specification

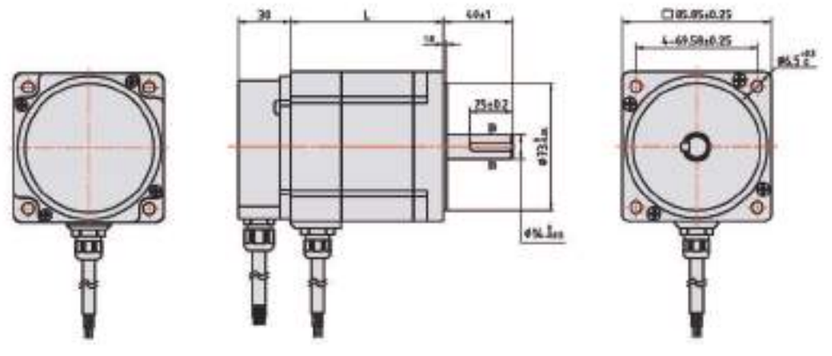
Model	Holding torque N.m	Rated current A/Phase	Resistence Ω/Phase	Inductance mH/Phase	Rotational inertia g.cm²	Index	Encoder output circuit	Protection grade	Weight kg
NEMA23 □57mm									
BBF57IP255E1KS	1.2	4	0.45	1.4	280	✗	Differential output	IP65	1.6
BBF57IP255E2K5zS						✓			
BBF57IP276E1KS	2	5	0.37	1.8	480	✗			2.5
BBF57IP276E2K5zS						✓			
NEMA34 □86mm									
BBF86IP280E1KS	4.5	6	0.34	2.4	1800	✗	Differential output	IP65	3.1
BBF86IP280E2K5zS						✓			
BBF86IP2120E1KS	8.5		0.5	5.1	3600	✗			4.6
BBF86IP2120E2K5zS						✓			
BBF86IP2160E1KS	12		0.7	7.3	5400	✗			6.1
BBF86IP2160E2K5zS						✓			

■ Dimensions (unit: mm)



□57mm

Model	L
BBF57IP255	86mm
BBF57IP276	107mm



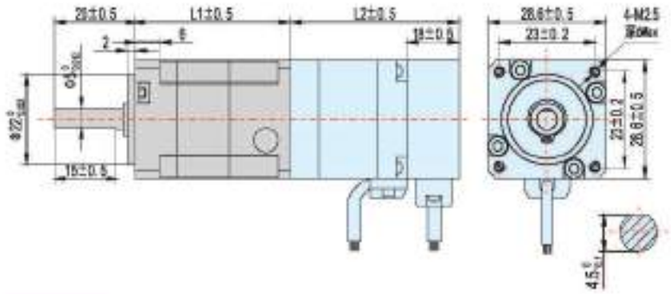
□86mm

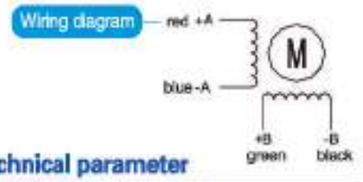
Model	L
BBF86IP280	161mm
BBF86IP2120	176mm
BBF86IP2160	214mm

Two phase closed loop stepping motor with planetary reducer

□28mm (Bipolar 4 wires)

■ **Dimensions** (unit: mm)



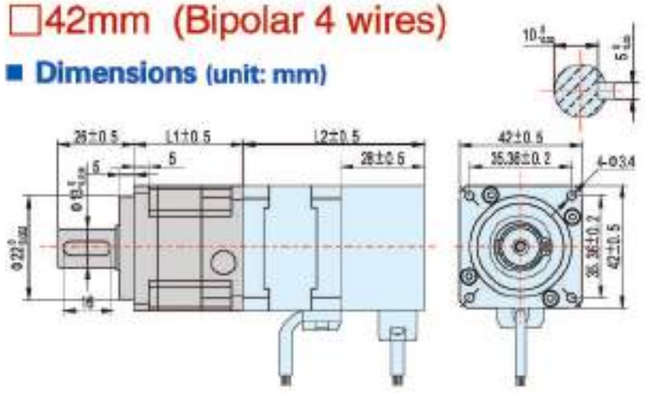


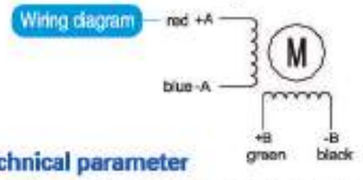
■ **Technical parameter**

ratio	4、5、7、10	16、20、25、35
stage	1	2
L(mm)	38	46.5
efficiency	≥96%	≥94%

□42mm (Bipolar 4 wires)

■ **Dimensions** (unit: mm)



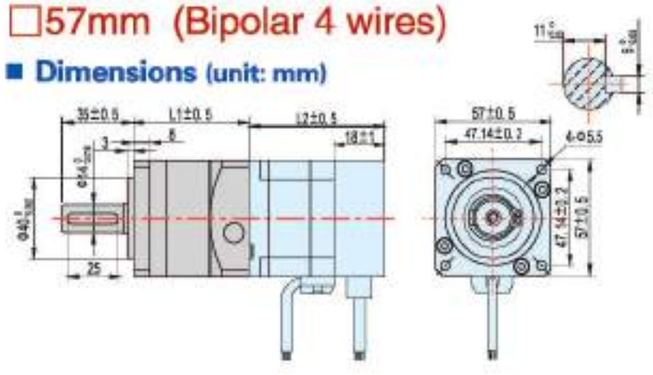


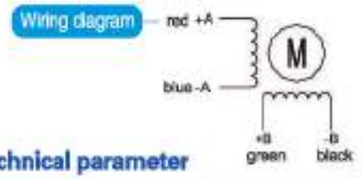
■ **Technical parameter**

ratio	4、5、7、10	16、20、25、35
stage	1	2
L(mm)	37	47.3
efficiency	≥96%	≥94%

□57mm (Bipolar 4 wires)

■ **Dimensions** (unit: mm)





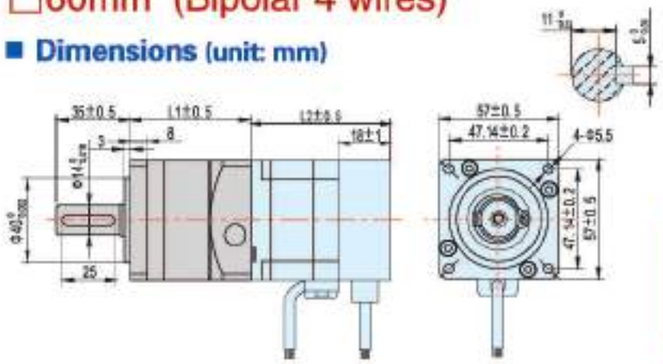
■ **Technical parameter**

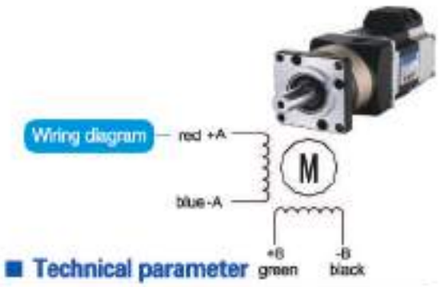
ratio	4、5、7、10	16、20、25、35
stage	1	2
L(mm)	37	47.3
efficiency	≥96%	≥94%

※ this outline drawing shows the stepping motor of the planetary reducer, [redacted] which is the planetary reducer.
※ we can formulate the electrical parameters of the stepping motor according to your needs, and we can also add planetary reducer, power-off brake, encoder, etc.
※ when installing the stepping motor, be sure to use the installation seam of the front cover of the motor for positioning, pay attention to the tolerance fit, and strictly ensure the concentricity of the output shaft of the stepping motor and the load.
※ for the performance parameters of the motor, please refer to the detailed motor parameters of the corresponding model in the previous sample.

□60mm (Bipolar 4 wires)

■ **Dimensions** (unit: mm)



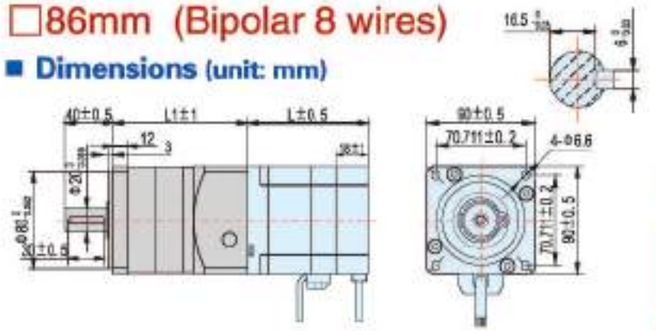


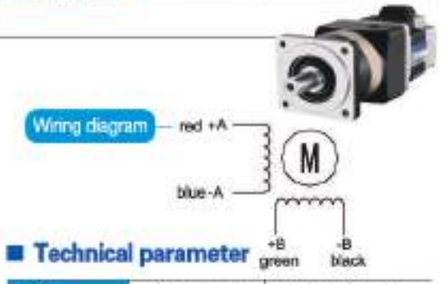
■ **Technical parameter**

ratio	4、5、7、10	16、20、25、35
stage	1	2
L(mm)	37	47.3
efficiency	≥96%	≥94%

□86mm (Bipolar 8 wires)

■ **Dimensions** (unit: mm)





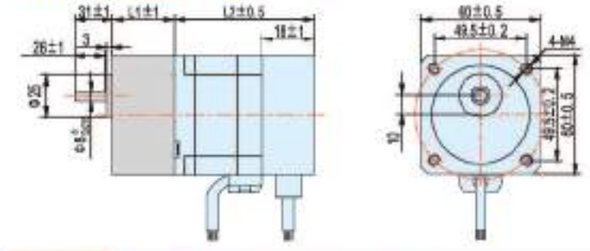
■ **Technical parameter**

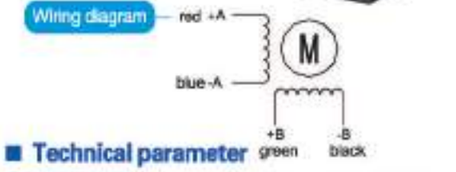
ratio	4、5、7、10	16、20、25、35
stage	1	2
L(mm)	152	173
efficiency	≥96%	≥94%

Two phase closed loop stepper motor with gearbox

□60mm (Bipolar 4 wires)

■ **Dimensions** (unit: mm)



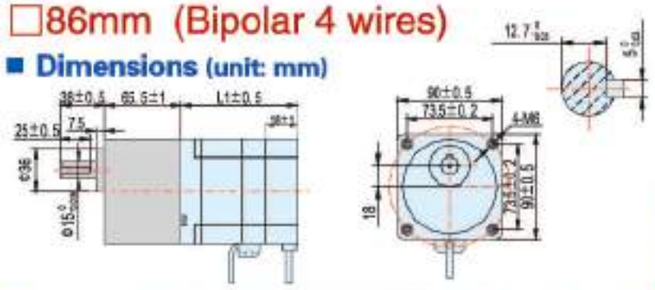


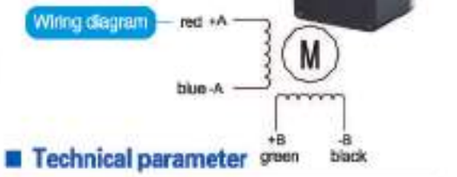
■ **Technical parameter**

ratio	3、3.6、5、6、7.5、10、12.5、15	20
stage	1	2
L(mm)	32	42

□86mm (Bipolar 4 wires)

■ **Dimensions** (unit: mm)





■ **Technical parameter**

ratio	3、3.6、5、6、7.5、9、12.5、15、20
stage	1
L(mm)	65.5

※ this outline drawing shows the stepping motor of the planetary reducer, [redacted] which is the planetary reducer.
※ for the performance parameters of the motor, please refer to the detailed motor parameters of the corresponding model in the previous sample.

Stepper drive systems

EtherCAT
CANopen
RS485
Pulse command

Stepper Drive Product Series

Pulse Universal Type

Pulse command
DM Open Loop Pulse
DMB Closed Loop Pulse
- Digital DSP stepper drive
- Support single-ended or differential connection
- High reliability, low cost

Drive And Control Tntegrated Type

DM-IO Series
DMB IO Series
- Constant speed control via IO switch signa
- Use PC software to set the speed of each gear
- Acceleration and low-speed operation are more stable
- Low-cost solution and simple application

485 Bus Type

DMR Series
- 36-bit DSP stepper drive
- Constant speed control via IO switch signal
- Use PC software to set the speed of each gear
- Acceleration and low-speed operation are more stable
- Low-cost solution and simple application

High-Speed Bus Type

DME Series
- Support COE (CIA402 protocol)
- Support CSP, PP, PV, HM control modes
- Compatible with most EtherCAT masters on the market
- Support PC software debugging
- Stable, reliable and low-cost

CAN Bus Type

CANopen
DMC Series
- CiA 301/402 standard protocol
- Maximum 1Mbps communication rate
- Fully digital DSP algorithm
- Smooth operation and anti-resonance
- Compatible with mainstream CANopen controllers

Integrated Drive Motor

YC/YB/YB/YRB series
- Support serial port debugging function
- Integrated design of motor and drive
- More compact installation,
- reducing external interference

Control type stepper drive series naming rules

DMB 5 56 - IO
① ② ③ ④

① Series Name: Driver Type
DM: General pulse/IO control type DMR: Modbus 485 bus/IO control type
DMB: Closed-loop pulse/IO control type DME: EtherCAT bus type

② Driver maximum input voltage: 4:40V 5:50V 8:80V 22:AC220V

③ Driver output peak current: 42:4.2A 56:5.6A 60:6A

④ Custom code; IO: IO customized version S: High performance version
T: Three-phase winding motor (the one without T suffix is two-phase winding)

DM Series Open Loop Pulse / IO General Purpose Type

The DM series is a two-phase digital open-loop stepper driver launched by Fenghua Transmission Technology Co., Ltd. It adopts vector control technology, built-in micro-segmentation technology, and adaptive filtering technology, which greatly optimizes the performance of the stepper motor. It runs smoothly at low, medium and high speeds, with low noise and low motor heat. It has a very high cost performance and can meet the application needs of most occasions.

- Built-in micro-segmentation
- High cost performance, high stability
- Compatible with 5~24V pulse signal
- New 32-bit DSP technology

Main features

- Low vibration and low noise
- Optically isolated differential signal input
- Current automatically halved when stationary
- Precise current control greatly reduces motor heating
- Overvoltage, undervoltage, phase loss and other protection functions
- Pulse response frequency can reach up to 200KHz (higher can be modified)

Performance parameter table

Driver Model	DM422	DM542S	DM556	DM556S	DM860	DM860S	DM556-IO	DM860-T	DM2260-T
Model Description	42 Standard Model	42 Enhanced Mode	57 Standard model	57 Enhanced Model	86 Standard model	86 Enhanced Model	57 IO Customized Model	86 Customized Model	86 Three-phase AC Model
Adaptive motor	20、28、35、42	35、42	57、60		86、110、130		20、28、35、42、57、60	20~130	20~130
Adaptive motor phase number	Two-phase							Three-phase	
Supply voltage	DC(20~40)	DC(24~48)	DC(24~48)	DC(24~48)	DC(24~80)	DC(24~110)	DC(20~50)	DC(20~50)	AC200V~240V
Output Current	0.3~2.2A	1~4.2A	1.4~5.6A	1.4~5.6A	1.4~7.2A	2.4~7.2A	1.4~5.6A	2.1~8.3A	3~7.2A
Input Function	Pulse、direction、enable						—	Pulse、direction、enable	
Output Function	—							drive ready、alarm	
Pulse signal level	5-24VDC compatible							5-24VDC compatible	5V
Control Mode	Open loop pulse						Open loop IO control	Open loop pulse	
Limit pulse frequency	200KHz (higher frequency can be adjusted)							200KHz (higher frequency can be adjusted)	
Size L*H*W	85.5*56*21	109*69.2*26.5	85.5*56*21	109*69.2*26.5	116*69.2*26.5	143*97*48	109*69.2*26.5	112*75.5*34	202*147*78
Use occasions	Do not place it near other heating equipment, avoid dust, oil mist, corrosive gas, flammable gas and conductive dust;								
Operating temperature	0-50℃								
Storage temperature	-20℃-50℃								
Operating environment humidity	40~90%RH								
vibration	10~55Hz/0.15mm								

DMB Series Closed Loop Pulse/ IO Control General Purpose Type

The DM series is a two-phase digital open-loop stepper driver launched by Fenghua Transmission Technology Co., Ltd. It adopts vector control technology, built-in micro-segmentation technology, and adaptive filtering technology, which greatly optimizes the performance of the stepper motor. It runs smoothly at low, medium and high speeds, with low noise and low motor heat. It has a very high cost performance and can meet the application needs of most occasions.

Compatible with pulse & IO control

High cost performance, high stability

Compatible with 5~24V pulse signal

New 32-bit DSP technology

Main features

- Low vibration and low noise
- Optically isolated differential signal input
- Built-in microfine division, excellent low-speed smoothness Over-voltage, over-differential and other alarm protection functions.Precision current control greatly reduces motor heat generation.
- Impulse response frequency up to 200KHz (higher can be changed).
- Reserved interface for brake output control, no need for relay intermediate control.
- Subdivision setting range 400-60000 (any micro-subdivision can be set through the host computer).
- External dial code setting for driver subdivision, initial direction, alarm polarity, algorithm, smoothing factor.Translated with DeepL.com (free version)

Performance parameter table

Driver model	DMB542	DMB556	DMB860
Model description	42 Standard Model	57 Standard Model	86 Standard Model
Applicable motor	20、28、35、42	57、60	86、110、130
Applicable motor phase number	Two-phase		
Supply voltage	DC (24~50)	DC (24~50)	DC (24~110)
Output curren	alarm		
Input function	Pulse, direction, enable		
Output function	Brake, alarm		in-position, alarm
Pulse signal level	5-24VDC compatible		
Control mode	Pulse closed loop/IO control		
Limit pulse frequency	200KHz(higher frequency can be adjusted)		
Dimensions L*H*W	109*69*26.5	109*69*26.5	112.5*76*34
Application occasions	Do not place it near other heating equipment, avoid dust, oil mist, corrosive gas, flammable gas and conductive dust;		
Application temperature	0-50℃		
Storage temperature	-20℃-50℃		
Application environment humidity	40~90%RH		
Vibration	10~55Hz/0.15mm		
Debugging port/debugging software	MotorView_v1.0.8.02		

DMR RS485 Bus Stepper Drives

The 485 bus open-closed loop stepper driver adopts a servo-like control principle, which is compatible with the dual advantages of open-loop stepper and servo systems. It adopts the latest 32-bit DSP control technology, which greatly improves the performance of the stepper system. It has excellent stability and ultra-low noise at medium and low speeds, and the high-speed torque is also greatly improved, which expands the speed application range of the stepper motor. The smooth and precise pure sine current vector control technology effectively reduces the heating of the motor, and it has strong compatibility and high cost performance,which can meet the application of most occasions.

New generation 32-bit DSP technology, reliable and low-cost

Built-in single-axis control function (PR)

Flexible IO configuration

Isolated RS485 bus

Support open-loop and closed-loop mode switching

Main features

- Built-in micro-segmentation, excellent low-speed stability
- With overcurrent, overvoltage, undervoltage, phase loss, over-tolerance and other protection functions
- Pure sine current vector control effectively reduces motor heating
- Universal AC and DC, voltage range: AC20~50V/DC24V~70V
- Support speed mode, position mode, multi-segment position mode and return to origin mode
- Current, lock current, subdivision, PI and other parameters can be set and queried through the master station
- Dial code SW1-5 sets the driver communication address, which can support 31 devices, and more can be set through the master station
- 11-way optoelectronic isolation programmable input interface, receives external control signals, and realizes driver enable, start and stop, limit and other functions
- 5-way optoelectronic isolation programmable output interface, outputs driver status and control signals, such as alarm, arrival, return to origin completion and other functions

Performance parameter table

Driver model	DMR556	DMR860
Adapted motors	20、28、35、42、57、60	86、110、130
Power supply Voltage	DC(24~70)	DC24V~70V
Output Current	adaptive	
Digital Input	11 DI	
Input Specification	Control signal 12~24V, functions support origin, positive limit, negative limit, emergency stop, general input, etc.	
Digital Output	5 DO	
Output Specification	OC output, maximum pull-up 30V, supports common cathode and common anode compatible wiring, maximum output 100mA, functions support alarm, brake output, etc.	
Control Mode	Modbus RTU/IO Control	
Open and closed loop selection	Support open-closed loop switching	
Dimension L*H*W	126*82*25	
Communication protocol standard	Modbus RTU	
Control Mode	IO control, PR16 segment path (absolute, relative, speed, return to zero mode)	
Application occasions	Do not place it near other heating equipment, avoid dust, oil mist, corrosive gas, flammable gas and conductive dust;	
Application temperature	Operating temperature: 0~50℃; Storage temperature:: -20℃~65℃;	
Application environment humidity	40~90%RH	
Vibration	10~55Hz/0.15mm	
Debugging port/debugging software	MotorView_v1.0.8.02	

DME Ether CAT Bus Stepper Drives

DME Ether CAT bus open-closed loop integrated stepper driver adopts Ether CAT bus communication interface, integrating Ether CAT slave technology, vector control technology, built-in micro-segmentation technology, adaptive filtering technology, and closed-loop control technology, realizing real-time control and real-time data transmission of the stepper system, and optimizing the performance of the stepper motor: excellent stability and ultra-low noise at medium and low speeds; high-speed torque is greatly improved, expanding the speed application range of the stepper motor; smooth and precise pure sinusoidal current vector control technology effectively reduces motor heating.

EtherCAT bus communication

Supports open-loop and closed-loop mode switching

New generation 32-bit ARM technology

High cost performance, good stability, excellent noise and vibration performance

Main features

- Any current reduction ratio can be set when stationary
- The closed loop can set the out-of-tolerance alarm warning value
- Excellent stability at low frequency and small subdivision
- Pure sinusoidal current vector control effectively reduces motor heating
- With arbitrary subdivision adjustment, the subdivision can be changed at will
- With overvoltage, undervoltage and other protection functions, voltage range:
- Support CIA301 and CIA402 sub-protocols, support CSP, PV, PP, HM mode
- 3-way optoelectronic isolation programmable output interface, output driver status and control signal
- 5-way optoelectronic isolation programmable input interface, receive external control signals,realize driver limit, origin, emergency stop and other functions

Performance parameter table

Driver model	DME542	DME556
Adapted motors	20、28、35、42	57、60、86
Power supply Voltage	20~50VDC	20~50VDCadaptive
Output Current	adaptive	
Digital Input	5DI	
Input Specification	Control signal 12~24V, functions support origin, positive limit, negative limit, emergency stop, general input, etc.	
Digital Output	3DO	
Output Specification	OC output, maximum pull-up 30V, supports common cathode and common anode compatible wiring, maximum output 100mA, functions support alarm, brake output, etc.	
Open and closed loop selection	Supports open and closed loop switching	
Dimension L*H*W	119*76*34	
Communication protocol standard	EtherCAT	
Control Mode	CSP、PP、PV、HM	
Synchronization mode	DC Synchronization and Free run mode	
Synchronization cycle	250us~20ms	
Application occasions	Do not place it near other heating equipment, avoid dust, oil mist, corrosive gas, flammable gas and conductive dust;	
Application temperature	Operating temperature: 0~50℃; Storage temperature:: -20℃~65℃;	
Application environment humidity	40~90%RH	
Vibration	10~55Hz/0.15mm	
Debugging port/debugging software	MotorView_v1.0.8.02	

Integral Stepper Drives

The integrated stepper driver is the latest integrated motor driver launched by Fenghua Transmission Technology Co., Ltd. It uses the latest dedicated motor control digital signal processor to improve the overall performance of the motor, reduce the heating level of the motor and reduce the vibration of the motor. The integrated design of the motor and driver makes the installation more compact and reduces external interference.

Integrated motor and drive design

More compact installation, less external interference

Support serial port debugging function, using MINIUSB interface

Integrated stepper driver naming convention

YC	28	M	-	32
①	②	③		④

① Series Name: Driver Type
C: Pulse open-loop stepper driver integrated machine B: Pulse type closed-loop stepping driver all-in-one machine
R: 485-bus open-loop stepper driver in one unit BR: 485 bus closed-loop stepper driver integrated machine

② Base: 28: 28 Flange Integrated 35: 35 Flange Integrated 42: 42 Flange Integrated 57: 57 Flange Integrated 60: 60 Flange Integrated

③ Type: Blank: Integrated Drive (without Motor) M: Integrated motor (with motor)

④ Motor body length: 32: 32mm 42: 42mm 52: 52mm .....

Integrated product series

Pulse Type (Open Loop) Stepper Drivers All-in-One List	Pulse Type (Closed Loop) Stepper Drives All-in-One List	Type 485 (Open Loop) Stepper Driver All-in-One List	Type 485 (Closed Loop) Stepper Drives All-in-One List
			
YC28M-32 YC42M-48 YC28M-42 YC42M-60 YC28M-52 YC57M-56 YC35M-36 YC57M-80 YC35M-56 YC60M-68 YC42M-40 YC60M-86	YB28M-32 YB42M-48 YB28M-42 YB42M-60 YB28M-52 YB57M-56 YB35M-36 YB57M-80 YB35M-56 YB60M-68 YB42M-40 YB60M-86	YR28M-32 YR42M-48 YR28M-42 YR42M-60 YR28M-52 YR57M-56 YR35M-36 YR57M-80 YR35M-56 YR60M-68 YR42M-40 YR60M-86	YBR28M-32 YBR42M-48 YBR28M-42 YBR42M-60 YBR28M-52 YBR57M-56 YBR35M-36 YBR57M-80 YBR35M-56 YBR60M-68 YBR42M-40 YBR60M-86

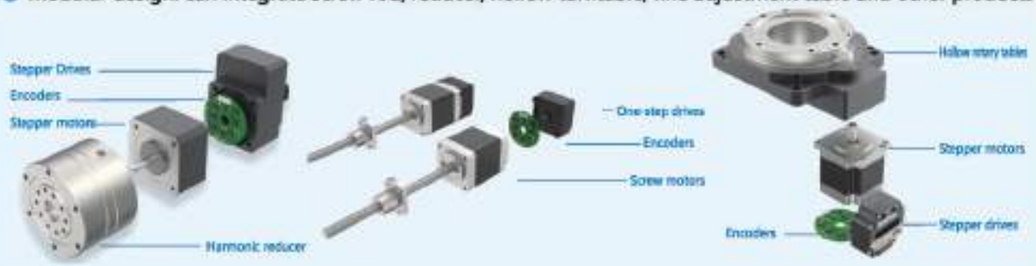
Product Features

● Space saving: highly integrated, minimum size 20 flange

● Communication: multiple control methods, driver + network cable + protocol

● Wiring saving: wiring reduced by 50%

● Modular design: can integrate screw rod, reducer, hollow turntable, fine adjustment table and other products



Performance parameter table

• Pulse-type open-loop stepper driver all-in-one unit

Model	Base	Current (A)	Voltage (V)	Total body length (including driver) mm	Shaft diameter (mm)	Shaft length (mm)	Holding torque (N.m)
YC28M-32	28	1.4~2.1	DC(12~40)	48	5	20	0.06
YC28M-42		1.4~2.1	DC(12~40)	58	5	20	0.09
YC28M-52		1.4~2.1	DC(12~40)	68	5	20	0.13
YC35M-36	35	1.4~2.1	DC(12~40)	56	5	24	0.22
YC35M-56		1.4~2.1	DC(12~40)	76	5	24	0.4
YC42M-40	42	1.4~2.1	DC(12~40)	62	5	24	0.4
YC42M-48		1.4~2.1	DC(12~40)	70	5	24	0.6
YC42M-60		1.4~2.1	DC(12~40)	82	5	24	0.8
YC57M-56	57	1.4~5.3	DC(24~48)	74	8	21	1.3
YC57M-80		1.4~5.3	DC(24~48)	98	8	21	2.4
YC60M-68	60	1.4~5.3	DC(24~48)	86	8	21	2.4
YC60M-86		1.4~5.3	DC(24~48)	104	8	21	3

• Pulse-type closed-loop stepper driver all-in-one unit

Model	Base	Current (A)	Voltage (V)	Total body length (including driver) mm	Shaft diameter (mm)	Shaft length (mm)	Holding torque (N.m)
YB28M-32	28	1.4~2.1	DC(12~40)	48	5	20	0.06
YB28M-42		1.4~2.1	DC(12~40)	58	5	20	0.09
YB28M-52		1.4~2.1	DC(12~40)	68	5	20	0.13
YB35M-36	35	1.4~2.1	DC(12~40)	56	5	24	0.22
YB35M-56		1.4~2.1	DC(12~40)	76	5	24	0.4
YB42M-40	42	1.4~2.1	DC(12~40)	62	5	24	0.4
YB42M-48		1.4~2.1	DC(12~40)	70	5	24	0.6
YB42M-60		1.4~2.1	DC(12~40)	82	5	24	0.8
YB57M-56	57	1.4~5.3	DC(24~48)	74	8	21	1.3
YB57M-80		1.4~5.3	DC(24~48)	98	8	21	2.4
YB60M-68	60	1.4~5.3	DC(24~48)	86	8	21	2.4
YB60M-86		1.4~5.3	DC(24~48)	104	8	21	3

• 485 Type Open Loop Stepper Driver All-in-One

Model	Base	Current (A)	Voltage (V)	Total body length (including driver) mm	Shaft diameter (mm)	Shaft length (mm)	Holding torque (N.m)
YR28M-32	28	1.4~2.1	DC(12~40)	48	5	20	0.06
YR28M-42		1.4~2.1	DC(12~40)	58	5	20	0.09
YR28M-52		1.4~2.1	DC(12~40)	68	5	20	0.13
YR35M-36	35	1.4~2.1	DC(12~40)	56	5	24	0.22
YR35M-56		1.4~2.1	DC(12~40)	76	5	24	0.4
YR42M-40	42	1.4~2.1	DC(12~40)	62	5	24	0.4
YR42M-48		1.4~2.1	DC(12~40)	70	5	24	0.6
YR42M-60		1.4~2.1	DC(12~40)	82	5	24	0.8
YR57M-56	57	1.4~5.3	DC(24~48)	74	8	21	1.3
YR57M-80		1.4~5.3	DC(24~48)	98	8	21	2.4
YR60M-68	60	1.4~5.3	DC(24~48)	86	8	21	2.4
YR60M-86		1.4~5.3	DC(24~48)	104	8	21	3

• 485 Type Closed-loop Stepper Driver All-in-One

Model	Base	Current (A)	Voltage (V)	Total body length (including driver) mm	Shaft diameter (mm)	Shaft length (mm)	Holding torque (N.m)
YBR28M-32	28	1.4~2.1	DC(12~40)	48	5	20	0.06
YBR28M-42		1.4~2.1	DC(12~40)	58	5	20	0.09
YBR28M-52		1.4~2.1	DC(12~40)	68	5	20	0.13
YBR35M-36	35	1.4~2.1	DC(12~40)	56	5	24	0.22
YBR35M-56		1.4~2.1	DC(12~40)	76	5	24	0.4
YBR42M-40	42	1.4~2.1	DC(12~40)	62	5	24	0.4
YBR42M-48		1.4~2.1	DC(12~40)	70	5	24	0.6
YBR42M-60		1.4~2.1	DC(12~40)	82	5	24	0.8
YBR57M-56	57	1.4~5.3	DC(24~48)	74	8	21	1.3
YBR57M-80		1.4~5.3	DC(24~48)	98	8	21	2.4
YBR60M-68	60	1.4~5.3	DC(24~48)	86	8	21	2.4
YBR60M-86		1.4~5.3	DC(24~48)	104	8	21	3

AC servo motors and AC servo drives

AC servo motor

AC servo drives

Standard AC Servo Drives

Performance AC Servo Drives

Specification selection of AC servo motor

F	80	-	75B	-	30C	S	-	J1	-	Z	-	F

Motor Naming
F

Motor Flange
40: 40mm
60: 60mm
80: 80mm
110: 110mm
130: 130mm
180: 180mm
200: 200mm
220: 220mm
263: 263mm

Power Rating (W)
Numerical and Alphabetical Combinations
B × 10
C × 100
D × 1000
Example:
75B: 750W

Rated speed (rpm)
Numerical and Alphabetical Combinations
B × 10
C × 100
Example:
30C: 3000rpm

Voltage class (V)
S: 220
T: 380

Encoder Interface Types
M: 2500 line incremental
J: 17-digit multi-turn absolute
J1: 17-digit single-turn absolute value
J2: 23-digit multi-turn absolute value
J3: 23-digit single-turn absolute value
X: Rotary Transformer

Motor holding brake
Vacant: without brake
Z: with brake

Motor Fans
A: Without fan
F: with fan

AC servo drive specification selection

SV860	P	S100

Product Series
SV830: Standard AC Servo Drive
SV860: Performance AC Servo Drives

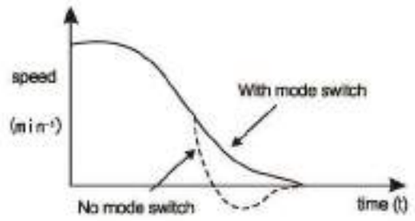
Product Type
P: RS485+Pulse
E: EhterCAT bus
C: CANopen bus
N: Profinet bus

Rating
S: AC220V / T: AC380
D: Single-phase AC220V / 3-phase AC220V
100: 100W; 750: 750W; 2300: 2.3KW;
200: 200W; 1000: 1KW; 3000: 3KW;
400: 400W; 1500: 1.5KW; 4500:4.5KW;

Functional features

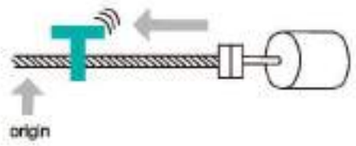
Mode switch

In order to improve the transient characteristics of the motor during acceleration and deceleration, the PI (proportional integral) control and P (proportional) control of the speed loop can be switched. So as to suppress overshoot and undershoot.



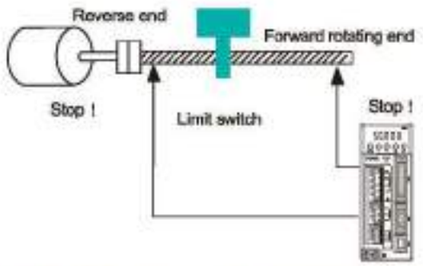
Origin retrieval

Locate the stop at the origin pulse position of the code disk. It is used for matching motor shaft and mechanical position.



Prevent overtravel

When the mechanical movable part exceeds its movable range, stop driving the motor.



Highly flexible internal position programming mode

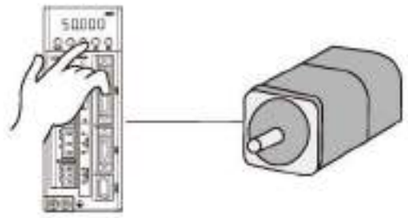
Automatically call the next path after path 1 is completed

Regeneration overload alarm.

Before the regeneration overload alarm, a signal can be sent in advance.

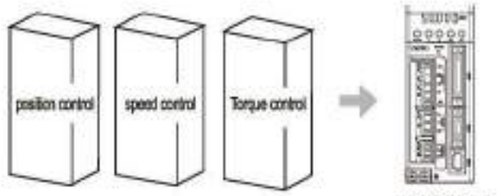
Jog operation

No need to input commands, the motor can also be operated by using the handheld operator, which is convenient for trial operation.



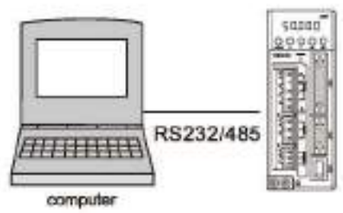
Multi in one control

In addition to position, speed and torque control, it can also switch the control modes.



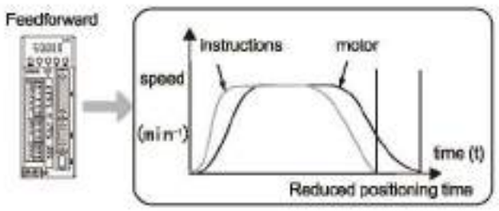
Computer interface

Computer interface is equipped as standard, which can set user parameters, command speed and torque, draw monitoring waveform and 1:n communication



Feedforward compensation

Because the feedforward compensation is added, the positioning time is shortened.

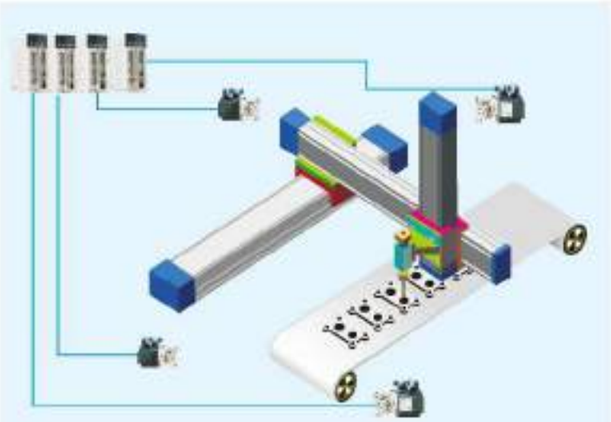


Case analysis

Precise position control.

Function description:
The servo driver receives the position signal sent by the multi-axis motion controller in the position control mode, and performs linear and curve interpolation. The high-speed response characteristic ensures the processing accuracy.
In the processing process, according to the load condition or before and after the change of the transmission mechanism, different PI gain values are used for control (by means of upper computer communication or manual input, two sets of PI gain values are preset for the internal function code of the driver) to ensure that The system can continue to be stable and reliable under different working conditions.

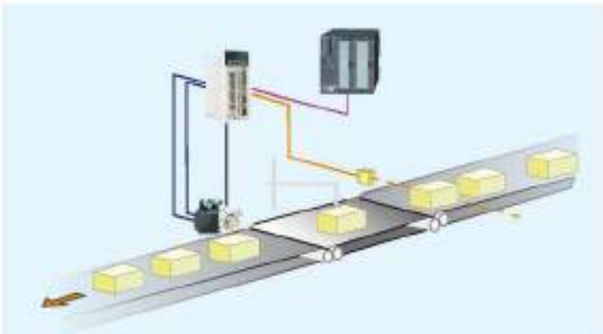
For example: filling machine, packaging machine, automatic centering flash butt welding machine, robotic arm, wire cutting lathe, engraving machine, spraying machine, etc.



Interrupt fixed length control

The speed and position control switching of the system is completed by the external input terminal, and after the switching, the system realizes a certain fixed position control (the user can preset the internal function code of the drive through the communication of the upper computer or manual input), and realize the 'speed/position control". "Fast, accurate, and reliable connections can simplify PLC design. The speed and position smoothness during operation can be adjusted by the built-in filter, and finally realize the smooth operation and ensure that the production process requirements are met.

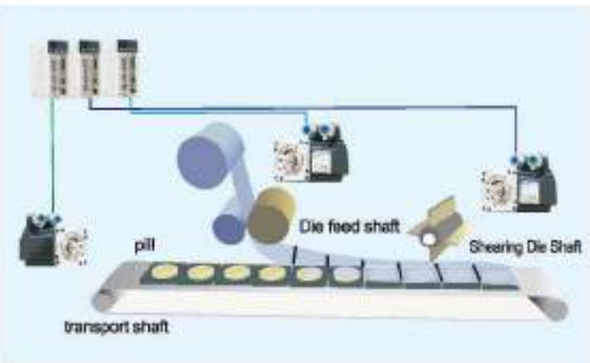
For example: discharge mechanism, slitting knife arrangement mechanism, laser printing production line, etc.



position following control

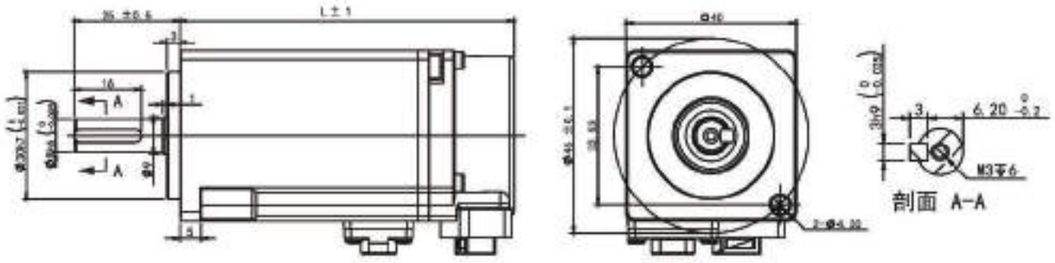
The servo driver of the conveying shaft outputs the motor encoder signal of the conveying shaft, and the film feeding shaft and the film shearing shaft automatically generate speed and position signals according to the signal, and finally make the feeding, film cutting, film feeding position consistent and running smoothly , to ensure that the entire system meets the processing requirements.

For example: die-cutting machine, feeder, steel plate stop-and-stop shearing feeding, pipe bending machine feeding, etc.



F40 AC servo motor

■ Outline drawing / unit: mm

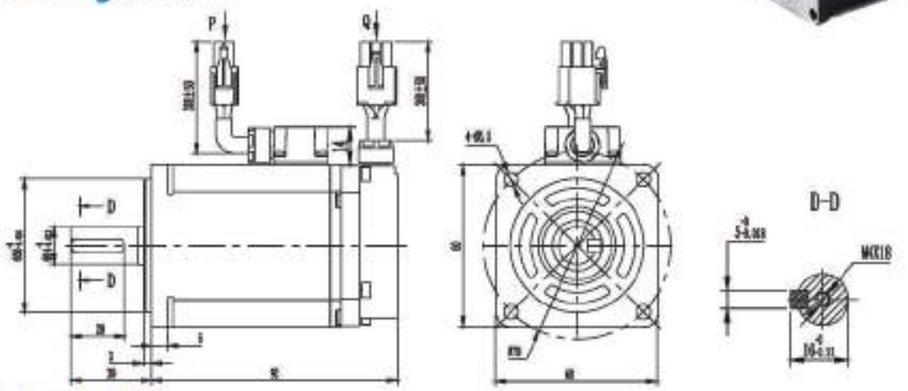


■ Technical parameter

MOTOR MODEL	F40-5B30CS-□□□	F40-10B30CS-□□□
Rated Power(kW)	50	100
Rated Voltage(V)	220	220
Rated Current(A)	1	1.1
Peak Current(A)	3	3.5
Rated Torque(N.m)	0.16	0.318
Peak Torque(N.m)	0.48	0.954
Rated Speed(rpm)	3000	3000
Peak Speed(rpm)	7000	6000
Line- line Resistance(Ω)	70	20.6
Line-line Inductance(mH)	12	10.5
Voltage Constant(V/1000r/min)	11	24
Polar Number	5	5
Rotor Inertia(kg.m²)	0.03	0.066
Torque Coefficient(N.m/A)	0.25	0.29
Body Length	65	78.8
Body Length	98.2	112
Electrical Time- constant(ms)	0.2	1.02
Encord Line Number(PPR)	17bit/23bit	
Insulation Class	ClassF	
Safety Class	IP65	
Environment	Temperature:-20℃~+40℃ Humidity Below 90%RH No Dewing	
Motor Winding Plue	Motor Winding Leads: U / Receptacle Number: 1 — V / 2 — W / 3 — PE / 4	
Photoelectric Encoder Socket(15Pin)	Winding Leads / Receptacle Number: 5V 2 — 0V 3 — B 4 — Z- 5 — U 6 — Z 7 — U- 8 — A 9 — V 10 — W 11 — V- 12 — A- 13 — B- 14 — W- 15 — PE 1	
Absolute Encoder Socket(7Pin)	Winding Bow Wire / Receptacle Number: E- 2 — E+ 3 — SD- 4 — 0V 5 — SD+ 6 — +5V 7 — PE 1	

F60 AC servo motor

■ Outline drawing / unit: mm

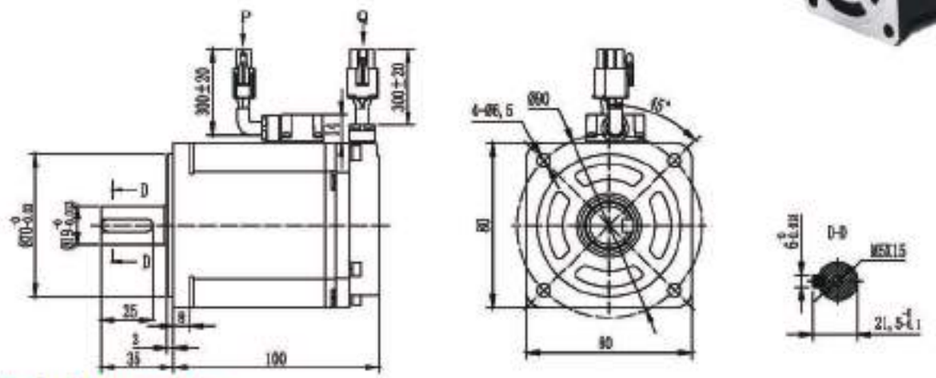


■ Technical parameter

MOTOR MODEL	F60-20B30CS-□□□	F60-40B30CS-□□□	F60-60B30CS-□□□
Rated Power(kW)	0.2	0.4	0.6
Rated Voltage(V)	220	220	220
Rated Current(A)	1.7	2.5	4.1
Peak Current(A)	5.1	7.5	12.3
Rated Torque(N.m)	0.64	1.27	1.91
Peak Torque(N.m)	1.91	3.81	5.73
Rated Speed(rpm)	3000	3000	3000
Peak Speed(rpm)	6000	6000	6000
Line- line Resistance(Ω)	4.5	3.3	2.5
Line-line Inductance(mH)	10.8	6.9	4.5
Voltage Constant(V/1000r/min)	23	30.7	30
Polar Number	5	5	5
Rotor Inertia(kg.m2)	0.028×10^{-3}	0.052×10^{-3}	0.078×10^{-3}
Torque Coefficient(N.m/A)	0.38	0.51	0.47
Body Length	75	92	109
Body Length	105	122	139
Electrical Time- constant(ms)	2.40	2.09	1.8
Encord Line Number(PPR)	2500ppr/17bit/23bit/rotation		
Insulation Class	ClassF		
Safety Class	IP65		
Environment	Temperature:-20℃~+40℃ Humidity Below 90%RH No Dewing		
Motor Winding Plue	Motor Winding Leads: U / Receptacle Number: 1 — V / 2 — W / 3 — PE / 4		
Photoelectric Encoder Socket(15Pin)	Winding Leads / Receptacle Number: 5V 2 — 0V 3 — B 4 — Z- 5 — U 6 — Z 7 — U- 8 — A 9 — V 10 — W 11 — V- 12 — A- 13 — B- 14 — W- 15 — PE 1		
Absolute Encoder Socket(7Pin)	Winding Bow Wire / Receptacle Number: E- 2 — E+ 3 — SD- 4 — 0V 5 — SD+ 6 — +5V 7 — PE 1		

F80 AC servo motor

■ Outline drawing / unit: mm

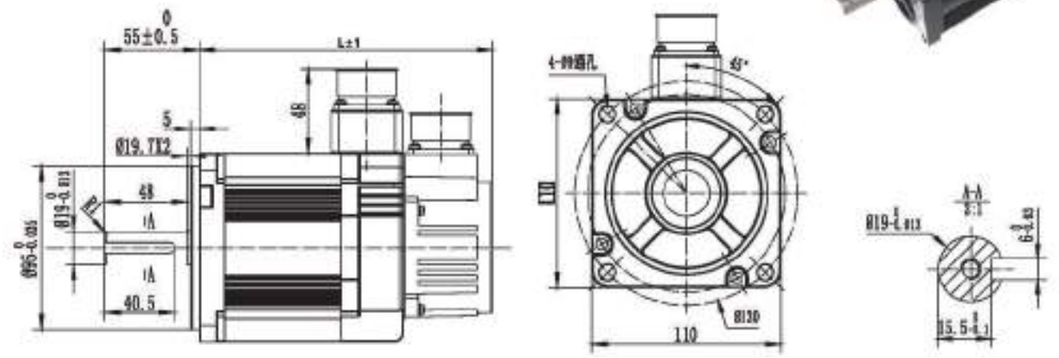


■ Technical parameter

MOTOR MODEL	F80-75B30CS-□□□	F80-10C30CS-□□□
Rated Power(kW)	0.75	1
Rated Voltage(V)	220	220
Rated Current(A)	4.4	5.8
Peak Current(A)	13.2	17.4
Rated Torque(N.m)	2.39	3.3
Peak Torque(N.m)	7.17	9.9
Rated Speed(rpm)	3000	3000
Peak Speed(rpm)	6000	6000
Line- line Resistance(Ω)	1.15	0.78
Line-line Inductance(mH)	4.9	3.2
Voltage Constant(V/1000r/min)	33	32
Polar Number	5	5
Rotor Inertia(kg.m²)	$0.148X10^{-3}$	$0.227x10^{-3}$
Torque Coefficient(N.m/A)	0.54	0.57
Body Length	100	113
Body Length	134	147
Electrical Time- constant(ms)	4.26	4.10
Encord Line Number(PPR)	2500ppr/17bit/23bit	
Insulation Class	ClassF	
Safety Class	IP65	
Environment	Temperature:-20℃~+40℃ Humidity Below 90%RH No Dewing	
Motor Winding Plue	Motor Winding Leads: U V W PE Receptade Number: 1 2 3 4	
Photoelectric Encoder Socket(15Pin)	Winding Leads: 5V 0V B Z- U Z U- A V W V- A- B- W- PE Receptacle Number: 2 3 4 5 6 7 8 9 10 11 12 13 14 15 1	
Absolute Encoder Socket(7Pin)	Winding Bow Wire: E- E+ SD- 0V SD+ +5V PE Receptacle Number: 2 3 4 5 6 7 1	

F110 AC servo motor

■ Outline drawing / unit: mm

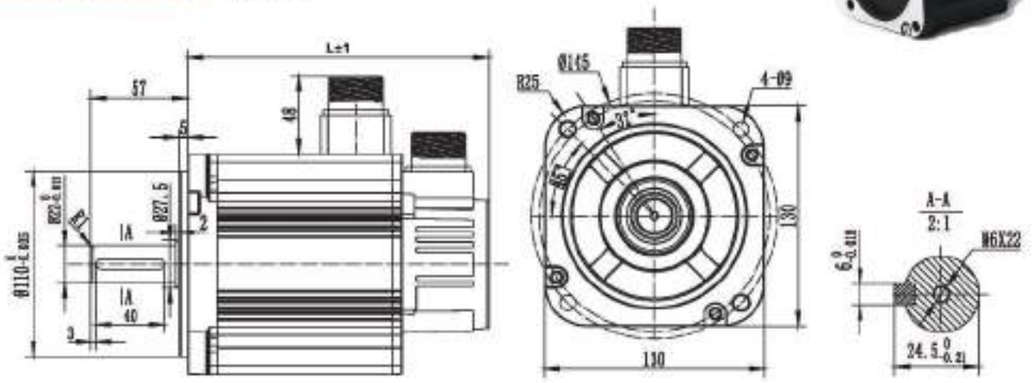


■ Technical parameter

MOTOR MODEL	F110-88B20CS-□□□	F110-11C20CS-□□□	F110-13C20CS-□□□	F110-15C20CS-□□□
Rated Power(kW)	0.88	1.1	1.3	1.5
Rated Voltage(V)	220	220	220	220
Rated Current(A)	4.5	5.4	6.5	7.5
Peak Current(A)	13.5	16.2	19.5	22.5
Rated Torque(N.m)	4.2	5.4	6.4	7.5
Peak Torque(N.m)	12.6	16.2	19.2	22.5
Rated Speed(rpm)	2000	2000	2000	2000
Peak Speed(rpm)	3000	3000	3000	3000
Line- line Resistance(Ω)	1.6	1.3	1.0	0.8
Line-line Inductance(mH)	7.4	6.4	5.4	4.5
Voltage Constant(V/1000r/min)	65	66	68	65
Polar Number	5	5	5	5
Rotor Inertia(kg.m²)	$0.79x10^{-3}$	$0.92x10^{-3}$	$1.06x10^{-3}$	$1.24x10^{-3}$
Torque Coefficient(N.m/A)	0.93	1.0	0.98	1.0
Encord Line Number(PPR)	Tamagawa 23-bit Absolute			
Insulation Class	ClassF			
Safety Class	IP65			
Environment	Temperature:-20℃~+40℃ Humidity Below 90%RH No Dewing			
Motor Winding Plue	Motor Winding Leads: U V W PE Receptade Number: 2 3 4 1			
Photoelectric Encoder Socket(15Pin)	Winding Leads: 5V 0V A+ B+ Z+ A- B- Z- U+ V+ W+ U- V- W- PE Receptacle Number: 2 3 4 5 6 7 8 9 10 11 12 13 14 15 1			
Absolute Encoder Socket(7Pin)	Winding Bow Wire: E- E+ SD- 0V SD+ +5V PE Receptacle Number: 2 3 4 5 6 7 1			

F130 AC servo motor

■ Outline drawing / unit: mm

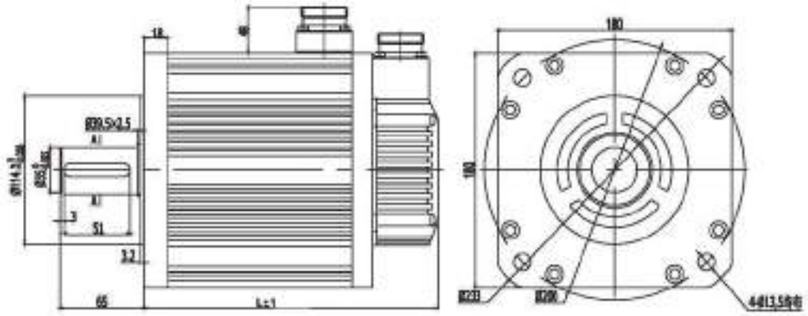


■ Technical parameter

MOTOR MODEL	F130-85B15CS-□□□	F130-13C15CS-□□□	F130-18C15CS-□□□	F130-23C15CS-□□□
Rated Power(kW)	0.85	1.3	1.8	2.3
Rated Voltage(V)	220	220	220	220
Rated Current(A)	5.3	7.5	10.5	14
Peak Current(A)	15.9	22.5	31.5	42
Rated Torque(N.m)	5.4	8.34	11.5	14.6
Peak Torque(N.m)	16.2	25	34.5	43.8
Rated Speed(rpm)	1500	1500	1500	1500
Peak Speed(rpm)	3000	3000	3000	3000
Line- line Resistance(Ω)	1.25± 10%	0.78± 10%	0.49± 10%	0.34± 10%
Line- line Resistance(mH)	10.7± 20%	8.0± 20%	5.4± 20%	3.6± 20%
Voltage Constant(V/1000r/min)	64	65	64	63
Polar Number	5	5	5	5
Rotor Inertia(kg.m²)	$1.25x10^{-3}$	$1.78x10^{-3}$	$2.41x10^{-3}$	$3.15x10^{-3}$
Torque Coefficient(N.m/A)	1.02	1.112	1.1	1.04
Encoder Specifications	17bit magnetic programming			
Insulation Class	ClassF			
Safety Class	IP65			
Environment	Temperature:-20℃~+40℃ Humidity Below 90%RH No Dewing			
Motor Winding Plug	Motor Winding Leads / Receptacle Number: U 2 / V 3 / W 4 / PE 1			
Photoelectric Encoder Socket(15Pin)	Winding Leads / Receptacle Number: 5V 2, 0V 3, A+ 4, B+ 5, Z+ 6, A- 7, B- 8, Z- 9, U+ 10, V+ 11, W+ 12, U- 13, V- 14, W- 15, PE 1			
Absolute Encoder Socket(7Pin)	Winding Bow Wire / Receptacle Number: E- 2, E+ 3, SD- 4, 0V 5, SD+ 6, +5V 7, PE 1			

F180 AC servo motor

■ Outline drawing / unit: mm



■ Technical parameter

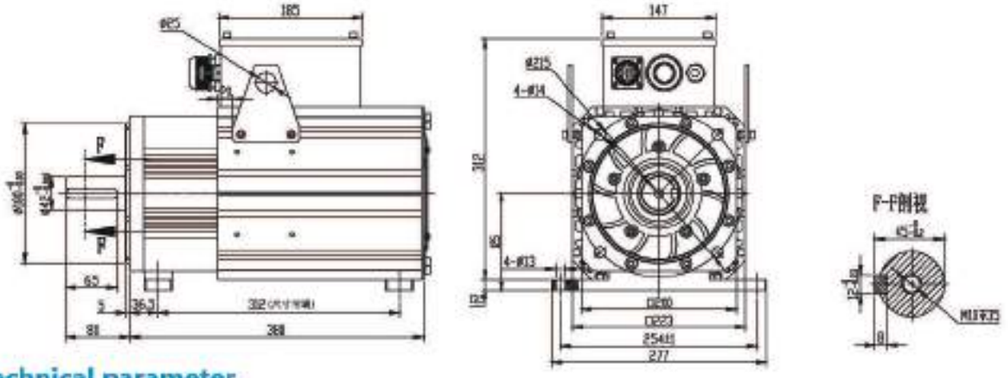
MOTOR MODEL	F180-27C15C □-□□□	F180-30C15C □-□□□	F180-45C20C □-□□□	F180-29C10C □-□□□	F180-43C15C □-□□□	F180-37C10C □-□□□	F180-55C15C □-□□□	F180-75C15C □-□□□
Rated Power(kW)	2.7	3.0	4.5	2.9	4.3	3.7	5.5	7.5
Rated Voltage(V)	220 380	220 380	220 380	220 380	220 380	220 380	220 380	220 380
Rated Current(A)	10.5 6.5	12 7.5	16 9.5	12 7.5	16 10	16 10	24 12	32 20
Rated Speed(rpm)	1500	1500	2000	1000	1500	1000	1500	1500
Rated Torque(N.m)	17.2	19	21.5	27	27	35	35	48
Peak Torque(N.m)	43	47	53	67	67	87.5	87.5	120
Voltage Constant(V/1000r/min)	112 167	97 170	84 140	138 224	103 172	134 223	90 181	94 156
Torque Coefficient(N.m/A)	1.64 2.65	1.58 2.5	1.34 2.26	2.25 3.6	1.69 2.7	2.2 3.5	1.45 2.9	1.5 2.4
Rotor Inertia(kg.m²)	$6.5x10^{-3}$	$7.0x10^{-3}$	$7.69x10^{-3}$	$9.64x10^{-3}$	$9.64x10^{-3}$	$12.25x10^{-3}$	$12.25x10^{-3}$	$16.72x10^{-3}$
Line- line Resistance(Ω)	0.7 1.47	0.4 1.23	0.24 0.71	0.48 1.37	0.28 0.796	0.31 0.93	0.14 0.62	0.104 0.273
Line- line Inductance(mH)	3.5 7.6	2.42 7.3	1.45 4	3.26 8.6	1.74 4.83	2.11 5.66	1.0 4	0.77 2.14
Electrical Time- constant(ms)	5 5.3	6 5.93	6 5.6	6.79 6.27	6.2 6	5.8 6.3	7.14 6.45	7.4 7.8
Weight(kg)	19.5	20.5	22.2	25.5	25.5	30.5	30.5	40
Encord Line Number(PPR)	2500ppr/17bit/23bit/rotational change							
Insulation Class	ClassF							
Safety Class	IP65							
Environment	TEMPERATURE:-20℃~+40℃ HUMIDITY BELOW90%RH NODEWING							
Motor Winding Plug	Motor Winding Leads / Receptacle Number: U 2 / V 3 / W 4 / PE 1							
Photoelectric Encoder Socket(15Pin)	Winding Leads / Receptacle Number: 5V 2, 0V 3, A+ 4, B+ 5, Z+ 6, A- 7, B- 8, Z- 9, U+ 10, V+ 11, W+ 12, U- 13, V- 14, W- 15, PE 1							
Absolute Encoder Socket(7Pin)	Winding Bow Wire / Receptacle Number: E- 2, E+ 3, SD- 4, 0V 5, SD+ 6, +5V 7, PE 1							

F180 series servo motor body length

Rated torque(N.m)	17.2	19	21.5	27	35	48
L without electric brake	226	232	243	262	292	348
L with electromagnetic brake	308	304	315	334	364	418

F200 AC servo motor

■ Outline drawing / unit: mm

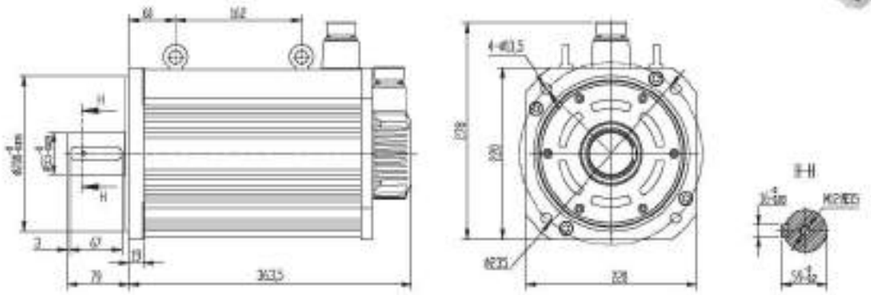


■ Technical parameter

MOTOR MODEL	F200-76C17CT -□□□	F200-11D17CT -□□□	F200-15D17C -□□□	F200-18D17CT -□□□	F200-23D17CT -□□□	F200-26D17C -□□□	F200-31D17CT -□□□	F200-35D17CT -□□□
Rated Power(kW)	7.6	11	15.3	18.7	23	26.5	31.5	35
Rated Speed(rpm)	1700	1700	1700	1700	1700	1700	1700	1700
Rated Torque(N.m)	43	62	86	105	129	149	177	196
Rated Voltage(V)	380	380	380	380	380	380	380	380
Rated Current(A)	15	22	30	37	45	54	57	70
Frequance(HZ)	113.3	113.3	113.3	113.3	113.3	113.3	113.3	113.3
Voltage Constant(V/1000r/min)	310/ 1700	306/1700	307/1700	295/1700	304/1700	298/1700	330/1700	315/1700
Torque Coefficient(N.m/A)	2.87	2.82	2.87	2.84	2.87	2.76	3.11	2.8
Rotor Inertia(kg.m²)	$5.8x10^{-3}$	$7.5x10^{-3}$	$9.8x10^{-3}$	$11.4x10^{-3}$	$13.1x10^{-3}$	$14.5x10^{-3}$	$15.9x10^{-3}$	$17.4x10^{-3}$
Line- line Resistance(Ω)	1.12	0.58	0.34	0.31	0.22	0.15	0.15	0.27
Line- line Inductance(mH)	12.1	7.9	5.1	4.8	3.9	2.8	2.5	2.2
L1(mm)	312	312	312	312	312	396	396	396
L2(mm)	344	380	416	452	488	524	560	596
Encord Line Number(PPR)	Absolute/rotation							
Insulation Class	ClassF							
Safety Class	Ip54							
Environment	TEMPERATURE:- 20℃~+40℃ HUMIDITY BELOW 90%RH NO DEWING							
Motor Winding Plue	Motor Winding Leads U V W PE							
Photoelectric Encoder Socket(15Pin)	Winding Leads / Receptacle Number: 5V 2, 0V 3, A+ 4, B+ 5, Z+ 6, A- 7, B- 8, Z- 9, U+ 10, V+ 11, W+ 12, U- 13, V- 14, W- 15, PE 1							
Absolute Encoder Socket(7Pin)	Winding Bow Wire / Receptacle Number: E- 2, E+ 3, SD- 4, 0V 5, SD+ 6, +5V 7, PE 1							

F220 AC servo motor

■ Outline drawing / unit: mm

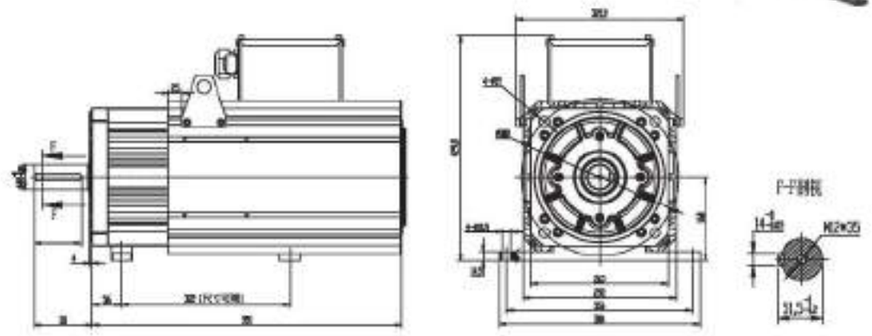


■ Technical parameter

MOTOR MODEL	F220-70C10CS-□□□	F220-15D15CS-□□□	FZ20-10D15CT-□□□	FZ20-15D15CT-□□□
Rated Power(kW)	7.0	15	10.5	15
Rated Voltage(V)	220	220	380	380
Rated Current(A)	31.3	67	28	38
Rated Speed(rpm)	1000	1500	1500	1500
Rated Torque(N.m)	67	95.5	67	95.5
Peak Torque(N.m)	150	240	150	240
Voltage Constant(V/1000r/min)	140	95	175	169
Torque Coefficient(N.m/A)	2.1	1.42	2.58	2.51
Rotor Inertia(kg.m²)	$177x10^{-4}$	$248x10^{-4}$	$177x10^{-4}$	$248x10^{-4}$
Line- line Resistance(Ω)	0.133	0.05	0.2	0.14
Line- line Inductance(mH)	3.8	1.2	5.81	3.79
Electrical Time- constant(ms)	28.5	24	29.05	27.09
Weight(kg)	50	73	50	73
Encord Line Number(PPR)	Absolute/rotation			
Insulation Class	ClassF			
Safety Class	IP65			
L without holding brake	124	151	179	191
L with permanent magnet holding brake	178	205	233	245
L with electromagnetic brake	164	191	291	231
Environment	TEMPERATURE:- 20℃~+40℃ HUMIDITY BELOW 90%RH NO DEWING			
Motor Winding Plue	Motor Winding Leads / Receptacle Number: U 2, V 3, W 4, PE 1			
Photoelectric Encoder Socket(18Pin)	Winding Leads / Receptacle Number: 5V 2, 0V 3, A+ 4, B+ 5, Z+ 6, A- 7, B- 8, Z- 9, U+ 10, V+ 11, W+ 12, U- 13, V- 14, W- 15, PE 1			
Absolute Encoder Socket(7Pin)	Winding Bow Wire / Receptacle Number: E- 2, E+ 3, SD- 4, 0V 5, SD+ 6, +5V 7, PE 1			

F263 AC servo motor

■ Outline drawing / unit: mm



■ Technical parameter

MOTOR MODEL	F263-23D17CT-□□□	F263-31D17CT-□□□	F263-37D17CT-□□□	F263-45D17CT-□□□	F263-57D17CT-□□□
Rated Power(kW)	23.5	31	37	45.4	57.6
Rated Speed(rpm)	1700	1700	1700	1700	1700
Rated Torque(N.m)	132	175	208	255	325
Rated Voltage(V)	380	380	380	380	380
Rated Current(A)	45.4	64	74	87	116
Frequence(HZ)	113.3	113.3	113.3	113.3	113.3
Voltage Constant(V/1000r/min)	316/1700	310/1700	305/1700	328/1700	306/1700
Torque Coefficient(N.m/A)	2.91	2.73	2.81	2.93	2.8
Rotor Inertia(kg.m²)	28x10⁻⁴	35x10⁻⁴	42x10⁻⁴	50x10⁻⁴	58x10⁻⁴
Line- line Realatance(Ω)	0.13	0.15	0.11	0.05	0.041
Line- line Inductance(mH)	2.17	6.51	3.21	1.18	1.02
L1(mm)	322	322	322	322	322
L2(mm)	470	510	550	590	630
Encord Line Number(PPR)	Absolute/rotation				
Insulation Class	ClassF				
Safety Class	Ip54				
Environment	TEMPERATURE:- 20℃~+40℃ HUMIDITY BELOW 90%RH NO DEWING				
Motor Winding Plue	Motor Winding Leads Receptacle Number	U	V	W	PE
Photoelectric Encoder Socket(15Pin)	Winding Leads Receptacle Number	5V 0V A+ B+ Z+ A- B- Z- U+ V+ W+ U- V- W- PE 2 3 4 5 6 7 8 9 10 11 12 13 14 15 1			
Absolute Encoder Socket(7Pin)	Winding Bow Wire Receptacle Number	E- E+ SD- 0V SD+ +5V PE 2 3 4 5 6 7 1			

Explosion proof servo motor

■ Accurate, compact, safe and energy-saving

The FB series are gas zone 1 and dust zone 21 explosion-proof servo motors. The FB series explosion-proof servo motors are suitable for all ground explosion-proof scenarios and are widely used in oil and gas, medicine, spraying, printing and other industries. All R&D, design and manufacturing are carried out in strict accordance with explosion-proof standards to protect the application of system integrators and equipment manufacturers in explosion-proof environments.

The FB series not only has explosion-proof certification, but also has compact dimensions, high power density, rich speed and torque options, and low current design to reduce system costs, helping to create safe, reliable, efficient and energy-saving excellent equipment.

■ Technical highlights

FB series explosion-proof servo motors have a new explosion-proof design with multiple winding types and feedback options. Zone 1 explosion-proof, for applications that require higher explosion-proof certification, adopts an explosion-proof design to ensure that in gas and dust explosion-proof scenarios, the motor housing withstands internal explosions without damage, ensuring equipment safety.

—
High torque density and high power density, smaller size and lighter weight.

—
High torque density and high power density, smaller size and lighter weight.

—
Low cogging torque and low torque fluctuation, excellent low-speed performance and system control performance, high dynamic response, precise dynamic balance.

—
Excellent overload capacity, three times electrical overload output, four times mechanical overload capacity.

—
Optional brake, optional encoder, prefabricated cable kit, or optional standard cable connector.

—
The overall epoxy potting process of the stator makes the structure more compact and the heat dissipation more efficient.

—
High-precision machining process, more precise flange and shaft matching, ensure lower noise and lower vibration.

—
The stator has a variety of winding types to achieve different speed torques. Double-layer winding process, the neutral point connection in the housing is completely insulated to ensure safety.

Radiation Resistant-High and Low Temperature-Vacuum Servo/Brushless Motor

Main features

- Complete product range: DC24V~AC380V can be selected, the stall torque ranges from 0.18Nm-82Nm, and can be expanded to 250Nm if necessary
- Maximum speed can reach 30000RPM
- Low rotor inertia ensures high dynamic response, and the peak torque is 3 times the stall torque
- Standard protection level is IP65
- Built-in temperature sensor, providing real-time temperature detection signal
- Motor operating temperature range -40°C~150°C
- Shock resistance can reach more than 15G
- Can be expanded to operate under nuclear radiation conditions (105Gray)
- Can be expanded to operate in a vacuum environment (10-7Pa)

Radiation resistance-high and low temperature-vacuum servo/brushless motor performance parameters

Voltage options 24V, 48V, 72V, 96V, 220V, 380V (The voltage does not affect the motor performance, but only the rated current)

Motor Model	Rated power (KW)	Rated speed (rpm)	Maximum speed (rpm)	Rated torque (N.m)	Peak torque (N.m)	Rotor inertia (kg.cm²)	L(mm) standard type	L(mm) Holding brake type
			FS40					
FS40-01630-□□-□ (B)	0.05	3000	3600	0.16	0.32	0.033	85	107
FS40-03230-□□-□ (B)	0.1	3000	3600	0.32	0.64	0.066	101	123
			FS60					
FS60-00630-□□-□ (B)	0.2	3000	3600	0.6	1.2	0.3	141	141
FS60-01330-□□-□ (B)	0.4	3000	3600	1.3	2.6	0.58	161	161
FS60-02030-□□-□ (B)	0.6	3000	3600	2	4	0.85	186	186
			FS90					
FS90-01330-□□-□ (B)	0.4	3000	3600	1.3	3.9	1.3	140	165
FS90-02430-□□-□ (B)	0.75	3000	3600	2.4	7.2	1.8	160	185
FS90-03330-□□-□ (B)	1	3000	3600	3.3	9.6	2.3	175	200
			FS110					
FS110-04030-□□-□ (B)	1.2	3000	3600	4	12	4.9	172	192
FS110-06030-□□-□ (B)	1.8	3000	3600	6	18	7.8	192	212
FS110-08030-□□-□ (B)	2.5	3000	3600	8	24	9.6	212	232

Note: The motor interface, voltage, and speed can be customized according to customer requirements

SV830 Standard AC Servo Drive System

EtherCAT. | RS485
CANopen | pulse instruction

Servo Drive Naming Rules

SV830 — Product Series: SV830, Standard AC Servo Drives

P — Product Type: P: RS485+Impulse; E: EhterCAT bus; C: CANopen bus

S100 — rated power: S: AC220V / T: AC 380; D: Single phase AC 220V / 3-phase AC 220V
100: 100W; 750: 750W; 2300: 2.3KW;
200: 200W; 1000: 1KW; 3000: 3KW;
400: 400W; 1500: 1.5KW; 4500:4.5KW;

AC servo driver function configuration relationship table

√ Yes — No

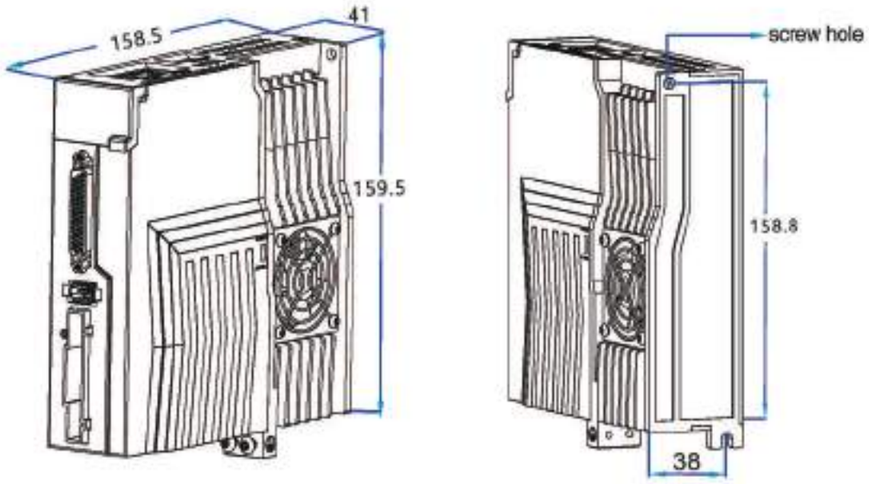
Series	Product Type	Drive Model	Communication Method	Pulse Input	Digital	Analogue	Frequency division output
SV830 Series	Pulse full-function model	SV830P***	RS485+RS232	√	9CH DI+5CH DO	2CH AI	√
	EC bus standard type	SV830E***	EtherCAT	-	5CH DI+4CH DO	-	-
	CAN bus standard	SV830C***	CANopen	-	9CH DI+5CH DO	-	√

SV830 Series Specifications

Electrical specifications for single-phase / three-phase 220V rated servo drives

Drive Model		SV830□ S100	SV830□ S400	SV830□ S750	SV830□ S1000	SV830□ D1000	SV830□ D1500	SV830□ D2000	SV830□ D3000
Rated output power		100W	400W	750W	1000W	1000W	1500W	2000W	3000W
Rated output current (Arms)		1.2	3.5	5.5	7	3.5	5.4	8.4	11.9
Maximum output current (Arms)		4.8	9.5	16.6	21	10.6	14	24.8	33.2
Main circuit power input		Single phase AC 200V~240V, -10%~+10%, 50/60Hz				Single phase / Three-phase AC 200V~240V, -10%~+10%, 50/60Hz			
Regeneration resistor	Resistor value (Ω)	40	40	40	40	30	30	30	30
	Resistor power (W)	50	50	50	50	60	60	60	60
	Minimum allowable resistance value of external resistor (Ω)	30	30	30	30	30	30	30	30
	Resistor power (W)	20	80	150	200	200	300	400	600
Cooling method		Autocooling				Fan Cooling			
Size H*L*W(mm)		158.5*41*159.5				168.5*51*191.3			

SV830 Drive Dimensional Drawing



SV830P General specifications for servo drives

脉冲指令 | ePLC RS485

Interface Configuration	
Debug Port	RJ45 interface, support 485 communication, based on ModBus communication protocol
Low-speed pulse input	Differential inputs: up to 500kHz open collector; up to 200kHz
High-speed pulse input	None
Frequency division output	Supports A-phase/B-phase/Z-phase Differential frequency division outputs
Analog input	2 analog inputs (voltage type)
Digital input	9 points (support common negative and common positive) DI1~DI9, common negative and common positive can not be mixed)
Digital output	5 points (5-point double-ended output DO1~DO5)
Control Mode	• External pulse position control • Speed control • Torque control • JOG control • Hybrid control: position torque/position speed/speed torque mode • PR control
Encoder feedback mode	17-bit, 23-bit multi-turn absolute encoder (can be used as incremental encoder without battery), 2500-wire incremental type
Applicable load inertia	Less than 3 times the motor inertia
Input signal	
Basic model	DI Points: 9 points (supports 2 types of co-yin and co-yang) Assignable input signals: servo enable, fault and warning reset (along the effective function), gain switching, main and auxiliary operation command switching, multi-segment speed DI switching operation direction setting, multi-segment operation command switching 1~4, mode switching 1~2, zero fix enable, position command disable, forward overtravel switch, reverse overtravel switch, positive and negative external torque limitation, positive and negative direction pointing, stepping amount enable, handwheel Multiplier signal 1~2, handwheel enable signal, electronic gear selection, torque, speed and position command direction setting, multi-segment position command enable, interrupt length release, home switch, home return enable, interrupt length disable, emergency stop, clear position deviation, internal speed limit source, pulse command disable
Output signal	
Basic model	Do points: 5 points (double output) Assignable output signals: servo ready, motor rotation output, zero speed, speed consistent, positioning complete, positioning close, torque speed limit, holding brake output, warning output, fault output, output 3-digit alarm code, interruption of fixed length complete, home return to zero output, electrical return to zero output, torque arrival output, speed arrival output, angle recognition output, DB brake output, internal command output.

SV830E General specifications for servo drives

EtherCAT

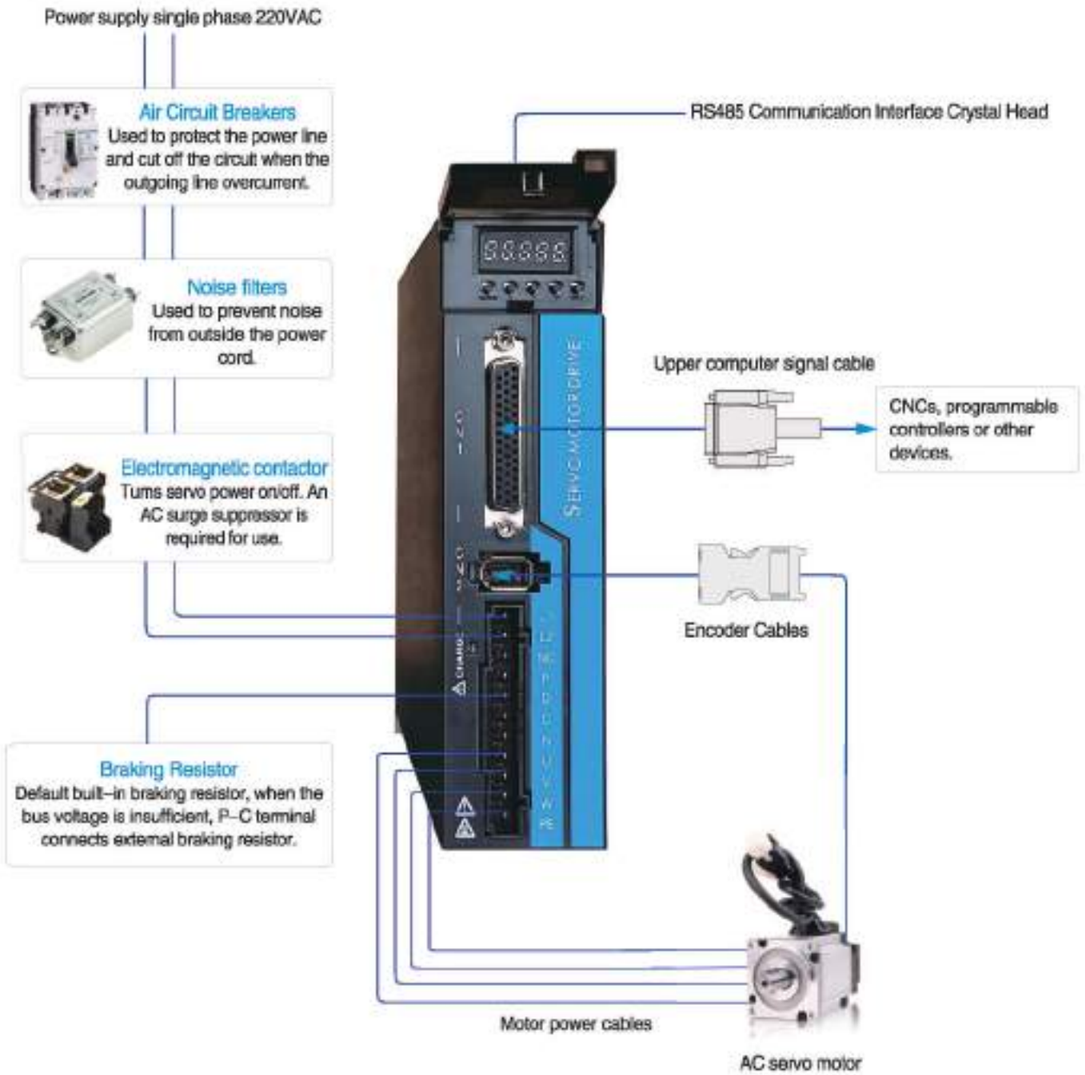
Interface Configuration	
Debug Ports	CN1 connection, 232 communication
Digital Inputs	5 points (support common negative and common positive) DI1~DI5
Digital output	4 points (5-point double output DO1 to DO4)
Communication	EtherCAT support: Real-time operation commands can be transmitted, parameters can be set, and status can be monitored.
Control mode	PP: Protocol position mode • CSP: Cyclic synchronized position mode PV: Protocol speed mode • CSV: Cyclic synchronous speed mode PT: Protocol torque mode • CST: Cyclic synchronous torque mode • HM: Home mode
Encoder feedback method	17-bit, 23-bit multi-turn absolute encoder (can be used as incremental encoder without battery), 2500-wire incremental type
Applicable load inertia	Less than 3 times the motor inertia
Input signal	
Basic model	Di Points: 5 points (supports 2 types of co-yin and co-yang) Assignable input signals: Assignable input signals: servo enable, fault and warning reset (along valid function), gain switching, zero fix enable,Position command inhibit, forward overtravel switch, reverse overtravel switch, positive and negative external torque limit, positive and negative pointing, torque & speed & position command direction setting, home switch, emergency stop, clear position deviation, internal speed limit source, probe 1 & 2
Output signal	
Basic model	Do points: 4 points (double output) Assignable output signals: servo ready, motor rotation output, zero speed, speed consistent, positioning complete, torque speed limit, holding brake output,Warning output, fault output, 3-digit alarm code output, torque arrival output, speed arrival output, angle recognition output.

SV830C General specifications for servo drives

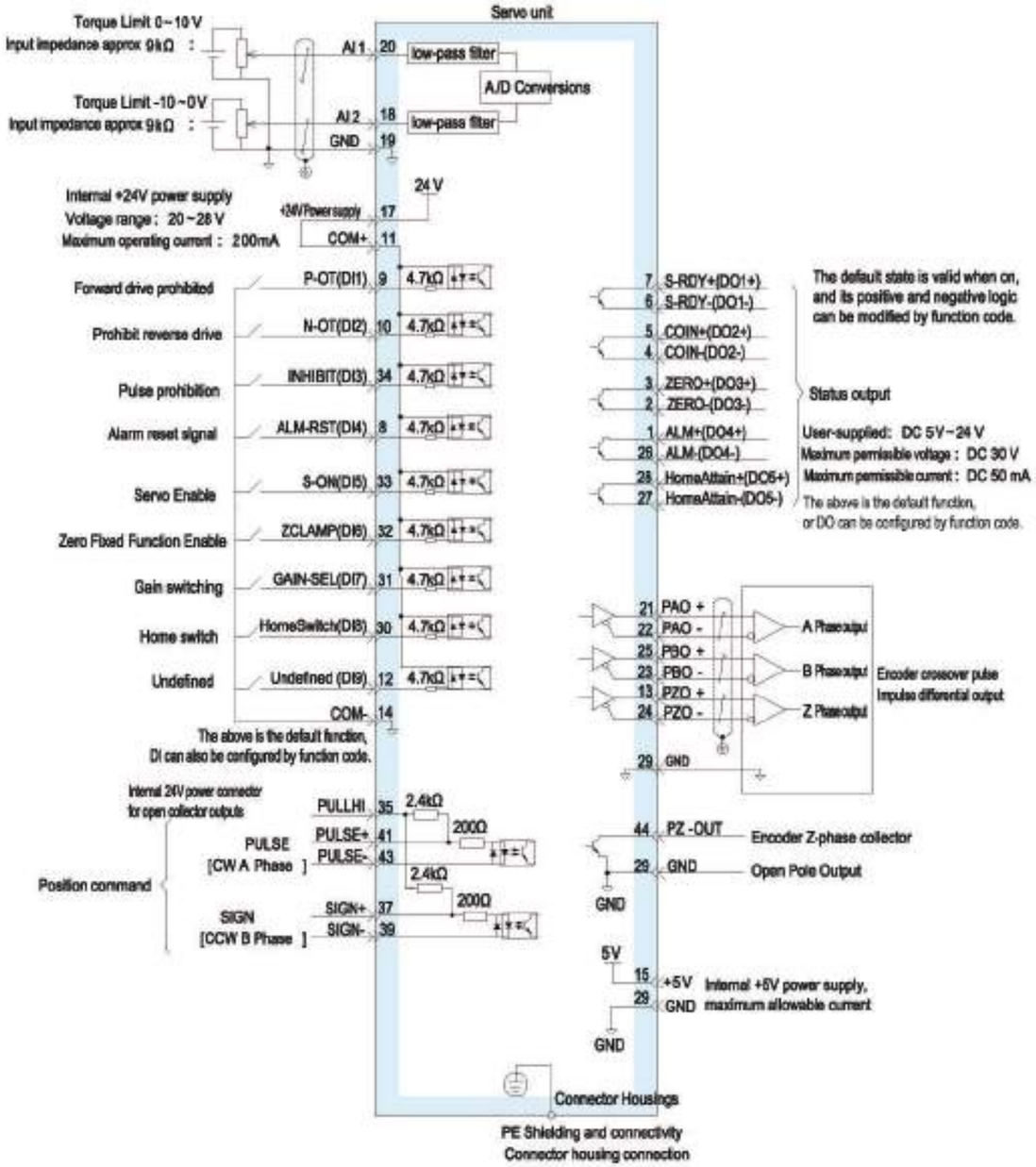
CANopen

Interface Configuration	
Debug Port	RJ45 interface, support 485 communication, based on ModBus communication protocol
Crossover Output	Support A-phase/B-phase/Z-phase Differential Frequency Division Outputs
Digital Inputs	9 points (support common negative and common positive) DI1~DI9
Digital output	5 points (5 points double-ended output DO1~DO5)
Communication	RJ45 interface, support CANopen bus communication; support RS232 communication (CN4)
Control mode	• External pulse position control • Speed control • Torque control • Hybrid control: position torque/position speed/velocity power mode • CANopen mode
Encoder feedback method	17-bit, 23-bit multi-turn absolute encoder (can be used as incremental encoder without battery), 2500-wire incremental type
Applicable load inertia	Less than 3 times the motor inertia
Input signal	
Basic model	DI Points: 9 points (supports 2 ways of co-yin and co-yang) Assignable Input Signals: Servo Enable, Fault and Warning Reset (Along Function), Gain Switching, Main and Auxiliary Operation Command Switching, Multi-Segment Speed DI Switching Direction Setting, Multi-Segment Operation Command Switching 1~4, Mode Switching 1~2, Zero Fixed Enable, Position Command Inhibit, Positive Overtravel Switch, Reverse Overtravel Switch, Positive and Negative Torque Limit, Positive and Negative Toggle, Stepping Amount Enable, Hand Wheel Multiplier signal 1~2, handwheel enable signal, electronic gear selection, torque, speed and position command direction setting, multi-segment position command enable, interrupt length release, home switch, home return enable, interrupt length disable, emergency stop, clear position deviation, internal speed limit source, pulse command disable.
Output signal	
Basic model	Do points: 5 points (double output) Assignable output signals: servo ready, motor rotation output, zero speed, speed consistent, positioning complete, positioning close, torque speed limit, holding brake output, warning output, fault output, output 3-digit alarm code, interruption of fixed length complete, home return to zero output, electrical return to zero output, torque arrival output, speed arrival output, angle recognition output, DB brake output, internal command output.

SV830 Series, Single Phase 220V Wiring Diagrams



Position Mode Wiring Diagram



∫ Indicates a twisted pair

Stake:
- Signal cables and power cables must be routed separately and spaced at least 30cm apart;
- When the signal cable is not long enough to continue the cable, be sure to connect the shield reliably to ensure reliable shielding and grounding;
- +5V is referenced to GND and +24V is referenced to COM-. Do not exceed the maximum allowable current or the driver will not work properly.

SV860 Performance
AC Servo Drive System

EtherCAT. PLC RS485 PROFINET
CANopen 脉冲指令

AC Servo Drive Function Configuration Relationship Table

√ support — Not supported at this time

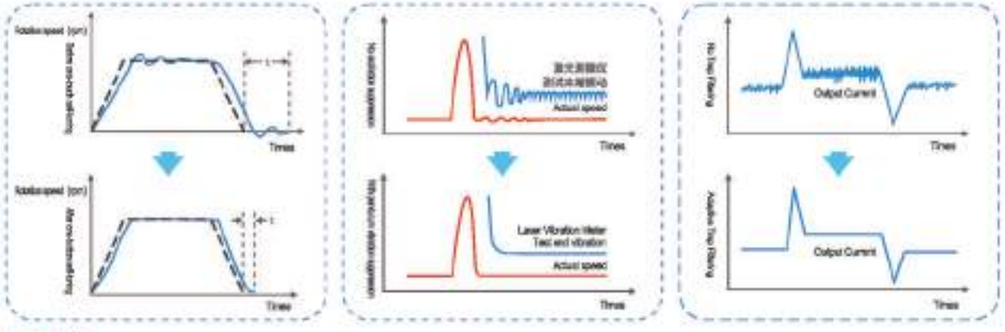
Series	Product Type	Drive Model	Communication method	Pulse Input	Digital quantity	Analog	Crossover output
SV860	Pulse Standard	SV860P***	RS485	√	7CH DI+5CH DO	2-way AI	√
	EC Bus Standard	SV860E***	EtherCAT	-	7CH DI+5CH DO	2-way AI	√
	CAN bus standard type	SV860C***	CANopen	-	9CH DI+5CH DO	-	√
	PN bus type	SV860N***	Profinet	-	5CH DI+3CH DO	-	√

• PROFINET Support

SV860 servo drive supports PROFINET bus communication, which can be perfectly adapted with Siemens PLC that supports PROFINET communication, supports 1/3/111/102/105 telegrams and Siemens 750 auxiliary telegrams, support RT real-time communication and IRT and other real-time communication.

• Advanced servo control algorithms

High-performance "one-key self-tuning" function can simplify the gain debugging process, automatic parameter gain adjustment after planning the trip, shortening the tuning time.
Pendulum vibration suppression during stopping, suppressing low-frequency vibration below 200Hz, realizing high beat operation of flexible system.
Adaptive Trap Filter, providing 3 sets of Notch Filter, manual/automatic filtering, eliminating resonance.



Servo Drive Naming Rules

SV860 — Product Series
SV860
Performance AC Servo Drives

P — Product Type
P: RS485+Pulse
E: EhterCAT bus
C: CANopen bus
N: Profinet bus

S100 — Rated power
S: AC220V / T: AC380
D: Single phase AC220V / 3–Phase AC220V
100: 100W; 750: 750W; 2300: 2.3KW;
200: 200W; 1000: 1KW; 3000: 3KW;
400: 400W; 1500: 1.5KW; 4500:4.5KW;

SV860 Series Specifications

Electrical specifications for single–phase 220V rated servo drives

Drive Model		SV860□-S100	SV860□-S400	SV860□-S750	SV860□-S1000	SV860□-S2300	SV860□-S3000
Rated Output Power		100W	400W	750W	1000W	2300W	3000W
Rated Output Current (Arms)		1.6	2.8	5.5	7	7.6	11.6
Maximum Output Current (Arms)		5.8	10.1	16.9	21	23	32
Main circuit power input		Single phase AC 200V~240V, -10%~+10%, 50/60Hz					
Regenerative resistor	Resistor Resistance Value (Ω)	/	/	50	50	25	
	Resistor Power (W)	/	/	50	50	80	
	Minimum permissible resistance value of external resistor (Ω)	40	45	40	20	20	15
	Capacitor can absorb the maximum braking energy (J)	9.3	26.29	22.41	26.7	26.7	26.7
Cooling method		Autocooling		Fan Cooling			
Sizes H*L*W(mm)		170*40*150		170*50*173		170*55*173	170*80*183

Electrical specifications for three–phase 380V rated servo drives

Drive Model		SV860□ T850	SV860□ T1500	SV860□ T2300	SV860□ T3000	SV860□ T4500	SV860□ T5500	SV860□ T7500	SV860□ T11000	SV860□ T15000
Rated Output Power		850W	1500W	2300W	3000W	4500W	5500W	7500W	11KW	15KW
Rated Output Current (Arms)		5.3	3.5	5.4	8.4	11.9	17.8	21	32	36
Maximum Output Current (Arms)		15.9	10.5	16.2	21	29.75	44.5	52.5	64	72
Main circuit power input		Three-phase 380VAC~420VAC, -10%~+10%, 50Hz/60Hz								
Regenerative resistor	Resistor Resistance Value (Ω)	50	50	50	36	36	36	36	/	/
	Resistor Power (W)	80	80	80	80	80	100	100	/	/
	Minimum permissible resistance value of external resistor (Ω)	50	50	50	30	30	30	30	20	20
	Capacitor can absorb the maximum braking energy (J)	34.28	34.28	34.28	50.41	50.41	70.5	70.5	200	200
Cooling method		Fan Cooling								
Sizes H*L*W(mm)		170*55*173		170*80*183		250*90*230		192*304*208		

SV860P General specifications for servo drives

脉冲指令 ePLC RS485

	Interface Configuration
Debug Port	RJ45 interface, supports 485 communication, based on ModBus communication protocol
Low-speed pulse input	Differential input: up to 500kHz open collector; up to 200kHz
Frequency division output	Supports A-phase/B-phase/Z-phase differential frequency outputs
Analog input	2 analog inputs (voltage type)
Digital input	7 points (support common negative and common positive) DI1~DI7
Digital output	5 points (5-point double-ended output DO1~DO5)
Control mode	• External pulse position control • Speed control • Torque control • JOG control • Hybrid control: position torque/position speed/velocity torque mode • PR control 17-bit, 23-bit multi-turn absolute encoder (can be used as an incremental encoder without battery connection)
Encoder feedback method	Less than 3 times the motor inertia
Applicable load inertia	
	Input signal
Basic model	DI Points: 7 points (supports 2 ways of co-yin and co-yang) Assignable input signals: Positive/negative logic change: Servo-ON (/SV-ON), P-action (/P-CON), alarm reset (/ALM-RST) Prohibition of forward-side drive (P-0T), Prohibition of reverse-side drive (N-0T), Positive-side torque limitation (/P-CL), Reverse-side torque limitation (/N-CL), Internal speed switching (/SPD-D, /SPD-A, /SPD-B), Control mode switching (/C-SEL), Zero position fixing (/ZCLAMP), Control mode switching (/C-SEL), Zero position fixing (/ZCLAMP). , /SPD-A, /SPD-B), control mode switching (/C-SEL), zero position fixing (/ZCLAMP), command pulse inhibit (/INHIBIT), gain switching (/G-SEL).
	Output signal
Basic model	Do points: 5 points (double output) Assignable output signals: Positioning completion (/COIN), velocity-caused detection (/V-CMP), servo motor rotation detection (/TGON), servo ready (/S-RDY), torque limit detection (/CLT), velocity limit detection (/VLT), brake interlock (BK) warning (/XARN), proximity (/NEAR).

SV860E Servo Drive General Specifications

EtherCAT.

	Interface Configuration
Debug Port	RJ45 interface, support 485 communication, based on ModBus communication protocol
Crossover Output	Support A-phase/B-phase/Z-phase Differential Frequency Division Outputs
Analog Input	2 analog inputs (voltage type)
Digital Inputs	7 points (support common negative and common positive) DI1~DI7
Digital output	5 points (5-point double-ended output DO1~DO5)
control mode	• PP: Protocol position mode • CSP: Cyclic synchronized position mode • PV: Protocol velocity mode • CSV: Cyclic synchronized velocity mode • PT: Protocol torque mode • CST: Cyclic synchronous torque mode • HM: Home mode
Encoder feedback method	17-bit and 23-bit multi-turn absolute encoders (can be used as incremental encoders without battery connection)
Applicable load inertia	Less than 3 times the motor inertia
	Input signal
Basic model	Di Points: 7 points (supports 2 ways of co-yin and co-yang) Assignable input signals: Positive/negative logic change: Servo-ON (/SV-ON), P-action (/P-CON), alarm reset (/ALM-RST) Prohibition of forward-side drive (P-0T), Prohibition of reverse-side drive (N-0T), Positive-side torque limitation (/P-CL), Reverse-side torque limitation (/N-CL), Internal speed switching (/SPD-D, /SPD-A, /SPD-B), Control mode switching (/C-SEL), Zero position fixing (/ZCLAMP), Control mode switching (/C-SEL), Zero position fixing (/ZCLAMP) (/SPD-D, /SPD-A, /SPD-B), control mode switching (/C-SEL), zero position fixing (/ZCLAMP), command pulse inhibit (/INHIBIT), gain switching (/G-SEL).
	Output signal
Basic model	Do points: 5 points (double output) Assignable output signals: Positioning completion (/COIN), velocity-caused detection (/V-CMP), servo motor rotation detection (/TGON), servo ready (/S-RDY), torque limit detection (/CLT), velocity limit detection (/VLT), brake interlock (BK) warning (/XARN), proximity (/NEAR).

SV860C Servo Drive General Specifications

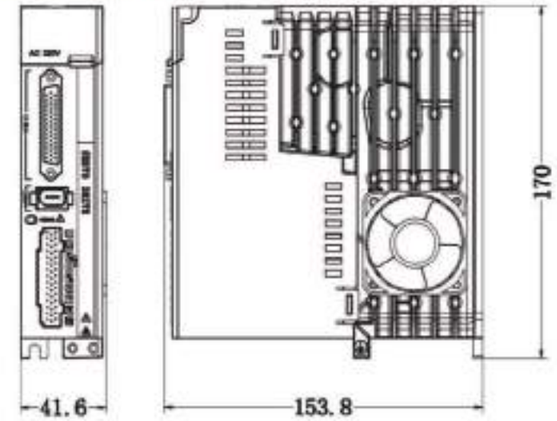
CANopen

	Interface Configuration
Debug Port	RJ45 interface, support 485 communication, based on ModBus communication protocol
Crossover Output	Support A-phase/B-phase/Z-phase Differential Frequency Division Outputs
Digital Inputs	9 points (support common negative and common positive) DI1~DI9
Digital output	5 points (5 points double-ended output DO1~DO5)
Communication	RJ45 interface, support CANopen bus communication; support RS232 communication (CN4)
Control mode	• External pulse position control • Speed control • Torque control • Hybrid control: position torque/position speed/speed torque mode • CANopen mode
	Control Features & Functions
Control method	IGBT SVPWM sine wave control
Encoder feedback method	17-bit, 23-bit multi-turn absolute encoder (can be used as incremental encoder without battery), 2500-wire incremental encoder (can be used as incremental encoder without battery)
Normalized servo parameters	Servo parameter adjustment can be realized quickly using PC debugging tools and parameters such as rigidity.
Trap Filter	Supports four sets of traps, 50Hz~4000Hz, to suppress mechanical resonance.
Oscillation suppression	Suppresses end vibration
DI/DO settings	Digital input/output can be assigned automatically.
Probe function	Locking of position information in the event of a change in the external DI signal or motor Z signal.
Alarm function	External pulse "overvoltage, undervoltage, overcurrent, overload, overheat, overspeed, main power supply input phase loss, abnormal regenerative braking status, • Control of "excessive position deviation, encoder feedback error, excessive braking rate, travel overrun, EEPROM error, etc.". • Speed control • Torque control • Hybrid control: position torque/position speed/velocity torque mode • CANopen mode
Operation and Display	Pushbutton 5, LED 5-digit with dot
Debugging software	"The debugging software allows you to adjust the parameters of the current, position, and speed loops, change the effective level of the input and output signals and motor parameters, and import and export parameters in file format, making it easy to match the drive to different motors or loads; and monitor the waveforms of speed and position errors under trapezoidal waveform test operation."
Applicable load inertia	Less than 3 times the motor inertia
	Input signal
Basic model	Di points: 9 points (supports 2 ways of common Yin and common Yang) Assignable input signals: servo enable, fault and warning reset (along the effective function), gain switching, main and auxiliary operation command switching, multi-segment speed DI switching operation direction setting, multi-segment operation command switching 1~4, mode switching 1~2, zero fix enable, position command disable, forward over-travel switch, reverse over-travel switch, positive and negative external torque limiting, positive and negative direction pointing, stepping amount enable, handwheel Multiplier signal 1~2, handwheel enable signal, electronic gear selection, torque, speed and position command direction setting, multi-segment position command enable, interrupt length release, home switch, home return enable, interrupt length disable, emergency stop, clear position deviation, internal speed limit source, pulse command disable
	Output signal
Basic model	Do points: 5 points (double output) Assignable output signals: servo ready, motor rotation output, zero speed, speed consistent, positioning complete, positioning close, torque speed limit, holding brake output, warning output, fault output, output 3-digit alarm code, Interruption of fixed length complete, home return to zero output, electrical return to zero output, torque arrival output, speed arrival output, angle recognition output, DB brake output, internal command output,
	Environments in which the drive is used
Temperature	"Use Temperature: 0℃~45℃ (Please reduce the use level if the ambient temperature is higher than 45℃.) Storage temperature: 0℃~70℃ (no condensation) Do not store over 65℃ for more than 72 hours"
Humidity	Below 90%RH (no condensation)
Elevation	Maximum altitude up to 2000m; no derating for use below 1000m above sea level, 1% for every 100m above 1000m, please contact us for more than 2000m
Vibration	Less than 0.5g (4.9m/s) 10-60Hz (non-continuous operation)

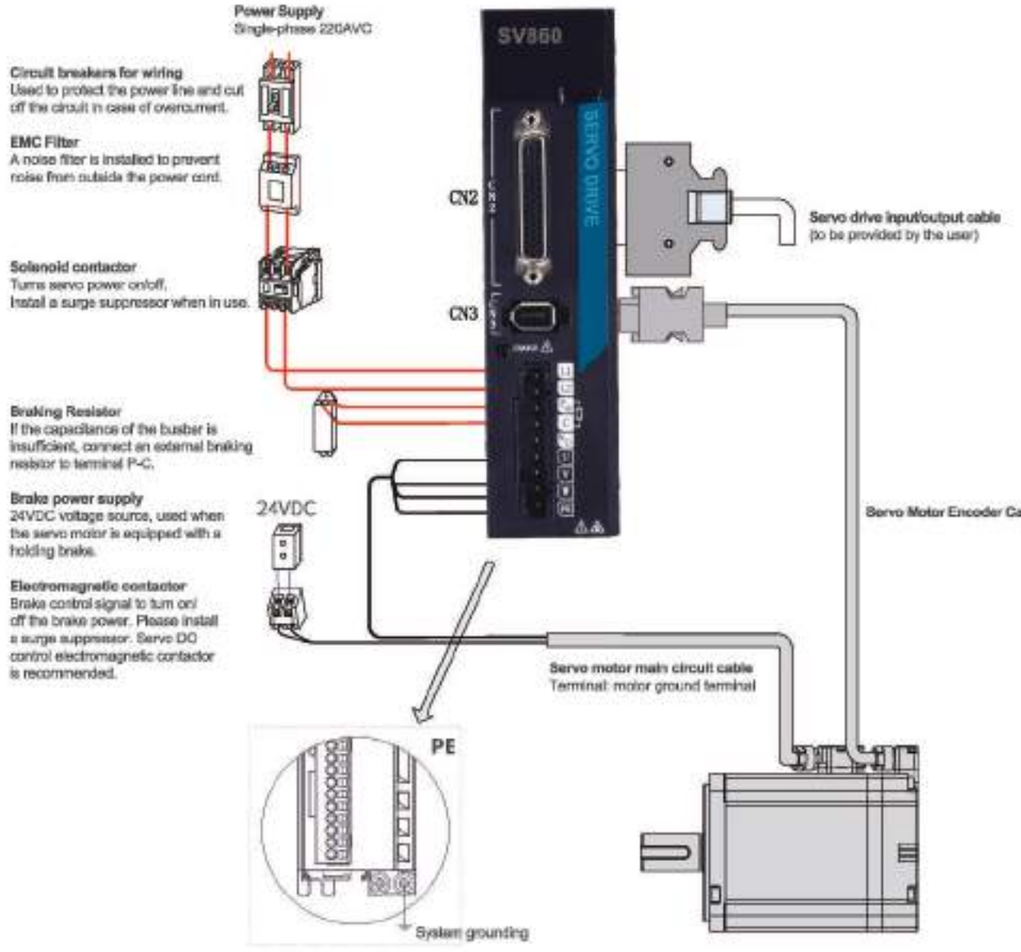
SV860N Servo Drive General Specifications

Interface Configuration	
Debug Port	Type-C debug port
Crossover Output	Support A-phase/B-phase/Z-phase Differential Frequency Division Outputs
Digital Inputs	5 points (support common negative and common positive) DI1~DI5
Digital output	3 points (5 points double-ended output DO1~DO3)
Communication mode	RJ45 interface, support CANopen bus communication; support RS232 communication (CN4)
Control mode	Profinet bus mode
RT/IRT communication	Be in favor of
Master telegram support	1/3/111/102/105
Torque Limit	Parameter setting (or torque limitation via auxiliary message 750)
	Control Features & Functions
Control method	IGBT SVPWM sine wave control
Encoder feedback method	17-bit and 23-bit multi-turn absolute encoders
Normalized servo parameters	Quick servo parameter adjustment using PC debugging tools and parameters such as rigidity.
Trap Filter	Suppresses mechanical resonance and supports four traps, 50Hz~4000Hz.
Oscillation suppression	Suppresses end vibration
DI/DO setting	Self-assignable digital input/output.
Self-contained holding brake output port	Dedicated interface for holding brake output eliminates the need for external relays and power supplies.
Alarm function	Overvoltage, undervoltage, overcurrent, overload, overheat, overspeed, phase loss in the main power input, abnormal braking status, excessive position deviation, encoder feedback error, excessive braking rate, travel overrun, EEPROM error, etc.
Operation and Display	Pushbutton 5, LED 5-digit with dot
Debugging software	The debugging software allows you to adjust the parameters of the current, position, and speed loops, change the effective levels of the input and output signals, and change the motor parameters, and import and export parameters in file format, making it easy to match the drive with different motors or loads; and to monitor the waveforms of the speed and position errors under the trapezoidal waveform test.
STO/Second Encoder	Supports
Dynamic braking	Built-in dynamic braking, often used for emergency stops in case of faults or sudden power failures
Applicable load inertia	Less than 3 times the motor inertia
	Input signal
Basic model	Di Points: 5 points (supports 2 types of co-yin and co-yang) Assignable input signals: Servo ON (/SV-ON), P action (/P-CON), alarm reset (/ALM-RST), prohibition of forward side drive (P-OT), prohibition of reverse side drive (N-OT)
	Output signal
Basic model	Do points: 3 points (double output) Positioning completion (/COIN), velocity-compensation check (/V-CMP), servo motor rotation check (/TGON), servo ready (/S-RDY), torque limit check (/CLT), velocity limit check (/VLT), warning (/XARN).
	Environments in which the drive is used
Temperature	Use temperature: 0℃~45℃ (ambient temperature greater than 45℃, please reduce the amount of use) Storage temperature: 0℃~70℃ (no condensation) over 65℃ storage time please do not exceed 72 hours
Humidity	Below 90%RH (no condensation)
Elevation	Altitude up to 2000m; no derating required for use below 1000m above sea level, 1% derating for every 100m above 1000m, contact factory for use above 2000m
Vibration	Less than 0.5g (4.9m/s) 10-60Hz (non-continuous operation)

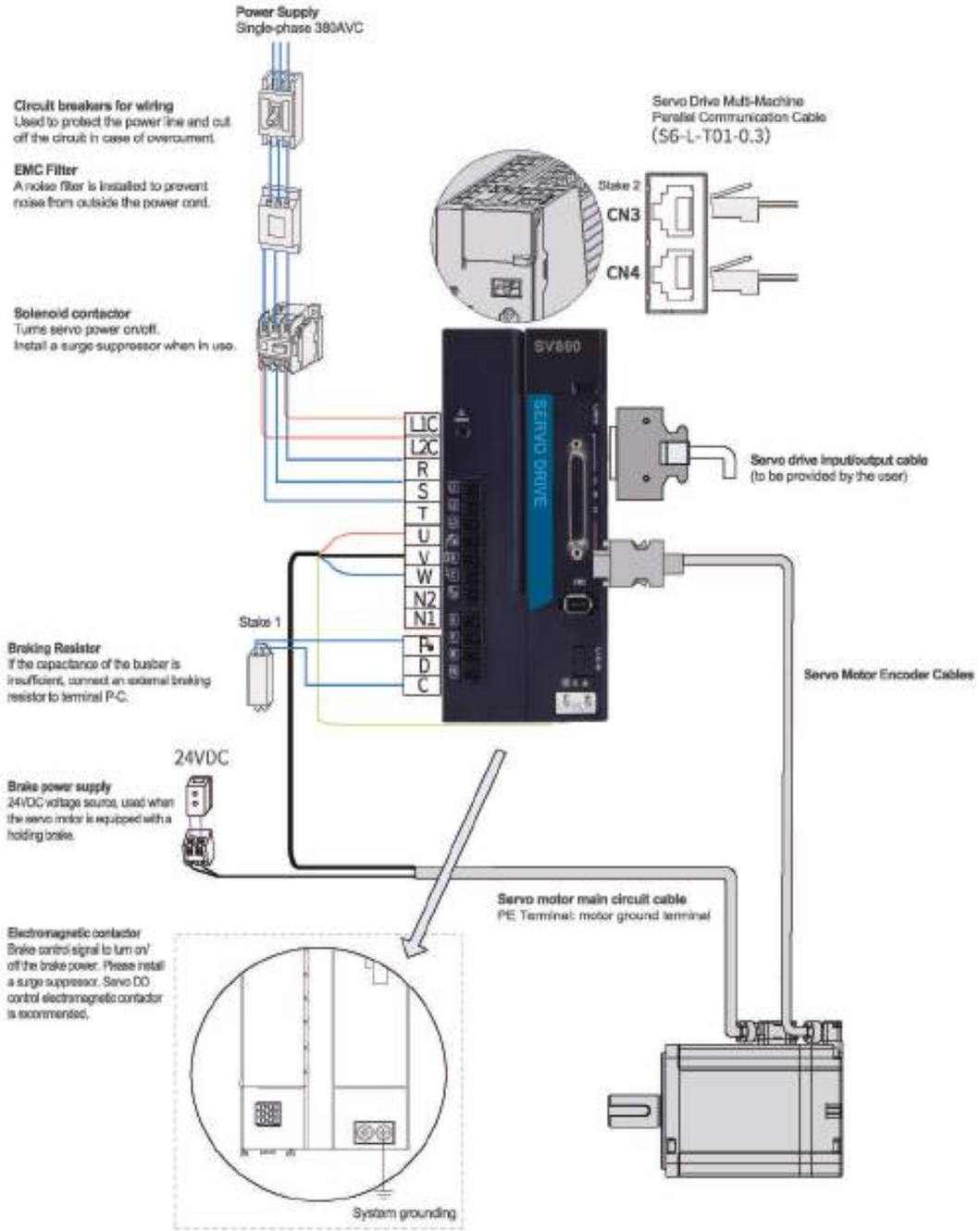
SV860 Drive Dimension Drawing



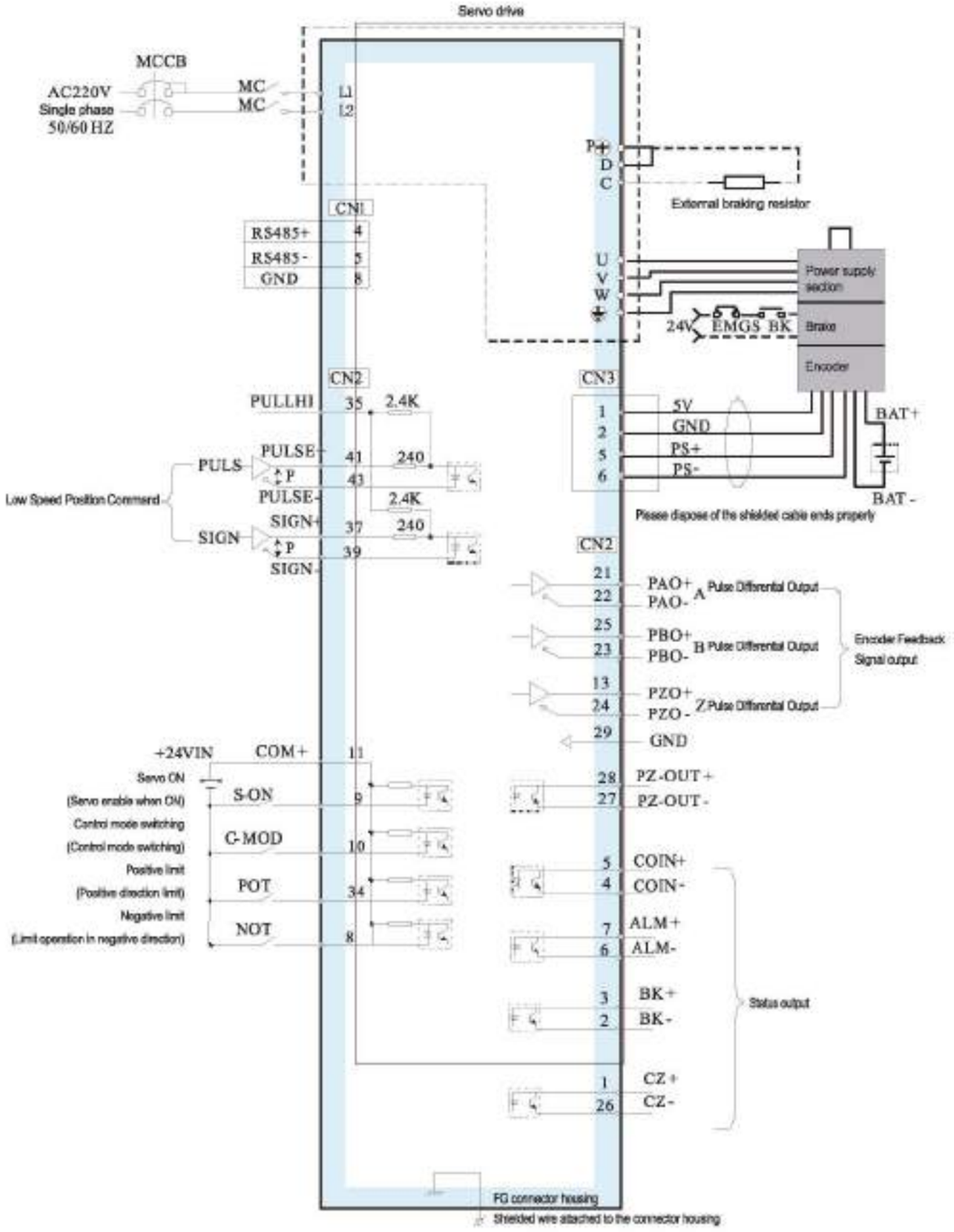
SV860 Series Single Phase 220V Wiring Diagram



SV860 series single-phase 380V wiring diagram



Connection diagram for position control



Introduction and model description of DC servo motor

The servo system composed of DC servo motor and corresponding servo driver device can be widely used in machine tool, textile, plastic, printing and dyeing, printing, building materials, packaging, wooden bars, chemical industry and other fields.

The motor consists of stator, rotor, high-precision, feedback elements (such as: incremental photoelectric encoder, resolver, etc.). The air gap magnetic field is formed by using high-performance rare earth permanent magnet material, and the stator iron core with inorganic casing is used, which has large temperature gradient and high heat dissipation efficiency, and has the following characteristics:

- Compact structure and high power density;
- Small moment of inertia, fast response;
- Ultra high intrinsic coercivity rare earth permanent magnet material; strong anti-demagnetization ability;
- It can output constant torque almost in the whole speed range
- Low torque pulsation at low speed; high balance precision and stable operation at high speed;
- Low noise and vibration; fully sealed design; cost-effective.

Servo motor model description

60DC - 024 30 A 5 - E B NS

Flange Mounting Dimensions
40/60/80/110/130/180
DC: DC Servo

Rated torque
R16: 0.16NM 024:2.4NM
190: 19NM

Rated speed
30: 3000Rpm 15:1500Rpm

Rated voltage
A:24V B:36V C:48V D:60V E:72V
F:220V G:380V H:80-120V

Non-standard code
NS: Non-standard axis
NC: Non-standard end

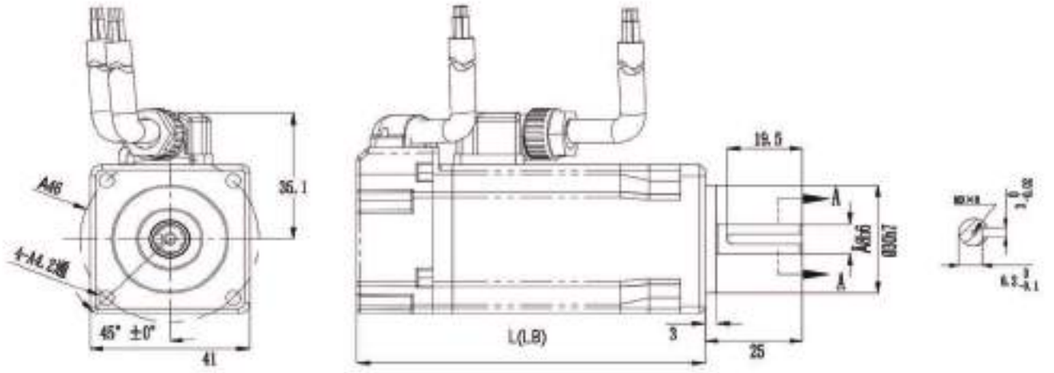
Brake
B: Brake

Special function
E: Incremental A/B Quadrature Encoder
R: resolver C: magnetic encoder
A: Absolute encoder H: Digital

Number of pole pairs
5:5 pair of poles 10:10 pair of poles

Remarks: 1.E defaults to E25, which means 2500-line incremental photoelectric encoder;
2.C defaults to C25, which means 2500-line magnetic encoder;

40 Outline dimension drawing of DC servo motor

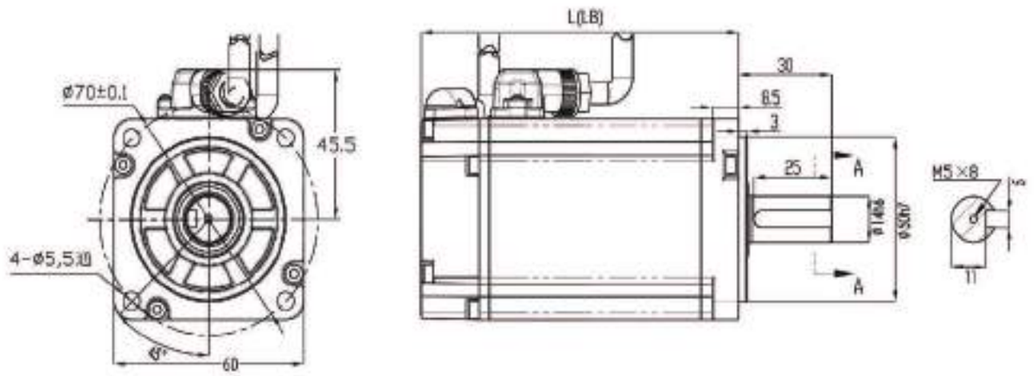


Specifications and parameters of DC servo motor

Motor model	40DC-R1630A5	40DC-R3230A5	40DC-R3230C5
Power (W)	50	100	100
Rated voltage (V)	24	24	48
Rated torque (N.M)	0.16	0.32	0.32
Rated speed (rpm)	3000	3000	3000
Rated current (Arms)	2.8±10%	5±10%	2.7± 10%
Moment coefficient (N.m/A)	0.058±10%	0.071±10%	0.1± 10%
Rotor inertia (kg.m2X10^{-4})	0.033±10%	0.066±10%	0.066± 10%
Line Back EMF (V/krpm)	3.5±10%	4.3±10%	6.6± 10%
Line inductance (mH)	0.8±10%	0.3±10%	1.3± 10%
Line resistance(Ω)	0.72±10%	0.38±10%	1.27± 10%
Body length L(mm)	72	96(90)	96(90)
Body length LB with brake (mm)	100	114(109)	114(109)
Weight(KG)	0.45/0.68	0.57/0.8	0.57/0.8
Feedback element (optional)	Photoelectric incremental 2500 lines (E) Magnetoelectric incremental 2500 lines (C)/absolute value 17bit (A17)/resolver (R)		
Insulation resistance	DC500V,>20MΩ(F)		
Use environment	Temperature -20~45°C, humidity 20~80% without condensation		
Protection class	IP65		

Remarks: The voltage and torque, speed and installation size of the motor can be customized as required;

60 Outline dimension drawing of DC servo motor

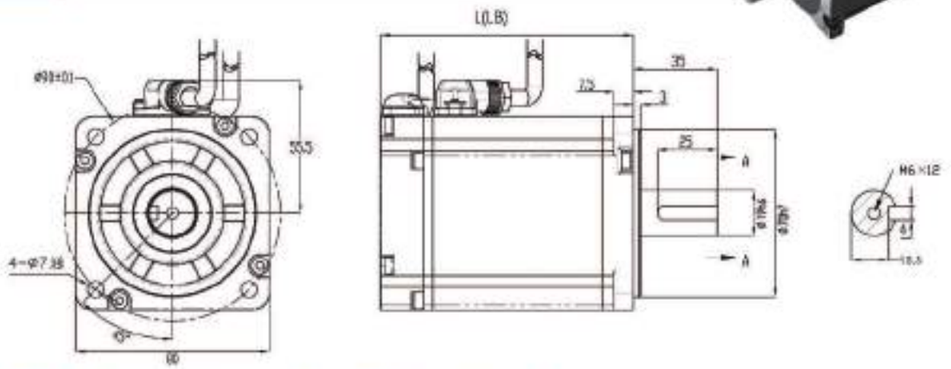


Specifications and parameters of DC servo motor

Motor model	60DC-R6430A5	60DC-R6430C5	60DC-01330A5	60DC-01330C5	60DC-01930A5	60DC-01930C5	60DC-01930E5
Power (W)	200	200	400	400	600	600	600
Rated voltage (V)	24VDC	48VDC	24VDC	48VDC	24VDC	48VDC	72VDC
Rated torque (N.M)	0.64	0.64	1.27	1.27	1.91	1.91	1.91
Rated speed (rpm)	3000	3000	3000	3000	3000	3000	3000
Rated current (Arms)	12.5±10%	6.5±10%	20±10%	11±10%	35±10%	16±10%	11±10%
Moment coefficient (N.m/A)	0.05±10%	0.1±10%	0.06±10%	0.12±10%	0.058±10%	0.13±10%	0.18±10%
Rotor inertia (kg.m2X10^{-4})	0.3±10%	0.3±10%	0.58±10%	0.58±10%	0.85±10%	0.85±10%	0.85±10%
Line Back EMF (V/krpm)	3.2±10%	5.9±10%	3.8±10%	7±10%	3.5±10%	7.9±10%	11±10%
Line inductance (mH)	0.19±10%	0.12±10%	0.17±10%	0.56±10%	±10%	0.4±10%	±10%
Line resistance(Ω)	0.11±10%	0.44±10%	0.07±10%	0.27±10%	±10%	0.17±10%	±10%
Body length L(mm)	89(77)	89(77)	108(98)	108(98)	127(119)	127(119)	127(119)
Body length LB with brake (mm)	127(118)	127(118)	146(136)	146(136)	174(165)	163(153)	163(153)
Weight(KG)	1/1.35	1/1.35	1.35/1.75	1.35/1.75	1.75/2.15	1.75/2.15	1.75/2.15
Feedback element (optional)	Photoelectric incremental 2500 lines/absolute value 17bit/resolver						
Insulation resistance	DC500V,>20MΩ(F)						
Use environment	Temperature -20~45°C, humidity 20~80% without condensation						
Protection class	IP65						

Remarks: The voltage and torque, speed and installation size of the motor can be customized as required;

80 Outline dimension drawing of DC servo motor

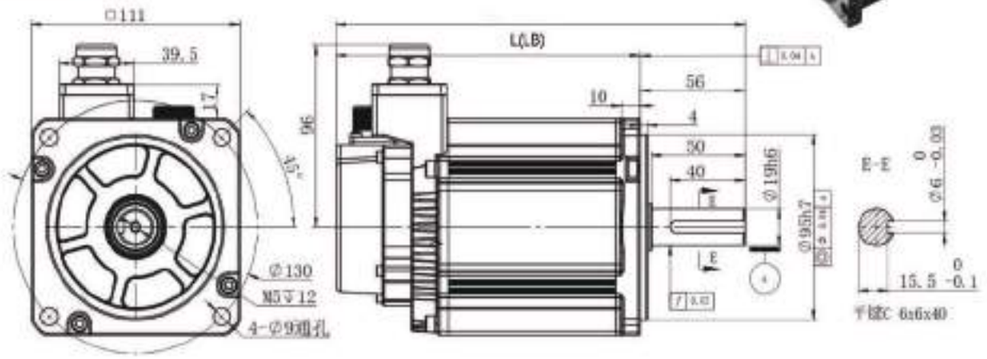


Specifications and parameters of DC servo motor

Motor model	80DC-01330C10	80DC-02430A5	80DC-02430C5	80DC-02430E5	80DC-02430C10	80DC-03230C5
Power (W)	400	750	750	750	750	1000
Rated voltage (V)	48VDC	24VDC	48VDC	72VDC	48VDC	48VDC
Rated torque (N.M)	1.27	2.4	2.4	2.4	2.4	3.2
Rated speed (rpm)	3000	3000	3000	3000	3000	3000
Rated current (Arms)	32.5±10%	40±10%	19.5±10%	13.5±10%	17±10%	25±10%
Moment coefficient (N.m/A)	0.075±10%	0.06±10%	0.12±10%	0.18±10%	0.14±10%	0.13±10%
Rotor inertia (kg.m2X10^{-4})	1.8±10%	1.8±10%	1.8±10%	1.8±10%	1.8±10%	2.25±10%
Line Back EMF (V/krpm)	4.5±10%	3.7±10%	7.5±10%	11±10%	8.5±10%	8±10%
Line inductance (mH)	0.12±10%	0.12±10%	0.24±10%	±10%	0.24±10%	0.2±10%
Line resistance(Ω)	0.0138±10%	0.0138±10%	0.08±10%	±10%	0.08±10%	0.05±10%
Body length L(mm)	82	134(121)	120(107)	120(107)	92	134(121)
Body length LB with brake (mm)	122	184(161)	160(147)	160(147)	132	174(161)
Weight(KG)	2.3/2.9	2.95/3.6	2.3/3.05	2.3/3.05	2.3/2.9	2.95/3.6
Feedback element (optional)	Photoelectric incremental 2500 lines/absolute value 17bit/resolver					
Insulation resistance	DC500V,>20MΩ(F)					
Use environment	Temperature -20~45°C, humidity 20~80% without condensation					
Protection class	IP65					

Motor model	80DC-03230C10	80DC-03230E5	80DC-04030C10	80DC-04030E10	80DC-04830C10	80DC-04830E10
Power (W)	1000	1000	1250	1250	1500	1500
Rated voltage (V)	48VDC	72VDC	48VDC	72VDC	48VDC	72VDC
Rated torque (N.M)	3.2	3.2	4	4	4.8	4.8
Rated speed (rpm)	3000	3000	3000	3000	3000	3000
Rated current (Arms)	23.5±10%	17±10%	29.2±10%	18±10%	35.1±10%	21.6±10%
Moment coefficient (N.m/A)	0.13±10%	0.19±10%	0.14±10%	0.22±10%	0.14±10%	0.22±10%
Rotor inertia (kg.m2X10^{-4})	2.25±10%	2.25±10%	2.25±10%	2.25±10%	2.5±10%	2.5±10%
Line Back EMF (V/krpm)	8.3±10%	11±10%	8.3±10%	13.4±10%	8.3±10%	13.4±10%
Line inductance (mH)	0.2±10%	±10%	0.12±10%	0.12±10%	±10%	±10%
Line resistance(Ω)	0.05±10%	±10%	0.033±10%	0.033±10%	±10%	±10%
Body length L(mm)	107	134(121)	107	107	121	121
Body length LB with brake (mm)	147	174(161)	147	147	/	/
Weight(KG)	2.3/2.9	2.95/3.6	2.3/2.9	2.3/2.9	2.95	2.95
Feedback element (optional)	Photoelectric incremental 2500 lines/absolute value 17bit/resolver					
Insulation resistance	DC500V,>20MΩ(F)					
Use environment	Temperature -20~45°C, humidity 20~80% without condensation					
Protection class	IP65					

110 Outline dimension drawing of DC servo motor

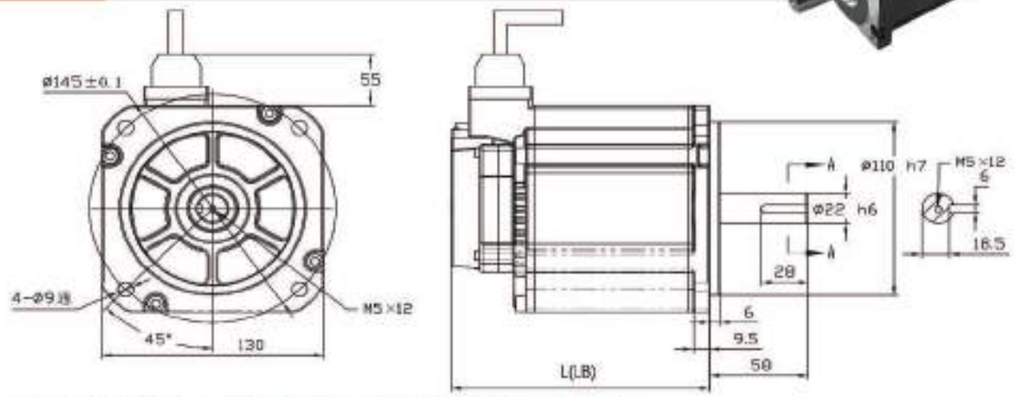


Specifications and parameters of DC servo motor

Motor model	110DC-04030C5	110DC-04030C10	110DC-04030E5	110DC-06020C5	110DC-06020C10	110DC-05030C5	110DC-05030E5
Power (W)	1250	1250	1250	1250	1250	1550	1550
Rated voltage (V)	48VDC	48VDC	72VDC	48VDC	48VDC	48VDC	72VDC
Rated torque (N.M)	4	4	4	6	6	5	5
Rated speed (rpm)	3000	3000	3000	2000	2000	3000	3000
Rated current (Arms)	31±10%	31±10%	21±10%	32±10%	32±10%	40±10%	26±10%
Moment coefficient (N.m/A)	0.126±10%	0.126±10%	0.185±10%	0.18±10%	0.18±10%	0.128±10%	0.191±10%
Rotor inertia (kg.m2X10^{-4})	4.83±10%	4.83±10%	4.83±10%	7.8±10%	7.8±10%	7.8±10%	7.8±10%
Line Back EMF (V/krpm)	7.66±10%	7.66±10%	11.3±10%	11±10%	11±10%	7.7±10%	11.57±10%
Line inductance (mH)	±10%	±10%	±10%	±10%	±10%	±10%	±10%
Line resistance(Ω)	±10%	±10%	±10%	±10%	±10%	±10%	±10%
Body length L(mm)	147	147	147	162	162	162	162
Body length LB with brake (mm)	181	181	181	196	196	196	196
Weight(KG)	4.7/7	4.7/5.4	4.7/7	6.5/7.3	6.5/7.3	6.5/7.3	6.5/7.3
Feedback element (optional)	Photoelectric incremental 2500 lines/absolute value 17bit/resolver						
Insulation resistance	DC500V,>20MΩ(F)						
Use environment	Temperature -20~45°C, humidity 20~80% without condensation						
Protection class	IP65						

Motor model	110DC-05030C10	110DC-07520E10	110DC-06030C5	110DC-06030E10	110DC-10020E10	110DC-07530E5	110DC-07530C10
Power (W)	1550	1570	1880	1880	2000	2350	2350
Rated voltage (V)	48VDC	72VDC	48VDC	72VDC	48VDC	72VDC	48VDC
Rated torque (N.M)	5	7.5	6	6	10	7.5	7.5
Rated speed (rpm)	3000	2000	3000	3000	2000	3000	3000
Rated current (Arms)	40±10%	26±10%	46±10%	34±10%	39.2±10%	39.2±10%	59±10%
Moment coefficient (N.m/A)	0.128±10%	0.28±10%	0.128±10%	0.185±10%	0.191±10%	0.191±10%	0.128±10%
Rotor inertia (kg.m2X10^{-4})	7.8±10%	7.8±10%	7.8±10%	7.8±10%	7.8±10%	7.8±10%	7.8±10%
Line Back EMF (V/krpm)	7.7±10%	17.5±10%	7.7±10%	11.57±10%	11.57±10%	11.57±10%	7.7±10%
Line inductance (mH)	±10%	±10%	±10%	±10%	±10%	±10%	±10%
Line resistance(Ω)	±10%	±10%	±10%	±10%	±10%	±10%	±10%
Body length L(mm)	162	162	162	162	162	162	162
Body length LB with brake (mm)	196	196	196	196	196	196	196
Weight(KG)	6.5/7.3	6.5/7.3	6.5/7.3	6.5/7.3	6.5/7.3	6.5/7.3	6.5/7.3
Feedback element (optional)	Photoelectric incremental 2500 lines/absolute value 17bit/resolver						
Insulation resistance	DC500V,>20MΩ(F)						
Use environment	Temperature -20~45°C, humidity 20~80% without condensation						
Protection class	IP65						

130 Outline dimension drawing of DC servo motor

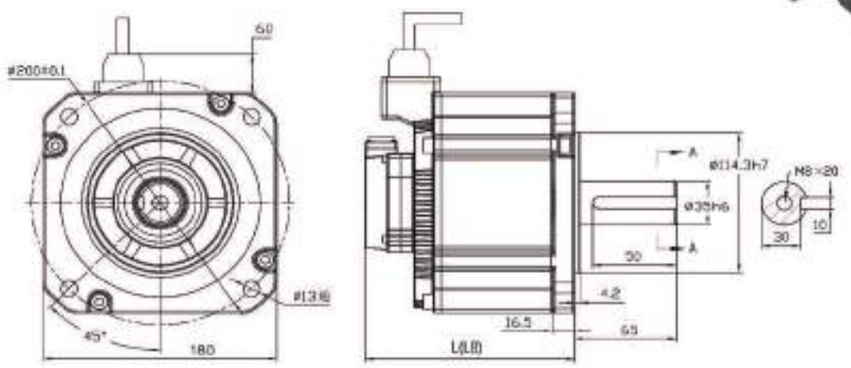


Specifications and parameters of DC servo motor

Motor model	130DC-05030C5	130DC-05030E5	130DC-07520C5	130DC-07520E5	130DC-07530C5	130DC-07530E5
Power (W)	1550	1550	1570	1570	2350	2350
Rated voltage (V)	48VDC	72VDC	48VDC	72VDC	48VDC	72VDC
Rated torque (N.M)	5	5	7.5	7.5	7.5	7.5
Rated speed (rpm)	3000	3000	2000	2000	3000	3000
Rated current (Arms)	40±10%	26±10%	40±10%	26±10%	60±10%	41±10%
Moment coefficient (N.m/A)	0.12±10%	0.19±10%	0.18±10%	0.28±10%	0.13±10%	0.19±10%
Rotor inertia (kg.m2X10^{-4})	12.9±10%	12.9±10%	12.9±10%	12.9±10%	12.9±10%	12.9±10%
Line Back EMF (V/krpm)	7.3±10%	11.3±10%	11±10%	16.5±10%	7.8±10%	11.3±10%
Line inductance (mH)	0.25±10%	±10%	±10%	±10%	0.25±10%	0.4±10%
Line resistance(Ω)	±10%	±10%	±10%	±10%	0.024±10%	0.03±10%
Body length L(mm)	142	142	157(142)	157(142)	157(142)	157(142)
Body length LB with brake (mm)	174(189)	174(189)	204(189)	204(189)	204(189)	204(189)
Weight(KG)	8/9.8	8/9.8	8/9.8	8/9.8	8/9.8	8/9.8
Feedback element (optional)	Photoelectric incremental 2500 lines/absolute value 17bit/resolver					
Insulation resistance	DC500V,>20MΩ(F)					
Use environment	Temperature -20~45°C, humidity 20~80% without condensation					
Protection class	IP65					

Motor model	130DC-15020C5	130DC-15020E5	130DC-15025E5	130DC-15030E5	130DC-19015C5	130DC-19015E5
Power (W)	3150	3150	3800	4700	3000	3000
Rated voltage (V)	48VDC	72VDC	72VDC	72VDC	48VDC	72VDC
Rated torque (N.M)	15	15	15	15	19	19
Rated speed (rpm)	2000	2000	2500	3000	1500	1500
Rated current (Arms)	80±10%	53±10%	66±10%	88±10%	78±10%	57±10%
Moment coefficient (N.m/A)	0.18±10%	0.27±10%	0.22±10%	0.17±10%	0.25±10%	0.35±10%
Rotor inertia (kg.m2X10^{-4})	17±10%	17±10%	17±10%	17±10%	25.2±10%	25.2±10%
Line Back EMF (V/krpm)	11.3±10%	16.8±10%	13.6±10%	10.5±10%	15±10%	21±10%
Line inductance (mH)	0.26±10%	±10%	0.5±10%	0.26±10%	±10%	0.66±10%
Line resistance(Ω)	0.02±10%	±10%	0.04±10%	0.019±10%	±10%	0.04±10%
Body length L(mm)	189(174)	189(174)	189(174)	189(174)	204(189)	204(189)
Body length LB with brake (mm)	229	229	229	229	(259)	(259)
Weight(KG)	14/15.8	14/15.8	14/15.8	14/15.8	16	16
Feedback element (optional)	Photoelectric incremental 2500 lines/absolute value 17bit/resolver					
Insulation resistance	DC500V,>20MΩ(F)					
Use environment	Temperature -20~45°C, humidity 20~80% without condensation					
Protection class	IP65					

180 Outline dimension drawing of DC servo motor



Specifications and parameters of DC servo motor

Motor model	180DC-15015ES	180DC-19015ES	180DC-19020ES	180DC-28015ES	180DC-15030CS	180DC-36015ES
Power (W)	2350	3000	4000	4400	4700	5500
Rated voltage (V)	72VDC	72VDC	72VDC	72VDC	48VDC	72VDC
Rated torque (N.M)	15	19	19	28	15	36
Rated speed (rpm)	1500	1500	2000	1500	3000	1500
Rated current (Arms)	42±10%	54±10%	69±10%	77±10%	125±10%	102±10%
Moment coefficient (N.m/A)	0.25±10%	0.25±10%	0.27±10%	0.25±10%	0.12±10%	0.24±10%
Rotor inertia (kg.m2X10^{-4})	60±10%	60±10%	90±10%	90±10%	122±10%	122±10%
Line Back EMF (V/krpm)	15±10%	15±10%	16.5±10%	15±10%	7.5±10%	14.5±10%
Line inductance (mH)	±10%	±10%	±10%	±10%	±10%	±10%
Line resistance(Ω)	±10%	±10%	±10%	±10%	±10%	±10%
Body length L(mm)	178	178	209	208	234(209)	234
Body length LB with brake (mm)	272(234)	272(234)	272	272(234)	328	328
Weight(KG)	14.5/32	14.5/32	14.5/32	18.9/33	24/33	22.7/34
Feedback element (optional)	Photoelectric incremental 2500 lines/absolute value 17bit/resolver					
Insulation resistance	DC500V,>20MΩ(F)					
Use environment	Temperature -20~45°C, humidity 20~80% without condensation					
Protection class	IP65					

Motor model	180DC-28020E5	180DC-19030E5	180DC-36020E5	180DC-48015E5	180DC-28030E5	180DC-48020E5
Power (W)	5800	6000	7500	7500	8800	10000
Rated voltage (V)	72VDC	72VDC	72VDC	72VDC	72VDC	72VDC
Rated torque (N.M)	28	19	36	48	28	48
Rated speed (rpm)	2000	3000	2000	1500	3000	2000
Rated current (Arms)	100±10%	105±10%	135±10%	136±10%	150±10%	155±10%
Moment coefficient (N.m/A)	0.27±10%	0.18±10%	0.27±10%	0.35±10%	0.18±10%	0.27±10%
Rotor inertia (kg.m2X10^{-4})	122±10%	122±10%	150±10%	150±10%	150±10%	150±10%
Line Back EMF (V/krpm)	16.5±10%	11.2±10%	16.5±10%	21±10%	11±10%	16.5±10%
Line inductance (mH)	0.44±10%	0.13±10%	±10%	±10%	0.13±10%	0.23±10%
Line resistance(Ω)	0.015±10%	0.005±10%	±10%	±10%	0.005±10%	0.01±10%
Body length L(mm)	234(209)	234(209)	272(234)	272	272(234)	326(283)
Body length LB with brake (mm)	328	328	328	328	328	328
Weight(KG)	18.9/33	24/33	22.7/34	27.8/35	27.8/34	27.8/35
Feedback element (optional)	Photoelectric incremental 2500 lines/absolute value 17bit/resolver					
Insulation resistance	DC500V,>20MΩ(F)					
Use environment	Temperature -20~45°C, humidity 20~80% without condensation					
Protection class	IP65					

Comprehensive introduction of DC servo driver

SC, SE and SE2 series intelligent servo drives are general-purpose, high-performance, DC-powered, compact all-digital servo drives with a maximum power of 15kw, integrating programmable motion control, PLC, and servo drive functions. Mainly used for position, speed and torque control of linear (DDL), torque (DDR), voice coil, brushed and brushless servo motors. It can run in three modes: independent programmable control (Stand-alone), external control, or distributed network (CAN (CANopen), EtherCAT, RS232, RS485 (external) control, and can support incremental encoder, analog positive Cosine (Sin/Cos) encoder, multi-protocol type absolute encoder, (Abs), resolver (Resolver), digital Hall feedback, also supports absolute encoder. The multi-mode encoder port is used as input or The output depends on the basic settings of the drive. As input is the feedback from the secondary encoder to create a dual loop position control system.

EtherCAT. CANopen ePLC RS485

Servo drive model description

SC PC - 090 12 - OP E B

Series
SC: Standard DC Servo Drive (with CAN)
SE: Bus driver (with CAN, EtherCAT)
SE2: (one for two bus drivers)

Input command
P: Pulse Hp: high speed pulse A: Analog
R:RS485 C:CANopen E:EtherCAT

Supply voltage
090:20V-90VDC 180:20V-180VDC
220:220VAC 380:380VAC
A: single phase B: three phases

Brake unit
B: with brake

Feedback
E : Incremental A/B Quadrature Encoder
R: resolver C: Magnetic encoder
A: Absolute value encoder
H: Digital Hall
S : Analog sine cosine encoder

Special function
OP: Pulse output OA: analog output
R: round cut F: chase
Z: special for tapping machine

Rated current
16:16Apk 50:50Apk 150:150Apk

Remarks: 1. The power supply voltage of the driver must be greater than or equal to the rated voltage of the motor
2. The rated current of the drive must be greater than or equal to the rated current of the motor

DC Servo Drive Specification Summary

Drive model	Supply voltage	Continuous current Amps(Arms)	peak current Amps(Arms)6S	Feedback type	Dimensions	weight
SCPC-09002-OPE	18~90 VDC	2A	6A	Incremental	133*90*32mm	0.35kg
SCPC-09004-OPE		4A	8A			
SCPC-09008-OPE		8A	24A			
SCPC-09016-OPE		16A	48A			
SCPC-09024-OPE		24A	50A			
SCPC-09030-OPE		30A	60A		167*100*35mm	0.45kg
SCPC-09040-OPE		40A	80A			
SCPC-09050-OPE		50A	100A			
SCPC-09075-OPE		75A	150A		200*114*59mm	1.10kg
SCPC-090100-OPE		100A	200A			
SCPC-090150-OPE		150A	250A		221*140*59mm	1.45kg
SCPC-090200-OPE		200A	300A		221*140*90mm	1.8kg
SCPC-090300-OPE		300A	420A			
SCPC-18024-OPE	18~135 /180 VDC	24A	50A		167*100*35mm	0.45kg
SCPC-18050-OPE		50A	100A		200*114*59mm	1.10kg
SCPC-18075-OPE		75A	150A			
SCPC-135100-OPE		100A	200A		221*140*59mm	1.45kg
SCPC-180100-OPE						
SCPC-135150-OPE		150	250		221*140*90mm	1.8kg
SEPC-09003-OPEA	18~90 VDC	3A	6A	Incremental | absolute value	167*100*35mm	0.45kg
SEPC-09005-OPEA		5A	10A			
SEPC-09016-OPEA		16A	48A			
SEPC-09024-OPEA		24A	50A			
SEPC-09040-OPEA		40A	80A			
SEPC-09050-OPEA		50A	100A			
SEPC-09075-OPEA		75A	150A		200*114*59mm	1.10kg
SEPC-090100-OPEA		100A	200A			
SEPC-090150-OPEA		150A	250A		221*140*59mm	1.45kg
SEPC-090200-OPEA		200A	300A		221*140*90mm	1.8kg
SEPC-090300-OPEA		300A	420A			
SEPC-18024-OPEA	18~135 /180 VDC	24A	50A		167*100*35mm	0.45kg
SEPC-18050-OPEA		50A	100A		200*114*59mm	1.10kg
SEPC-18075-OPEA		75A	300A			
SEPC-135100-OPEA		100A	200A		221*140*59mm	1.45kg
SEPC-180100-OPEA						
SE2PC-09003-OPEA	18~90 VDC	3A	6A		208*118*40mm	0.7kg
SE2PC-09005-OPEA		5A	10A			
SE2PC-09010-OPEA		10A	25A			
SE2PC-09016-OPEA		16A	48A			
SE2PC-09024-OPEA		24A	50A			
SE2PC-09040-OPEA		40A	80A			
SE2PC-09050-OPEA		50A	100A			
SE2PC-09075-OPEA		75A	150A		245*148*59mm	1.65kg
SE2PC-090100-OPEA		100A	200A			
SE2PC-090150-OPEA		150A	250A			
SE2PC-18024-OPEA	18~135 /180 VDC	24A	50A		208*118*40mm	0.7kg
SE2PC-18050-OPEA		50A	100A		245*148*59mm	1.65kg
SE2PC-18075-OPEA		75A	150A			
SE2PC-135100-OPEA		100A	200A			

SC Technical specification for DC servo driver

- Control mode: position, speed, torque;
- Sampling frequency (time) current loop: 15KHz (66.7us); speed/position loop: 3KHz (330μs)
- Bandwidth: The current loop is generally 2.5kHz, which varies with parameter adjustment and load inductance
- Motion mode: electronic gear, electronic cam, proportional linkage, point-to-point;
- Programmable protection: position error, overcurrent, overvoltage or undervoltage, I2t, output short circuit overload and other multi-directional protection functions;
- Drive motor type: three-phase stepping motor, brushless motor, brushed motor, linear motor, voice coil motor, etc.;
- Position feedback: incremental encoder, Hall, grating ruler, analog sine/cosine (Sin/Cos) encoder, resolver (plus conversion card);
- Impulse response frequency up to 2MHz, with digital filtering function;
- RS232 serial interface, baud rate up to 115KB;
- CAN2.0 local bus, compatible with CANopen DS-402, baud rate up to 1MHz;
- Power supply voltage: 18-90 (135/180) VDC;

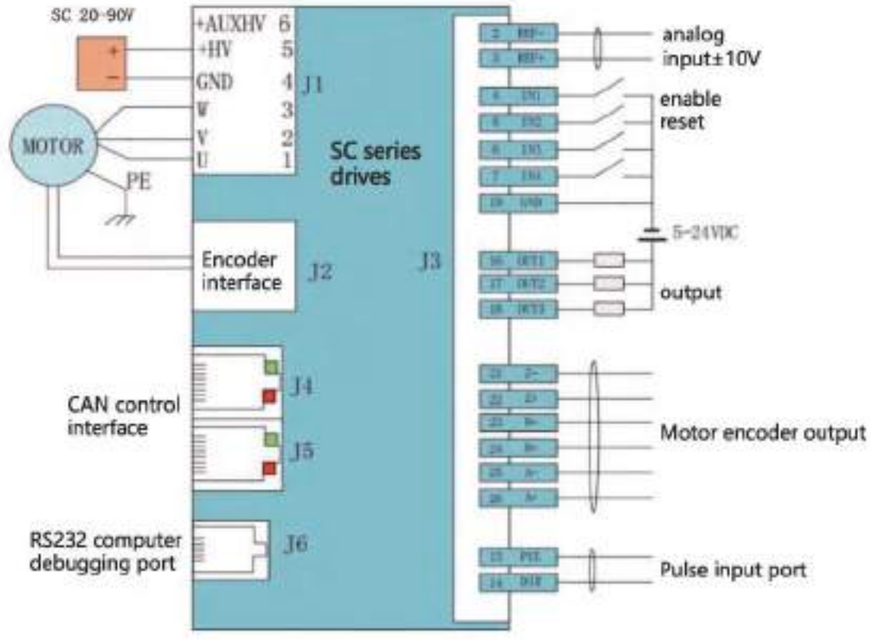
CANopen ePLC RS485

Position control	Command control method			Servo enable, external reset, forward and reverse limit, motor stop,high-speed analog acquisition control, PWM synchronization signal input, high-speed pulse input, etc.
	signal input	Pulse command	Input pulse shape	Including "direction + pulse", "A, B phase quadrature pulse", "CW/CCW pulse" three command forms
			Signal format	Differential input, open collector
			Maximum pulse frequency	Differential input: (Max 2Mpps) Open collector: (Max 500Kpps)
		Simulation command	Voltage range	Input voltage range ±10V
			Input resistance	Differential input impedance = 5KΩ
Speed control	Command control method			PWN- ±10V Analog, function generator, software programming
	signal input	PWM	Polarity	PWM=0~100%, Polarity=1/0
			Non-polar	PWM=50% +/-50%
			Frequency Range	Minimum 1kHz, Maximum 100kHz
			Minimum pulse width	220ns
		Simulation command	Voltage range	Input voltage range ±10V
			Input resistance	Differential input impedance = 5KΩ
Current control	Command control method			PWN- ±10V Analog, function generator, software programming
	signal input	PWM	Polarity	PWM=0~100%, Polarity=1/0
			Non-polar	PWM=50% +/-50%
			Frequency Range	Minimum 1kHz, Maximum 100kHz
			Minimum pulse width	220ns
		Simulation command	Voltage range	Input voltage range ±10V
			Input resistance	Differential input impedance = 5KΩ
I/O signal	Digital input IN		number of ports	10 IN6, IN7, IN8, IN9, IN10 are high-speed ports, and IN5 is used for motor temperature protection)
			Signal format	NPN (active low)
			Configurable function	Servo enable, external reset, forward and reverse limit, motor stop,high-speed analog acquisition control, PWM synchronization signal input, high-speed pulse input, etc.
	Digital output OUT		number of ports	3
			Signal format	NPN (active low), can withstand a maximum current of 300mAdc and a maximum voltage of 30Vdc
			Configurable function	Fault signal, brake control, PWM synchronization signal, custom event, track state position trigger, program control

SC DC Servo Drive Technical Specifications

Features	LED indication			Status indication, CAN network indication
	Communication unction	RS-232	baud rate	9600-115200
			protocol	Full duplex mode, ASCII or binary format
		CAN	baud rate	20kbit/s-1Mbit/s
			protocol	Canopen application layer DS -301V4.02
			equipment	DSP-402 Device Driver and Motion Control
	Protective function			Overvoltage, overcurrent, undervoltage, overload, overheating, encoder abnormality, position tracking error is too large, etc.
Use environment	Installation Location			No corrosive gas, flammable gas, etc.
	Altitude			below 1000 meters
	temperature			-20℃~+40℃
	humidity			5%~95%RH, no condensation
	Vibration/Shock Strength			小于4.9m/s2/小于19.6m/s2
Feedback	Digital A/B quadrature encoder (-E, maximum rate 5M line/s)			
	Auxiliary encoder input/output (full closed loop control/-OP)			
	Simulate sin/cos encoder (-s) optional			
	Resolver (-R) optional			
	Digital Hall (-H(UN/W, 120 degree electrical phase difference))			

SC DC servo drive system wiring diagram

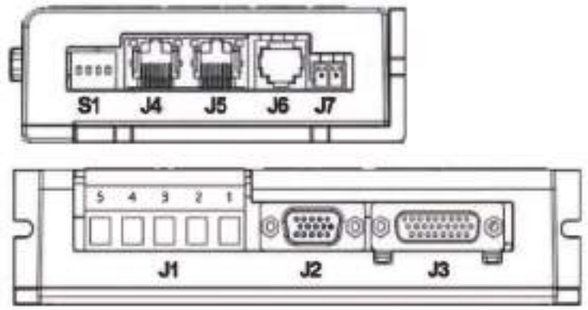


Explain: 1. Input terminals IN1, IN2, IN3, IN4, IN5, IN11, IN12 are common ports that can receive NPN and PNP signals, with a maximum input voltage of 24V.
2. IN6, IN7, IN8, IN9, IN10 are high-speed input ports with a maximum input voltage of 5V.
3. +AUXHV is the auxiliary power supply, it can be connected if necessary. When +HV is disconnected from the power supply, the communication will be maintained when +AUXHV is powered on, but there will be no action after sending commands.

SC DC Servo Drive Terminal Definition

J6 RS-232 for debugging

Foot position	Definition
1	NO Connection
2	RxD
3	Signal Ground
4	Signal Groudn
5	TxD
6	NO Connection



J4-J5 CAN communication link

Foot position	Definition
1	CAN_H
2	CAN_L
3	CAN_GND
4	No Connection
5	Reserved
6	(CAN_SHLD)[1]
7	CAN_GND
8	(CAN_V+)[1]

J1 Motor Power

Foot position	Definition
1	U
2	V
3	W
4	0V
5	DC20-90
6	Auxiliary power

J3 control signal terminal

Foot position	Definition	Foot position	Definition	Foot position	Definition
1	ground	10	[IN6] customize	19	0V
2	Analog input-	11	[IN7] customize	20	+5V
3	Analog input+	12	[IN8] customize	21	Pulse output Z-
4	[IN1] enable	13	[IN9] customize	22	Pulse output Z+
5	[IN2] customize	14	[IN10] customize	23	Pulse output B-
6	[IN3] customize	15	[IN5] Motor temperature	24	Pulse output B+
7	[IN4] customize	16	[OUT1] customize	25	Pulse output A-
8	[IN11] customize	17	[OUT2] customize	26	Pulse output A+
9	[IN12] customize	18	[OUT3] customize		

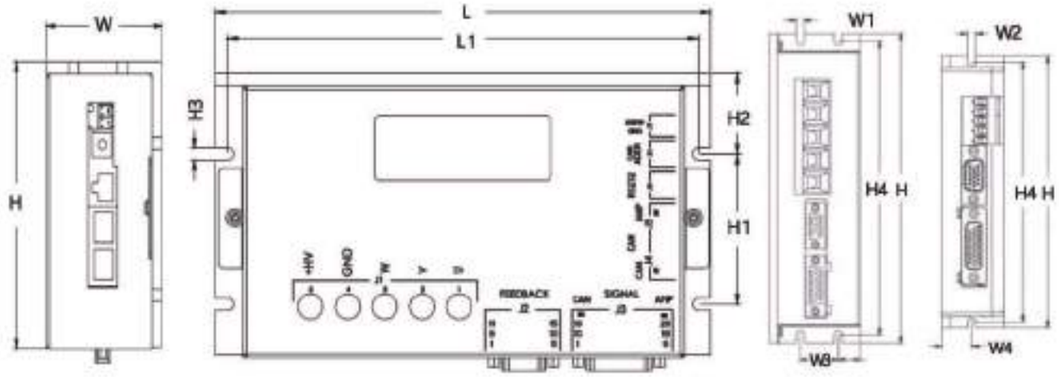
J2 Motor encoder feedback

Foot position	Definition	Foot position	Definition	Foot position	Definition
1	SIN+	6	V	11	B-
2	SIN-	7	Z-	12	B+
3	U	8	Z+	13	A-
4	+5 V	9	W	14	A+
5	0V	10	COS+	15	COS-

SW DIP switch corresponding station number

SW switch serial number	Corresponding station number
1	1
2	2
3	4
4	8

Dimensions of SC DC Servo Drive



Model	L	L1	W	W1	W2	W3	W4	H	H1	H2	H3	H4
SCPC-2A~24A	141	134	32	/	4.0	/	15.5	89	51	18	4	134
SCPC-30A~50A	167	160	35	/	2.4	/	19.5	100	51	22	4-4	160
SCPC-75A100A	200	190	59	4-4.5	/	25	/	114	604	33	4-4.8	190
SCPC-100AF	200	190	59	4-4.5	/	25	/	114	60	33	4-4.8	190
SCPC-150A	221	211	59	5	/	25	/	140	60	45	4.8	211
SCPC-150AF	221	211	59	5	/	25	/	140	60	45	4.8	211
SCPC-200A	221	211	90	5	/	25	/	140	25	14	5	211
SCPC-300A	221	211	90	5	/	25	/	140	25	14	5	211

SE Technical specification for DC servo driver

- Control mode: position, speed, torque;
- Sampling frequency (time) current loop: 16KHz (66.7us); speed/position loop: 4KHz (330μs)
- Bandwidth: The current loop is generally 2.5kHz, which varies with parameter adjustment and load inductance
- Programmable protection: position error, overcurrent, overvoltage or undervoltage, It, output short circuit overload and other multi-directional protection functions;
- Drive motor type: brushless motor, brushed motor, linear motor, voice coil motor, etc.;
- Encoder feedback: incremental encoder, Hall, grating ruler, resolver (plus conversion card); absolute encoder, support SSI,EnDat, Absolute A, BisS (B&C) protocol.
- Impulse response frequency up to 2MHz, with digital filtering function;
- RS232 serial interface, the baud rate can reach 115KB;
- CAN2.0 local bus, capable of CANopen DS-402, baud rate up to 1MHz; support PVT, zero return, interpolation.
- EtherCAT Ethernet field bus, using CANopen application protocol as EterCAT slave station, EtherCAT (CoE) protocol of DSP-402 for motion control equipment, supporting cyclic synchronization position-velocity-torque (CSP-CSV-CST), PVT, interpolation,return to zero
- Power supply voltage: 18-90 (135/180) VDC;

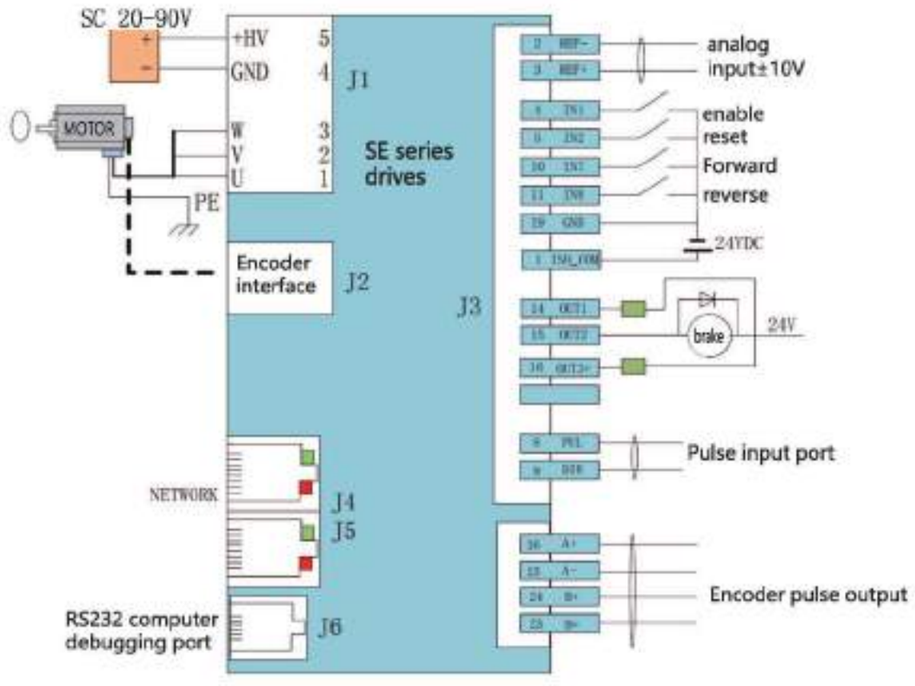
EtherCAT. CANopen ePLC RS485

Position control	Command control method			Servo enable, external reset, forward and reverse limit, motor stop,high-speed analog acquisition control, PWM synchronization signal input, high-speed pulse input, etc.
	signal input	Pulse command	Input pulse shape	Including "direction + pulse", "A, B phase quadrature pulse", "CW/CCW pulse" three command forms
			Signal format	Differential input, open collector
			Maximum pulse frquency	Differential Input: (Max 2Mpps) Open collector: (Max 500Kpps)
		Simulation command	Voltage range	Input voltage range ±10V
			Input resistance	Differential input impedance = 5KΩ
Speed control	Command control method			PWN、±10V Analog, function generator, software programming
	signal input	PWM	Polarity	PWM = 0 ~ 100 %， Polarity=1/0
			Non-polar	PWM=50% +/-50%
			Frequency Range	Minimum 1kHz, Maximum 100kHz
			Minimum pulse width	220ns
		Simulation command	Voltage range	Input voltage range ±10V
			Input resistance	Differential input impedance = 5KΩ
Current control	Command control method			PWN、±10V Analog, function generator, software programming
	signal input	PWM	Polarity	PWM = 0 ~ 100 %， Polarity=1/0
			Non-polar	PWM=50% +/-50%
			Frequency Range	Minimum 1kHz, Maximum 100kHz
			Minimum pulse width	220ns
		Simulation command	Voltage range	Input voltage range ±10V
			Input resistance	Differential input impedance = 5KΩ
I/O signal	Digital input IN		number of ports	10 IN6, IN7, IN8, IN9, IN10 are high-speed ports, and IN5 is used for motor temperature protection)
			Signal format	NPN (active low)
			Configurable function	Servo enable, external reset, forward and reverse limit, motor stop,high-speed analog acquisition control, PWM synchronization signal input, high-speed pulse input, etc.
	Digital output OUT		number of ports	3
			Signal format	NPN (active low), can withstand a maximum current of 300mAdc and a maximum voltage of 30Vdc
			Configurable function	Fault signal, brake control, PWM synchronization signal, custom event, track state position trigger, program control

SE DC Servo Drive Technical Specifications

Features	LED indication			Status indication, CAN network indication
	Communication uncton	RS-232	baud rate	9600-115200
			protocol	Full duplex mode, ASCII or binary format
		CAN	baud rate	20kbit/s-1Mbit/s
			protocol	Canopen application layer DS-301V4.02
			equipment	DSP-402 Device Driver and Motion Control
			protocol	CoE, CiA-402
	Protective function			Overvoltage, overcurrent, undervoltage, overload, overheating, encoder abnormality, position tracking error is too large, etc.
Use environment	Installation Location			No corrosive gas, flammable gas, etc.
	Altitude			below 1000 meters
	temperature			-20℃~+40℃
	humidity			5%~95%RH, no condensation
	Vibration/Shock Strength			小于4.9m/s2/小于19.6m/s2
Feedback	Digital A/B quadrature encoder (-E, maximum rate 5M line/s)			
	Auxiliary encoder input/output (full closed loop control/-OP)			
	Simulate sin/cos encoder (-s) optional			
	Resolver (-R) optional			
	Digital Hall (-H(UN/W, 120 degree electrical phase difference))			

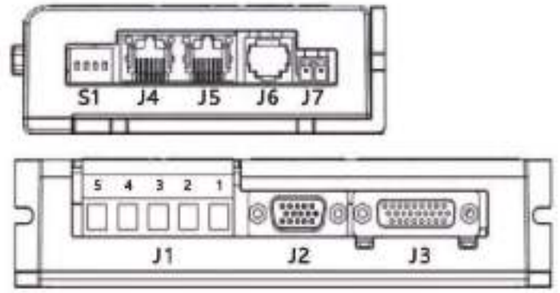
SE DC servo drive system wiring diagram



SE series terminal definition

J6 RS-232 for debugging

pin	definition	name
2	RXD	RS232 communication receiver
3	GND	Communication power ground
5	TXD	RS232 communication sender



J1 Motor Power

series	definition	name	name
1	U	Motor power line U phase	It must be connected to the motor one by one according to the label
2	V	Motor power line V phase	
3	W	Motor power line W phase	+20~90V DC
4	GND	Input power -	
5	+HV	Input power+	

J4-J5 CAN communication link

pin	definition	Name
1	CAN_H	CANH Signal
2	CAN_L	CANL Signal
3	GND	Communication power ground

J3 control signal terminal

pin	definition	function	pin	definition	function
1	ISO_COM	Common terminal of ISO terminal	14	ISO_OUT1	customize
2	Ref-	Analog input	15	ISO_OUT2	customize
3	Ref+	Analog input	16	ISO_OUT3	customize
4	IN1	customize	17	MUL_ENC_S-	Second absolute value encoded input
5	IN2	customize	18	MUL_ENC_S+	Second absolute value encoded input
6	IN3	customize	19	GND	power ground
7	IN4	customize	20	+5V	5V power output (100mA)
8	IN5	customize	21	EONZ- (CLK-/MA-)	Motor encoder output signal Z- (or second incremental encoder input)
9	IN6	customize	22	EONZ+ (CLK+/MA+)	Motor encoder output signal Z+ (or second incremental encoder input)
10	ISO_IN7	customize	23	EONB-	Motor encoder output signal B-
11	ISO_IN8	customize	24	EONB+	Motor encoder output signal B+
12	ISO_IN9	customize	25	EONA-	Motor encoder output signal A-
13	ISO_IN10	customize	26	EONA+	Motor encoder output signal A+

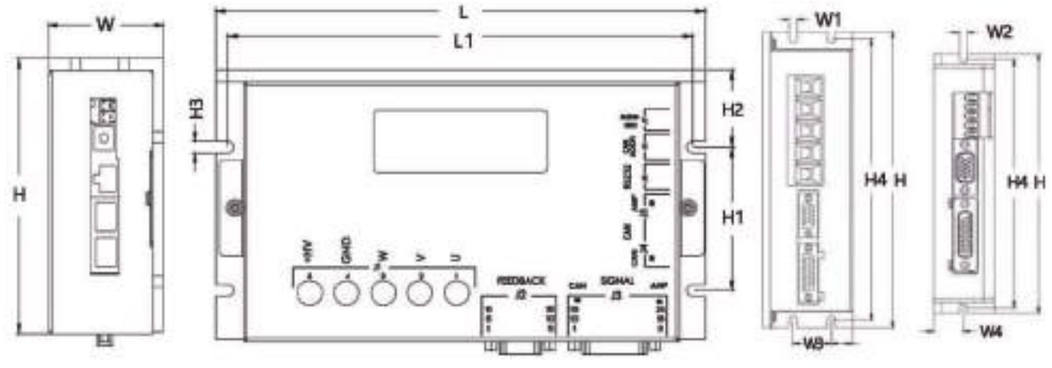
J2 Motor encoder feedback

pin	definition	function	pin	definition	function
1			9	W+	Motor encoder W+ input
2			10		
3	U+	Motor encoder U+ input	11	B-(DAT-)	Motor encoder B-input (Absolute encoder DAT-)
4	+5V	Motor signal line +5V	12	B+(DAT+)	Motor encoder B+input (Absolute encoder DAT+)
5	0V	Motor signal line GND	13	A-	Motor encoder A input
6	V+	Motor encoder V+ input	14	A+	Motor encoder A+ input
7	Z- (CLK-/MA-)	Motor encoder Z-input (Absolute value CLK-/MA-)	15		
8	Z+ (CL+/MA+)	Motor encoder Z+input (Absolute value CLK-/MA+)			

SW DIP switch corresponding station number

SW switch serial number	Corresponding station number
1	1
2	2
3	4
4	8

Dimensions of SE DC Servo Drive



model	L	L1	W	W1	W2	W3	W4	H	H1	H2	H3	H4
SEPC-3A~50A	167	160	35	/	2.4	/	19.5	100	51	22	4-4	160
SEPC-75A	200	190	59	4-4.5	/	25	/	114	604	33	4-4.8	190
SEPC-100A	200	190	59	4-4.5	/	25	/	114	604	33	4-4.8	190
SEPC-150A	221	211	59	5	/	25	/	140	60	45	4.8	211
SEPC-200A	221	211	90	5	/	25	/	140	25	14	5	211
SEPC-300A	221	211	90	5	/	25	/	140	25	14	5	211

SE2 Technical specification for DC servo driver (one driven two) series

- Control mode: position, speed, torque;
- Sampling frequency (time) Current loop: 16KHz (66.7us) Speed/position loop: 4KHz (330μs)
- Bandwidth: current loop - - is generally 2.5kHz, which varies with parameter adjustment and load inductance
- Programmable protection: position error, overcurrent, overvoltage or undervoltage, It, output short circuit overload and other multi-directional protection functions;
- Drive motor type: brushless motor, brushed motor, linear motor, voice coil motor, etc.;
- Encoder feedback: incremental encoder, Hall, grating ruler, analog sine/cosine (Sin/Cos) encoder, resolver (plus conversion card);absolute encoder, support SSI, EnDat, Absolute A, BiSS (B&C) protocol.
- Impulse response frequency up to 2MHz, with digital filtering function;
- RS232 serial interface, the baud rate can reach 115KB;
- CAN2.0 local bus, compatible with CANopen DS-402, baud rate up to 1MHz; support PVT, return to zero, interpolation.
- EtherCAT Ethernet field bus, using CANopen application protocol as EterCAT slave station, EtherCAT (CoE) protocol of DSP-402 for motion control equipment, supporting cyclic synchronization position speed torque (CSP-CSV-CST), PVT, interpolation , return to zero.
- Power supply voltage: 18-90 (135/180) VDC;

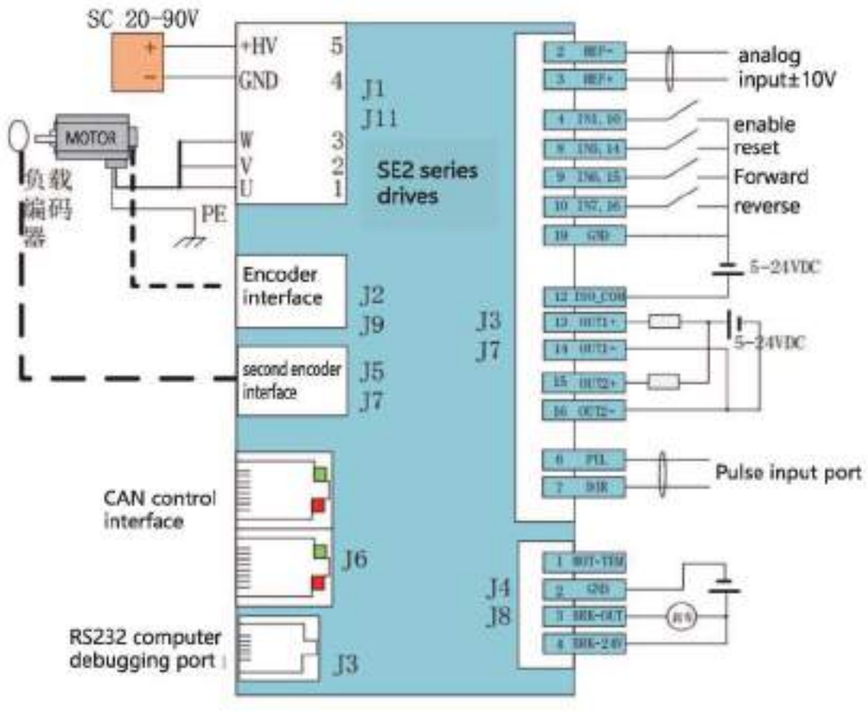
EtherCAT. CANopen ePLC RS485

Position control	Command control method			Servo enable, external reset, forward and reverse limit, motor stop,high-speed analog acquisition control, PWM synchronization signal input, high-speed pulse input, etc.
	signal input	Pulse command	Input pulse shape	Including "direction + pulse", "A, B phase quadrature pulse", "CW/CCW pulse" three command forms
			Signal format	Differential input, open collector
			Maximun pulse frequency	Differential input: (Max 2Mpps) Open collector: (Max 500Kpps)
		Simulation command	Voltage range	Input voltage range ±10V
			Input resistance	Differential input impedance = 5KΩ
Speed control	Command control method			PWM、±10V Analog, function generator, software programming
	signal input	PWM	Polarity	PWM = 0 ~ 100 %， Polarity=1/0
			Non-polar	PWM=50% +/-50%
			Frequency Range	Minimum 1kHz, Maximum 100kHz
			Minimum pulse width	220ns
		Simulation command	Voltage range	Input voltage range ±10V
			Input resistance	Differential input impedance = 5KΩ
Current control	Command control method			PWM、±10V Analog, function generator, software programming
	signal input	PWM	Polarity	PWM = 0 ~ 100 %， Polarity=1/0
			Non-polar	PWM=50% +/-50%
			Frequency Range	Minimum 1kHz, Maximum 100kHz
			Minimum pulse width	220ns
		Simulation command	Voltage range	Input voltage range ±10V
			Input resistance	Differential input impedance = 5KΩ
1/0 signal	Digital input IN		number of ports	10 IN6, IN7, IN8, IN9, IN10 are high-speed ports, and IN5 is used for motor temperature protection)
			Signal format	NPN (active low)
			Configurable function	Servo enable, external reset, forward and reverse limit, motor stop,high-speed analog acquisition control, PWM synchronization signal input, high-speed pulse input, etc.
	Digital output OUT		number of ports	3
			Signal format	NPN (active low), can withstand a maximum current of 300mAdc and a maximum voltage of 30Vdc
			Configurable function	Fault signal, brake control, PWM synchronization signal, custom event, track state position trigger, program control

SE2 DC Servo Drive Technical Specification

Features	LED indication			Status indication, CAN network indication
	Communication unction	RS-232	baud rate	9600-115200
			protocol	Full duplex mode, ASCII or binary format
		CAN	baud rate	20kbit/s-1Mbit/s
			protocol	Canopen application layer DS -301V4.02
			equipment	DSP-402 Device Driver and Motion Control
			protocol	CoE, CiA-402
	Protective function			Overvoltage, overcurrent, undervoltage, overload, overheating, encoder abnormality, position tracking error is too large, etc.
Use environment	Installation Location			No corrosive gas, flammable gas, etc.
	Altitude			below 1000 meters
	temperature			-20℃~+40℃
	humidity			5%~95%RH, no condensation
	Vibration/Shock Strength			小于4.9m/s2/小于19.6m/s2
Feedback	Digital A/B quadrature encoder (-E, maximum rate 5M line/s)			
	Auxiliary encoder input/output (full closed loop control/-OP)			
	Simulate sin/cos encoder (-s) optional			
	Resolver (-R) optional			
	Digital Hall (-H(UN/W, 120 degree electrical phase difference))			

SE2 DC Servo Drive System Wiring Diagram



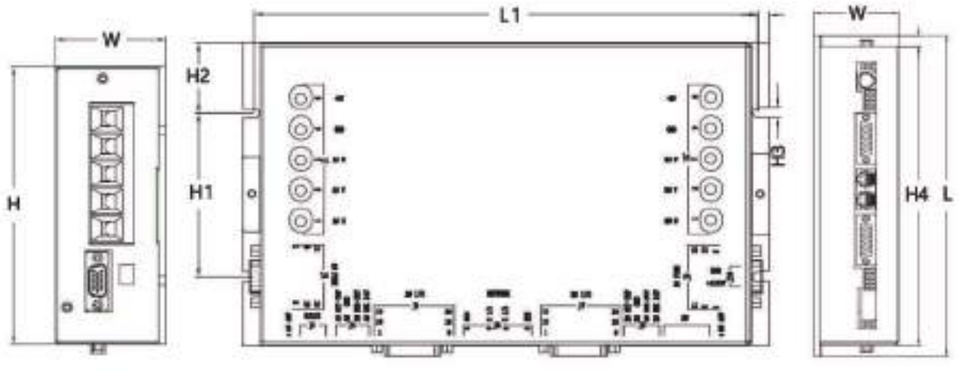
Motor encoder feedback J2 &J9

pin	definition	function	pin	definition	function
1	SIN+	SIN+	9	W+	Motor encoder W+ input
2	SIN-	SIN-	10	COS+	COS+
3	U+	Motor encoder U+ input	11	B-(DAT-)	Motor encoder B-input (Absolute encoder DAT-)
4	+5V	Motor signal line +5V	12	B+(DAT+)	Motor encoder B+input (Absolute encoder DAT+)
5	0V	Motor signal line GND	13	A-	Motor encoder A input
6	V+	Motor encoder V+ input	14	A+	Motor encoder A+ input
7	Z-	Motor encoder Z-input	15	COS-	COS-
8	Z+	Motor encoder Z+input			

SW DIP switch corresponding station number

SW switch serial number	Corresponding station number	SW switch serial number	Corresponding station number
1	1	5	16
2	2	6	32
3	4	7	64
4	8	8	128

Dimensions of SE2 DC Servo Drive



model	L	L1	W	H	H1	H2	H3	H4
SE2PC-09003A~50A	208	198	40	118	101	/	4-4.8	192
SE2PC-09075A~150A	245	235	59	148	80	34.5	5	229
SE2PC-18024A	208	198	40	118	101	/	4-4.8	192
SE2PC-18050A~75A	245	235	59	148	80	34.5	5	229
SE2PC-135100A								

ABC306 Low voltage DC servo driver

ABC306 low-voltage DC servo driver is developed with high-performance processor, providing users with a cost-effective servo control solution, pursuing the functions and performance that are closest to the application on the premise of ensuring stability and reliability. Compared with stepping products, it has low noise, low heat generation, high speed, constant torque output, and no step loss; compared with stepping servo products, it completely abandons the inherent disadvantages of stepping products, and has better functions, performance and reliability. Excellent; compared with well-known foreign servos, the performance is close, the price is low, and it is easy to use. ABC306 is small in appearance and powerful in function, especially suitable for high-performance motion requirements and applications with small installation space, and can be customized according to needs. It is a cost-effective servo drive solution.

5-100W power
(DC standard type)
server Driver

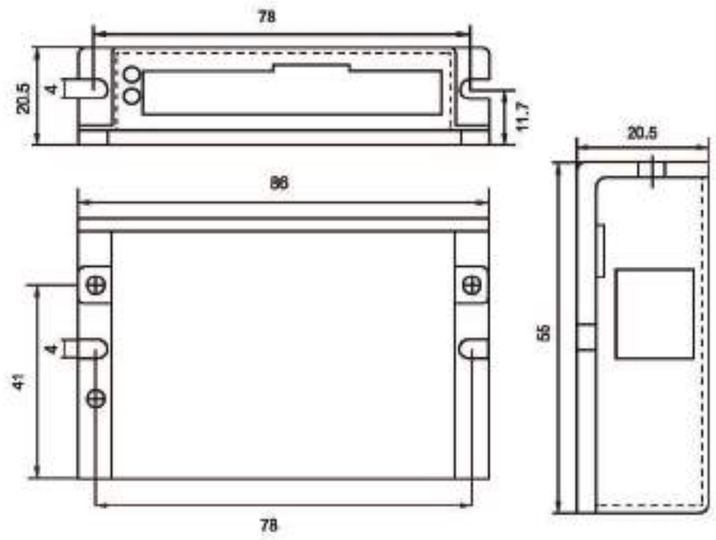
Selection list

model	Peak current (A)	Voltage (VDC)	Adapter motor	Dimensions (mm)	way to control
ABC306	10	24	Low Voltage DC Servo Motor Brushless DC motor with encoder Hollow Cup Servo Motor (100W and below)	86*55*20.5	Pulse (single-ended/differential), analog, CAN bus, RS232, IO

Application Features

Operating Voltage	24VDC
Output current	peak 10A
Adapter motor	5 ~ 100W low voltage DC servo motor, brushless DC motor with encoder or hollow cup motor
way to control	External pulse (single ended / differential), analog quantity, can bus, RS232 communication control, IO control, etc., supporting position, speed and torque modes
Parameter debugging	It adopts RS232 communication, PC debugging software or handheld debugger debugging, and can back up and import parameters
Abnormal protection	It has the alarm functions of undervoltage, overvoltage, overload, overcurrent, excessive position deviation, encoder abnormality and so on
tracking error	±1pulse
Speed control accuracy	±1PRM
Upper limit of received pulse	1MHZ
Minimum speed	1RPM
Maximum no-load acceleration	200PRM/ms

Appearance dimension

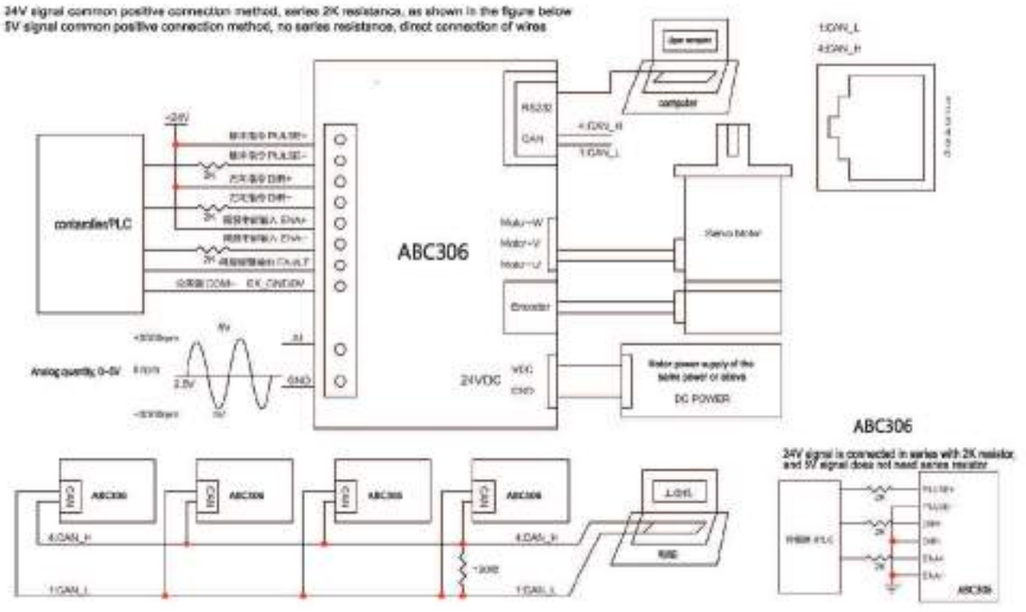


Note: the volume can be smaller without adding shell

Physical interface diagram

1. RS232 / CAN interface
2. Control signal I / O interface
3. Encoder input interface
4. Power line and power interface

Wiring diagram



ABC306 common cathode connection method (only limited to pulse direction enable signal)

ABC806 Low voltage DC servo driver

ABC806 low-voltage DC servo driver is developed with high-performance processor to provide users with a cost-effective servo control solution. On the premise of ensuring stability and reliability, it pursues the function and performance closest to the application. Compared with stepping products, it has low noise, low heating, high speed, constant torque output and no step loss; Compared with stepping servo products, it completely abandons the inherent disadvantages of stepping products, and has better function, performance and reliability; Compared with foreign well-known servo, it has close performance, affordable and easy to use. ABC806 is a classic low-voltage DC servo drive scheme, which has high cost performance and high reliability, and can be customized according to requirements. It is suitable for applications with high cost requirements.

100w-400w power
(DC standard)
Servo driver

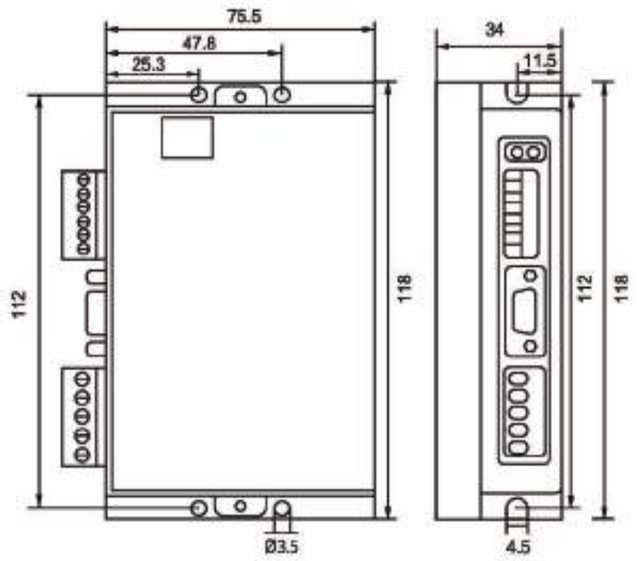
Selection list

model	Peak current (A)	Voltage (VDC)	Adapter motor	Dimensions (mm)	way to control
ABC806	10	24-60	Low Voltage DC Servo Motor Brushless DC motor with encoder Hollow Cup Servo Motor (600W and below)	118*75.5*34	Pulse (single-ended/differential), analog, CAN bus, RS232, IO

Application Features

Operating Voltage	24~60VDC
Output current	peak 10A
Adapter motor	5 ~ 600W low voltage DC servo motor, brushless DC motor with encoder or hollow cup motor
way to control	External pulse (single ended / differential), analog quantity, can bus, RS232 communication control, IO control, etc., supporting position, speed and torque modes
Parameter debugging	It adopts RS232 communication, PC debugging software or handheld debugger debugging, and can back up and import parameters
Abnormal protection	It has the alarm functions of undervoltage, overvoltage, overload, overcurrent, excessive position deviation, encoder abnormality and so on
tracking error	±1pulse
Speed control accuracy	±1PRM
Upper limit of received pulse	1MHZ
Minimum speed	1RPM
Maximum no-load acceleration	200PRM/ms

Appearance dimension

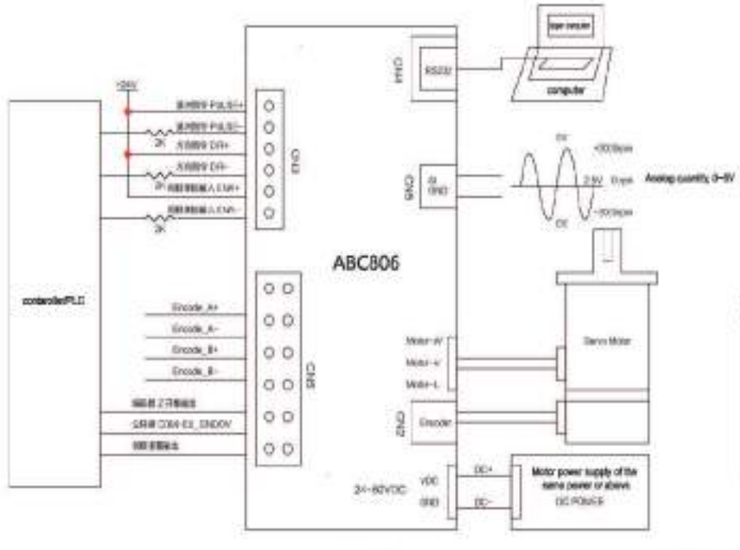


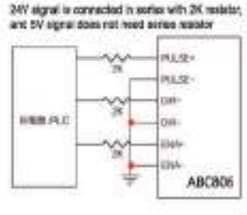
Physical interface diagram

1. Braking resistance
2. Control signal I / O interface
3. Encoder input interface
4. Motor power line and power interface
5. RS232 / RS485 / can communication interface
6. Analog input interface
7. ID dial setting

Wiring diagram

24V signal common positive connection method, series 2K resistance, as shown in the figure below
5V signal common positive connection method, no series resistance, direct connection of wires





ABC806 common cathode connection method (only limited to pulse direction enable signal)

ABC830 Low voltage DC servo driver

ABC830 low-voltage DC servo driver is developed with high-performance processor to provide users with a cost-effective servo control solution. On the premise of ensuring stability and reliability, it pursues the function and performance closest to the application. Compared with stepping products, it has low noise, low heating, high speed, constant torque output and no step loss; Compared with stepping servo products, it completely abandons the inherent disadvantages of stepping products, and has better functional performance and reliability; Compared with foreign well-known servo, it has close performance, low price and easy to use. ABC830 is the function and power enhanced version of ABC806, with high cost performance and reliability. It is suitable for applications with various control modes.

EtherCAT. CANopen ePLC RS485

100w-400w power
(DC standard)
Servo driver

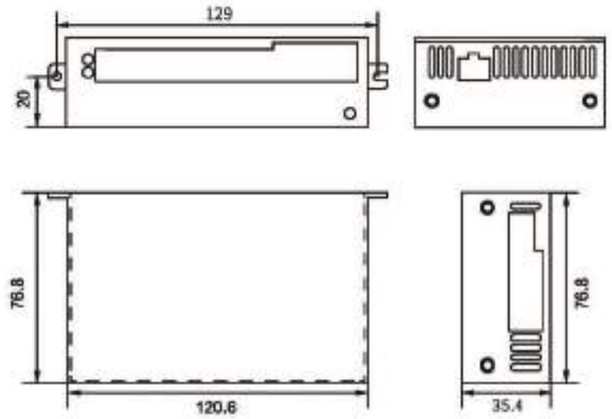
Selection list

model	Peak current (A)	Voltage (VDC)	Adapter motor	Dimensions (mm)	way to control
ABC830	30	24-60	Low voltage DC servo motor (750W and below)	120.6*76.8*35.4	Pulse (single-ended/differential), analog, CAN bus, RS232, IO

Application Features

Operating Voltage	24~60VDC
Output current	peak 30A
Adapter motor	5 ~ 750W low voltage DC servo motor
way to control	External pulse (single ended / differential), can bus, RS485 bus, RS232 communication control, I0 control, etc., supporting position, speed and torque modes
Parameter debugging	It adopts RS232 communication, PC debugging software or handheld debugger debugging, and can back up and import parameters
Abnormal protection	It has the alarm functions of undervoltage, overvoltage, overload, overcurrent, excessive position deviation, encoder abnormality and so on
tracking error	±1pulse
Speed control accuracy	±1PRM
Upper limit of received pulse	1MHZ
Minimum speed	1RPM
Maximum no-load acceleration	200PRM/ms

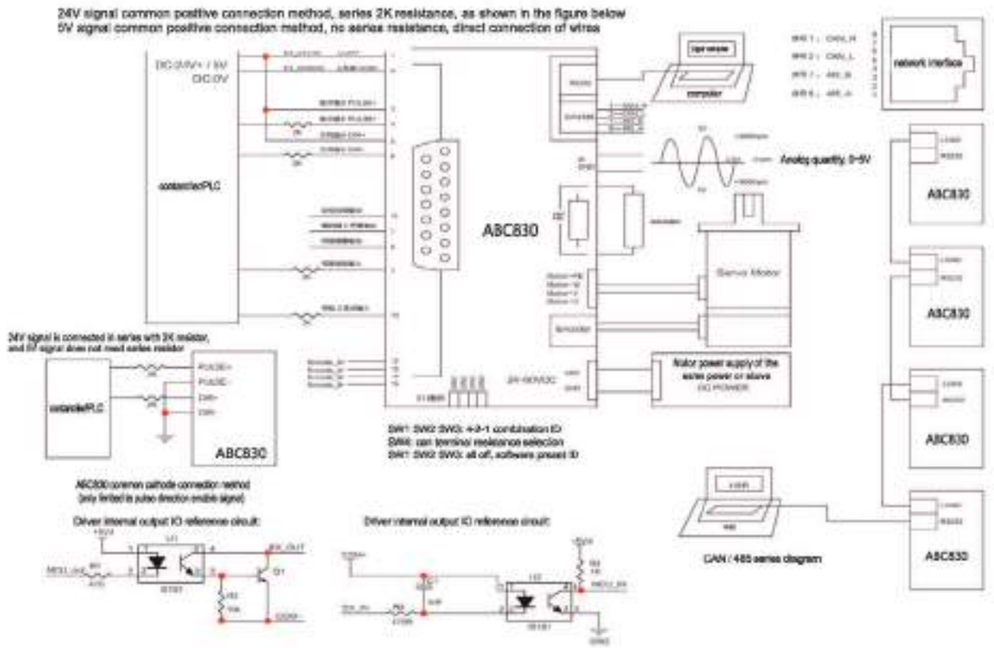
Appearance dimension



Physical interface diagram

1. Braking resistance
2. Control signal I / O interface
3. Encoder input interface
4. Motor power line and power interface
5. RS232 / RS485 / can communication interface
6. Analog input interface
7. ID dial setting

Wiring diagram



ABC850 Low voltage DC servo driver

ABC850 low-voltage DC servo driver is developed with high-performance processor to provide users with a cost-effective servo control solution. On the premise of ensuring stability and reliability, it pursues the function and performance closest to the application. Compared with stepping products, it has low noise, low heating, high speed, constant torque output and no step loss; Compared with stepping servo products, it completely abandons the inherent disadvantages of stepping products, and has better function, performance and reliability; Compared with foreign well-known servo, it has close performance, low price and easy to use. ABC850 is the power amplification version of ABC830, with stronger load capacity and reliability. It is suitable for high load applications.

EtherCAT. CANopen ePLC RS485

600w-1500w power
(DC bus control type)
Servo driver

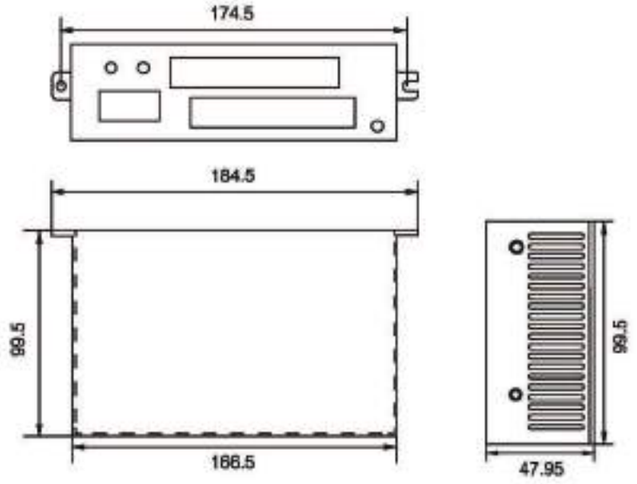
Selection list

model	Peak current (A)	Voltage (VDC)	Adapter motor	Dimensions (mm)	way to control
ABC850	50	24-80	Low voltage DC motor (1500W and below)	166.5*99.5*47.95	Pulse (single-ended/differential), analog, CAN bus, RS232, IO

Application Features

Operating Voltage	24~80VDC
Output current	peak 50A
Adapter motor	5 ~ 150W low voltage DC servo motor
way to control	External pulse (single ended / differential), can bus, RS485 bus, RS232 communication control, I0 control, etc., supporting position, speed and torque modes
Parameter debugging	It adopts RS232 communication, PC debugging software or handheld debugger debugging, and can back up and import parameters
Abnormal protection	It has the alarm functions of undervoltage, overvoltage, overload, overcurrent, excessive position deviation, encoder abnormality and so on
Support energy consumption relief function	
tracking error	±1pulse
Speed control accuracy	±1PRM
Upper limit of received pulse	1MHZ
Minimum speed	1RPM
Maximum no-load acceleration	200PRM/ms

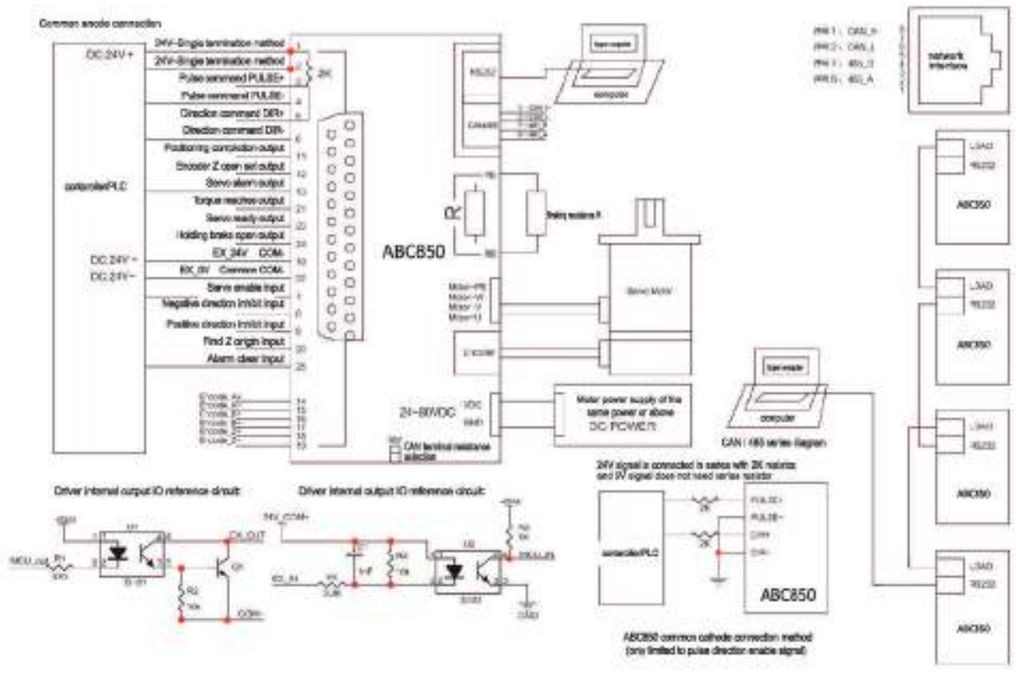
Appearance dimension



Physical interface diagram

1. Communication interface
2. Braking resistance interface
3. Power line interface
4. Power interface
5. Control signal I / O interface
6. Encoder input interface

Wiring diagram



Brushless motor system

- Speed loop and current loop double loop drive
- Selection of multiple speed regulation modes
- Low temperature rise, low heating and low noise
- customized service for product scheme

Brushless product characteristics

Rich speed mode selection

WSD series brushless DC motor driver can support the selection of multiple speed regulation modes. Some products can have up to 5 speed regulation modes through code pulling setting

- Built in potentiometer speed regulation
- External analog speed regulation
- Pulse frequency speed regulation
- External potentiometer speed regulation
- PWM speed regulation
- RS-485 communication speed regulation (with communication port)

Motor acceleration / deceleration control open

WSD series brushless DC motor driver is suitable for different application fields and fields. It opens the function of controlling the acceleration time and deceleration time of Brushless DC motor.

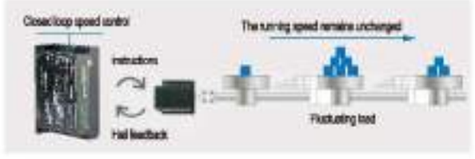
Acceleration time refers to the time required to reach the rated speed from standstill, and deceleration time refers to the time required to stop the motor from the rated speed.

The acceleration and deceleration time can be adjusted by turning the potentiometer left and right, and the setting range is 0.3 ~ 15s.

The driver has two control modes: open-loop and closed-loop

In order to improve the speed stability of load variation during operation, WSD series brushless DC motor driver has open / closed-loop switching control function.

- open loop speed control (factory default): suitable for constant load application environment, with good speed stability and small impulse current.
- closed loop speed control: it is applicable to variable load application environment. The feedback signal is used to stabilize the speed output. The application environment with high requirements for speed accuracy can be switched to closed-loop speed control.



Motor locked rotor torque holding function

WSD series brushless DC motor driver has the function of maintaining motor torque when locked rotor reaches the set current.

- the locked rotor torque can be adjusted arbitrarily (within the adjustable range).
- this locked rotor torque is a short-term behavior and cannot be used as brake locked rotor.

Selection of brushless reduction motor

57	BLD	100	–	24	A	–	25S	M
①	②	③		④	⑤		⑥	⑦

①		Model & Dimension			
	Code	42	57	86	110
	Mounting flange mm	□ 42	□ 57	□ 86	□ 110
	Case dimension	42*42	57*57	86*86	110*110
②	Motor type	BLD: DC Brushless gear motor			
③	(W) Output power (W)	(e.g) 100: 100W			
④	Voltage	(e.g) 24: 24VDC (Optional voltage 24V–48VDC, single phase 100V–120VAC, single phase 220V–240VAC, 50/60Hz)			
⑤	Relative to square type gear box: Motor shaft type L type gearbox: Shaft shape	GN: GN type gear shaft GU: GU type gear shaft GNL: GN Type L GN series gear shaft (Mainly for 2&4 series) GUL: Type L GU series gear shaft (Mainly for 5&6 series)			
	Shape of the output shaft: A: Circular shaft type	A1: Keyway type			
⑥	Motor speed	(e.g) 25S: 2500RPM	Low voltage for 30S		
⑦	Motor parts M: Electromagnetic brake BFE: Closed loop feedback mode, generally refers to the motor to increase the encoder (Including the simple holzer encoder)				

■ Gear reducer

5	GU	50	LC
①	②	③	④

①	Gearhead frame size	2: 60mm 4: 80mm 5: 90mm 6: 104mm
②	Gear type	ype GN gear shaft (For L series 2&4) Type GU gear shaft (For L series 5&6)
③	Gear ratio	(例e.g) 50: 减速比 50: Reduction ratio
④	Bearing type	K：Standard parallel axis output LC：type hollow shaft output reducer RC: Hollow shaft output of spiral bevel gear RT: Solid shaft output of spiral bevel gear

■ Square Shape Gearbox

PAV	050	20
①	②	③

①	Precision worm gear reducer	
②	Frame number	030 040 050 063 075 090 110 130 150
③	Gear ratio	5 / 7.5 / 10 / 15 / 20 / 25 / 30 / 50 / 60

■ Standard Type Planetary Gearbox

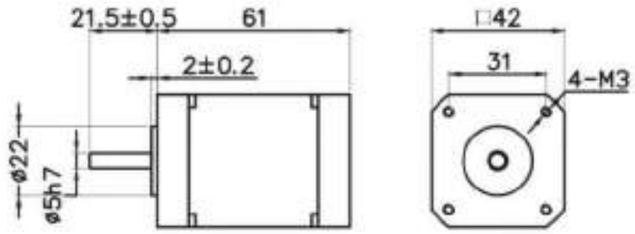
PLF	060	5	S2	P2
①	②	③	④	⑤

①	Planetary Gearbox	
②	Reducer Model	PLF040, PLF060, PLF080, PLF090, PLF120, PLF160
③	Gear ratio	1-stage: 3,4,5,6,7,8,9,10 2-stage: 12,15,16,20,25,28,30,35,40,50,70,80,100
④	Output Shaft Keyway	S1：(Solid Output Shaft No Keyway)、S2：(Standard (Keyway)、S3：Output for holes
⑤	Backlash Grade	P0：High precision backlash、P1：Precision backlash、P2：Standard backlash

40W Optical axis brushless motor

42 Brushless motor Outline drawing (Unit mm)

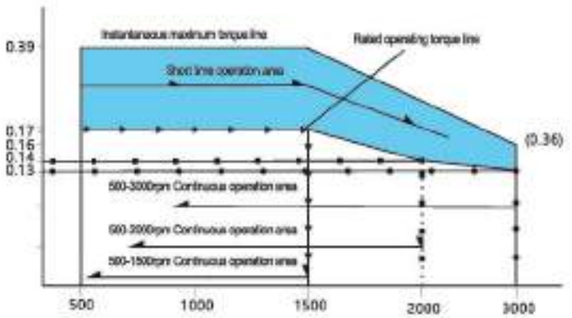
Mounting screws are included with gearhead



SPECS / CONTINUOUS RATING

Motor model	power W	Voltage V	No load speed rpm	Rated speed rpm	Rated current A	Rated torque N.m	Maximum torque N.m	No load current A	Recommended drive model
42BLD40-12A-30S	40	12	3300	3000	4.17	0.13	0.38	<1.2A	WSD-120A
42BLD40-24A-30S	40	24	3300	3000	2.08	0.13	0.38	<0.9A	WSD-70
42BLD40-36A-30S	40	36	3300	3000	1.39	0.13	0.38	<0.6A	WSD-120A
42BLD40-48A-30S	40	48	3300	3000	1.04	0.13	0.38	<0.4A	WSD-300B
42BLD40-310A-30S	40	310	3300	3000	0.16	0.13	0.38	<0.06A	WSD-350B

40W Brushless motor curve diagram



- instantaneous maximum torque line: the maximum torque of motor starting and instantaneous impact load; Exceeding this torque will cause overcurrent protection of the driver and shutdown;
- short time operation area: when the motor rotates at different speeds, it can operate at a short speed within this torque range. If the time is too long, it is easy to cause the motor to heat up, resulting in burning or driving overheating, driving protection and shutdown;
- rated operating torque line: the motor can run for a long time under the fixed torque at different speeds;
- continuous operation area: at different speeds, the motor operates continuously in this corresponding section;

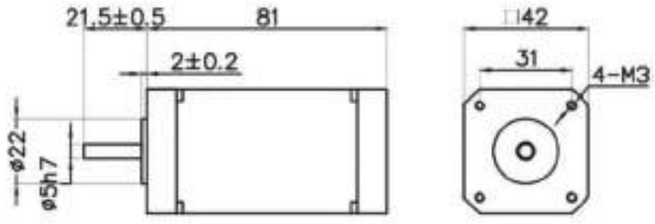
High Voltage Wrie Plughole Corresp-onding Signal Explanation

The meaning of wiring correspondance									
1	2	3	4	5	6	7	8	9	10
Black (thick)	Blue (thin)	Red (thick)	Green (thin)	Yellow (thick)	white (thin)		Wire mesh	Red (thin)	Black (thin)
W	H u	U	H v	V	H w			Vcc+ 5V	GND

50W Optical axis brushless motor

42 Brushless motor Outline drawing (Unit mm)

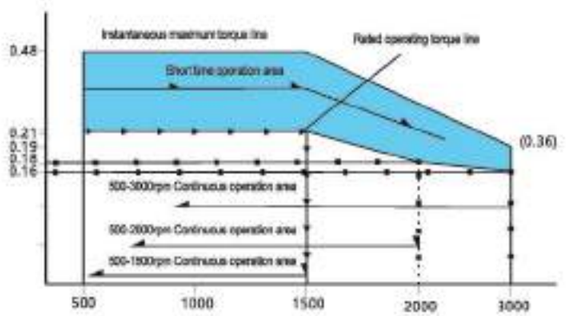
Mounting screws are included with gearhead



SPECS / CONTINUOUS RATING

Motor model	power W	Voltage V	No load speed rpm	Rated speed rpm	Rated current A	Rated torque N.m	Maximum torque N.m	No load current A	Recommended drive model
42BLD50-12A-30S	50	12	3300	3000	5.21	0.16	0.48	<1.3A	WSD-300B
42BLD50-24A-30S	50	24	3300	3000	2.60	0.16	0.48	<0.8A	WSD-70
42BLD50-36A-30S	50	36	3300	3000	1.74	0.16	0.48	<0.6A	WSD-300B
42BLD50- 48A-30S	50	48	3300	3000	1.30	0.16	0.48	<0.4A	WSD-300B
42BLD50-310A-30S	50	310	3300	3000	0.20	0.16	0.48	<0.05A	WSD-350B

50W Brushless motor curve diagram



- instantaneous maximum torque line: the maximum torque of motor starting and instantaneous impact load; Exceeding this torque will cause overcurrent protection of the driver and shutdown;
- short time operation area: when the motor rotates at different speeds, it can operate at a short speed within this torque range. If the time is too long, it is easy to cause the motor to heat up, resulting in burning or driving overheating, driving protection and shutdown;
- rated operating torque line: the motor can run for a long time under the fixed torque at different speeds;
- continuous operation area: at different speeds, the motor operates continuously in this corresponding section;

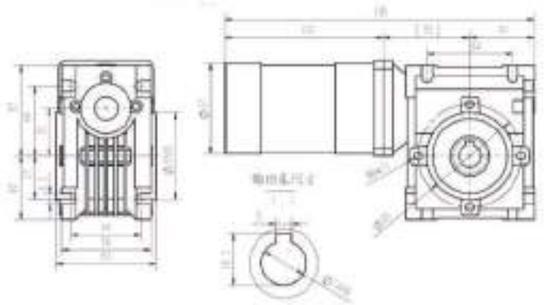
High Voltage Wrie Plughole Corresp-onding Signal Explanation

The meaning of wiring correspondance									
1	2	3	4	5	6	7	8	9	10
Black (thick)	Blue (thin)	Red (thick)	Green (thin)	Yellow (thick)	white (thin)		Wire mesh	Red (thin)	Black (thin)
W	H u	U	H v	V	H w			Vcc+ 5V	GND

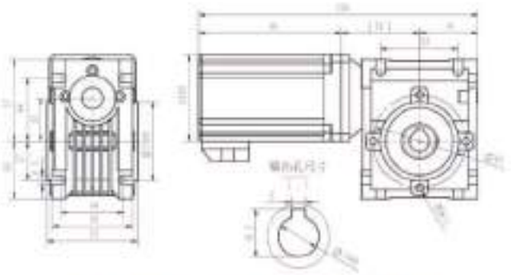
150W Brushless motor with RV

■ 57/60 Brushless motor with RV drawing(Unit mm)

Mounting screws are included with gearhead



57 type brushless motor with RV030



60 type brushless motor with RV030

■ ALLOWABLE TORQUE BEING WITH GEARHEAD

Type of reducer	Reducer model	Reduction ratio
Worm gear reducer	RV030-□	7.5、10、15、20、25 30、40、50、60、80

The middle port of the reducer model is the value of the reduction ratio

- The middle port of the reducer model is the value of the reduction ratio
- The speed is calculated by dividing the rated speed of the motor by the reduction ratio. The actual speed will be reduced by about 2% - 20% compared with the value shown with the change of load.
- Marked with * is an unconventional model, which is not recommended.

Reduction ratio	7.5	10	15	20	25	30	40	50	60	80
Rated output speed (RPM)	267	200	133	100	80	67	50	40	33	25
Rated output torque (Nm)	4.3	5.7	8.6	11.2	13.6	15.9	17.0	12.0	17.0	12.0

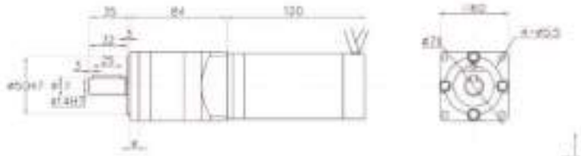
● High Voltage Wrie Plughole Corresp-onding Signal Explanation

The meaning of wiring correspondence									
1	2	3	4	5	6	7	8	9	10
Black (thick)	Blue (thin)	Red (thick)	Green (thin)	Yellow (thick)	white (thin)		Wire mesh	Red (thin)	Black (thin)
W	H u	U	H v	V	H w			Vcc+ 5V	GND

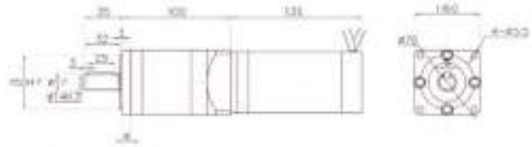
150W Brushless motor with planetary reducer

■ 57/60 Type brushless motor with planetary reducer drawing(Unit mm)

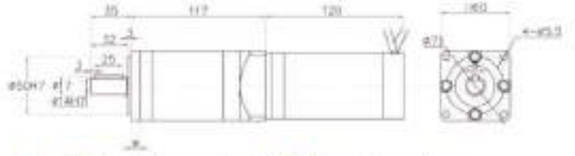
Mounting screws are included with gearhead



Type 57 brushless motor with 60 planetary reducer



Type 57 brushless motor with 60 planetary reducer



Type 57 brushless motor with 60 planetary reducer

■ ALLOWABLE TORQUE BEING WITH GEARHEAD

Type of reducer	Reducer model	Reduction ratio
Precision planetary reducer	PLF060-□	4、5、7、10、16、20、25、28 35、40、50、70、80、100、125 140、175、200、250

The middle port of the reducer model is the value of the reduction ratio

- The middle port of the reducer model is the value of the reduction ratio
- The speed is calculated by dividing the rated speed of the motor by the reduction ratio. The actual speed will be reduced by about 2% - 20% compared with the value shown with the change of load.
- Marked with * is an unconventional model, which is not recommended.

Reduction ratio	4	5	7	10	16	20	25	28	35	40	50	70	80	100	125	140	175	200	250
Rated output speed (RPM)	750	600	429	300	188	150	120	107	86	75	60	43	38	30	24	21	17	15	12
Rated output torque (Nm)	1.8	2.3	3.2	4.6	7.2	9.0	11.2	12.6	15.7	18.0	22.4	31.4	34.4	37.5	41.0	37.5	41.0	37.5	41.0
Maximum output torque (Nm)	5.5	6.9	9.6	13.8	21.5	26.9	33.7	37.7	47.1	53.9	66.0	43.0	75.0	75.0	82.0	75.0	82.0	75.0	82.0
Moment of inertia (kgcm²)	0.094	0.092	0.091	0.091	0.094	0.092	0.092	0.091	0.091	0.091	0.091	0.091	0.092	0.092	0.092	0.091	0.091	0.091	0.091

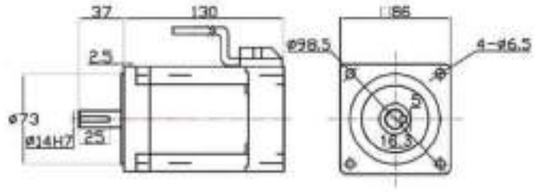
● High Voltage Wrie Plughole Corresp-onding Signal Explanation

The meaning of wiring correspondence									
1	2	3	4	5	6	7	8	9	10
Black (thick)	Blue (thin)	Red (thick)	Green (thin)	Yellow (thick)	white (thin)		Wire mesh	Red (Min)	Black (thin)
W	H u	U	H v	V	H w			Vcc+ 5V	GND

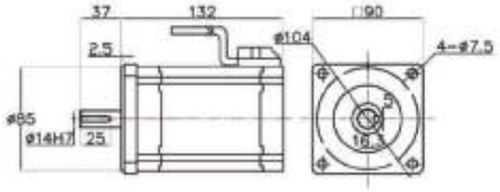
750W Optical axis brushless motor

■ 86 Brushless motor Outline drawing (Unit mm)

Mounting screws are included with gearhead



86 type brushless motor 86 square flange

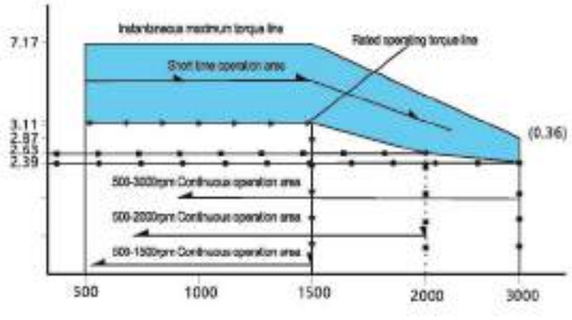


86 type brushless motor 90 square flange

■ SPECS / CONTINUOUS RATING

Motor model	power W	Voltage V	No load speed rpm	Rated speed rpm	Rated current A	Rated torque N.m	Maximum torque N.m	No load current A	Recommended drive model
86BLD750-24A-30S	750	24	3300	3000	39.06	2.39	7.16	<9.2A	WSD- 4850
86BLD750-36A-30S	750	36	3300	3000	26.04	2.39	7.16	<8.13A	WSD 4830
86BLD750- 48A-30S	750	48	3300	3000	19.53	2.39	7.16	<6.5A	WSD-750
86BLD750-310A-30S	750	310	3300	3000	3.02	2.39	7.16	<1.61A	WSD-750A

● 200W Brushless motor curve diagram

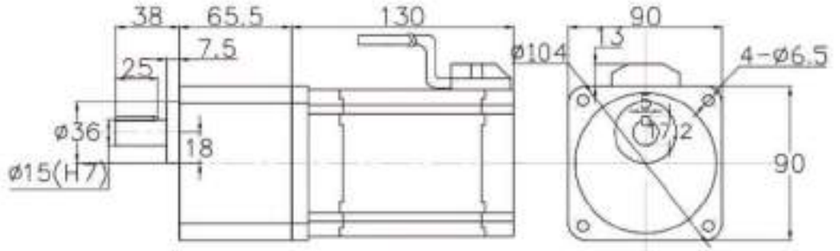


- instantaneous maximum torque line: the maximum torque of motor starting and instantaneous impact load; Exceeding this torque will cause overcurrent protection of the driver and shutdown;
- short time operation area: when the motor rotates at different speeds, it can operate at a short speed within this torque range. If the time is too long, it is easy to cause the motor to heat up, resulting in burning or driving overheating, driving protection and shutdown;
- rated operating torque line: the motor can run for a long time under the fixed torque at different speeds;
- continuous operation area: at different speeds, the motor operates continuously in this corresponding section;

750W Brushless motor with reducer

■ 86 brushless motor with 90 reducer drawing(Unit mm)

Mounting screws are included with gearhead



86 type brushless motor with 90 type reducer

■ ALLOWABLE TORQUE BEING WITH GEARHEAD

Type of reducer	Reducer model	Reduction ratio
Long life - low noise	5GU□K	3、5、7.5、10、12.5、15、18、20 25、30、36、40、50、60、75、90 100、150、180、200

The middle port of the reducer model is the value of the reduction ratio

- The middle port of the reducer model is the value of the reduction ratio
- Color indicates that the motor operates in the same direction, while others are in the opposite direction.
- The speed is calculated by dividing the rated speed of the motor by the reduction ratio. The actual speed will be
- reduced by about 2% - 20% compared with the value shown with the change of load.

Marked with * is an unconventional model, which is not recommended.

Reduction ratio	3	5	7.5	10	12.5	15	18	20	25	30	36	40	50	60	75	90	100	120	150	180	200	300*
Output shaft speed r / min	1000	600	400	300	240	200	166.7	150	120	100	83.33	75	60	50	40	33.33	30	25	20	16.67	15	10
Gu allowable torque N.m	5.802	9.669	14.5	19.34	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Gu allowable torque kgf.cm	58.02	96.69	145	193.4	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200

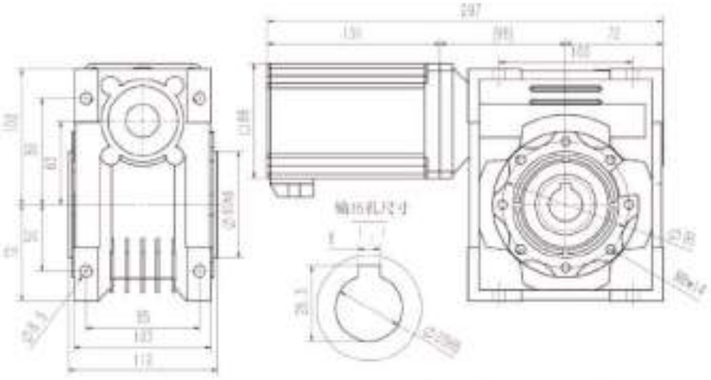
● High Voltage Wrie Plughole Corresp-onding Signal Explanation

The meaning of wiring correspondence									
1	2	3	4	5	6	7	8	9	10
Black (thick)	Blue (thin)	Red (thick)	Green (thin)	Yellow (thick)	white (thin)		Wire mesh	Red (thin)	Black (thin)
W	H u	U	H v	V	H w			Vcc+ 5V	GND

750W Brushless motor with RV

■ 86 Brushless motor with RV drawing(Unit mm)

Mounting screws are included with gearhead



86 type brushless motor with RV063

■ ALLOWABLE TORQUE BEING WITH GEARHEAD

Type of reducer	Reducer model	Reduction ratio
turbo-Worm Reducer	RV063-□	7.5、10、15、20、25、30 40、50、60、80、100

The middle port of the reducer model is the value of the reduction ratio

- The middle port of the reducer model is the value of the reduction ratio
- The speed is calculated by dividing the rated speed of the motor by the reduction ratio. The actual speed will be reduced by about 2% - 20% compared with the value shown with the change of load.
- Marked with * is an unconventional model, which is not recommended.

Reduction ratio	7.5	10	15	20	25	30	40	50	60	80	100
Rated output speed (RPM)	267	200	133	100	80	67	50	40	33	25	20
Rated output torque (Nm)	21.5	28.7	43.0	55.9	68.0	79.5	100.3	116.4	94.0	115.0	87.0

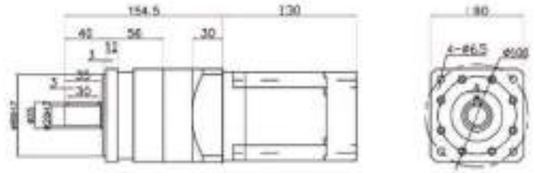
● High Voltage Wrie Plughole Corresp-onding Signal Explanation

The meaning of wiring correspondence									
1	2	3	4	5	6	7	8	9	10
Black (thick)	Blue (thin)	Red (thick)	Green (thin)	Yellow (thick)	white (thin)		Wire mesh	Red (thin)	Black (thin)
W	H u	U	H v	V	H w			Vcc+ 5V	GND

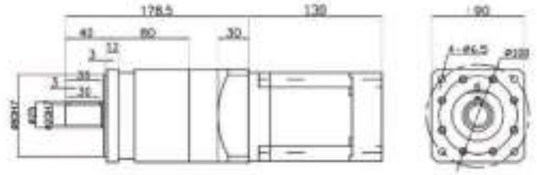
750W Brushless motor with planetary reducer

■ 86 Type brushless motor with planetary reducer drawing(Unit mm)

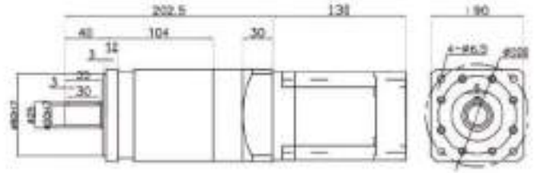
Mounting screws are included with gearhead



86 brushless motor with 90 planetary reducer



86 brushless motor with 90 planetary reducer



86 brushless motor with 90 planetary reducer

■ ALLOWABLE TORQUE BEING WITH GEARHEAD

Type of reducer	Reducer model	Reduction ratio
Precision planetary reducer	PLF090-□	4、5、7、10、16、20、25、28 35、40、50、70、80、100、125 140、175、200、250

The middle port of the reducer model is the value of the reduction ratio

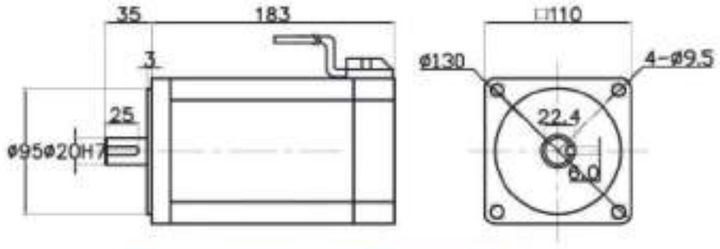
- The middle port of the reducer model is the value of the reduction ratio
- The speed is calculated by dividing the rated speed of the motor by the reduction ratio. The actual speed will be reduced by about 2% - 20% compared with the value shown with the change of load.
- Marked with * is an unconventional model, which is not recommended.

Reduction ratio	4	5	7	10	16	20	25	28	35	40	50	70	80	100	125	140	175	200	250
Rated output speed (RPM)	750	600	429	300	188	150	120	107	86	75	60	43	38	30	24	21	17	15	12
Rated output torque (Nm)	9.2	11.5	16.0	22.9	35.9	44.9	56.1	62.8	78.5	89.8	112.2	143.0	179.5	219.7	264.0	240.0	264.0	240.0	264.0
Maximum output torque (Nm)	27.5	34.4	48.1	68.8	107.7	134.7	168.3	188.5	211.0	192.0	211.0	143.0	240.0	240.0	264.0	240.0	264.0	240.0	264.0
Moment of inertia (kgcm²)	0.094	0.092	0.091	0.091	0.094	0.092	0.092	0.091	0.091	0.091	0.091	0.091	0.092	0.092	0.092	0.091	0.091	0.091	0.091

2000W Optical axis brushless motor

110 Brushless motor Outline drawing (Unit mm)

Mounting screws are included with gearhead

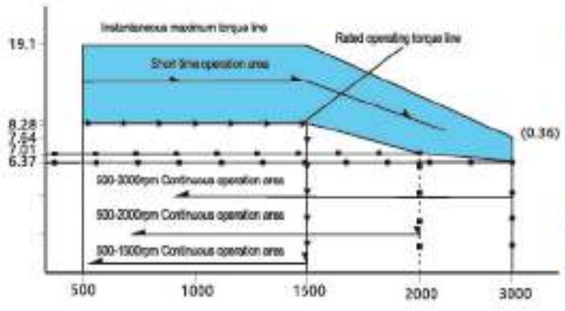


110 type brushless motor 110 square flange

SPECS / CONTINUOUS RATING

Motor model	power W	Voltage V	No load speed rpm	Rated speed rpm	Rated current A	Rated torque N.m	Maximum torque N.m	No load current A	Recommended drive model
1108LD2000-48A-305	2000	48	3300	3000	52.08	6.37	19.10	<16A	WSD-24150
1108LD2000-310A-305	2000	310	3300	3000	8.06	6.37	19.10	<2.3A	WS-2206

1500W Brushless motor curve diagram



- instantaneous maximum torque line: the maximum torque of motor starting and instantaneous impact load; Exceeding this torque will cause overcurrent protection of the driver and shutdown;
- short time operation area: when the motor rotates at different speeds, it can operate at a short speed within this torque range. If the time is too long, it is easy to cause the motor to heat up, resulting in burning or driving overheating, driving protection and shutdown;
- rated operating torque line: the motor can run for a long time under the fixed torque at different speeds;
- continuous operation area: at different speeds, the motor operatas continuously in this corresponding section;

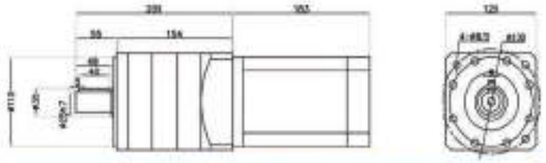
High Voltage Wrie Plughole Corresp-onding Signal Explanation

The meaning of wiring correspondence									
1	2	3	4	5	6	7	8	9	10
Black (thick)	Blue (thin)	Red (thick)	Green (thin)	Yellow (thick)	white (thin)		Wire mesh	Red (thin)	Black (thin)
W	H u	U	H v	V	H w			Vcc+ 8V	GND

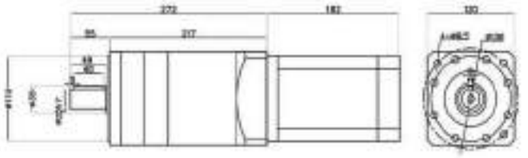
2000W Brushless motor with planetary reducer

110 Type brushless motor with planetary reducer drawing(Unit mm)

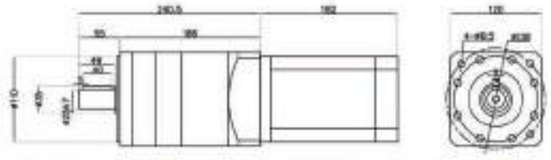
Mounting screws are included with gearhead



110 type brushless motor with 120 planetary reducer level 1



110 type brushless motor with 120 planetary reducer level 3



110 type brushless motor with 120 planetary reducer level 2

ALLOWABLE TORQUE BEING WITH GEARHEAD

Type of reducer	Reducer model	Reduction ratio
Precision planetary reducer	PLF120-□	1 pole: 4、5、7、10 2 pole: 16、20、25、28、35、40、50、70 3 pole: 80100、125、140、175、200、250

The middle port of the reducer model is the value of the reduction ratio

- The middle port of the reducer model is the value of the reduction ratio
- The speed is calculated by dividing the rated speed of the motor by the reduction ratio. The actual speed will be reduced by about 2% - 20% compared with the value shown with the charge of load.
- Marked with * is an unconventional model, which is not recommended.

Reduction ratio	3	4	5	7	10	16	20	25	28	35	40	50	80	100	125	140	175	200	250
Rated output speed (RPM)	1000	750	600	429	300	188	150	120	107	86	75	60	38	30	24	21	17	15	12
Rated output torque (Nm)	18	24	31	43	61	96	120	150	168	209	239	264	310	310	329	310	301	310	329
Maximum output torque (Nm)	55.0	73.3	91.7	128.4	183.4	287.3	359.1	448.9	500.0	528.0	500.0	528.0	620.0	620.0	658.0	620.0	658.0	620.0	658.0
Moment of inertia (kgcm²)	1.65	1.22	1.15	1.13	1.11	1.22	1.15	1.15	1.13	1.13	1.11	1.11	1.15	1.15	1.15	1.13	1.13	1.11	1.11

High Voltage Wrie Plughole Corresp-onding Signal Explanation

The meaning of wiring correspondence									
1	2	3	4	5	6	7	8	9	10
Black (thick)	Blue (thin)	Red (thick)	Green (thin)	Yellow (thick)	write (thin)		Wire mesh	Red (thin)	Black (thin)
W	H u	U	H v	V	H w			Vcc+ 8V	GND

60 Series of brushless DC motor

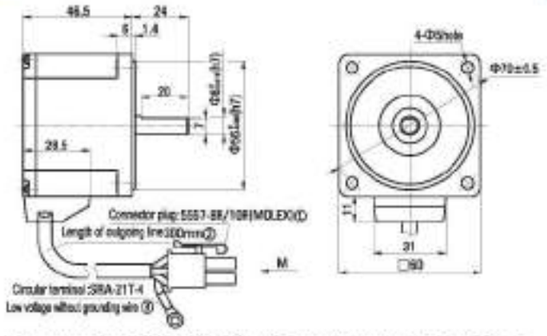
Basic Characteristics Of Motor

- 25W (DC Power Supply When Applied To 24VDC/36VDC/48VDC)

Rated power (Continuous)		W	25 (15W/25W)		
Rated speed		r/min	3000		
Rated torque		N.m	0.096		
Instantaneous maximum torque		N.m	0.144		
Rotor moment of inertia		J:X10 $^{-4}$ kg.m ^{2}	0.042		
Speed control range		RPM	High pressure 200-2500RPM (Low pressure 200-3000RPM)		
Speed control range	On load		Below ±1%: condition 0--rated torque, rated speed, rated voltage, room temperature		
	On voltage		Below±1%: condition rated voltage ±10%, rated speed, rated load, room temperature		
	On temperature		Below±1%: Conditions of ambient temperature 0~+40°C rated voltage, rated load and rated speed		
Power input	Rated voltage	V	Single phase 110V	Single phase 220V	24VDC (Optional 36VDC/48VDC)
	Voltage tolerance range		±10%		
	Frequency	Hz	50/60		/
	Frequency tolerance range		±5%		/
	Rated input current	A	1.0	0.6	1.7
	Instantaneous maximum input current	A	2.0	1.2	2.6

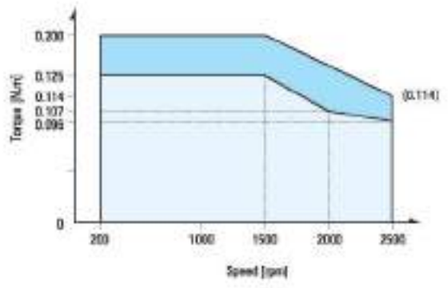
Circular Shaft Type Optical Motor

- Z2BLD25-□A-25S □ Voltage 24/36/48/110/220



①Connector: 5557-8R/10R (MOLEX) ②The sheath length of lead line 300mm
③Round terminal: SRA-21T-4 (Low ground)

- Z2BLD25-220A-25S Diagram (ZD Standard Drive)



- Low Voltage Wrie Plughole Corresp-onding Signal Explanation

plughole	1	2	3	4
signal	U	W	Hv	Hu
plughole	5	6	7	8
signal	V	GND	Hw	Vcc

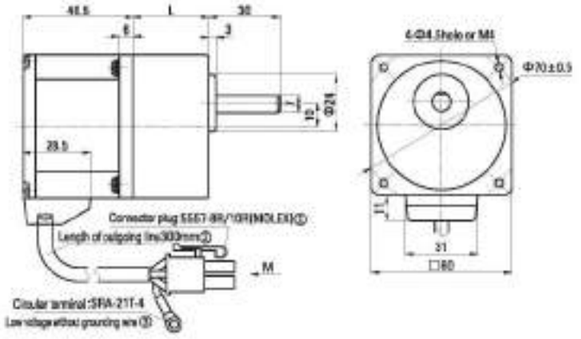
- High Voltage Wrie Plughole Corresp-onding Signal Explanation

The meaning of wiring correspondence										
1	2	3	4	5	6	7	8	9	10
Black (thick)	Blue (thin)	Red (thick)	Green (thin)	Yellow (thick)	white (thin)		Wire mesh	Red (thin)	Black (thin)
W	Hu	U	Hv	V	Hw			Vcc+5V	GND

■ 25W

• Parallel Shaft Speed Reducer

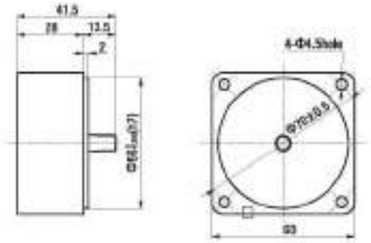
Z2BLD25-□GN-25S/2GN□K □Voltage 24/36/48/110/220
□ Velocity Ratio Value



①Connector: 5557-8R/10R (MOLEX) ②The sheath length of lead line 300mm
③Round terminal: SRA-21T-4 (Low ground)

• Decimal Gearhead

2GN□XK
□ Velocity Ratio Value, Generally 10



Gearhead Model	Gear Ratio	L Dimension
2GN□K	3—18	32&41
	20—200	41

- Enter the gear ratio in the box (□) within the model name

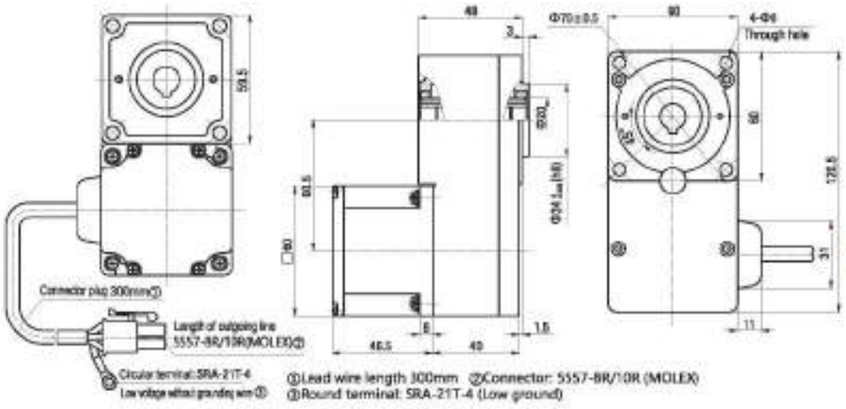
- Z2BLD15-□GN-25S/2GN□K Machine Allowable Torque (Unit: N.m)

Model	Reduction Ratio / Motor Speed	3	3.6	5	6	7.5	9	10	12.5	15	18	20	25	30	36	50	60	75	90	100	120	150	180	200
Z2BLD25-□GN	200~1500RPM	0.30	0.36	0.50	0.60	0.75	0.91	1.00	1.26	1.51	1.81	1.81	2.27	2.72	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
	2000RPM	0.29	0.35	0.49	0.58	0.73	0.87	0.97	1.21	1.46	1.75	1.75	2.18	2.61	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
	2500RPM	0.23	0.28	0.39	0.46	0.58	0.69	0.77	0.97	1.16	1.39	1.39	1.74	2.09	2.51	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

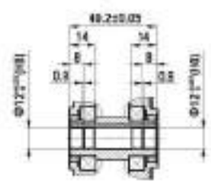
Note: The (blue) in the table indicates that the rotation direction is consistent with the motor.
The torque under different speed and speed ratio is obtained under the standard.)

• L Type Speed Reduce

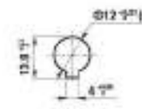
Z2BLD25-□GNL-25S/2GN□LC □ Voltage 24/36/48/110/220 □ Velocity Ratio Value



①Lead wire length 300mm ②Connector: 5557-8R/10R (MOLEX)
③Round terminal: SRA-21T-4 (Low ground)



- The Output Shaft Hole Structure



- Z2BLD25-□GNL-25S/2GN□LC Machine Allowable Torque (Unit: N.m)

Motor Speed \ Reduction Ratio	5	10	15	20	30	50	100	200
200--1500RPM	0.50	1.00	1.51	2.01	2.72	4.53	9.06	16.4
2000RPM	0.43	0.85	1.28	1.70	2.30	3.83	7.67	13.9
2500RPM	0.35	0.70	1.05	1.39	2.09	3.49	6.97	12.6

Note: All gearbox output turn direction in form are opposite as motor turn direction.
The torque under different speed and speed ratio is obtained under the standard.)

90 Series of brushless DC motor (Gu type)

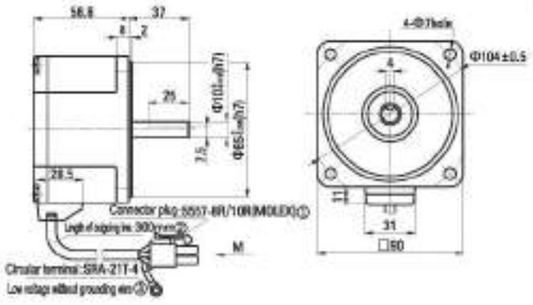
Basic Characteristics Of Motor

- 120W (DC Power Supply When Applied To 24VDC/36VDC/48VDC)

Rated power (Continuous)		W	120 (60W/90W/120W)		
Rated speed		r/min	3000		
Rated torque		N.m	0.458		
Instantaneous maximum torque		N.m	0.687		
Rotor moment of inertia		$J\times10^{-4}$ kg.m^2	0.250		
Speed control range		RPM	High pressure 200-2500RPM (Low pressure 200-3000RPM)		
Speed control range	On load		Below ±1%: condition 0~rated torque, rated speed, rated voltage, room temperature		
	On voltage		Below±1%: condition rated voltage ±10%, rated speed, rated load, room temperature		
	On temperature		Below±1%: Conditions of ambient temperature 0~+40°C rated voltage, rated load and rated speed		
Power input	Rated voltage	V	Single phase 110V	Single phase 220V	24VDC(Optional 36VDC/48VDC)
	Voltage tolerance range		±10%		
	Frequency	Hz	50/60		/
	Frequency tolerance range		±5%		/
	Rated input current	A	3.5	2.0	6.8
	Instantaneous maximum input current	A	7.0	4.5	13.0

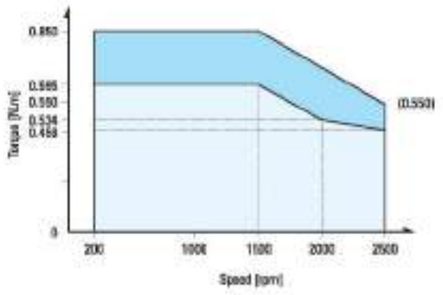
Circular Shaft Type Optical Motor

- Z5BLD120□A-25S □ Voltage 24/36/48/110/220



①Connector: 5557-6R/10R (MOLEX) ②Lead wire length 300mm
③Round terminal: SRA-21T-4 (Low ground)

- Z2BLD25-220A-25S Diagram (Standard Drive)



- Low Voltage Wrie Plughole Corresp-onding Signal Explanation

plughole	1	2	3	4
signal	U	W	Hv	Hu
plughole	5	6	7	8
signal	V	GND	Hw	Vcc

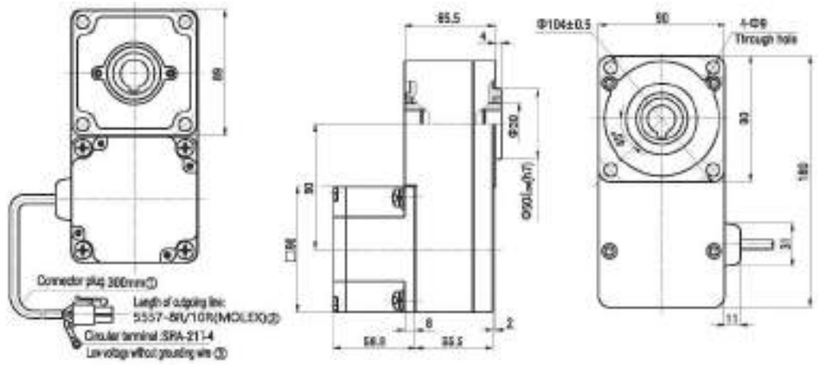
- High Voltage Wrie Plughole Corresp-onding Signal Explanation

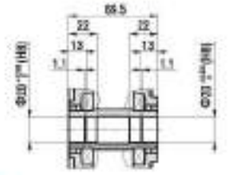
The meaning of wiring correspondence										
1	2	3	4	5	6	7	8	9	10	
Black (thick)	Blue (thin)	Red (thick)	Green (thin)	Yellow (thick)	white (thin)		Wire mesh	Red (thin)	Black (thin)	
W	H u	U	H v	V	H w			Vcc+5V	GN D	

120W

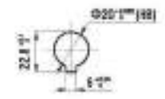
• L Type Speed Reduce

ZSBLD120-□GUL-25S/5GU□LC □ Voltage 24/36/48/110/220 □ Velocity Ratio Value





- The Output Shaft Hole Structure



①Lead wire length 300mm ②Connector: 5557-6R/10R (MOLEX) ③Round terminal: SRA-21T-4 (Low ground)

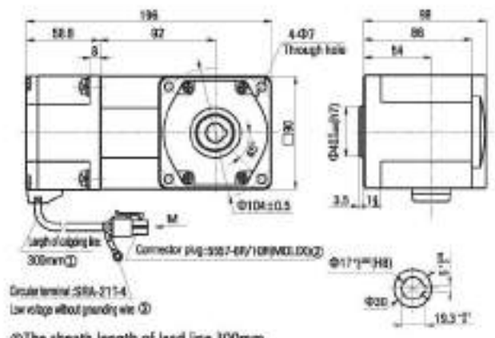
- Z5BLD120-□GUL-25S/5GU□LC Machine Allowable Torque (Unit: N.m)

Motor Speed \ Reduction Ratio	5	10	15	20	30	50	100	200
200~1500RPM	2.41	4.83	7.24	9.65	13.1	21.8	43.5	68.0
2000RPM	2.04	4.08	6.13	8.17	11.0	18.4	36.8	66.6
2500RPM	1.67	3.35	5.02	6.69	10.0	16.7	33.5	60.5

Note: All gearbox output turn direction in form are opposite as motor turn direction.
The torque under different speed and speed ratio is obtained under the standard.)

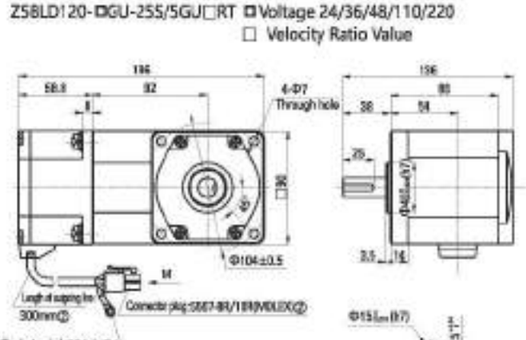
• Arc Cone Right Angle Speed Reducer Motor

Z5BLD120-□GU-25S/5GU□RC □Voltage 24/36/48/110/220
□ Velocity Ratio Value



①The sheath length of lead line 300mm
②Connector: 5557-6R/10R (MOLEX)
③Round terminal: SRA-21T-4 (Low ground)

Z5BLD120-□GU-25S/5GU□RT □Voltage 24/36/48/110/220
□ Velocity Ratio Value



- Z5BLD120-□GU-25S/5GU□RC/RT Machine Allowable Torque (Unit: N.m) □

Model	Motor Speed \ Raduction Ratio	7.5	9	10	12.5	15	18	20	25	30	36	50	60	75	90	100	120	150	180
Z5BLD120-□GU	200—1500RPM	3.62	4.34	4.35	5.44	6.53	7.83	7.87	9.83	11.8	14.2	19.7	20.0	20.0	20.0	20.0	20.0	20.0	20.0
	2000RPM	3.14	3.76	4.18	5.23	6.27	7.52	8.36	10.5	12.5	13.6	18.9	20.0	20.0	20.0	20.0	20.0	20.0	20.0
	2500RPM	2.50	3.01	3.35	4.18	5.02	6.02	6.69	8.37	10.0	10.9	15.1	18.2	20.0	20.0	20.0	20.0	20.0	20.0

Note: The (blue) in the table indicates that the rotation direction is consistent with the motor.
The torque under different speed and speed ratio is obtained under the standard.)

110 Series of brushless DC motor

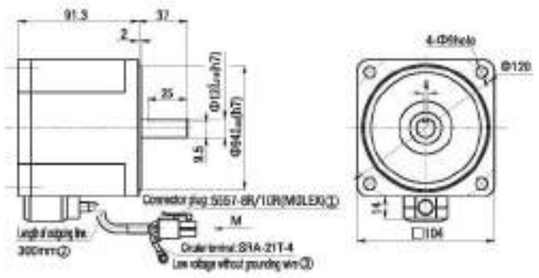
Basic Characteristics Of Motor

- 200W (DC Power Supply When Applied To 24VDC/36VDC/48VDC)

Rated power (Continuous)		W	200 (200W/400W)		
Rated speed		r/min	3000		
Rated torque		N.m	0.764		
Instantaneous maximum torque		N.m	1.146		
Rotor moment of inertia		J:X10 $^{-4}$ kg.m ^{2}	0.460		
Speed control range		RPM	High pressure 200-2500RPM (Low pressure 200-3000RPM)		
Speed control range	On load		Below ±1%: condition 0—rated torque, rated speed, rated voltage, room temperature		
	On voltage		Below±1%: condition rated voltage ±10%, rated speed, rated load, room temperature		
	On temperature		Below±1%: Conditions of ambient temperature 0—+40°C rated voltage, rated load and rated speed		
Power input	Rated voltage	V	Single phase 110V	Single phase 220V	36VDC(Optional 48VDC)
	Voltage tolerance range		±10%		
	Frequency	Hz	50/60		/
	Frequency tolerance range		±5%		/
	Rated input current	A	4.7	2.4	7.5
	Instantaneous maximum input current	A	9.0	4.8	11.5

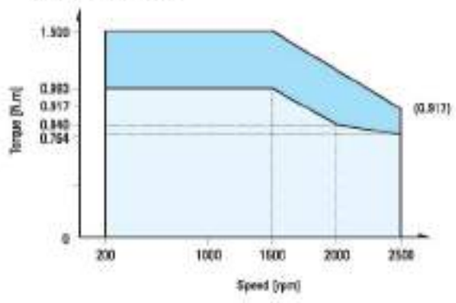
Circular Shaft Type Optical Motor

- Z6BLD200□A-25S □ Voltage 24/36/48/110/220

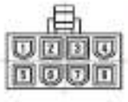


①Connector: 5557-8R/10R (MOLEX) ②Lead wire length 300mm
③Round terminal: SRA-21T-4 (Low ground)

- Z6BLD200-220A-25S Diagram (Standard Drive)



- Low Voltage Wrie Plughole Corresp-onding Signal Explanation



plughole	1	2	3	4
signal	U	W	Hv	Hu
plughole	5	6	7	8
signal	V	GND	Hw	Vcc

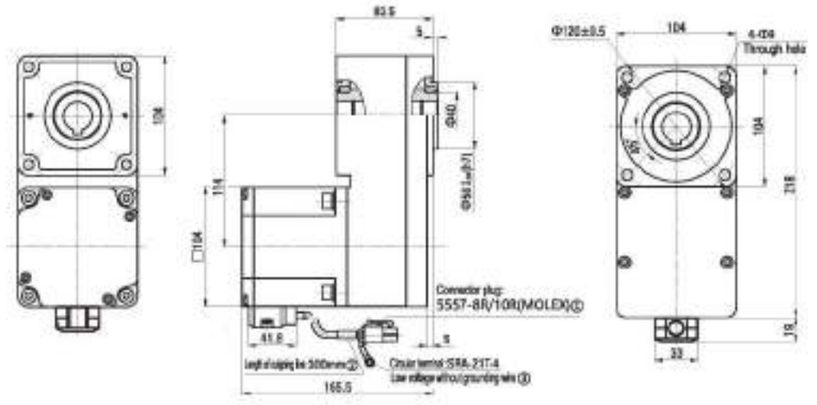
- High Voltage Wrie Plughole Corresp-onding Signal Explanation

The meaning of wiring correspondence										
1	2	3	4	5	6	7	8	9	10
Black (thick)	Blue (thin)	Red (thick)	Green (thin)	Yellow (thick)	white (thin)		Wire mesh	Red (thin)	Black (thin)
W	Hu	U	Hv	V	Hw			Vcc+5V	GND

■ 200W

• L Type Speed Reduce

Z6BLD200-□GUL-25S/6GU□LC □Voltage 24/36/48/110/220 □ Velocity Ratio Value



- The Output Shaft Hole Structure

①Connector: 5557-8R/10R (MOLEX) ②Lead wire length 300mm ③Round terminal: SRA-21T-4 (Low ground)

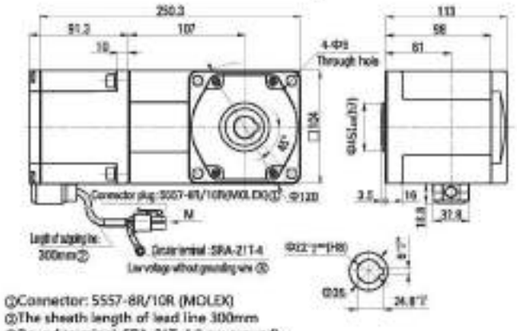
- Z6BLD200-□GUL-25S/6GU□LC Machine Allowable Torque (Unit: N.m)

Motor Speed \ Reduction Ratio	5	10	15	20	30	50	100	200
200—1500RPM	4.02	8.04	12.1	16.1	21.8	36.3	72.5	120
2000RPM	3.40	6.81	10.2	13.6	18.4	30.7	61.3	110
2500RPM	2.79	5.58	8.37	11.2	16.7	27.9	55.8	100

Note: All gearbox output turn direction in form ere opposite as motor turn direction.
The torque under different speed and speed ratio is obtained under the standard.)

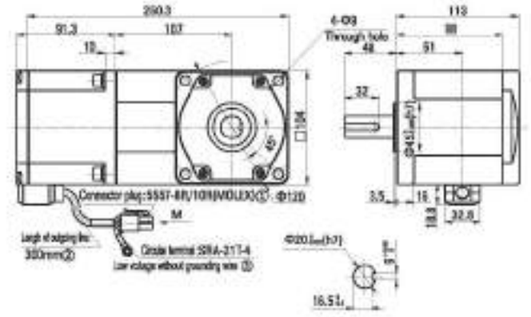
- Arc Cone Right Angle Speed Reducer Motor

Z6BLD200-□GU-25S/6GU□RC □Voltage 24/36/48/110/220
□ Velocity Ratio Value



①Connector: 5557-8R/10R (MOLEX)
②The sheath length of lead line 300mm
③Round terminal: SRA-21T-4 (Low ground)

Z6BLD200-□GU-25S/5GU□RT □Voltage 24/36/48/110/220
□ Velocity Ratio Value



- Z6BLD200-□GU-25S/6GU□RC/RT Machine Allowable Torque (Unit: N.m)

Model	Motor Speed \ Reduction Ratio	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180	200
Z6BLD200-□GU	200—1500RPM	6.03	7.24	9.06	10.9	13.1	16.4	19.7	23.6	32.8	39.3	40.0	40.0	40.0	40.0	40.0	40.0	40.0
	2000RPM	5.23	6.27	8.71	10.5	12.6	17.4	20.8	25.1	31.5	37.8	40.0	40.0	40.0	40.0	40.0	40.0	40.0
	2500RPM	4.18	5.02	6.97	8.37	10.0	13.9	16.7	20.1	25.2	30.3	37.8	40.0	40.0	40.0	40.0	40.0	40.0

Note: The (blue) in the table indicates that the rotation direction is consistent with the motor.
The torque under different speed and speed ratio is obtained under the standard.)

Low Voltage DC Brushless Driver

WSD-70 Universal Brushless DC Motor Driver

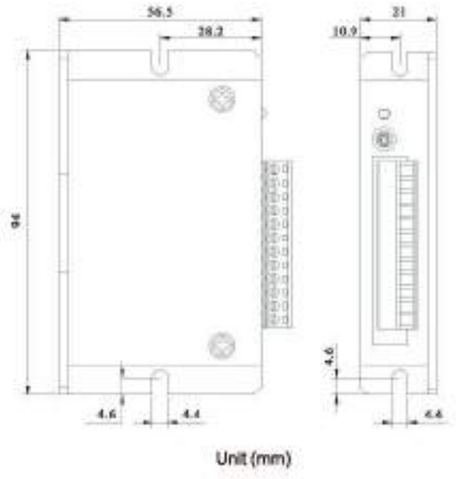
Product Features

- Can drive less than 70W brushless motor
- It has functions such as braking, forward and reverse switching, etc.
- With over-temperature, over-current, Hall error protection functions
- The internal potentiometer can be used to adjust the speed
- Can use external potentiometer to adjust speed
- Can use external analog voltage to adjust speed
- Small size, easy to install

Product Specifications

parameter	minimum	Typical value	maximum value	unit
Input voltage	12	24	30	VDC
Output current	–	–	3	A
Overvoltage protection	–	–	30	VDC
Undervoltage protection	12	–	–	VDC
External potentiometer		10K		Ω
Input analog voltage	–	–	5	VDC
speed control range	–	–	20000	RPM

Dimensions



Unit (mm)

Function selection settings

brake settings

When the brake function is factory set, the BRK terminal is connected to the DC- terminal. When the motor is running, the running and stopping of the motor can be controlled by connecting or disconnecting the connecting line between the BRK terminal and the DC- terminal.

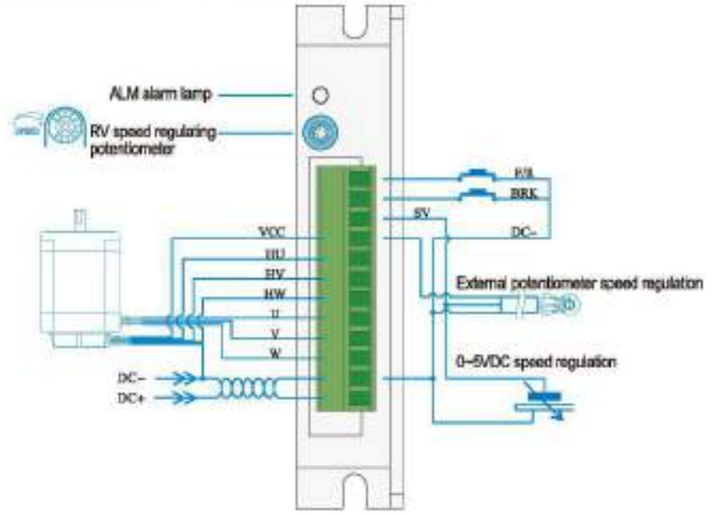
Forward and reverse setting

The factory setting of the forward and reverse switching function is that F/R and DC- are disconnected. When the power is turned on, by adjusting the potentiometer, the driver WSD - -70 can drive the motor to run clockwise. By connecting F/R and DC- it can be switched between the forward and reverse running of the motor by connecting a switch or PLC to control its on and off.When disconnecting the connecting wires of F/R terminal and DC terminal, the motor runs clockwise.When connecting the F/R terminal and the DC- terminal connecting wire, the motor runs counterclockwise.

Port Signal Description

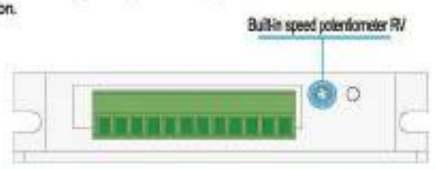
CN5 terminal number	Signal type	Signal description
F/R	control signal	The motor rotation direction control port, the FR port is disconnected from the DC- port,the motor rotates clockwise, and the short circuit is closed for counterclockwise rotation
BRK		Motor quick braking signal port, BRK port is disconnected from DC– port, the motor is fast braking, and short circuit is closed for normal operation
SV		Speed control signal input port, the middle terminal is connected here when the external potentiometer is used for speed control, and the two sides are connected to the VCC and DC- ports respectively
VCC		External potentiometer power port (the positive pole of the Hall power supply is shared by this port)
HU	Hall signal	DC brushless motor Hall signal HU
HV		DC brushless motor Hall signal HV
HW		DC brushless motor Hall signal HW
U	Motor connection	DC brushless motor U phase
V		DC brushless motor V phase
W		Brushless DC Motor W Phase
DC–	power connection	The DC power supply is connected to the negative pole (the negative pole of the Hall power supply is shared by this port)
DC+		The DC power supply is connected to the positive pole (voltage range: 12- -30VDC)

Driver function configuration diagram



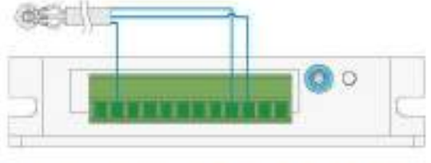
Built in potentiometer speed control

Built in potentiometer speed regulation control. When the built-in potentiometer RV is used for speed regulation, rotate the potentiometer RV clockwise to increase the motor speed, and rotate the potentiometer counterclockwise to decrease the motor speed When using other speed modes, please rotate counterclockwise to the limit position.



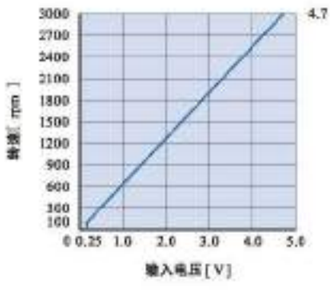
External potentiometer speed control

External potentiometer speed regulation control. When using an external potentiometer for speed regulation, please use a 10kΩ suitable potentiometer. The middle lead end of the potentiometer is connected to the SV port of the driver, and the leads on both sides are connected to VCC and DC ports respectively



External analog voltage speed regulation control

When the speed regulation mode is external analog voltage, the input voltage can be 0 ~ 5V for speed control. When the input voltage is about 0.25V, the motor speed is 5% of the maximum speed When the input voltage is about 4.7V, the motor speed is the maximum value, and the maximum speed value depends on the motor specification and power supply voltage.



Drive adaptation brushless motor

Motor model	base size	output power	Motor voltage	Rated speed	Rated torque	Fuselage Length
42WSM-0330NBB	42mm	30W	24VDC	3000rpm	0.1Nm	49mm
42WSM-0630NBB	42mm	62W	24VDC	3000rpm	0.2Nm	68mm
57WSM-0730NBB	57mm	69W	24VDC	3000rpm	0.22Nm	67mm
57WSM-1030NBB	57mm	65W	24VDC	1500rpm	0.4Nm	82mm
57WSM-1230NBB	57mm	65W	24VDC	3000rpm	0.22Nm	62mm

WSD-120A Universal brushless DC motor driver

Product Features

- Can drive less than 120W brushless motor
- Acceleration and deceleration time can be set
- With power protection function (maximum current setting)
- Can use external potentiometer to adjust speed
- Can use PWM speed regulation
- Can use external analog voltage to adjust speed
- Small size, easy to install

Product Specifications

parameter	minimum	Typical value	nsimum value	unit
Input voltage	12	24	30	VDC
Output current	–	–	8	A
Hall signal voltage	–	–	5	V
Hall drive current	–	20	–	mA
External potentiometer	–	10K	–	Ω
Input analog voltage	–	–	5	VDC
speed control range	–	–	20000	RPM

Function selection settings

Maximum current output setting

The output setting of the maximum current is to protect the brushless DC motor from being damaged when it is in overload operation. This purpose is achieved by starting the driver to report the overcurrent and stopping the driver operation. The set current value should be consistent with the rated current value of the motor. Match and pay attention to the actual power supply voltage used. Setting range: 1.6- 8A.

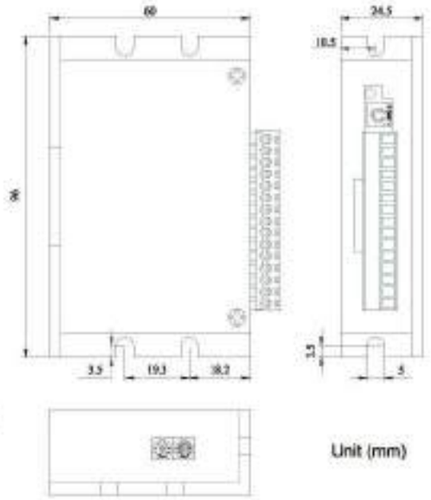
P-sv Current

Forward and reverse setting

the motor. The acceleration time is the time required for the motor to reach the rated speed of the motor from stop, and the deceleration time is the time required for the motor to go from the rated speed to the motor stop. The acceleration and deceleration time can be adjusted by turning left and right. Setting range: 0.3 ~ 15s.

ACC/DEC

Dimensions

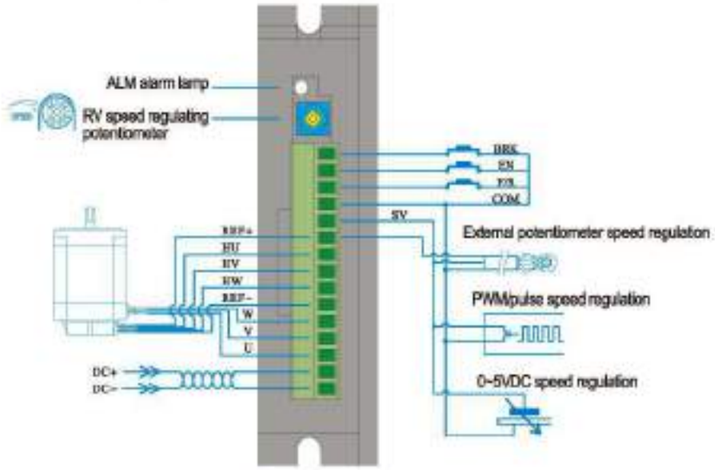


Unit (mm)

Port Signal Description

CN5 terminal number	Signal type	Signal description
BRK	control signal	Motor fast brake signal port, the motor is in normal operation when the BRK port is disconnected from the COM port, and the fast brake is shorted and closed.
EN		Stop signal control terminal, when the EN port is disconnected from the COM port, the motor stops slowly, and the short circuit is closed for normal operation.
F/R		Motor rotation direction control port, F/ R port is disconnected from COM port, the motor rotates clockwise, and short circuit is closed, it rotates counterclockwise
COM		Common port (0V reference level)
SV		Speed control signal input port, the middle terminal is connected here when the external potentiometer is used for speed control, and the two sides are connected to the REF+ and COM ports respectively
REF+	Hall signal	External potentiometer power port (the positive pole of the Hall power supply is shared by this port)
HU		DC brushless motor Hall signal HU
HV		DC brushless motor Hall signal HV
HW		DC brushless motor Hall signal HW
REF–		DC brushless motor hall signal ground wire
W	Motor connection	Brushless DC Motor W Phase
V		DC brushless motor V phase
U		DC brushless motor U phase
DC+	power connection	The DC power supply is connected to the positive pole (voltage range: 12 ~ 30VDC)
DC–		The DC power supply is connected to the positive pole

Driver function configuration diagram

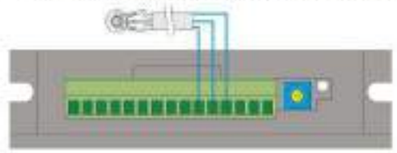


Built-in potentiometer speed control

Built-in potentiometer speed control, when using the built-in potentiometer RV for speed regulation, rotate the potentiometer RV clockwise to increase the motor speed, and rotate the potentiometer counterclockwise to decrease the motor speed. When using other speed modes, please rotate counterclockwise to limit position.

External potentiometer speed control

External potentiometer speed control, when using an external potentiometer for speed control, please use a suitable potentiometer of 10K2, the middle lead end of the potentiometer is connected to the SV port of the driver, and the leads on both sides are connected to the REF+ and COM ports respectively.

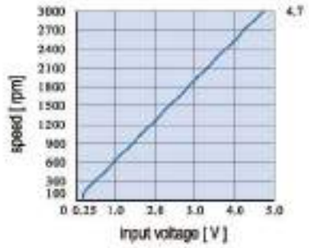


PWM speed control

PWM speed control input, when the speed control mode is PWM, the duty cycle is in the range of 2% - 90% for speed control, when the duty cycle is about 2%, the motor speed is 5% of the maximum speed, when the duty cycle is about 5% of the maximum speed When it is about 90%, the motor speed is the maximum value, and the maximum speed value depends on the motor specification and power supply voltage (duty cycle pulse frequency range: 1-3KHz).

External analog voltage speed control

When the speed regulation mode is an external analog voltage, the input voltage can be 0.25 ~ 4.7V for speed control. When the input voltage is about 0.25V, the motor speed is 5% of the maximum speed. When the input voltage is about 4.7V, the motor The speed is the maximum value, and the maximum speed value depends on the motor size and supply voltage.



Drive adaptation brushless motor

Motor model	base size	output power	Motor voltage	Rated speed	Rated torque	Fuselage Length
57WSM-0730NBB	57mm	69W	24VDC	3000rpm	0.22Nm	67mm
57WSM-1030NBB	57mm	103W	24VDC	3000rpm	0.33Nm	88mm
57WSM-1230NBB	57mm	120W	24VDC	3000rpm	0.44Nm	107mm
57WSM-0615NBB	57mm	65W	24VDC	1500rpm	0.4Nm	82mm
57WSM-0730NBB	57mm	65W	24VDC	3000rpm	0.22Nm	62mm
57WSM-1230NBB	57mm	125W	24VDC	3000rpm	0.4Nm	80mm

WSD-300B Universal brushless DC motor driver

Product Specifications

parameter	minimum	Typical value	maximum value	unit
Input voltage	12	48	56	VDC
Output current	–	–	15	A
Hall signal voltage	–	–	5	V
Hall drive current	12	–	–	mA
External potentiometer	–	10K	–	Ω
Input analog voltage	–	–	5	VDC
speed control range	–	–	20000	RPM

Function selection settings

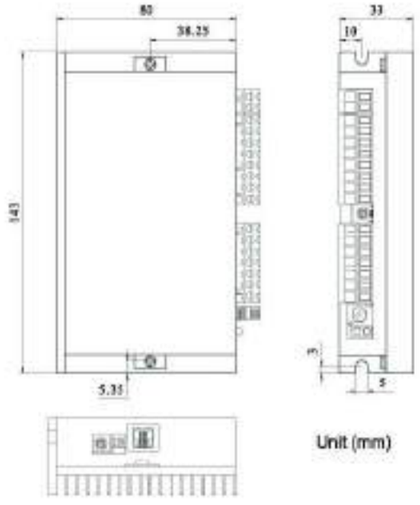
Motor pole pair number setting selection
In order to better match the DC brushless motors with different pole pairs, the driver is equipped with a pole pair setting option. The number of motor pole pairs can be set to 4 pairs of poles or 2 pairs of poles through the SW1 dial. The factory setting is 4 pairs of poles.

PID closed loop setting selection
In order to improve the speed stability of load changes during operation, the WSD-300B driver is equipped with a PID closed-loop control selection function, which can be selected through the SW2 dial on the side of the driver, and the factory setting is open-loop control.

Maximum current output setting
The output setting of the maximum current is to protect the brushless DC motor from being damaged when it is in overload operation. This purpose is achieved by starting the driver overcurrent alarm and stopping the driver operation. The set current value should be consistent with the rated current value of the motor. Match and pay attention to the actual power supply voltage used. Setting range: 3~15A.

Acceleration/Deceleration time setting
The potentiometer can set the acceleration and deceleration time of the motor. The acceleration time is the time required for the motor to reach the rated speed from the stop, and the deceleration time is the time required for the motor to go from the rated speed to the motor stop. The acceleration and deceleration time can be adjusted by rotating left and right. Range: 0.3~ 15s .

Dimensions

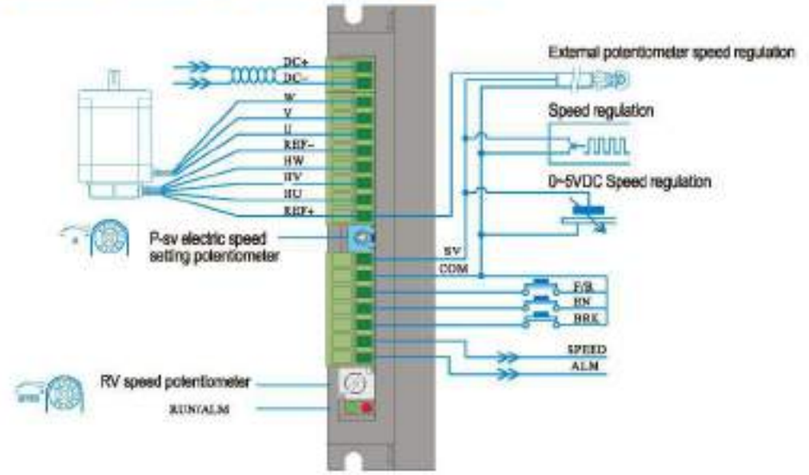


Unit (mm)

Port Signal Description

CN5 terminal number	Signal type	Signal description
DC+	power connection	The DC power supply is connected to the positive pole (voltage range: 12 ~ 56VDC)
DC−		The DC power supply is connected to the negative pole
W	Motor connection	Brushless DC Motor W Phase
V		DC brushless motor V phase
U		DC brushless motor U phase
REF+	Hall signal	DC brushless motor hall signal power cable
HW		DC brushless motor Hall signal HW
HV		DC brushless motor Hall signal HV
HU		DC brushless motor Hall signal HU
REF−		DC brushless motor hall signal ground wire
SV	control signal	The speed control signal input port, the middle terminal is connected here when the external potential in is used for speed control, and the two sides are connected to the REF+ and COM ports respectively
COM		Common port (0V reference level)
F/R		Motor rotation direction control port, F/ R port is disconnected from COM port, the motor rotates clockwise, and short circuit is closed, it rotates counterclockwise
EN		Stop signal control terminal, when the EN port is disconnected from the COM port, the motor stops slowly, and the short circuit is closed for normal operation.
BRK		Motor fast brake signal port, BRK port is disconnected from COM port, the motor is fast brake and short circuit is closed for normal operation
SPEED	output signal	Speed signal output port, corresponding to the running speed of the motor, output the corresponding pulse frequency
ALM		Alarm signal output port, the normal level is 5V when the fault occurs, the level is 0V

Driver function configuration diagram

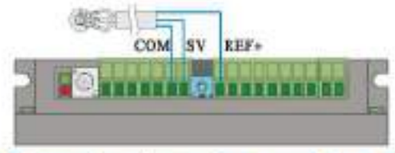


Built-in potentiometer speed control

Built-in potentiometer speed control, when using the built-in potentiometer RV for speed regulation, rotate the potentiometer RV clockwise to increase the motor speed, and rotate the potentiometer counterclockwise to decrease the motor speed. When using other speed modes, please rotate counterclockwise to limit position.

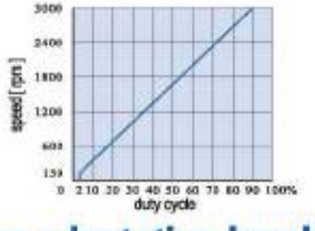
External potentiometer speed control

External potentiometer speed control, when using an external potentiometer for speed control, please use a suitable potentiometer of 10K2, the middle lead end of the potentiometer is connected to the SV port of the driver, and the leads on both sides are connected to the REF+ and COM ports respectively.



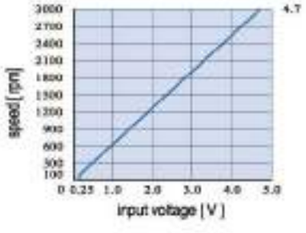
PWM speed control

PWM speed control input, when the speed control mode is PWM, the duty cycle is in the range of 2% - 90% for speed control, when the duty cycle is about 2%, the motor speed is 5% of the maximum speed, when the duty cycle is about 5% of the maximum speed When it is about 90%, the motor speed is the maximum value, and the maximum speed value depends on the motor specification and power supply voltage (duty cycle pulse frequency range: 1~3KHz).



External analog voltage speed control

When the speed regulation mode is an external analog voltage, the input voltage can be 0.25 ~ 4.7V for speed control. When the input voltage is about 0.25V, the motor speed is 5% of the maximum speed. When the input voltage is about 4.7V, the motor The speed is the maximum value, and the maximum speed value depends on the motor size and supply voltage.



Drive adaptation brushless motor

Motor model	base size	output power	Motor voltage	Rated speed	Rated torque	Fuselage Length
57WSM-1030NBB	57mm	103W	24VDC	3000rpm	0.33Nm	88mm
57WSM-1230NBB	57mm	120W	24VDC	3000rpm	0.44Nm	106mm
57WSM-1230NBB	57mm	120W	24VDC	3000rpm	0.4Nm	80mm
57WSM-1830NBB	57mm	180W	24VDC	3000rpm	0.6Nm	101mm
60WSM-1630NBB	60mm	160W	24VDC	3000rpm	0.5Nm	100mm
60WSM-2430NBB	60mm	240W	24VDC	3000rpm	0.75Nm	120mm

WSD-750 Universal Brushless DC Motor Driver

Product Specifications

parameter	minimum	Typical value	maximum value	unit
Input voltage	18	48	52	VDC
Output current	–	–	25	A
Hall signal voltage	–	–	5	V
Hall drive current	12	–	–	mA
External potentiometer	–	10K	–	Ω
Input analog voltage	–	–	5	VDC
speed control range	–	–	20000	RPM

Function selection settings

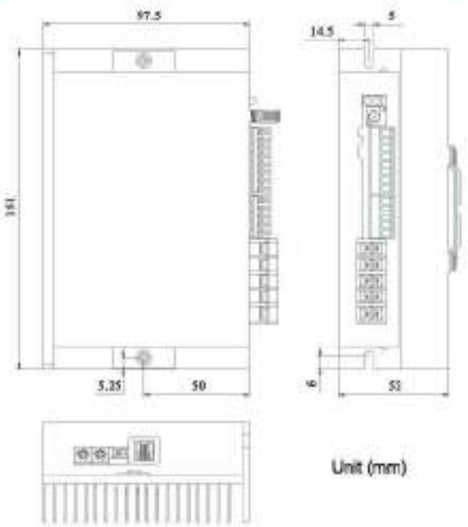
PID closed loop setting selection
In order to improve the speed stability of load changes during operation, the WSD-750 driver is equipped with a PID closed-loop control selection function. Mode selection can be performed through the SW1 dial on the side of the driver, and the factory setting is open-loop control.

Motor pole pair number setting selection
In order to better match the DC brushless motors with different pole pairs, the driver is equipped with a pole pair setting option. The number of motor pole pairs can be set to 2 pairs of poles or 4 pairs of poles through the SW2 dial, and the factory setting is 4 pairs. pole.

Maximum current output setting
The output setting of the maximum current is to protect the brushless DC motor from being damaged when it is in overload operation. This purpose is achieved by starting the driver overcurrent alarm and stopping the driver operation. The set current value should be consistent with the rated current value of the motor. Match and pay attention to the actual power supply voltage used. Setting range: 4~ 25A.

Acceleration/Deceleration time setting
The potentiometer can set the acceleration and deceleration time of the motor. The acceleration time is the time required for the motor to reach the rated speed from the stop, and the deceleration time is the time required for the motor to go from the rated speed to the motor stop. The acceleration and deceleration time can be adjusted by rotating left and right. Range: 0.3~ 15s .

Dimensions

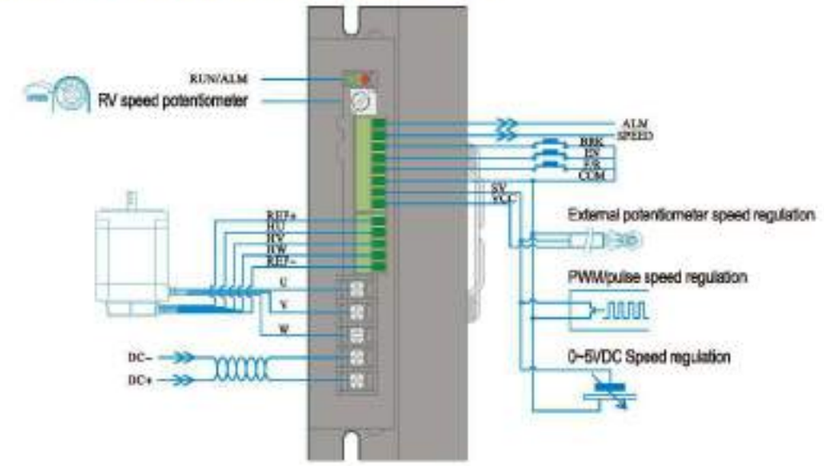


Unit (mm)

Port Signal Description

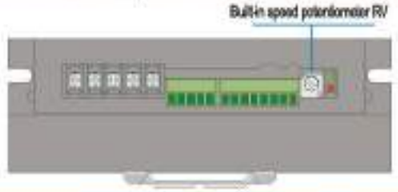
CN5 terminal number	Signal type	Signal description
ALM	output signal	Alarm signal output port, the normal level is 5V when the fault occurs, the level is 0V
SPEED		Speed signal output port, corresponding to the running speed of the motor, output the corresponding pulse frequency
BRK	control signal	Motor fast brake signal port, BRK port is disconnected from COM port, the motor is fast brake and short circuit is closed for normal operation
EN		Stop signal control terminal, when the EN port is disconnected from the COM port, the motor stops slowly, and the short circuit is closed for normal operation.
F/R		Motor rotation direction control port, F/ R port is disconnected from COM port, the motor rotates clockwise, and short circuit is closed, it rotates counterclockwise
COM		Common port (0V reference level)
SV		Speed control signal input port, the middle terminal is connected here when the external potentiometer is used for speed control, and the two sides are respectively connected to the VCC and COM ports
VCC		External potentiometer power interface
REF+	Hall signal	DC brushless motor hall signal power cable
HU		DC brushless motor Hall signal HU
HV		DC brushless motor Hall signal HV
HW		DC brushless motor Hall signal HW
REF–		DC brushless motor hall signal ground wire
U	Motor connection	DC brushless motor U phase
V		DC brushless motor V phase
W		Brushless DC Motor W Phase
DC–	power connection	The DC power supply is connected to the negative pole
DC+		Connect the DC power supply to the positive pole (voltage range: 18 ~ 52VDC)

Driver function configuration diagram



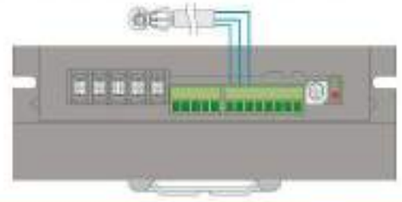
Built-in potentiometer speed control

Built-in potentiometer speed control, when using the built-in potentiometer RV speed control, rotate the potentiometer RV clockwise, the motor speed increases, rotate the potentiometer counterclockwise, the motor speed decreases, when using other speed modes, please rotate the RV counterclockwise To "click", it means it has been closed to the limit position.



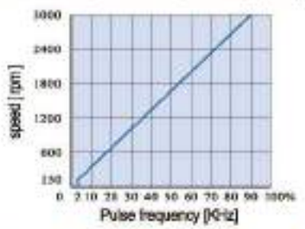
External potentiometer speed control

External potentiometer speed control, when using an external potentiometer for speed control, please use a suitable potentiometer of 10KΩ, the middle lead end of the potentiometer is connected to the SV port of the driver, and the leads on both sides are connected to the VCC and COM ports respectively.



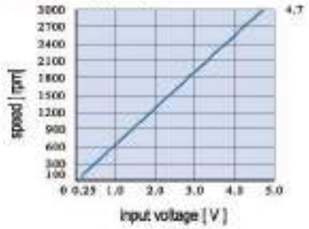
Pulse frequency speed control

Switch to pulse frequency speed regulation input mode through SW3 dialing code. When the speed regulation mode is pulse signal, the number of pulses is in the range of 150 ~ 4KHz for speed control. When the pulse frequency is about 150Hz, the motor speed is 5% of the maximum speed. When the pulse frequency is about 4KHz, the motor speed is the maximum value, and the maximum speed value depends on the motor specification and power supply voltage.



Pulse frequency speed control

Switch to external analog voltage speed control input mode through SW3 dialing code, when the speed control mode is external analog voltage, the inputvoltage can be 0.25 ~ 4.7V for speed control, when the input voltage is about 0.25V, the motor speed is the highest speed 5%. When the input voltage is about 4.7V, the motor speed is at the maximum value, and the maximum speed value depends on the motor size and supply voltage.



Drive adaptation brushless motor

Motor model	base size	output power	Motor voltage	Rated speed	Rated torque	Fuselage Length
60WSM-1630NBB	60mm	160W	24VDC	3000rpm	0.5Nm	100mm
60WSM-2430NBB	60mm	240W	48VDC	3000rpm	0.75Nm	120mm
70WSM-3230NBB	70mm	320W	48VDC	3000rpm	1.0Nm	120mm
86WSM-2230NBB	86mm	220W	48VDC	3000rpm	0.7Nm	82mm
86WSM-4430NBB	86mm	440W	48VDC	3000rpm	1.4Nm	109mm

High Voltage DC Brushless Driver

WHDH-350 Universal brushless DC motor driver

Product Specifications

parameter	minimum	Typical value	maximum value	unit
Input voltage	180	220	265	VDC
Output current	–	–	4	A
Hall signal voltage	–	–	5.5	V
Hall drive current	12	–	–	mA
External potentiometer	–	10K	–	Ω
Input analog voltage	–	–	5	VDC
speed control range	–	–	20000	RPM

Function selection settings

Speed control mode setting selection

Speed mode	SW1	SW2
Built-in potentiometer for speed regulation	OFF	OFF
External analog voltage / external potentiometer speed regulator	ON	OFF
PWM speed regulation	OFF	ON
Pulse frequency speed regulation	ON	ON

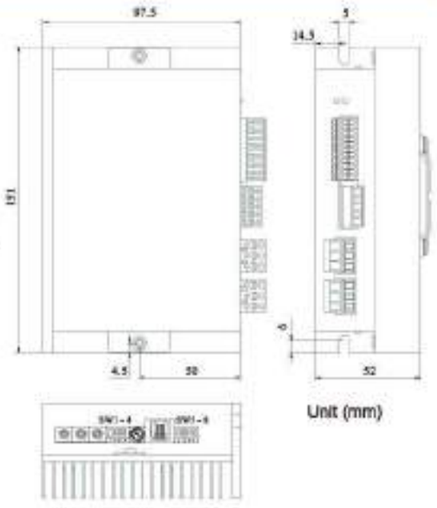
RS-485 communication setting
Set up RS-485 communication, you can set and read operation commands and various parameters through the host computer.
Set communication address selection through ADDR dial code

Acceleration/Deceleration time setting
The potentiometer can set the acceleration and deceleration time of the motor. The acceleration time is the time required for the motor to reach the rated speed from standstill, and the deceleration time is the time required for the motor to go from the rated speed to the motor stop. The acceleration and deceleration time can be adjusted by rotating left and right. Range: 0.3 ~ 15s .

Motor pole pair number setting selection
The driver can set the number of motor pole pairs through SW5 and SW6. The number of motor pole pairs can be set to 2 pairs of poles, 4 pairs of poles or 5 pairs of poles. The factory setting is 4 pairs of poles (can be modified through RS-485).

PID open/closed loop setting selection
SW7 sets open/closed loop selection: OFF = closed loop control, ON = open loop control
SW8 sets the closed-loop mode selection: OFF=speed closed-loop,
ON=speed current closed-loop

Dimensions

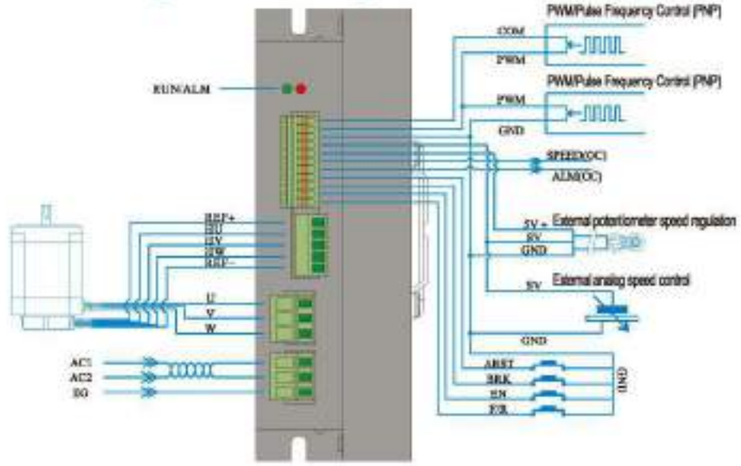


Unit (mm)

Port Signal Description

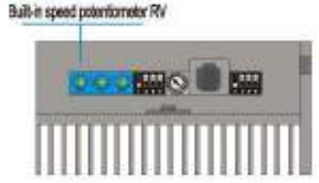
CN5 terminal number	Signal type	Signal description
COM	control signal	Common terminal of external power supply (for example: can be connected to PLC24V output port)
PWM		Pulse frequency/duty cycle speed control value number input port, set the speed control mode through SW1, SW2 dial code
GND		Control ground port (common)
SV		External speed control input port, when the external potentiometer is used for speed control, the middle terminal is connected here, and the two sides are connected to the +5V and GND ports respectively.
5V+		Built-in 5V voltage port, can be connected to a potentiometer for external speed regulation
SPEED		Speed signal output port, corresponding to the running speed of the motor, output the corresponding pulse frequency, this port is an open-drain output
ALM		Alarm signal output port, this port is open-drain output, no alarm is high level; alarm is low level
ARST		Fault reset input port, when the driver fails, connecting this port to the GND terminal will clear the fault alarm
BRK		Motor quick braking signal port, the BRK port is disconnected from the GND port, the motor is fast braking, and the short circuit is closed for normal operation
EN		Stop signal control terminal, when the EN port is disconnected from the GND port, the motor stops slowly, and the short circuit is closed for normal operation.
F/R		The motor rotation direction control port, the F/R port is disconnected from the GND port, the motor rotates clockwise, and the short circuit is closed for counterclockwise rotation
REF+	Motor connection	DC brushless motor hall signal power cable
HU、HV、HW		DC brushless motor Hall signal HU, Hv, Hw
REF–		DC brushless motor hall signal ground wire
U、V、W		DC brushless motor U, V, W phase
AC1	power connection	AC power access terminal (voltage range: 160 ~ 265VAC)
AC2		AC power access terminal
EG		Reliable grounding

Driver function configuration diagram



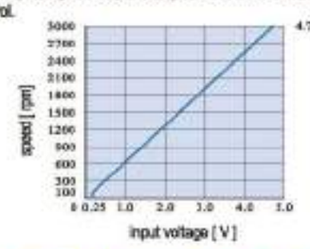
Built-in potentiometer speed control

Built-in potentiometer speed control, when using the built-in potentiometer RV for speed regulation, rotate the potentiometer RV clockwise to increase the motor speed, and rotate the potentiometer counterclockwise to decrease the motor speed. When using other speed modes, please rotate counterclockwise to limit position.



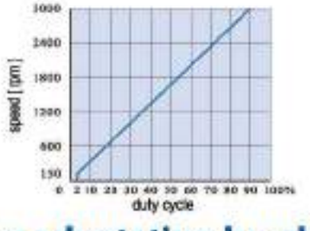
External analog speed control

External analog speed control input, switch the speed control mode to external analog speed control through SW1, SW2 dial code, when the speed control mode is analog voltage, the input voltage can be 0.25~4.7V or 0.25~9.4V for speed control.



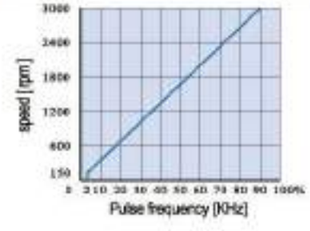
PWM speed control

Switch the speed control mode through the SW1 and SW2 dialing codes. When the speed control mode is PWM, the duty cycle is in the range of 2% ~ 90% for speed control. When the duty cycle is about 2%, the motor speed is 5% of the maximum speed. %. When the duty cycle is about 90%, the motor speed is the maximum value, and the maximum speed value depends on the motor specification and power supply voltage (duty cycle pulse frequency range: 1-3KHz).



Pulse frequency speed control

Switch the speed control mode through SW1 and SW2 dialing codes. When the speed control mode is pulse signal, the pulse frequency is in the range of 200 ~ 3.3KHz for speed control. When the pulse frequency is about 200Hz, the motor speed is 5% of the maximum speed. When the pulse frequency is about 3.3KHz, the motor speed is the maximum value, and the maximum speed value depends on the motor specification and power supply voltage.



Drive adaptation brushless motor

Motor model	base size	output power	Motor voltage	Rated speed	Rated torque	Fuselage Length
80WSM-2515HBB	80mm	250W	310VDC	1500rpm	1.6Nm	118mm
80WSM-2530HBB	80mm	250W	310VDC	3000rpm	0.8Nm	132mm
86WSM-2230HBB	86mm	220W	310VDC	3000rpm	0.7Nm	82mm
86WSM-3315HBB	86mm	330W	310VDC	1500rpm	2.1Nm	152mm
86WSM-3330HBB	86mm	330W	310VDC	3000rpm	1.05Nm	96mm

WHDH-750 Universal brushless DC motor driver

Product Specifications

parameter	minimum	Typical value	maximum value	unit
Input voltage	180	220	265	VDC
Output current	–	–	8	A
Hall signal voltage	–	–	5.5	V
Hall drive current	12	–	–	mA
External potentiometer	–	10K	–	Ω
Input analog voltage	–	–	5	VDC
speed control range	–	–	20000	RPM

Function selection settings

Speed control mode setting selection

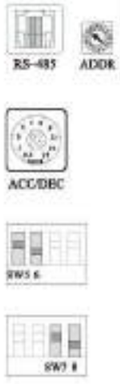
Speed mode	SW1	SW2
Built-in potentiometer for speed regulation	OFF	OFF
External analog voltage / external potentiometer speed regulation	ON	OFF
PWM speed regulation	OFF	ON
Pulse frequency speed regulation	ON	ON

RS-485 communication setting
Set up RS-485 communication, you can set and read operation commands and various parameters through the host computer.
Set communication address selection through ADDR dial code

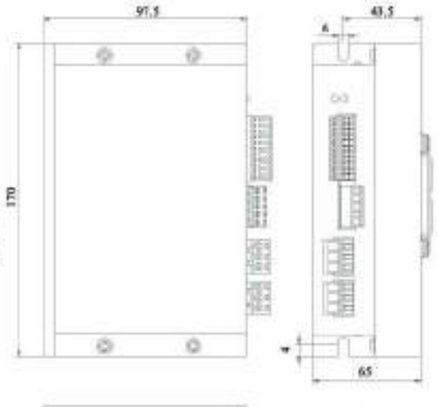
Acceleration/Deceleration time setting
The potentiometer can set the acceleration and deceleration time of the motor. The acceleration time is the time required for the motor to reach the rated speed from standstill, and the deceleration time is the time required for the motor to go from the rated speed to the motor stop. The acceleration and deceleration time can be adjusted by rotating left and right. Range: 0.3 ~ 15s .

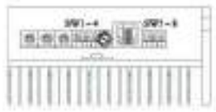
Motor pole pair number setting selection
The driver can set the number of motor pole pairs through SW5 and SW6. The number of motor pole pairs can be set to 2 pairs of poles, 4 pairs of poles or 5 pairs of poles. The factory setting is 4 pairs of poles (can be modified through RS-485).

PID open/closed loop setting selection
SW7 sets open/closed loop selection: OFF = closed loop control, ON = open loop control
SW8 sets the closed-loop mode selection: OFF=speed closed-loop,
ON=speed current closed-loop



Dimensions





Unit (mm)

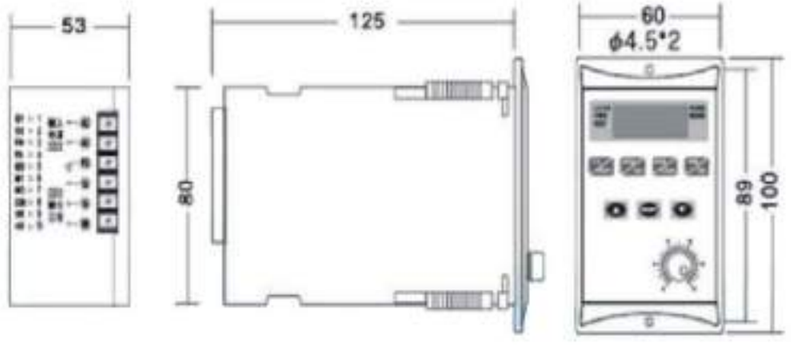
Port Signal Description

CN5 terminal number	Signal type	Signal description
COM	control signal	Common terminal of external power supply (for example: can be connected to PLC24V output port)
PWM		Pulse frequency/duty cycle speed control value number input port, set the speed control mode through SW1, SW2 dial code
GND		Control ground port (common)
5V		External speed control input port, when the external potentiometer is used for speed control, the middle terminal is connected here, and the two sides are connected to the +5V and GND ports respectively
5V+		Built-in 5V voltage port, can be connected to a potentiometer for external speed regulation
SPEED		Speed signal output port, corresponding to the running speed of the motor, output the corresponding pulse frequency, this port is an open-drain output
ALM		Alarm signal output port, this port is open-drain output, no alarm is high level; alarm is low level
ARST		Fault reset input port, when the driver fails, connecting this port to the GND terminal will clear the fault alarm
BRK		Motor quick braking signal port, the BRK port is disconnected from the GND port, the motor is fast braking, and the short circuit is closed for normal operation
EN		Stop signal control terminal, when the EN port is disconnected from the GND port, the motor stops slowly, and the short circuit is closed for normal operation.
F/R		The motor rotation direction control port, the F/R port is disconnected from the GND port, the motor rotates clockwise, and the short circuit is closed for counterclockwise rotation
REF+	Motor connection	DC brushless motor hall signal power cable
HU、HV、HW		DC brushless motor Hall signal HU, Hv, Hw
REF–		DC brushless motor hall signal ground wire
U、V、W		DC brushless motor U, V, W phase
AC1	power connection	AC power access terminal (voltage range: 180 ~ 265VAC)
AC2		AC power access terminal
EG		Reliable grounding

High Voltage Brushless Controller

- Model: FHLAC-21S
- High performance, multi-purpose, digital display, panel mounting, small size
- Low-noise, low-torque pulsation operation
- Support for Hall-less brushless motors
- Optional RS485 communication supporting the standard MODEBUS-RTU protocol
- Optional BUS communication, supports baud rate and address setting.
- Support multi-motor synchronous control, using speed loop control maximum error ± 2 RPM in 3000RPM
- Rated speed
- Optional with input anti-reverse circuit and over-voltage energy braking
- Lock screen function can be canceled

Outline and Installation Drawing



Direct Drive Motor

3F series DD motors have two types of inner rotor and outer rotor to meet more application requirements. Diameter from 60mm-490mm, continuous torque from 1-1200N.m, there are more than a dozen sizes to choose from. The absolute accuracy can reach +10arc-sec, and the repeatability can reach ±0.5arc-sec. It has the advantages of high precision, high rigidity, low axial radial runout, etc. It is widely used in semiconductor production equipment, optical media, optical alignment, positioning detection, precision CNC machine tools, automobile assembly/inspection, liquid crystal manufacturing equipment, screen lamination Equipment, lithium battery manufacturing equipment, high-end screen printing equipment and medical equipment and other micro-precision high-end manufacturing fields.

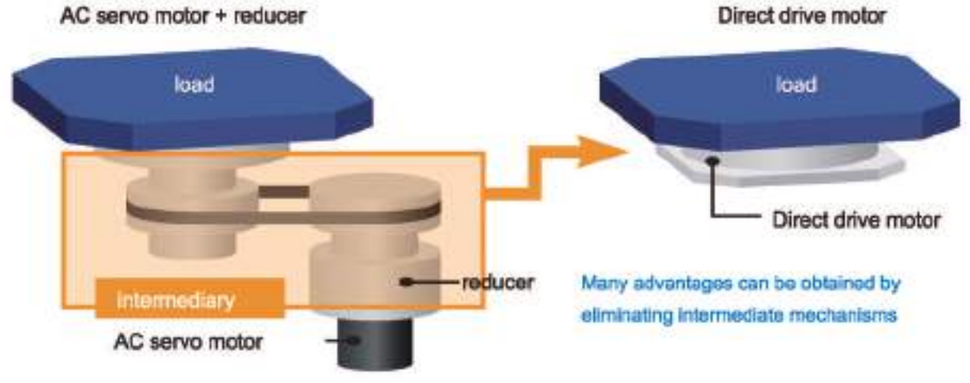
Patented product | CE certification | Reliable quality | Cost-effective | Short delivery time

DD Product Code Rules

DD	A	W	160	-	110	F	E	H		C	-	V	03		L	06
DD Direct drive motor	A: With frame B: frameless	W: outer rotor N: inner rotor	Outer diameter specification		peak torque	F: Flange R: round base	E: Optical analog incremental E2: Optical Digital Incremental E3: High-precision digital incremental 1: Magnetoelectric digital incremental A: absolute	without Hall H: with Hall		standard C: Customized		V:VCII pulse type VE:VCII EtherCAT VC:VCII CAN X: VXII pulse type XE:VXII EtherCAT	03: Rated current 3A 06: Rated current 6A		AC220V L : low voltage H:AC380V	Line length 3 meters 06: Line length 6 meters

Direct-drive motor and traditional AC servo motor compared to the obvious advantages

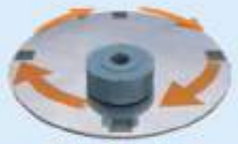
Because of the 3F direct drive motor - integrated structure, the load can be directly installed on the mounting surface of the DD motor, so there is no precision loss between the motor and the work station. This increases the precision of the device. Because there is no mechanical structure of the reducer, there is no energy loss like the traditional AC servo. The direct drive method makes it easy to change the station by program.



Three key points of direct drive motor easy to use

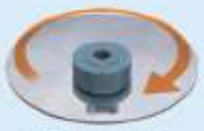
• flexible movement

Through rich programming functions, free motion can be realized.



Indexing action

swing

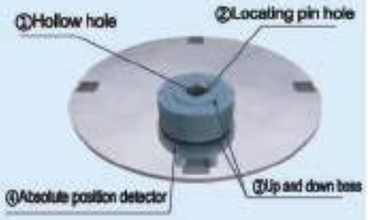


continuous rotation

• Reduce man-hours & save space

Simple 4 standard correspondence, simple design.

Motor + Timing Belt



Direct drive motor

• High reliability & maintenance free

Gearless type without gear damage and wear.

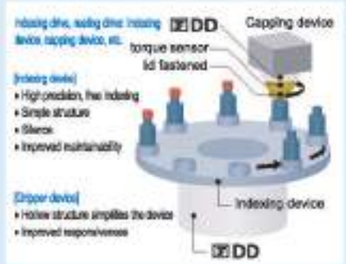
Worry about gear damage and wear

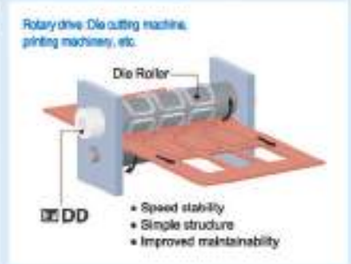
Gearless structure

DD Motor Use examples

Ideal for direct drive of AC servo + reducer mechanism

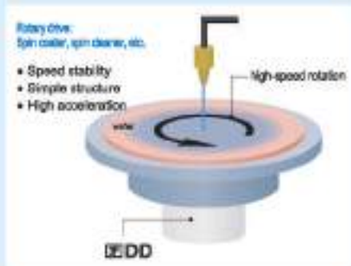
Application examples: Wafer handling equipment / Food handling equipment / Filling machine / Capping machine / Roll feeder / Laser processing machine / Laminator / FPD bonding equipment / Die cutting machine / Screen printing machine / Contact, non-contact Contact inspection device/various indexing tables





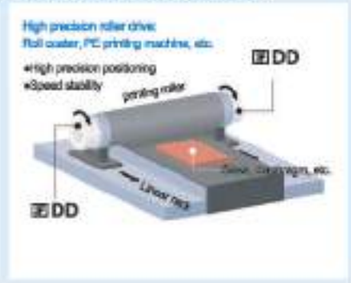
Ideal for applications requiring high-speed and high-precision motion

Application example:
mounter/sorter/spin coater/spin cleaner



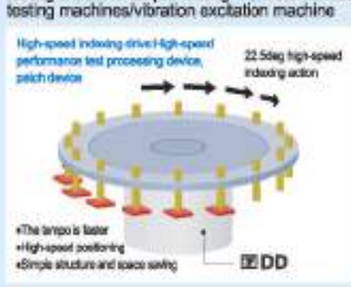
Ideal for applications requiring stable operation even with large inertia loads

Application examples: Scribe / FPD bonding equipment / Screen printing machine / FPD inspection equipment / Wafer cutting equipment / Packaging equipment / Wafer processing equipment / Wafer inspection equipment / X-ray analysis equipment / PE printer / Precision machining Devices, measuring devices/die-casting machines



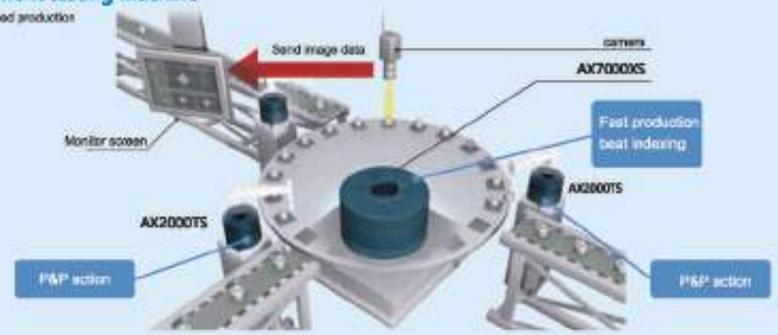
Most suitable for applications with small action angles and high tempo movements

Application examples: performance test processing device/appearance inspection device patch device/automobile related parts testing machine torque testing machine/various testing machines/vibration excitation machine



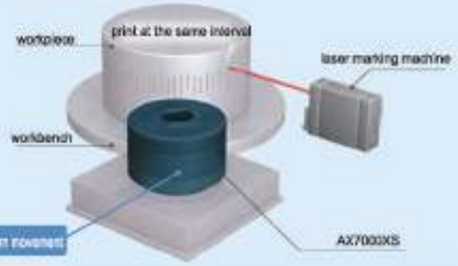
• Electronic component testing machine

Use multiple AXs for fast-paced production



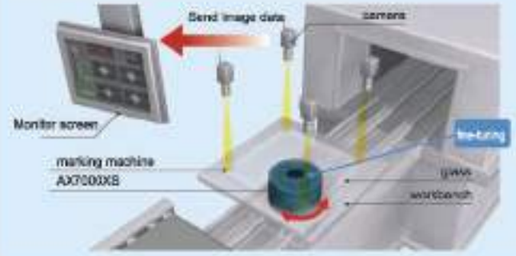
• Workpiece laser typewriter

Print at equal intervals using a laser marker.



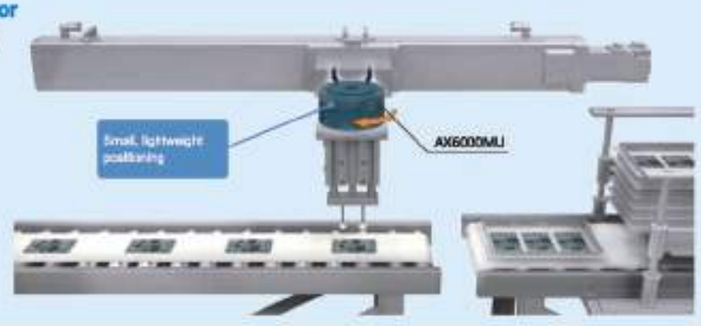
• Adjustment and positioning of glass substrates

Monitor the marking machine and adjust the small angle.



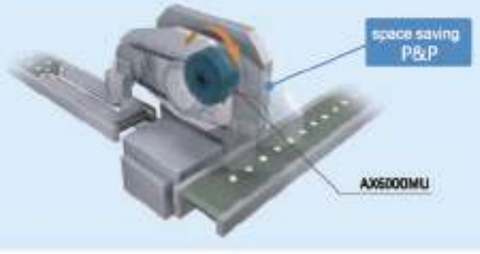
• Electronic substrate conveyor

Turn the direction of the electronic substrate



• P&P

Install the parallel movement mechanism to transport the workpiece.



• Assembly and testing machine

Make changeover adjustments without time loss.

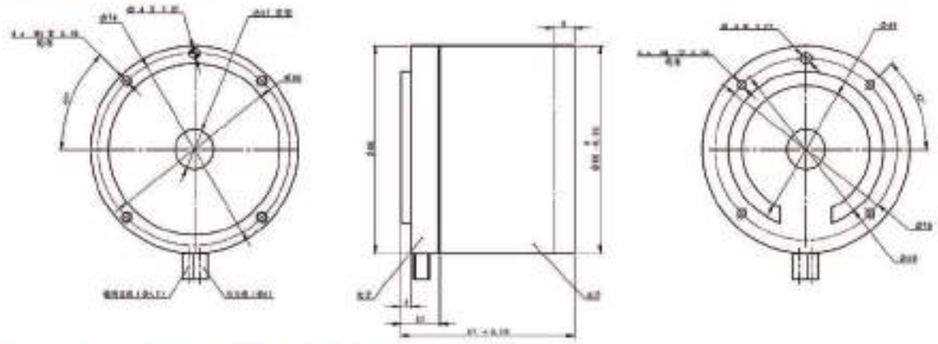
DDAW80-003RE Specifications

Outer rotor structure
outer ring rotation

Motor winding part Insulation class: Class F, insulation withstand voltage: 1500V for 1 minute
Insulation resistance: above 10MQ (500VDC)
Other structure: Outer rotor type, Excitation method: 3-phase

(Note) The nominal torque is the value when mounted on a metal frame with a sufficient heat capacity.
The position resolution is the recommended value and is set according to the drive.
The mechanical accuracy of the load mounting surface is the axial deviation and radial deviation of the mounting surface.
In the table, if there is no clear description, it is expressed as 200-230VAC power supply.

Outline Drawing (Unit: mm)



Performance parameter table

Specification				DDAW80-003RE
Instantaneous Maximum Output Torque			N.m	3.5
Continuous Maximum Torque			N.m	1
Maximum Speed			rps	4
Rated Speed			rps	2
Line Resistance			Ohm	3.8
Line Inductance			mH	4
Torque Constant			Nm/Arms	0.6
Back EMF Constant			Vp /(krpm)	51
Continuous Current			Arms	1.5
Peak Current			Arms	5
Number of Pole Pairs			-	11
Accuracy Requirement	Encoder Resolution		sin-cos/rev	1048576
	Absolute Accuracy		arc-sec	±32/±10
	Repeat Positioning Accuracy		arc-sec	±1.5
Origin Pulse Number			pulse/rev	1
Maximum Power			KVA	0.2
Rated Power			KVA	0.07
Rotor Inertia			kgcm²	6.35
Allowable Load	Axial Load	Forward	N	800
		Reverse	N	600
	Radial Load		Nm	10
Mechanical Accuracy of Load mounting Surface			μm	15 or less
Weight			kg	1.6
Environmental Requirements	Temperature		℃	40
	Humidity		%	85
	Atmospheric Environment		-	No corrosive gas or dust. Altitude below 1000m

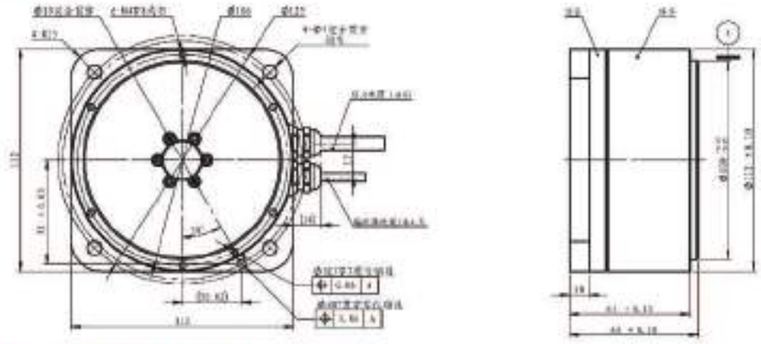
DDAW112-008FE Specifications

Outer rotor structure
outer ring rotation

Motor winding part Insulation class: Class F, insulation withstand voltage: 1500V for 1 minute
Insulation resistance: above 10MQ (500VDC)
Other structure: Outer rotor type, Excitation method: 3-phase

(Note) The nominal torque is the value when mounted on a metal frame with a sufficient heat capacity.
The position resolution is the recommended value and is set according to the drive.
The mechanical accuracy of the load mounting surface is the axial deviation and radial deviation of the mounting surface.
In the table, if there is no clear description, it is expressed as 200-230VAC power supply.

Outline Drawing (Unit: mm)



Performance parameter table

Specification				DDAW112-008FE
Instantaneous Maximum Output Torque			N.m	8
Continuous Maximum Torque			N.m	3
Maximum Speed			rps	4
Rated Speed			rps	2
Line Resistance			Ohm	4.7
Line Inductance			mH	5.7
Torque Constant			Nm/Arms	2
Back EMF Constant			Vp /(krpm)	171
Continuous Current			Arms	1.5
Peak Current			Arms	5
Number of Pole Pairs			-	10
Accuracy Requirement	Encoder Resolution		sin-cos/rev	1048576
	Absolute Accuracy		arc-sec	±26/±10
	Repeat Positioning Accuracy		arc-sec	±1.2
Origin Pulse Number			pulse/rev	1
Maximum Power			KVA	0.3
Rated Power			KVA	0.1
Rotor Inertia			kgcm²	26
Allowable Load	Axial Load	Forward	N	1000
		Reverse	N	600
	Radial Load		Nm	30
Mechanical Accuracy of Load mounting Surface			μm	15 or less
Weight			kg	2.8
Environmental Requirements	Temperature		℃	40
	Humidity		%	85
	Atmospheric Environment		-	No corrosive gas or dust. Altitude below 1000m

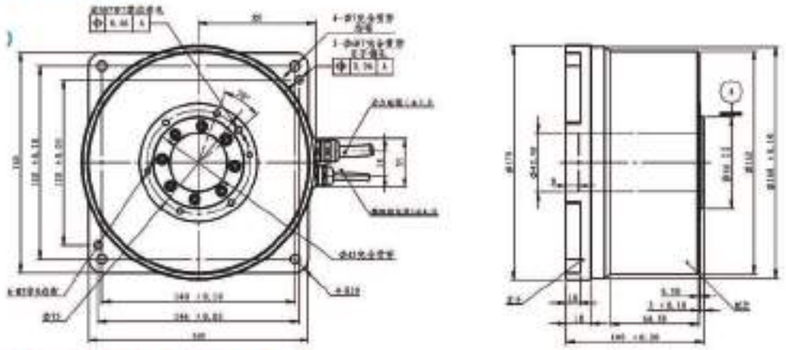
DDAW170-045FE Specifications

Outer rotor structure
outer ring rotation

Motor winding part Insulation class: Class F, insulation withstand voltage: 1500V for 1 minute
Insulation resistance: above 10MQ (500VDC)
Other structure: Outer rotor type, Excitation method: 3-phase

(Note) The nominal torque is the value when mounted on a metal frame with a sufficient heat capacity.
The position resolution is the recommended value and is set according to the drive.
The mechanical accuracy of the load mounting surface is the axial deviation and radial deviation of the mounting surface.
In the table, if there is no clear description, it is expressed as 200-230VAC power supply.

Outline Drawing (Unit: mm)



Performance parameter table

Specification				DDAW170-045FE
Instantaneous Maximum Output Torque			N.m	45
Continuous Maximum Torque			N.m	17
Maximum Speed			rps	4
Rated Speed			rps	2
Line Resistance			Ohm	6.2
Line Inductance			mH	18
Torque Constant			Nm/Arms	6.7
Back EMF Constant			Vp /(krpm)	572
Continuous Current			Arms	2.8
Peak Current			Arms	8
Number of Pole Pairs			-	10
Accuracy Requirement	Encoder Resolution		sin-cos/rev	1536000
	Absolute Accuracy		arc-sec	±26/±10
	Repeat Positioning Accuracy		arc-sec	±1.2
Origin Pulse Number			pulse/rev	1
Maximum Power			KVA	1
Rated Power			KVA	0.3
Rotor Inertia			kgcm²	179
Allowable Load	Axial Load	Forward	N	4200
		Reverse	N	2200
	Radial Load		Nm	100
Mechanical Accuracy of Load mounting Surface			μm	15, 8 or less
Weight			kg	11.6
Environmental Requirements	Temperature		℃	40
	Humidity		%	85
	Atmospheric Environment		-	No corrosive gas or dust. Altitude below 1000m

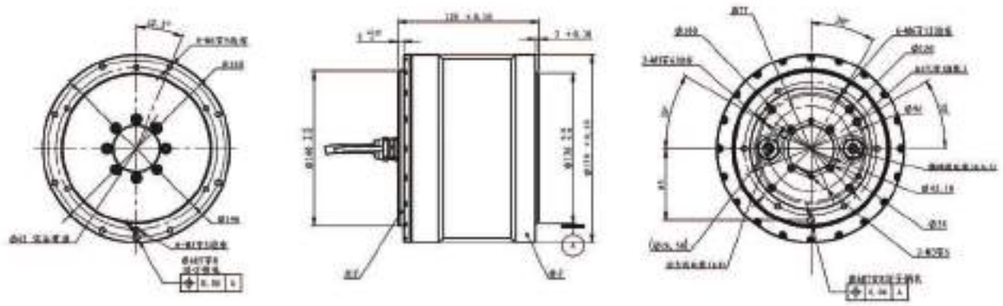
DDAW170-060RE Specifications

Outer rotor structure
outer ring rotation

Motor winding part Insulation class: Class F, insulation withstand voltage: 1500V for 1 minute
Insulation resistance: above 10MQ (500VDC)
Other structure: Outer rotor type, Excitation method: 3-phase

(Note) The nominal torque is the value when mounted on a metal frame with a sufficient heat capacity.
The position resolution is the recommended value and is set according to the drive.
The mechanical accuracy of the load mounting surface is the axial deviation and radial deviation of the mounting surface.
In the table, if there is no clear description, it is expressed as 200-230VAC power supply.

Outline Drawing (Unit: mm)



Performance parameter table

Specification				DDAW170-060RE
Instantaneous Maximum Output Torque			N.m	60
Continuous Maximum Torque			N.m	25
Maximum Speed			rps	4
Rated Speed			rps	2
Line Resistance			Ohm	6.2
Line Inductance			mH	18
Torque Constant			Nm/Arms	6.7
Back EMF Constant			Vp /(krpm)	569
Continuous Current			Arms	4
Peak Current			Arms	9
Number of Pole Pairs			-	10
Accuracy Requirement	Encoder Resolution		sin-cos/rev	1536000
	Absolute Accuracy		arc-sec	±26/±10
	Repeat Positioning Accuracy		arc-sec	±1.2
Origin Pulse Number			pulse/rev	1
Maximum Power			KVA	1
Rated Power			KVA	0.6
Rotor Inertia			kgcm²	260
Allowable Load	Axial Load	Forward	N	40000
		Reverse	N	16000
	Radial Load		Nm	300
Mechanical Accuracy of Load mounting Surface			μm	15, 5 or less
Weight			kg	13.2
Environmental Requirements	Temperature		℃	40
	Humidity		%	85
	Atmospheric Environment		-	No corrosive gas or dust. Altitude below 1000m

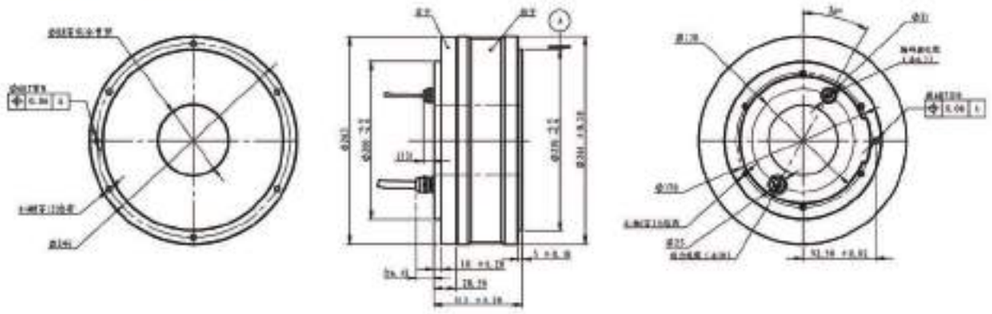
DDAW264-080RE Specifications

Outer rotor structure
outer ring rotation

Motor winding part Insulation class: Class F, insulation withstand voltage: 1500V for 1 minute
Insulation resistance: above 10MQ (500VDC)
Other structure: Outer rotor type, Excitation method: 3-phase

(Note) The nominal torque is the value when mounted on a metal frame with a sufficient heat capacity.
The position resolution is the recommended value and is set according to the drive.
The mechanical accuracy of the load mounting surface is the axial deviation and radial deviation of the mounting surface.
In the table, if there is no clear description, it is expressed as 200-230VAC power supply.

Outline Drawing (Unit: mm)



Performance parameter table

Specification				DDAW264-080RE
Instantaneous Maximum Output Torque			N.m	120
Continuous Maximum Torque			N.m	65
Maximum Speed			rps	2.5
Rated Speed			rps	1.2
Line Resistance			Ohm	5.8
Line Inductance			mH	22
Torque Constant			Nm/Arms	14.8
Back EMF Constant			Vp /(krpm)	1265
Continuous Current			Arms	4.5
Peak Current			Arms	9
Number of Pole Pairs			-	15
Accuracy Requirement	Encoder Resolution		sin-cos/rev	2592000
	Absolute Accuracy		arc-sec	±15/±6
	Repeat Positioning Accuracy		arc-sec	±0.5
Origin Pulse Number			pulse/rev	1
Maximum Power			KVA	2
Rated Power			KVA	0.8
Rotor Inertia			kgcm²	1296
Allowable Load	Axial Load	Forward	N	50000
		Reverse	N	20000
	Radial Load		Nm	400
Mechanical Accuracy of Load mounting Surface			μm	15, 8 or less
Weight			kg	29
Environmental Requirements	Temperature		℃	40
	Humidity		%	85
	Atmospheric Environment		-	No corrosive gas or dust. Altitude below 1000m

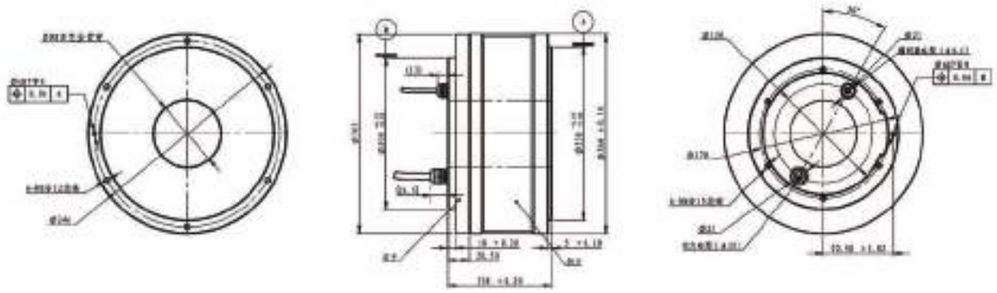
DDAW264-150RE Specifications

Outer rotor structure
outer ring rotation

Motor winding part Insulation class: Class F, insulation withstand voltage: 1500V for 1 minute
Insulation resistance: above 10MQ (500VDC)
Other structure: Outer rotor type, Excitation method: 3-phase

(Note) The nominal torque is the value when mounted on a metal frame with a sufficient heat capacity.
The position resolution is the recommended value and is set according to the drive.
The mechanical accuracy of the load mounting surface is the axial deviation and radial deviation of the mounting surface.
In the table, if there is no clear description, it is expressed as 200-230VAC power supply.

Outline Drawing (Unit: mm)



Performance parameter table

Specification				DDAW264-150RE
Instantaneous Maximum Output Torque			N.m	250
Continuous Maximum Torque			N.m	100
Maximum Speed			rps	2
Rated Speed			rps	1.2
Line Resistance			Ohm	8.5
Line Inductance			mH	37.4
Torque Constant			Nm/Arms	24
Back EMF Constant			Vp /(krpm)	2052
Continuous Current			Arms	4.2
Peak Current			Arms	10.5
Number of Pole Pairs			-	15
Accuracy Requirement	Encoder Resolution		sin-cos/rev	2592000
	Absolute Accuracy		arc-sec	±15/±6
	Repeat Positioning Accuracy		arc-sec	±0.5
Origin Pulse Number			pulse/rev	1
Maximum Power			KVA	3
Rated Power			KVA	1.2
Rotor Inertia			kgcm²	1440
Allowable Load	Axial Load	Forward	N	50000
		Reverse	N	20000
	Radial Load		Nm	400
Mechanical Accuracy of Load mounting Surface			μm	25, 15 or less
Weight			kg	36.9
Environmental Requirements	Temperature		℃	40
	Humidity		%	85
	Atmospheric Environment		-	No corrosive gas or dust. Altitude below 1000m

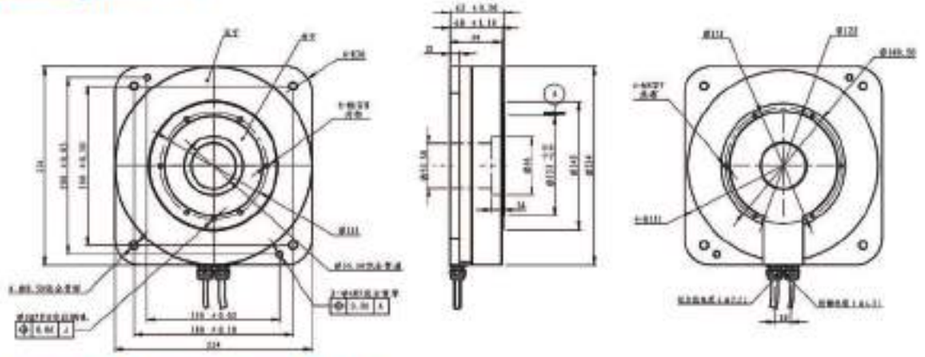
DDAN224-040FE Specification

Inner rotor structure
inner ring rotation

Motor winding part Insulation class: Class F, insulation withstand voltage: 1500V for 1 minute
Insulation resistance: above 10MQ (500VDC)
Other structure: Outer rotor type, Excitation method: 3-phase

(Note) The nominal torque is the value when mounted on a metal frame with a sufficient heat capacity.
The position resolution is the recommended value and is set according to the drive.
The mechanical accuracy of the load mounting surface is the axial deviation and radial deviation of the mounting surface.
In the table, if there is no clear description, it is expressed as 200-230VAC power supply.

Outline Drawing (Unit: mm)



Performance parameter table

Specification			DDAN224-040FE
Instantaneous Maximum Output Torque		N.m	50
Continuous Maximum Torque		N.m	35
Maximum Speed		rps	3
Rated Speed		rps	1.5
Accuracy Requirement	Encoder Resolution	sin-cos/rev	1536000
	Absolute Accuracy	arc-sec	±26/±10
	Repeat Positioning Accuracy	arc-sec	±1
Origin Pulse Number		pulse/rev	1
Maximum Power		KVA	2
Rated Power		KVA	1.2
Line Resistance		Ohm	20
Line Inductance		mH	85
Back EMF Constant		Up/ (krpm)	1026
Continuous Current		Arms	3
Peak Current		Arms	6
Number of Pole Pairs		-	15
Rotor Inertia		kgcm²	120
Allowable Load	Axial Load	N	2000
	Radial Load	Nm	120
Mechanical Accuracy of Load mounting Surface		μm	15,5 or less
Weight		kg	13.4
Environmental Requirements	Temperature	℃	40
	Humidity	%	85
	Atmospheric Environment	-	No corrosive gas or dust. Altitude below 1000m

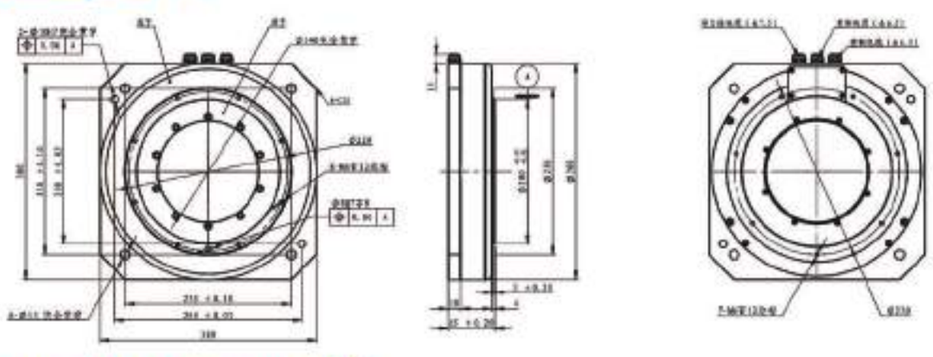
DDAN300-100FI Specification

Inner rotor structure
inner ring rotation

Motor winding part Insulation class: Class F, insulation withstand voltage: 1500V for 1 minute
Insulation resistance: above 10MQ (500VDC)
Other structure: Outer rotor type, Excitation method: 3-phase

(Note) The nominal torque is the value when mounted on a metal frame with a sufficient heat capacity.
The position resolution is the recommended value and is set according to the drive.
The mechanical accuracy of the load mounting surface is the axial deviation and radial deviation of the mounting surface.
In the table, if there is no clear description, it is expressed as 200-230VAC power supply.

Outline Drawing (Unit: mm)



Performance parameter table

Specification			DDAN300-100FI
Instantaneous Maximum Output Torque		N.m	100
Continuous Maximum Torque		N.m	35
Maximum Speed		rps	3
Rated Speed		rps	1.5
Line Resistance		Ohm	2.4
Line Inductance		mH	11.4
Torque Constant		Nm/Arms	7
Back EMF Constant		Vp /(krpm)	598
Continuous Current		Arms	5
Peak Current		Arms	15
Number of Pole Pairs		-	22
Accuracy Requirement	Encoder Resolution	sin-cos/rev	1200000
	Absolute Accuracy	arc-sec	±30
	Repeat Positioning Accuracy	arc-sec	±2
Origin Pulse Number		pulse/rev	1
Maximum Power		KVA	2
Rated Power		KVA	1.2
Rotor Inertia		kgcm²	211
Allowable Load	Axial Load	N	2000
	Radial Load	Nm	120
Mechanical Accuracy of Load mounting Surface		μm	15.5 or less
Weight		kg	23.7
Environmental Requirements	Temperature	℃	40
	Humidity	%	85
	Atmospheric Environment	-	No corrosive gas or dust. Altitude below 1000m

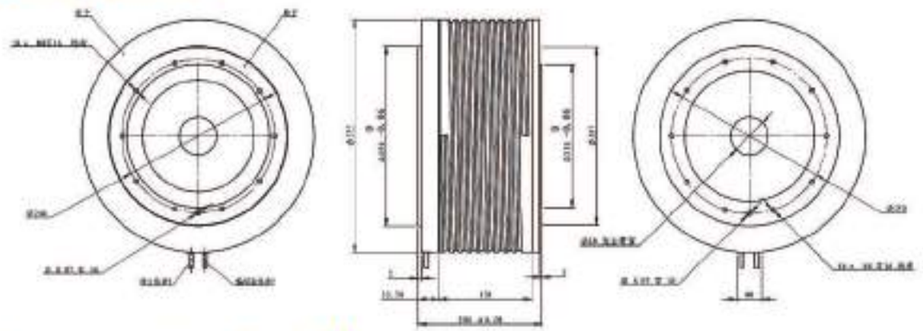
DDAN375-1000RE Specification

Inner rotor structure
Inner ring rotation

Motor winding part Insulation class: Class F, insulation withstand voltage: 1500V for 1 minute
Insulation resistance: above 10MQ (500VDC)
Other structure: Outer rotor type, Excitation method: 3-phase

(Note) The nominal torque is the value when mounted on a metal frame with a sufficient heat capacity.
The position resolution is the recommended value and is set according to the drive.
The mechanical accuracy of the load mounting surface is the axial deviation and radial deviation of the mounting surface.
In the table, if there is no clear description, it is expressed as 200-230VAC power supply.

Outline Drawing (Unit: mm)



Performance parameter table

Specification			DDAN375-1000RE
Instantaneous Maximum Output Torque		N.m	1062
Continuous Maximum Torque		N.m	369
Maximum Speed		rps	2
Rated Speed		rps	1
Line Resistance		Ohm	2592000
Line Inductance		mH	±15/±6
Torque Constant		Nm/Arms	±1.2
Back EMF Constant		Vp /(krpm)	1
Continuous Current		Arms	9
Peak Current		Arms	5
Number of Pole Pairs		-	46
Accuracy Requirement	Encoder Resolution	pulse/rev	3950
	Absolute Accuracy	arc-sec	5.3
	Repeat Positioning Accuracy	arc-sec	32
Origin Pulse Number		pulse/rev	8
Maximum Power		KVA	23
Rated Power		KVA	33
Rotor Inertia		kgcm²	5200
Allowable Load	Axial Load	N	20000
	Radial Load	Nm	600
Mechanical Accuracy of Load mounting Surface		μm	15, 5 or less
Weight		kg	90
Environmental Requirements	Temperature	℃	40
	Humidity	%	85
	Atmospheric Environment	-	No corrosive gas or dust. Altitude below 1000m

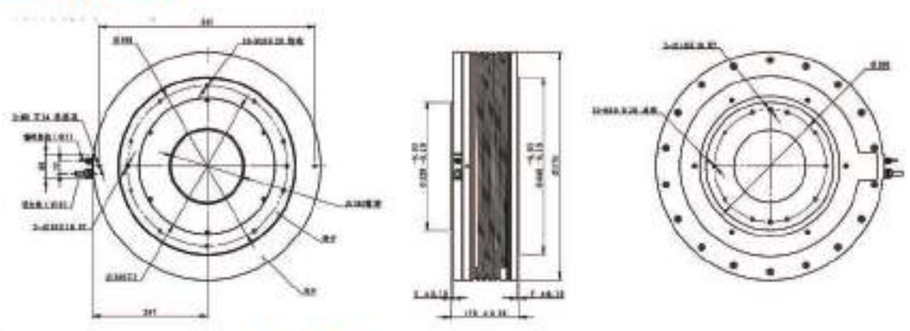
DDAN570-2000RI-N3 Specification

Inner rotor structure
Inner ring rotation

Motor winding part Insulation class: Class F, insulation withstand voltage: 1500V for 1 minute
Insulation resistance: above 10MQ (500VDC)
Other structure: Outer rotor type, Excitation method: 3-phase

(Note) The nominal torque is the value when mounted on a metal frame with a sufficient heat capacity.
The position resolution is the recommended value and is set according to the drive.
The mechanical accuracy of the load mounting surface is the axial deviation and radial deviation of the mounting surface.
In the table, if there is no clear description, it is expressed as 200-230VAC power supply.

Outline Drawing (Unit: mm)



Performance parameter table

Specification			DDAN570-2000RI-N3
Instantaneous Maximum Output Torque		N.m	2000
Continuous Maximum Torque		N.m	720
Maximum Speed		rps	1.5
Rated Speed		rps	1
Line Resistance		Ohm	1.4
Line Inductance		mH	19.3
Torque Constant		Nm/Arms	40.3
Back EMF Constant		Vp /(krpm)	3600
Continuous Current		Arms	18
Peak Current		Arms	66
Number of Pole Pairs		-	33
Accuracy Requirement	Encoder Resolution	sin-cos/rev	1 200000
	Absolute Accuracy	arc-sec	±80
	Repeat Positioning Accuracy	arc-sec	±2.5
Origin Pulse Number		pulse/rev	1
Maximum Power		KVA	20
Rated Power		KVA	6
Rotor Inertia		kgcm²	11500
Allowable Load	Axial Load Forward	N	20000
	Axial Load Reverse	N	12000
	Radial Load	Nm	600
Mechanical Accuracy of Load mounting Surface		μm	15,5orless.
Weight		kg	190
Environmental Requirements	Temperature	℃	40
	Humidity	%	85
	Atmospheric Environment	-	No corrosive gas or dust. Altitude below 1000m

PLC Programmable controller

Rich special functions

Function blocks written in C language

- The program confidentiality is better. After the user has compiled the function module, he can directly call the module where needed, and the internal program encryption is invisible.
- Save internal space, reduce workload, and have high programming efficiency.
- More abundant operation functions include some functions supported by C language.
- support local variables and global variables.

To realize the function of multiple summation, the user does not need to repeatedly input addition and subtraction instructions, but only needs to write an addition function and call it again.

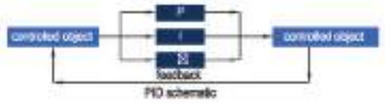
Body PID control

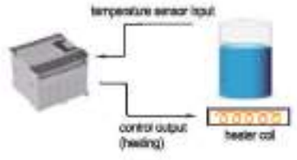
- PLC body supports PID control instructions, and provides self-tuning function, which is more flexible to use.
- Users can obtain the best sampling time and PID parameter values through self-tuning, thereby improving the control accuracy.
- There are two control methods, step response method and critical oscillation method, which can be applied to more applications.

Constant pressure water supply PID application

Support access to cloud platform

- Connect the cloud server through the host computer software to remotely program, debug and monitor the identifiable PLC.





Motion control type PCM series

In addition to all the functions of standard PLC, some enhanced functions can be added, such as electronic cam function, support 2GWIFI/4G module, CANopen bus communication.

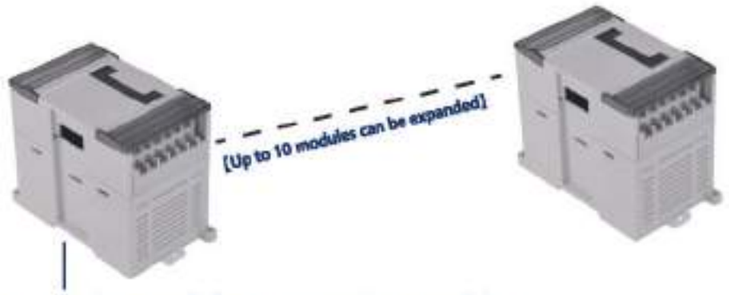
Programmer 256KB	I/O sequence control	Maximum I/O256 points	Basic instruction 0.02-0.05us
RS232、RS485	Host analog	2-4 channels of 200KHz pulse output	1-2 high-speed counting (single-phase, AB-phase maximum 200K)
canopen bus	Optional 2G/wifi/4G function	USB	Plug, electronic cam, G code

■ Performance specifications

Product series PCM		M0808T	M0808RT	M1410T/RT	M1410T4/RT4	M1814T/RT	M1814T4/RT4	M3624T/RT	M3624T4/RT4
Body I/O	total points	16	16	24	24	32	32	60	60
	input points	8	8	14	14	18	18	36	36
	output points	8	8	10	10	14	14	24	24
Maximum number of I/O points		176	176	186	186	192	192	220	220
High-speed positioning	Normal pulse output	2way	2way	2way	4way	2way	4way	2way	2way
	Differential pulse output	—							
high speed input	Single Phase/AB Mode	1way	1way	2way	2way	2way	2way		
	input mode	0C (open collector)							
Expendability	Right expansion module	10							
	left expansion module	—							
	BD board	—	—	1way	1way	1way	1way	2way	2way
interrupt	External Interrupt	4	4	4	4	4	4	4	4
	timed interrupt	3	3	3	3	3	3	3	3
	other interruptions	High count interrupt							
Communication function	communication port	RS232*1 、RS485*1 、USB*1 、 LAN*1							
	Protocol	Standard MODBUS RTU protocol, free port communication, Mitsubishi communication protocol							
Analog 2AD2DA/ (X)		—	—	optional	optional	—	—	optional	optional
Electronic cam / (C)		support	support	support	support	support	support	support	support
CanOpen function / (N)		support	support	support	support	support	support	support	support
2G/WIFI module/4G/ (2W/4)		optional	optional	optional	optional	optional	optional	optional	optional
PWM pulse width modulation		support							
Frequency measurement		support							
Precise timing		support							
Multi-station control		support							
program execution		Cyclic scanning from top to bottom							
programmatically		Instruction list, ladder diagram, and C language are used together							
power outage		Use FlashROM and lithium battery (3V button battery)							
Basic instruction processing speed		0.04us							
User program capacity (secure download mode)		256K							

Expansion unit

- In order to meet the application requirements of more occasions, CD series PLC basic units can be equipped with abundant I0 expansion modules, analog input and output modules, and temperature control modules. The main body can expand up to 10 right expansion modules of different types.



Right expansion module IO expansion module

- It is used to expand the number of input and output points, from 8 to 16 points, and the basic unit can be extended up to 256 points.
- The output expansion module is divided into two output types: transistor (T) and relay (R).

Analog Expansion Module

- With D/A, A/D conversion function. By expanding analog input and output modules and temperature control modules, CD series PLCs can be used in process control systems such as temperature, flow, liquid level, and force.
- Adding PID adjustment function, it is more widely used, more flexible to use, and has higher control precision, only need to set four parameters.
- Each channel of the temperature control module can perform PID control independently, can be self-tuning, and can exchange information with the main body through the FROM and TO commands.

Right expansion module

I/O expansion module

- This type of expansion module can be used when the number of main body points cannot meet the usage requirements.
- The basic unit can be extended by 256 points.

Digital input module

Model NPN/PNP input type	Function description	Specification
PC-E08S-D	8-channel switch input, DC24V power supply	Input filter time 1~50ms can be set R: Relay output T: Transistor output. R: response time less than 10ms T: Response time below 0.2ms R maximum load: resistive 2A inductive 80VA T maximum load: the maximum output current of each point is 0.3A
PC-E16S-D	16-channel switch input, DC24V power supply	

Switch output module

Model	Function description	Specification
PC-E08R-D	8-channel relay output, DC24V power supply	Input filter time 1~50ms can be set R: Relay output T: Transistor output. R: response time less than 10ms T: Response time below 0.2ms R maximum load: resistive 2A inductive 80VA T maximum load: the maximum output current of each point is 0.3A
PC-E08T-D	8-channel relay output, DC24V power supply	
PC-E16R-D	16-channel relay output, DC24V power supply	
PC-E16T-D	16-channel relay output, DC24V power supply	

YMC3 pulse
YMCE3 bus series

YMC3–Impulse

The YMC3 series high performance multi-axis motion controller is a pulse-type stand-alone motion controller. The controller itself supports up to 16 axes, expandable to 24 axes for complex continuous trajectory control needs.

YMC3E–Computer bus

The YMC3E/N series of high-performance multi-axis motion controllers are stand-alone motion controllers compatible with EtherCAT bus (of which N supports EtherCAT, RTEX dual bus) and pulse type. The controller itself supports up to 16 axes (EtherCAT bus or RTEX bus + pulse) and can be expanded to 24 axes for complex continuous trajectory control needs.

YMC3 series high-performance multi-axis motion controllers can be used for robots (SCARA, Delta, 6 joints), electronic semiconductor equipment (testing equipment, assembly equipment, locking equipment, soldering machine), dispensing equipment, non-standard equipment, printing and packaging equipment, textile and garment equipment, stage and entertainment equipment, medical equipment, assembly line and other applications.

EtherCAT. RTEX

■ YMC3 Pulse Functional Characteristics

◆ Number of axes: supports up to 24 axes motion control (including dummy axes);
◆ IO: up to 48 in and 32 out;
◆ Communication: RS232, RS485, RS422, U disk, Ethernet;
◆ Analog: up to 4-channel AD, 2-channel DA; support ZCAN expansion, can expand 256-channel AD, 128-channel DA;
◆ Pulse Mode: Direction+Pulse/Double Pulse;
◆ Pulse mode: direction + pulse/double pulse; ◆ Function:
01. support encoder input, can be configured as handwheel mode;
02. Support ZCAN expansion IO, up to 512 inputs and 512 outputs at the same time;
03. Axis positive and negative limit and home signal can be configured as any input port;
04. The maximum output current is 300mA, which can directly drive some solenoid valves;
05. support electronic cam, electronic gear, position latching, synchronous following, virtual axis, comparison output and other functions;
06. support multi-file multi-task programming, can support PC program and controller built-in program work at the same time;
07. support a variety of encryption means to ensure the safety of user programs;
08. Support power-down detection and power-down storage. 09;
09. support a variety of robotic algorithms (SCARA, Delta). 10;
10. support pulse closed loop, pitch compensation and other functions;
◆ Performance:
01. Maximum output pulse frequency up to 10MHz;
02. support up to 16-axis linear interpolation, arbitrary arc or space arc interpolation, spiral interpolation, elliptic interpolation;
03. supports independent continuous interpolation of multiple machines.

■ YMC3E Bus Functional Features

◆ Number of axes: Support up to 16 axes motion control (including dummy axes);
◆ IO: up to 52 in and 28 out
◆ Communication: RS232, RS485, RS422, U disk, Ethernet, EtherCAT or EtherCAT/RTEX dual bus;
◆ Analog: up to 2-channel AD, 2-channel DA; supports ZCAN expansion up to 256-channel, 128-channel DA;
◆ Pulse mode: direction + pulse/double pulse;
◆ Function:
01. Support encoder input, configurable as handwheel mode;
02. Support IO expansion, up to 512 inputs and 512 outputs at the same time;
03. Axis positive and negative limit and home signal can be configured as any input port;
04. The maximum output current is 300mA, which can directly drive some solenoid valves;
05. support electronic cam, electronic gear, position latching, synchronous following, virtual axis and other functions;
06. support hardware comparison output (HW_PSWITCH2, hardware timer, precise output in motion);
07. support multi-file and multi-task programming, can support PC program and controller built-in program to work at the same time;
08. support a variety of encryption means to ensure the safety of user programs. 09. support power-down detection, dropout detection and control;
09. support power-down detection, power-down storage. 10. support a variety of robotic structures (e.g., the robot can be used in a variety of ways);
10. support a variety of robot structure (SCARA, Delta). 11. support pulse closed-loop, screwdriver, and other
11. support pulse closed loop, pitch compensation and other functions;
◆ Performance:
01. The fastest EtherCAT refresh cycle is 500μs. 02;
02. Maximum output pulse frequency up to 10MHz;
03. support up to 12-axis linear interpolation, arbitrary arc or space arc interpolation, spiral interpolation, spline interpolation;
04. support multiple machines independent continuous interpolation.

Vision Motion Controller

YPLC516E EtherCAT

YPLC516E is a bus type vision motion control all-in-one machine. The controller itself supports up to 16-axis and can be extended to 32-axis motion control, which is used to realize a variety of electronic cams, straight lines, arcs, continuous trajectory machining, manipulators and other complex motion control and positioning, measurement, detection and identification and other machine vision applications.

YPLC516E motion controller can be used in 3C electronics, lithium-ion batteries, printing and packaging, food and medicine, robots, assistive robots, semiconductors and lasers and other industry applications.

■ Functional features

◆ Number of axes: Supports up to 32 axes of EtherCAT motion control (including dummy axes);
◆ Internal IO: 16 in and 16 out;
◆ Communication: RS232, RS485, USB, Ethernet, EtherCAT, CAN;
◆ Analog: support ZCAN expansion, expandable to 128 AD, 64 DA;
◆ Pulse mode: direction + pulse;
◆ Function:
01. Support visual fly-tap function;
02. Support handwheel interface input (12-point input);
03. Support 2-way camera interface (USB3.0 and GiGE);
04. EtherCAT expandable 4096 points input/ 4096 points output;
05. Support 2-channel precision output to realize position synchronization output PSO;
06. 30+ robotic model algorithms such as Delta, SCARA, 6 joints, dual rotation, etc. can be supported;
07. a variety of electronic cam, linear, circular arc, continuous trajectory processing and other complex motion control;.
08. support a variety of encryption means to ensure the safety of user programs;
09. support for power-down detection, power-down storage;
10 support ZBasic multi-file multi-task programming.
◆ Performance:
01. The fastest refresh cycle of EtherCAT within 16 axes is 100μs;
02. Maximum output pulse frequency up to 500KHz;
03. Supports up to 16-axis linear interpolation, arbitrary arc or space arc interpolation, spiral interpolation, elliptic interpolation;
04. support multiple machines independent continuous interpolation;
05. direct memory interaction, one order of magnitude faster than PCI/PCIe data interaction;
06. Built-in Linux system, can replace the traditional program of industrial computer + machine vision + motion control.

PCI464 bus type motion control card

EtherCAT RTEX

PCI series high performance multi-axis motion control card is a bus type motion control card. The control card itself supports up to 64 axes of motion control, to realize linear interpolation, arc interpolation, helical interpolation and elliptic interpolation and other complex continuous trajectory control needs.

PCI series high-performance multi-axis motion control card can be used for robotics (SCARA, Delta, 6 joints), electronic semiconductor equipment (testing equipment, assembly equipment, locking equipment, soldering machine), dispensing equipment, laser processing equipment, non-standard equipment, printing and packaging equipment, textile and apparel equipment, stage and entertainment equipment, and medical equipment and assembly lines and other applications.

■ Functional features

◆ Number of axes: supports up to 64 axes of motion control (EtherCAT), 32 axes (RTEX);
◆ IO: 8 in and 8 out as standard;
◆ Communication: PCI;
◆ Analog: support ZCAN expansion, can be expanded to 128-channel AD, 64-channel DA;
◆ Pulse Mode: Direction+Pulse/Double Pulse;
◆ Function:
01. Support encoder input, configurable as handwheel mode;
02. Supports ZCAN and EtherCAT expansion IO, up to 4096 inputs and 4096 outputs at the same time;
03. Axis positive and negative limit and home signal can be configured as any input port;
04. The maximum output current is 300mA, which can directly drive some solenoid valves;
05. support electronic cam, electronic gear, position latching, synchronous following, virtual axis and other functions;
06. support pulse closed loop, pitch compensation function;
07. Support multi-file and multi-task programming;
08. support a variety of encryption means to ensure that the user program security. 09. support for power-down detection, dropout, and so on;
09. support power-down detection, power-down storage;
◆ Performance:
01. Support 16-axis EtherCAT with the fastest refresh cycle of 100μs. 02;
02. Maximum output pulse frequency up to 10MHz;
03. support up to 16-axis linear interpolation, arbitrary arc, spiral interpolation, elliptic interpolation;
04. support multiple machines independent continuous interpolation;
05. EtherCAT/RTEX multi-bus axis + pulse axis hybrid interpolation.

General / Brake / Frequency conversion Motor / Inverter

AC/DC miniature gear motor

High efficiency hypoid gear reducer

AC small gear reduction motor

Worm gear reducer

DC-AC reduction motor

AC&DC / SMALL REDUCE GEAR MOTOR

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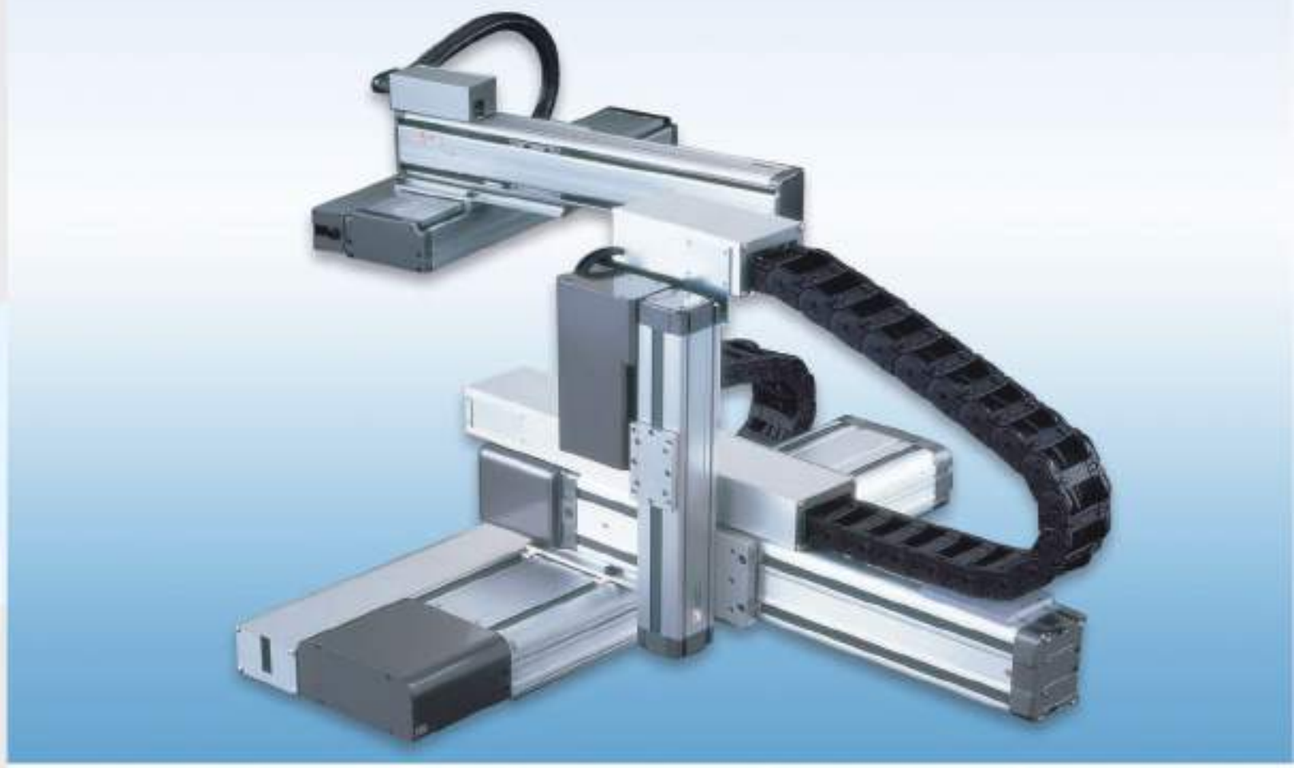
★ Note: Such products selection parameters require more, please consult the sales engineer to send a separate sample, and to assist in the selection.



Servomotor Cylinders - Linear Motor Slides
Belt / Screw Slide Modules

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