



Automation for a Changing World

# **Delta Planetary Gearbox** **PS High Precision Series** **PA Precision Series**

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 **DELTA**  
Smarter. Greener. Together.

## Planetary Gearbox PS High Precision S

The PS Series Planetary Gearbox features many benefits such as low noise, high smoothly transfer power from motor to applications and is widely applied to various industrial robots, medical devices and precision measurements.

### Helical Gear Design

The speed reduction mechanism employs helical gears, with double the tooth mesh rate when compared with regular spur gears. In addition, it also features extremely smooth running, low noise, high torque output and low backlash.



### Synthetic Lubrication Grease

The protective class IP65 seals design avoids leakage problems and requires no maintenance.



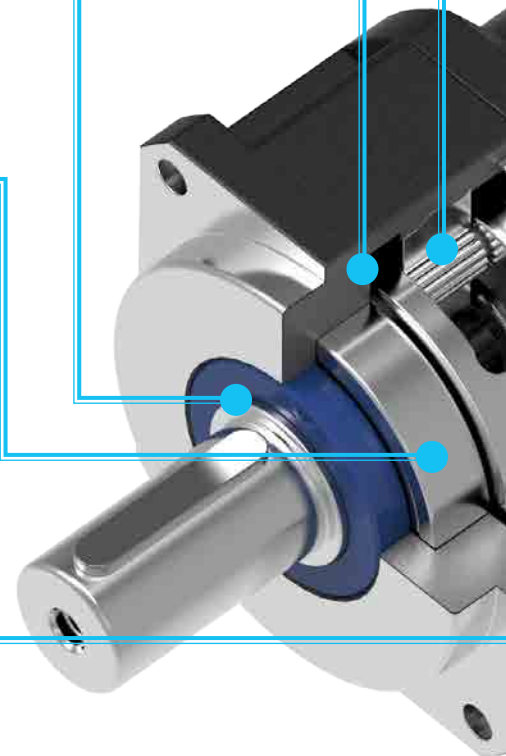
### Integrated Planetary Arm Bracket

The planetary arm bracket and the output shaft are constructed as one-piece to increase torsional rigidity and accuracy. The entire structure is one-time machined for controlling accuracy in the specified tolerance.



### One-piece Gearbox & Advanced Surface Treatment

The gearbox and internal gear ring are constructed as one-piece. High gear accuracy meets the DIN6 class standard. Gearbox surface is anticorrosive treated to enhance environment resistance and corrosion resistance capabilities.



# Series

output torque and low backlash. It is able to  
s industries including aerospace, semiconductors,



## Full Needle Roller Bearings Design

The planetary gear transmission employs full needle roller bearings without retainer to increase the contact surface, which greatly enhances structural rigidity and service life.



## High Precision Gear Machining

The planetary gear and sun gear are made from high quality Ni-Cr-Mo alloy steel (SNCM220), precision machined and carburized to hardness 57-60 HRC. Precision teeth grinding assures gear accuracy and attains DIN6 class. It provides better wear resistance, impact resistance and longer service life than gears that are only surface nitrided.



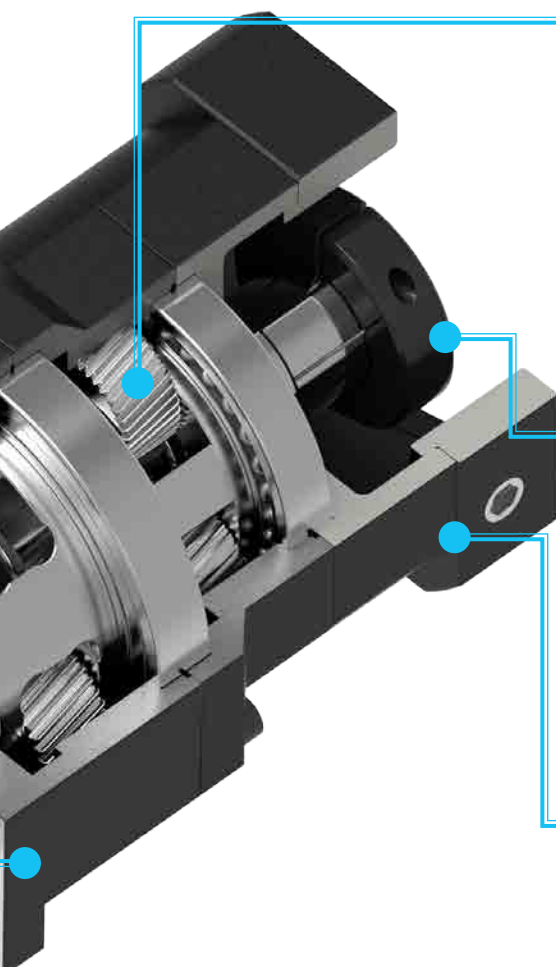
## Collet Locking Mechanism

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



## Modular Design of Motor Connection Plate

The special modular design of the motor connection plate is made from an aluminum alloy that is suitable for all series of Delta servomotors.



# PS High Precision Series Features

The Delta Planetary Gearbox is made using high-tech design software, high-precision gear hobbing machines and comprehensive quality control to ensure that it provides highly accurate gear engagement, smooth running and minimum noise.

## ► High Stability

Employs high tensile strength alloy steel. The gear is made using a vacuum carburizing process to ensure both core and surface hardness, which extends gear service life and maintains high precision after long periods of operation.

## ► High Precision

Backlash for concentric 1-stage gearbox is under 3 arcmin.  
Backlash for right angle 1-stage gearbox is under 4 arcmin.

## ► High Input Speed

Input speed allows for 5,000 RPM.

## ► High Torque

Higher output torque is in comparison with spur gearbox.

## ► High Efficiency

Efficiency for 1-stage model exceeds 97%.  
2-stage model exceeds 94%.

## ► Low Noise

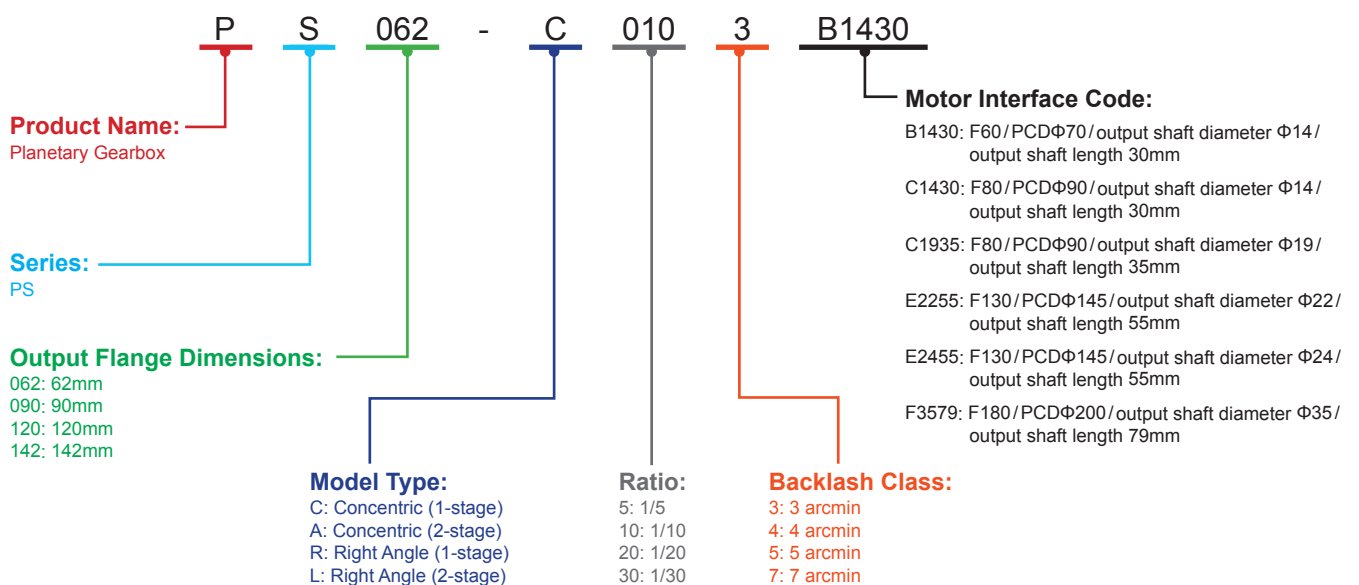
Under 65dB.

## ► Lifetime Lubrication

The protective class IP65 seals design avoids leakage problems and requires no maintenance during the product's lifetime.



# Model Explanation



# PS Series Compatible Motor Table

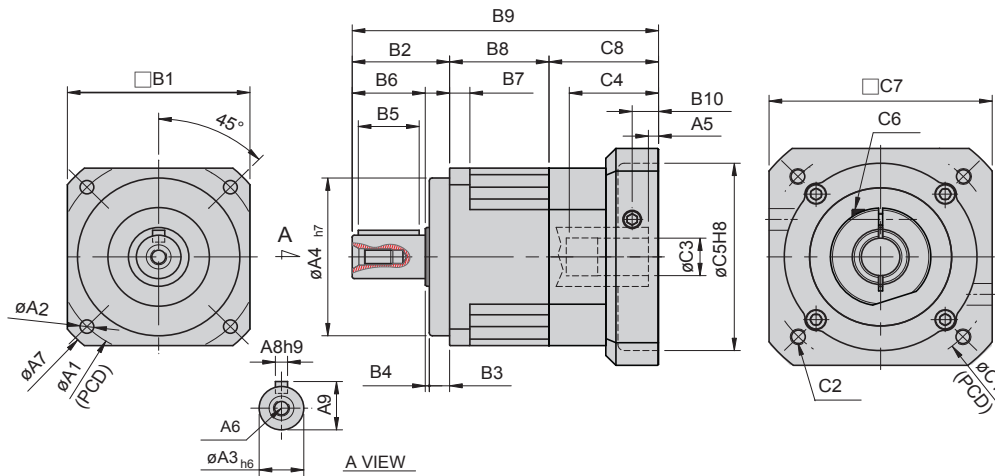
Type	Motor Frame Code	Power Rating	Output Shaft Diameter (S) & Length (LR) (mm)	Stage	Ratio	Backlash Class	Compatible Gearbox Model No.
Concentric	F60	200 W, 400 W	Φ14 / 30	1-stage	5, 10	3	PS062-CxxxxB1430
Concentric	F80	400 W, 750 W	Φ14 / 30	1-stage	5, 10	3	PS090-CxxxxC1430
Concentric	F80	750 W	Φ19 / 35	1-stage	5, 10	3	PS090-CxxxxC1935
Concentric	F130	300 W, 500 W, 600 W, 800 W, 900 W 1 kW, 1.3 kW, 1.5 kW, 1.8 kW, 2 kW	Φ22 / 55	1-stage	5, 10	3	PS120-CxxxxE2255
Concentric	F130	3 kW	Φ24 / 55	1-stage	5, 10	3	PS120-CxxxxE2455
Concentric	F180	2 kW, 3 kW, 3.5 kW, 4.5 kW	Φ35 / 79	1-stage	5, 10	3	PS142-CxxxxF3579
Concentric	F60	200 W, 400 W	Φ14 / 30	2-stage	20, 30	5	PS062-AxxxxB1430
Concentric	F80	400 W, 750 W	Φ14 / 30	2-stage	20, 30	5	PS090-AxxxxC1430
Concentric	F80	750 W	Φ19 / 35	2-stage	20, 30	5	PS090-AxxxxC1935
Concentric	F130	300 W, 500 W, 600 W, 800 W, 900 W 1 kW, 1.3 kW, 1.5 kW, 1.8 kW, 2 kW	Φ22 / 55	2-stage	20, 30	5	PS120-AxxxxE2255
Concentric	F130	3kW	Φ24 / 55	2-stage	20, 30	5	PS120-AxxxxE2455
Right-angle	F60	200 W, 400 W	Φ14 / 30	1-stage	5, 10	4	PS062-RxxxxB1430
Right-angle	F80	400 W, 750 W	Φ14 / 30	1-stage	5, 10	4	PS090-RxxxxC1430
Right-angle	F80	750 W	Φ19 / 35	1-stage	5, 10	4	PS090-RxxxxC1935
Right-angle	F130	300 W, 500 W, 600 W, 800 W, 900 W 1 kW, 1.3 kW, 1.5 kW, 1.8 kW, 2 kW	Φ22 / 55	1-stage	5, 10	4	PS120-RxxxxE2255
Right-angle	F130	3 kW	Φ24 / 55	1-stage	5, 10	4	PS120-RxxxxE2455
Right-angle	F180	2 kW, 3 kW, 3.5 kW, 4.5 kW	Φ35 / 79	1-stage	5, 10	4	PS142-RxxxxF3579
Right-angle	F60	200 W, 400 W	Φ14 / 30	2-stage	20, 30	7	PS062-LxxxxB1430
Right-angle	F80	400 W, 750 W	Φ14 / 30	2-stage	20, 30	7	PS090-LxxxxC1430
Right-angle	F80	750 W	Φ19 / 35	2-stage	20, 30	7	PS090-LxxxxC1935
Right-angle	F130	300 W, 500 W, 600 W, 800 W, 900 W 1 kW, 1.3 kW, 1.5 kW, 1.8 kW, 2 kW	Φ22 / 55	2-stage	20, 30	7	PS120-LxxxxE2255
Right-angle	F130	3 kW	Φ24 / 55	2-stage	20, 30	7	PS120-LxxxxE2455

# Specifications

## PS-C

Items	Unit	Ratio	62	90	120	142
Rated Output Torque	Nm	5	48	160	333	618
		10	43	141	294	549
Max. Acceleration Torque	Nm	5, 10	1.8 Times of Rated Output Torque			
Max. Output Torque	Nm	5, 10	3 Times of Rated Output Torque			
Rated Input Speed	rpm	5, 10	3,000	3,000	3,000	3,000
Max. Input Speed	rpm	5, 10	6,000	6,000	5,000	5,000
Backlash	arcmin	5, 10	≤ 3	≤ 3	≤ 3	≤ 3
Torsional Rigidity	Nm / arcmin	5, 10	6	14	27	60
Max. Radial Force	N	5, 10	1,180	3,200	6,800	9,300
Max. Axial Force	N	5, 10	590	1,600	3,400	4,650
Service Life	hr	5, 10	S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs)			
Efficiency	%	5, 10	≥ 97			
Operating Temperature		5, 10	- 25°C~ +90°C			
Lubrication		5, 10	Synthetic Grease			
Protection Class		5, 10	IP65			
Mounting Position		5, 10	Any			
Noise Level	dB	5, 10	≤ 58	≤ 60	≤ 63	≤ 65
Weight	Kg	5, 10	1.35	3.6	8	14.3
Mass Moment of Inertia	kg.cm <sup>2</sup>	5	0.13	0.47	2.71	7.42
		10	0.13	0.44	2.57	7.03

# Dimensions



## PS-C

Items	62	90	120	142
A1	70	100	130	165
A2	5.5	6.8	9	11
A3	16	22	32	40
A4	50	80	110	130
A5	6	9	10	10
A6	M5 x P0.8	M8 x P1.25	M10 x P1.5	M12 x P1.75
A7	80	116	148	186
A8	5	6	10	12
A9	18	24.5	35	43
B1	62	90	120	142
B2	36	48	65	92
B3	7	10	12	15
B4	1	2	3	3
B5	20	30	40	65
B6	28	36	50	74
B7	8	10	12	15
B8	38	49	61	70
B9	115	164.5	205	260.5
B10	11.5	16	19.5	20
C1	70	90	145	200
C2	M5	M6	M8	M12
C3	14	19	24	35
C4	33.5	59	67	84.5
C5	50	70	110	114.3
C6	M5 x P0.8	M6 x P1.0	M8 x P1.25	M10 x P1.5
C7	64	92	130	180
C8	41	67.5	79	98.5

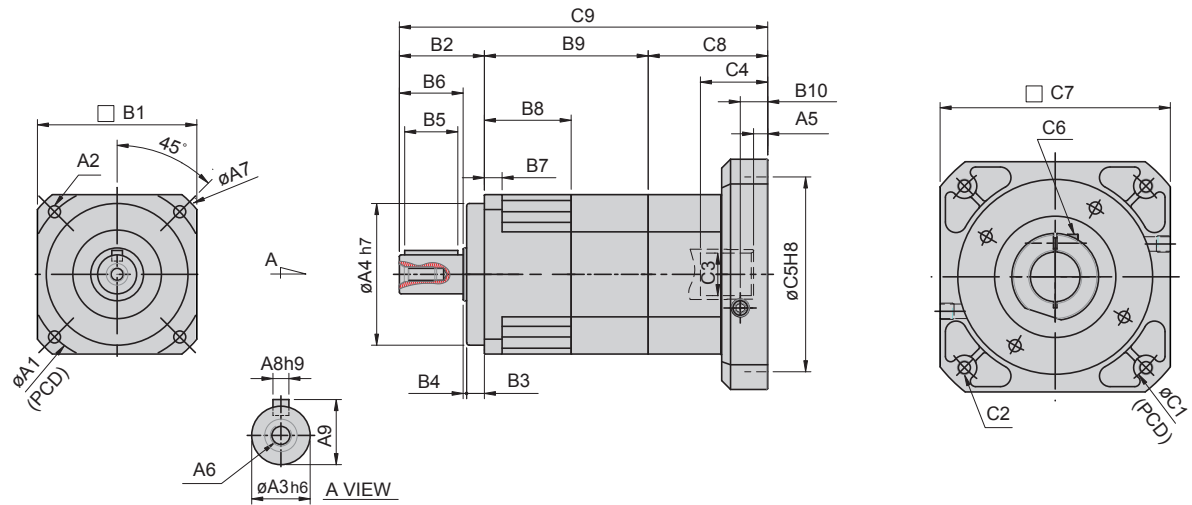
# Specifications

## PS-A

Items	Unit	Ratio	62	90	120
Rated Output Torque	Nm	20	51	146	300
		30	45	151	311
Max. Acceleration Torque	Nm	20, 30	1.8 Times of Rated Output Torque		
Max. Output Torque	Nm	20, 30	3 Times of Rated Output Torque		
Rated Input Speed	rpm	20, 30	3,000	3,000	3,000
Max. Input Speed	rpm	20, 30	6,000	6,000	5,000
Backlash	arcmin	20, 30	≤ 5	≤ 5	≤ 5
Torsional Rigidity	Nm / arcmin	20, 30	6	14	27
Max. Radial Force	N	20, 30	1,180	3,200	6,800
Max. Axial Force	N	20, 30	590	1,600	3,400
Service Life	hr	20, 30	S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs)		
Efficiency	%	20, 30	≥ 94		
Operating Temperature		20, 30	- 25°C~ +90°C		
Lubrication		20, 30	Synthetic Grease		
Protection Class		20, 30	IP65		
Mounting Position		20, 30	Any		
Noise Level	dB	20, 30	≤ 58	≤ 60	≤ 63
Weight	Kg	20, 30	2	5.5	11
Mass Moment of Inertia	kg.cm <sup>2</sup>	20	0.14	0.46	2.63
		30	0.14	0.46	2.43



# Dimensions



## PS-A

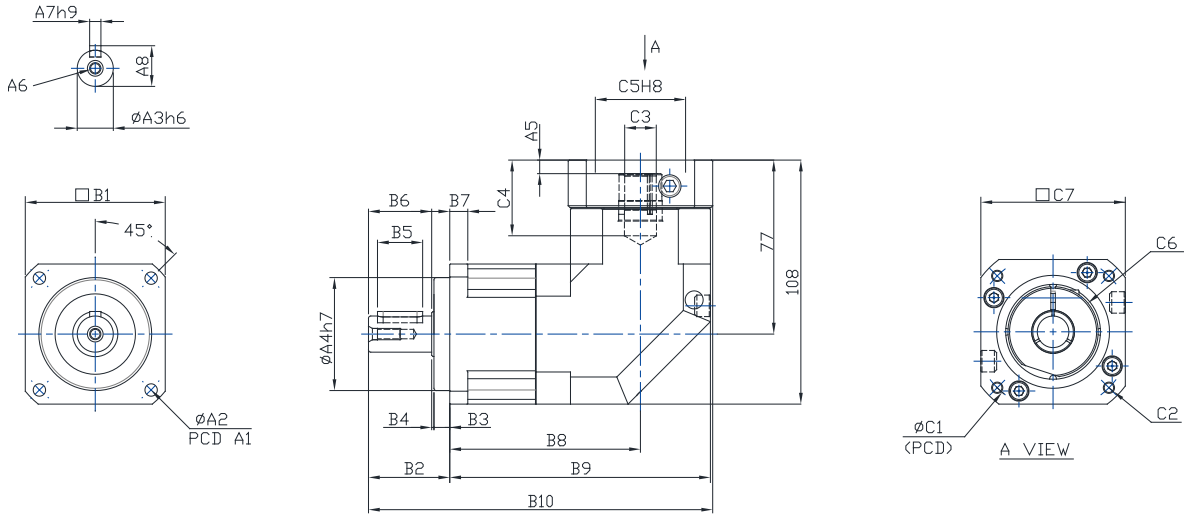
Items	62	90	120
A1	70	100	130
A2	5.5	6.8	9
A3	16	22	32
A4	50	80	110
A5	6	9	10
A6	M5 x P0.8	M8 x P1.25	M10 x P1.5
A7	80	116	148
A8	5	6	10
A9	18	24.5	35
B1	62	90	120
B2	36	48	65
B3	7	10	12
B4	1	2	3
B5	20	30	40
B6	28	36	50
B7	8	10	12
B8	38	49	61
B9	71.8	92.5	117
B10	11.5	16	19.5
C1	70	90	145
C2	M5	M6	M8
C3	14	19	24
C4	33.5	59	67
C5	50	70	110
C6	M5 x P0.8	M6 x P1.0	M8 x P1.25
C7	64	92	130
C8	41	67.5	79
C9	148.8	208	261

# Specifications

## PS-R

Items	Unit	Ratio	62	90	120	142
Rated Output Torque	Nm	5	48	160	333	618
		10	43	141	294	549
Max. Acceleration Torque	Nm	5, 10	1.8 Times of Rated Output Torque			
Max. Output Torque	Nm	5, 10	3 Times of Rated Output Torque			
Rated Input Speed	rpm	5, 10	3,000	3,000	3,000	3,000
Max. Input Speed	rpm	5, 10	6,000	6,000	5,000	5,000
Backlash	arcmin	5, 10	≤ 4	≤ 4	≤ 4	≤ 4
Torsional Rigidity	Nm / arcmin	5, 10	6	14	27	60
Max. Radial Force	N	5, 10	1,180	3,200	6,800	9,300
Max. Axial Force	N	5, 10	590	1,600	3,400	4,650
Service Life	hr	5, 10	S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs)			
Efficiency	%	5, 10	≥ 95			
Operating Temperature		5, 10	- 25°C~ +90°C			
Lubrication		5, 10	Synthetic Grease			
Protection Class		5, 10	IP65			
Mounting Position		5, 10	Any			
Noise Level	dB	5, 10	≤ 68	≤ 70	≤ 72	≤ 74
Weight	Kg	5, 10	2.3	6.6	13.8	52.8
Mass Moment of Inertia	kg.cm <sup>2</sup>	5	0.36	2.28	6.85	23.5
		10	0.36	2.28	6.85	23.5

# Dimensions



## PS-R

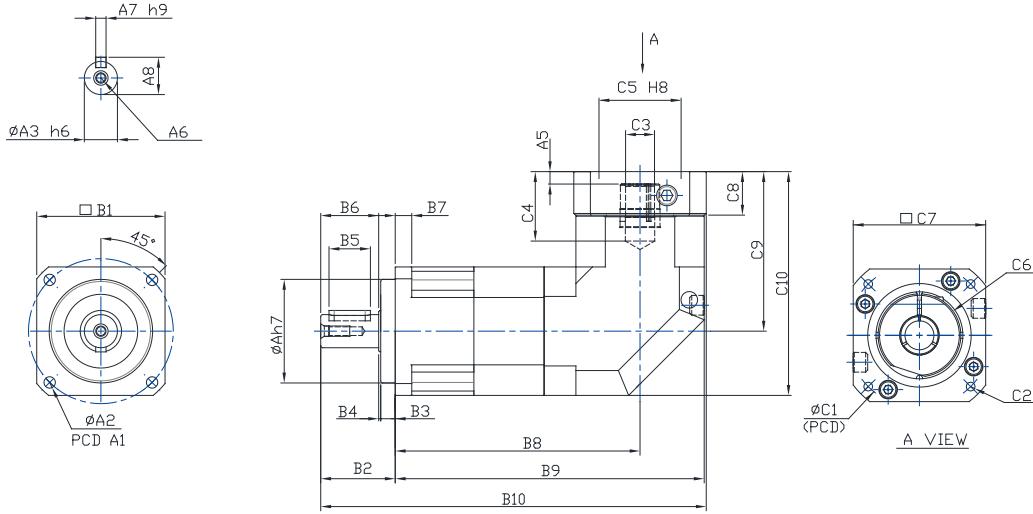
Items	62	90	120	142
A1	70	100	130	165
A2	5.5	6.8	9	11
A3	16	22	32	40
A4	50	80	110	130
A5	6	9	10	10
A6	M5xP0.8	M8xP1.25	M10xP1.5	M12xP1.75
A7	5	6	10	12
A8	18	24.5	35	43
B1	62	90	120	142
B2	36	48	65	92
B3	7	10	12	15
B4	1	2	3	3
B5	20	30	40	65
B6	28	36	50	74
B7	8	10	12	15
B8	84.5	122.1	148	165.5
B9	115.5	167.1	208	236.5
B10	152.5	216.1	278	347.5
C1	70	90	145	200
C2	M5	M6	M8	M12
C3	14	19	24	35
C4	33.5	53	67	85
C5	50	70	110	114.3
C6	M5 x P0.8	M6 x P1.0	M8 x P1.25	M10 x P1.5
C7	64	92	130	180
C8	21.5	26.5	35.5	35.5
C9	77	115.3	141	174
C10	108	160.3	201	245

# Specifications

## PS-L

Items	Unit	Ratio	62	90	120
Rated Output Torque	Nm	20	51	146	300
		30	45	151	311
Max. Acceleration Torque	Nm	20, 30	1.8 Times of Rated Output Torque		
Max. Output Torque	Nm	20, 30	3 Times of Rated Output Torque		
Rated Input Speed	rpm	20, 30	3,000	3,000	3,000
Max. Input Speed	rpm	20, 30	6,000	6,000	5,000
Backlash	arcmin	20, 30	≤ 7	≤ 7	≤ 7
Torsional Rigidity	Nm / arcmin	20, 30	6	14	27
Max. Radial Force	N	20, 30	1,180	3,200	6,800
Max. Axial Force	N	20, 30	590	1,600	3,400
Service Life	hr	20, 30	S5 Cycle Operation: >30,000 (S1 Continuous Operation: >15,000 hrs)		
Efficiency	%	20, 30	≥ 92		
Operating Temperature		20, 30	- 25°C~ +90°C		
Lubrication		20, 30	Synthetic Grease		
Protection Class		20, 30	IP65		
Mounting Position		20, 30	Any		
Noise Level	dB	20, 30	≤ 68	≤ 70	≤ 72
Weight	Kg	20, 30	3	8.2	12.5
Mass Moment of Inertia	kg.cm <sup>2</sup>	20	0.36	2.28	6.85
		30	0.36	2.28	6.85

# Dimensions



## PS-L

Items	62	90	120
A1	70	100	130
A2	5.5	6.8	9
A3	16	22	32
A4	50	80	110
A5	6	9	10
A6	M5 x P0.8	M8 x P1.25	M10 x P1.5
A7	5	6	10
A8	18	24.5	35
B1	62	90	120
B2	36	48	65
B3	7	10	12
B4	1	2	3
B5	20	30	40
B6	28	36	50
B7	8	10	12
B8	118.3	165.6	204
B9	149.3	210.6	264
B10	185.3	258.6	329
C1	70	90	145
C2	M5	M6	M8
C3	14	19	24
C4	33.5	53	67
C5	50	70	110
C6	M5 x P0.8	M6 x P1.0	M8 x P1.25
C7	64	92	130
C8	21.5	26.5	35.5
C9	77	115.3	141
C10	108	160.3	201

# PA Precision Series Features

## ► High Rigidity, High Torque

Employs uncaged needle roller bearings with a set design including ring teeth, gearbox and helical gears for high rigidity and output torque

## ► High Precision

Backlash for 1-stage gearbox is under 8 arcmin.  
Backlash for 2-stage gearbox is under 12 arcmin.

## ► High Efficiency

Efficiency for 1-stage model exceeds 95%  
Efficiency for 2-stage model exceeds 92%

## ► Low Noise

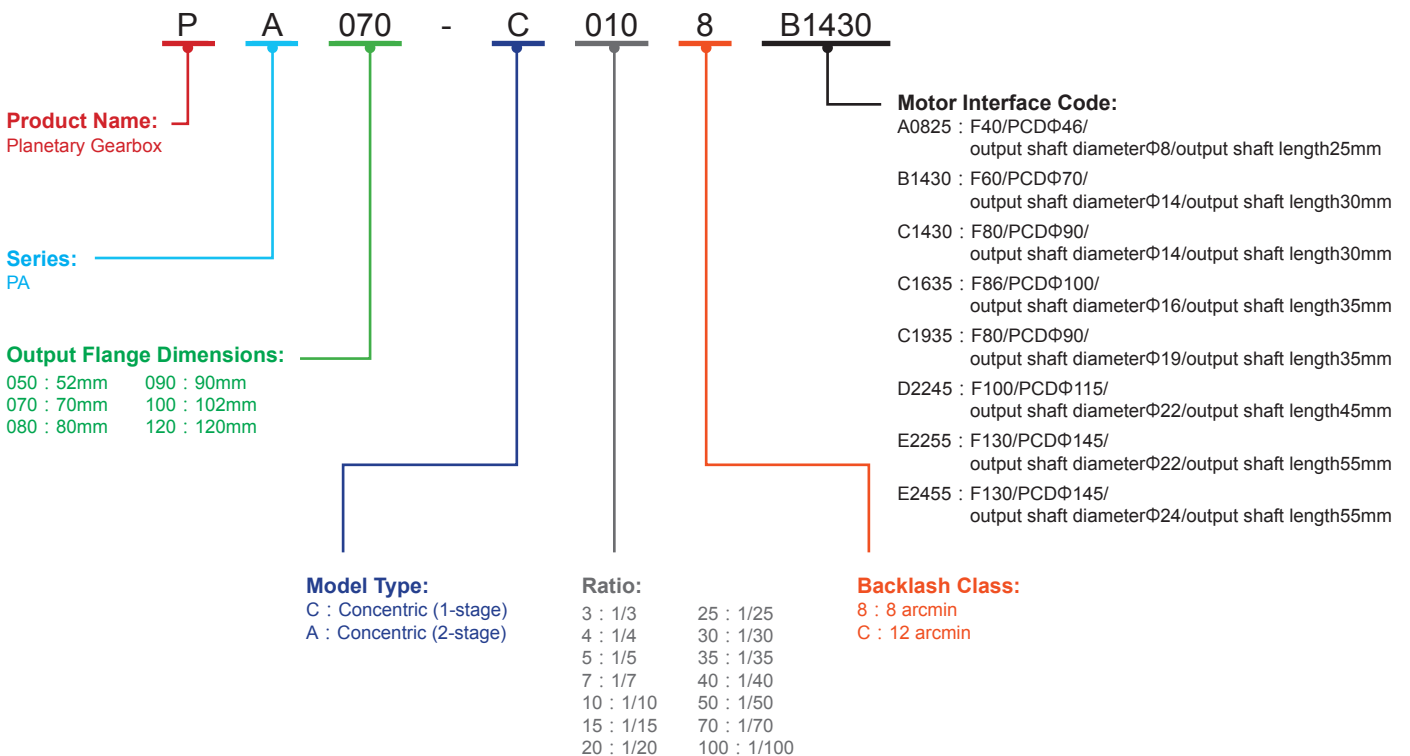
Uses helical gears capable of meshing to ensure smooth and quiet operation

## ► Lifetime Lubrication

The protective class IP65 seal design avoids leakage problems and requires no lubrication during the product's lifetime.



# Model Explanation



# PA Series Compatible Motor Table

Type	Motor Frame Code	Power Rating	Output Shaft Diameter (S) & Length (LR) (mm)	Stage	Ratio	Backlash Class	Compatible Gearbox Model No.
Concentric	F40	50W, 100W	Φ8 / 25	1-stage	3, 4, 5, 7, 10	8	PA050-CxxxxA0825
Concentric	F60	200W, 400W	Φ14 / 30	1-stage	3, 4, 5, 7, 10	8	PA050-CxxxxB1430 PA070-CxxxxB1430 PA080-CxxxxB1430
Concentric	F80	400W	Φ14 / 30	1-stage	3, 4, 5, 7, 10	8	PA080-CxxxxC1430 PA100-CxxxxC1430
Concentric	F80	750W	Φ19 / 35	1-stage	3, 4, 5, 7, 10	8	PA080-CxxxxC1935 PA090-CxxxxC1935
Concentric	F86	750W, 1kW	Φ16 / 35	1-stage	3, 4, 5, 7, 10	8	PA080-CxxxxC1635 PA090-CxxxxC1635 PA100-CxxxxC1635
Concentric	F100	1kW, 2kW	Φ22 / 45	1-stage	3, 4, 5, 7, 10	8	PA100-CxxxxD2245
Concentric	F130	300W, 500W, 600W, 800W, 900W 1kW, 1.3kW, 1.5kW, 1.8kW, 2kW	Φ22 / 55	1-stage	3, 4, 5, 7, 10	8	PA100-CxxxxE2255
Concentric	F130	3kW	Φ24 / 55	1-stage	3, 4, 5, 7, 10	8	PA100-CxxxxE2455 PA120-CxxxxE2455
Concentric	F40	50W, 100W	Φ14 / 30	2-stage	10, 15, 20, 25, 30, 35, 40,50,70,100	12	PA050-AxxxxA0825
Concentric	F60	200W, 400W	Φ14 / 30	2-stage	10, 15, 20, 25, 30, 35, 40,50,70,100	12	PA050-AxxxxB1430 PA070-AxxxxB1430 PA080-AxxxxB1430
Concentric	F80	400W	Φ14 / 30	2-stage	10, 15, 20, 25, 30, 35, 40,50,70,100	12	PA080-AxxxxC1430 PA100-AxxxxC1430
Concentric	F80	750W	Φ19 / 35	2-stage	10, 15, 20, 25, 30, 35, 40,50,70,100	12	PA080-AxxxxC1935 PA090-AxxxxC1935
Concentric	F86	750W, 1kW	Φ16 / 35	2-stage	10, 15, 20, 25, 30, 35, 40,50,70,100	12	PA080-AxxxxC1635 PA090-AxxxxC1635 PA100-AxxxxC1635
Concentric	F100	1kW, 2kW	Φ22 / 45	2-stage	10, 15, 20, 25, 30, 35, 40,50,70,100	12	PA100-AxxxxD2245
Concentric	F130	300W, 500W, 600W, 800W, 900W 1kW, 1.3kW, 1.5kW, 1.8kW, 2kW	Φ22 / 55	2-stage	10, 15, 20, 25, 30, 35, 40,50,70,100	12	PA100-AxxxxE2255
Concentric	F130	3kW	Φ24 / 55	2-stage	10, 15, 20, 25, 30, 35, 40,50,70,100	12	PA100-AxxxxE2455 PA120-AxxxxE2455

# Specifications

## PA Series

Items	Unit	Stage	Ratio	50	70	80	90	100	120
Rated Output Torque	Nm	1	3	19	54	112	112	165	286
			4	16	48	110	110	146	255
			5	16	45	108	108	160	264
			7	15	41	105	105	149	245
			10	14	40	100	100	141	234
		2	15	19	54	112	112	165	286
			20	16	48	110	110	146	255
			25	16	45	108	108	160	264
			30	19	41	112	112	165	286
			35	15	41	105	105	149	245
			40	16	39	110	110	146	255
			50	16	45	108	108	160	264
			70	15	41	105	105	149	245
			100	14	40	100	100	141	234
Max. Acceleration Torque	Nm	1,2	3 ~ 100	1.8 Times the Rated Output Torque					
Max. Output Torque	Nm	1,2	3 ~ 100	3 Times the Rated Output Torque					
Rated Input Speed	rpm	1,2	3 ~ 100	3,000					
Max. Input Speed	rpm	1,2	3 ~ 100	5,000					
Backlash	arcmin	1	3 ~ 10	≤ 8					
	arcmin	2	15 ~ 100	≤ 12					
Torsional Rigidity	Nm/arcmin	1,2	3 ~ 100	3	5	12	12	14	23
Max. Radial Force	N	1,2	3 ~ 100	350	800	1,200	1,200	3,200	5,220
Max. Axial Force	N	1,2	3 ~ 100	180	400	600	600	1,600	1,600
Service Life	hr	1,2	3 ~ 100	S5 Cycle Operation: > 20,000 (S1 Continuous Operation: > 10,000 hrs)					
Efficiency	%	1	3 ~ 10	≥ 97					
		2	15 ~ 100	≥ 95					
Operating Temperature		1,2	3 ~ 100	- 25°C ~ +90°C					
Lubrication		1,2	3 ~ 100	Synthetic Grease					
Protection Class		1,2	3 ~ 100	IP65					
Mounting Position		1,2	3 ~ 100	Any					
Noise Level	dB	1	3 ~ 10	≤ 58	≤ 58	≤ 60	≤ 60	≤ 65	≤ 67
		2	15 ~ 100	≤ 60	≤ 60	≤ 62	≤ 62	≤ 67	≤ 69
Weight ±2%	Kg	1	3 ~ 10	0.64	1.6	1.6	1.96	3.76	7.43
		2	15 ~ 100	0.96	2.1	2.8	3.06	5.92	10.3

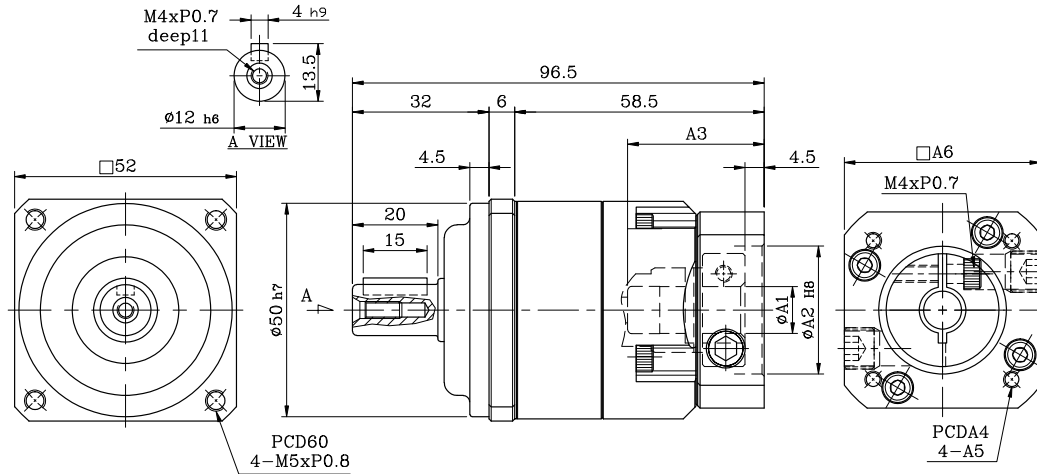
## Mass Moment of Inertia

Items	Unit	Stage	Ratio	50	70	80	90	100	120
Mass Moment of Inertia	kg.cm <sup>2</sup>	1	3	0.03	0.16	0.48	0.48	0.6	3.21
			4	0.03	0.14	0.38	0.38	0.45	2.64
			5	0.03	0.13	0.38	0.38	0.45	2.64
			7	0.03	0.13	0.38	0.38	0.45	2.62
			10	0.03	0.13	0.35	0.35	0.41	2.51
		2	15	0.03	0.13	0.41	0.41	0.45	2.64
			20~40	0.03	0.13	0.38	0.38	0.45	2.64
			50~100	0.03	0.13	0.38	0.38	0.45	2.51
				0.03	0.13	0.38	0.38	0.45	2.51



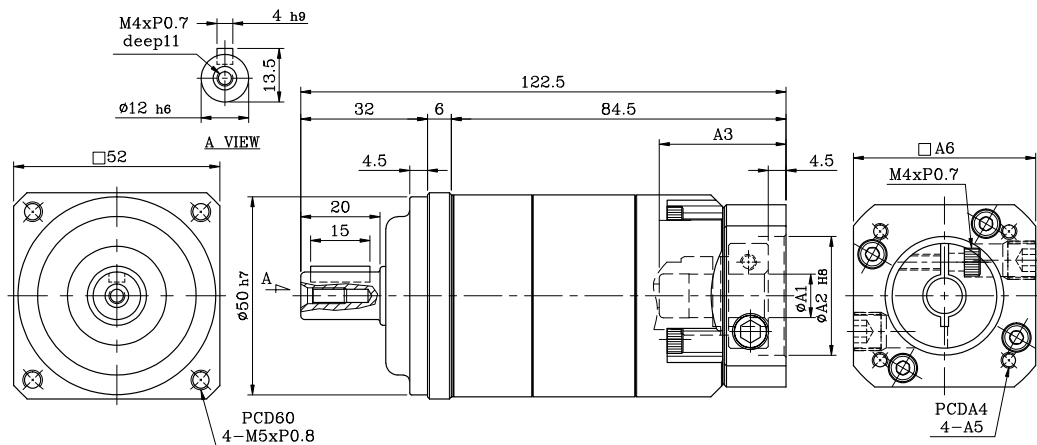
# Dimensions

## PA50 1-stage



	Motor Interface Code	$\phi A1$	$\phi A2$	A3	A4	A5	A6
PA50	A0825	8	30	32	46	M4	46
	B1430	14	50	32	70	M5	60

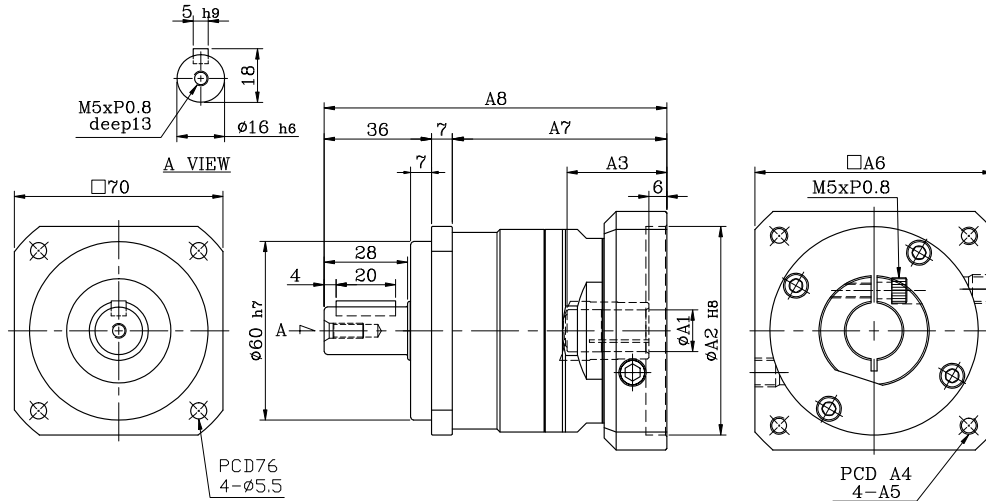
## PA50 2-stage



	Motor Interface Code	$\phi A1$	$\phi A2$	A3	A4	A5	A6
PA50	A0825	8	30	32	46	M4	46
	B1430	14	50	32	70	M5	60

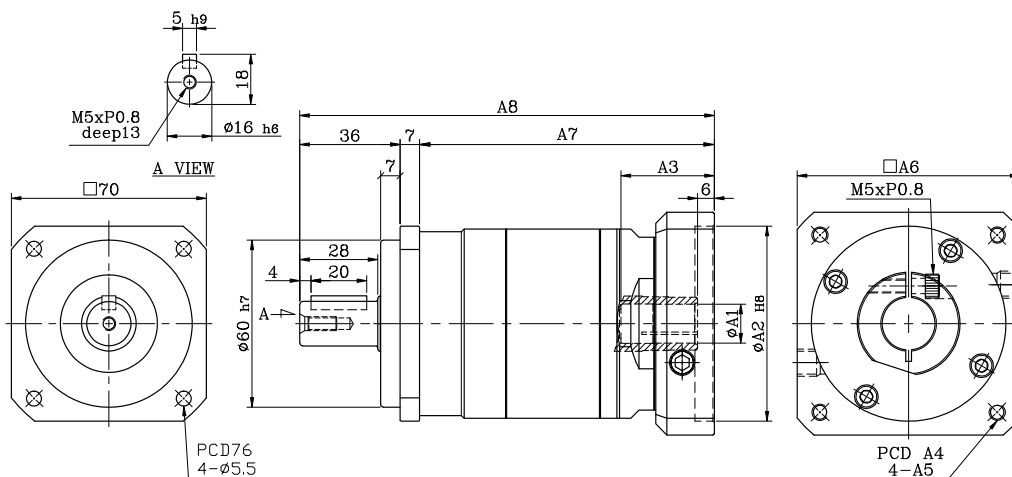
# Dimensions

## PA70 1-stage



	Motor Interface Code	$\Phi A1$	$\Phi A2$	A3	A4	A5	A6	A7	A8
PA70	B1430	14	50	33.5	70	M5	64	72	115

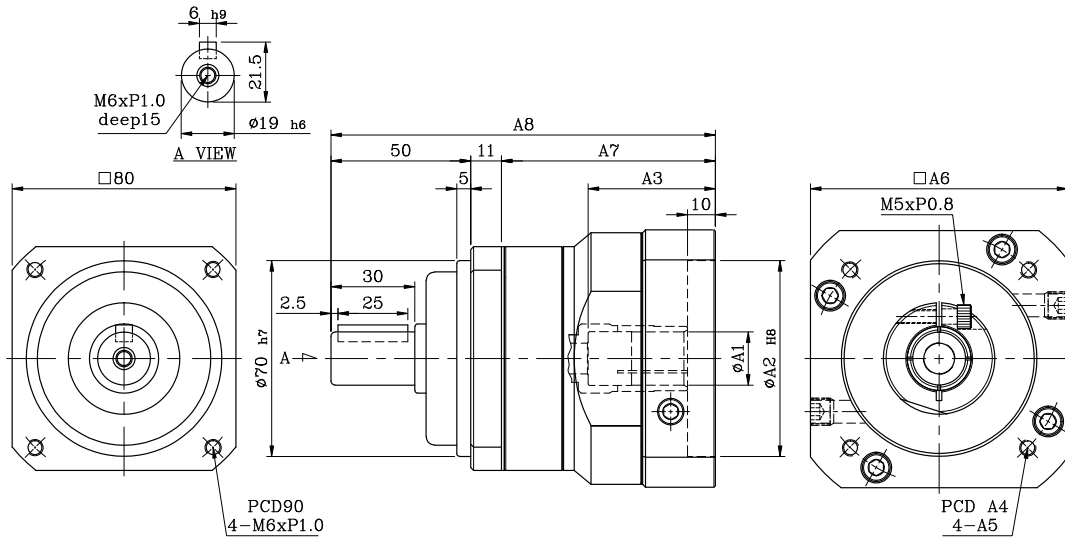
## PA70 2-stage



	Motor Interface Code	$\Phi A1$	$\Phi A2$	A3	A4	A5	A6	A7	A8
PA70	B1430	14	50	33.5	70	M5	64	72	115

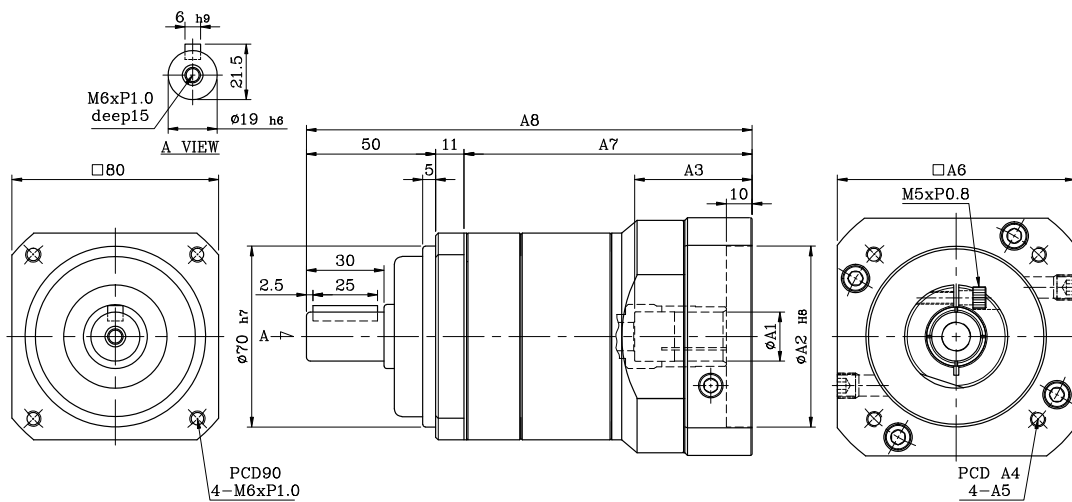
# Dimensions

## PA80 1-stage



	Motor Interface Code	$\Phi$ A1	$\Phi$ A2	A3	A4	A5	A6	A7	A8
PA80	B1430	14	50	33.5	70	M5	80	64.5	125.5
PA80	C1430	14	70	45.5	90	M6	92	76.5	137.5
PA80	C1935	19	70	45.5	90	M6	92	76.5	137.5
PA80	C1635	19	80	45.5	100	M6	92	76.5	137.5

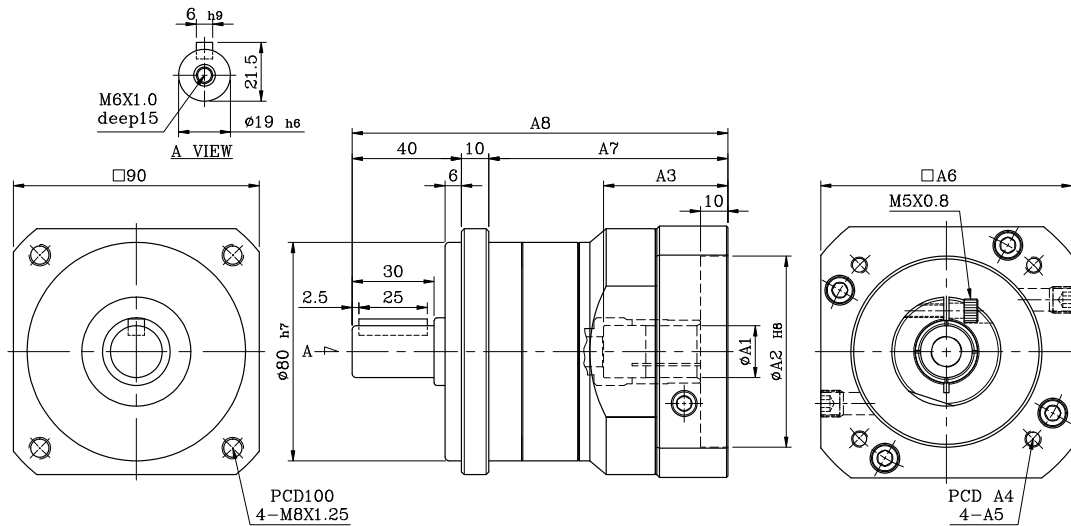
## PA80 2-stage



	Motor Interface Code	$\Phi$ A1	$\Phi$ A2	A3	A4	A5	A6	A7	A8
PA80	B1430	14	50	33.5	70	M5	80	99.5	160.5
PA80	C1430	14	70	45.5	90	M6	92	111.5	172.5
PA80	C1935	19	70	45.5	90	M6	92	111.5	172.5
PA80	C1635	19	80	45.5	100	M6	92	111.5	172.5

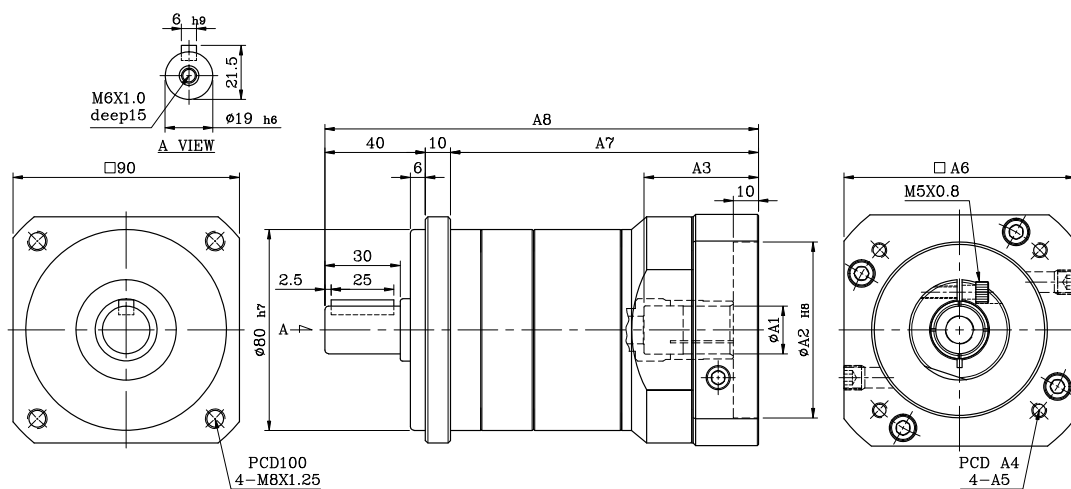
# Dimensions

## PA90 1-stage



	Motor Interface Code	$\Phi A1$	$\Phi A2$	A3	A4	A5	A6	A7	A8
PA90	C1935	19	70	45.5	90	M6	92	87.5	137.5
PA90	C1635	19	80	45.5	100	M6	92	87.5	137.5

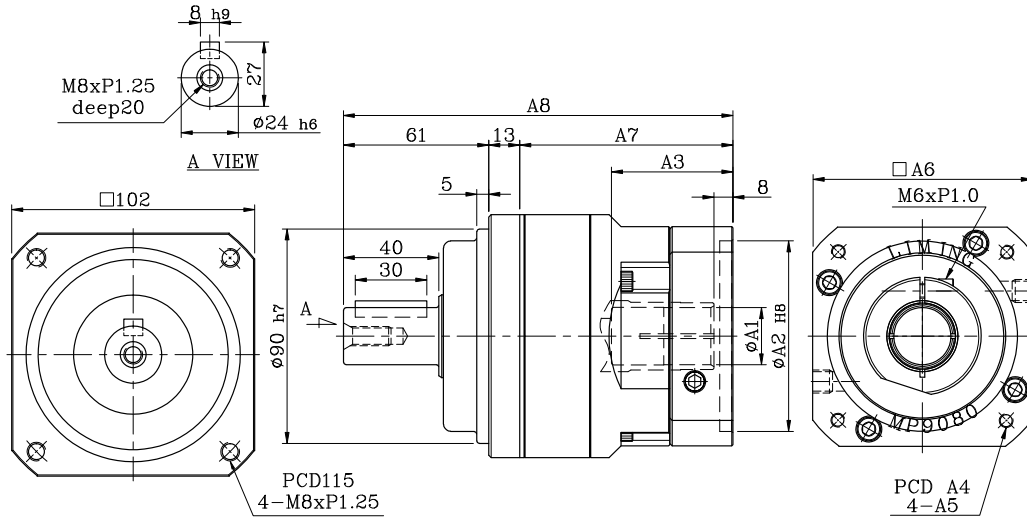
## PA90 2-stage



	Motor Interface Code	$\Phi A1$	$\Phi A2$	A3	A4	A5	A6	A7	A8
PA90	C1935	19	70	45.5	90	M6	92	122.5	172.5
PA90	C1635	19	80	45.5	100	M6	92	122.5	172.5

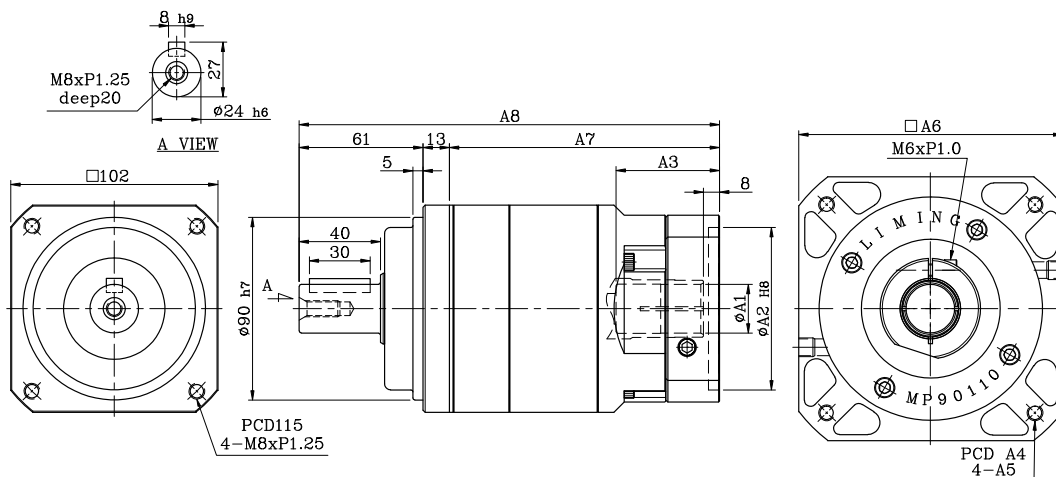
# Dimensions

## PA100 1-stage



	Motor Interface Code	$\Phi A1$	$\Phi A2$	A3	A4	A5	A6	A7	A8
PA100	C1430	14	70	51	90	M6	92	89.5	163.5
PA100	C1635	19	80	51	100	M6	92	89.5	163.5
PA100	D2245	22	95	51	115	M6	110	89.5	163.5
PA100	E2255	22	110	51	145	M8	130	89.5	163.5
PA100	E2455	24	110	65.5	145	M8	130	104	178

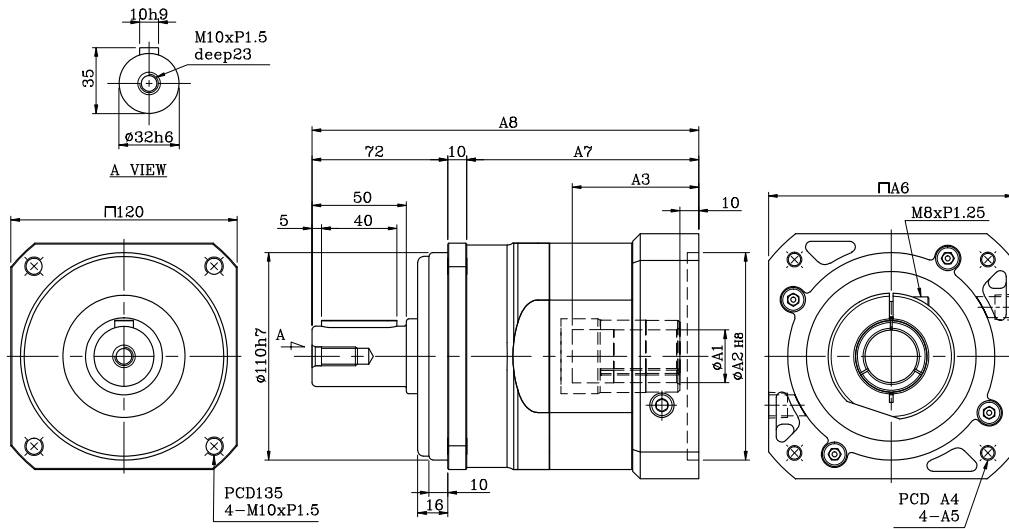
## PA100 2-stage



	Motor Interface Code	$\Phi A1$	$\Phi A2$	A3	A4	A5	A6	A7	A8
PA100	C1430	14	70	51	90	M6	92	133	207
PA100	C1635	19	80	51	100	M6	92	133	207
PA100	D2245	22	95	51	115	M6	110	133	207
PA100	E2255	22	110	51	145	M8	130	133	207
PA100	E2455	24	110	65.5	145	M8	130	147.5	221.5

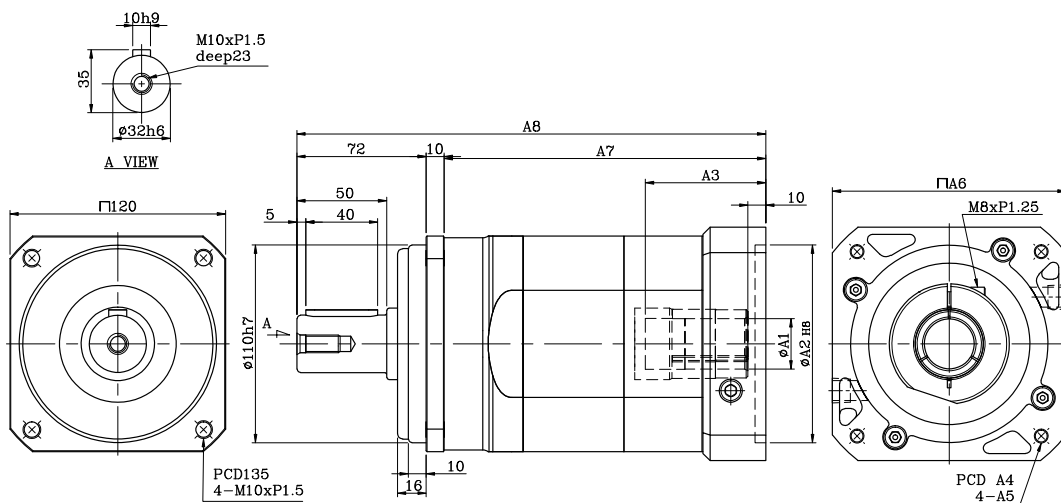
# Dimensions

## PA120 1-stage



	Motor Interface Code	$\Phi A1$	$\Phi A2$	A3	A4	A5	A6	A7	A8
PA120	E2455	24	110	67	145	M8	130	123	205

## PA120 2-stage



	Motor Interface Code	$\Phi A1$	$\Phi A2$	A3	A4	A5	A6	A7	A8
PA120	E2455	24	110	67	145	M8	130	123	205

# Calculation Method

- 01** Calculate Ratio  $i$  (Eq.1)
- 02** Calculate mean output torque  $T_{2m}$  (Eq.2)  
Mean output torque  $T_{2m} <$  Nominal output torque  $T_{2N}$
- 03** To determine Operation mode (S1 or S5)  
S5:  $ED < 60\%$   
S5:  $t_{work} < 20min$  (Eq.3)
- 04** If operation mode is (S5) then calculate the Max. Acceleration Torque  $T_{2max}$  (Eq.4)  
Max acceleration torque  $T_{2max} <$  acceleration torque  $T_{2B}$
- 05** Calculate the Mean Output speed  $n_{2m}$  and the Nominal Output speed  $n_{2N}$  of Gearbox (Eq.5)  
 $n_{2m} < n_{2N}$
- 06** Calculate the mean radial force  $F_{2rm}$  (Eq.6)  
mean radial force  $F_{2rm} <$  Max. radial force  $F_{2rB}$
- 07** Calculate the mean Axial force  $F_{2am}$  (Eq.7)  
mean axial force  $F_{2am} <$  Max. axial force  $F_{2aB}$
- 08** Select the Required Backlash and Shaft Option
- 09** Order your LIMING Gearbox

Recommended (for S5 Cyclic Operation)

The general design is given for

$$\frac{J_L}{i^2} \leq 4 \cdot J_m$$

The optimal design is given for

$$\frac{J_L}{i^2} \cong J_m$$

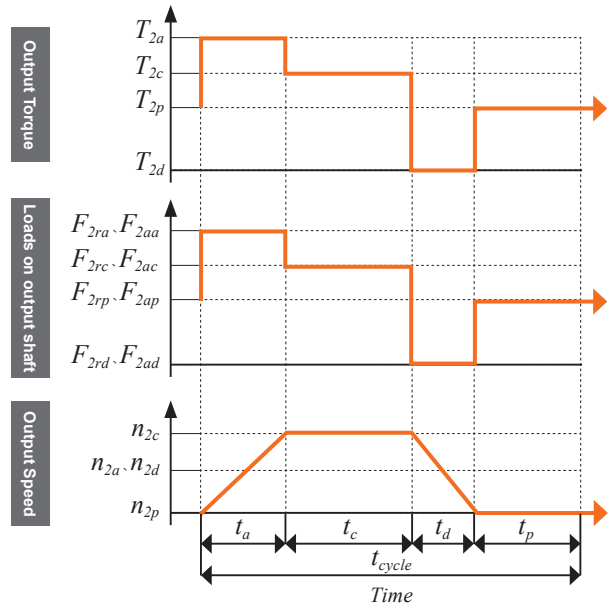
Where  $J_L$  is Load Inertia and  $J_m$  is Motor Inertia.

$T_{2m}$ : please reference catalog "Rated Output Torque"

$F_{2rB}$ : please reference catalog "Max. Radial Force"

**Eq. 1** 
$$i \cong \frac{n_m}{n_{work}}$$

$n_m$  is output speed of the motor,  
 $n_{work}$  is working speed



**Eq. 2** 
$$T_{2m} = \sqrt[3]{\frac{n_{2a} \cdot t_a \cdot T_{2a}^3 + n_{2c} \cdot t_c \cdot T_{2c}^3 + n_{2d} \cdot t_d \cdot T_{2d}^3}{n_{2a} \cdot t_a + n_{2c} \cdot t_c + n_{2d} \cdot t_d}}$$

**Eq. 3** 
$$ED = \frac{t_a + t_c + t_d}{t_{cycle}} \cdot t_{work} = t_a + t_c + t_d$$

$t_a$  is the time for acceleration,  $t_c$  is constant travel,  $t_d$  is the time for deceleration and  $t_p$  is the time for pause.

**Eq. 4** 
$$T_{2max} = T_{mB} \cdot i \cdot k_s \cdot \eta$$

$T_{mB}$  is the Max. output torque of the motor and  $\eta$  is the efficiency of the gearbox.

$k_s$ service factor	
$k_s$	No. of Cycles / hr
1.0	0 ~ 1,000
1.1	1,000 ~ 1,500
1.3	1,500 ~ 2,000
1.6	2,000 ~ 3,000
1.8	3,000 ~ 5,000

**Eq. 5** 
$$n_{2a} = n_{2d} = \frac{n_{2c}}{2}$$

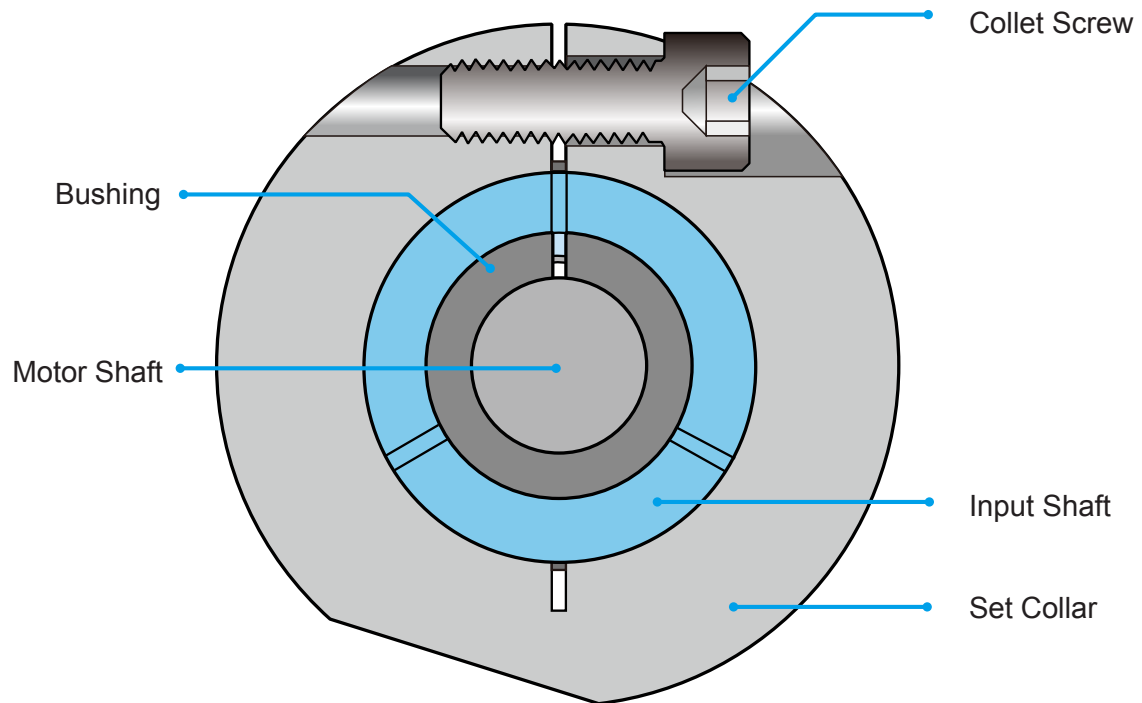
$$n_{2m} = \frac{n_{2a} \cdot t_a + n_{2c} \cdot t_c + n_{2d} \cdot t_d}{t_a + t_c + t_d}$$

$$n_{2N} = \frac{n_{1N}}{i}$$

**Eq. 6** 
$$F_{2rm} = \sqrt[3]{\frac{n_{2a} \cdot t_a \cdot F_{2ra}^3 + n_{2c} \cdot t_c \cdot F_{2rc}^3 + n_{2d} \cdot t_d \cdot F_{2rd}^3}{n_{2a} \cdot t_a + n_{2c} \cdot t_c + n_{2d} \cdot t_d}}$$

**Eq. 7** 
$$F_{2am} = \sqrt[3]{\frac{n_{2a} \cdot t_a \cdot F_{2aa}^3 + n_{2c} \cdot t_c \cdot F_{2ac}^3 + n_{2d} \cdot t_d \cdot F_{2ad}^3}{n_{2a} \cdot t_a + n_{2c} \cdot t_c + n_{2d} \cdot t_d}}$$

## Collet Screw & Set Collar Torque Table



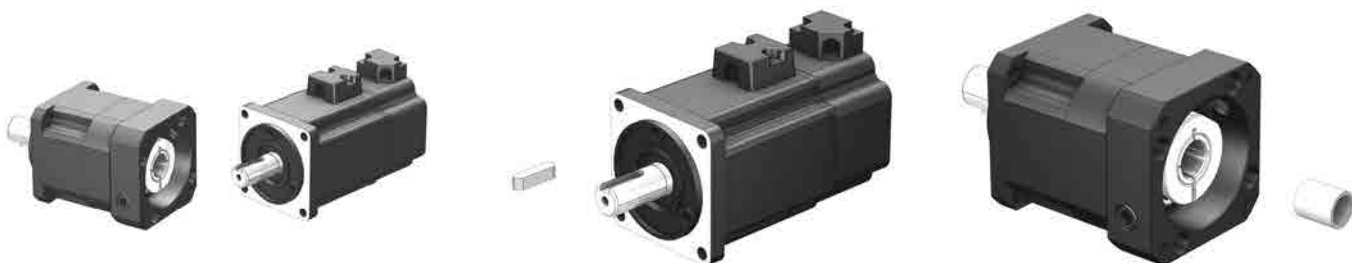
Frame	Collet Screw Specifications	Screw Grade	Tighten Torque (Nm)	Clench Torque (Nm)
62	M5 x P 0.8	12.9	10	164
90	M6 x P 1.0	12.9	16.3	233
120	M8 x P 1.25	12.9	41	423
142	M10 x P 1.5	12.9	81	678





# Installation Instructions

## Assembling the Planetary Gearbox with Motor



**01**

Confirm the compatibility of motor model and gearbox spec.  
Clean the mounting surface.



**02**

Remove the motor key.



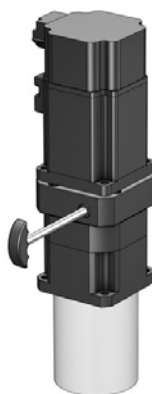
**03**

Check motor shaft size  
If necessary, insert the bushing into the input bore.



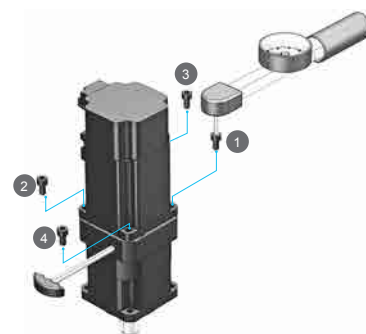
**04**

Remove the plug into the adapter plate.  
Loosen the set collar and align the bolt.



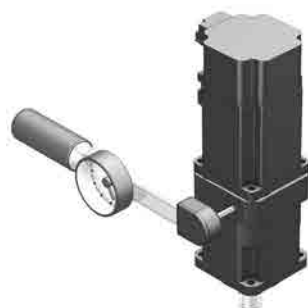
**05**

Vertically insert motor from the gearbox.



**06**

Tighten the mounting bolts from bolt 1 to bolt 4 with a torque wrench.



**07**

Tighten the set collar bolt with the torque wrench.



**08**

Tighten up the screw plug.

### **!** Important

1. You must tighten the motor before tightening the set collar on the motor shaft.
2. Please follow the instruction steps for assembly. Step 6 and step 7 must follow in order.

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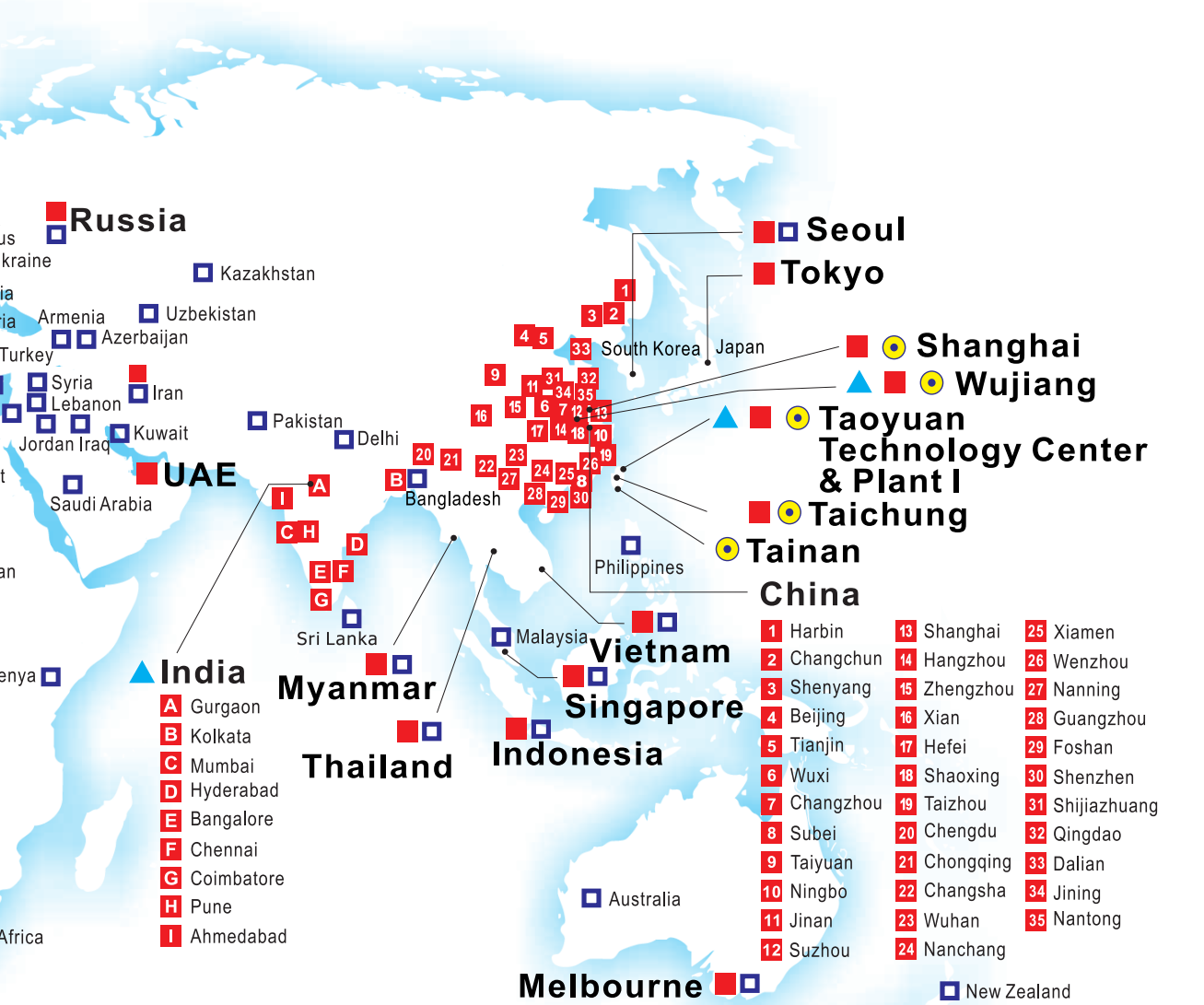
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