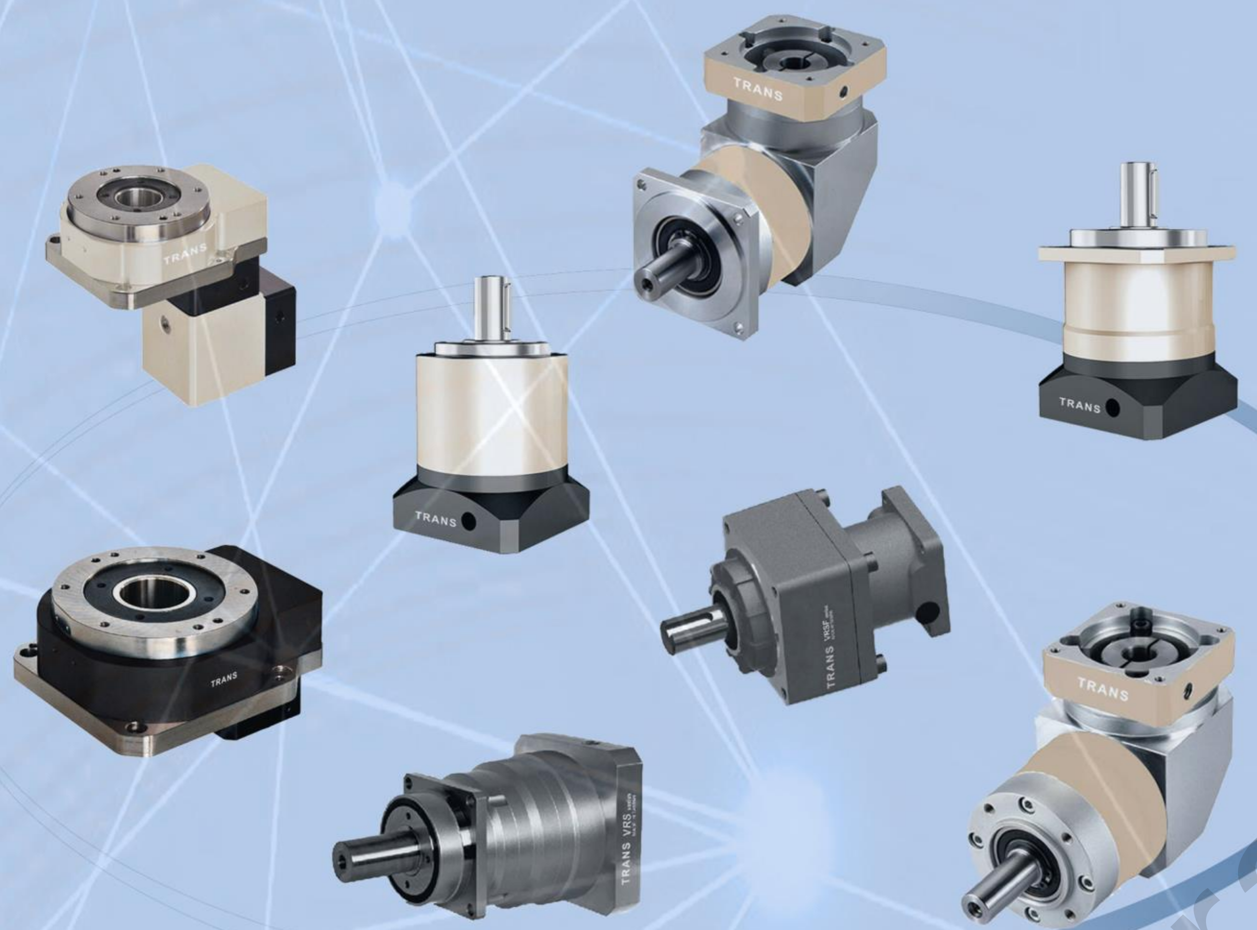
TRANS

Trans Industrial is committed to offering you quality products
ONE-STOP MOTION CONTROL SOLUTION EXPERT
Specializing in R & D and production of various precision planetary gear transmission products
Click https://transreducer.com for more information



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TRANS®
MOTION CONTROL SOLUTION EXPERT

For stepper / servo motor

Planetary Gearbox

Excellent technology / precision transmission solutions expert

Shanghai Trans Intelligent Technology Co., Ltd.

Company Profile

Shanghai Trans Intelligent Technology Co., Ltd.(Hereinafter referred to as TRANS) is a professional manufacturer in the field of motion control products, which integrates R & D, manufacturing and sales as a whole. The TRANS company's R&D team and factory colleagues have more than 20 years of gear design and manufacturing experience and have the core technology of this field and advanced processing equipment. In the early stage, the factory mainly produced worm gear reducers, UDL step-less speed changer, helical gear reducers, hypoid gear reducers, K, R, F, S series hard gear reducers, and PC helical gear reducers. The company is far-sighted and has laid out the company's future development direction in advance. In the mid-term, TRANS cooperated with the German reducer technical team to establish a precision gearbox division to cooperate in the development of high-level high-precision gear reducers, including planetary reducers and harmonic reducers (American genius inventor C W.Musser created and invented the principle of wave gear device), 90-degree right-angle servo gearbox (suitable for different installation and output requirements of automation), cycloidal pinwheel RV reducer (suitable for multi-joint robot industry). Also, the company produces related products in the motion control field such as precision rack and pinion, coupling, linear motor, servo motor, etc. Meanwhile, TRANS company also provide non-standard customized reducer services. The precision planetary reducer produced by the TRANS company has three characteristics of low backlash (3 ~ 8 arcmin), low noise (60dAB), and high efficiency (>=95%). The size and accuracy are fully matched with Japanese and German reducers, and can directly replace German and Japanese brand reducers. The products are suitable for servo motors and stepper motors produced by domestic and foreign servo factories, such as Panasonic, Yaskawa, Omron, Mitsubishi, Schneider, Delta, Siemens, MOOG, Beckoff, Festo, Leadshine, etc. Our company's precision reducers are widely used in laser cutting machines, woodworking engraving machines, gantry machine tools, industrial robots, 3C automation, plastic machinery, three-dimensional parking lots, photovoltaic equipment, automobile manufacturing, lithium batteries, milling machines, full servo tissue machinery, precision embossing Printing machines, servo pipe benders, precision coating machines, CNC spring machines, and other highly automated equipment.

The TRANS factory matches a large inventory of standard gearboxes and flanges suitable for different motor input sizes, which can achieve the fastest delivery time of 7~10 working days, saving customers costs in terms of time.

TRANS company's products have passed the ISO9001: 2015 quality management system, the European CE certification, and the US UL certification. The products have been sold to more than 100 countries at home and abroad, and have been widely recognized and repurchased by European and American customers who have high-quality requirements.

TRANS company is committed to the field of motion control, working with servo motor manufacturers and system integrators to serve the global automation industry and robotics, providing customers with high-quality products, timely and fast services, and striving to be a leader in the transmission field. Your satisfaction is our eternal pursuit.

PRODUCTION WORKSHOP

FAST DELIVERY TIME

CUSTOMIZED SERVICE IS AVAILABLE

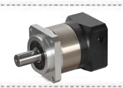
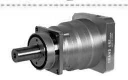
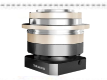
COMPETITIVE PRICE WITH TOP QUALITY

ALTERNATIVES TO BRAND SPEED REDUCERS

ALL-ROUND PROFESSIONAL TECHNICAL SUPPORT

BROAD RANGE OF SPEED REDUCERS FOR SELECTION

CONTENTS

	Series	Positioning accuracy	Radial forces	Torsional stiffness	Backlash	Wide range of size	Power density	Wide range of ratios
	AF	⚙⚙	⚙⚙	⚙⚙	⚙⚙	⚙⚙⚙	⚙⚙⚙	⚙⚙⚙
	MAE	⚙⚙	⚙⚙	⚙⚙	⚙⚙	⚙⚙⚙	⚙⚙⚙	⚙⚙⚙
	AB	⚙⚙⚙	⚙⚙	⚙⚙⚙	⚙⚙⚙	⚙⚙	⚙⚙⚙	⚙⚙⚙
	ABR	⚙⚙⚙	⚙⚙	⚙⚙⚙	⚙⚙	⚙⚙	⚙⚙	⚙⚙⚙
	VRB	⚙⚙⚙	⚙⚙	⚙⚙⚙	⚙⚙⚙	⚙⚙⚙	⚙⚙⚙	⚙⚙⚙
	VRL	⚙⚙⚙	⚙⚙	⚙⚙⚙	⚙⚙⚙	⚙⚙⚙	⚙⚙⚙	⚙⚙⚙
	VRS	⚙⚙⚙	⚙⚙⚙	⚙⚙⚙	⚙⚙⚙	⚙⚙⚙	⚙⚙⚙	⚙⚙⚙
	AD	⚙⚙⚙	⚙⚙⚙	⚙⚙⚙	⚙⚙⚙	⚙⚙	⚙⚙⚙	⚙⚙⚙
	MFR	⚙⚙⚙	⚙⚙	⚙⚙	⚙⚙	⚙	⚙⚙	⚙⚙
	MER	⚙⚙⚙	⚙⚙	⚙⚙	⚙⚙	⚙	⚙⚙	⚙⚙
	AD	⚙⚙⚙	⚙⚙⚙	⚙⚙⚙	⚙⚙	⚙	⚙⚙	⚙⚙
	MLF	⚙⚙	⚙⚙	⚙⚙	⚙⚙	⚙⚙⚙	⚙⚙⚙	⚙⚙⚙
	MLE	⚙⚙	⚙⚙	⚙⚙	⚙⚙	⚙⚙⚙	⚙⚙⚙	⚙⚙⚙
	VRSF	⚙⚙⚙	⚙⚙	⚙⚙	⚙⚙	⚙	⚙	⚙⚙
	ZR	⚙⚙	⚙⚙	⚙⚙⚙	⚙⚙	⚙⚙⚙	⚙	⚙⚙⚙
	MD	⚙⚙⚙	⚙⚙	⚙⚙	⚙⚙	⚙⚙	⚙	⚙⚙⚙

⚙ Standard ⚙⚙ Strong ⚙⚙⚙ Highest

Power Grade

Find your target quickly:

Program Overview

You will no longer need to spend much time searching in the future by giving detailed datas.
You only need to use our company's clear search program to quickly select the products you need.
In this overview, you can find the important specifications features of the products.

Reference Table of Reducer Selection

Selecting reducer according to the output power of servo motor

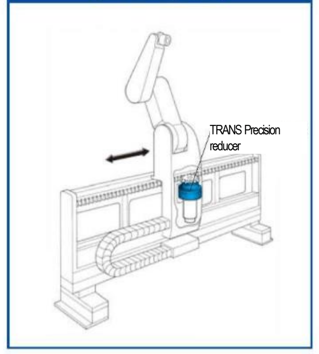
Capacity	Model	1/3	1/4	1/5	1/7	1/10	1/12	1/15	1/16	1/20	1/25	1/28	1/30	1/35	1/40	1/50	1/70	1/100
100w	042	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
	060	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
200w	060	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	090	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
400w	060	●	●	●	●	●	●	●	●	●	●	●	●					
	090	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
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.

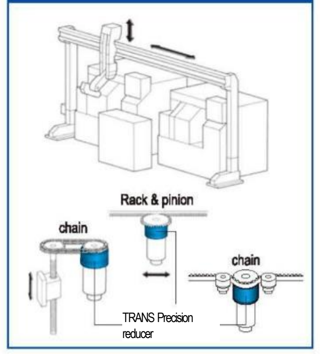
Product Application Industry

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

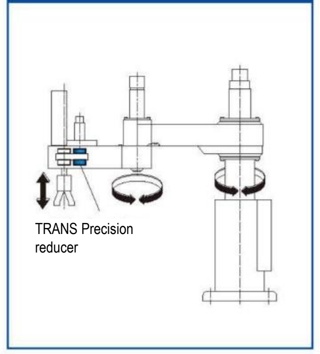
The walking shaft of a robot (rack and pinion)



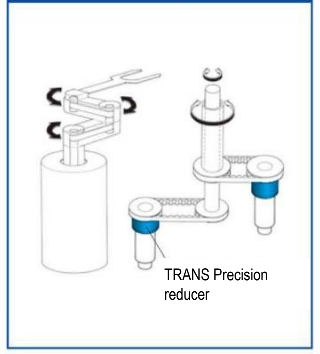
Gantry robot of machine tool



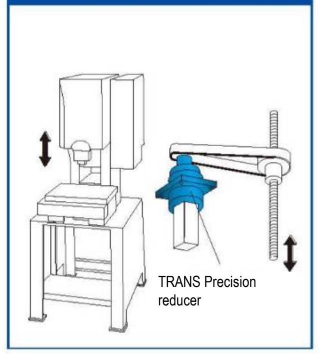
Horizontal multi-joint robot



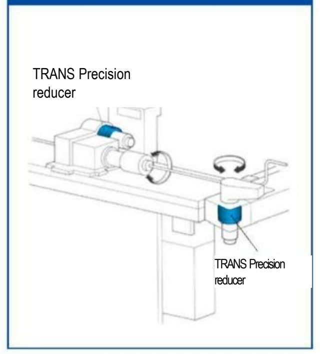
Wafer handling robot



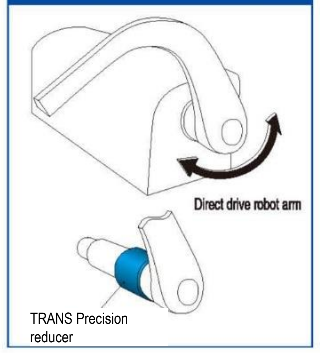
Stamping equipment (riveting)



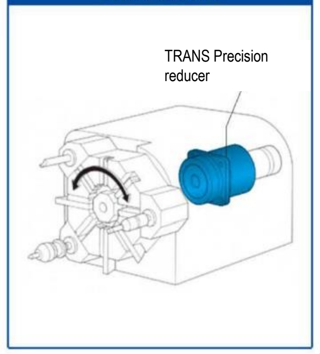
Pipe bending machine



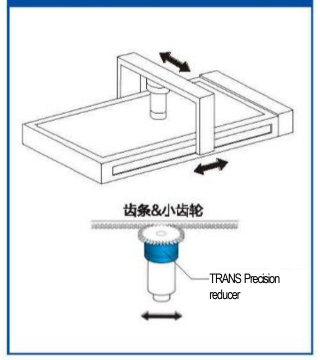
Injection mold taken-out robot



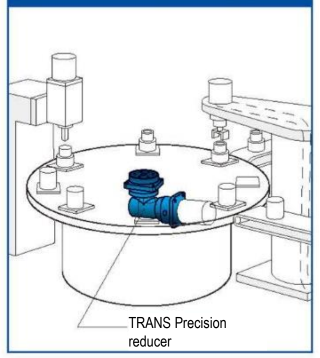
Rotary tower knife frame rotation of machine tool



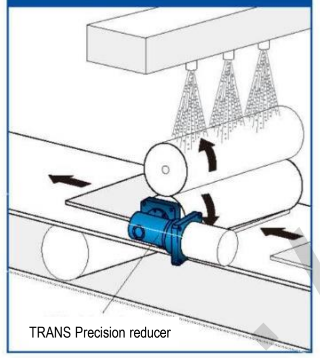
The XY axis of machine tool



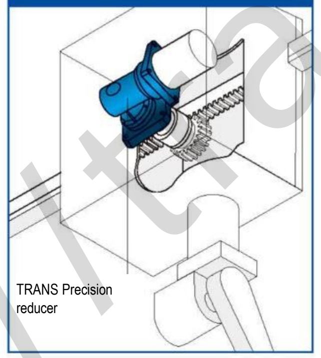
Indexing table drive



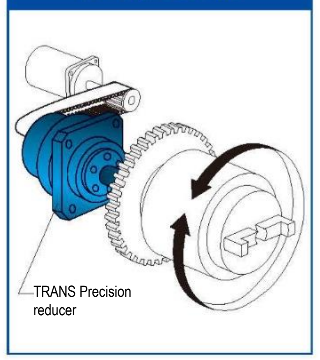
Roller drive for daubing use



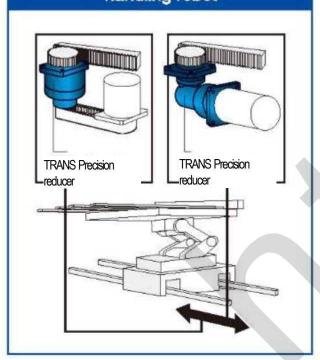
Pulley for loader use



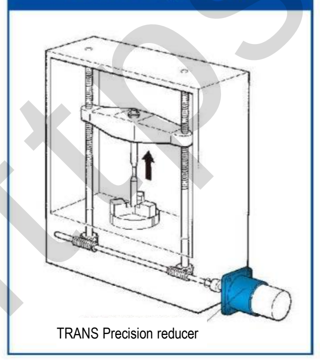
Shaft input belt drive



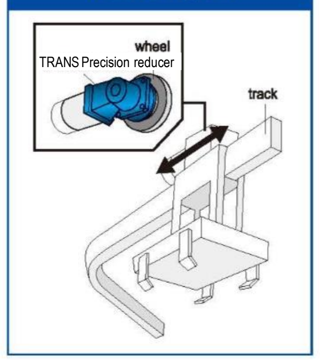
Liquid crystal glass substrate handling robot



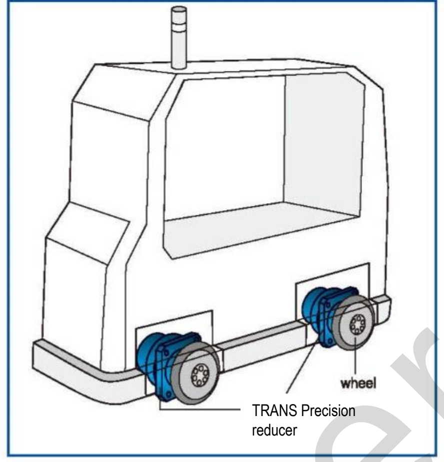
Tensile testing machine



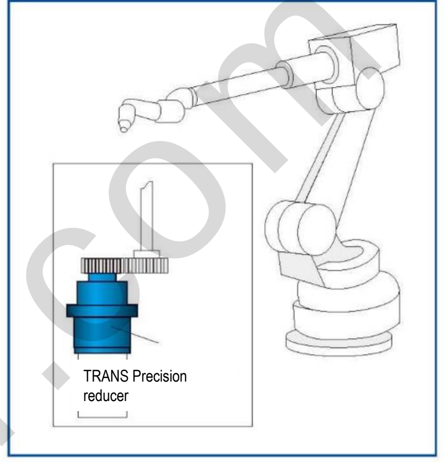
Roof walking van



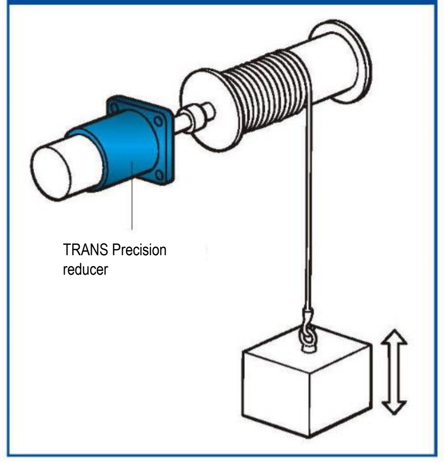
Unmanned vehicle



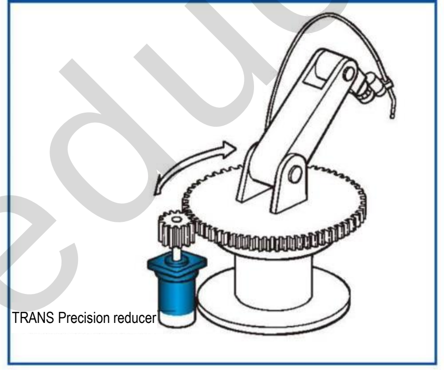
Robot for working in height



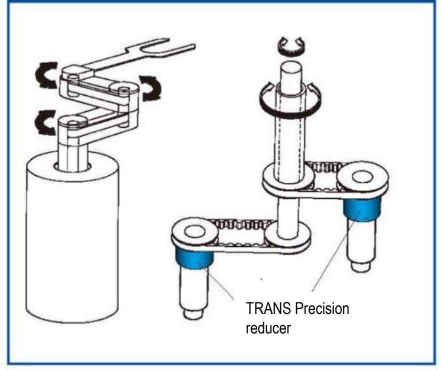
Roll up



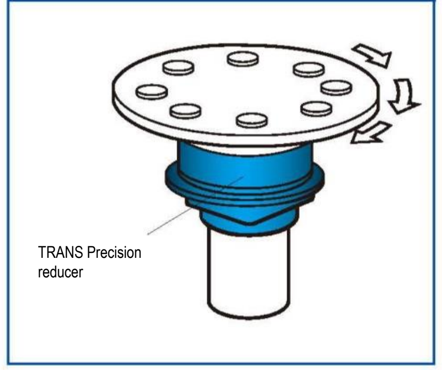
Rotate



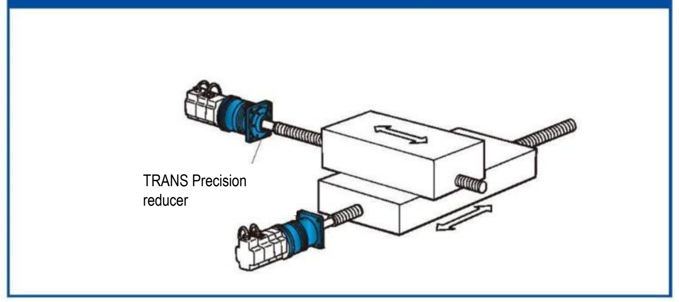
Transport



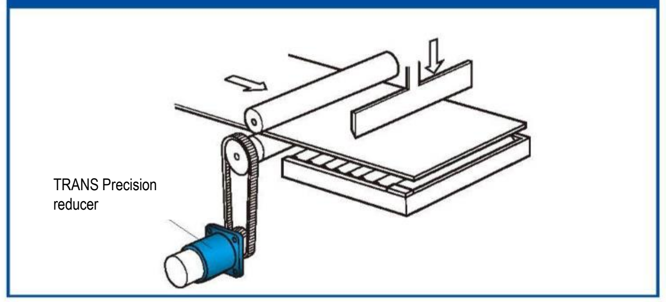
Angle (positioning) control



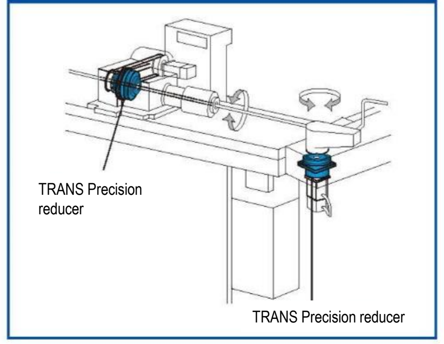
Two axis control (XY workbench)



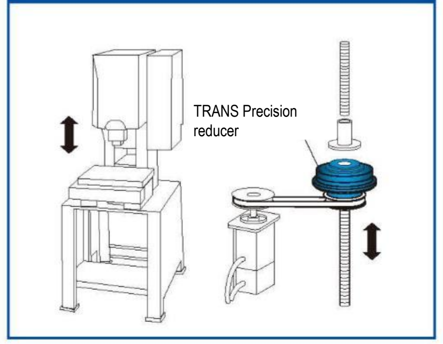
Roller drive



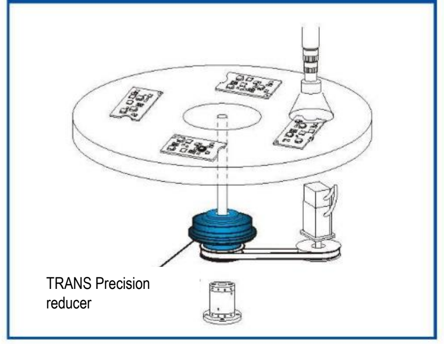
Pipe bending machine



Punching (riveting)

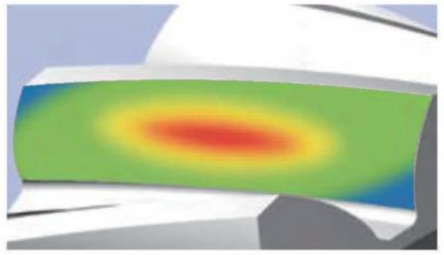


Printed circuit board inspection device



Product Technology

The TRANS 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.

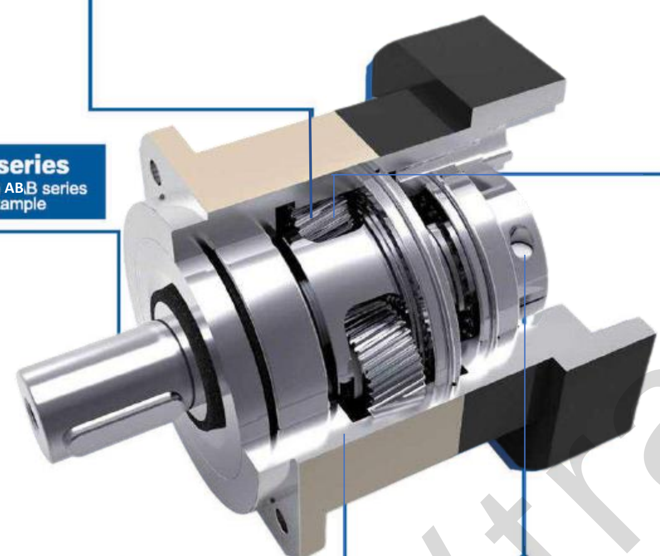


Finite element analysis of gear strength is carried out by using ANSYS technology. Tooth profile and lead trimming of tooth surface are also made to reduce the impact and noise of gear meshing, and increase the service life of gear system.

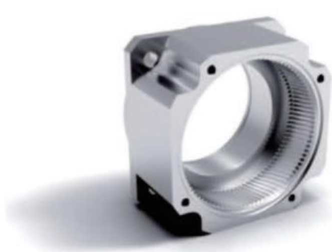
Carbon-nitriding heat-treated high quality alloy steel is adopted in gear materials to obtain the best wear resistance and impact toughness.

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.

AB series
Take the AB 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.

PRECISION PLANETARY GEARBOX

VRB

- Quiet operation
  Helical gears are used to achieve smooth and quiet operation.
- High precision
  The backlash is less than 3 arcmin and the positioning is accurate.
- High rigidity & torqueThe use of integral ball bearings greatly improves the rigidity and torque.
- Methods of flange and connector
  It can be installed on any motor in the world.
- No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 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

Model Example: VRB090-100-S2-P1/Panasonic MSMJ 082S1A

VRB Reducer Specifications

Specs	Unit	Stage	Ratio	VRB042	VRB060	VRB090	VRB115	VRB142	VRB180	VRB220
Rated Output Torque / T_{2N}	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	20	55	150	310	600	1100	1900
			35	19	50	140	300	550	1100	1800
			40	17	45	120	260	500	1000	1600
			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 / T_{2NOT}[1]/	Nm	1,2	3~100	3Times of Nominal Output Torque						
Rated Input Speed / n_{1N}	rpm	1,2	3~100	5000	5000	4000	4000	3000	3000	2000
Max.Input Speed / n_{1B}	rpm	1,2	3~100	10000	10000	8000	8000	6000	6000	4000
Precision Backlash P1	arcmin	1	3~10	≤2	≤2	≤2	≤2	≤2	≤2	≤2
		2	12~100	≤4	≤4	≤4	≤4	≤4	≤4	≤4
Standard Backlash P2	arcmin	1	3~10	≤4	≤4	≤4	≤4	≤4	≤4	≤4
		2	12~100	≤6	≤6	≤6	≤6	≤6	≤6	≤6
Torsional Rigidity	Nm/arcmin	1,2	3~100	3	7	14	25	50	145	225
Max.Radial Force / F_{2rB}[2]	N	1,2	3~100	780	1530	3250	6700	9400	14500	50000
Max.Axial Force / F_{2a1B}[2]	N	1,2	3~100	350	630	1300	3000	4000	6200	35000
Max.Axial Force / F_{2a1B}[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	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	50.56
		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

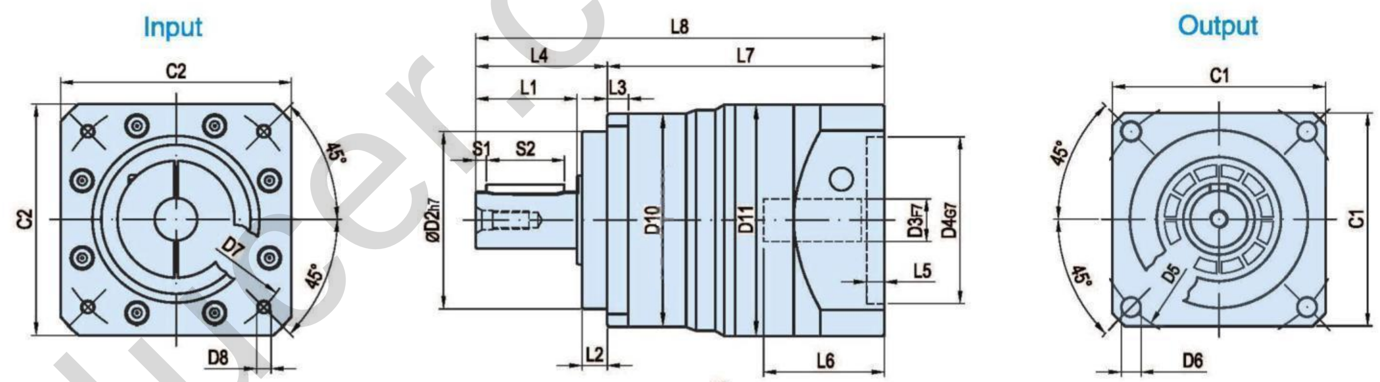
1. Ratio (i=Nin/Nout)
2. When output speed is 100rpm, acting on the output shaft center position
3. The Max. acceleration torque T2B=60% of T2NOT, continuous operation, service life is 10000hrs

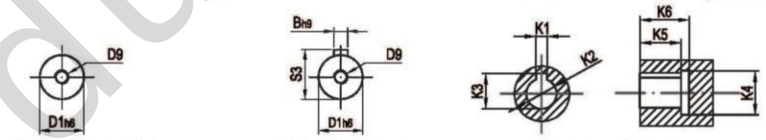
MODEL: VRB

1–Stage

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

Dimensions:





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	ϕ16	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 (6–11)	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)	65(65–80)	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	65	70	90
S3	15	18	24.5	35	43	59	79.5
B	5	5	6	10	12	16	20
K1	3	4	6	8	10	14	18
K2	ϕ8	ϕ11	ϕ22	ϕ28	ϕ38	ϕ50	ϕ60
K3	9.4	12.8	24.5	31.3	41.3	53.8	64.4
K4	ϕ13	ϕ16	ϕ32	ϕ38	ϕ48	ϕ60	ϕ72
K5	15	15	20	27	35	43	60
K6	18	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

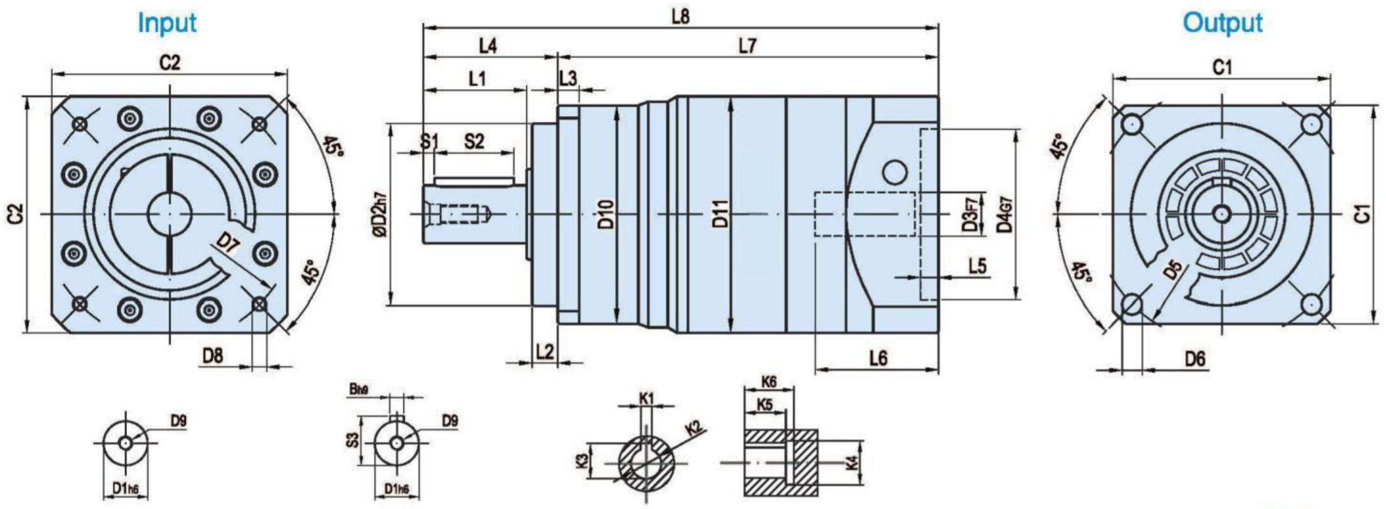
2–Stage

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

PRECISION PLANETARY GEARBOX

VRL

Dimensions：



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	ϕ80	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 (ϕ45–66.67)	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)	206 (189–206)	235 (225.5–235)	269 (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)	65	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	3	4	6	8	10	14	18
K2	ϕ8	ϕ11	ϕ22	ϕ28	ϕ38	ϕ50	ϕ60
K3	9.4	12.8	24.5	31.3	41.3	53.8	64.4
K4	ϕ13	ϕ16	ϕ32	ϕ38	ϕ48	ϕ60	ϕ72
K5	15	15	20	27	35	43	60
K6	18	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.

- Quiet operation
  Helical gears are used to achieve smooth and quiet operation.
- High precision
  The backlash is less than 3 arcmin and the positioning is accurate.
- High rigidity & torqueThe use of integral ball bearings greatly improves the rigidity and torque.
- Methods of flange and connector
  It can be installed on any motor in the world.
- No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 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
VRL050，VRL070，VRL090，VRL120，
VRL155，VRL205，VRL235

Output Shaft Keyway
S1:(Solid Output Shaft No Keyway)
S2Standard (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

Model Example：VRL090–100–S2–P1/Panasonic MSMJ 082S1A

VRL Reducer Specifications

Specs	Unit	Stage	Ratio	VRL050	VRL070	VRL090	VRL120	VRL155	VRL205	VRL235
Rated Output Torque / T_{2N}	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	20	55	150	310	600	1100	1900
			35	19	50	140	300	550	1100	1800
			40	17	45	120	260	500	1000	1600
			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 / T_{2NOT}[1]/	Nm	1,2	3~100	3Times of Nominal Output Torque						
Rated Input Speed / n_{1N}	rpm	1,2	3~100	5000	5000	4000	4000	3000	3000	2000
Max.Input Speed / n_{1B}	rpm	1,2	3~100	10000	10000	8000	8000	6000	6000	4000
Precision Backlash P1	arcmin	1	3~10	≤2	≤2	≤2	≤2	≤2	≤2	≤2
		2	15~100	≤4	≤4	≤4	≤4	≤4	≤4	≤4
Standard Backlash P2	arcmin	1	3~10	≤4	≤4	≤4	≤4	≤4	≤4	≤4
		2	15~100	≤6	≤6	≤6	≤6	≤6	≤6	≤6
Torsional Rigidity	Nm/arcmin	1,2	3~100	3	7	14	25	50	145	225
Max.Radial Force / F_{2rB}[2]	N	1,2	3~100	680	1260	2880	6000	8200	12800	27800
Max.Axial Force / F_{2a1B}[2]	N	1,2	3~100	330	625	1250	2400	3890	6100	15000
Max.Axial Force / F_{2a1B}[2]	N	1,2	3~100	370	760	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	50.56
		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

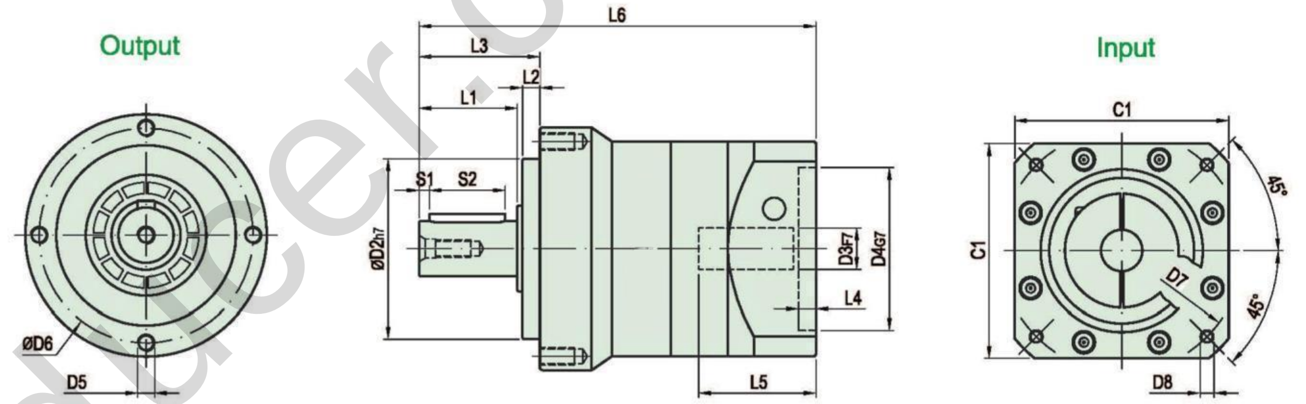
1. Ratio (i=Nin/Nout)
2. Output revolutions 100rpm, acting on the output shaft center position.
3. The Max. acceleration torque T2B=60% of T2NOT, continuous operation, service life is 10000hrs.

MODEL: VRL

1–Stage

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

Dimensions:



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

Unit:mm

Size	VRL070–L1	VRL090–L1	VRL120–L1	VRL155–L1	VRL205–L1	VRL235–L1
D1	ϕ16	ϕ22	ϕ32	ϕ40	ϕ55	ϕ75
D2	ϕ52	ϕ68	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	ϕ62	ϕ80	ϕ108	ϕ140	ϕ184	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	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	7~8	6~11	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.

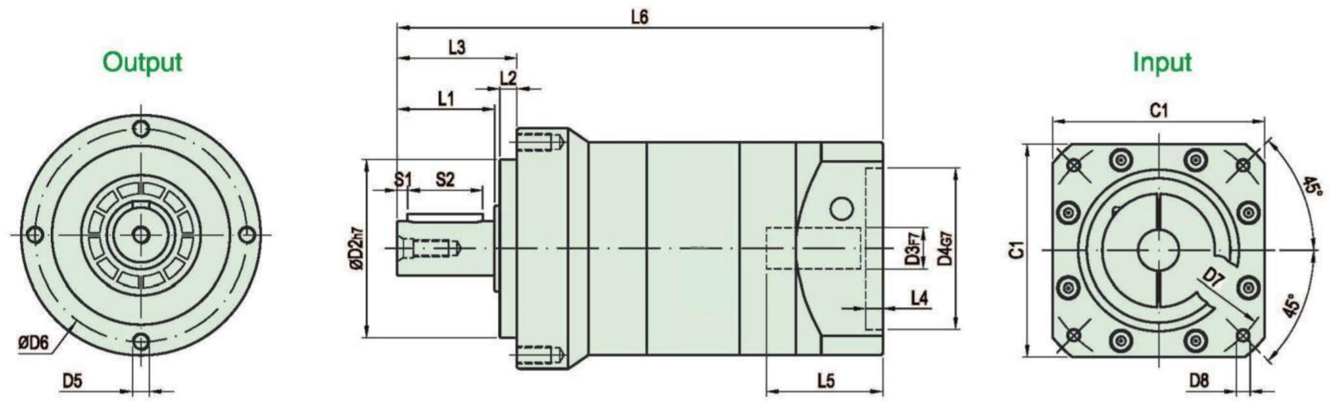
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

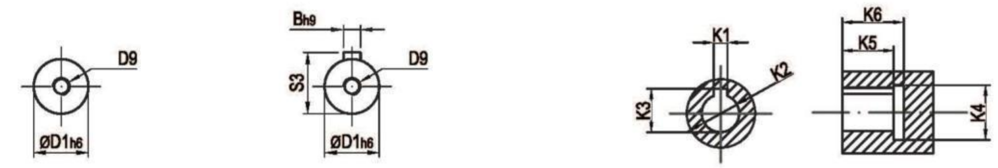
MODEL：VRL

2–Stage

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

Dimensions：





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)	286 (286–303)	340 (330.5–340)	407 (402–437)
C1	65	80 (65–86)	130 (90–130)	130 (130–180)	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	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.

PRECISION PLANETARY GEARBOX

AB

- 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

AB　Type

AB090 – 10 – S1 – P1 / Motor

Reducer Model

AB042, AB060, AB090, AB115 PAB115
AB142, AB180, AB220

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

Model Example：AB090–100–S2–P1/Panasonic MSMJ 082S1A

ABB Reducer Specifications

Specs	Unit	Stage	Ratio	AB042	AB060	AB090	AB115	AB142	AB180	AB220
Rated Output Torque / T_{2N}	Nm	1	3	19	56	148	280	520	1020	1550
			4	20	55	160	330	580	1280	2160
			5	21	58	159	330	580	1250	2100
			6	16	48	120	240	410	980	1350
			7	19	50	148	300	530	1030	1580
			8	13	45	130	230	450	880	1260
			9	12	40	100	220	410	880	1450
			10	15	46	125	260	475	950	1530
		2	12	18	52	155	300	530	1100	1750
			15	18	53	150	280	550	1050	1650
			16	20	53	158	320	580	1200	2050
			20	20	52	155	320	580	1200	2050
			25	19	52	158	320	580	1200	2000
			28	19	50	150	300	550	1100	1850
			30	18	49	145	390	500	1050	1600
			35	17	48	155	290	500	1020	1500
			40	18	48	150	290	530	1100	1350
			50	18	50	145	290	530	1000	1300
			70	16	50	140	280	490	1000	1200
			80	10	43	110	230	410	960	980
			100	10	43	120	260	450	950	1100
Max.Output Torque / T_{2NOT}[1]/	Nm	1,2	3~100	3Times of Nominal Output Torque						
Rated Input Speed / n_{1N}	rpm	1,2	3~100	4000	4000	4000	3500	3000	2000	2000
Max.Input Speed / n_{1B}	rpm	1,2	3~100	6000	6000	6000	5500	4500	4500	4000
Micro Backlash P0	arcmin	1	3~10	—	—	≤1	≤1	≤1	≤1	≤1
		2	12~100	—	—	—	≤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	≤7	≤7	≤7	≤7	≤7	≤7	≤7
		2	12~100	≤9	≤9	≤9	≤9	≤9	≤9	≤9
Torsional Rigidity	Nm/arcmin	1,2	3~100	3	7	12	25	50	140	210
Max.Radial Force / F_{2rB}[2]	N	1,2	3~100	780	1300	3200	6750	9400	14500	50000
Max.Axial Force / F_{2a1B}[2]	N	1,2	3~100	330	700	1580	3300	4700	7200	28000
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
		2	12~100	0.8	1.48	4.1	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	≤63	≤63	≤63	≤65	≤65	≤70	≤70

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	AB042	AB060	AB090	AB115	AB142	AB180	AB220
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	50.56
		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

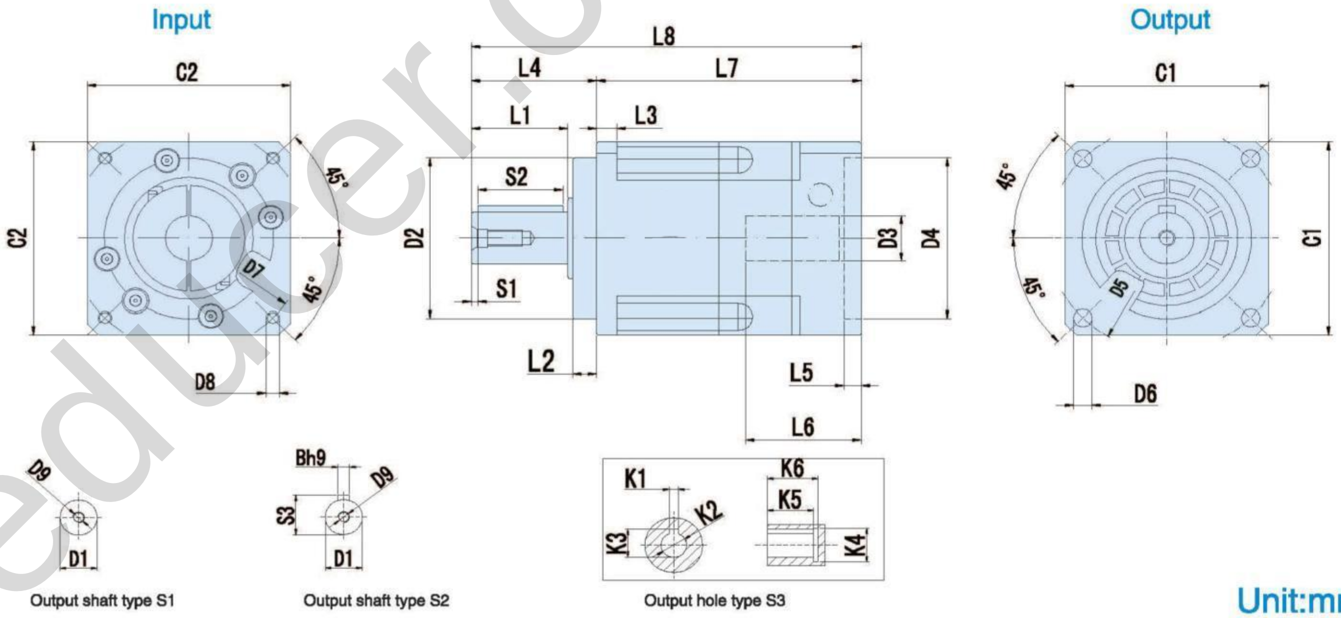
1. The Max. acceleration torque T2B=60% of T2NOT
2. When output speed is 100rpm, inertia acts on the output shaft center position.
3. 3-stage big ratios are not in the above table. There is shaft lengthening and enlarging design. Please tell sales person if you need it.

MODEL：AB

1–Stage

Ratio：3，4，5，6，7，8，9，10

Dimensions：



Unit:mm

Size	AB042–L1	AB060-L1	AB090–L1	AB115–L1	AB142–L1	AB180–L1	AB220–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	138
L5	(4)	(5)	(7)	(11)	(7)	(7)	(12.5)
L6	30	34	45	65	67.5	85	105
L7	(65.5)	(78)	(99)	(135)	(150)	(182)	(226)
L8	(91.5)	(115)	(147)	(200)	(247)	(287)	(365)
C1	□42	□60	□90	□115	□142	□180	□220
C2	(□42)	(□60)	(□90)	(□130)	(□142)	(□180)	(□220)
S1	2	2	3	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	3	4	6	8	10	14	16
K2	ϕ8	ϕ11	ϕ22	ϕ28	ϕ38	ϕ50	ϕ60
K3	9.2	12.7	25	31.3	42	53.8	64.4
K4	ϕ13	ϕ16	ϕ32	ϕ38	ϕ48	ϕ60	ϕ72
K5	15	15	20	27	35	43	60
K6	18	18	24	32	40	50	65

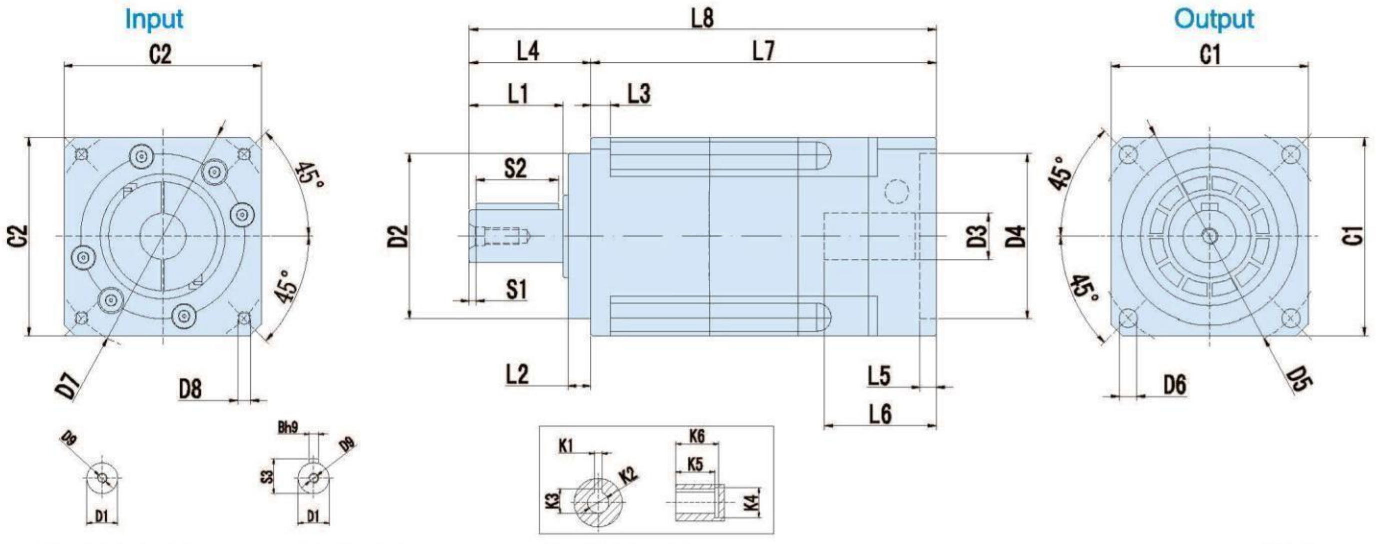
Note 1：Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

MODEL: AB

2–Stage

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

Dimensions:



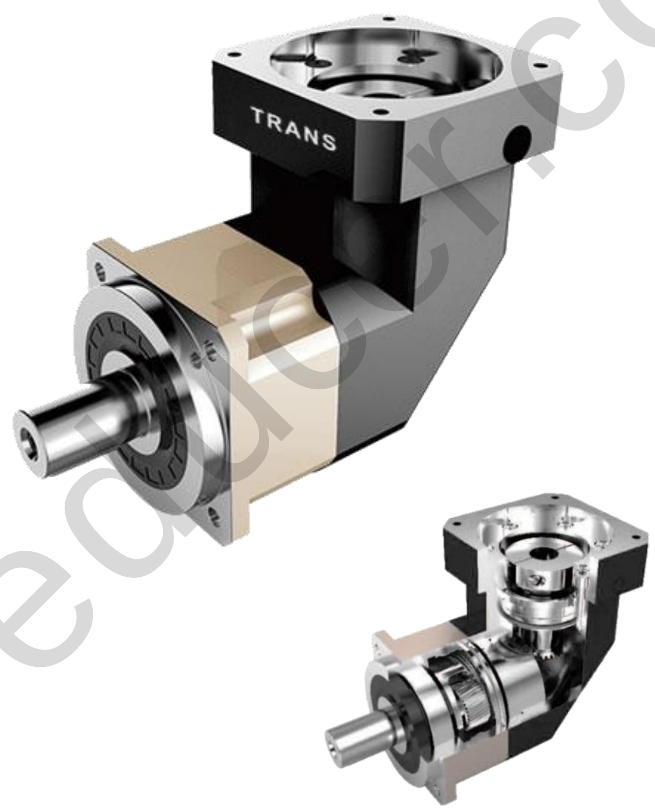
Unit:mm

Size	AB042–L2	AB060–L2	AB090–L2	AB115–L2	AB142–L2	AB180–L2	AB220–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(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	138
L5	(4)	(5)	(7)	(11)	(7)	(7)	(12.5)
L6	25	34	45	65	67.5	85	105
L7	(93)	(117)	(144)	(161)	(196)	(232)	(277)
L8	(114)	(154)	(192)	(226)	(293)	(337)	(415)
C1	□42	□60	□90	□115	□142	□180	□220
C2	(□42)	(□60)	(□90)	(□130)	(□142)	(□180)	(□220)
S1	2	2	3	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	3	4	6	8	10	14	16
K2	ϕ8	ϕ11	ϕ22	ϕ28	ϕ38	ϕ50	ϕ60
K3	9.2	12.7	25	31.3	42	53.8	64.4
K4	ϕ13	ϕ16	ϕ32	ϕ38	ϕ48	ϕ60	ϕ72
K5	15	15	20	27	35	43	60
K6	18	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

ABR



- 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.
- High rigidity & torqueThe use of integral needle roller bearings greatly improves the rigidity and torque.
- Connector and shaft sleeve mode
  It can be installed on any motor in the world.
- No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

ABR Type

ABR090 – 10 – S1 – P1 / Motor

Reducer Model

ABR042, ABR060, ABR090, ABR115 5

ABR142, ABR180, ABR220

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

Model Example: ABR090-100-S2-P1/Panasonic MSMJ 082S1A

Reducer Specifications

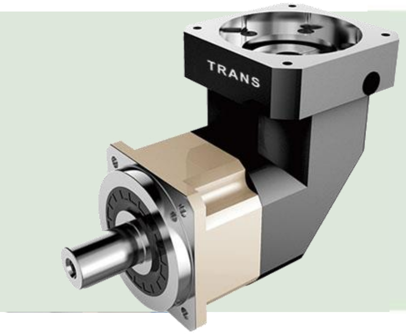
Specs	Unit	Stage	Ratio	ABR042	ABR060	ABR090	ABR115	ABR142	ABR180	ABR220
Rated Output Torque / T_{2N}	Nm	1	3	13	50	150	310	550	1100	1860
			4	16	55	153	330	600	1250	1950
			5	15	53	152	325	590	1200	1900
			6	11	45	130	250	450	950	1600
			7	15	50	140	300	540	1050	1760
			8	11	45	110	260	460	960	1550
			9	9	40	100	230	450	900	1500
			10	12	48	128	280	520	1000	1120
			14	13	42	120	265	500	1020	1100
			20	10	42	115	255	500	980	1100
		2	15	13	50	150	300	530	1100	1800
			20	15	52	150	300	530	1150	1800
			25	15	53	150	325	590	1200	1800
			30	13	49	150	310	550	1100	1830
			35	13	50	140	300	540	1100	1800
			40	15	45	140	260	500	1000	1600
			50	15	50	135	230	580	1200	1670
			70	13	50	130	300	520	1100	1600
			80	11	40	100	260	500	1000	1500
			100	10	40	100	230	450	900	1500
			120	—	—	130	310	500	1100	1900
			140	—	—	130	300	530	1100	1800
			160	—	—	120	260	520	1000	1600
			180	—	—	100	230	450	900	1500
			200	—	—	100	230	450	900	1500
Max.Output Torque / T_{2NOT}[1]/	Nm	1,2	3~200	3Times of Nominal Output Torque						
Rated Input Speed / n_{1N}	rpm	1,2	3~200	3000	3000	3000	3000	2500	2000	2000
Max.Input Speed / n_{1B}	rpm	1,2	3~200	6000	6000	6000	5500	4500	4500	4000
Precision Backlash P1	arcmin	1	3~20	≤5	≤5	≤5	≤5	≤5	≤5	≤5
		2	15~200	≤8	≤8	≤8	≤8	≤8	≤8	≤8
Standard Backlash P2	arcmin	1	3~20	≤8	≤8	≤8	≤8	≤8	≤8	≤8
		2	15~200	≤10	≤10	≤10	≤10	≤10	≤10	≤10
Torsional Rigidity	Nm/arcmin	1,2	3~200	3	6	14	25	56	140	220
Max.Radial Force / F_{2rB}[2]	N	1,2	3~200	780	1300	3200	6750	9400	14500	50000
Max.Axial Force / F_{2a1B}[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	2.1	6.4	13	24.5	51	83
		2	25~200	1.2	1.5	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	ABR042	ABR060	ABR090	ABR115	ABR142	ABR180	ABR220
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.

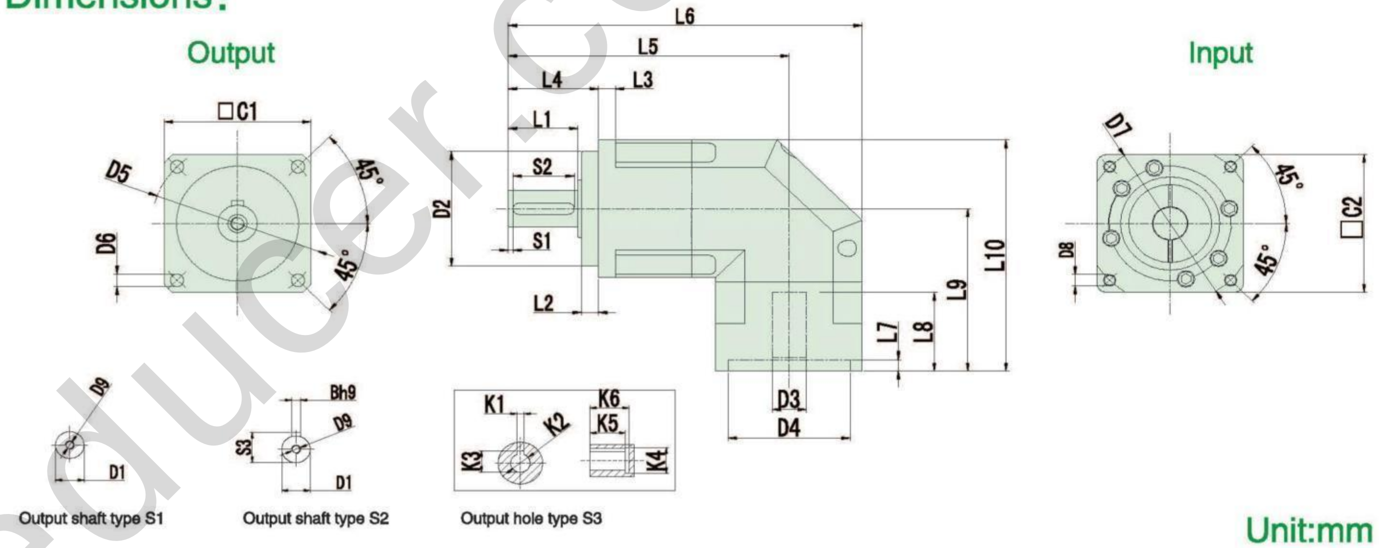
MODEL: ABR



1-Stage

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

Dimensions:



Unit:mm

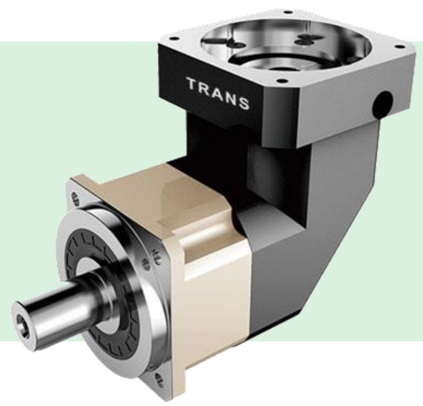
Size	ABR042 -L1	ABR060 -L1	ABR090 -L1	ABR115 -L1	ABR142 -L1	ABR180 -L1	ABR220 -L1
D1	ϕ13	ϕ16	ϕ22	ϕ32	ϕ40	ϕ55	ϕ75
D2	ϕ35	ϕ50	ϕ80	ϕ110	ϕ130	ϕ160	ϕ180
D3	ϕ8(≤11)	ϕ14(≤14)	ϕ19(≤24)	ϕ24(≤32)	ϕ35(≤42)	ϕ38(≤50)	ϕ55(≤55)
D4	ϕ30(30-50)	ϕ50(30-70)	ϕ70(50-110)	ϕ110(50-130)	ϕ114.3(95-180)	ϕ180(95-180)	ϕ215(180-255)
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	138
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	3	4	6	8	10	14	16
K2	ϕ8	ϕ11	ϕ22	ϕ28	ϕ38	ϕ50	ϕ60
K3	9.2	12.7	25	31.3	42	53.8	64.4
K4	ϕ13	ϕ16	ϕ32	ϕ38	ϕ48	ϕ60	ϕ72
K5	15	15	20	27	35	43	60
K6	18	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.

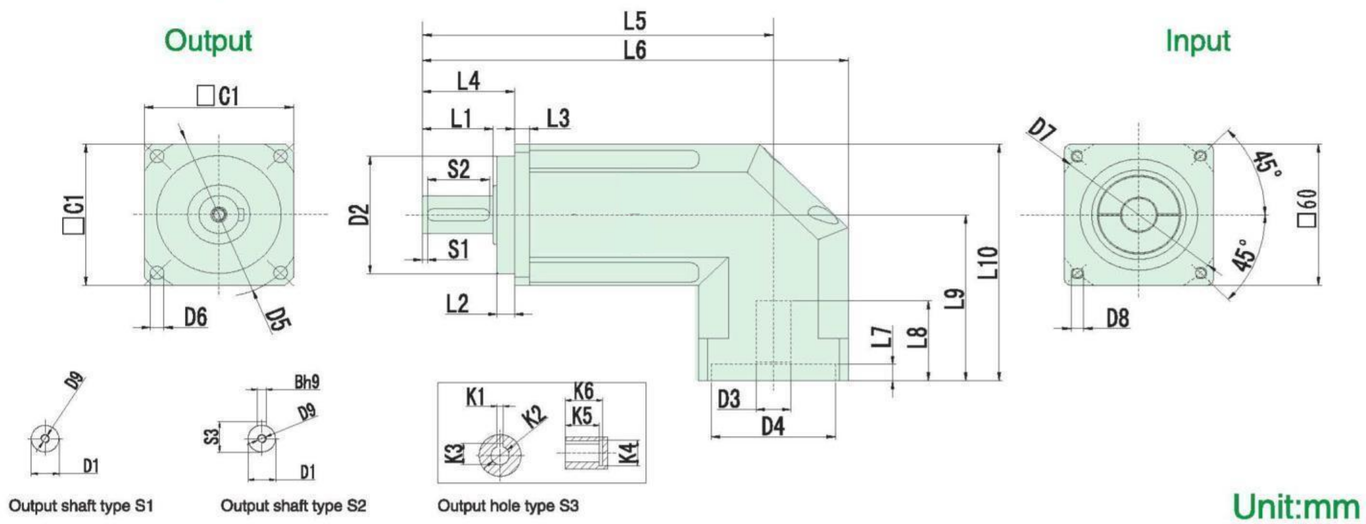
MODEL：ABR

2–Stage

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



Dimensions：



Unit:mm

Sze	ABR042–L2	ABR060 –L2	ABR090 –L2	ABR115 –L2	ABR142 -L2	ABR180 –L2	ABR220 –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(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	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	65	70	90
S3	15	18	24.5	35	43	59	79
B	5	5	6	10	12	16	20
K1	3	4	6	8	10	14	16
K2	ϕ8	ϕ11	ϕ22	ϕ28	ϕ38	ϕ50	ϕ60
K3	9.2	12.7	25	31.3	42	53.8	64.4
K4	ϕ13	ϕ16	ϕ32	ϕ38	ϕ48	ϕ60	ϕ72
K5	15	15	20	27	35	43	60
K6	18	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

MLF

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

Model Selection of Speed Reducers

MLF Type

MLF080 – 10 – S1 – P1 / Motor

Reducer Model
MLF040, MLF060, MLF080
MLF120, MLF160

Output Shaft Keyway
S1:(Solid Output Shaft No Keyway)
S2Standard (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

Model Example：MLF080–100–S2–P1/Panasonic MSMJ 082S1A

MLF Reducer Specifications

Specs	Unit	Stage	Ratio	MLF040	MLF060	MLF080	MLF120	MLF160
Rated Output Torque / T_{2N}	Nm	1	3	17	28	112	165	423
			4	15	38	110	146	364
			5	14	40	108	160	423
			7	13	35	105	149	358
			10	12	25	100	141	293
		2	15	17	28	112	165	423
			20	15	38	110	146	364
			25	14	40	108	160	423
			30	13	28	112	165	423
			35	13	35	105	149	358
			40	12	38	110	146	364
			50	14	40	108	160	423
			70	13	35	105	149	358
			100	12	25	100	141	293
Max.Output Torque / T_{2NOT}[1]/	Nm	1,2	3~100	3Times of Nominal Output Torque				
Rated Input Speed / n_{1N}	rpm	1,2	3~100	3000	3000	3000	3000	2500
Max.Input Speed / n_{1B}	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	≤8	≤8	≤8	≤8	≤8
Torsional Rigidity	Nm/arcmin	1,2	3~100	3	6	12	22	50
Max.Radial Force / F_{2rB}[2]	N	1,2	3~100	320	460	1300	3200	6520
Max.Axial Force / F_{2a1B}[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				
Noise Level(n1=3000rpm, No load)	dB(A)	1,2	3~100	≤62	≤63	≤65	≤67	≤68

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	MLF040	MLF060	MLF080	MLF120	MLF160
Moment of Inertia	$kg.cm^2$	1	3	0.16	0.63	3.48	12.84	36.72
			4	0.16	0.6	3.31	12.22	34.63
			5	0.16	0.59	3.28	12.1	34.24
			7	0.16	0.59	3.27	12.05	34.07
			10	0.16	0.59	3.26	12.03	34.02
		2	12-40	0.16	0.59	3.26	12.03	34.02
			50-100	0.16	0.59	3.26	12.03	34.02

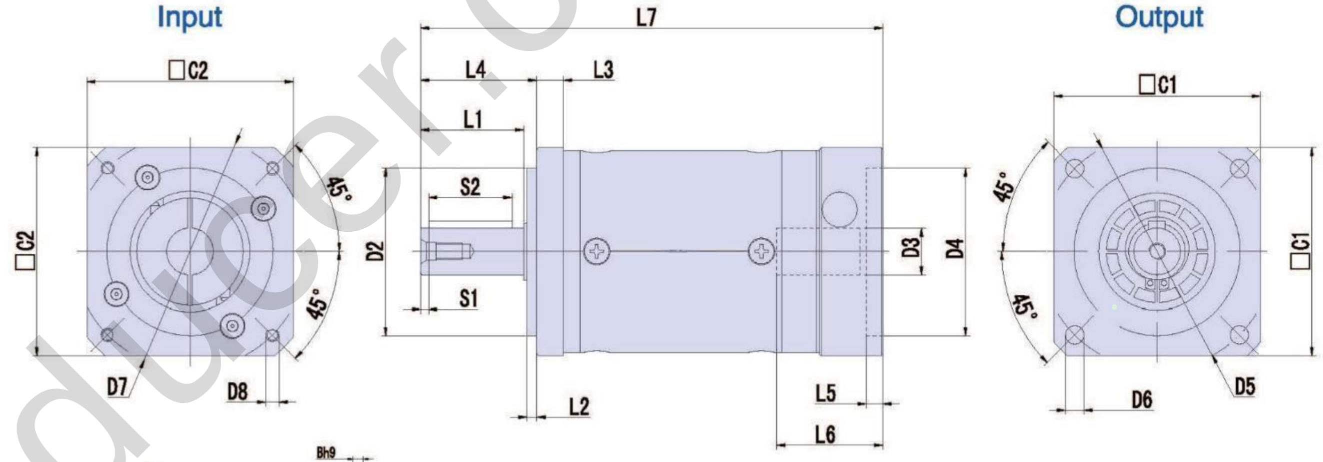
1. Ratio (i=Nin/Nout)
2. Output revolutions 100rpm, acting on the output shaft center position.
3. *Continuous operation, service life is 10000hrs.

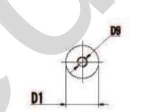
MODEL: MLF

1-Stage

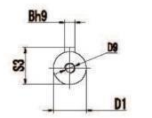
Ratio: 3, 4, 5, 7, 10,

Dimensions:



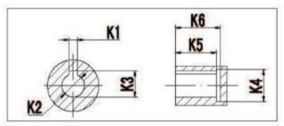


Output shaft type S1



Output shaft type S2

Output hole type S3



Unit:mm

Size	MLF040-L1	MLF060-L1	MLF080 -L1	MLF120-L1	MLF160-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)	ϕ185(165)
D6	4-ϕ3.4	4-ϕ5	4-ϕ6.5	4-ϕ9	4-ϕ11
D7	ϕ46(45-70)	ϕ70(70-130)	ϕ90(70-145)	ϕ145(90-165)	ϕ200(145-220)
D8	(4-M4X8L)	(4-M4X10L)	(4-M5X12L)	(4-M8X25L)	(4-M12X25L)
D9	M4X0.7P	M5X0.8P	M6X1.0P	M10X1.5P	M16X2.0P
L1	18	31	36	50	80
L2	3	3	3	4	5
L3	4	8	10	15	16
L4	22.5	35	40	55	87
L5	(5)	(5)	(5)	(8)	(7)
L6	(32)	(37)	(42)	(59)	(86)
L7	(88)	(117)	(157)	(211)	(292)
C1	□45	□62	□90	□124	□175
C2	(□50)	(□62)	(□92)	(□120)	(□176)
S1	2	2.5	4	5	8
S2	14	25	28	40	65
S3	13.5	16	22.6	28	43
B	4	5	5	8	12
K1	3	3	6	8	10
K2	ϕ8	ϕ8	ϕ18	ϕ25	ϕ35
K3	9.2	9.2	21	28	38.3
K4	ϕ11	ϕ11	ϕ24	ϕ32	ϕ42
K5	20	20	30	40	52
K6	24	24	35	48	58

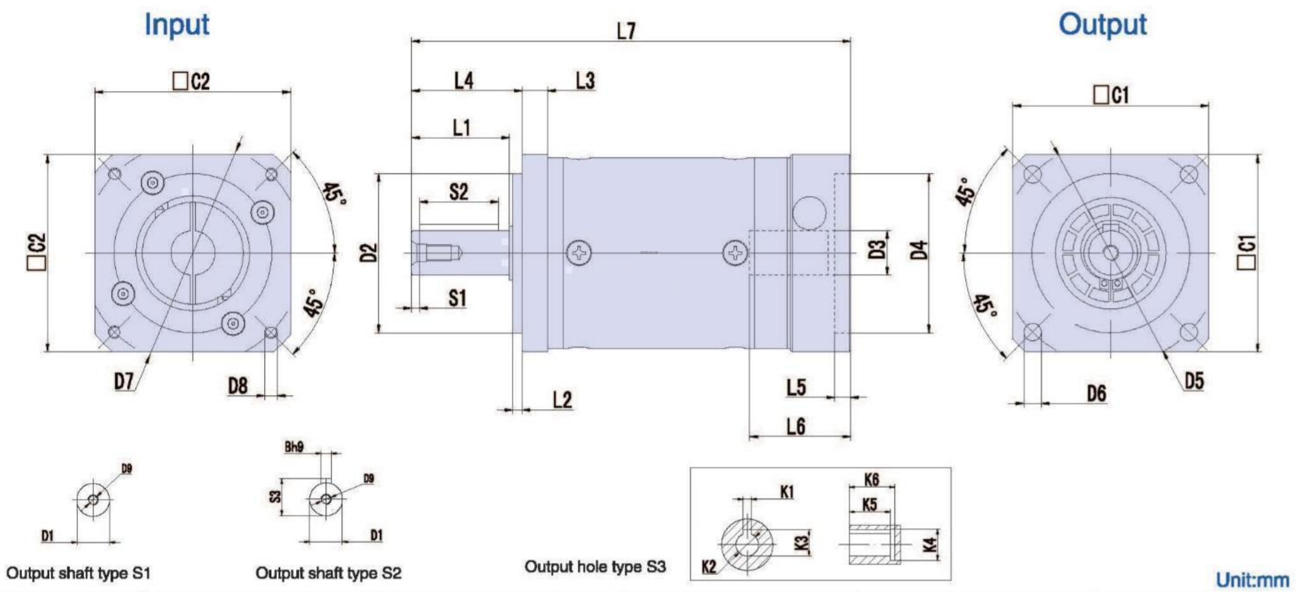
Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

MODEL：MLF

2–Stage

Ratio：15，20，25，30，35，40，50， 70，100

Dimensions：



Unit:mm

Size	MLF040 -L2	MLF060 -L2	MLF080 -L2	MLF120 -L2	MLF160 -L2
D1	[illegible]	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	4–ϕ6.5	4–ϕ9	4–ϕ11
D7	ϕ46(45–70)	ϕ70(70–130)	ϕ90(70–145)	ϕ145(90–165)	ϕ200(145–220)
D8	(4–M4X8L)	(4–M4X10L)	(4–M5X12L)	(4–M8X25L)	(4–M12X25L)
D9	M4X0.7P	M5X0.8P	M6X1.0P	M10X1.5P	M16X2.0P
L1	18	31	36	50	80
L2	3	3	3	4	5
L3	4	8	10	15	16
L4	22.5	35	40	55	87
L5	(5)	(5)	(5)	(8)	(7)
L6	(32)	(37)	(42)	(59)	(86)
L7	(105)	(138)	(160)	(224)	(295)
C1	□45	□62	□90	□124	□175
C2	(□50)	(□62)	(□92)	(□120)	(□176)
S1	2	2.5	4	5	8
S2	14	25	28	40	65
S3	13.5	16	22.6	28	43
B	4	5	5	8	12
K1	3	3	6	8	10
K2	ϕ8	ϕ8	ϕ18	ϕ25	ϕ35
K3	9.2	9.2	21	28	38.3
K4	ϕ11	ϕ11	ϕ24	ϕ32	ϕ42
K5	20	20	30	40	52
K6	24	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 PLANETARY GEARBOX

MLE

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

Model Selection of Speed Reducers

MLE Type

MLE080 – 10 – S1 – P1 / Model

Reducer Model
MLE040, MLE060, MLE080
MLE120, MLE160

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

Model Example：MLE080–100–S2–P1/Panasonic MSMJ 082S1A

MLE Reducer Specifications

Specs	Unit	Stage	Ratio	MLE040	MLE060	MLE080	MLE120	MLE160
Rated Output Torque / T_{2N}	Nm	1	3	17	28	112	165	423
			4	15	38	110	146	364
			5	14	40	108	160	423
			7	13	35	105	149	358
			10	12	25	100	141	293
		2	15	17	28	112	165	423
			20	15	38	110	146	364
			25	14	40	108	160	423
			30	13	28	112	165	423
			35	13	35	105	149	358
			40	12	38	110	146	364
			50	14	40	108	160	423
			70	13	35	105	149	358
			100	12	25	100	141	293
Max.Output Torque / T_{2NOT}[1]/	Nm	1,2	3~100	3Times of Nominal Output Torque				
Rated Input Speed / n_{1N}	rpm	1,2	3~100	3000	3000	3000	3000	2500
Max.Input Speed / n_{1B}	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	≤8	≤8	≤8	≤8	≤8
Torsional Rigidity	Nm/arcmin	1,2	3~100	3	6	12	22	50
Max.Radial Force / F_{2rB}[2]	N	1,2	3~100	320	460	1300	3200	6520
Max.Axial Force / F_{2a1B}[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	MLE040	MLE060	MLE080	MLE120	MLE160
Moment of Inertia	$kg.cm^2$	1	3	0.16	0.63	3.48	12.84	36.72
			4	0.16	0.6	3.31	12.22	34.63
			5	0.16	0.59	3.28	12.1	34.24
			7	0.16	0.59	3.27	12.05	34.07
			10	0.16	0.59	3.26	12.03	34.02
		2	12–40	0.16	0.59	3.26	12.03	34.02
			50–100	0.16	0.59	3.26	12.03	34.02

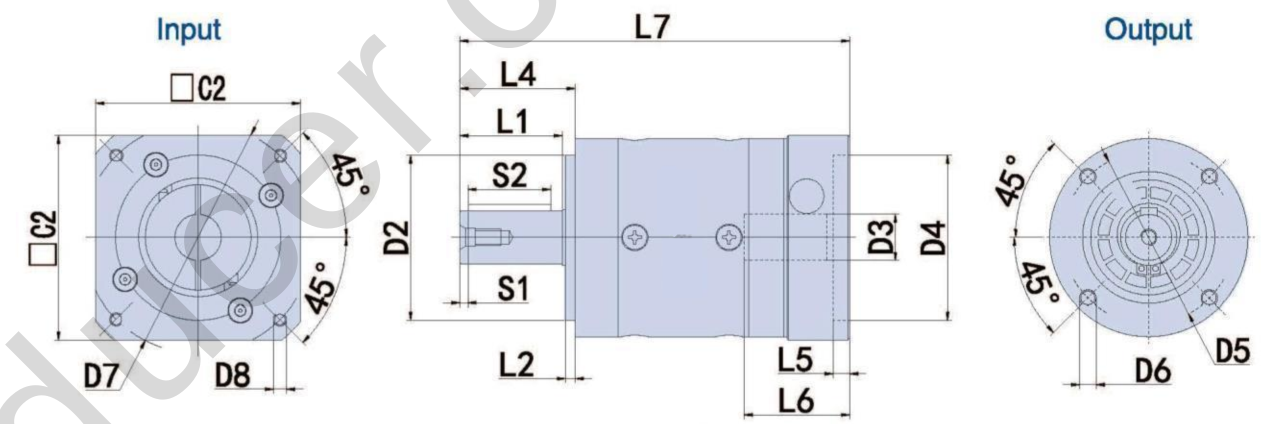
1. Ratio (i=Nin/Nout)
2. Output revolutions 100rpm, acting on the output shaft center position.
3. *Continuous operation, service life is 10000hrs.

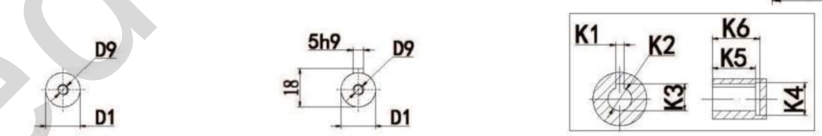
MODEL: MLE

1-Stage

Ratio: 3, 4, 5, 7, 10,

Dimensions:





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

Unit:mm

Size	MLE040 -L1	MLE060 -L1	MLE080 -L1	MLE120 -L1	MLE160 -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(50–110)	ϕ110(70–130)	ϕ114.3(110–150
D5	ϕ34	ϕ52	ϕ70	ϕ100	ϕ145
D6	(4–M4)	(4–M5)	(4–M6)	(4–M10)	(4–M12)
D7	ϕ46(45–70)	ϕ70(70–130)	ϕ90(70–145)	ϕ145(90–165)	ϕ200(145–220)
D8	(4–M4X8L)	(4–M4X10L)	(4–M5X12L)	(4–M8X25L)	(4–M12X25L)
D9	M4X0.7P	M5X0.8P	M6X1.0P	M10X1.5P	M16X2.0P
L1	18	31	36	50	80
L2	2	3	3	4	5
L4	26	35	40	55	87
L5	(4)	(5)	(5)	(8)	(7)
L6	26	32	42	59	86
L7	88	113	148	181	282
C1	ϕ42	ϕ60	ϕ80	ϕ120	ϕ160
C2	(□50)	(□62)	(□92)	(□120)	(□176)
S1	2	2	4	5	8
S2	14	25	28	40	65
S3	13.5	16	22.5	28	43
B	4	5	6	8	12
K1	3	3	6	8	10
K2	ϕ8	ϕ8	ϕ18	ϕ25	ϕ35
K3	9.2	9.2	21	28	38.3
K4	ϕ11	ϕ11	ϕ24	ϕ32	ϕ42
K5	20	20	30	40	52
K6	24	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.

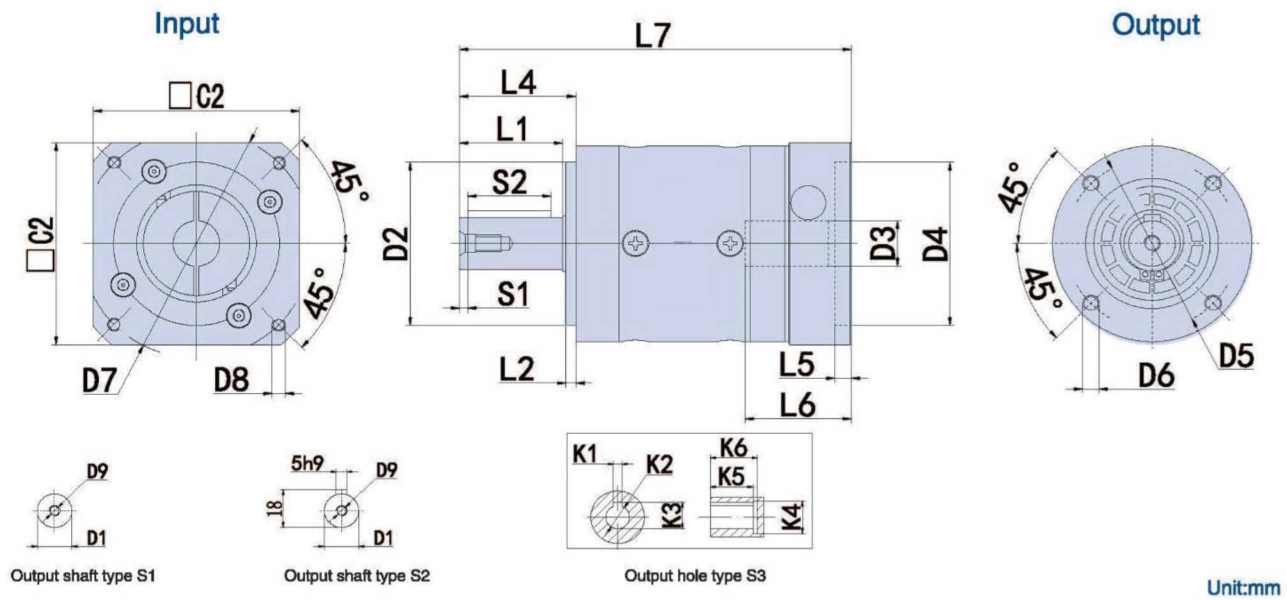
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

MODEL：MLE

2–Stage

Ratio：15，20，25，30，35，40，50， 70，100

Dimensions：



Unit:mm

Size	MLE040 -L2	MLE060 -L2	MLE080 -L2	MLE120 -L2	MLE160 -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(50–110)	ϕ110(70–110)	ϕ114.3(110–150)
D5	ϕ34	ϕ52	ϕ70	ϕ100	ϕ145
D6	(4–M4)	(4–M5)	(4–M6)	(4–M10)	(4–M12)
D7	ϕ46(45–70)	ϕ70(70–130)	ϕ90(70–145)	ϕ145(90–165)	ϕ200(145–220)
D8	(4–M4X8L)	(4–M4X10L)	(4–M5X12L)	(4–M8X25L)	(4–M12X25L)
D9	M4X0.7P	M5X0.8P	M6X1.0P	M10X1.5P	M16X2.0P
L1	18	31	36	50	80
L2	2	3	3	4	5
L4	26	35	40	55	87
L5	(4)	(5)	(5)	(8)	(7)
L6	26	32	42	59	86
L7	104.5	133	168	221	331.5
C1	ϕ42	ϕ60	ϕ80	ϕ120	ϕ160
C2	(□50)	(□62)	(□92)	(□120)	(□176)
S1	2	2	4	5	8
S2	14	25	28	40	65
S3	13.5	16	22.5	28	43
B	4	5	6	8	12
K1	3	3	6	8	10
K2	ϕ8	ϕ8	ϕ18	ϕ25	ϕ35
K3	9.2	9.2	21	28	38.3
K4	ϕ11	ϕ11	ϕ24	ϕ32	ϕ42
K5	20	20	30	40	52
K6	24	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 PLANETARY GEARBOX

AD

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

Model Selection of Speed Reducers

AD Type

AD090 – 10 – S1 – P1 / Motor

Reducer Model

AD047, AD064, AD090, AD110 'AD110

AD140, AD200, AD255

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

Model Example：**AD090-100-S2-P1/Panasonic MSMJ 082S1A**

PAD Reducer Specifications

Specs	Unit	Stage	Ratio	AD047	AD064	AD090	AD110	AD140	AD200	AD255
Rated Output Torque / T_{2N}	Nm	1	4	19	50	133	278	555	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	19	50	133	278	555	1050	1700
			25	22	60	160	330	650	1200	2000
			35	19	50	140	300	550	1100	1800
			40	19	45	120	260	500	1000	1600
			50	22	60	160	330	650	1200	2000
			70	19	50	140	300	550	1100	1800
			100	14	40	100	230	450	900	1500
Max.Output Torque / T_{2NOT}[1]/	Nm	1,2	4~100	3Times of Nominal Output Torque						
Rated Input Speed / n_{1N}	rpm	1,2	4~100	5000	5000	4000	4000	3000	3000	2000
Max.Input Speed / n_{1B}	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	≤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 / F_{2rB}[2]	N	1,2	4~100	43	125	235	430	1300	3064	5900
Max.Axial Force / F_{2a1B}[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	≤56	≤58	≤60	≤63	≤65	≤67	≤70

Reducer Rotary Inertia

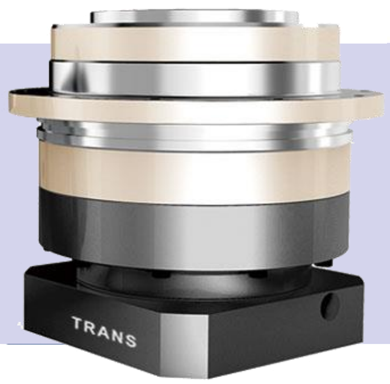
Specs	Unit	Stage	Ratio	AD047	AD064	AD090	AD110	AD140	AD200	AD255
Moment of Inertia	kg.cm[2]	1	4	0.03	0.14	0.48	2.74	7.54	23.67	54.37
			5	0.03	0.13	0.47	2.71	7.42	23.29	53.27
			7	0.03	0.13	0.45	2.62	7.14	22.48	50.97
			10	0.03	0.13	0.44	2.57	7.03	22.51	50.56
		2	20–40	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			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。

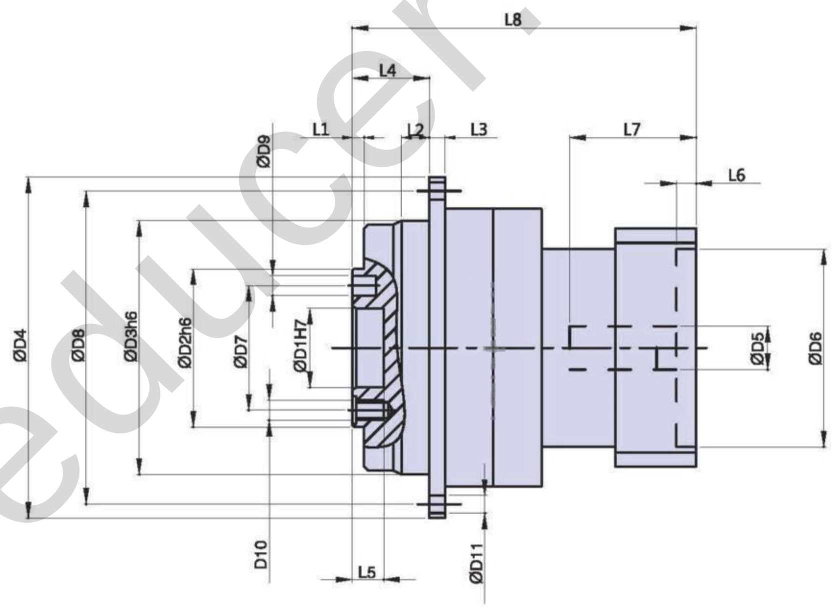
MODEL：AD

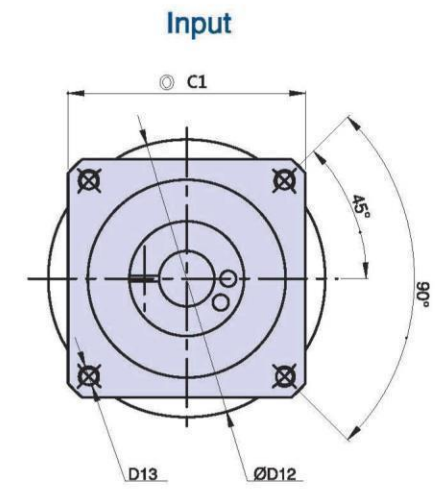
1–Stage

Ratio：4，5，7，10



Dimensions：





Unit:mm

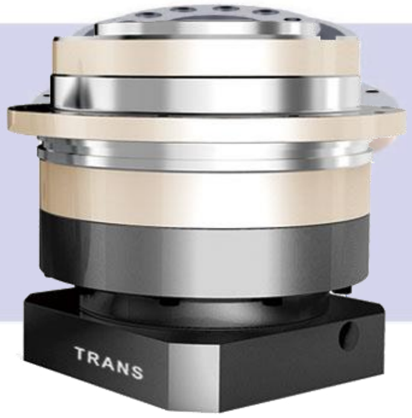
Size	AD047 –L1	AD064 –L1	AD090–L1	AD110 -L1	AD140 –L1	AD200–L1	AD255–L1
D1	12	20	31.5	40	50	80	100
D2	28	40	63	80	100	160	180
D3	47	64	90	110	140	200	255
D4	72	86	118	145	179	247	300
D5	≤11/≤12	11(8 ~ 14)	19(14 ~ 22)	24(22 ~ 28)	24(24 ~ 48)	35(35 ~ 48)	48(48 ~ 55)
D6	30	30(30 ~ 50)	50(50 ~ 110)	110	110(110 ~ 114.3)	114.3(114.3 ~ 200)	200
D7	20	31.5	50	63	80	125	140
D8	67	79	109	135	168	233	280
D9	Ø3	Ø5x Depth(D)8	Ø6xDepth(D)7	Ø6xDepth(D)7	Ø8xDepth(D)7	Ø10xDepth(D)10	Ø12xDepth(D)10
D10	4–M3	7–M5xDepth(D)8	8–M6xDepth(D)12	11–M6xDepth(D)12	11–M8xDepth(D)17	11–M10xDepth(D)20	12–M16xDepth(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	48	60(40 ~ 60)	90(60 ~ 130)	130	130(130 ~ 180)	180(180 ~ 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.

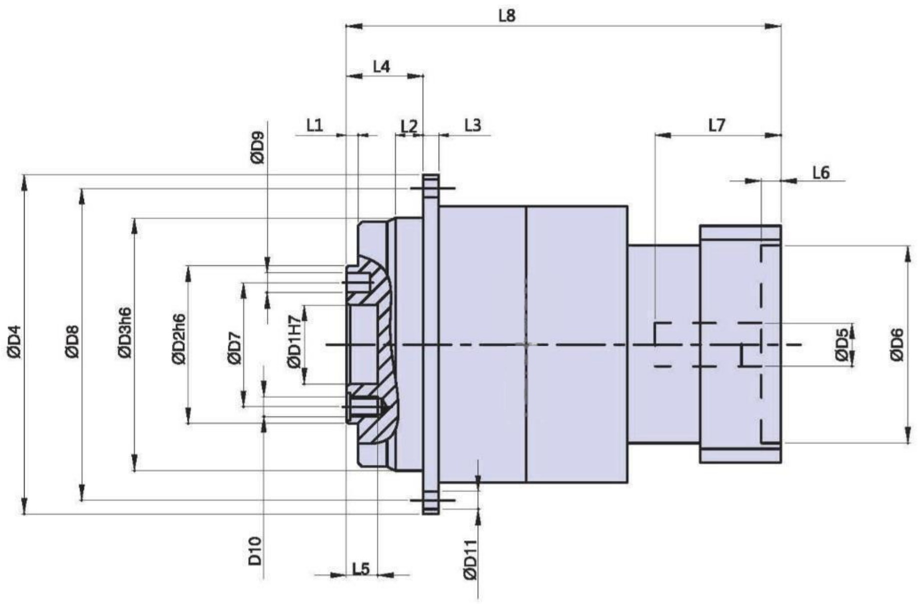
MODEL：AD

2–Stage

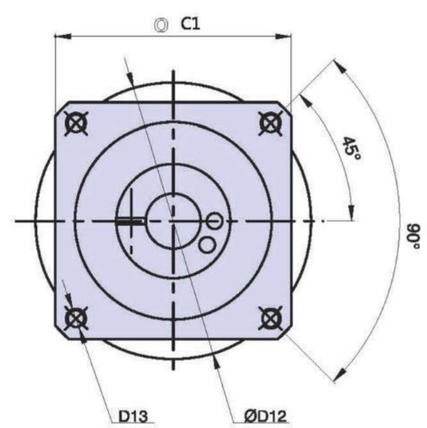
Ratio：20，25，28，35，40，50，70，100



Dimensions：



Input



Unit:mm

Size	AD047–L2	AD064 -L2	AD090 -L2	AD110 –L2	AD140 -L2	AD200–L2	AD255–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	Ø5xDepth(D)8	Ø6xDepth(D)7	Ø6xDepth(D)7	Ø8xDepth(D)7	Ø10xDepth(D)10	Ø12xDepth(D)10
D10	4–M3	7–M5xDepth(D)8	8–M6xDepth(D)12	11–M6xDepth(D)12	11–M8xDepth(D)17	11–M10xDepth(D)20	12–M16xDepth(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	M6～M8	M5～M12	M8～M12	M12
L1	3	3	6	6	6	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	16	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	48	60(40～60)	90(60～130)	90(90～130)	90(90～180)	180(130～220)	180(180～220)

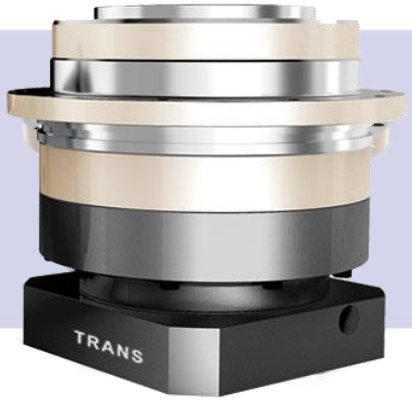
Note 1：Inside of () is the optional range of sizes, outside of () is the standard sizes.

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

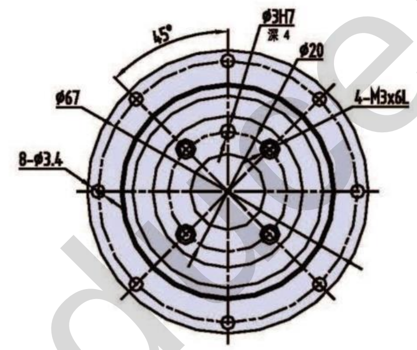
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

MODEL：AD

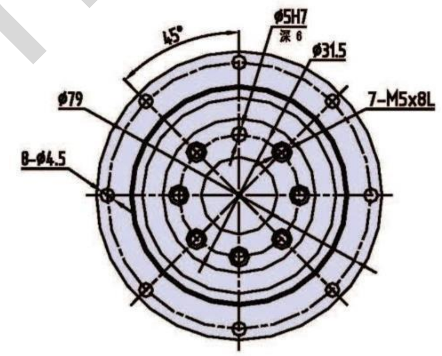
Output Dimensions



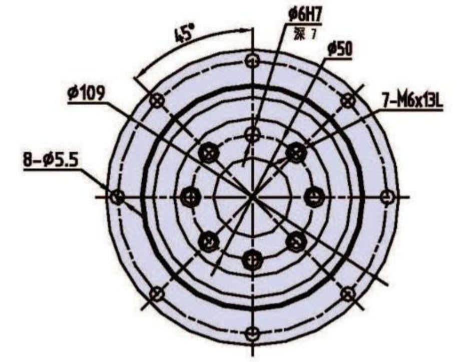
AD047 OUTPUT



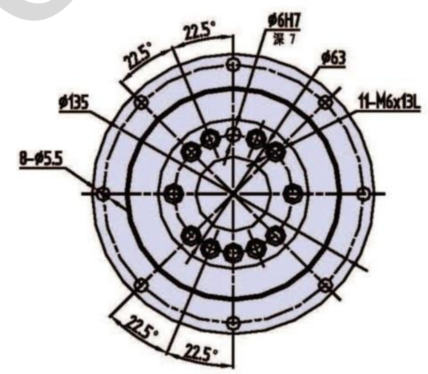
AD064 OUTPUT



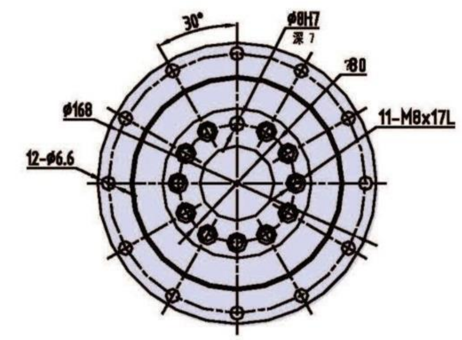
AD090 OUTPUT



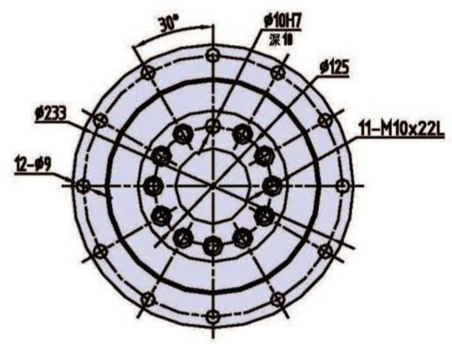
AD110 OUTPUT



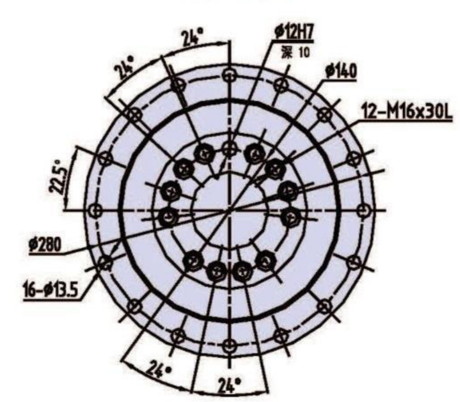
AD140 OUTPUT



AD200 OUTPUT



AD255 OUTPUT



PRECISION PLANETARY GEARBOX

ADR

- **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.
- **High rigidity & torque**
  The use of integral needle roller bearings greatly improves the rigidity and torque.
- **Connector and shaft sleeve mode**
  It can be installed on any motor in the world.
- **No grease leakage**
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- **Convenient maintenance**
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

ADR Type

ADR090 – 10 – S1 – P1 / Motor

Reducer Model
ADR047, ADR064, ADR090,
ADR110, ADR140, ADR200,
ADR110

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

Model Example：ADR090–100–S2–P1/Panasonic MSMJ 082S1A

PADR Reducer Specifications

Specs	Unit	Stage	Ratio	AD047	AD064	AD090	AD110	AD140	AD200	AD255
Rated Output Torque / T_{2N}	Nm	1	4	19	50	133	278	555	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	19	50	133	278	555	1050	1700
			25	22	60	160	330	650	1200	2000
			35	19	50	140	300	550	1100	1800
			40	19	45	120	260	500	1000	1600
			50	22	60	160	330	650	1200	2000
			70	19	50	140	300	550	1100	1800
			100	14	40	100	230	450	900	1500
Max.Output Torque / T_{2NOT}[1]/	Nm	1,2	4~100	3Times of Nominal Output Torque						
Rated Input Speed / n_{1N}	rpm	1,2	4~100	5000	5000	4000	4000	3000	3000	2000
Max.Input Speed / n_{1B}	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	≤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 / F_{2rB}[2]	N	1,2	4~100	43	125	235	430	1300	3064	5900
Max.Axial Force / F_{2a1B}[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	≤59	≤62	≤65	≤68	≤69	≤70

Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	AD047	AD064	AD090	AD110	AD140	AD200	AD255
Moment of Inertia	$kg.cm^2$	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

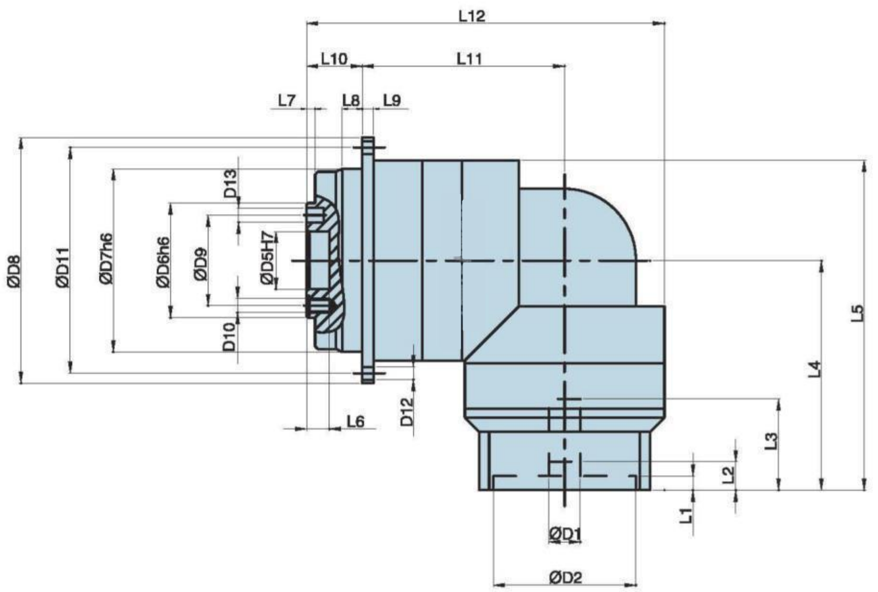
1. Ratio (i=Nin/Nout) .
2. 2.The Max. acceleration torque T2B=60% of T2NOT.
3. When output speed is 100rpm, acting on the output shaft center position *Continuous operation, service life is 15000hrs.

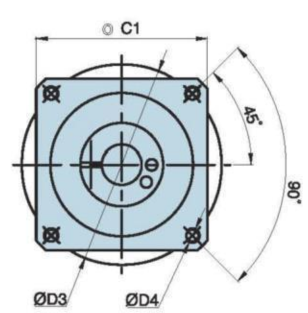
MODEL：ADR

1–Stage

Ratio：3，4，5，7，10

Dimensions：





Unit:mm

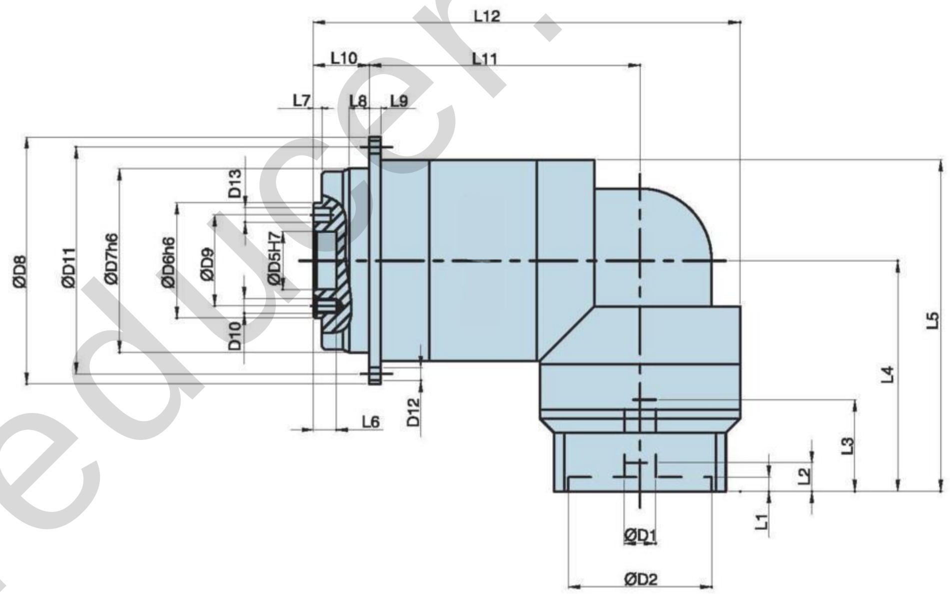
Size	ADR047–L1	ADR064–L1	ADR090–L1	ADR110–L1	ADR140–L1	ADR200–L1	ADR255–L1
D1	≤11/≤12	11(11～14)	19(19～24)	24(22～32)	32(24～35)	≤48	≤55
D2	30	50	70(70～110)	110(110～130)	110(110～114.3)	85	116
D3	46	70	90(90～145)	145(145～165)	145(145～200)	215	235
D4	M4	M4	M8	M8～M10	M8～M12	M12	M12
D5	12	20	31.5	40	50	80	100
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–M5xDepth(D)8	8–M6xDepth(D)12	11–M6xDepth(D)12	11–M8xDepth(D)17	11–M10xDepth(D)20	12–M16xDepth(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	Ø5xDepth(D)8	Ø6xDepth(D)7	Ø6xDepth(D)7	Ø8xDepth(D)7	Ø10xDepth(D)10	Ø12xDepth(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	398.5
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	60	71	102	130	142.5	189	216
L12	107.5	125.5	172	220	255.5	334.5	392
C1	48	60	90(90～130)	130～160	130(130～220)	190	220

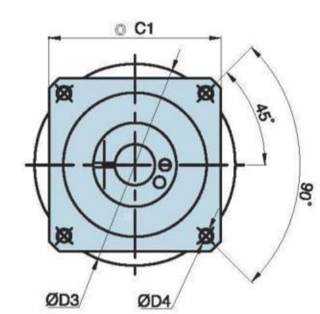
MODEL：ADR

2–Stage

Ratio：15，20，25，30，35，40，50，70，100

Dimensions：





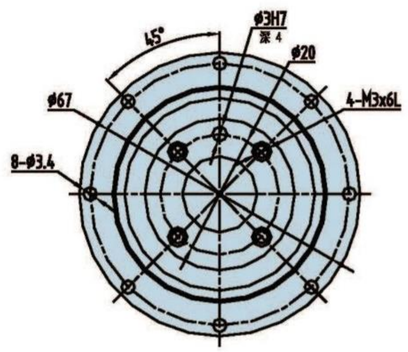
Unit:mm

Size	ADR047–L2	ADR064–L2	ADR090–L2	ADR110–L2	ADR140–L2	ADR200–L2	ADR255–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	M8	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–M5xDepth(D)8	8–M6xDepth(D)12	11–M6xDepth(D)12	11–M8xDepth(D)17	11–M10xDepth(D)20	12–M16xDepth(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	Ø5xDepth(D)8	Ø6xDepth(D)7	Ø6xDepth(D)7	Ø8xDepth(D)7	Ø10xDepth(D)10	Ø12xDepth(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	48	60	90(90～130)	130～160	130(130～220)	190	220

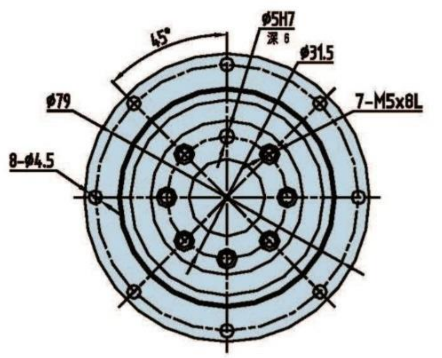
MODEL：ADR

Output Dimensions

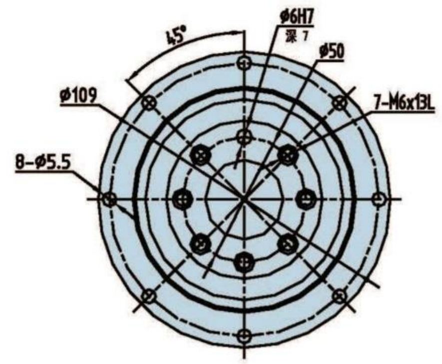
ADR047
OUTPUT



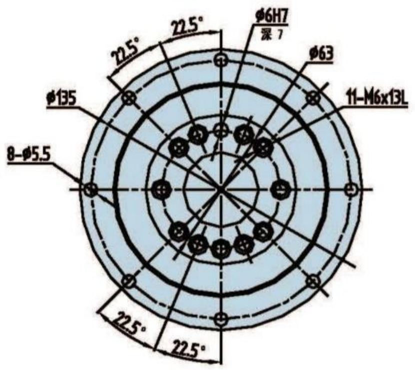
ADR064
OUTPUT



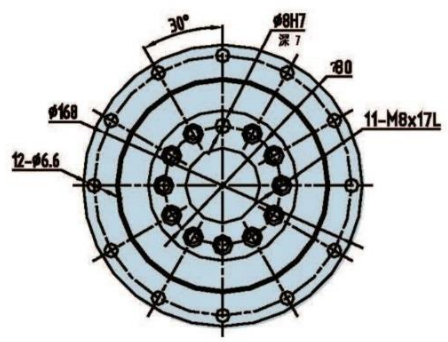
ADR090
OUTPUT



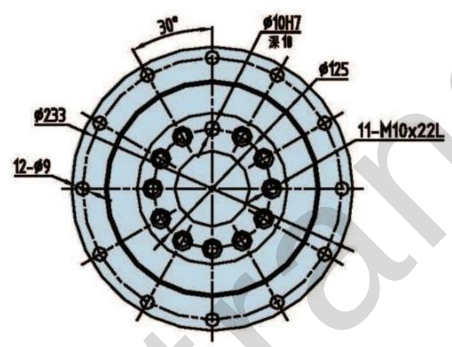
ADR110
OUTPUT



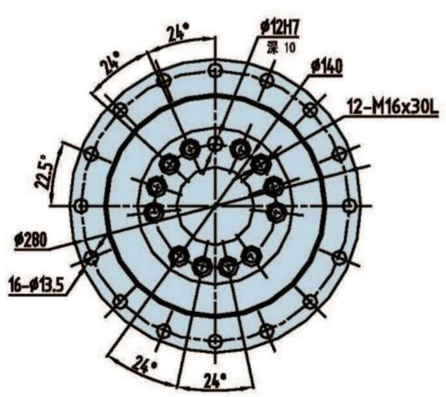
ADR140
OUTPUT



ADR200
OUTPUT



ADR2555
OUTPUT



PRECISION PLANETARY GEARBOX

AF

- 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

AF Type e

AF090 0 – 10 – S1 – P1 / Motor

Reducer Model
AF042, AF060, AF090, AF120, AF120
AF150, AF180, AF220

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

Model Example：AF090-100-S2-P1/Panasonic MSMJ 082S1A

MAF Reducer Specifications

Specs	Unit	Stage	Ratio	AF042	AF060	AF090	AF120	AF150	AF180	AF220
Rated Output Torque / T_{2N}	Nm	1	3	15	46	145	280	520	1020	1550
			4	17	48	155	300	550	1280	2160
			5	17	48	158	310	530	1250	2100
			6	12	42	120	240	410	980	1350
			7	13	47	143	290	500	1030	1580
			8	12	39	108	230	420	880	1260
			9	10	38	100	220	410	880	1450
			10	12	42	120	260	475	950	1530
		2	12	15	48	155	300	530	1100	1750
			15	15	48	150	280	520	1050	1650
			16	17	47	158	300	530	1200	2050
			20	17	48	155	300	530	1200	2050
			25	17	47	158	310	520	1200	2000
			28	16	46	150	300	520	1100	1850
			30	15	46	145	280	500	1050	1600
			35	16	46	155	290	500	1020	1500
			40	17	46	150	290	410	1100	1350
			50	15	45	145	290	490	1000	1300
			70	13	45	140	280	490	1000	1200
			80	10	38	110	230	410	960	980
			100	10	39	120	260	450	950	1100
Max.Output Torque / T_{2NOT}[1]	Nm	1,2	3~100	3Times of Nominal Output Torque						
Rated Input Speed / n_{1N}	rpm	1,2	3~100	3000	3000	3000	3000	2500	2000	2000
Max.Input Speed / n_{1B}	rpm	1,2	3~100	6000	6000	6000	5500	4500	4500	4000
Precision Backlash P1	arcmin	1	3~10	≤5	≤5	≤5	≤5	≤5	≤5	≤5
		2	12~100	≤7	≤7	≤7	≤7	≤7	≤7	≤7
Standard Backlash P2	arcmin	1	3~10	≤8	≤8	≤8	≤8	≤8	≤8	≤8
		2	12~100	≤10	≤10	≤10	≤10	≤10	≤10	≤10
Torsional Rigidity	Nm/arcmin	1,2	3~100	3	7	12	25	50	140	210
Max.Radial Force / F_{2rB}[2]	N	1,2	3~100	750	1130	3000	6700	9150	14500	48500
Max.Axial Force / F_{2a1B}[2]	N	1,2	3~100	310	600	1500	3220	4550	7100	24000
Service Life	hr	1,2	3~100	20000h						
Efficiency / η	%	1	3~10	≥97%						
		2	12~100	≥94%						
Weight	kg	1	3~10	0.5	1.1	2.9	7.8	15	28	52
		2	12~100	0.8	1.39	3.9	9.6	18.9	35	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	≤63	≤63	≤63	≤65	≤65	≤67	≤70

Reducer Rotary Inertia

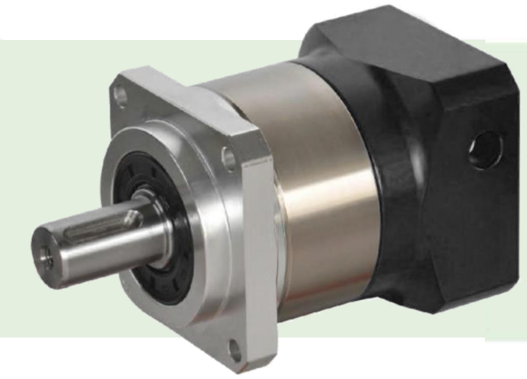
Specs	Unit	Stage	Ratio	AF042	AF060	AF090	AF120	AF150	AF180	AF220
Moment of Inertia	$kg.cm^2$	1	3	0.03	0.16	0.61	3.25	9.21	28.98	69.61
			4	0.03	0.14	0.48	2.74	7.54	23.67	54.37
			5	0.03	0.13	0.47	2.71	7.42	23.29	53.27
			6	0.03	0.13	0.45	2.65	7.25	22.75	51.72
			7	0.03	0.13	0.45	2.62	7.14	22.48	50.97
			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	50.56
		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. 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.

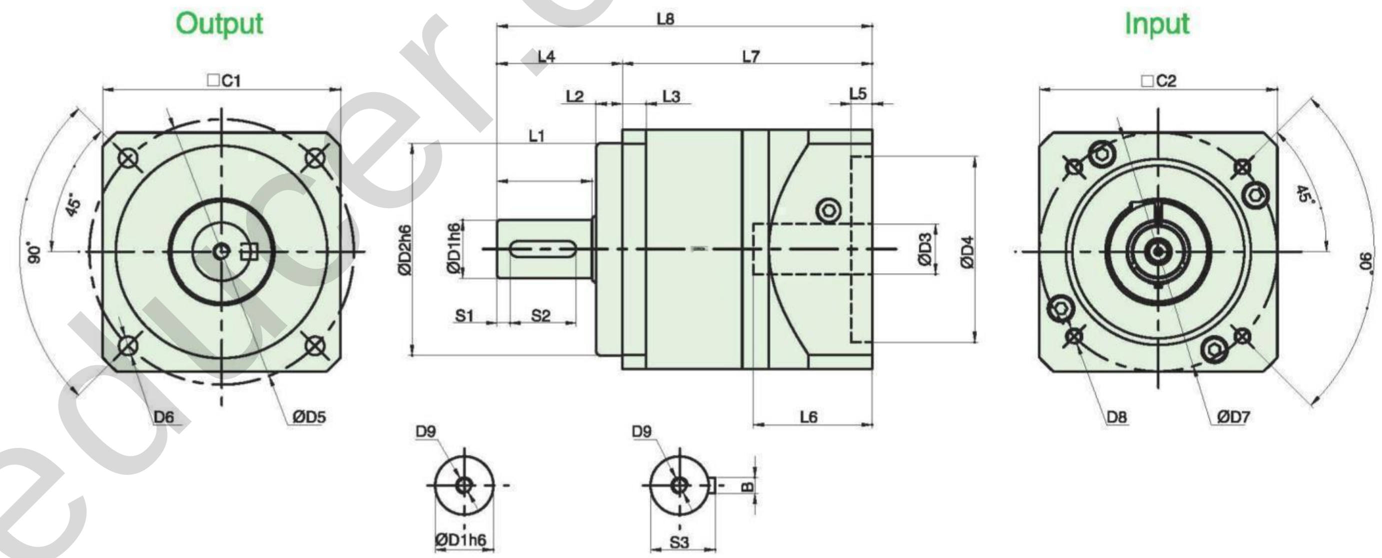
MODEL: AF

1–Stage

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



Dimensions:



Output shaft type S1　　Output shaft type S2

Unit:mm

Size	AF042 -L1	AF060–L1	AF090–L1	AF120–L1	AF150–L1	AF180–L1	AF220–L1
D1	13	16	22	32	40	55	75
D2	35	50	80	110	130	160	180
D3	8(≤11)	14(≤14)	19(≤24)	24 (≤32)	35(≤42)	38(≤50)	55(≤55)
D4	30(30 ~ 50)	50(30 ~ 70)	70(50 ~ 110)	110 (50 ~ 130)	130(95 ~ 180)	180(95 ~ 180)	200(180 ~ 250)
D5	50	70	100	130	165	215	250
D6	4–Ø4.2	4–Ø5.5	4–Ø7	4–Ø9	4–Ø11	4–Ø13	4–Ø17
D7	46(22 ~ 70)	70(45 ~ 90)	90(70 ~ 145)	145 (70 ~ 145)	145(90 ~ 215)	200(145 ~ 300)	235(200 ~ 300)
D8	M3 ~ M5	M3 ~ M6	M4 ~ M10	M6 ~ M10	M8 ~ M13	M10 ~ M13	M10 ~ M13
D9	M4 × 0.7P	M5 × 0.8P	M6 × 1.0P	M8 × 1.25P	M12 × 1.75P	M12 × 1.75P	M20 × 2.5P
L1	20	28	36	50	74	82	105
L2	5.5	7	10	12	15	20	30
L3	7	8	9	12	15	16	20
L4	27	36	47.5	65	92	106	138
L5	4(2 ~ 7)	5(2 ~ 10)	8(4 ~ 10)	10 (4 ~ 10)	10(4 ~ 10)	12.5(4 ~ 12.5)	12.5(4 ~ 12.5)
L6	26	32(30 ~ 42)	45(25 ~ 60)	65 (50 ~ 80)	84(50 ~ 90)	105(50 ~ 130)	105(60 ~ 130)
L7	56	79	94.5	126.8	155.8	177	279
L8	83	115	142	191.8	247.8	283	417
C1	42	62	90	120	150	180	220
C2	42(42 ~ 70)	62(62 ~ 90)	90(90 ~ 165)	120 (115 ~ 130)	150(142 ~ 200)	182(182 ~ 220)	220
S1	3	3	5	5	5	6	7
S2	15	20	25	40	60	70	90
S3	15	18	24.5	35	43	59	79.5
B	5	5	6	10	12	16	20

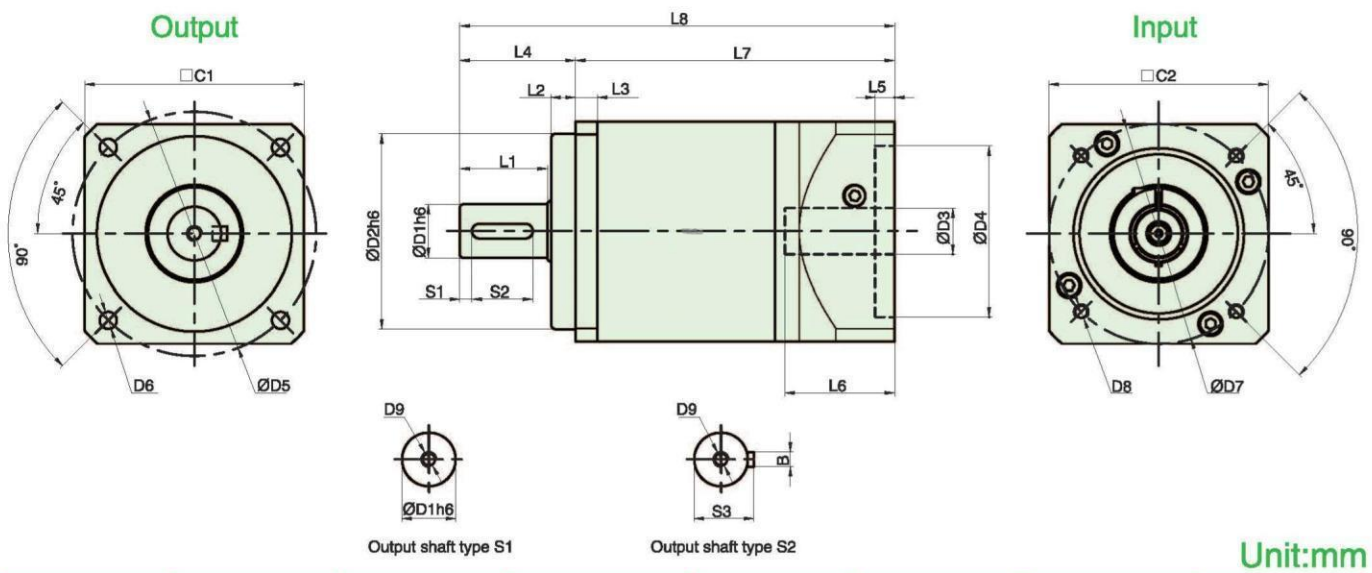
Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

MODEL：AF

2–Stage

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

Dimensions：



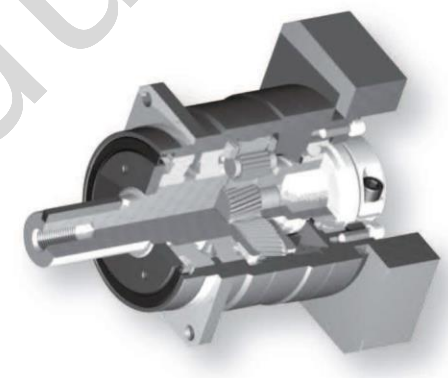
Unit:mm

Size	AF042 -L2	AF060 -L2	AF090-L2	AF120–L2	AF150–L2	AF180–L2	AF220–L2
D1	13	16	22	32	40	55	75
D2	35	50	80	110	130	160	180
D3	8(≤11)	14(≤14)	19(≤24)	24(≤32)	35(≤42)	38(≤50)	55(≤55)
D4	30(30～50)	50(30～70)	70(50～110)	110(50～130)	130(95～180)	180(95～180)	200(180～250)
D5	50	70	100	130	165	215	250
D6	4–Ø4.2	4–Ø5.5	4–Ø7	4–Ø9	4–Ø11	4–Ø13	4–Ø17
D7	46(22～70)	70(45～90)	90(70～145)	145(70～145)	145(90～215)	200(145～300)	235(200～300)
D8	M3～M5	M3～M6	M4～M10	M6～M10	M8～M13	M10～M13	M10～M13
D9	M4×0.7P	M5×0.8P	M6×1.0P	M8×1.25P	M12×1.75P	M12×1.75P	M20×2.5P
L1	20	28	36	50	74	82	105
L2	5.5	7	10	12	15	20	30
L3	7	8	9	12	15	16	20
L4	27	36	47.5	65	92	106	138
L5	4(2～7)	5(2～10)	8(4～10)	10(4～10)	10(4～10)	12.5(4～12.5)	12.5(4～12.5)
L6	26	32(30～42)	45(25～60)	65(50～80)	84(50～90)	105(50～130)	105(60～130)
L7	72	111.5	131	175.3	213.3	257	328
L8	99	147.5	178.5	240.3	305.3	363	466
C1	42	62	90	120	150	180	220
C2	42(42～70)	62(62～90)	90(90～165)	120(115～130)	150(142～200)	182（182～220)	220
S1	3	3	5	5	5	6	7
S2	15	20	25	40	60	70	90
S3	15	18	24.5	35	43	59	79.5
B	5	5	6	10	12	16	20

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

VRS



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

VRS060 – 10 – S1 – P1 / 馬達

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：15，16，20，25，28，30，35，40，
50，70，100

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

Model Example：VRS180–100–S2–P1/Panasonic MSMJ 082S1A

VRS Reducer Specifications

Specs	Unit	Stage	Ratio	VRS060	VRS075	VRS100	VRS140	VRS180	VRS210	VRS240
Rated Output Torque / T_{2N}	Nm	1	3	55	130	208	342	588	1140	1500
			4	50	140	290	542	1050	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	55	130	208	342	588	1140	2300
			20	50	140	290	542	1050	1700	2500
			25	60	160	330	650	1200	2000	2500
			28	60	160	330	650	1200	2000	2500
			30	55	150	310	600	1100	1900	2300
			35	50	140	300	550	1100	1800	2200
			40	45	120	260	500	1000	1600	2350
			50	60	160	330	650	1200	2000	2200
			70	50	140	300	550	1100	1800	2200
			100	40	100	230	450	900	1500	1800
Max.Output Torque / T_{2NOT}[1]	Nm	1,2	3~100	3Times of Nominal Output Torque						
Rated Input Speed / n_{1N}	rpm	1,2	3~100	5000	4000	4000	3000	3000	2000	1000
Max.Input Speed / n_{1B}	rpm	1,2	3~100	10000	8000	8000	6000	6000	4000	2500
Precision Backlash P1	arcmin	1	3~10	≤1	≤1	≤1	≤1	≤1	≤1	≤1
		2	12~100	≤3	≤3	≤3	≤3	≤3	≤3	≤3
Standard Backlash P2	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 / F_{2rB}[2]	N	1,2	3~100	2750	4100	6400	9880	15000	20000	27500
Max.Axial Force / F_{2aB}[2]	N	1,2	3~100	2350	3200	5360	9690	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	≤65	≤68	≤68	≤70	≤70

Reducer Rotary Inertia

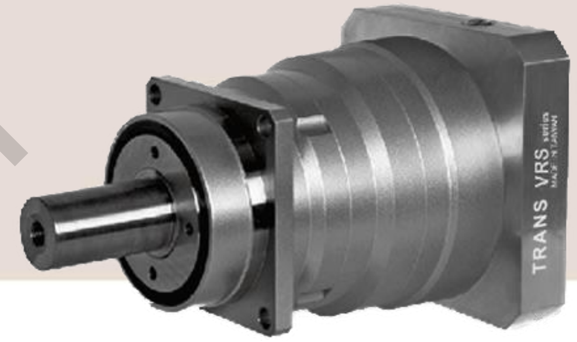
Specs	Unit	Stage	Ratio	VRS060	VRS075	VRS100	VRS140	VRS180	VRS210	VRS240
Moment of Inertia	$kg.cm^2$	1	3	0.16	0.61	3.25	9.21	28.98	69.61	82.16
			4	0.14	0.48	2.74	7.54	23.67	54.37	75.58
			5	0.13	0.47	2.71	7.42	23.29	53.27	75.29
			6	0.13	0.45	2.65	7.25	22.75	51.72	72.35
			7	0.13	0.45	2.62	7.14	22.48	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

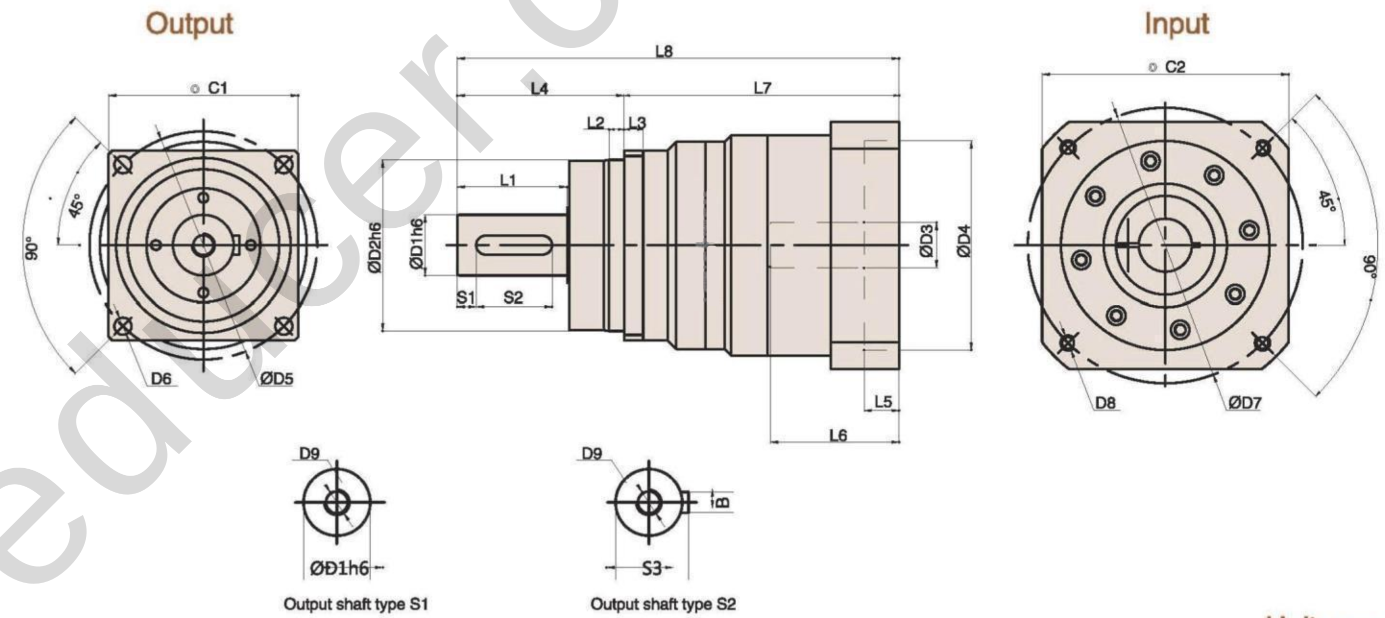
MODEL: VRS

1-Stage

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



Dimensions:



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	8(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

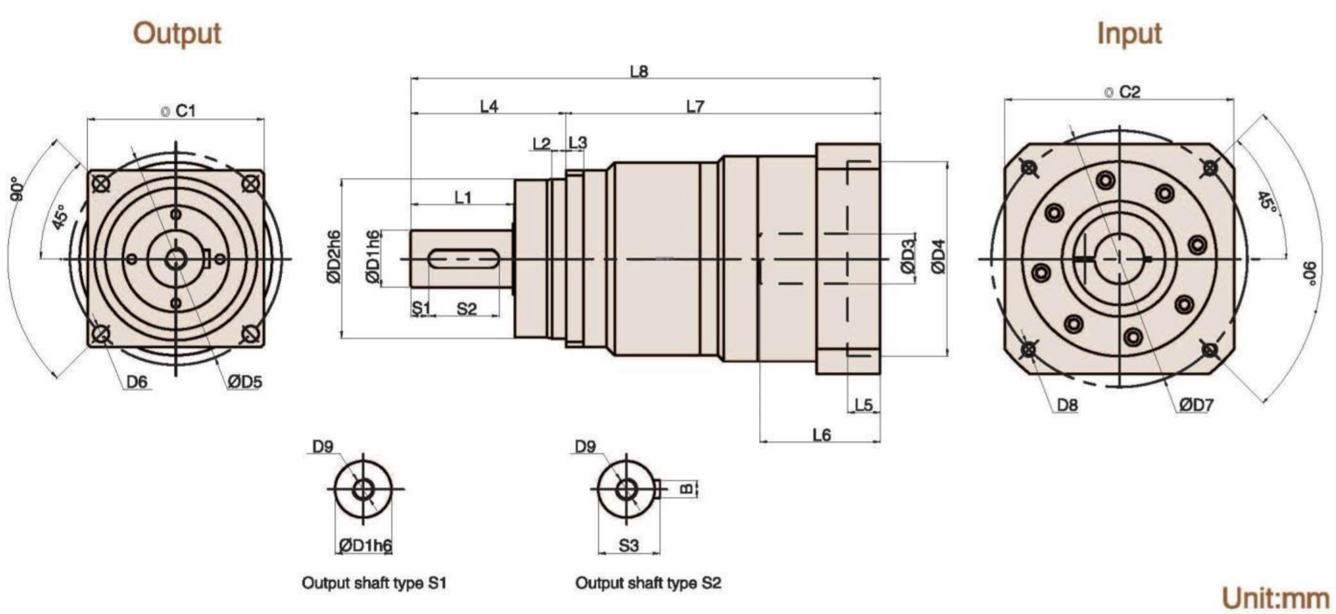
Note 1: Inside of () is the optional range of sizes, outside of () is the standard sizes.
Note 2: The reducer output shaft size and length can be customized for customers.
Note 3: The input size can be changed according to the servomotor or stepper motor of each brand.

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	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(45～70)	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	61～68	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)	60(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.

PRECISION PLANETARY GEARBOX

MFR

- 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.
- High rigidity & torque
  The use of integral ball bearings greatly improves the rigidity and torque.
- Connector and shaft sleeve mode
  It can be installed on any motor in the world.
- No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

MFR Type

MFR080 – 10 – S1 – P1 / Motor

Reducer Model

MFR040, MFR060, MFR080,
MFR120, MFR160

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

Model Example：MFR080–100–S2–P1/Panasonic MSMJ 082S1A

MFR Reducer Specifications

Specs	Unit	Stage	Ratio	MFR040	MFR060	MFR080	MFR120	MFR160
Rated Output Torque / T_{2N}	Nm	1	3	17	28	112	165	423
			4	15	38	110	146	364
			5	14	40	108	160	423
			7	13	35	105	149	358
			10	12	25	100	141	293
		2	15	17	28	112	165	423
			20	15	38	110	146	364
			25	14	40	108	160	423
			30	13	28	112	165	423
			35	13	35	105	149	358
			40	12	38	110	146	364
			50	14	40	108	160	423
			70	13	35	105	149	358
			100	12	25	100	141	293
Max.Output Torque / T_{2NOT}[1]/	Nm	1,2	3~100	3Times of Nominal Output Torque				
Rated Input Speed / n_{1N}	rpm	1,2	3~100	3000	3000	3000	3000	2500
Max.Input Speed / n_{1B}	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 / F_{2rB}[2]	N	1,2	3~100	320	460	1300	3200	6520
Max.Axial Force / F_{2a1B}[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

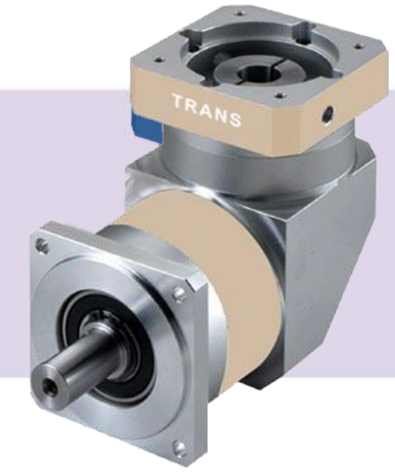
Reducer Rotary Inertia

Specs	Unit	Stage	Ratio	MFR040	MFR060	MFR080	MFR120	MFR160
Moment of Inertia	kg.cm²	1	3	0.16	0.63	3.48	12.84	36.72
			4	0.16	0.6	3.31	12.22	34.63
			5	0.16	0.59	3.28	12.1	34.24
			7	0.16	0.59	3.27	12.05	34.07
			10	0.16	0.59	3.26	12.03	34.02
		2	12–40	0.16	0.59	3.26	12.03	34.02
			50–100	0.16	0.59	3.26	12.03	34.02

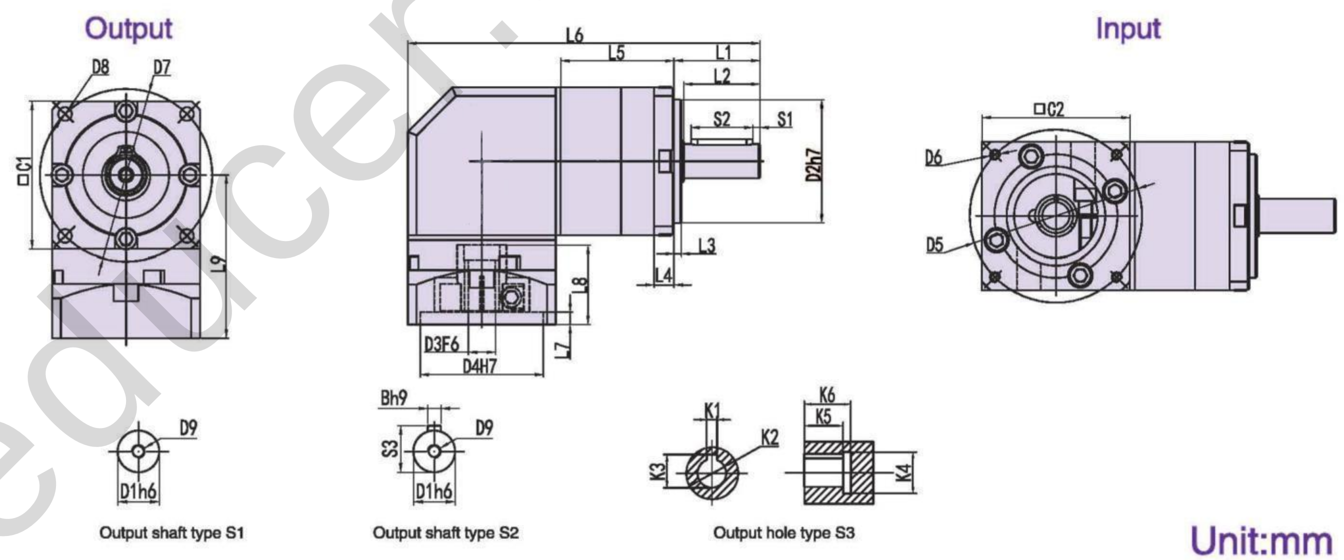
1. The Max. acceleration torque T2B=60%
2.When output speed is 100rpm, acting on the output shaft center position
3. 3–stage big ratios are not in the above table. There is shaft lengthening and enlarging design. Please tell sales person if you need it.

MODEL：MFR

1–Stage
Ratio：3，4，5，6，7，8，9，10，14，20



Dimensions：



Unit:mm

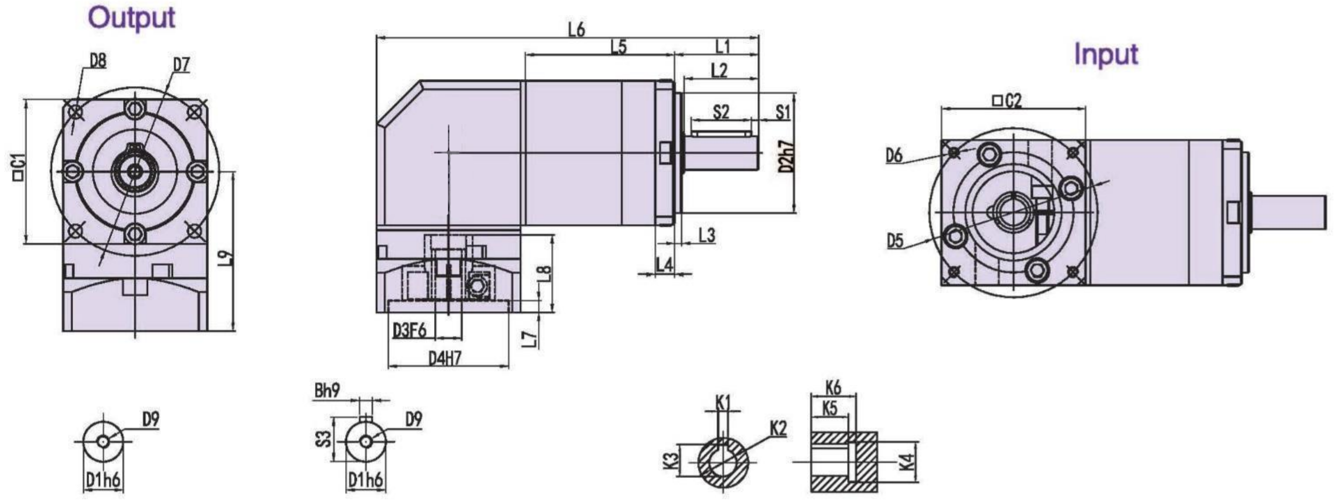
Size	MFR060–L1	MFR080–L1	MFR120–L1	MFR160–L1
D1	ϕ14(16)	ϕ20 (22)	ϕ25 (32)	ϕ40
D2	ϕ50	ϕ80	ϕ110	ϕ130
D3	ϕ14 (ϕ6.35–19)	ϕ19 (ϕ11–24)	ϕ22 (ϕ16–24)	ϕ35 (ϕ22–38)
D4	ϕ50 (ϕ30–70)	ϕ70 (ϕ50–110)	ϕ110 (ϕ55.5–110)	ϕ114.3 (ϕ110–114.3)
D5	ϕ70 (ϕ45–90)	ϕ90 (ϕ70–145)	ϕ145 (ϕ90–155)	ϕ200 (ϕ145–200)
D6	4–M4 (M3–M6)	4–M5 (M4–M8)	4–M8 (M6–M12)	4–M12 (M8–M12)
D7	ϕ70	ϕ100	ϕ130	ϕ185
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	295
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

MODEL：MFR

2-Stage

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

Dimensions：



Unit:mm

Size	MFR060–L2	MFR080–L2	MFR120–L2	MFR160–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	ϕ185
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

PRECISION PLANETARY GEARBOX

MER

- 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.
- High rigidity & torque
  The use of integral ball bearings greatly improves the rigidity and torque.
- Connector and shaft sleeve mode
  It can be installed on any motor in the world.
- No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- Convenient maintenance
  No need to replace the grease in the product life period , and the installation is more convenient.

Model Selection of Speed Reducers

MER Type

MER080 – 10 – S1 – P1 / Motor

Reducer Model
MER040, MER060, MER080, MER120, MER160

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

Model Example：MER080–100–S2–P1/Panasonic MSMJ 082S1A

MER Reducer Specifications

Specs	Unit	Stage	Ratio	MER040	MER060	MER080	MER120	MER160
Rated Output Torque / T_{2N}	Nm	1	3	17	28	112	165	423
			4	15	38	110	146	364
			5	14	40	108	160	423
			7	13	35	105	149	358
			10	12	25	100	141	293
		2	15	17	28	112	165	423
			20	15	38	110	146	364
			25	14	40	108	160	423
			30	13	28	112	165	423
			35	13	35	105	149	358
			40	12	38	110	146	364
			50	14	40	108	160	423
			70	13	35	105	149	358
			100	12	25	100	141	293
Max.Output Torque / T_{2NOT}[1]/	Nm	1,2	3~100	3Times of Nominal Output Torque				
Rated Input Speed / n_{1N}	rpm	1,2	3~100	3000	3000	3000	3000	2500
Max.Input Speed / n_{1B}	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 / F_{2rB}[2]	N	1,2	3~100	320	460	1300	3200	6520
Max.Axial Force / F_{2a1B}[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	MER040	MER060	MER080	MER120	MER160
Moment of Inertia	kg.cm²	1	3	0.16	0.63	3.48	12.84	36.72
			4	0.16	0.6	3.31	12.22	34.63
			5	0.16	0.59	3.28	12.1	34.24
			7	0.16	0.59	3.27	12.05	34.07
			10	0.16	0.59	3.26	12.03	34.02
		2	12–40	0.16	0.59	3.26	12.03	34.02
			50–100	0.16	0.59	3.26	12.03	34.02

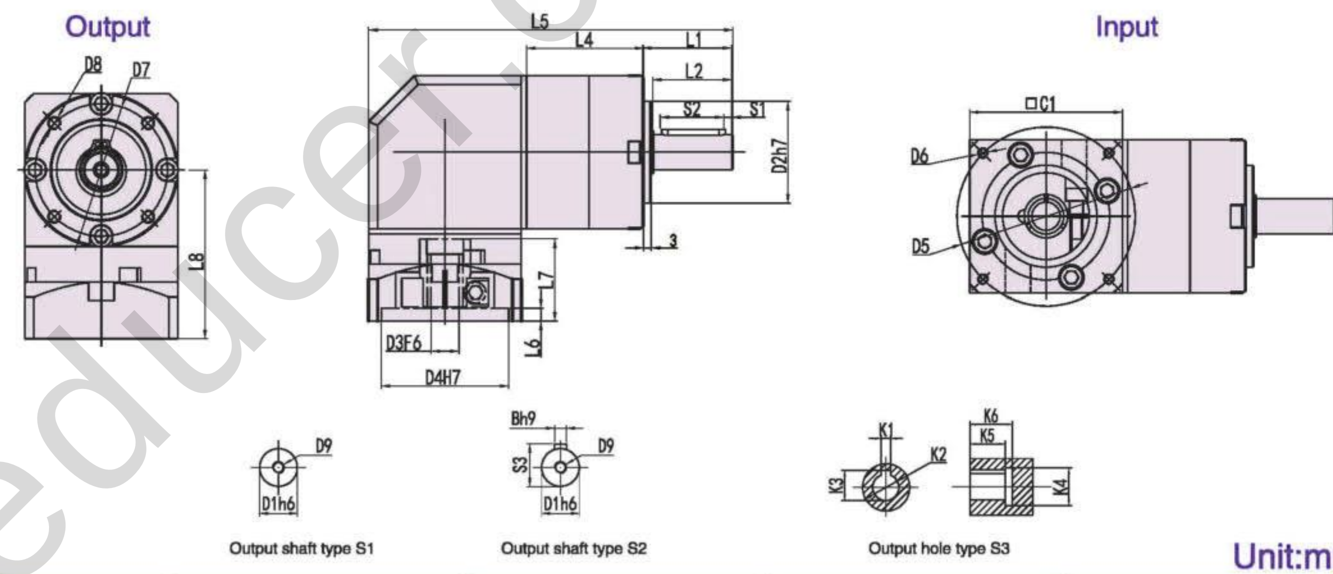
1. The Max. acceleration torque T2B=60% of T2NOT
2. When output speed is 100rpm, acting on the output shaft center position.
3. 3-stage big ratios are not in the above table. There is shaft lengthening and enlarging design. Please tell sales person if you need it.

MODEL：MER

1-Stage

Ratio：3，4，5，6，7，8，9，10，14，20

Dimensions：



Unit:mm

Size	MER060-L1	MER080-L1	MER120-L1	MER160-L1
D1	ϕ14(16)	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	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：MER

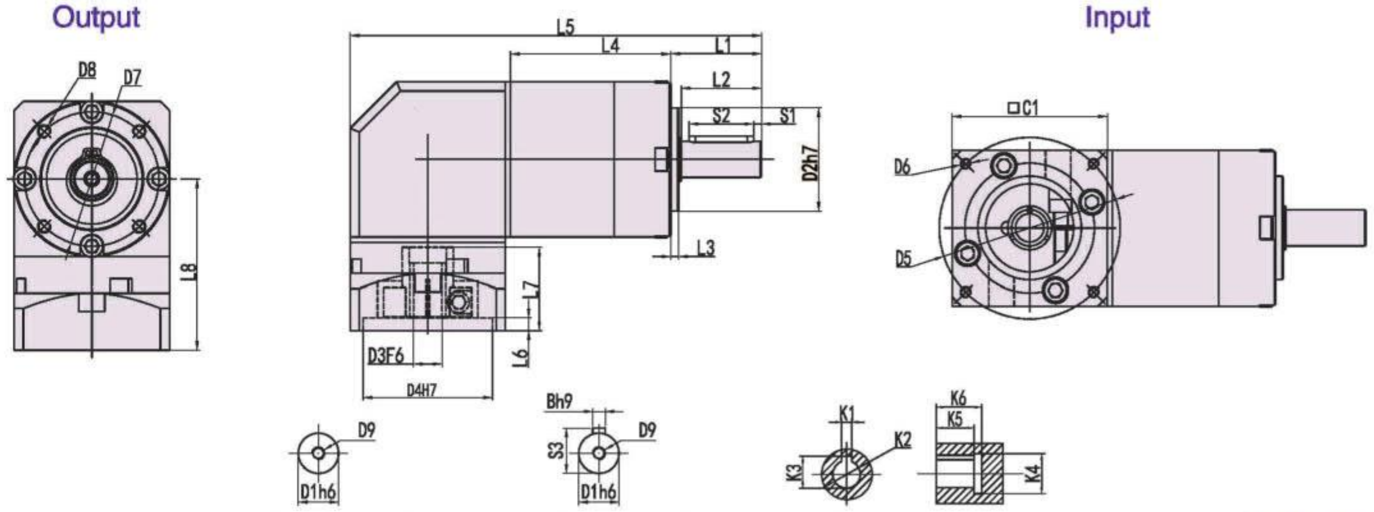
2–Stage

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

Dimensions：

Output

Input



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

Unit:mm

Size	MER060–L2	MER080–L2	MER120–L2	MER160–L2
D1	ϕ14(16)	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	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

PRECISION PLANETARY GEARBOX

VRSF

- Quiet operation
  Helical gears are used to achieve smooth and quiet operation.
- High precision
  The backlash is less than 3 arcmin and the positioning is accurate.
- High rigidity & torqueThe use of integral ball bearings greatly improves the rigidity and torque.
- Methods of flange and connector
  It can be installed on any motor in the world.
- No grease leakage
  The use of grease with high viscosity which is not easy to separate effectively prevents the grease leakage.
- 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

VRSF 080 – 10 – S1 – P1 / Motor

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

Model Example：VRSF080–100–S2–P1/Panasonic MSMJ 082S1A

VRSF Reducer Specifications

Specs	Unit	Stage	Ratio	VRSF060	VRSF080	VRSF100	VRSF125
Rated Output Torque / T_{2N}	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 / T_{2NOT}[1]/	Nm	1,2	3~100	3Times of Nominal Output Torque			
Rated Input Speed / n_{1N}	rpm	1,2	3~100	3000	3000	3000	3000
Max.Input Speed / n_{1B}	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 / F_{2rB}[2]	N	1,2	3~100	800	1200	3200	5220
Max.Axial Force / F_{2aB}[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	IP65			
Mounting Position		1,2	3~100	Any Direction			
Noise Level(n1=3000rpm, No load)	dB(A)	1,2	3~100	≤60	≤62	≤65	≤67

Reducer Rotary Inertia

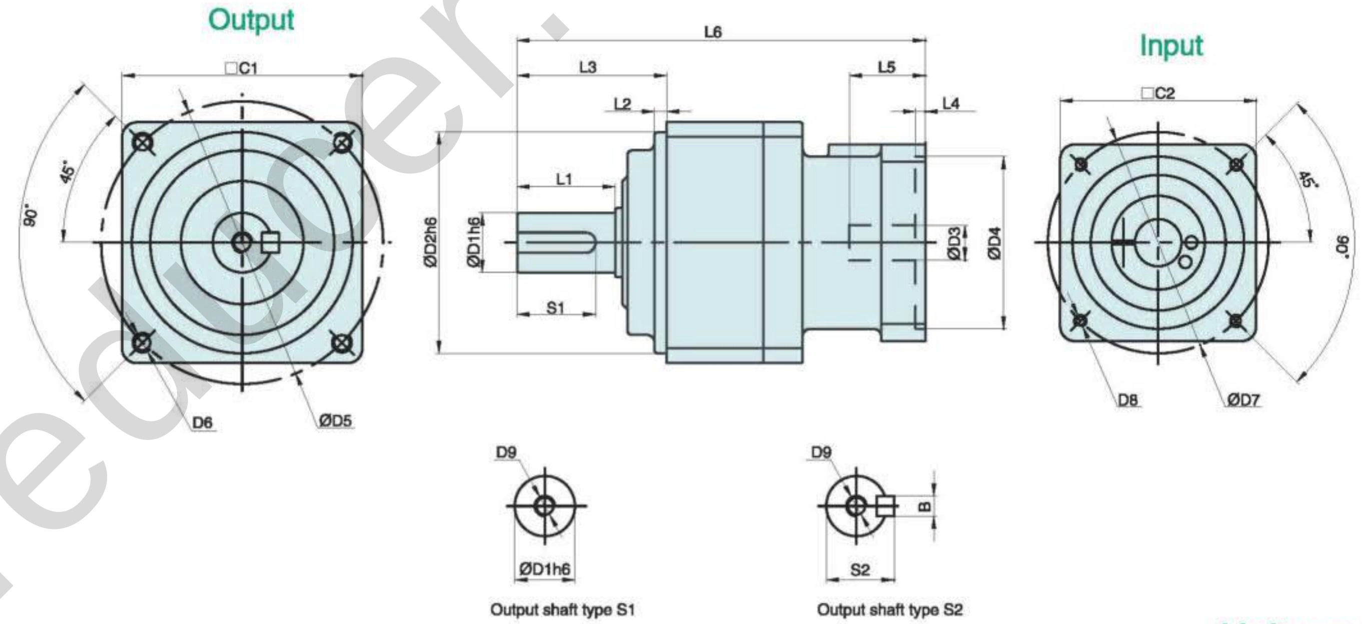
Specs	Unit	Stage	Ratio	VRSF060	VRSF080	VRSF100	VRSF125
Moment of Inertia	$kg.cm^2$	1	3	0.16	0.61	3.25	9.21
			4	0.14	0.48	2.74	7.54
			5	0.13	0.47	2.71	7.42
			6	0.13	0.45	2.65	7.25
			7	0.13	0.45	2.62	7.14
			8	0.13	0.44	2.58	7.07
			9	0.13	0.44	2.57	7.04
			10	0.13	0.44	2.57	7.03
		2	12~40	0.03	0.13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



Unit:mm

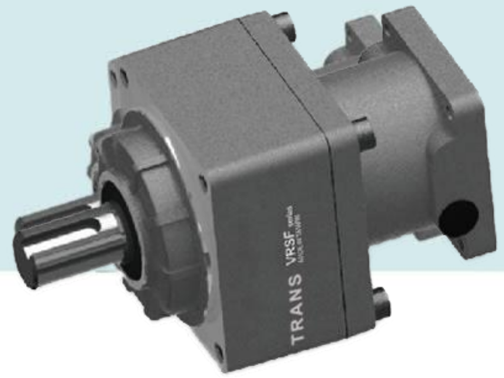
Size	VRSF060-L1	VRSF080-L1	VRSF100-L1	VRSF125-L1
D1	12	19	24	32
D2	50	70	90	110
D3	8(8~14)	14(14~19)	19	22(22~24)
D4	30(30~50)	50(50~70)	70	110
D5	60	90	115	135
D6	M5	M6	M8	M10
D7	45(45~70)	70(70~90)	90	145
D8	M4~M5	M4~M5	M6	M8
D9	M4	M6	M8	M12
L1	20	30	40	55
L2	3	3	5	5
L3	32	50	61	75
L4	4	4	4	8
L5	27~32	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	6	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.

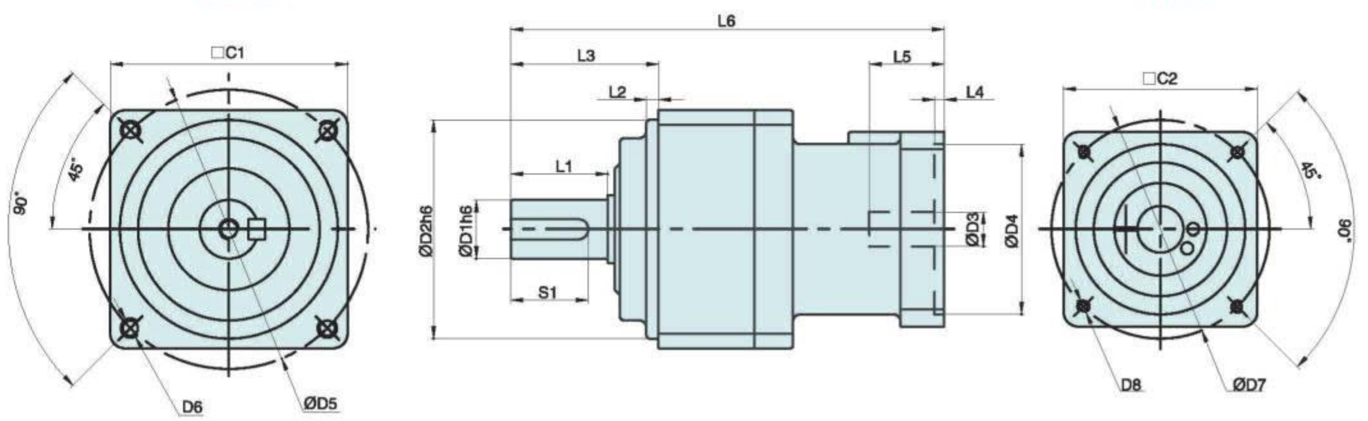
MODEL： VRSF

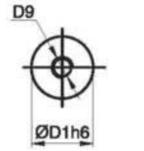
2-Stage

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

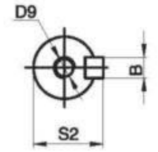


Dimensions：





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.

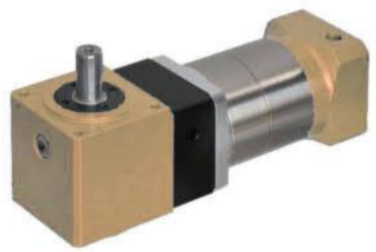
RIGHT ANGLE GEARBOX

ZR

ZR
Solid shaft

ZR-K
Hollow shaft

ZR-S
Doubl e output shaft



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.

Features

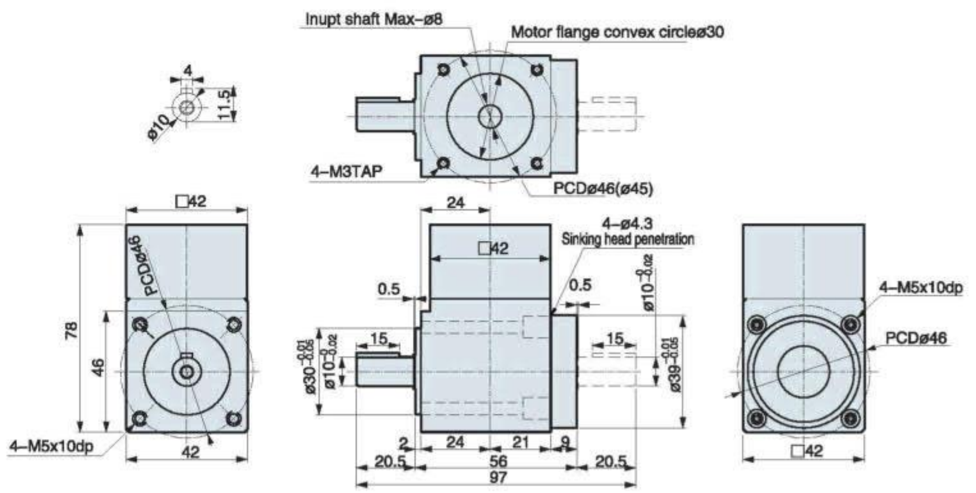
- The reducer body with a compact structure and small volume to save the mounting space.
- Although the reducer is small in volume and light in weight, and it features of high torque output and low backlash.
- When ordering, please inform the sizes of motor flange and shaft.

Model Identification

ZR — 42 — 3 — V2

Right Angle Reducer | Specifications | Ratio | Motor

V1: Servo Ø8 PCD45,M3 V2: Servo Ø8 PCD46,M4	T1: Stepper Ø5 PCD43.8,M3 T2: Stepper Ø6 PCD43.8,M3
100W AC servo motor for each brand	42 stepper motor for each brand



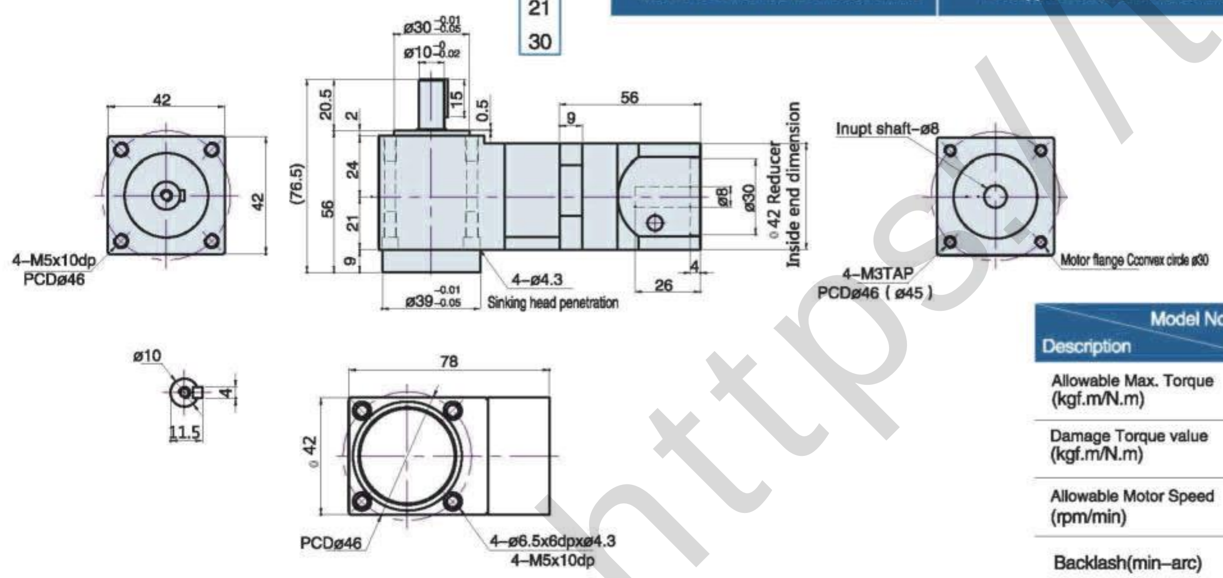
Model No. / Description	ZR42
Allowable Max. Torque (kgf.m/N.m)	1.5/15
Damage Torque value (kgf.m/N.m)	4/40
Allowable Motor Speed (rpm/min)	2500
Backlash(min-arc)	0.5
Weight(kg)	0.5

ZR — 42S — 9 — V2

Right Angle Reducer | Specifications | Ratio | Motor

9
12
15
21
30

V1: Servo Ø8 PCD45,M3 V2: Servo Ø8 PCD46,M4	T1: Stepper Ø5 PCD43.8,M3 T1: Stepper Ø6 PCD43.8,M3
100W AC servo motor for each brand	42 stepper motor for each brand



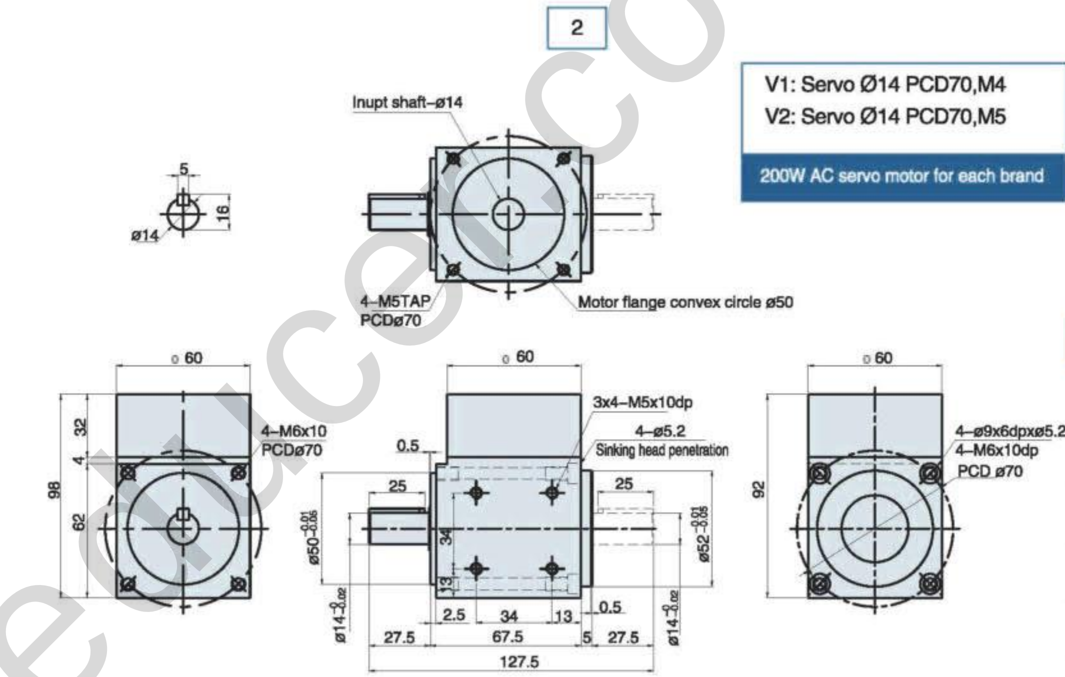
Model No. / Description	ZR42S
Allowable Max. Torque (kgf.m/N.m)	1.5/15
Damage Torque value (kgf.m/N.m)	4/40
Allowable Motor Speed (rpm/min)	2500
Backlash(min-arc)	2
Weight(kg)	0.9

Model Identification

ZR — 60 — 2 — V2

Right Angle Reducer | Specifications | Ratio | Motor

V1: Servo Ø14 PCD70,M4 V2: Servo Ø14 PCD70,M5	T1: Stepper Ø8 PCD66.67,M4 T2: Stepper Ø8 PCD70,M4 T3: Stepper Ø10 PCD70,M4
200W AC servo motor for each brand	60 stepper motor for each brand



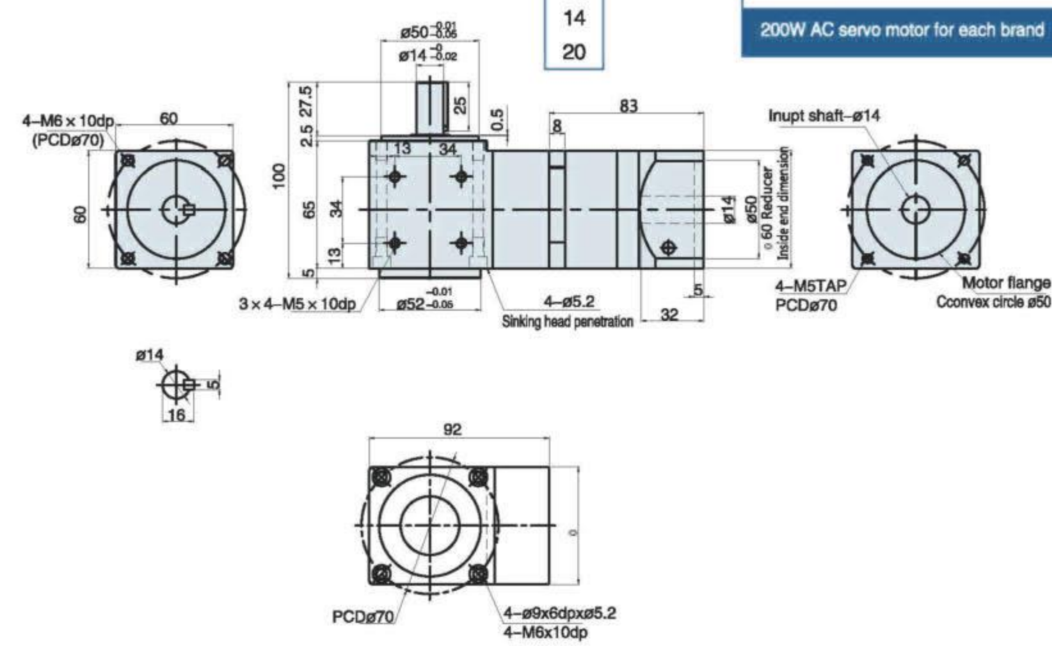
Model No. / Description	ZR60
Allowable Max. Torque (kgf.m/N.m)	4.5/45
Damage Torque value (kgf.m/N.m)	12/120
Allowable Motor Speed (rpm/min)	2500
Backlash(min-arc)	0.5
Weight(kg)	1.2

ZR — 60S — 6 — V2

Right Angle Reducer | Specifications | Ratio | Motor

6
8
10
14
20

V1: Servo Ø14 PCD70,M4 V2: Servo Ø14 PCD70,M5	T1: Stepper Ø8 PCD66.67,M4 T2: Stepper Ø8 PCD70,M4 T3: Stepper Ø10 PCD70,M4
200W AC servo motor for each brand	60 stepper motor for each brand



Model No. / Description	ZR60S
Allowable Max. Torque (kgf.m/N.m)	4.5/45
Damage Torque value (kgf.m/N.m)	12/120
Allowable Motor Speed (rpm/min)	2500
Backlash(min-arc)	2
Weight(kg)	2

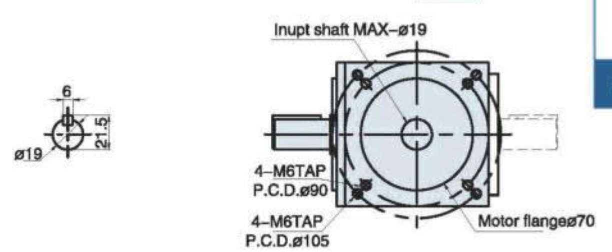
Model Identification

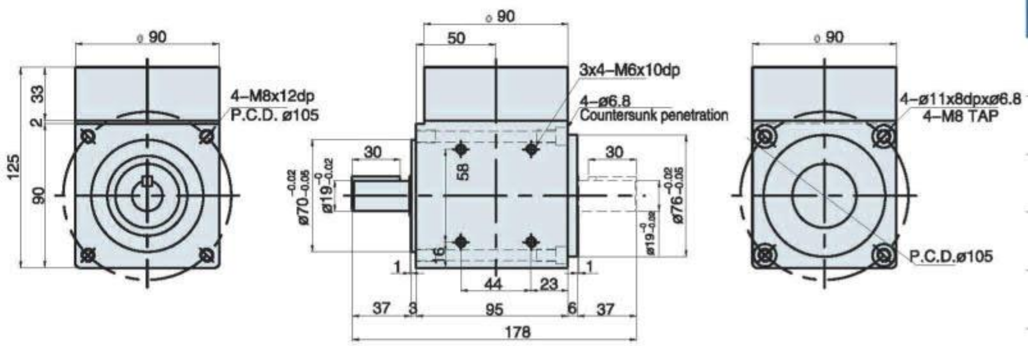
ZR —— 90 —— 2 —— V2

Right Angle Reducer | Specifications | Ratio | Motor

2

V1: Servo Ø19 PCD90,M5 V2: Servo Ø19 PCD90,M6	T1: Stepper Ø14 PCD98.4,M5 T2: Stepper Ø6 PCD43.8,M3
75W AC servo motor for each brand	86 stepper motor for each brand





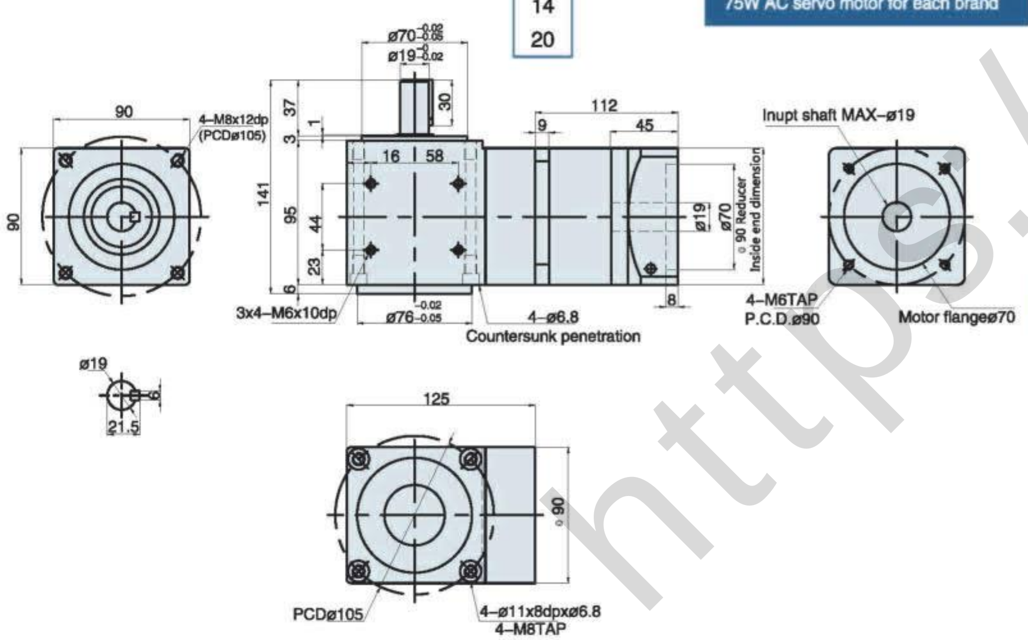
Description \ Model No.	ZR90
Allowable Max. Torque (kgf.m/N.m)	12/120
Damage Torque value (kgf.m/N.m)	32/320
Allowable Motor Speed (rpm/min)	2500
Backlash(min-arc)	0.5
Weight(kg)	3.6

ZR —— 90S —— 6 —— V2

Right Angle Reducer | Specifications | Ratio | Motor

6
8
10
14
20

V1: Servo Ø19 PCD90,M5 V2: Servo Ø19 PCD90,M6	T1: Stepper Ø14 PCD98.4,M5
75W AC servo motor for each brand	86 stepper motor for each brand



Description \ Model No.	ZR90S
Allowable Max. Torque (kgf.m/N.m)	12/120
Damage Torque value (kgf.m/N.m)	32/320
Allowable Motor Speed (rpm/min)	2500
Backlash(min-arc)	2
Weight(kg)	6.5

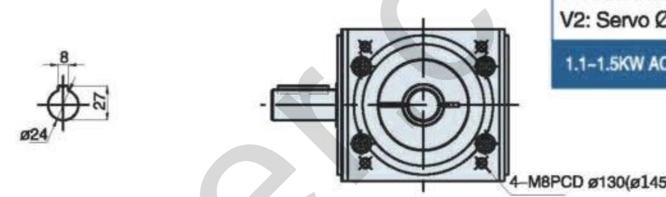
Model Identification

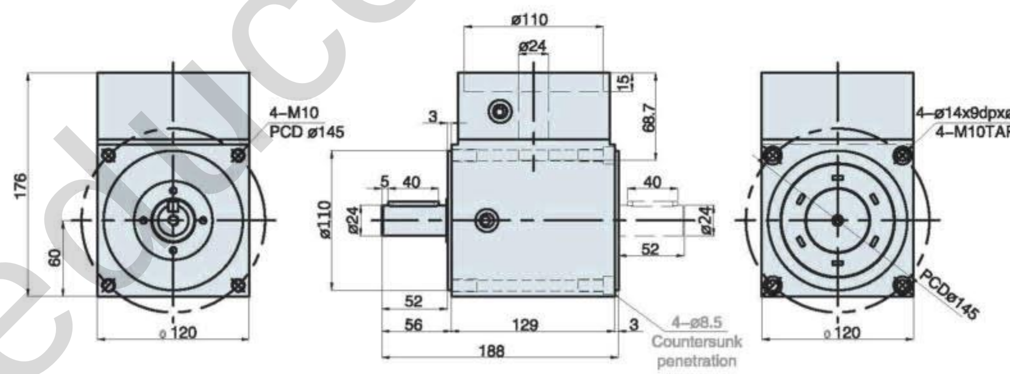
ZR —— 120 —— 2 —— V2

Right Angle Reducer | Specifications | Ratio | Motor

2

V1: Servo Ø24 PCD145,M10 V2: Servo Ø24 PCD145,M10	T1: Stepper 19 PCD98.4,M5
1.1-1.5KW AC servo motor for each brand	86 stepper motor for each brand





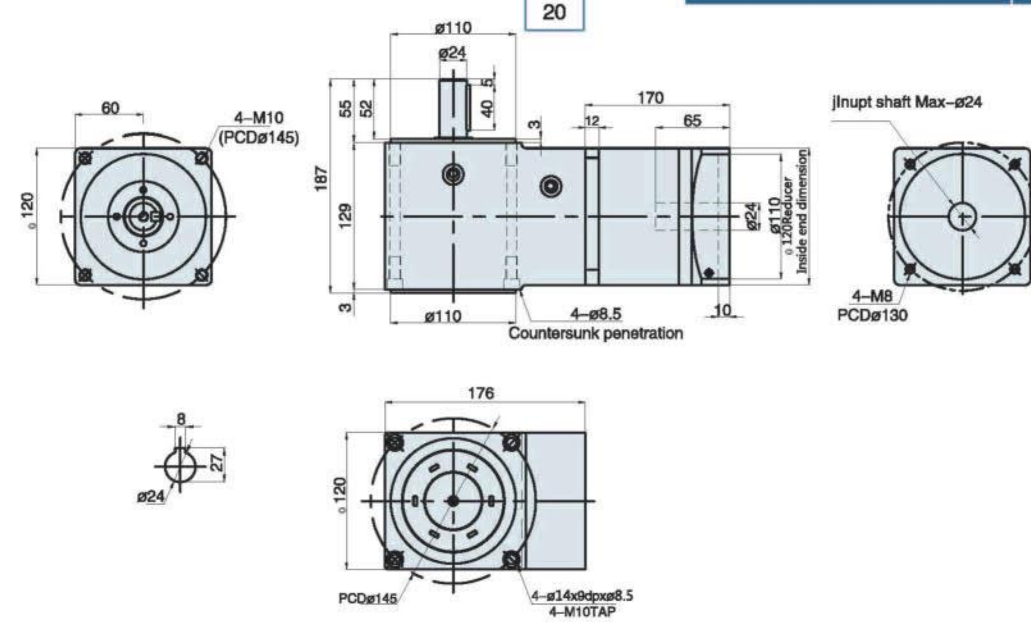
Description \ Model No.	ZR120
Allowable Max. Torque (kgf.m/N.m)	16/160
Damage Torque value (kgf.m/N.m)	45/450
Allowable Motor Speed (rpm/min)	2500
Backlash(min-arc)	0.5
Weight(kg)	8

ZR —— 120S —— 6 —— V2

Right Angle Reducer | Specifications | Ratio | Motor

6
8
10
14
20

V1: Servo Ø24 PCD145,M10 V2: Servo Ø24 PCD145,M10	T1: Stepper 19 PCD98.4,M5
1.1-1.5KW AC servo motor for each brand	86 stepper motor for each brand



Description \ Model No.	ZR120S
Allowable Max. Torque (kgf.m/N.m)	16/160
Damage Torque value (kgf.m/N.m)	45/450
Allowable Motor Speed (rpm/min)	2500
Backlash(min-arc)	2
Weight(kg)	15.5

HOLLOW ROTARY ACTUATORS

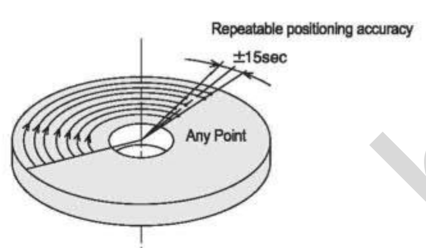
MD

- **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 fills 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.

MD60–5–5A　MD100–8　MD130–10　MD200–10　MD275–10

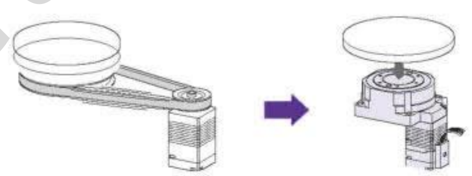
- **High positioning accuracy. Repeatable positioning accuracy is ±15 sec and idling accuracy is 2 min**

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.



Calculation of Selection

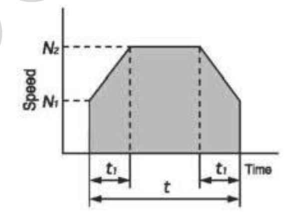
Pre–calculation should be done in order to select suitable products of equipment. The introduction of calculation methods of the ZK series are as follow.

The calculation of the necessary torque

1 Firstly, calculate the inertia of the working object.
The work inertia should be under the 30 times of the inertia of the transmission equipment.
2 Determine the positioning angle
3 If there is no friction torque, please refer to the positioning time chart of ZK series to confirm the positioning time.
4 Determine the positioning time and acceleration and deceleration time.
Observe the following two conditions:
Positioning time ≥Calculating the shortest positioning time according to the positioning time chart.
Time of acceleration and deceleration t x 2 ≤ Positioning time
5 Determine the start speed N1, then calculate the speed N2 according to the following formula. Please set N1 to low speed 0~ number r/min]. Be careful not to set it too large.

$$N_2\,[\mathrm{r/min}] = \frac{\theta - 6N_1t_1}{6(t - t_1)}$$

N_2 : Speed (r/min) [r/min]
θ : Positioning angle[°]
N_1 : Start speed[r/min]
t : Positioning time [s]
t_1 : Acceleration (deceleration) time [s]



If the result calculated by the above formula can not satisfy the condition of N1 < N2 <≤200 (r/min), please return to procedure 4 and confirm the conditions again.

6 Calculate the acceleration torque according to the following formula

$$\text{Acceleration torque } \mathrm{Ta}[\mathrm{N\cdot m}] = (J_1 + J_L) \times \frac{\pi}{30} \times \frac{(N_2 - N_1)}{t}$$

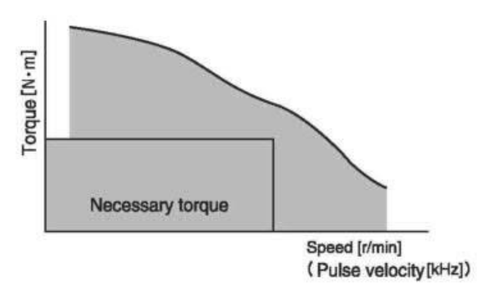
J_1 : Inertia of a rotating drive [kg·m²]
J_L : Inertia [kg·m²]
N_2 : [r/min]
N_1 : Starting speed [r/min]
t_1 : Acceleration (deceleration) time [s]

7 Calculate the necessary torque, the necessary torque is the load torque caused by the friction impedance plus the acceleration torque caused by the inertia, and then multiplied by the safety factor.

$$\text{Necessary torque} = (\text{Load torque } [\mathrm{N\cdot m}] + \text{Acceleration torque } [\mathrm{N\cdot m}]) \times \text{Safety factor} = (T_L + \mathrm{Ta}) \times S$$

Please set safety factor S above 1.5.

8 Verify that the necessary torque T is included in the range of speed and torque characteristics. If not, please turn back to step 4, then change the conditions and recalculate.



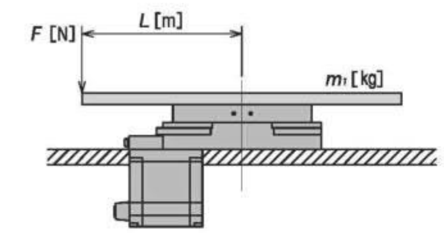
In addition, when the speed is converted to the pulse speed, please calculate the following the below formula.

$$f\,[\mathrm{Hz}] = \frac{6N}{\theta s}$$

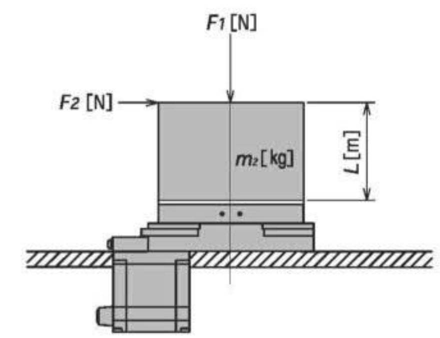
f : Pulse velocity [Hz]
N : speed [r/min]
θs : The step angle of the rotating platform[° /step]

The calculation method of the steering load and the inertia load

As shown below, when the load is loaded on the rotary platform, please calculate the axial load and mass load according to the formula below, and confirm whether it is within the specification value.



Axial load [N] $F_S = F + m_1 \times g$
Inertial load [N·m] $M = F \times L$

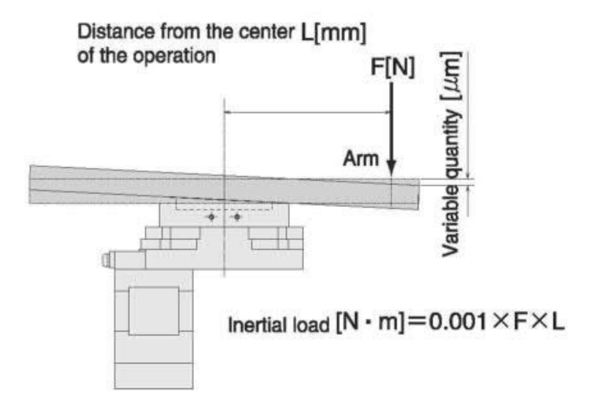


Product Name	a
ZK–60	0.01
ZK–100	0.02
ZK–130	0.03
ZK–200	0.04
ZK–275	0.05

$F_S = F_1 + m_2 \times g$
$M = F_2 \times (L + a)$

Variable quantity (reference value) caused by an inertial load

When attaching the inertia load to the rotating platform, the position will change. The variable quantity in the chart shows the change of inertia load on the L position of the center of rotation from the rotating platform to a fixed direction. If the inertia load acts on the positive and negative two directions, the variable quantity will be about 2 times.



Inertial load [N · m]=0.001×F×L

Model Identification

Wgt:2kg

MD	60	R	5	5A
Hollow Rotating Series	Specifications	Optional	Ratio	Motor

R: Right angle steering deceleration
F: with motor connection seat

V1: Servo Ø8 PCD45,M3 V2: Servo Ø8 PCD46,M4	T1: Stepper Ø5 PCD43.8, M3 T2: Stepper Ø6 PCD43.8, M3 5A: Stepping motor42H5K–2A
100W AC servo motor for each brand	42 stepper motor for each brand

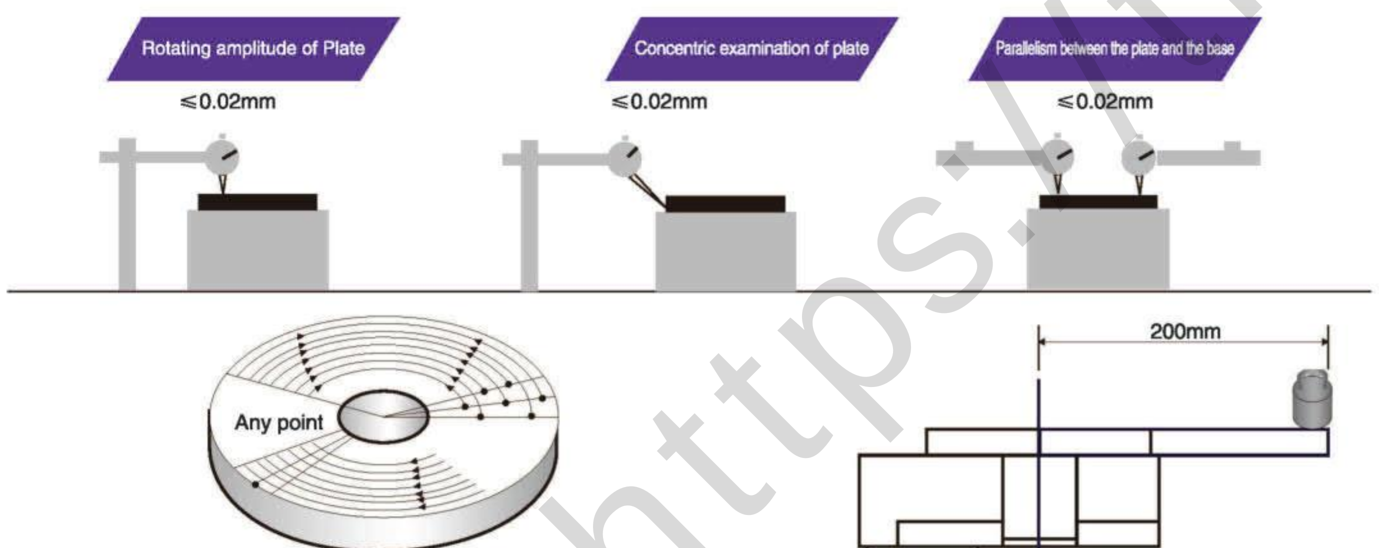
Specification

Model	MD60	MD60R
Bearing of rotate table	Deep groove ball+Thrust ball bearing	
Allowable torque (N.m)	5	
Precision lifetime	15000Hrs	
Allowable speed (rpm)	200(面 Plate)	
Ratio	5	15
Repeated accuracy(arc–sec)	≤15	≤20
Positioning accuracy(arc–min)	≤1	≤1
Parallelism of rotate plate(mm)	≤0.02	
Coaxiality of rotate plate(mm)	≤0.02	
Protection Class	IP40	

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

Positioning Accuracy Examination

The accuracy of this specification is tested by this ratio



Positioning precision radius of any point of outer diameter 19mm≤1min

Precision radius of repeated positioning 19mm≤15sec

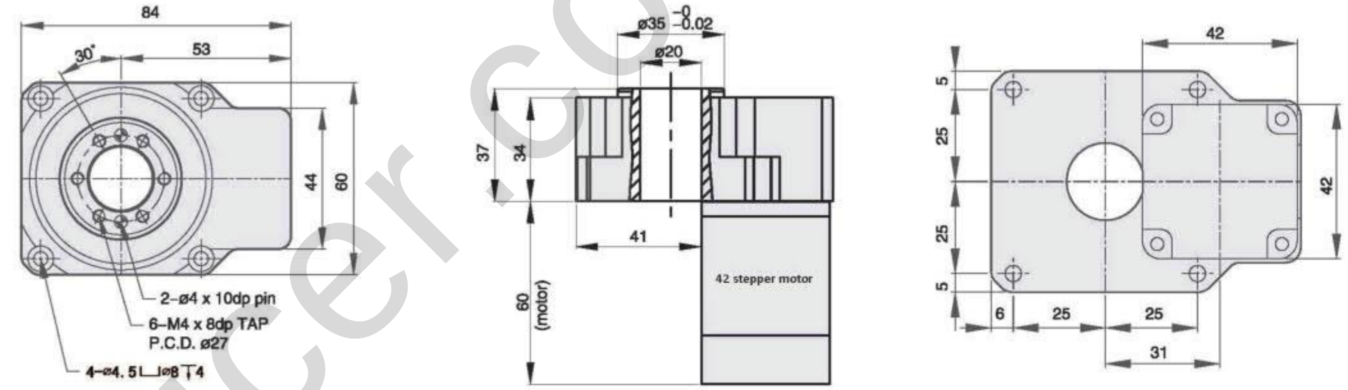
Radius arm 200mm
When the force gravity at 5kg
The outer edge of MD60
was measured ≤0.02mm

Dimensions

Unit:mm

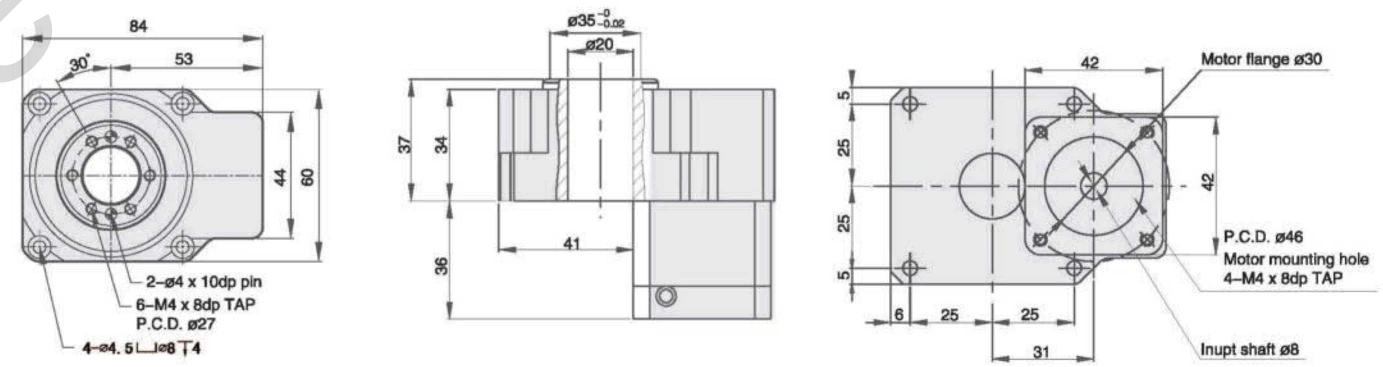
MD60–5–5A

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



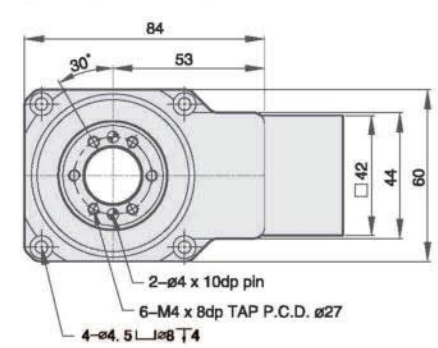
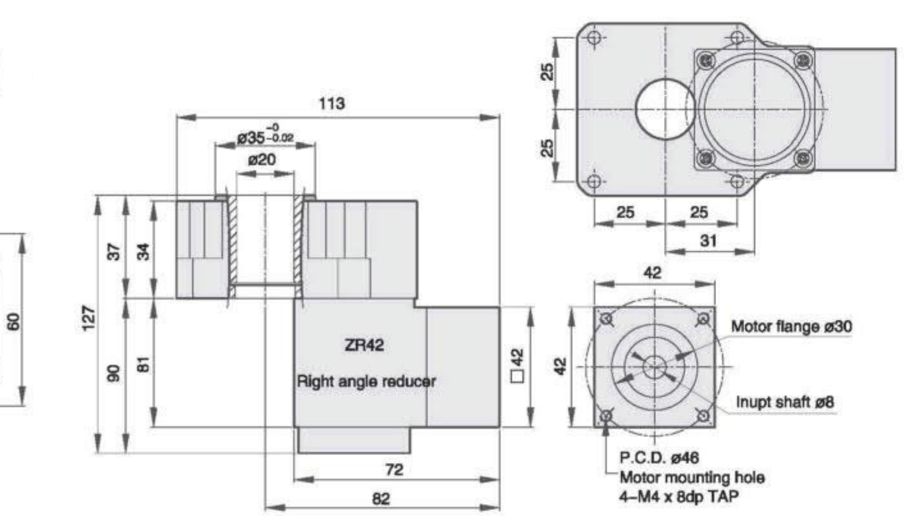
MD60F–5

(A self assembled motor with a connecting seat)



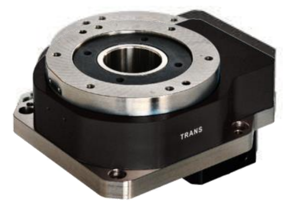
MD60R–15

(Right angle steering 1:15)

Please provide the size of the motor flange when ordering
P.S：Origin Sensor specification (selection) OMRON EE–SX672

Model Identification



MD	100	R	8	V2
Hollow Rotating Series	Specifications	Optional	Ratio	Motor

Wgt:2.5kg

R: Right angle steering deceleration
F: In-line Direction Deceleration

V1: Servo Ø14 PCD70 M4 V2: Servo Ø14 PCD70 M5	T1: Stepper Ø8 PCD66.67,M4 T2: Stepper Ø8 PCD70,M4 T3: Stepper Ø10 PCD70,M4
200~400W AC servo motor for each brand	60 stepper motor for each brand

Specification

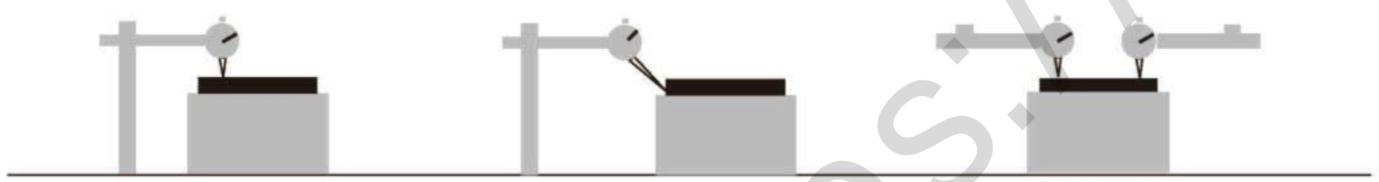
Model	MD100	MD100R	MD100P
Bearing of rotate table	Tapered roller bearing		
Allowable torque (N.m)	45		
Precision lifetime	20000Hrs		
Allowable speed (rpm)	200(Plate)		
Ratio	8	16,24	24,32,40
Repeated accuracy(arc-sec)	≤10	≤20	≤60
Positioning accuracy(arc-min)	≤1	≤1	≤2
Parallelism of rotate plate(mm)	≤0.02		
Coaxiality of rotate plate(mm)	≤0.015		
Protection Class	IP40		

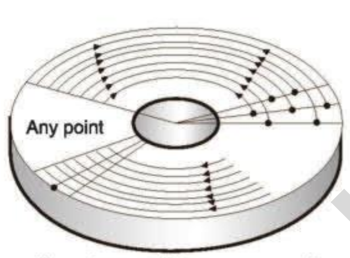
P.S: Circumferential unit: 1 rpm=360° 1° =60'(arc-min) 1'=60"(arc-sec)
Circumferential error conversion linear error:Disc diameter × 3.14159 ÷ (360° × 60' × 60")The value of backlash

Positioning Accuracy Examination

The accuracy of this specification is tested by this ratio

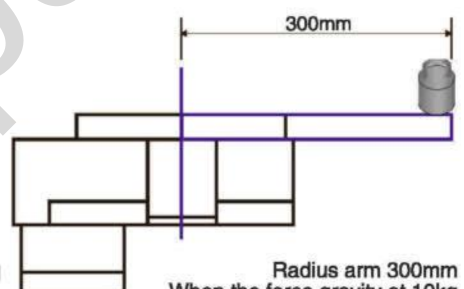
Rotating amplitude of Plate	Concentric examination of plate	Parallelism between the plate and the base
≤0.005mm	≤0.015mm	≤0.02mm





Positioning precision radius of any point of outer diameter 50mm≤1min

Precision radius of repeated positioning 50mm≤10sec



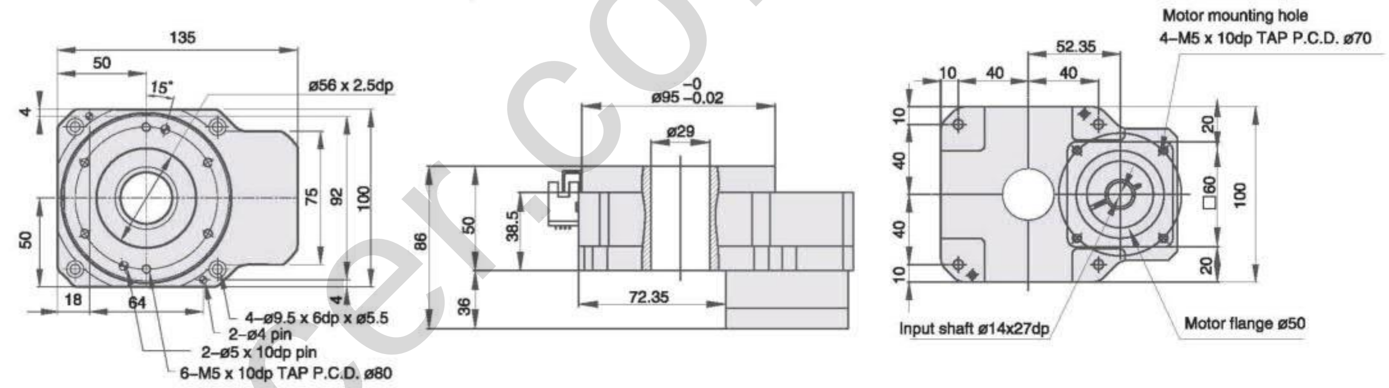
Radius arm 300mm
When the force gravity at 10kg
The outer edge of MD100
was measured ≤0.01mm

Dimensions

Unit:mm

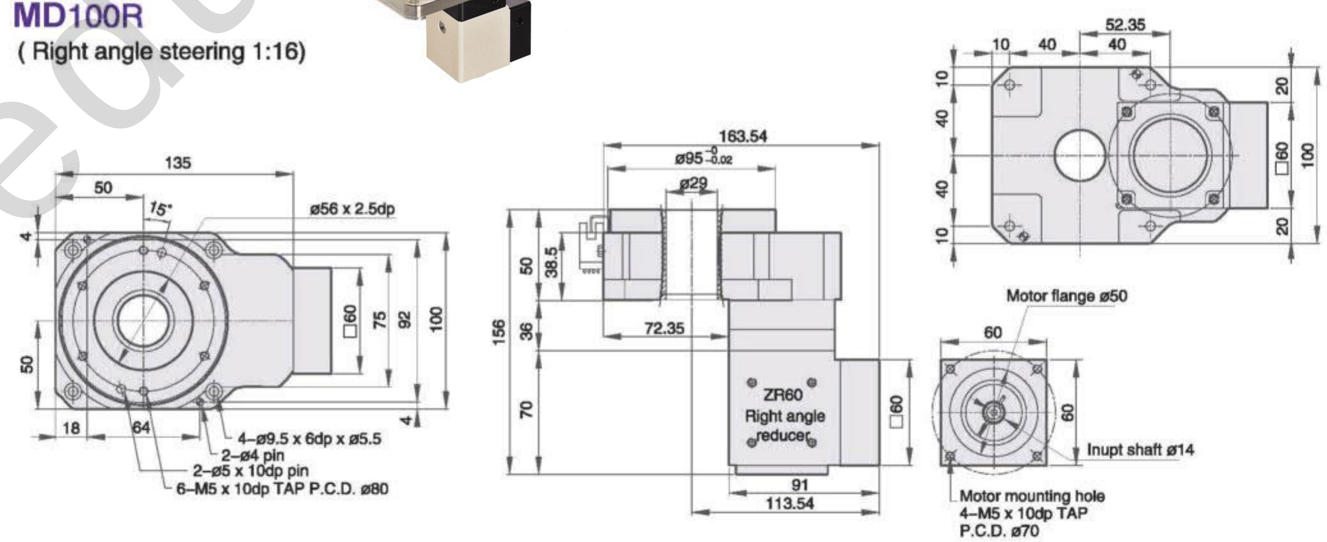
MD 100

(A self assembled motor with a connecting seat)



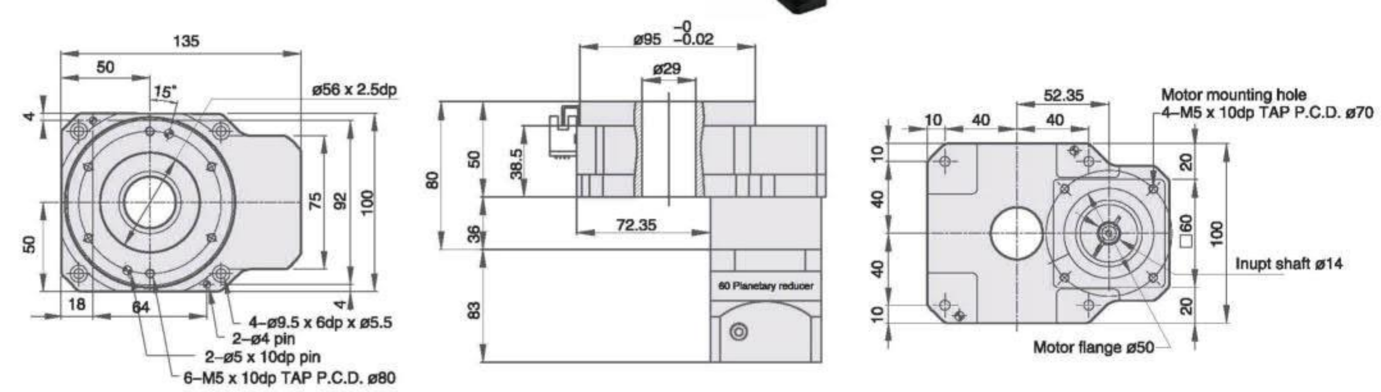
MD100R

(Right angle steering 1:16)



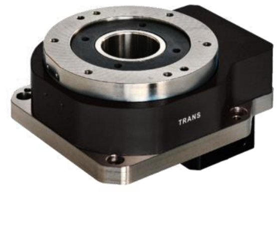
MD100P

(Attached planetary reducer ratio 24,32,40)



Please provide the size of the motor flange when ordering
P.S: Origin Sensor specification (selection) OMRON EE-SX672

Model Identification



Wgt:4.5kg

MD	130	R	10	V2
Hollow Rotating Series	Specifications	Optional	Ratio	Motor

R：Right angle steering deceleration
F：In-line Direction Deceleration

V1: Servo Ø14 PCD70 M4 V2: Servo Ø14 PCD70 M5	T1: Stepper Ø8 PCD66.67,M4 T2: Stepper Ø8 PCD70,M4 T3: Stepper Ø10 PCD70,M4
200~400W AC servo motor for each brand	60 stepper motor for each brand

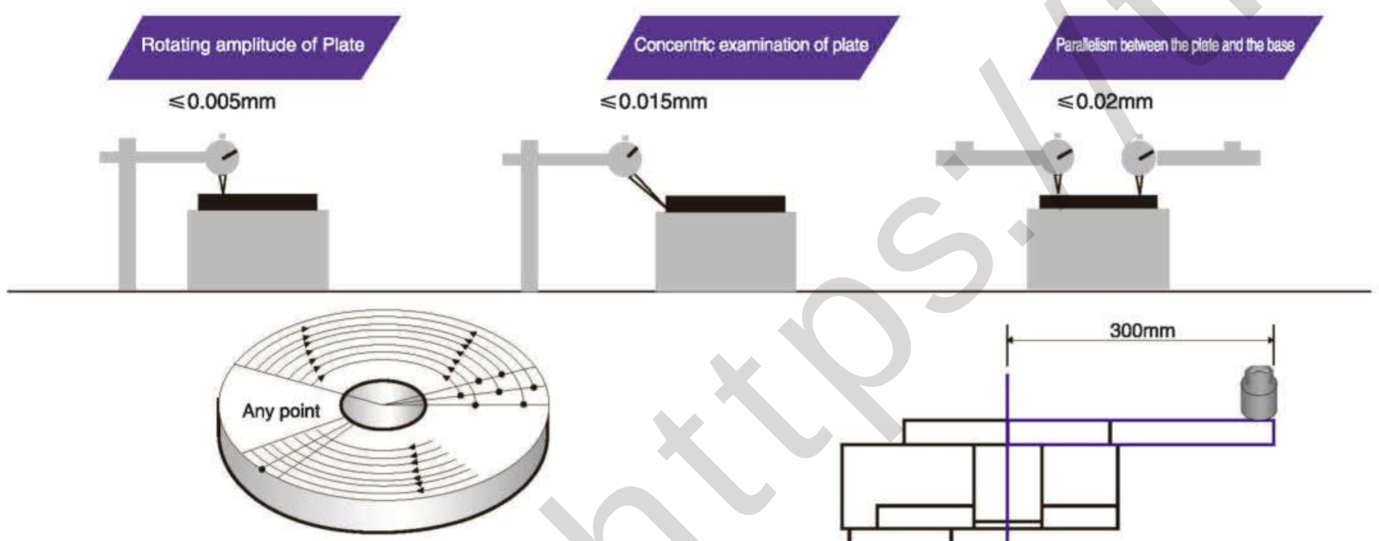
Specification

Model	MD130	MD130R	MD130P
Bearing of rotate table	Tapered roller bearing		
Allowable torque (N.m)	45		
Precision lifetime	20000Hrs		
Allowable speed (rpm)	200(Plate)		
Ratio	10	20,30	30,40,50
Repeated accuracy(arc-sec)	≤10	≤20	≤60
Positioning accuracy(arc-min)	≤1	≤1	≤2
Parallelism of rotate plate(mm)	≤0.02		
Coaxiality of rotate plate(mm)	≤0.015		
Protection Class	IP40		

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

Positioning Accuracy Examination

The accuracy of this specification is tested by this ratio



Positioning precision radius of any point of outer diameter 60mm≤1min

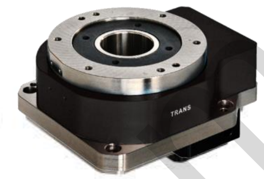
Precision radius of repeated positioning 60mm≤10sec

Radius arm 300mm
When the force gravity at 15kg
The outer edge of ZK130
was measured ≤0.01mm

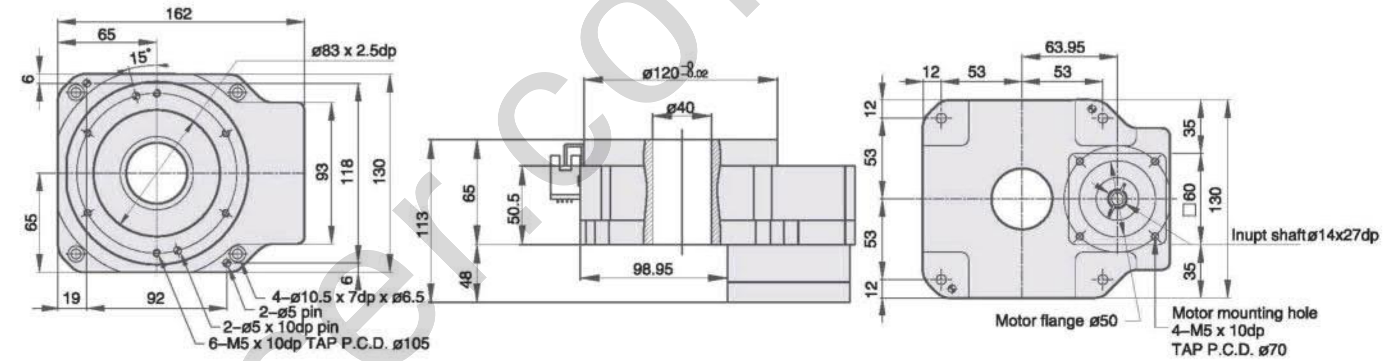
Dimensions

MD130

(A self assembled motor with a connecting seat)

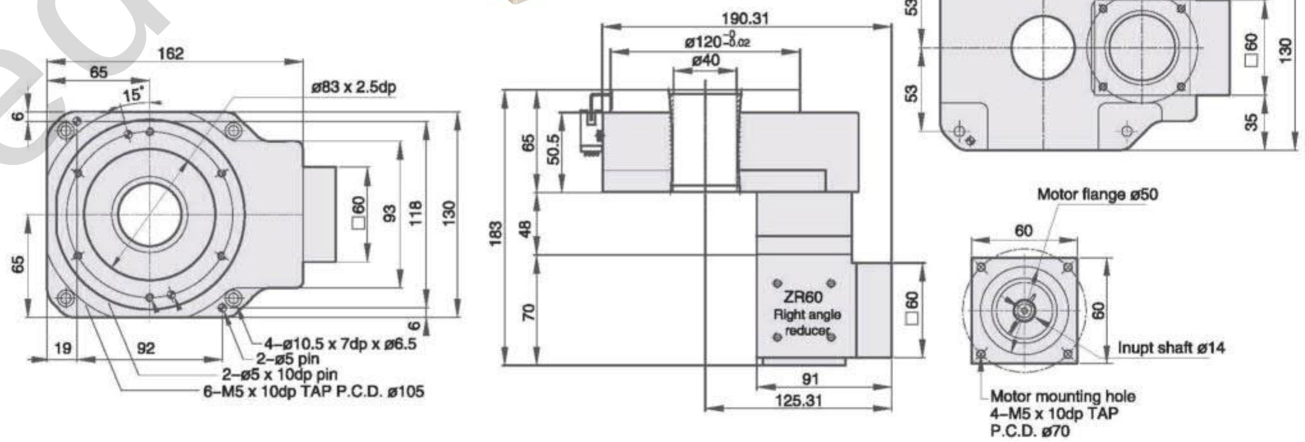


Unit:mm



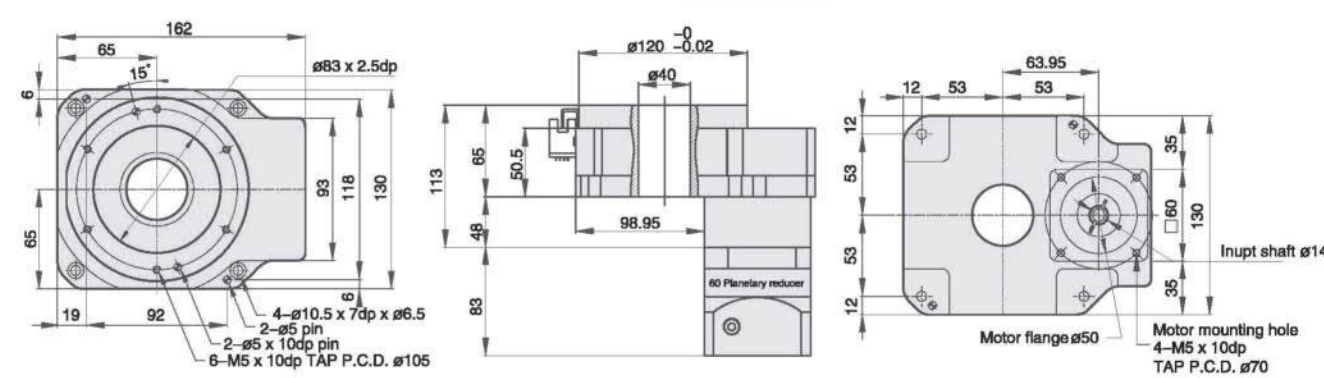
MD130R

(Right angle steering 1:20)



MD130P

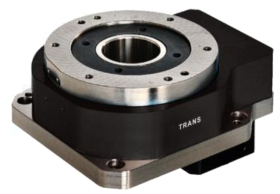
(Attached planetary reducer ratio 30,40,50)



Please provide the size of the motor flange when ordering

P.S：Origin Sensor specification (selection) OMRON EE-SX672

Model Identification



Wgt:11.5kg

MD —— **200** —— **R** —— **10** —— **V2**

MD	200	R	10	V2
Hollow Rotating Series	Specifications	Optional	Ratio	Motor

R: Right angle steering deceleration
F: In-line Direction Deceleration

V1: Servo Ø19 PCD90 M5 V2: Servo Ø19 PCD90 M6	T1: Stepper Ø14 PCD98.4, M5
750W AC servo motor for each brand	86 stepper motor for each brand

Specification

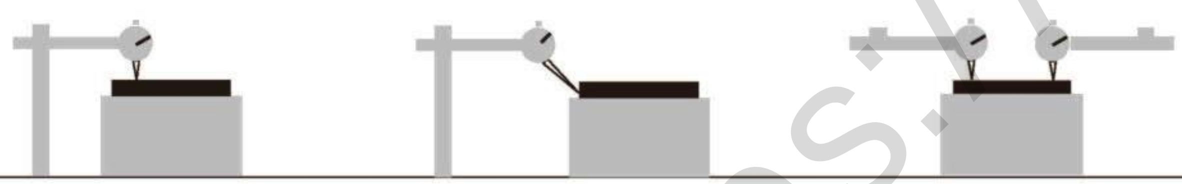
Model	MD200	MD200R	MD200P
Bearing of rotate table	Tapered roller bearing		
Allowable torque (N.m)	80		
Precision lifetime	20000Hrs		
Allowable speed (rpm)	200(Plate)		
Ratio	10	20,30	30,40,50
Repeated accuracy(arc-sec)	≤10	≤20	≤60
Positioning accuracy(arc-min)	≤1	≤1	≤2
Parallelism of rotate plate(mm)	≤0.02		
Coaxiality of rotate plate(mm)	≤0.015		
Protection Class	IP40		

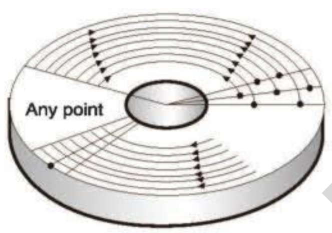
P.S:Circumferential unit: 1 rpm=360° 1° =60'(arc-min) 1'=60"(arc-sec)
Circumferential error conversion linear error:Disc diameter × 3.14159 ÷ (360° × 60' × 60")The value of backlash

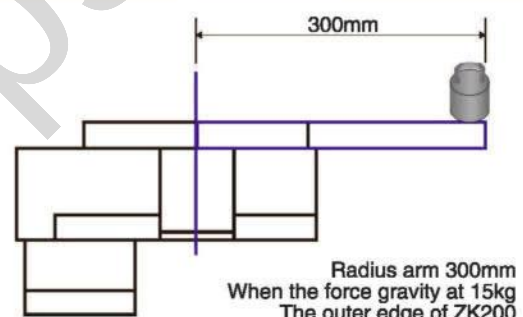
Positioning Accuracy Examination

The accuracy of this specification is tested by this ratio

Rotating amplitude of Plate	Concentric examination of plate	Parallelism between the plate and the base
≤0.005mm	≤0.015mm	≤0.02mm







Positioning precision radius of any point of outer diameter 100mm≤1min

Precision radius of repeated positioning 100mm≤10sec

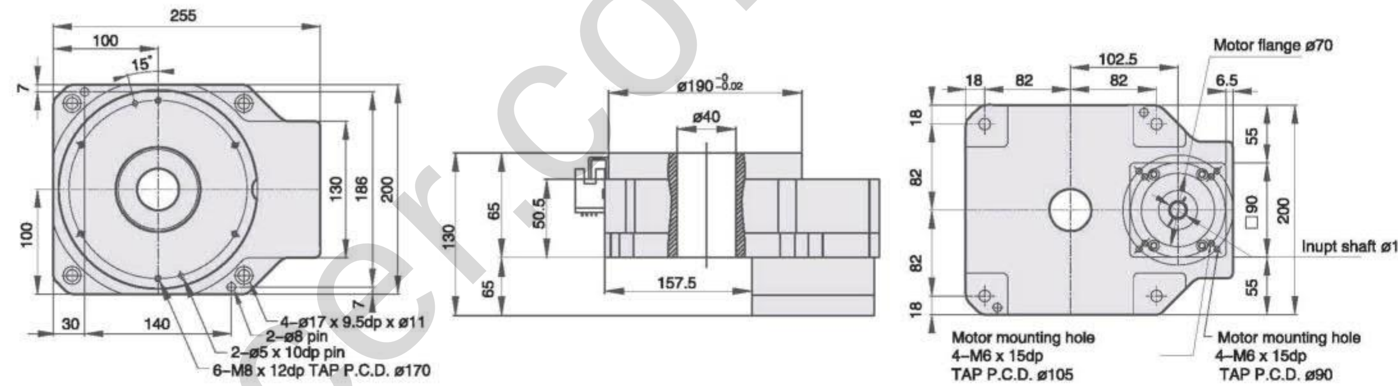
Radius arm 300mm
When the force gravity at 15kg
The outer edge of ZK200
was measured ≤0.01mm

Dimensions

Unit:mm

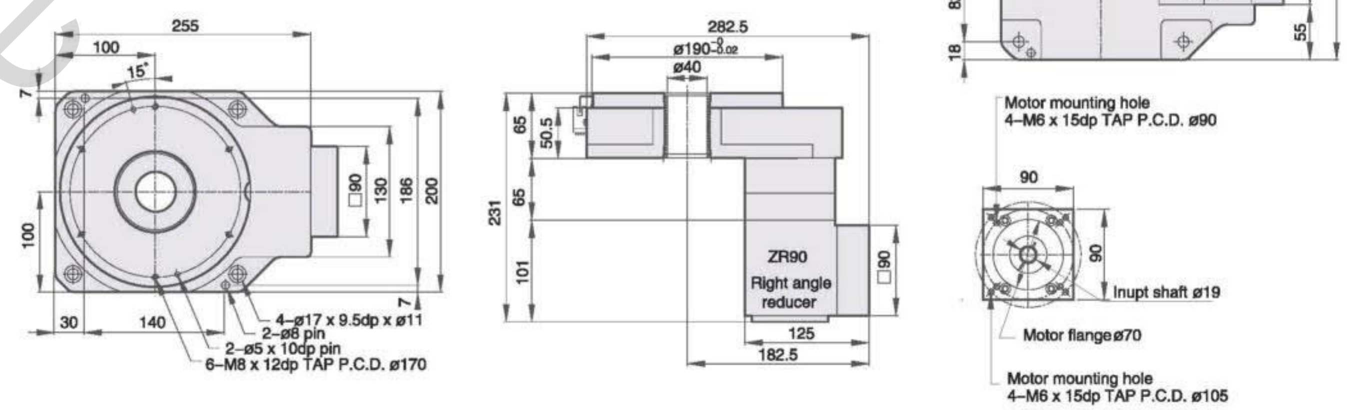
ZK 200

(A self assembled motor with a connecting seat)



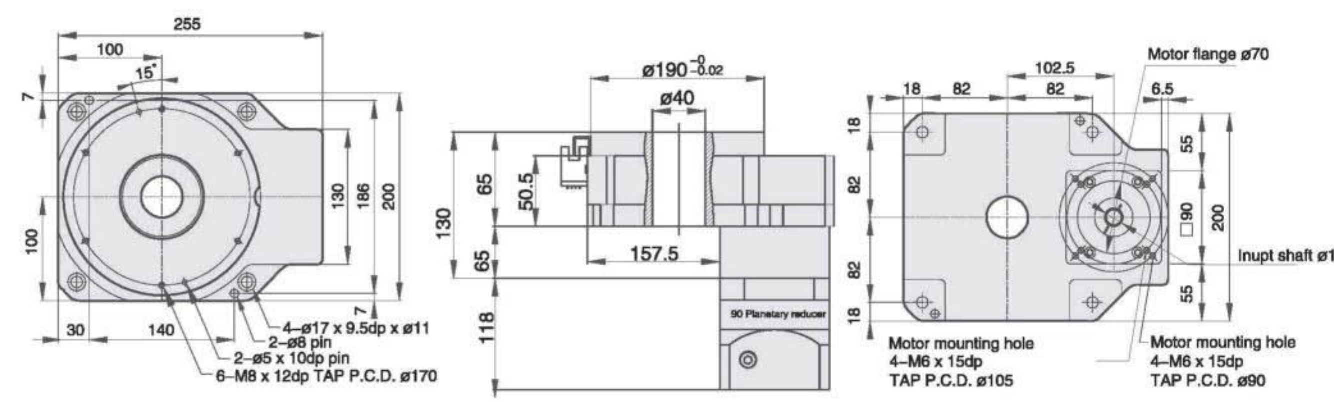
MD200R

(Right angle steering 1:20)



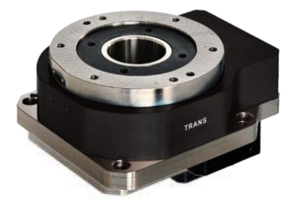
MD200P

(Attached planetary reducer ratio 30,40,50)



Please provide the size of the motor flange when ordering
P.S: Origin Sensor specification (selection) OMRON EE-SX672

Model Identification



MD —— 275 —— R —— 10 —— V2

| Hollow Rotating Series | Specifications | Optional | Ratio | Motor | Wgt:16kg

R: Right angle steering deceleration
F: In-line Direction Deceleration

V1: Servo Ø19 PCD90 M5 V2: Servo Ø19 PCD90 M6	T1: Stepper Ø14 PCD98.4, M5
750W AC servo motor for each brand	86 stepper motor for each brand

Specification

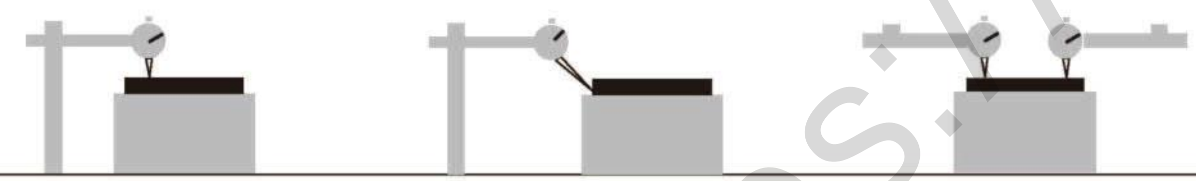
Model	MD275	MD275R	MD275P
Bearing of rotate table	Tapered roller bearing		
Allowable torque (N.m)	80		
Precision lifetime	20000Hrs		
Allowable speed (rpm)	200(Plate)		
Ratio	10	20,30	30,40,50
Repeated accuracy(arc-sec)	≤10	≤20	≤60
Positioning accuracy(arc-min)	≤1	≤1	≤2
Parallelism of rotate plate(mm)	≤0.02		
Coaxiality of rotate plate(mm)	≤0.015		
Protection Class	IP40		

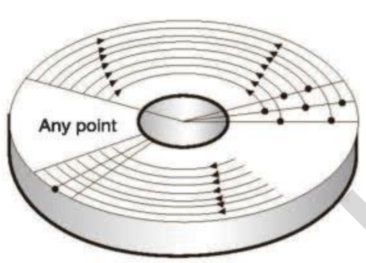
P.S: Circumferential unit: 1 rpm=360° 1° =60'(arc-min) 1'=60"(arc-sec)
Circumferential error conversion linear error:Disc diameter×3.14159÷(360° ×60'×60")The value of backlash

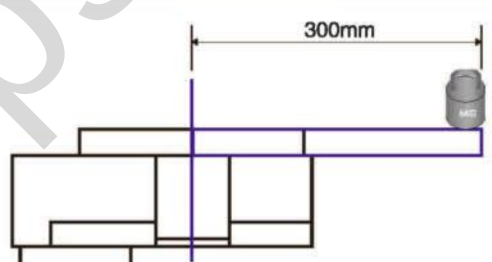
Positioning Accuracy Examination

The accuracy of this specification is tested by this ratio

Rotating amplitude of Plate	Concentric examination of plate	Parallelism between the plate and the base
≤0.005mm	≤0.015mm	≤0.02mm







Positioning precision radius of any point of outer diameter 100mm≤1min

Precision radius of repeated positioning 100mm≤10sec

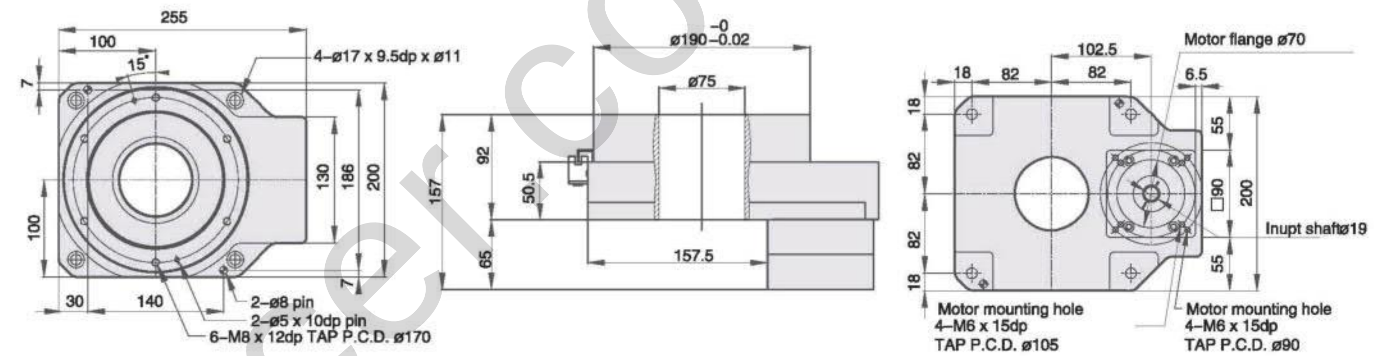
Radius arm 300mm
When the force gravity at 30kg
The outer edge of MD275
was measured ≤0.01mm

Dimensions

MD275

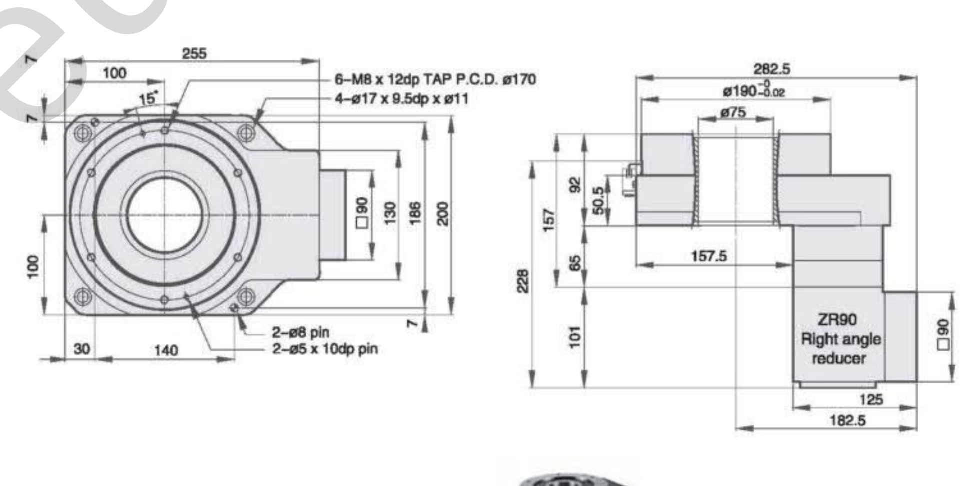
(A self assembled motor with a connecting seat)

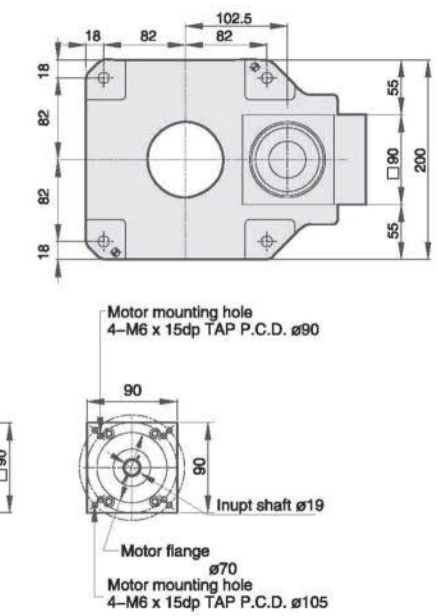
Unit:mm



MD275R

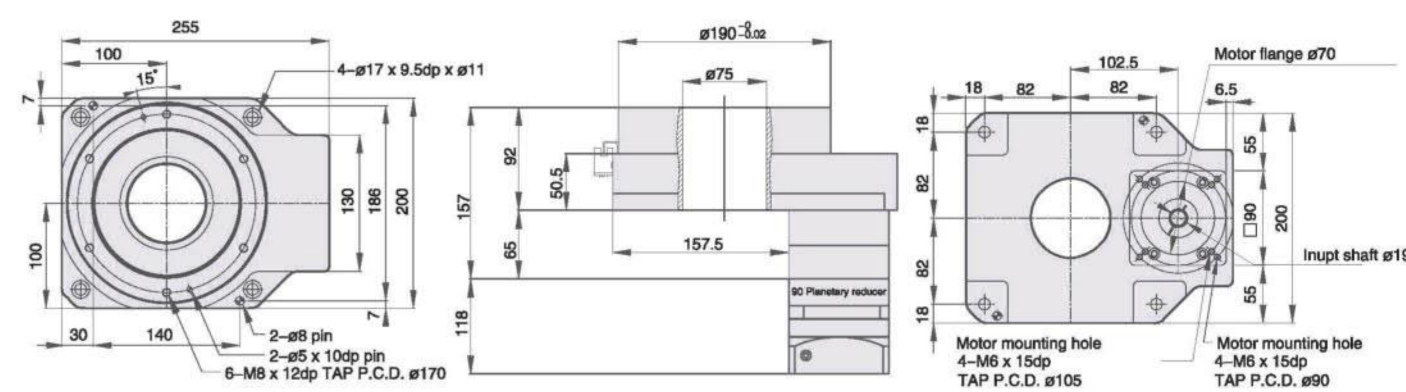
(Right angle steering 1:20)





MD275P

(Attached planetary reducer ratio 30,40,50)



Please provide the size of the motor flange when ordering
P.S: Origin Sensor specification (selection) OMRON EE-SX672

HOLLOW ROTARY ACTUATOR

DG

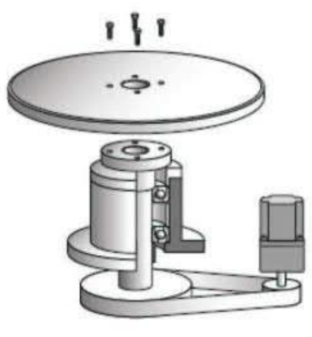
Hollow rotary transmission device with large diameter Simple wiring and piping

Direct connection Simple design to improve trust

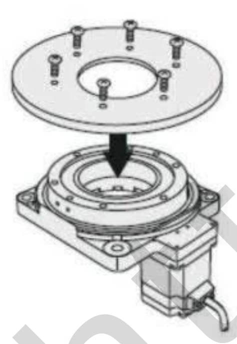
High positioning precision The accuracy of repeated positioning is + 15sec Lost motion is 2mins Angle transmission error is 4mins

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

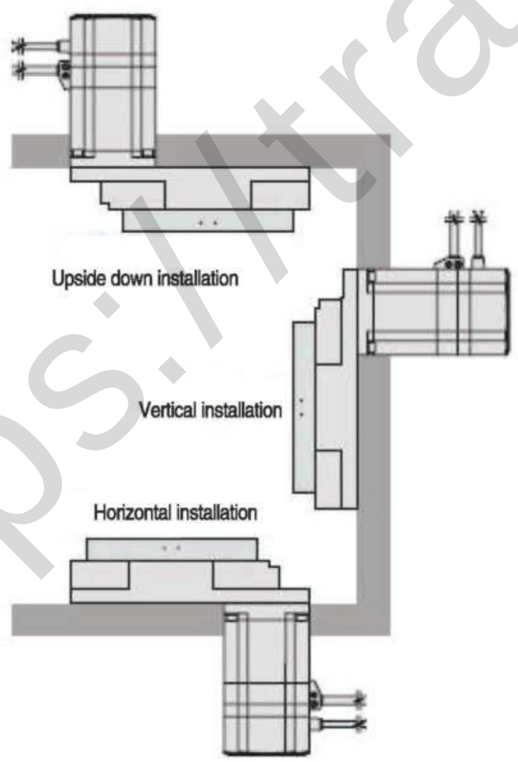
Short time positioning The positioning of the inertial load can be realized in a short time



Motor + mechanism components (separate design * procurement)



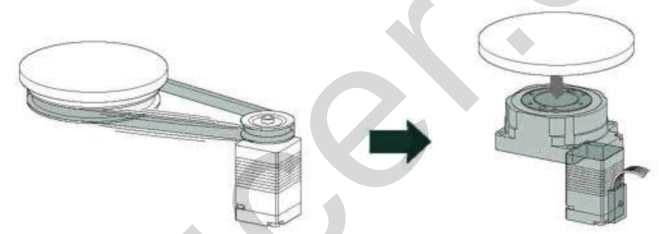
DGII series (Integrated product)



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**

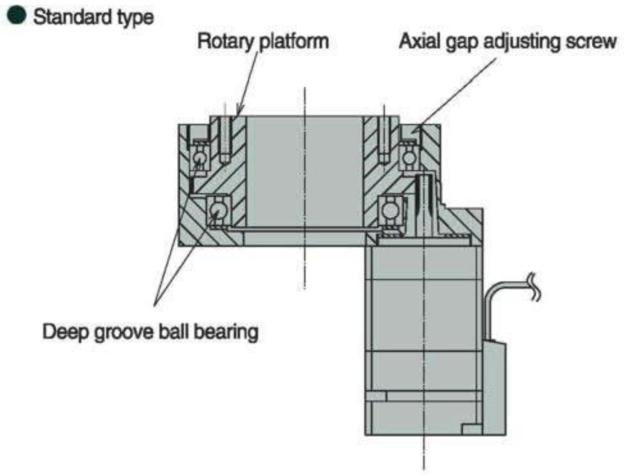
The design of a large diameter hollow hole (penetration) is realized by using one stage reduction gear mechanism to increase the diameter of the driven gear. It is suitable for the complicated wiring and piping application and so on, which makes the equipment design more succinct.

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

Eg：The application of DG130R.

Structure drawing

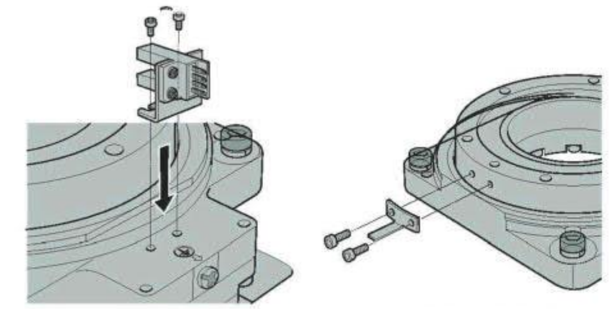
- Standard type



- **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.

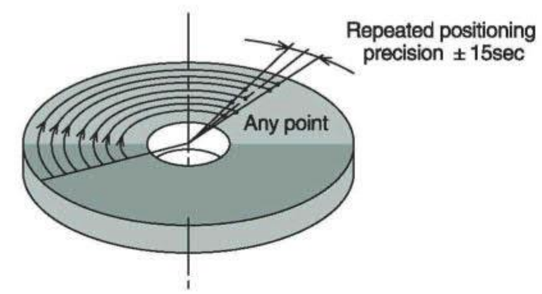
(DG130R sensor, example of shading plate installation)



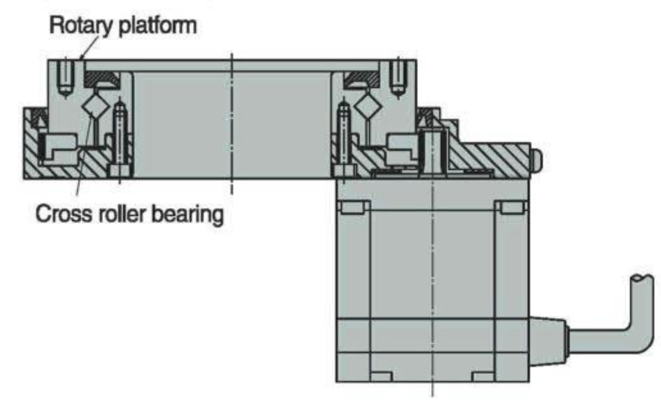
Installation of sensor　　Installation of shading plate

- **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.



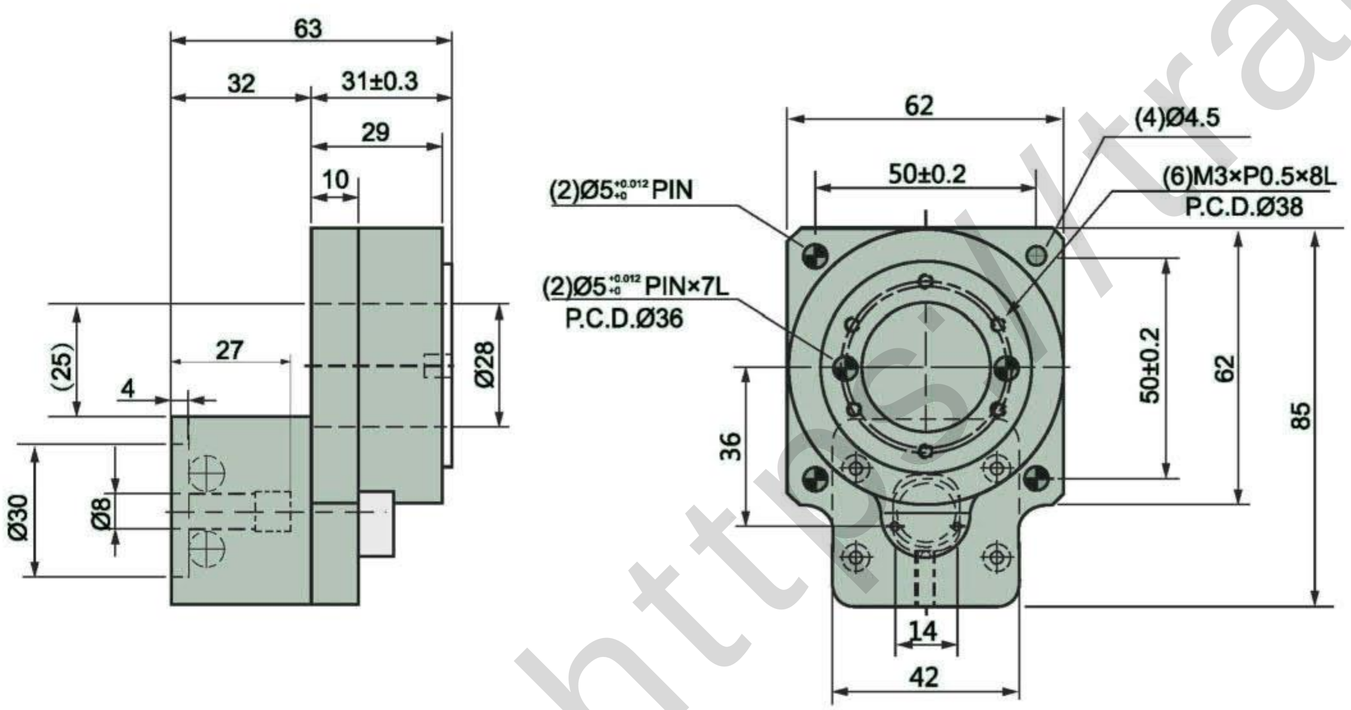
- High rigidity type (DG85R、DG130R)



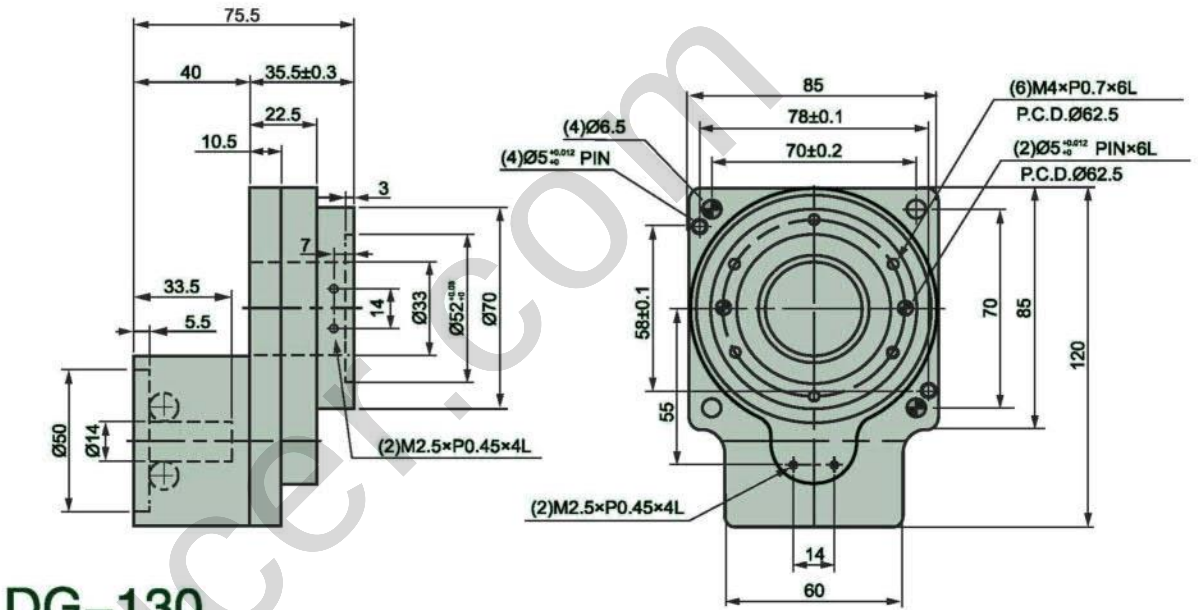
Technical parameter

Specs	Unit	DG-62	DG-85	DG-130	DG-200
Servo Motor	W	100W	200-400W	200-400W	750-1KW
Permissible torque	Nm	3.5	20	20	65
Moment of inertia	kgm^2	2480×10^{-6}	2498×10^{-6}	9472×10^{-6}	93581×10^{-6}
Allowable speed	rpm	200	200	200	200
Ratio		1/5	1/5	1/10	1/10
Positioning accuracy	sec	≤15	≤15	≤15	≤15
Repeated positioning accuracy	sec	±10	±5	±5	±5
Permissible thrust load	kgf	20	200	250	500
Permissible inertia load	Nm	10	60	60	200
Parallelism of rotating platform	μm	±5	±2	±2	±2
Concentricity of rotating platform	mm	±0.01	±0.01	±0.01	±0.01
Weight	kg	2.2	3	5.5	14

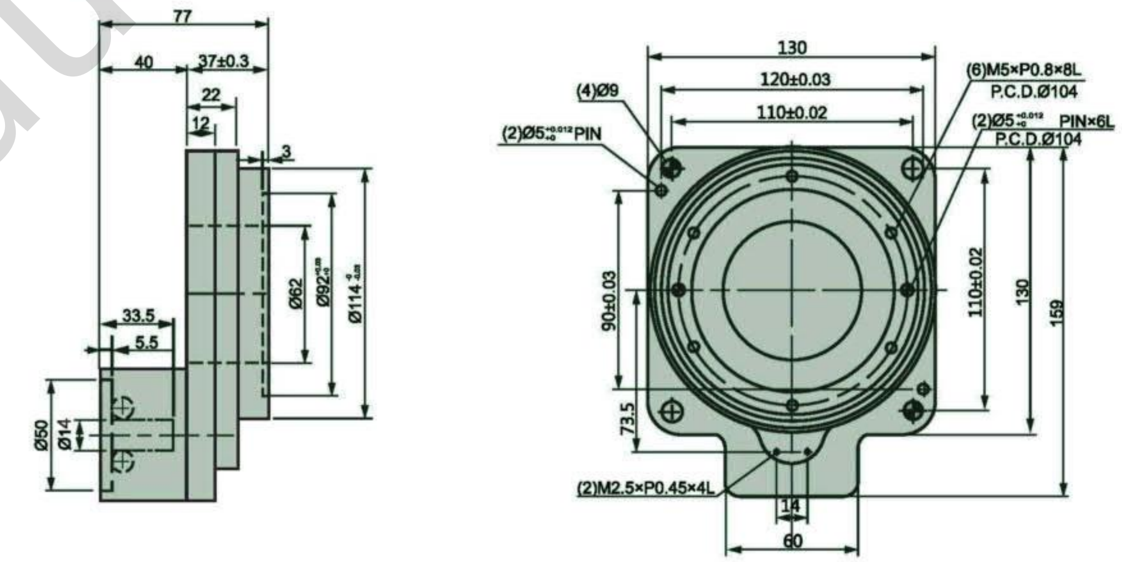
DG-62



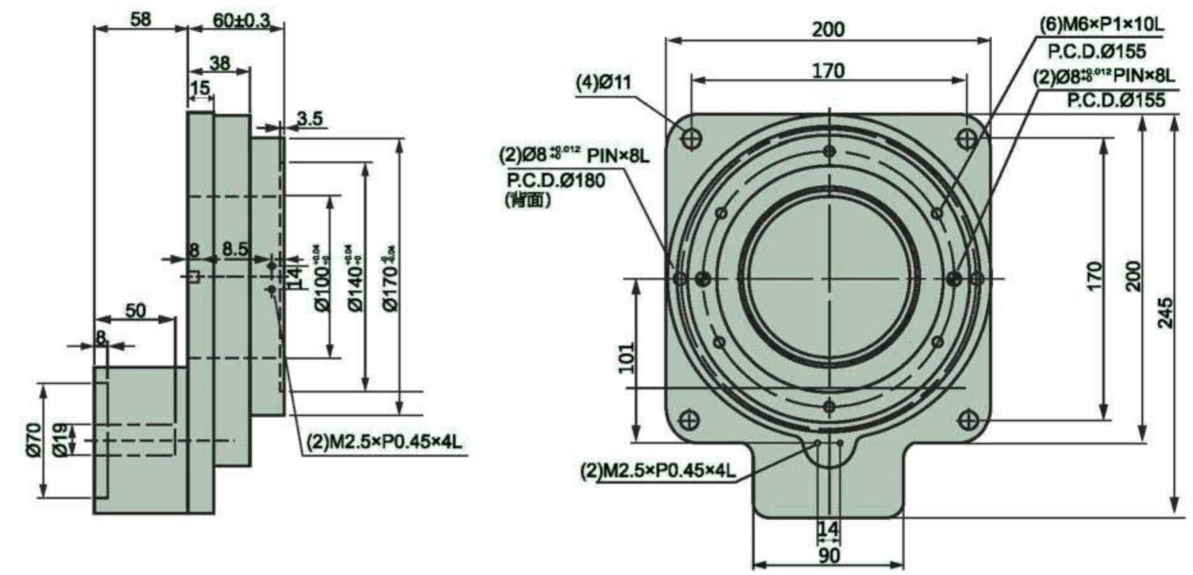
DG-85



DG-130



DG-200



Safety Precautions

Cautions for storage

Whenever temporarily keeping the product, keep the following directions:

1.Keep in a clean and dry place.
2.Whenever storing outdoors or in a humid place, put in a box so that it does not directly contact rain or external air and cover with a vinyl sheet (Take a measure to prevent rust.)

Cautions for operation

When the reducer is delivered to you······

When the product delivered, please con rm that you received the exact same model you have ordered.
Please wipe out the input and output shaft of the reducer which is covered by anti–corrosive oil.
※Please remove the rubber cap on the input shaft before you wipe the shafts.
※Lubricant(grease) is already lled in the reducer. It is available as it is.

Fixation & installation

Avoid use in a place where rain or water drops directly.
In case of use outdoors or in a place where dust and water drops, consult in advance.
Install at 0℃~40℃ of surrounding temperature.
In case of use at temperature out of the above–mentioned range, contact the headquarters and consult on this.
Firmly x with a bolt onto a solid stand without vibration.
Install in consideration of convenience in repair and inspection.

Cautions prior to starting the operation

Reducer can be used soon after arrival, since it has already been lled out with lubrication.
At initial operation, check the rotating direction of the output shaft and then gradually apply load.

Cautions during operation

Avoid overload. Ensure that input speed shall not be the number of revolutions beyond the speci cation.
In the following cases, stop the operation and check the following points:
- If temperature sharply increases
- If an abnormal noise appears sharply
- If the number of revolutions becomes unstable sharply

Regulations

The scope of warranty only includes the product.
The following costs and damages are not covered by the warranty.
1) Shipping cost of this product.
2) The cost of removing, installing or other incidental construction of the product from other devices after connection or installation.
3) Due to the failure of this product, indirect damage caused to the user due to loss of use opportunities or business interruption.
4) All other derived or consequential damages.

Installation

Mounting procedure to the motor

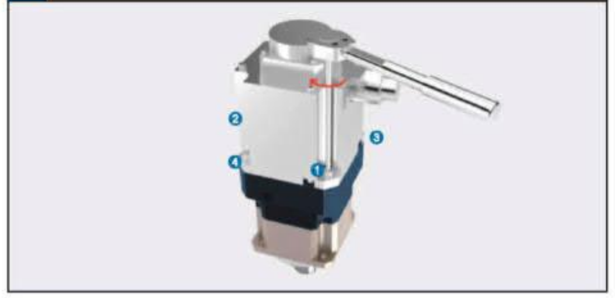
1 Wipe off anti–rust agent and oil on the motor shaft.

2 Remove the plug

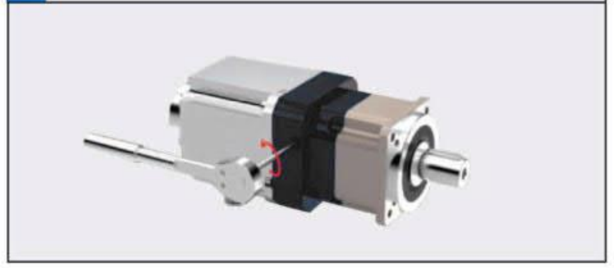
3 Turn the input shaft until the cap screw is seen. Make sure the cap screw is loosened.

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.

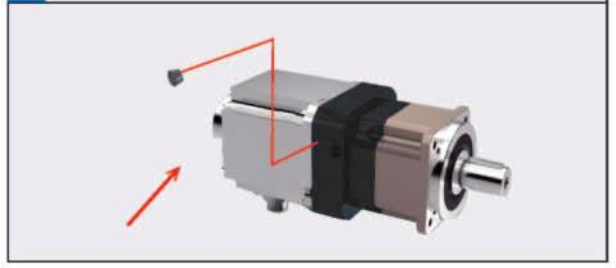


Table1

Bolt size			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