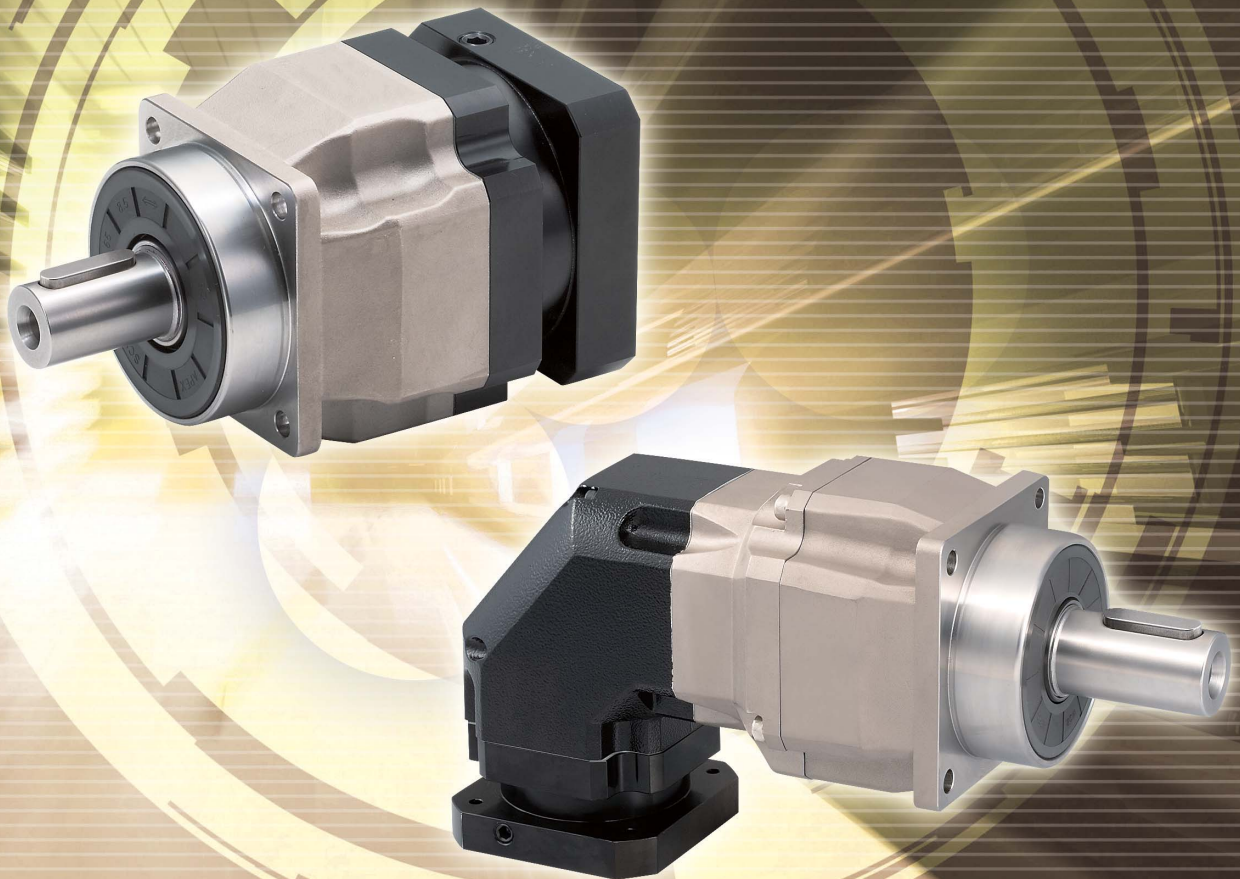


TSUBAKI HIGH PRECISION PLANETARY GEARBOX for SERVO MOTORS

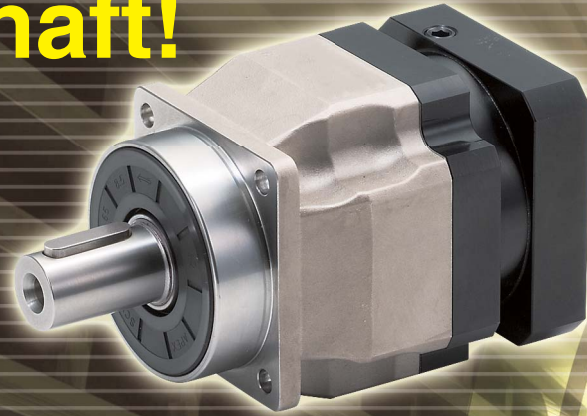
Basic Series

*Planetary
Accurate
Tsubaki Reducer*



Superior gear cutting technology delivers

Stainless housing and output shaft!



Planetary

Accurate

Tsubaki Reducer

Basic Series

Environment-resistant

Stainless steel housing and output shaft exhibits excellent rust and corrosion resistance, making this series ideal for clean environments.

Quiet operation

The precision machined helical planetary gears provide a smooth mesh that maintains even load balancing for quiet operation.

High efficiency, compact

The helical planet gear mechanism achieves high efficiency, while the ring gear machined integrally to the housing make it compact.

Low backlash

Excellent gear cutting technology achieves low backlash.

Wide variation

Full lineup offers an array of reduction ratios in 7 frame sizes, available with in line or right angle shafts.

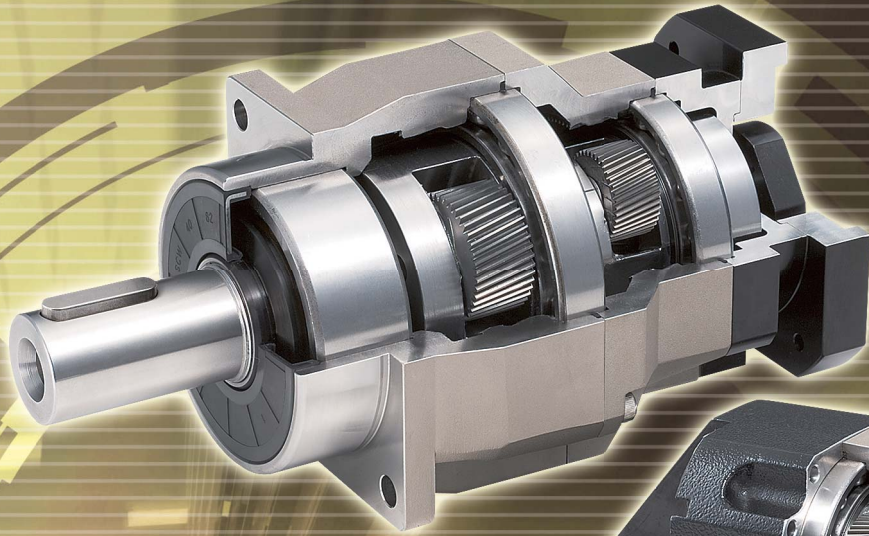
Heavy-duty

Output shaft features double row angular contact ball bearings for extra durability against thrust and radial loads.

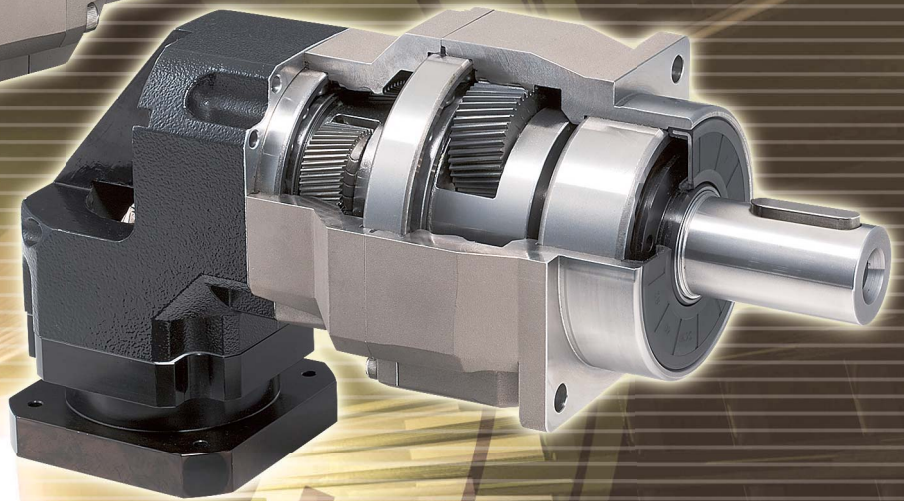
Mount codes

Standard line of flanges mount to servo motors from various manufacturers.

high quality and transfer capacity

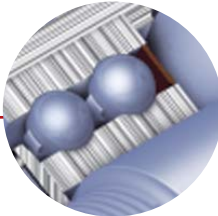


Developed jointly
with APEX DYNAMICS, INC.



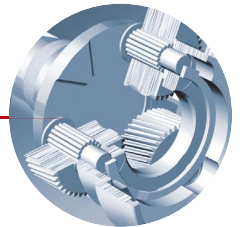
1 Double row angular contact ball bearings

Bears thrust loads from both directions to provide heavy-duty performance against moment loads.



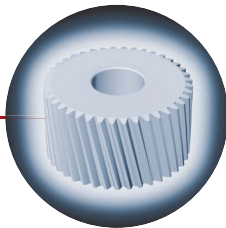
2 Needle roller bearings

Uncaged needle rollers arranged directly inside the planet gears afford greater contact area to deliver high stiffness and torque.



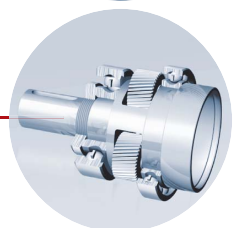
3 Helical planet gears

Low-temperature plasma nitriding treatment.



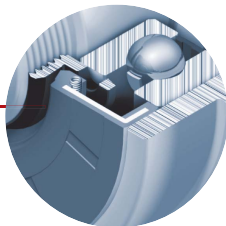
4 One piece carrier

Integral carrier and output shaft achieve torsional rigidity and concentricity.



5 Output and input sealing systems

Carbon-coated shaft surfaces reduce friction and heat generation, and extend service life.



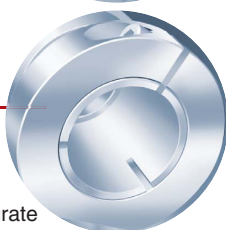
6 Carrier design

The carrier supports the bearing for the input sun gear to maintain concentricity and precision.



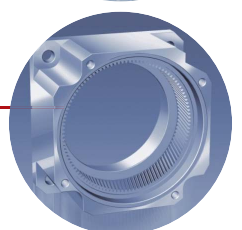
7 Input clamping system

The set collar clamp features a triple split collet for a balanced clamp and greater clamping force. Suitable for high input speeds. Delivers accurate power transmission performance.



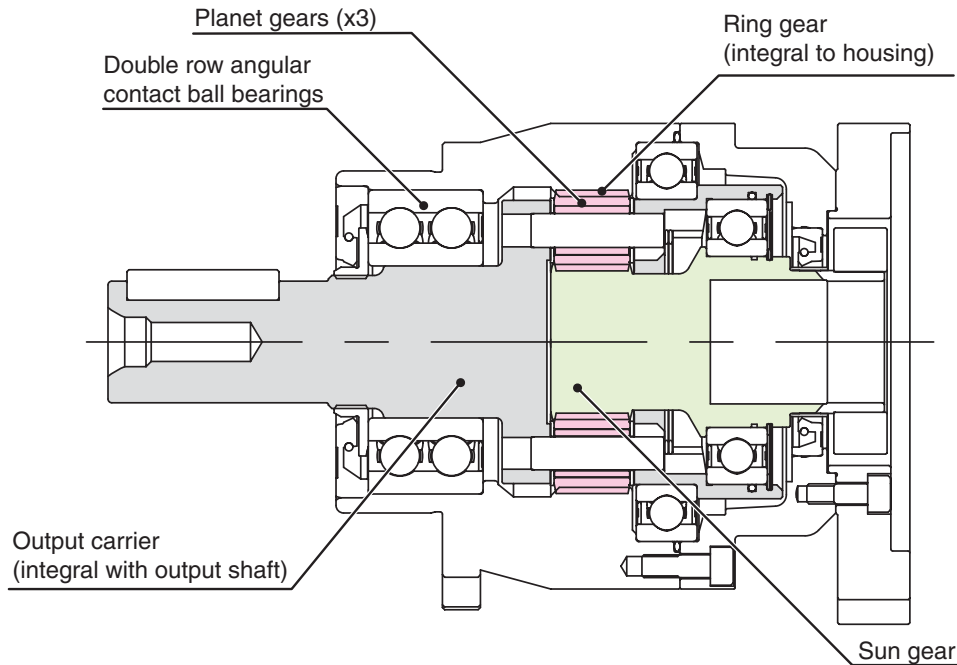
8 Helical ring gear

Integral ring gear and housing delivers high torque and stiffness.



Theory of Operation

Planetary type → The ring gear is fixed, and the sun gear shaft serves as the drive shaft while the planetary carrier shaft serves as the follower shaft with both drive and follower shafts reducing speed by rotating in the same direction.



This **planetary gear mechanism** consists of an outer **ring gear** meshed with three **planet gears** which rotate about their own axes while revolving about a **sun gear**. The orbital motion of the planet gears drive the output carrier.

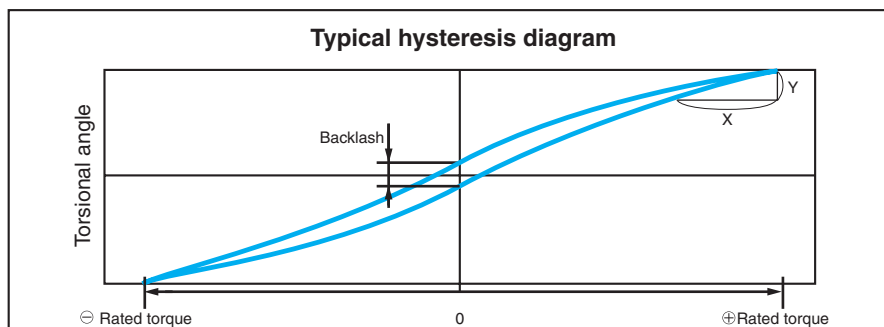
Advantages of the planetary gear mechanism are its ability to

- provide large reduction ratio with fewer stages
- transfer high torque
- arrange the input and output shafts coaxially.

Backlash

Backlash refers to the "play" between teeth when the gears are meshed.

When torque is applied to the output of a gearbox, the resultant torsion angle displays a hysteresis.



Torsional rigidity

The torsional rigidity of an output shaft is a measure of how easy a shaft will twist under torque, and is expressed by the upward slope in the hysteresis.

The higher the torsional rigidity (X/Y N·m/arc min), the less the shaft will deform when torqued.

High Precision Planetary Gearbox PAT-B Series

Model Number

	Series	Frame No.	Type	Ratio	Output shaft	Backlash	Mount code								
Straight Type (S)	PAT-B	120	S	003	K	P1	B3D								
	B Series (Basic)	120/160 (16A)/220 (22 A)/320 400/550 750	S: In line	1 stage: 3, 4, 5 7, 9, 10 2 stages: 15, 20, 25 30, 35, 40 50, 70, 100	K: with key (Standard) S: Smooth	<table border="1"> <thead> <tr> <th></th> <th>1 stage</th> <th>2 stages</th> </tr> </thead> <tbody> <tr> <td>P1: Reduced</td> <td>≤ 3 arcmin</td> <td>≤ 5 arcmin</td> </tr> <tr> <td>P2: Standard</td> <td>≤ 5 arcmin</td> <td>≤ 7 arcmin</td> </tr> </tbody> </table>		1 stage	2 stages	P1: Reduced	≤ 3 arcmin	≤ 5 arcmin	P2: Standard	≤ 5 arcmin	≤ 7 arcmin
	1 stage	2 stages													
P1: Reduced	≤ 3 arcmin	≤ 5 arcmin													
P2: Standard	≤ 5 arcmin	≤ 7 arcmin													
Right Angle Type (R)	PAT-B	220	R	100	K	P1	K3Y								
	B Series (Basic)	120/160 220/320 400/550 750	R: Right angle	1 stage: 3, 4, 5 7, 9, 10 14, 20 2 stages: 25, 30, 40 50, 70, 100, 140, 200	K: with key (Standard) S: Smooth	<table border="1"> <thead> <tr> <th></th> <th>1 stage</th> <th>2 stages</th> </tr> </thead> <tbody> <tr> <td>P1: Reduced</td> <td>≤ 4 arcmin</td> <td>≤ 7 arcmin</td> </tr> <tr> <td>P2: Standard</td> <td>≤ 6 arcmin</td> <td>≤ 9 arcmin</td> </tr> </tbody> </table>		1 stage	2 stages	P1: Reduced	≤ 4 arcmin	≤ 7 arcmin	P2: Standard	≤ 6 arcmin	≤ 9 arcmin
	1 stage	2 stages													
P1: Reduced	≤ 4 arcmin	≤ 7 arcmin													
P2: Standard	≤ 6 arcmin	≤ 9 arcmin													

* Frames 16A and 22A are exclusively for double reduction models. Contact us for characteristics, dimensions, etc.

Standard Package

Type	In line: S		Right angle: R	
Ratio (Actual ratio)	1 stage	2 stages	1 stage	2 stages*
	1/3, 1/4, 1/5, 1/7, 1/9, 1/10	1/15, 1/20, 1/25, 1/30, 1/35, 1/40, 1/50, 1/70 1/100	1/3, 1/4, 1/5, 1/7, 1/9, 1/10, 1/14, 1/20	1/25, 1/30, 1/40, 1/50, 1/70, 1/100, 1/140, 1/200
Backlash	P1: Reduced, ≤ 3 arcmin P2: Standard ≤ 5 arcmin	P1: Reduced, ≤ 5 arcmin P2: Standard ≤ 7 arcmin	P1: Reduced, ≤ 4 arcmin P2: Standard ≤ 6 arcmin	P1: Reduced, ≤ 7 arcmin P2: Standard ≤ 9 arcmin
	Helical planetary mechanism		Helical planetary mechanism	Right angle: spiral bevel gear
Reduction method				
Lubrication	Synthetic gear grease (NYOGEL 792D)			
Output shaft key	JIS B1301-1976			
Noise level (1 m)	PAT-B120: ≤ 56 dB (A scale)		PAT-B120: ≤ 61 dB (A scale)	
	PAT-B160: ≤ 58 dB (A scale)		PAT-B160: ≤ 63 dB (A scale)	
	PAT-B220: ≤ 60 dB (A scale)		PAT-B220: ≤ 65 dB (A scale)	
	PAT-B320: ≤ 63 dB (A scale)		PAT-B320: ≤ 68 dB (A scale)	
	PAT-B400: ≤ 65 dB (A scale)		PAT-B400: ≤ 70 dB (A scale)	
	PAT-B550: ≤ 67 dB (A scale)		PAT-B550: ≤ 72 dB (A scale)	
Torsional rigidity N-m/arcmin (Representative)	PAT-B120: 3		PAT-B120: 3	
	PAT-B160: 7		PAT-B160: 7	
	PAT-B220: 14		PAT-B220: 14	
	PAT-B320: 25		PAT-B320: 25	
	PAT-B400: 50		PAT-B400: 50	
	PAT-B550: 145		PAT-B550: 145	
Installation place	Indoors			
Ambient temperature	-10 to 40 °C			
Ambient humidity	85 % or less (no condensation)			
Altitude	No more than 1,000 m above sea level			
Atmosphere	Area must be free of corrosive and explosive gases and steam.			
Mounting direction	Mounts on any angle.			

* PAT-B120R: ratio 1/14 supplied as 1/15 and is 2 stages. Also, ratio 1/20 is 2 stages.

Models / Specification Table

Models / In line Type <S>

Frame No.	1 stage						2 stages								
	3	4	5	7	9	10	15	20	25	30	35	40	50	70	100
PAT-B120	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PAT-B160	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PAT-B220	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PAT-B320	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PAT-B400	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PAT-B550	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PAT-B750	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Specification Table / In line Type <S>

Ratio	Frame No.	Nominal output torque T _{2N} (Nm)	Max output torque T _{2B} (Nm)	Max radial load F _{2rB} (N)	Max axial load F _{2aB} (N)	Moment of inertia on input shaft (kg·cm ²)	Nominal input speed n _{1N} (r/min)	Max. input speed n _{1B} (r/min)
1/3	PAT-B120	8.5	25.5	610	302	0.03	3000	6000
	PAT-B160	28.1	84.3	2900	1450	0.16	3000	6000
	PAT-B220	76.3	228	4500	2250	0.61	3000	6000
	PAT-B320	160	480	7800	3900	3.25	3000	6000
	PAT-B400	315	945	9450	4725	9.21	3000	6000
	PAT-B550	583	1749	15600	7800	28.98	3000	6000
	PAT-B750	1057	3171	46000	23000	69.61	2000	4000
1/4	PAT-B120	7.7	23.1	610	302	0.03	3000	6000
	PAT-B160	25.5	76.5	2900	1450	0.14	3000	6000
	PAT-B220	69.5	208	4500	2250	0.48	3000	6000
	PAT-B320	146	438	7800	3900	2.74	3000	6000
	PAT-B400	288	864	9450	4725	7.54	3000	6000
	PAT-B550	535	1605	15600	7800	23.67	3000	6000
	PAT-B750	969	2907	46000	23000	54.37	2000	4000
1/5	PAT-B120	8.8	26.4	610	302	0.03	3000	6000
	PAT-B160	29.1	87.3	2900	1450	0.13	3000	6000
	PAT-B220	79.5	238	4500	2250	0.47	3000	6000
	PAT-B320	167	501	7800	3900	2.71	3000	6000
	PAT-B400	330	990	9450	4725	7.42	3000	6000
	PAT-B550	613	1839	15600	7800	23.29	3000	6000
	PAT-B750	1109	3327	46000	23000	53.27	2000	4000
1/7	PAT-B120	7.8	23.4	610	302	0.03	3000	6000
	PAT-B160	26.0	78.0	2900	1450	0.13	3000	6000
	PAT-B220	71.2	213	4500	2250	0.45	3000	6000
	PAT-B320	150	450	7800	3900	2.62	3000	6000
	PAT-B400	297	891	9450	4725	7.14	3000	6000
	PAT-B550	553	1659	15600	7800	22.48	3000	6000
	PAT-B750	1000	3000	46000	23000	50.97	2000	4000
1/9	PAT-B120	6.7	20.1	610	302	0.03	3000	6000
	PAT-B160	22.4	67.2	2900	1450	0.13	3000	6000
	PAT-B220	61.3	183	4500	2250	0.44	3000	6000
	PAT-B320	129	387	7800	3900	2.57	3000	6000
	PAT-B400	257	771	9450	4725	7.04	3000	6000
	PAT-B550	479	1437	15600	7800	22.53	3000	6000
	PAT-B750	864	2592	46000	23000	50.63	2000	4000
1/10	PAT-B120	6.8	20.4	610	302	0.03	3000	6000
	PAT-B160	22.5	67.5	2900	1450	0.13	3000	6000
	PAT-B220	61.8	185	4500	2250	0.44	3000	6000
	PAT-B320	131	393	7800	3900	2.57	3000	6000
	PAT-B400	259	777	9450	4725	7.03	3000	6000
	PAT-B550	483	1449	15600	7800	22.51	3000	6000
	PAT-B750	872	2616	46000	23000	50.56	2000	4000
1/15	PAT-B120	8.5	25.5	610	302	0.03	3000	6000
	PAT-B160	28.1	84.3	2900	1450	0.03	3000	6000
	PAT-B220	76.3	228	4500	2250	0.13	3000	6000
	PAT-B320	160	480	7800	3900	0.47	3000	6000
	PAT-B400	315	945	9450	4725	2.71	3000	6000
	PAT-B550	583	1749	15600	7800	7.42	3000	6000
	PAT-B750	1057	3171	46000	23000	23.29	2000	4000
1/20	PAT-B120	7.7	23.1	610	302	0.03	3000	6000
	PAT-B160	25.5	76.5	2900	1450	0.03	3000	6000
	PAT-B220	69.5	208	4500	2250	0.13	3000	6000
	PAT-B320	146	438	7800	3900	0.47	3000	6000
	PAT-B400	288	864	9450	4725	2.71	3000	6000
	PAT-B550	535	1605	15600	7800	7.42	3000	6000
	PAT-B750	969	2907	46000	23000	23.29	2000	4000

Ratio	Frame No.	Nominal output torque T _{2N} (Nm)	Max output torque T _{2B} (Nm)	Max radial load F _{2rB} (N)	Max axial load F _{2aB} (N)	Moment of inertia on input shaft (kg·cm ²)	Nominal input speed n _{1N} (r/min)	Max. input speed n _{1B} (r/min)
1/25	PAT-B120	8.8	26.4	610	302	0.03	3000	6000
	PAT-B160	29.1	87.3	2900	1450	0.03	3000	6000
	PAT-B220	79.5	238	4500	2250	0.13	3000	6000
	PAT-B320	167	501	7800	3900	0.47	3000	6000
	PAT-B400	330	990	9450	4725	2.71	3000	6000
	PAT-B550	613	1839	15600	7800	7.42	3000	6000
	PAT-B750	1109	3327	46000	23000	23.29	2000	4000
1/30	PAT-B120	8.0	24.0	610	302	0.03	3000	6000
	PAT-B160	26.6	79.8	2900	1450	0.03	3000	6000
	PAT-B220	72.6	217	4500	2250	0.13	3000	6000
	PAT-B320	153	459	7800	3900	0.47	3000	6000
	PAT-B400	302	906	9450	4725	2.71	3000	6000
	PAT-B550	562	1686	15600	7800	7.42	3000	6000
	PAT-B750	1016	3048	46000	23000	23.29	2000	4000
1/35	PAT-B120	7.8	23.4	610	302	0.03	3000	6000
	PAT-B160	26.0	78.0	2900	1450	0.03	3000	6000
	PAT-B220	71.2	213	4500	2250	0.13	3000	6000
	PAT-B320	150	450	7800	3900	0.47	3000	6000
	PAT-B400	297	891	9450	4725	2.71	3000	6000
	PAT-B550	553	1659	15600	7800	7.42	3000	6000
	PAT-B750	1000	3000	46000	23000	23.29	2000	4000
1/40	PAT-B120	7.2	21.6	610	302	0.03	3000	6000
	PAT-B160	23.8	71.4	2900	1450	0.03	3000	6000
	PAT-B220	65.3	195	4500	2250	0.13	3000	6000
	PAT-B320	138	414	7800	3900	0.47	3000	6000
	PAT-B400	273	819	9450	4725	2.71	3000	6000
	PAT-B550	509	1527	15600	7800	7.42	3000	6000
	PAT-B750	919	2757	46000	23000	23.29	2000	4000
1/50	PAT-B120	8.8	26.4	610	302	0.03	3000	6000
	PAT-B160	29.1	87.3	2900	1450	0.03	3000	6000
	PAT-B220	79.5	238	4500	2250	0.13	3000	6000
	PAT-B320	167	501	7800	3900	0.44	3000	6000
	PAT-B400	330	990	9450	4725	2.57	3000	6000
	PAT-B550	613	1839	15600	7800	7.03	3000	6000
	PAT-B750	1109	3327	46000	23000	22.51	2000	4000
1/70	PAT-B120	7.8	23.4	610	302	0.03	3000	6000
	PAT-B160	26.0	78.0	2900	1450	0.03	3000	6000
	PAT-B220	71.2	213	4500	2250	0.13	3000	6000
	PAT-B320	150	450	7800	3900	0.44	3000	6000
	PAT-B400	297	891	9450	4725	2.57	3000	6000
	PAT-B550	553	1659	15600	7800	7.03	3000	6000
	PAT-B750	1000	3000	46000	23000	22.51	2000	4000
1/100	PAT-B120	6.8	20.4	610	302	0.03	3000	6000
	PAT-B160	22.5	67.5	2900	1450	0.03	3000	6000
	PAT-B220	61.8	185	4500	2250	0.13	3000	6000
	PAT-B320	131	393	7800	3900	0.44	3000	6000
	PAT-B400	259	777	9450	4725	2.57	3000	6000
	PAT-B550	483	1449	15600	7800	7.03	3000	6000
	PAT-B750	872	2616	46000	23000	22.51	2000	4000

· F_{2rB} and F_{2aB} represent the values at the center of the output shaft rotating at 100 r/min.

High Precision Planetary Gearbox PAT-B Series

Models / Right Angle Type <S>

Frame No.	1 stage								2 stages									
	3	4	5	7	9	10	14	20	15	20	25	30	40	50	70	100	140	200
PAT-B120	○	○	○	○	○	○	-	-	○	○	○	○	○	○	○	-	-	-
PAT-B160	○	○	○	○	○	○	○	○	-	-	○	○	○	○	○	-	-	-
PAT-B220	○	○	○	○	○	○	○	○	-	-	○	○	○	○	○	○	○	○
PAT-B320	○	○	○	○	○	○	○	○	-	-	○	○	○	○	○	○	○	○
PAT-B400	○	○	○	○	○	○	○	○	-	-	○	○	○	○	○	○	○	○
PAT-B550	○	○	○	○	○	○	○	○	-	-	○	○	○	○	○	○	○	○
PAT-B750	○	○	○	○	○	○	○	○	-	-	○	○	○	○	○	○	○	○

Specification Table / Right Angle Type <R>

Ratio	Frame No.	Nominal output torque T _{2N} (Nm)	Max output torque T _{2B} (Nm)	Max radial load F _{2rB} (N)	Max axial load F _{2aB} (N)	Moment of inertia on input shaft (kg·cm ²)	Nominal input speed n _{1N} (r/min)	Max. input speed n _{1B} (r/min)
1/3	PAT-B120	8.5	25.5	610	302	0.09	3000	6000
	PAT-B160	28.1	84.3	2900	1450	0.35	3000	6000
	PAT-B220	76.3	228	4500	2250	2.25	3000	6000
	PAT-B320	160	480	7800	3900	6.84	3000	6000
	PAT-B400	315	945	9450	4725	23.4	3000	6000
	PAT-B550	583	1749	15600	7800	68.9	3000	6000
	PAT-B750	1057	3171	46000	23000	135.4	2000	4000
1/4	PAT-B120	7.7	23.1	610	302	0.09	3000	6000
	PAT-B160	25.5	76.5	2900	1450	0.35	3000	6000
	PAT-B220	69.5	208	4500	2250	2.25	3000	6000
	PAT-B320	146	438	7800	3900	6.84	3000	6000
	PAT-B400	288	864	9450	4725	23.4	3000	6000
	PAT-B550	535	1605	15600	7800	68.9	3000	6000
	PAT-B750	969	2907	46000	23000	135.4	2000	4000
1/5	PAT-B120	8.8	26.4	610	302	0.09	3000	6000
	PAT-B160	29.1	87.3	2900	1450	0.35	3000	6000
	PAT-B220	79.5	238	4500	2250	2.25	3000	6000
	PAT-B320	167	501	7800	3900	6.84	3000	6000
	PAT-B400	330	990	9450	4725	23.4	3000	6000
	PAT-B550	613	1839	15600	7800	68.9	3000	6000
	PAT-B750	1109	3327	46000	23000	135.4	2000	4000
1/7	PAT-B120	7.8	23.4	610	302	0.09	3000	6000
	PAT-B160	26.0	78.0	2900	1450	0.35	3000	6000
	PAT-B220	71.2	213	4500	2250	2.25	3000	6000
	PAT-B320	150	450	7800	3900	6.84	3000	6000
	PAT-B400	297	891	9450	4725	23.4	3000	6000
	PAT-B550	553	1659	15600	7800	68.9	3000	6000
	PAT-B750	1000	3000	46000	23000	135.4	2000	4000
1/9	PAT-B120	6.7	20.1	610	302	0.09	3000	6000
	PAT-B160	22.4	67.2	2900	1450	0.35	3000	6000
	PAT-B220	61.3	183	4500	2250	2.25	3000	6000
	PAT-B320	129	387	7800	3900	6.84	3000	6000
	PAT-B400	257	771	9450	4725	23.4	3000	6000
	PAT-B550	479	1437	15600	7800	68.9	3000	6000
	PAT-B750	864	2592	46000	23000	135.4	2000	4000
1/10	PAT-B120	6.8	20.4	610	302	0.09	3000	6000
	PAT-B160	22.5	67.5	2900	1450	0.35	3000	6000
	PAT-B220	61.8	185	4500	2250	2.25	3000	6000
	PAT-B320	131	393	7800	3900	6.84	3000	6000
	PAT-B400	259	777	9450	4725	23.4	3000	6000
	PAT-B550	483	1449	15600	7800	68.9	3000	6000
	PAT-B750	872	2616	46000	23000	135.4	2000	4000
1/14	PAT-B160	26.0	78.0	2900	1450	0.07	3000	6000
	PAT-B220	71.2	213	4500	2250	1.87	3000	6000
	PAT-B320	150	450	7800	3900	6.25	3000	6000
	PAT-B400	297	891	9450	4725	21.8	3000	6000
	PAT-B550	553	1659	15600	7800	65.6	3000	6000
	PAT-B750	1000	3000	46000	23000	119.8	2000	4000
1/15	PAT-B120	8.5	25.5	610	302	0.09	3000	6000
1/20	PAT-B120	7.7	23.1	610	302	0.09	3000	6000
	PAT-B160	22.5	67.5	2900	1450	0.07	3000	6000
	PAT-B220	61.8	185	4500	2250	1.87	3000	6000
	PAT-B320	131	393	7800	3900	6.25	3000	6000
	PAT-B400	259	777	9450	4725	21.8	3000	6000
	PAT-B550	483	1449	15600	7800	65.6	3000	6000
PAT-B750	872	2616	46000	23000	119.8	2000	4000	

Ratio	Frame No.	Nominal output torque T _{2N} (Nm)	Max output torque T _{2B} (Nm)	Max radial load F _{2rB} (N)	Max axial load F _{2aB} (N)	Moment of inertia on input shaft (kg·cm ²)	Nominal input speed n _{1N} (r/min)	Max. input speed n _{1B} (r/min)
1/25	PAT-B120	8.8	26.4	610	302	0.09	3000	6000
	PAT-B160	29.1	87.3	2900	1450	0.35	3000	6000
	PAT-B220	79.5	238	4500	2250	2.25	3000	6000
	PAT-B320	167	501	7800	3900	6.84	3000	6000
	PAT-B400	330	990	9450	4725	23.4	3000	6000
	PAT-B550	613	1839	15600	7800	68.9	3000	6000
	PAT-B750	1109	3327	46000	23000	135.4	2000	4000
1/30	PAT-B120	8.0	24.0	610	302	0.09	3000	6000
	PAT-B160	26.6	79.8	2900	1450	0.35	3000	6000
	PAT-B220	72.6	217	4500	2250	2.25	3000	6000
	PAT-B320	153	459	7800	3900	6.84	3000	6000
	PAT-B400	302	906	9450	4725	23.4	3000	6000
	PAT-B550	562	1686	15600	7800	68.9	3000	6000
	PAT-B750	1016	3048	46000	23000	135.4	2000	4000
1/40	PAT-B120	7.2	21.6	610	302	0.09	3000	6000
	PAT-B160	23.8	71.4	2900	1450	0.35	3000	6000
	PAT-B220	65.3	195	4500	2250	2.25	3000	6000
	PAT-B320	138	414	7800	3900	6.84	3000	6000
	PAT-B400	273	819	9450	4725	23.4	3000	6000
	PAT-B550	509	1527	15600	7800	68.9	3000	6000
	PAT-B750	919	2757	46000	23000	135.4	2000	4000
1/50	PAT-B120	8.8	26.4	610	302	0.09	3000	6000
	PAT-B160	29.1	87.3	2900	1450	0.35	3000	6000
	PAT-B220	79.5	238	4500	2250	2.25	3000	6000
	PAT-B320	167	501	7800	3900	6.84	3000	6000
	PAT-B400	330	990	9450	4725	23.4	3000	6000
	PAT-B550	613	1839	15600	7800	68.9	3000	6000
	PAT-B750	1109	3327	46000	23000	135.4	2000	4000
1/70	PAT-B120	7.8	23.4	610	302	0.09	3000	6000
	PAT-B160	26.0	78.0	2900	1450	0.35	3000	6000
	PAT-B220	71.2	213	4500	2250	2.25	3000	6000
	PAT-B320	150	450	7800	3900	6.84	3000	6000
	PAT-B400	297	891	9450	4725	23.4	3000	6000
	PAT-B550	553	1659	15600	7800	68.9	3000	6000
	PAT-B750	1000	3000	46000	23000	135.4	2000	4000
1/100	PAT-B120	6.8	20.4	610	302	0.09	3000	6000
	PAT-B160	22.5	67.5	2900	1450	0.35	3000	6000
	PAT-B220	61.8	185	4500	2250	2.25	3000	6000
	PAT-B320	131	393	7800	3900	6.84	3000	6000
	PAT-B400	259	777	9450	4725	23.4	3000	6000
	PAT-B550	483	1449	15600	7800	68.9	3000	6000
	PAT-B750	872	2616	46000	23000	135.4	2000	4000
1/140	PAT-B220	71.2	213	4500	2250	0.31	3000	6000
	PAT-B320	150	450	7800	3900	1.87	3000	6000
	PAT-B400	297	891	9450	4725	6.25	3000	6000
	PAT-B550	553	1659	15600	7800	21.8	3000	6000
1/200	PAT-B750	1000	3000	46000	23000	65.6	2000	4000
	PAT-B220	61.8	185	4500	2250	0.31	3000	6000
	PAT-B320	131	393	7800	3900	1.87	3000	6000
	PAT-B400	259	777	9450	4725	6.25	3000	6000
1/200	PAT-B550	483	1449	15600	7800	21.8	3000	6000
	PAT-B750	872	2616	46000	23000	65.6	2000	4000

• F_{2rB} and F_{2aB} represent the values at the center of the output shaft rotating at 100 r/min.

Easy Sizing Website (Selection tool)

Our website provides a tool for easily selecting a gearbox by servo motor model numbers from various manufacturers. The site also provides downloadable PDF drawings and CAD file drawings in DXF and 3D formats. (Available in Japanese only)

<http://www.tsubakimoto.jp/power-transmission/reducer-variable-speed-drive/servo-moter/reducer/>

Click here !!

http://tt-net.tsubakimoto.co.jp/tecs/calc/gen/calc_gan_pat.asp

Motor Matching Table

Panasonic Motors

● MINAS A4 Series MSMD

Motor model numbers	Rated output kW	Gearbox frame No.	In line type (S)														Right angle type (R)																					
			1 stage							2 stages							1 stage							2 stages														
			Mount code	Ratio					Mount code	Ratio					Mount code	Ratio					Mount code	Ratio																
			3	4	5	7	9	10		15	20	25	30	35	40	50	70	100		3	4	5	7	9	10	14	20		15	20	25	30	40	50	70	100	140	200
MSMD5A	0.05	120	B2D						B2D						B2D						B2D						B2D											
		160																																				
MSMD01	0.1	120	B2D						B2D						B2D						B2D						B2D											
		160																																				
MSMD02	0.2	120	E3G						E3G						E3G						E3G						E3G											
		160																																				
		220																																				
MSMD04	0.4	160	E3H						E3H						E3H						E3H						E3H											
		16A																																				
		220																																				
MSMD08	0.75	220	G4L						G4L						G4L						G4L						G4L											
		22A																																				
		320																																				

● MINAS A4 Series MSMA

Motor model numbers	Rated output kW	Gearbox frame No.	In line type (S)														Right angle type (R)																					
			1 stage							2 stages							1 stage							2 stages														
			Mount code	Ratio					Mount code	Ratio					Mount code	Ratio					Mount code	Ratio																
			3	4	5	7	9	10		15	20	25	30	35	40	50	70	100		3	4	5	7	9	10	14	20		15	20	25	30	40	50	70	100	140	200
MSMA08	0.75	220	G4L						G4L						G4L						G4L						G4L											
		22A																																				
		320																																				
MSMA10	1	220	H4L						H4L						H4L						H4L						H4L											
		22A																																				
		320																																				
MSMA15	1.5	220	J4L						J4L						J4L						J4L						J4L											
		22A																																				
		320																																				
MSMA20	2	220	J4L						J4L						J4L						J4L						J4L											
		320																																				
		400																																				
MSMA25	2.5	220	J4L						J4L						J4L						J4L						J4L											
		320																																				
		400																																				
MSMA30	3	220	K3M						K3M						K3M						K3M						K3M											
		320																																				
		400																																				
MSMA35	3.5	220	K3M						K3M						K3M						K3M						K3M											
		320																																				
		400																																				
MSMA40	4	220	K4Y						K4Y						K4Y						K4Y						K4Y											
		320																																				
		400																																				
MSMA45	4.5	220	K4Y						K4Y						K4Y						K4Y						K4Y											
		320																																				
		400																																				
MSMA50	5	220	K4Y						K4Y						K4Y						K4Y						K4Y											
		320																																				
		400																																				

● MINAS A4 Series MDMA

Motor model numbers	Rated output kW	Gearbox frame No.	In line type (S)														Right angle type (R)																					
			1 stage							2 stages							1 stage							2 stages														
			Mount code	Ratio					Mount code	Ratio					Mount code	Ratio					Mount code	Ratio																
			3	4	5	7	9	10		15	20	25	30	35	40	50	70	100		3	4	5	7	9	10	14	20		15	20	25	30	40	50	70	100	140	200
MDMA08	0.75	220	K3L						K3L						K3L						K3L						K3L											
		22A																																				
		320																																				
		400																																				
MDMA10	1	220	K3M						K3M						K3M						K3M						K3M											
		22A																																				
		320																																				
		400																																				
		550																																				
MDMA15	1.5	220	K3M						K3M						K3M						K3M						K3M											
		320																																				
		400																																				
		550																																				
MDMA20	2	220	K3M						K3M						K3M						K3M						K3M											
		320																																				
		400																																				
		550																																				
MDMA25	2.5	220	K4Y						K4Y						K4Y						K4Y						K4Y											
		320																																				
		400																																				
		550																																				
MDMA30	3	220	K4Y						K4Y						K4Y						K4Y						K4Y											
		320																																				
		400																																				
		550																																				
MDMA35	3.5	320	M3P						M3P						M3P						M3P						M3P											
		400																																				
		550																																				
		750																																				
MDMA40	4	320	M3P						M3P						M3P						M3P						M3P											
		400																																				
		550																																				
		750																																				
MDMA45	4.5	400	L1R						L1R						L1R						L1R						L1R											
		550																																				
		750																																				
MDMA50	5	400	L1R						L1R						L1R						L1R						L1R											
		550																																				
		750																																				
MDMA75	7.5	550	L2S						L2S						L2S						L2S						L2S											
		750																																				

Note) // : Motor torque limit is required. Use only within the gearbox's performance.

Keyence Motors

● MV Series

Motor model numbers	Rated output kW	Gearbox frame No.	In line type (S)													Right angle type (R)																			
			Mount code	1 stage Ratio					Mount code	2 stages Ratio						Mount code	1 stage Ratio					Mount code	2 stages Ratio												
				3	4	5	7	9		10	15	20	25	30	35		40	50	70	100	3		4	5	7	9	10	14	20	15	20	25	30	40	50
MV-M05 (B05)	0.05	120	B3D							B3D											B3D														
		160	B3D							B3D											B3D														
		220								B3D											B3D														
MV-M10 (B10)	0.1	120	B3D							B3D											B3D														
		160	B3D							B3D											B3D														
		220								B3D											B3D														
MV-M20 (B20)	0.2	160	E4H							E4H											E4H														
		16A								E4H											E4H														
		220								E4H											E4H														
MV-M40 (B40)	0.4	160	E4H							E4H											E4H														
		16A								E4H											E4H														
		220								E4H											E4H														
MV-M75 (B75)	0.75	160	G4K							G4K											G4K														
		220	G4K							G4K											G4K														
		320								G4K											G4K														

● SV Series

Motor model numbers	Rated output kW	Gearbox frame No.	In line type (S)													Right angle type (R)																		
			Mount code	1 stage Ratio					Mount code	2 stages Ratio						Mount code	1 stage Ratio					Mount code	2 stages Ratio											
				3	4	5	7	9		10	15	20	25	30	35		40	50	70	100	3		4	5	7	9	10	14	20	15	20	25	30	40
SV-M005 (B005)	0.05	120	B3D							B3D											B3D													
		160	B3D							B3D											B3D													
		220								B3D											B3D													
SV-M010 (B010)	0.1	120	B3D							B3D											B3D													
		160	B3D							B3D											B3D													
		220								B3D											B3D													
SV-M020 (B020)	0.2	160	E4H							E4H											E4H													
		16A								E4H											E4H													
		220								E4H											E4H													
SV-M040 (B040)	0.4	160	E4H							E4H											E4H													
		16A								E4H											E4H													
		220								E4H											E4H													
SV-M075 (B075)	0.75	220	G5L							G5L											G5L													
		22A								G5L											G5L													
		320								G5L											G5L													
SV-M100A (B100A)	0.85	220	K3L							K3L											K3L													
		22A								K3L											K3L													
		320	K4L							K3L											K3L													
		400	K3L							K4L											K4L													
		550								K3L											K3L													
SV-M150A (B150A)	1.3	220	K3M							K3M											K3M													
		320	K4M							K3M											K4M													
		400	K3M							K4M											K3M													
		550								K3M											K3M													
SV-M200A (B200A)	1.8	220	K3Y							K3Y											K3Y													
		320	K4Y							K3Y											K4Y													
		400	K3Y							K4Y											K3Y													
		550								K3Y											K3Y													
SV-M300A (B300A)	2.9	400	L1R							L1R											L1R													
		550	L1R							L1R											L1R													
		750								L1R											L1R													
SV-M500A (B500A)	4.4	400	L1R							L1R											L1R													
		550	L1R							L1R											L1R													
		750								L1R											L1R													

Note) // : Motor torque limit is required. Use only within the gearbox's performance.

Nikki Denso Motors

● NA100 Series (Rated speed 1000 r/min)

Motor model numbers	Rated output kW	Gearbox frame No.	In line type (S)										Right angle type (R)																												
			1 stage					2 stages					1 stage					2 stages																							
			Mount code	3	4	5	7	9	10	Mount code	15	20	25	30	35	40	50	70	100	Mount code	3	4	5	7	9	10	14	20	Mount code	15	20	25	30	40	50	70	100	140	200		
NA100-110F(B)-10	1.2	320 400 550	Z9P Z9P Z9P								Z9P									Z9P Z9P											Z9P	-	-								
NA100-180F(B)-10	1.9	320 400 550 750	Z9P Z9P Z9P Z9P								Z9P									Z9P Z9P Z9P											Z9P	-	-								
NA100-270F(B)-10	2.8	400 550 750	Z9Z Z9Z Z9Z								Z9Z									Z9Z Z9Z											Z9Z	-	-								
NA100-370F(B)-10	3.7	400 550 750	Z9Z Z9Z Z9Z								Z9Z									Z9Z Z9Z											Z9Z	-	-								
NA100-550F(B)-10	5.5	550 750	Z9S Z9S								Z9S									Z9S											Z9S	-	-								
NA100-750F(B)-10	7.5	550 750	Z9Z Z9Z								Z9Z									Z9Z											Z9Z	-	-								
NA100-1100F(B)-10	11	750	Z9Z								Z9Z									Z9Z											Z9Z	-	-								

● NA100 Series (Rated speed 2000 r/min)

Motor model numbers	Rated output kW	Gearbox frame No.	In line type (S)										Right angle type (R)																												
			1 stage					2 stages					1 stage					2 stages																							
			Mount code	3	4	5	7	9	10	Mount code	15	20	25	30	35	40	50	70	100	Mount code	3	4	5	7	9	10	14	20	Mount code	15	20	25	30	40	50	70	100	140	200		
NA100-110F(B)	2.2	320 400 550	Z9P Z9P Z9P								Z9P									Z9P Z9P											Z9P	-	-								
NA100-180F(B)	3.7	320 400 550 750	Z9P Z9P Z9P Z9P								Z9P									Z9P Z9P Z9P											Z9P	-	-								
NA100-270F(B)	5.5	400 550 750	Z9Z Z9Z Z9Z								Z9Z									Z9Z Z9Z											Z9Z	-	-								
NA100-370F(B)	7.5	400 550 750	Z9Z Z9Z Z9Z								Z9Z									Z9Z Z9Z											Z9Z	-	-								
NA100-550F(B)	11	550 750	Z9S Z9S								Z9S									Z9S											Z9S	-	-								
NA100-750F(B)	15	550 750	Z9Z Z9Z								Z9Z									Z9Z											Z9Z	-	-								
NA100-1100F(B)	22	750	Z9Z								Z9Z									Z9Z											Z9Z	-	-								

● NA80 Series

Motor model numbers	Rated output kW	Gearbox frame No.	In line type (S)										Right angle type (R)																												
			1 stage					2 stages					1 stage					2 stages																							
			Mount code	3	4	5	7	9	10	Mount code	15	20	25	30	35	40	50	70	100	Mount code	3	4	5	7	9	10	14	20	Mount code	15	20	25	30	40	50	70	100	140	200		
NA80-05	0.05	120 160 220	Z9D Z9D Z9D								Z9D									Z9D Z9D											Z9D	-	-								
NA80-10	0.1	120 160 220	Z9D Z9D Z9D								Z9D									Z9D Z9D											Z9D	-	-								
NA80-20	0.2	160 16A 220	Z9H Z9H Z9H								Z9H									Z9H											Z9H	-	-								
NA80-40	0.4	160 16A 220	Z9H Z9H Z9H								Z9H									Z9H											Z9H	-	-								
NA80-60	0.6	220 22A 320	Z9L Z9L Z9L								Z9L									Z9L											Z9L	-	-								
NA80-75	0.75	220 22A 320	Z9L Z9L Z9L								Z9L									Z9L											Z9L	-	-								

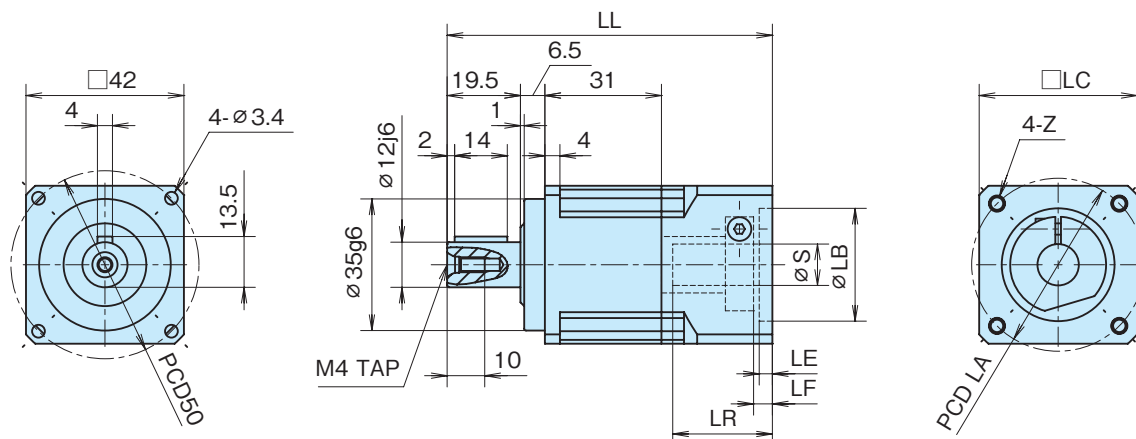
● NA800 Series

Motor model numbers	Rated output kW	Gearbox frame No.	In line type (S)										Right angle type (R)																												
			1 stage					2 stages					1 stage					2 stages																							
			Mount code	3	4	5	7	9	10	Mount code	15	20	25	30	35	40	50	70	100	Mount code	3	4	5	7	9	10	14	20	Mount code	15	20	25	30	40	50	70	100	140	200		
NA830-162	1.6	220 22A 320 400 550	Z9M Z9M Z9M Z9M Z9M								Z9M									Z9M Z9M											Z9M	-	-								
NA830-332	3.3	220 320 400 550	Z9M Z9M Z9M Z9M								Z9M									Z9M Z9M											Z9M	-	-								
NA820-402	4	320 400 550 750	Z9Q Z9Q Z9Q Z9Q								Z9Q									Z9Q Z9Q											Z9Q	-	-								
NA820-602	6	320 400 550 750	Z9Q Z9Q Z9Q Z9Q								Z9Q									Z9Q Z9Q											Z9Q	-	-								
NA820-752	7.5	320 400 550 750	Z9Q Z9Q Z9Q Z9Q								Z9Q									Z9Q Z9Q											Z9Q	-	-								
NA820-113	11	550 750	Z9S Z9S								Z9S									Z9S											Z9S	-	-								
NA820-153	15	550 750	Z9S Z9S								Z9S									Z9S											Z9S	-	-								

Note) // : Motor torque limit is required. Use only within the gearbox's performance.

Dimensions In line Type (S)

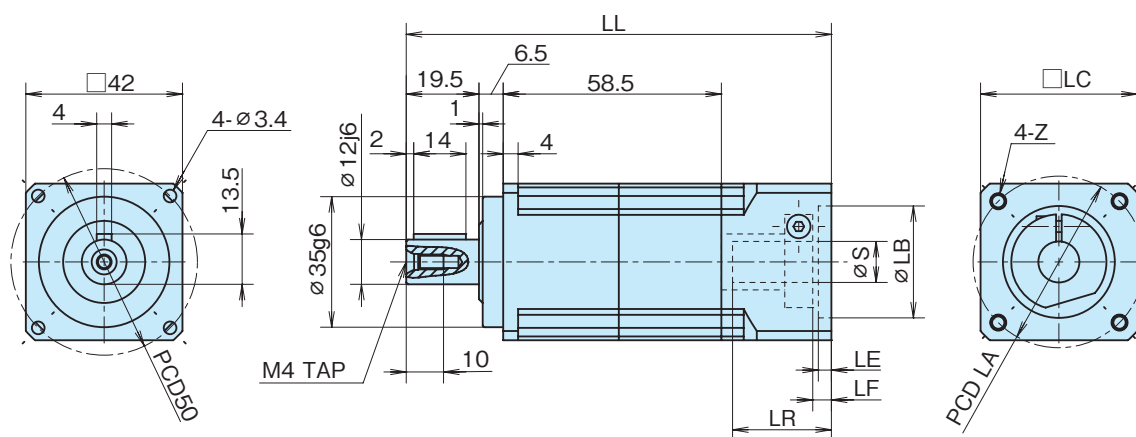
PAT – B 120 S 003 to 010 (1 stage) K P1 (P2) – Mount code



Mass: 0.6 kg

Mount code	LL	LC	LB	LE	S (Max. 11)	LR	LF	LA	Z
B2D	86.5	42	30	3.5	8	26.5	5	45	M3 6 deep
B3B	86.5	42	30	3.5	6	26.5	5	46	M4 9 deep
B3D	86.5	42	30	3.5	8	26.5	5	46	M4 9 deep

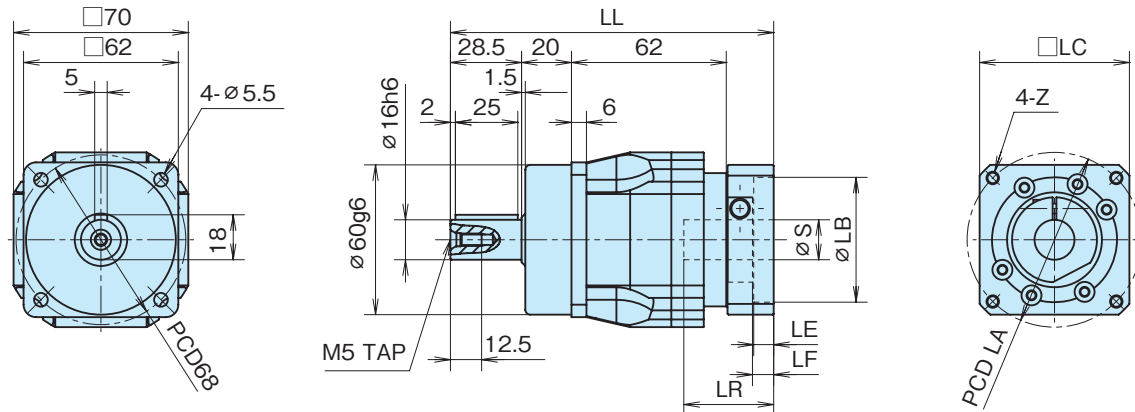
PAT – B 120 S 015 to 100 (2 stages) K P1 (P2) – Mount code



Mass: 0.8 kg

Mount code	LL	LC	LB	LE	S (Max. 11)	LR	LF	LA	Z
B2D	114	42	30	3.5	8	26.5	5	45	M3 6 deep
B3B	114	42	30	3.5	6	26.5	5	46	M4 9 deep
B3D	114	42	30	3.5	8	26.5	5	46	M4 9 deep

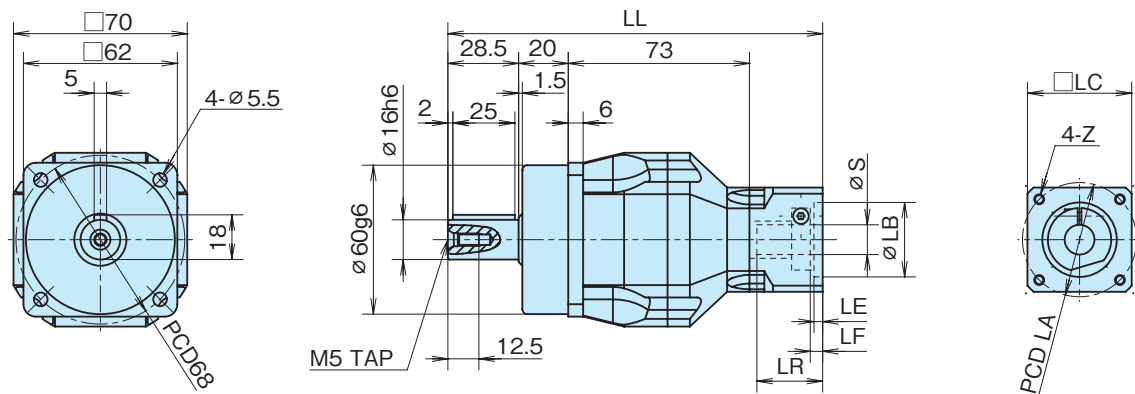
PAT – B 160 S 003 to 010 (1 stage) K P1 (P2) – Mount code



Mass: 1.7 kg

Mount code	LL	LC	LB	LE	S (Max. 14)	LR	LF	LA	Z
E3G	125.5	60	50	4	11	32	4.5	70	M4 9 deep
E4E	129.5	60	50	8	9	36	8.5	70	M5 10 deep
E4H	129.5	60	50	8	14	36	8.5	70	M5 10 deep

PAT – B 160 S 015 to 100 (2 stages) K P1 (P2) – Mount code

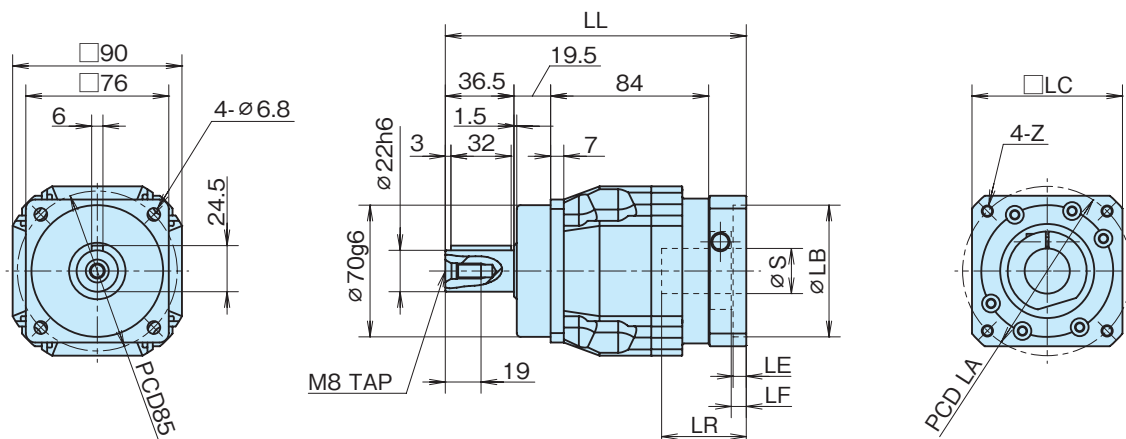


Mass: 2.0 kg

Mount code	LL	LC	LB	LE	S (Max. 11)	LR	LF	LA	Z
B2D	151	42	30	3.5	8	26.5	5	45	M3 6 deep
B3B	151	42	30	3.5	6	26.5	5	46	M4 9 deep
B3D	151	42	30	3.5	8	26.5	5	46	M4 9 deep

Dimensions In line Type (S)

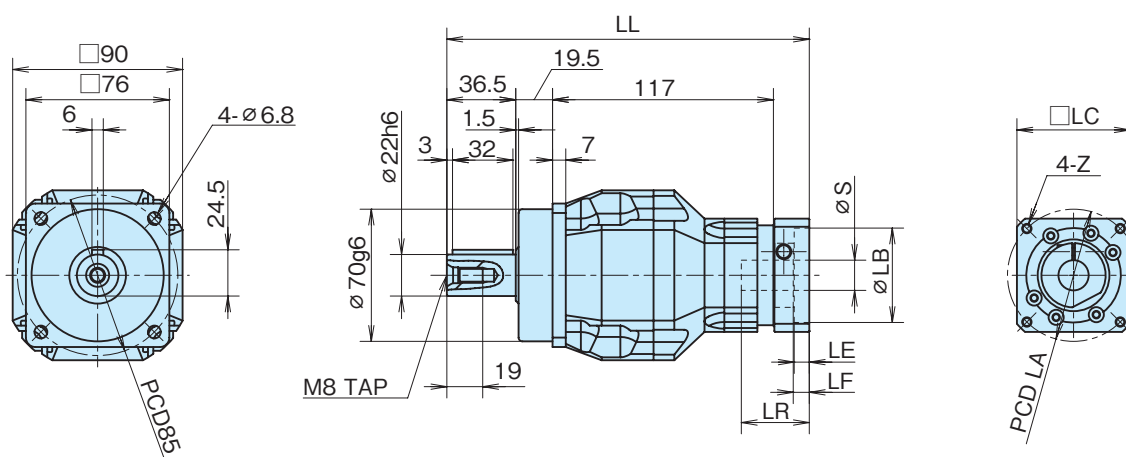
PAT – B 220 S 003 to 010 (1 stage) K P1 (P2) – Mount code



Mass: 3.5 kg

Mount code	LL	LC	LB	LE	S (Max. 19/24)	LR	LF	LA	Z
G4L	158.5	80	70	5.5	19	43.5	6.5	90	M5 10 deep
G5K	160	80	70	7	16	45	8	90	M6 12 deep
G5L	160	80	70	7	19	45	8	90	M6 12 deep
H4F	172	90	80	8	10	57	20	100	M6 12 deep
H1H	161	90	80	7.5	14	46	9	100	M6 12 deep
K3L	175	130	110	18	19	60	23	145	M8 15 deep
K3M	175	130	110	18	22	60	23	145	M8 15 deep
K3Y	175	130	110	18	24	60	23	145	M8 15 deep

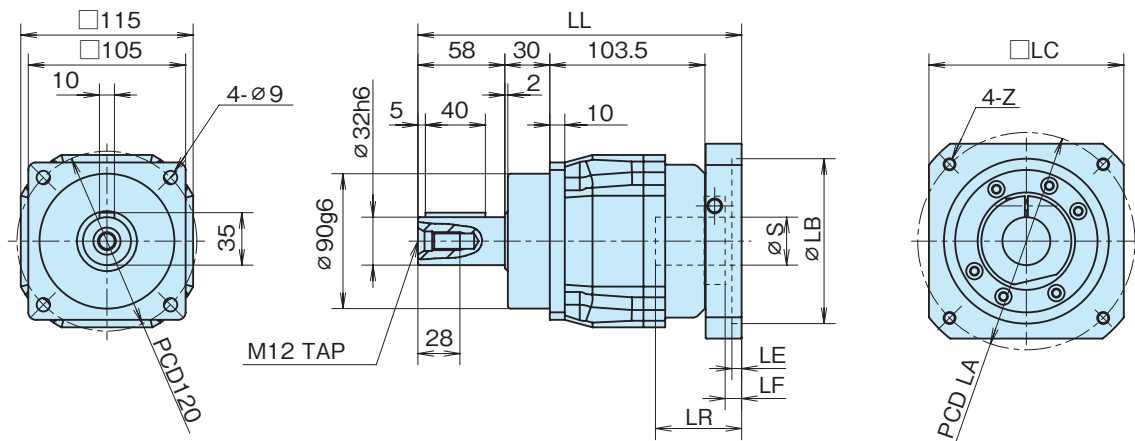
PAT – B 220 S 015 to 100 (2 stages) K P1 (P2) – Mount code



Mass: 4.0 kg

Mount code	LL	LC	LB	LE	S (Max. 14)	LR	LF	LA	Z
E3G	188	60	50	4	11	32	4.5	70	M4 9 deep
E4E	192	60	50	8	9	36	8.5	70	M5 10 deep
E4H	192	60	50	8	14	36	8.5	70	M5 10 deep

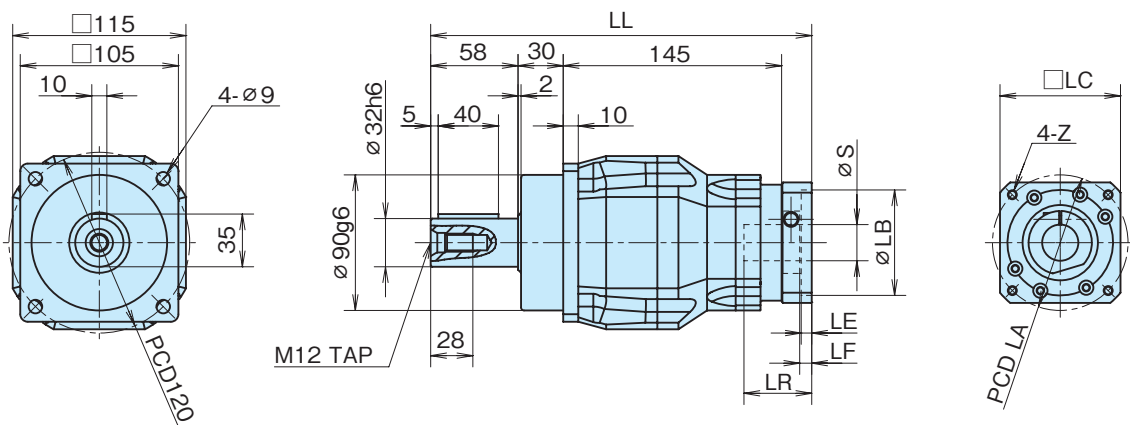
PAT – B 320 S 003 to 010 (1 stage) K P1 (P2) – Mount code



Mass: 7.4 kg

Mount code	LL	LC	LB	LE	S (Max. 32)	LR	LF	LA	Z
K3M	216	130	110	6.5	22	57.5	11	145	M8 15 deep
K3Y	216	130	110	6.5	24	57.5	11	145	M8 15 deep

PAT – B 320 S 015 to 100 (2 stages) K P1 (P2) – Mount code

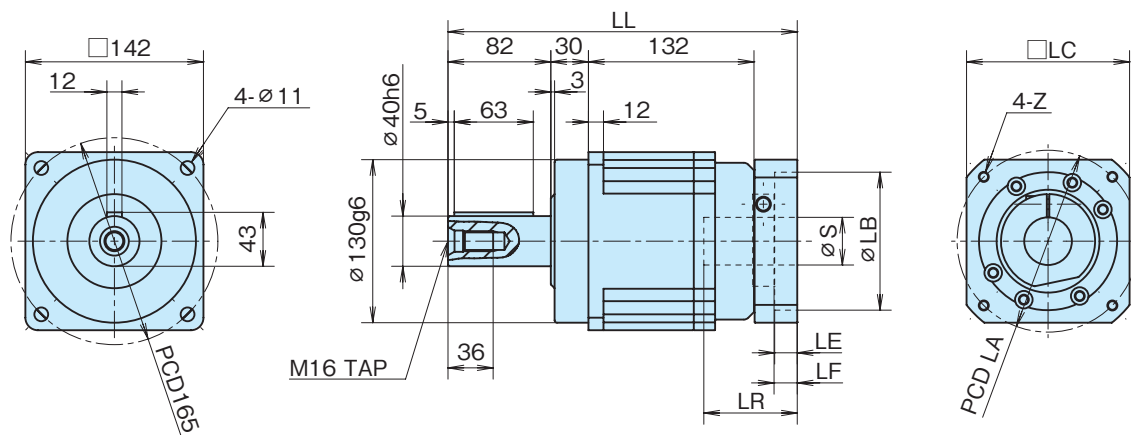


Mass: 9.0 kg

Mount code	LL	LC	LB	LE	S (Max. 19/24)	LR	LF	LA	Z
G4L	251.5	80	70	5.5	19	43.5	6.5	90	M5 10 deep
G5K	253	80	70	7	16	45	8	90	M6 12 deep
G5L	253	80	70	7	19	45	8	90	M6 12 deep
H4F	265	90	80	8	10	57	20	100	M6 12 deep
H1H	254	90	80	7.5	14	46	9	100	M6 12 deep
K3L	268	130	110	18	19	60	23	145	M8 15 deep
K3M	268	130	110	18	22	60	23	145	M8 15 deep
K3Y	268	130	110	18	24	60	23	145	M8 15 deep

Dimensions In line Type (S)

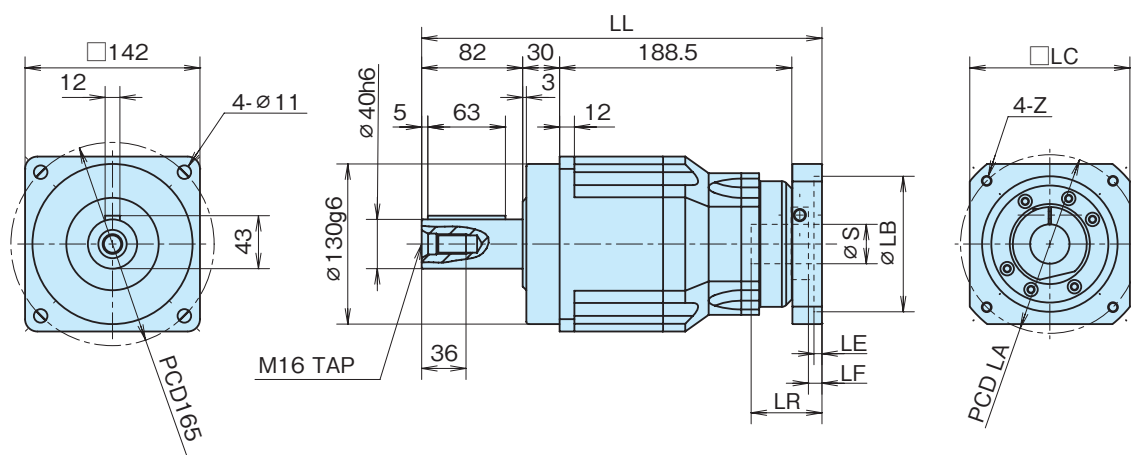
PAT – B 400 S 003 to 010 (1 stage) K P1 (P2) – Mount code



Mass: 15.8 kg

Mount code	LL	LC	LB	LE	S (Max. 38)	LR	LF	LA	Z
K3Y	278.5	130	110	18	24	74.5	18.5	145	M8 15 deep
L1R	286.5	176	114.3	6	35	82.5	26.5	200	M12 21 deep

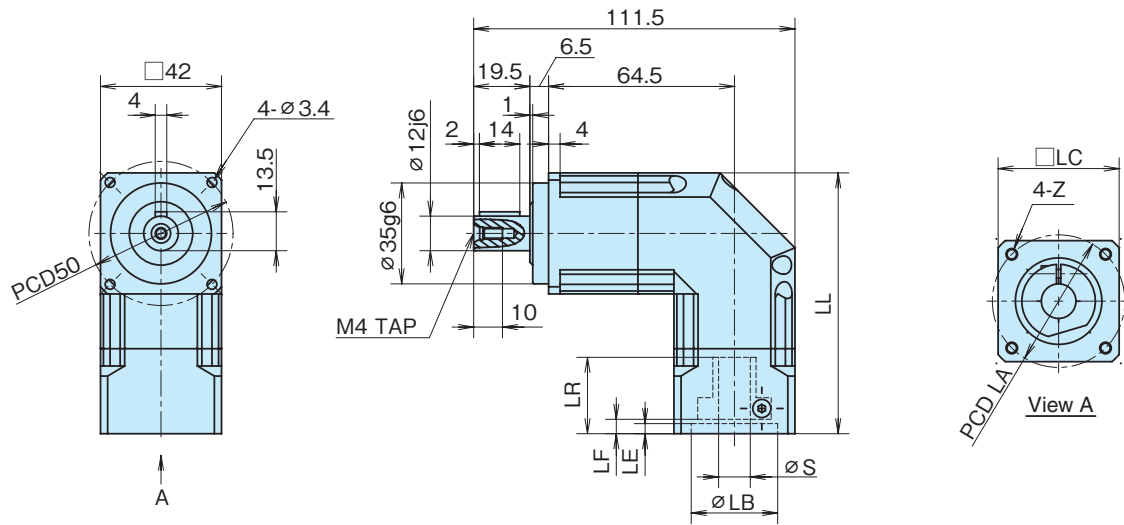
PAT – B 400 S 015 to 100 (2 stages) K P1 (P2) – Mount code



Mass: 19.1 kg

Mount code	LL	LC	LB	LE	S (Max. 32)	LR	LF	LA	Z
K3M	325	130	110	6.5	22	57.5	11	145	M8 15 deep
K3Y	325	130	110	6.5	24	57.5	11	145	M8 15 deep

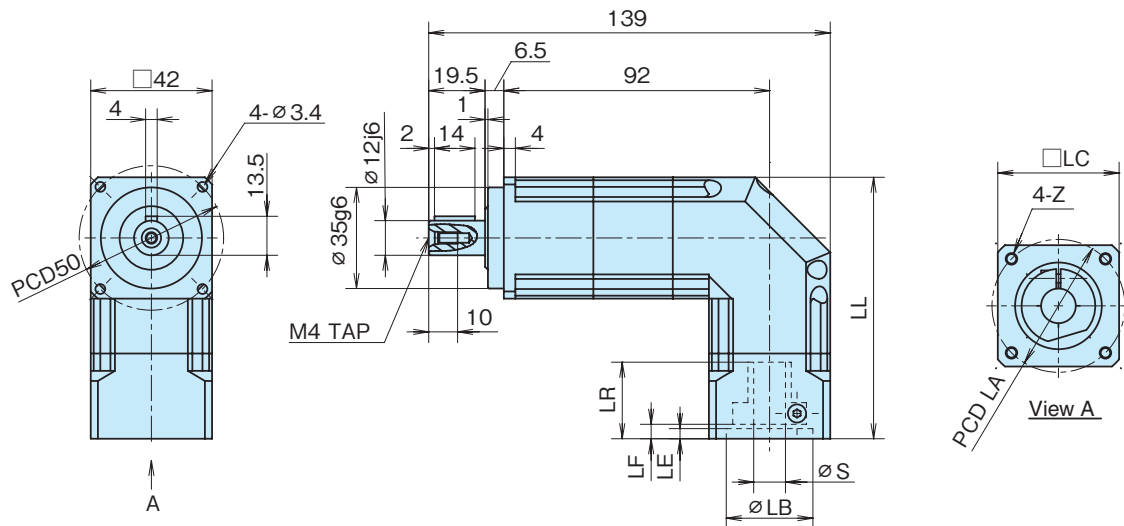
PAT – B 120 R 003 to 010 (1 stage) K P1 (P2) – Mount code



Mass: 0.9 kg

Mount code	LL	LC	LB	LE	S (Max. 11)	LR	LF	LA	Z
B2D	90.5	42	30	3.5	8	26.5	5	45	M3 6 deep
B3B	90.5	42	30	3.5	6	26.5	5	46	M4 9 deep
B3D	90.5	42	30	3.5	8	26.5	5	46	M4 9 deep

PAT – B 120 R 015 to 100 (2 stages) K P1 (P2) – Mount code

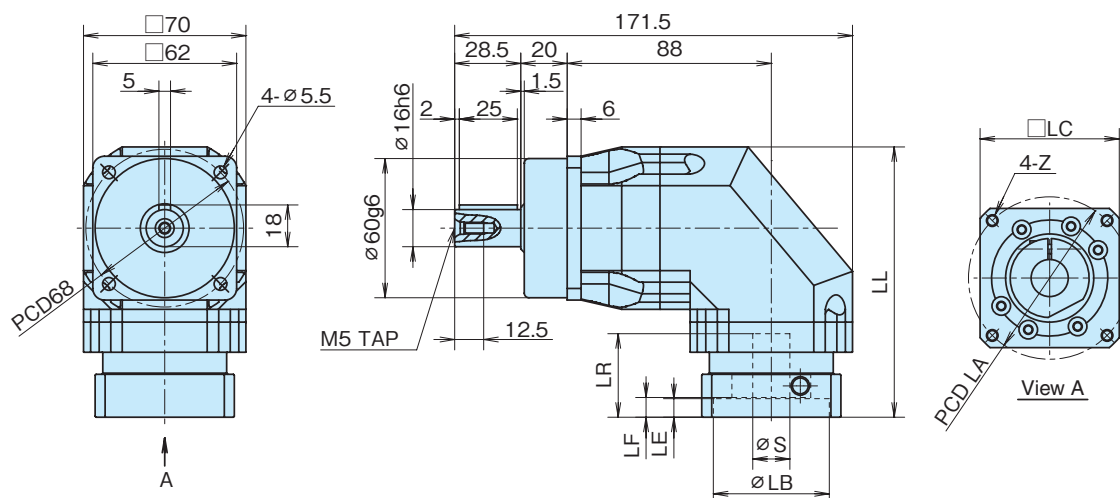


Mass: 1.2 kg

Mount code	LL	LC	LB	LE	S (Max. 11)	LR	LF	LA	Z
B2D	90.5	42	30	3.5	8	26.5	5	45	M3 6 deep
B3B	90.5	42	30	3.5	6	26.5	5	46	M4 9 deep
B3D	90.5	42	30	3.5	8	26.5	5	46	M4 9 deep

Dimensions Right Angle Type (R)

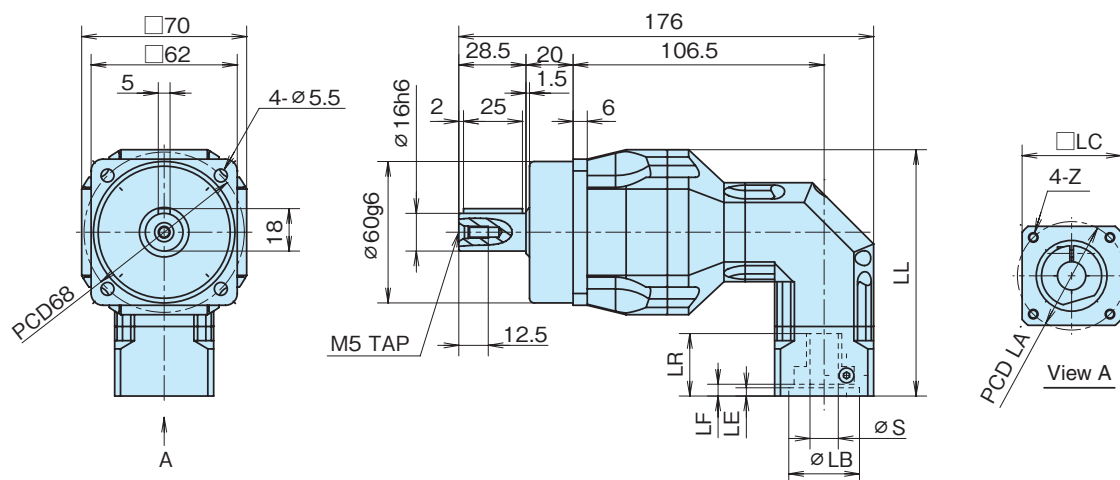
PAT – B 160 R 003 to 020 (1 stage) K P1 (P2) – Mount code



Mass: 2.7 kg

Mount code	LL	LC	LB	LE	S (Max. 14)	LR	LF	LA	Z
E3G	112.5	60	50	4	11	32	4.5	70	M4 9 deep
E4E	116.5	60	50	8	9	36	8.5	70	M5 10 deep
E4H	116.5	60	50	8	14	36	8.5	70	M5 10 deep

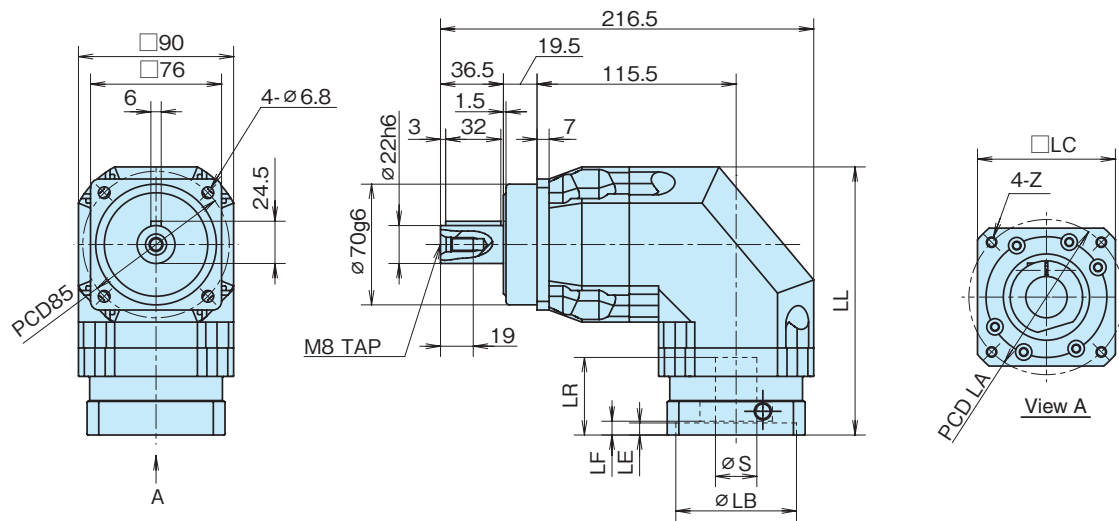
PAT – B 160 R 025 to 100 (2 stages) K P1 (P2) – Mount code



Mass: 2.4 kg

Mount code	LL	LC	LB	LE	S (Max. 11)	LR	LF	LA	Z
B2D	104.5	42	30	3.5	8	26.5	5	45	M3 6 deep
B3B	104.5	42	30	3.5	6	26.5	5	46	M4 9 deep
B3D	104.5	42	30	3.5	8	26.5	5	46	M4 9 deep

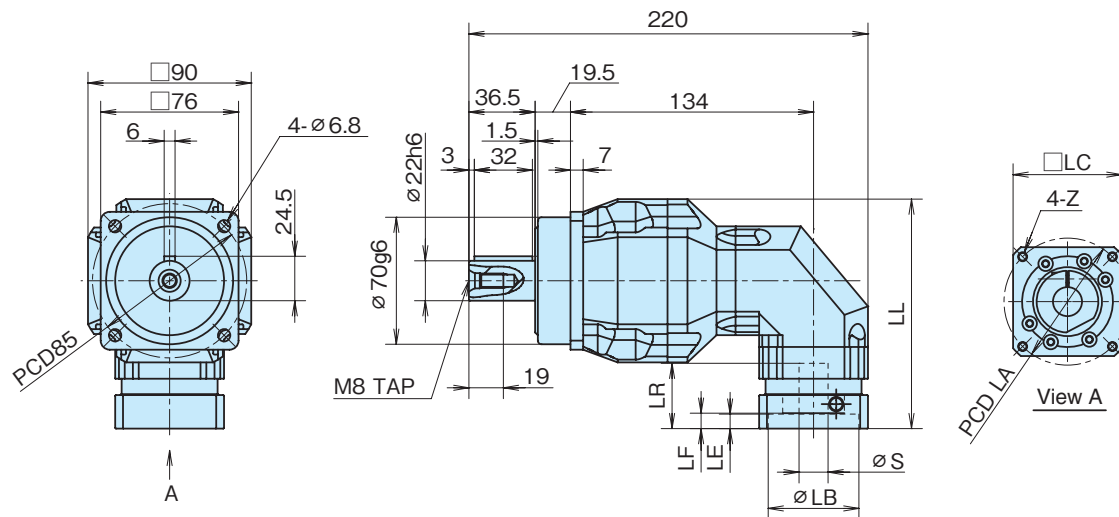
PAT – B 220 R 003 to 020 (1 stage) K P1 (P2) – Mount code



Mass: 6.1 kg

Mount code	LL	LC	LB	LE	S (Max. 19/24)	LR	LF	LA	Z
G4L	154	80	70	5.5	19	43.5	6.5	90	M5 10 deep
G5K	155.5	80	70	7	16	45	8	90	M6 12 deep
G5L	155.5	80	70	7	19	45	8	90	M6 12 deep
H4F	167.5	90	80	8	10	57	20	100	M6 12 deep
H1H	156.5	90	80	7.5	14	46	9	100	M6 12 deep
K3L	170.5	130	110	18	19	60	23	145	M8 15 deep
K3M	170.5	130	110	18	22	60	23	145	M8 15 deep
K3Y	170.5	130	110	18	24	60	23	145	M8 15 deep

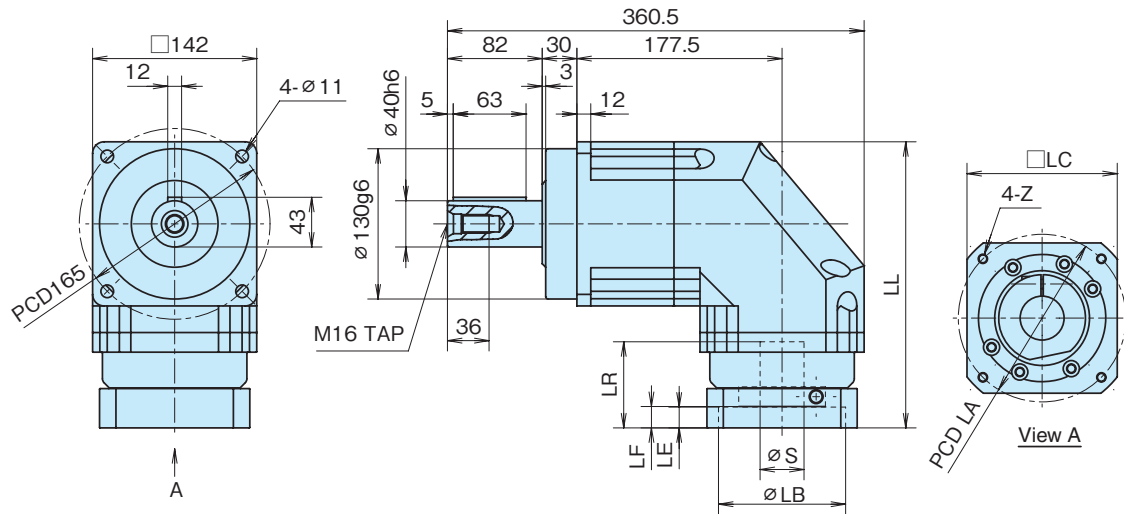
PAT – B 220 R 025 to 200 (2 stages) K P1 (P2) – Mount code



Mass: 4.8 kg

Mount code	LL	LC	LB	LE	S (Max. 14)	LR	LF	LA	Z
E3G	122.5	60	50	4	11	32	4.5	70	M4 9 deep
E4E	126.5	60	50	8	9	36	8.5	70	M5 10 deep
E4H	126.5	60	50	8	14	36	8.5	70	M5 10 deep

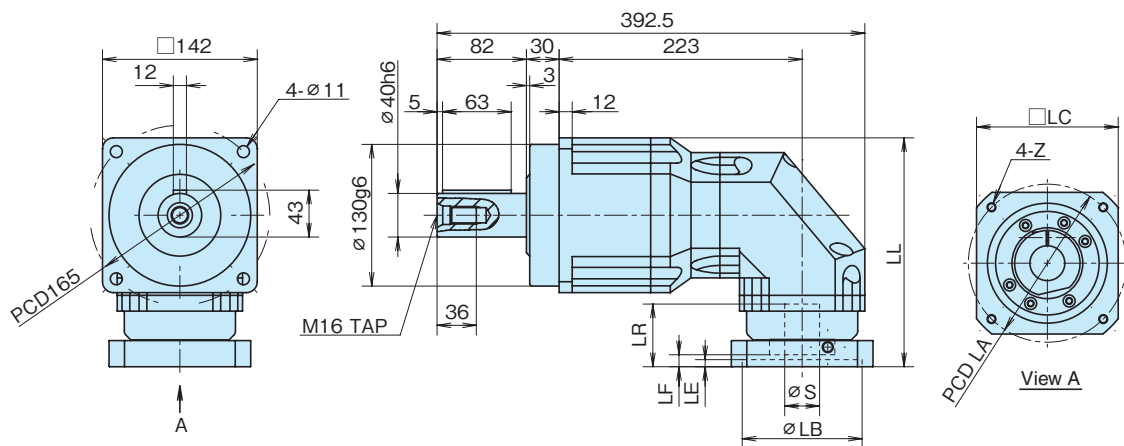
PAT – B 400 R 003 to 020 (1 stage) K P1 (P2) – Mount code



Mass: 25.3 kg

Mount code	LL	LC	LB	LE	S (Max. 38)	LR	LF	LA	Z
K3Y	247.5	130	110	18	24	74.5	18.5	145	M8 15 deep
L1R	255.5	176	114.3	6	35	82.5	26.5	200	M12 21 deep

PAT – B 400 R 025 to 200 (2 stages) K P1 (P2) – Mount code

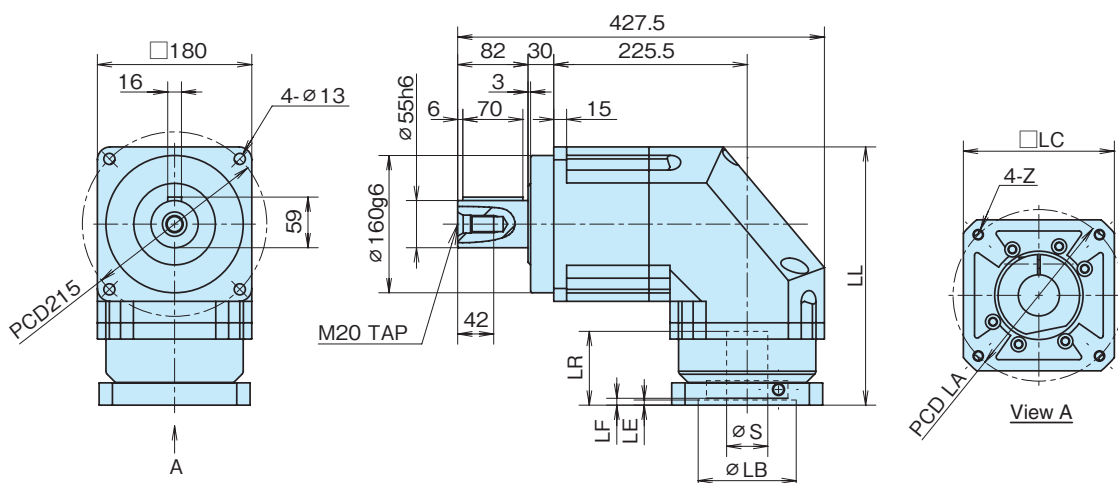


Mass: 24.0 kg

Mount code	LL	LC	LB	LE	S (Max. 32)	LR	LF	LA	Z
K3M	210	130	110	6.5	22	57.5	11	145	M8 15 deep
K3Y	210	130	110	6.5	24	57.5	11	145	M8 15 deep

Dimensions Right Angle Type (R)

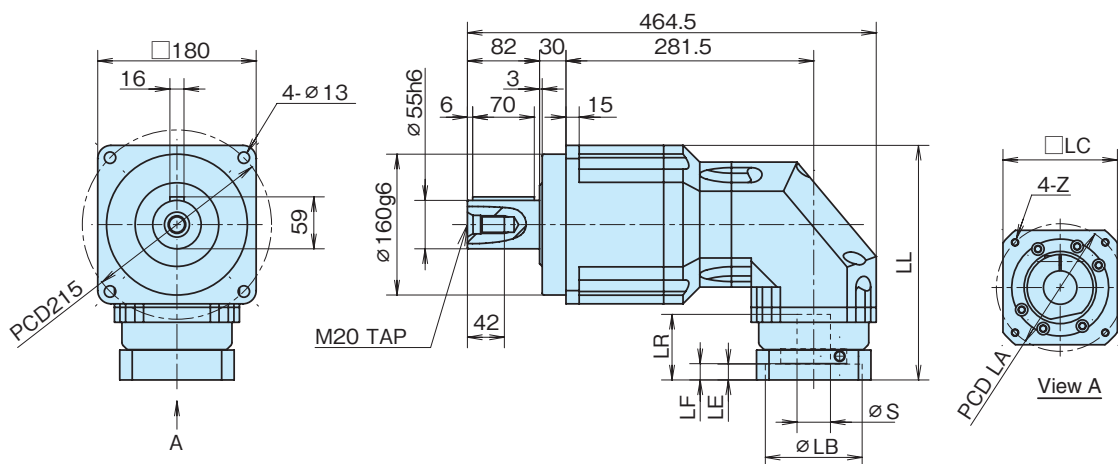
PAT – B 550 R 003 to 020 (1 stage) K P1 (P2) – Mount code



Mass: 50.2 kg

Mount code	LL	LC	LB	LE	S (Max. 48)	LR	LF	LA	Z
L1R	301	176	114.3	6	35	86	8	200	M12 21 deep
L2S	331.5	180	114.3	6	42	116.5	38.5	200	M12 21 deep

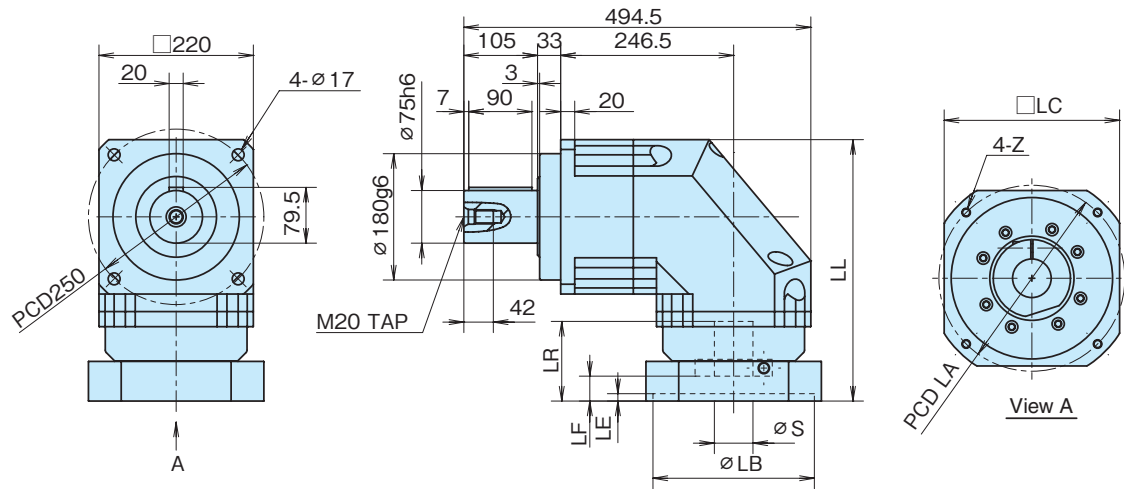
PAT – B 550 R 025 to 200 (2 stages) K P1 (P2) – Mount code



Mass: 47.4 kg

Mount code	LL	LC	LB	LE	S (Max. 38)	LR	LF	LA	Z
K3Y	266.5	130	110	18	24	74.5	18.5	145	M8 15 deep
L1R	274.5	176	114.3	6	35	82.5	26.5	200	M12 21 deep

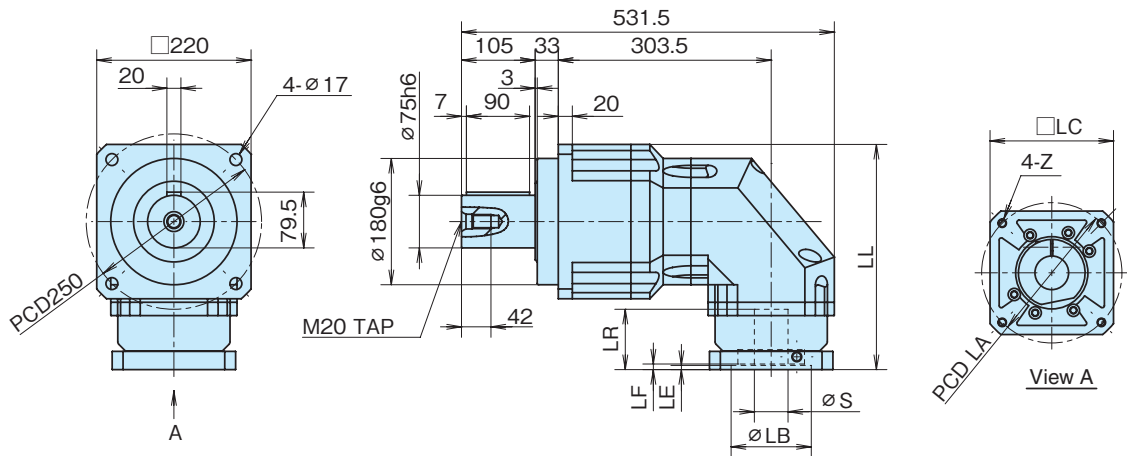
PAT – B 750 R 003 to 020 (1 stage) K P1 (P2) – Mount code



Mass: 81.7 kg

Mount code	LL	LC	LB	LE	S (Max. 55)	LR	LF	LA	Z
R1T	372.5	250	230	10.5	55	113.5	35.5	265	M12 21 deep

PAT – B 750 R 025 to 200 (2 stages) K P1 (P2) – Mount code

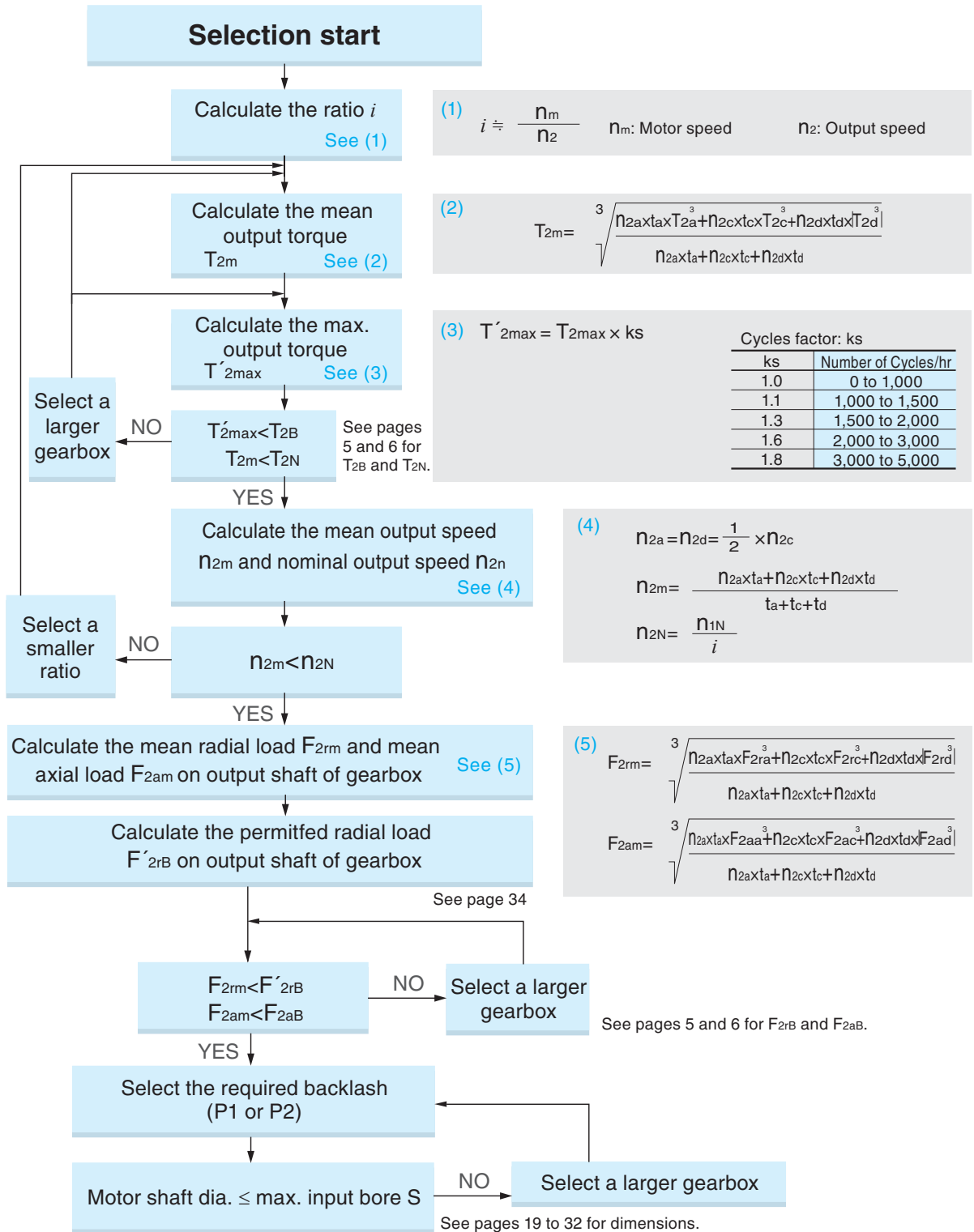


Mass: 78.3 kg

Mount code	LL	LC	LB	LE	S (Max. 48)	LR	LF	LA	Z
L1R	321	176	114.3	6	35	86	8	200	M12 21 deep
L2S	351.5	180	114.3	6	42	116.5	38.5	200	M12 21 deep

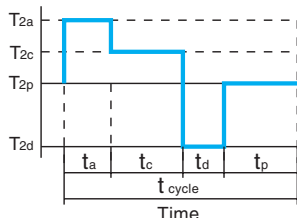
Selection of the optimum gearbox

Selection

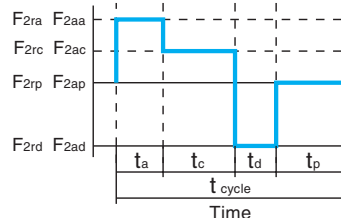


Motion Profile

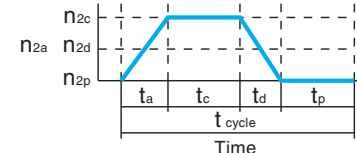
Output torque



Loads on output shaft



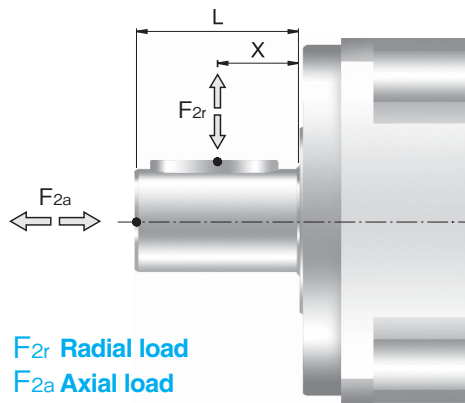
Output speed



Index

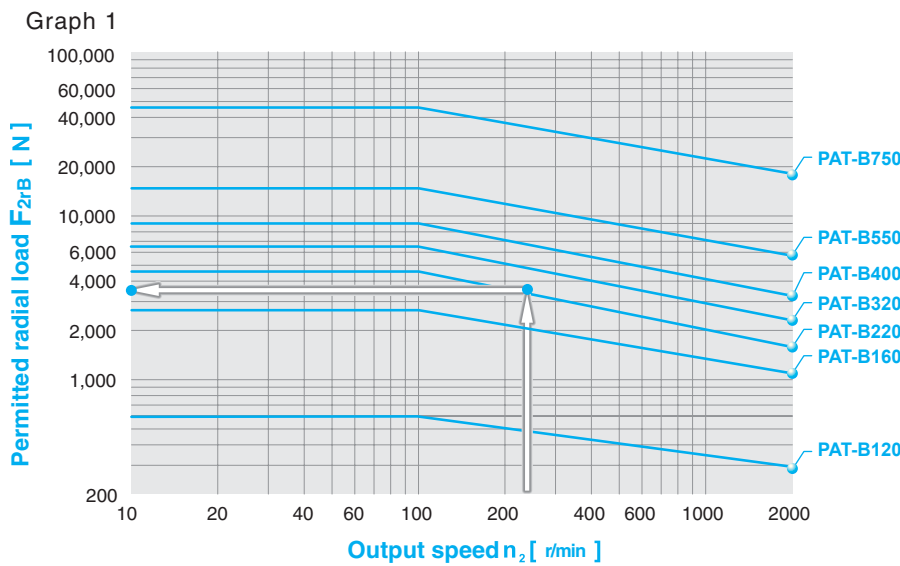
a: acceleration c: constant d: deceleration p: pause t: time T: torque F: shaft load 1: input 2: output

Permitted Radial and Axial Loads on Output Shaft

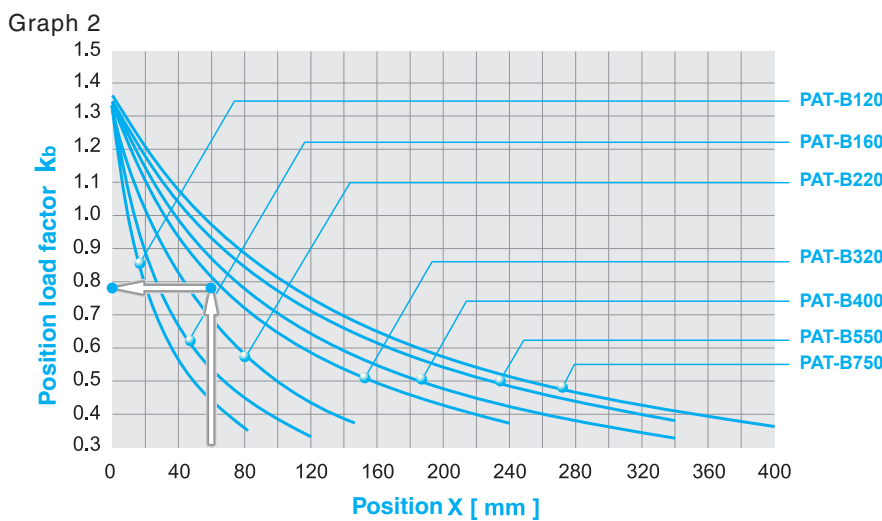


F_{2r} Radial load
 F_{2a} Axial load

The permitted radial and axial loads on the output shaft of the gearbox depend on the design of the gearbox supporting bearings. Double row angular contact ball bearings offer longevity and can withstand heavy radial and axial loads.



Graph 1 shows the permitted radial load when radial load F_{2r} is applied to the center ($X = L/2$) of the output shaft. Determine the permitted radial load from the frame no. and output speed.



Graph 2 shows the position load factor k_b when radial load F_{2r} is applied to a non-center position ($X > L/2$ or $X < L/2$) of the output shaft. Determine the position load factor k_b from the frame no. and position: X .

Corrected permitted radial load:

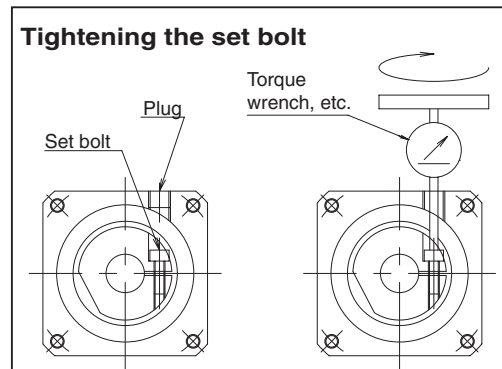
$$F'_{2rB} = k_b \times F_{2rB}$$

Motor Mounting, Precaution, Maintenance

Motor Mounting Procedures

1. For smooth motor shafts

- (1) Set the gearbox so that the mounting surface is on top.
- (2) Thoroughly remove rust, dust, rust-preventive oil, or any other protective agents on the motor shaft.
- (3) Remove the plug from the adapter and turn the input shaft so that the bolt head aligns with the plug hole.
- (4) Use an Allen key wrench to check that the set bolt is loose.
- (5) Insert the motor shaft into the input shaft bore. Make sure the motor shaft is not cocked. Otherwise, the shaft will bind in the bore and will not mount properly.
- (6) After inserting the spigot facing completely, fasten the motor to the adapter using the appropriate tightening torque.
- (7) Tighten the set bolt on the input shaft using a torque wrench or similar tool to the tightening torque listed in the table below. Failure to apply the proper amount of torque may cause the set bolt to loosen. If this occurs, the motor shaft may slip and cause operating failures.
Do not apply Loctite or any other locking agent to the set bolt. Doing so will prevent the bolt from being tightened to its appropriate torque and result in an insufficient clamp.
- (8) Attach the plug. This completes the motor set up procedure.



Unexpected shock may cause the interlocking surfaces of the clamp to slip. Furnish a separate safety mechanism when using for lifting and hoisting applications.

● Set bolt tightening torque

Gearbox frame no.		Motor shaft diameter mm	Bolt size mm	Width across flats mm	Tightening torque N·m
PAT-B120	1 stage	≤11	M3 ×0.5P ×8L	2.5	2.1
	2 stages	≤11	M3 ×0.5P ×8L	2.5	2.1
PAT-B160	1 stage	≤14	M4 ×0.7P ×12L	3	4.9
	2 stages	≤11	M3 ×0.5P ×8L	2.5	2.1
PAT-B220	1 stage	≤24	M5 ×0.8P ×14L	4	9.8
	2 stages	≤14	M4 ×0.7P ×12L	3	4.9
PAT-B320	1 stage	≤32	M6 ×1P ×16L	5	17
	2 stages	≤24	M5 ×0.8P ×14L	4	9.8
PAT-B400	1 stage	≤38	M8 ×1.25P×20L	6	41
	2 stages	≤32	M6 ×1P ×16L	5	17
PAT-B550	1 stage	≤48	M10×1.5P ×25L	8	80
	2 stages	≤38	M8 ×1.25P×20L	6	41
PAT-B750	1 stage	≤55	M12×1.75P×30L	10	139
	2 stages	≤48	M10×1.5P ×25L	8	80

* Tightening torque for bolts should be between x1.0 and x1.2 the above figures.

● Motor mounting bolt tightening torque

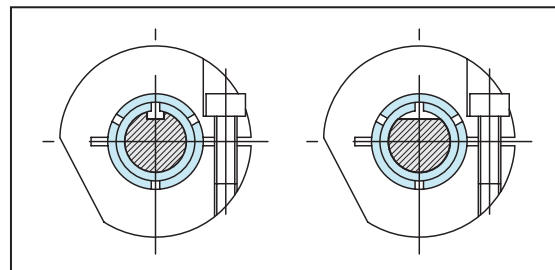
Bolt size mm	Width across flats mm	Tightening torque N·m
M3 ×0.5P	2.5	1.8
M4 ×0.7P	3	4.1
M5 ×0.8P	4	8.2
M6 ×1P	5	14
M8 ×1.25P	6	34
M10×1.5P	8	67
M12×1.85P	10	116
M14×2P	12	186
M16×2P	14	286

2. Mounting a keyed/flatted motor

Keyed/flatted motor shafts can be used with clamp type just like smooth shafts by removing the key.

Set the keyway/flat, each slit, and set bolt on the motor shaft as shown in the figure on the right.

Otherwise, assemble using the same procedures for smooth shafts.



Handling Precautions

1. Upon delivery

Check the following items and contact the distributor if you find any defects.

- (1) Verify the model number engraved on the gearbox corresponds to your order.
- (2) Visually inspect for damage sustained during transport.
- (3) Make sure there are no loose screws or bolts.

* When contacting the distributor, note (1) the serial number and (2) model number engraved on the gearbox.

2. Transporting

When transporting this product, use the mounting holes in the gearbox and keep the gearbox balanced when hoisting.

For details, refer to the instruction manual supplied with the product.

Daily Maintenance

- (1) Make sure the surface of the gearbox is 90 °C or less.
- (2) Regularly check the clamp bolt for loosening.

Selecting a Coupling for the Output Shaft

When selecting couplings for Tsubaki PAT gear reducers, we recommend our ECHT-FLEX Coupling NES Series.

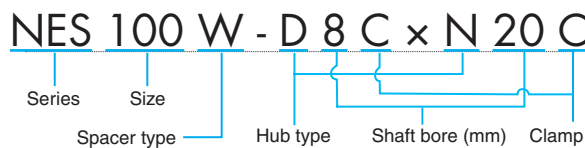
Features

- (1) No backlash
- (2) High torsional stiffness
- (3) Low moment of inertia
- (4) Clamp-on design for easy mounting
(Can also be mounted on keyed shafts.)
- (5) Environmentally friendly



Select the coupling size from the table below based on the frame number of the gearbox, input speed, allowable maximum torque, gearbox output shaft diameter, and mating shaft diameter. Depending on conditions of your application, it may be necessary to include the service factor in the allowable maximum torque. For details, refer to our brochure, "ECHT-FLEX Coupling NES Series". In addition to the NES Series, we offer other couplings that can be used with our Tsubaki PAT gear reducers. Refer to the Tsubaki "Couplings", or visit our website.

Model Number



Hub type D: low inertia hub
N: Straight hub
Shaft bore (mm)
(Specify 6.3 for a bore diameter of 6.35 mm, or 9.5 for 9.525 mm.)
* Specify the smaller diameter first.

Straight hub type

Model No.	Allowable torque N·m (kgf·m)	Maximum speed *1 r/min	Shaft bore diameter φ D mm Bore range	Moment of inertia *2 kg·m ²
NES07W	0.7 (0.07)	18000	4 to 6	0.32×10 ⁻⁶
NES15W	1.5 (0.15)	18000	4 to 8	0.90×10 ⁻⁶
NES20W	2.0 (0.20)	18000	5 to 10	2.7 ×10 ⁻⁶
NES30W	3.0 (0.31)	18000	6 to 16	8.0 ×10 ⁻⁶
NES50W	5.0 (0.51)	18000	6 to 16	14 ×10 ⁻⁶
NES70W	7.0 (0.71)	18000	8 to 20	21 ×10 ⁻⁶
NES100W	10 (1.0)	15000	8 to 22	47 ×10 ⁻⁶
NES250W	25 (2.6)	10000	10 to 25	140 ×10 ⁻⁶
NES800W	80 (8.2)	10000	14 to 30	320 ×10 ⁻⁶
NES1300W	130 (13)	10000	20 to 35	1100 ×10 ⁻⁶
NES2000W	200 (20.4)	9000	25 to 45	1700 ×10 ⁻⁶
NES3000W	300 (30.6)	8000	35 to 50	2960 ×10 ⁻⁶

Low inertia hub type

Model No.	Allowable torque N·m (kgf·m)	Maximum speed *1 r/min	Shaft bore diameter φ D mm Bore range	Moment of inertia *2 kg·m ²
NES50W	5.0 (0.51)	18000	5 to 10	7.1×10 ⁻⁶
NES70W	7.0 (0.71)	18000	8 to 14	12.8×10 ⁻⁶
NES100W	10 (1.0)	15000	8 to 15	28.8×10 ⁻⁶
NES250W	25 (2.6)	10000	10 to 20	83.1×10 ⁻⁶
NES800W	80 (8.2)	10000	14 to 24	188 ×10 ⁻⁶
NES1300W	130 (13)	10000	19 to 32	671 ×10 ⁻⁶
NES2000W	200 (20.4)	9000	25 to 35	1230 ×10 ⁻⁶
NES3000W	300 (30.6)	8000	32 to 42	2230 ×10 ⁻⁶

- *1. The maximum rotating speed does not take dynamic balance into account.
- *2. The moment of inertia is given for the maximum bore diameter.
- *3. The output shaft on the PAT-B120 is finished to a j6 tolerance. If you are considering using an NES coupling, contact us.

Technical Data Form (for inquiries)

1. Machine and application

(1) Machine name

(2) Application

* To explain your application in detail, attach a layout drawing and any other relevant application study documents.

2. Drive motor

(1) Manufacturer

(2) Series, model number

(3) Rated output kW

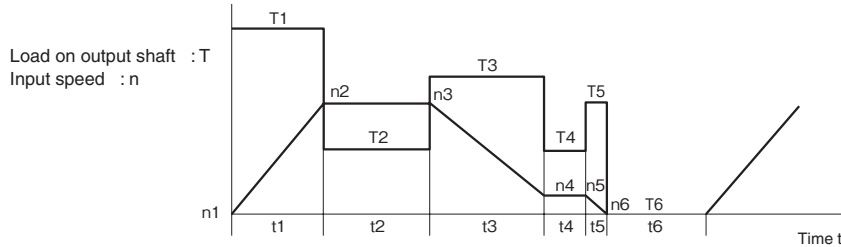
(4) Rated speed r/min Max. speed r/min

(5) Rated torque N·m Max. torque N·m

(6) Motor output dimensions - Attach motor outline drawing.

* Specify whether motor is keyed, has oil seals, etc. Tapered shafts may not be used.

3. Motion profile



Example

Time sec	Motion	Input speed r/min	Load on output shaft N·m
t 1	Acceleration	n 1 → n 2	T 1
t 2	Constant	n 2	T 2
t 3	Deceleration	n 3 → n 4	T 3
t 4	Constant 2	n 4	T 4
t 5	Deceleration 2	n 5 → n 6	T 5
t 6	Stop	n 6	T 6

Cycle time = $\sum t1$ to $t 6$

Time sec	Motion	Input speed r/min	Load on output shaft N·m

Cycle time =

4. Gearbox specifications and operating conditions

(1) Type S: In line, R: Right angle

(2) Ratio 1/

(3) Output shaft K: keyed (Standard)

(4) Backlash P2: standard, P1: reduced

(5) Radial load N Position X = mm (See page 34)

(6) Axial load N

(7) Others

Complete this form and fax it to one of the sales offices listed on the back cover of this brochure.

Tsubaki

TERVO Series — Gear Reducers for Servo Motors

TERVO series offers a line of general-purpose gear heads for servo motors from various manufacturers. Available from 0.1 to 4 kW with ratios of 1/5 to 1/200 (choose either parallel or right-angle shafts, hollow or solid, hypoid or worm gear.)

Ideal for general-purpose speed control applications, feedback-based torque control applications, and positioning in hoisting and lifting applications.



HMTK H type
Hypoid gear head



GMTK U type
Helical gear head



GMTK L type
Helical gear head



TMMK type
Worm gear head



EWMK type
Worm gear head



SWMK type
Worm gear head

Limited Warranty

Tsubaki E&M Co.: hereinafter referred to as "Seller"
Customer: hereinafter referred to as "Buyer"
Goods sold or supplied by Seller to Buyer: hereinafter referred to as "Goods"

1. Warranty period without charge

18 months effective the date of shipment or 12 months effective the first use of Goods, including installation of Goods to Buyer's equipment or machine - whichever comes first.

2. Warranty coverage

Should any damage or problem with the Goods arise within the warranty period, given that the Goods were operated and maintained according to the instructions provided in the manual, Seller will repair and replace at no charge once the Goods are returned to the Seller.

This warranty only covers individual Goods supplied by the Seller to the Buyer and therefore does not include the following:

- (1) Any costs related to the removal or re-installation of Goods from the Buyer's equipment or machine to repair or replace parts.
- (2) Cost to transport Buyer's equipment or machines to replace or repair.
- (3) Costs to reimburse any profit loss due to any repair or damage and consequential losses caused by the Buyer.

3. Warranty with charge

Seller will charge for any investigation and repair of Goods (even during the warranty period without charge) caused by:

- (1) Improper installation by failing to follow the instruction manual.
- (2) Insufficient maintenance or improper operation by the Buyer.
- (3) Incorrect installation of Goods onto other equipment or machines.
- (4) Structure change of the Goods by any modifications or alterations by the Buyer.
- (5) Any repair by engineers other than the Seller or those designated by the Seller.
- (6) Operation in an inappropriate environment not specified in the manual.
- (7) Force Majeure or forces beyond the Seller's control such as a natural disaster and injustices committed by a third party.
- (8) Secondary damage or problems incurred by the Buyer's equipment or machines.
- (9) Defective parts supplied or specified by the Buyer.
- (10) Wear, tear or deterioration of parts including bearings and oil seals.
- (11) Loss or damage not liable to the Seller.

Safety precautions

(General)

- Comply with the required safety regulations where the product is set or used. (Ordinance on Labor Safety Law by government, electrical system technical standards, building standard laws, etc.)
- To ensure optimum performance is obtained from the product, it is necessary to read and understand the instructions and safety precautions contained in the manual.
If the instruction manual is not at hand, request one from the distributor where you purchased the product with product name and model number.
This manual should remain with the product at all times, including when redistributed.
Make sure this manual is available to every person who operates the product.

(Selection)

- Select the products which are suitable for the usage environment and application.
- When using with equipment for transporting humans or an elevating device, install a suitable protection device on the equipment for safety purposes. Otherwise an accident resulting in death, injury or damage to the equipment may occur due to accidental falling.
- When the product is used for food processing machinery, install devices such as oil pans to prevent grease from leaking. Lubricant oil can damage food or other such products.



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