



**INDUSTRIAL
MOTOR**



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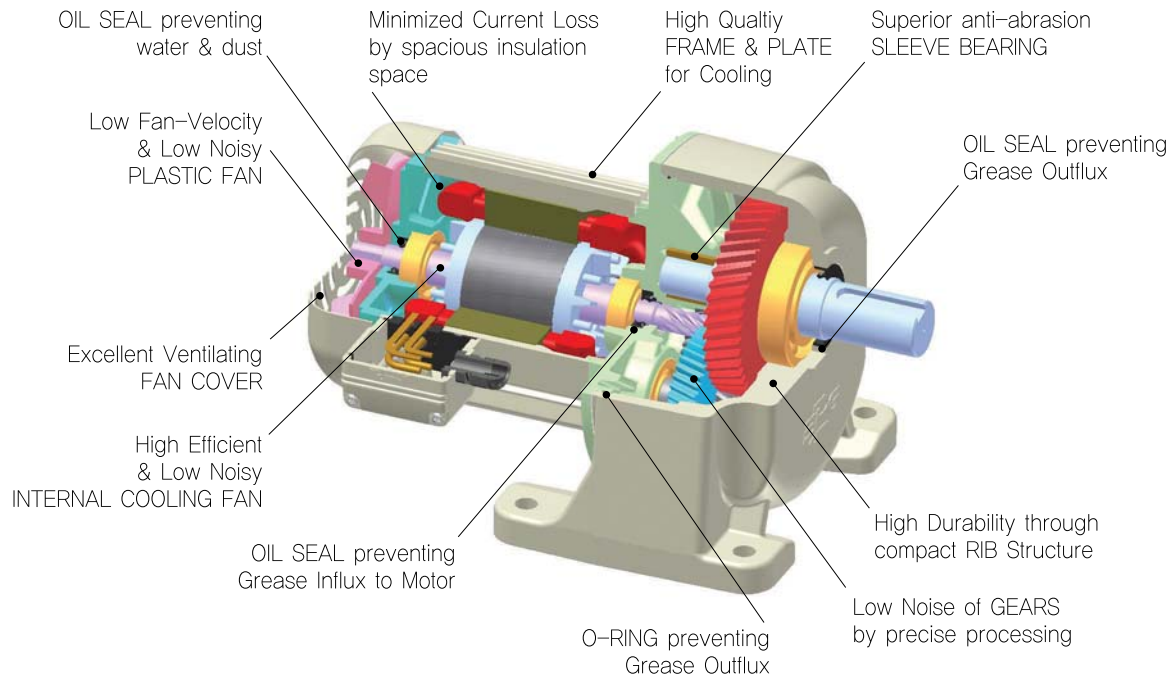


Industrial Geared Motor

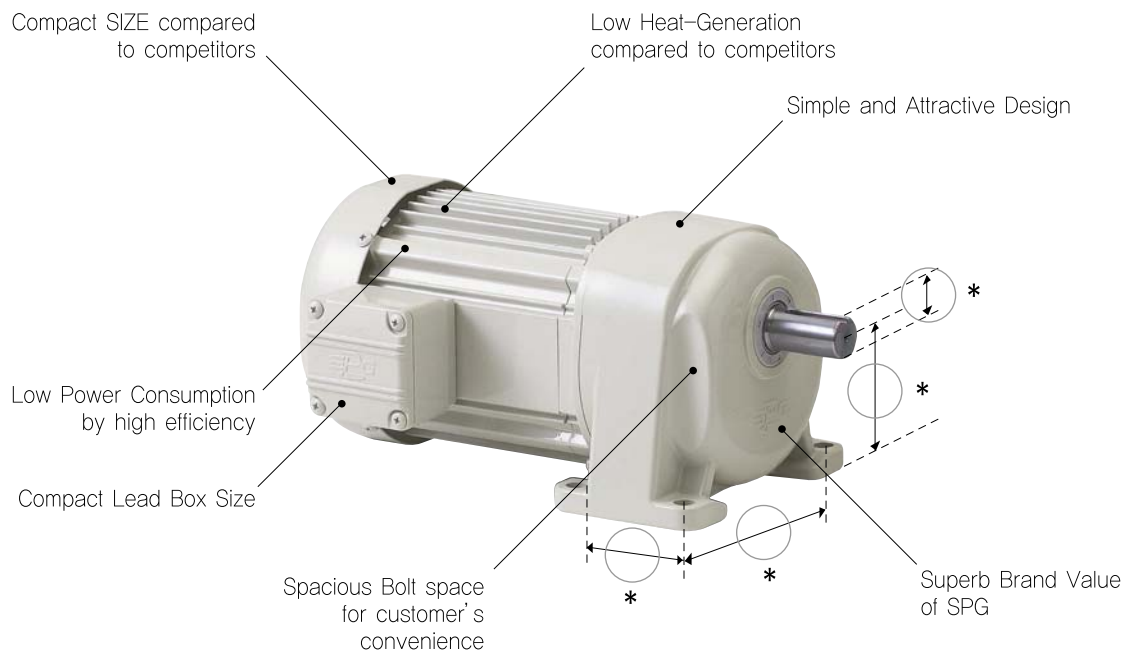
- ▶ Compact Size, High Efficiency.
- ▶ Permissible Torque 764 N · m MAX.
- ▶ High Reliability & Low Noise by Precise processing.
- ▶ Protection Degree : IP55
- ▶ Insulation Class : Class F

PA Series GEARED MOTOR

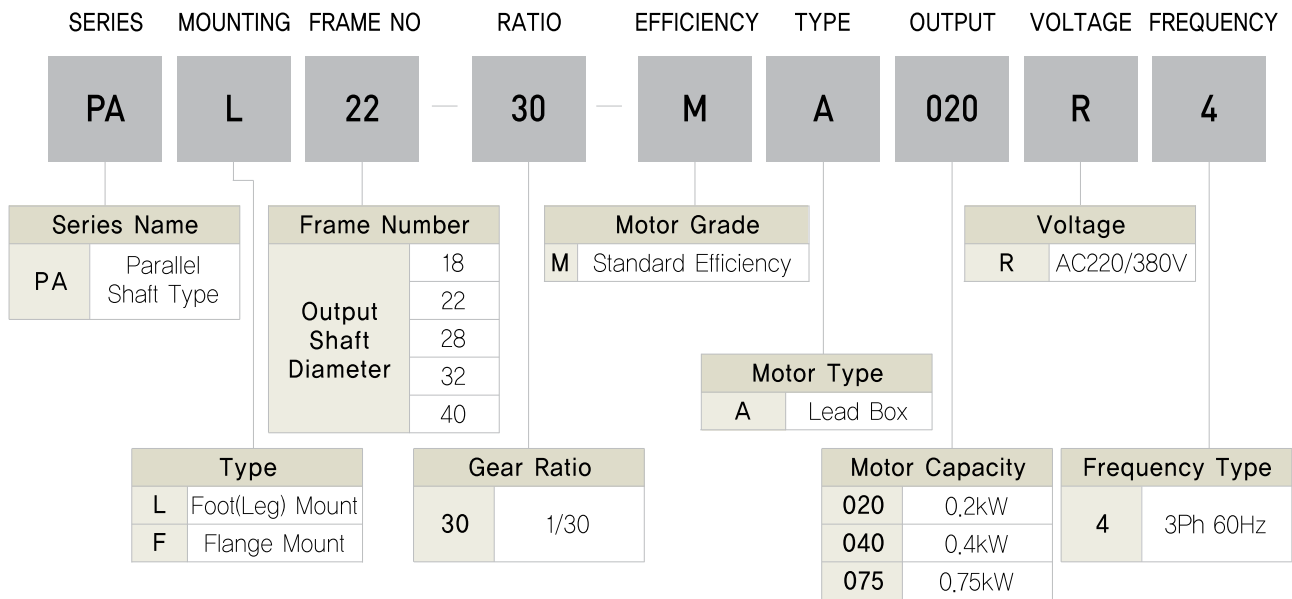
■ Product structure



■ PA Series MERIT



PA SERIES GEARED MOTOR CODING



■ CHARACTERISTIC

MOTOR OUTPUT	0.2kW, 0.4kW, 0.75kW
RATED VOLTAGE	3Ph 220V, 380V
GEAR BOX SHAFT	Ø18, Ø22, Ø28, Ø32, Ø40
GEAR RATIO	1/5~25, 1/5~100, 1/5~200, 1/30~200, 1/100~200
PERMISSIBLE TORQUE	30, 97, 234, 431, 764 N · m
PROTECTION DEGREE	IP 55
INSULATION CLASS	Class F

■ PA Series MODEL LINEUP

4P MOTOR	FRAME	GEAR RATIO					
3-Phase 0.2kW	18	1/5	1/10	1/15	1/20	1/25	
	22	1/30	1/40	1/50	1/60	1/80	1/100
	28	1/100	1/120	1/160	1/200		
3-Phase 0.4kW	22	1/5	1/10	1/15	1/20	1/25	
	28	1/30	1/40	1/50	1/60	1/80	1/100
	32	1/100	1/120	1/160	1/200		
3-Phase 0.75kW	28	1/5	1/10	1/15	1/20	1/25	
	32	1/30	1/40	1/50	1/60	1/80	1/100
	40	1/100	1/120	1/160	1/200		

PA Series GEARED MOTOR



PA Series 3-Phase 0.2kW

■ SPECIFICATION

■ MOTOR

Output (kW)	Poles	Motor Capacity Designation	Voltage (V)	Freq. (Hz)	Duty	Rated Load		Insulation Classification	Protective Cooling System
						Current(A)	Speed(r/min)		
0.2	4	020	220/380	60	CONT.	1.1/0.6	1715	F	Totally Enclosed Fan-Cooled

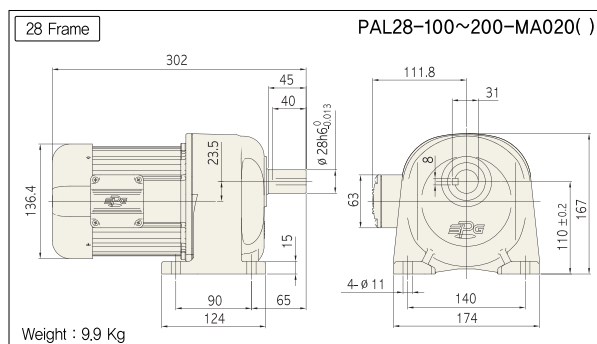
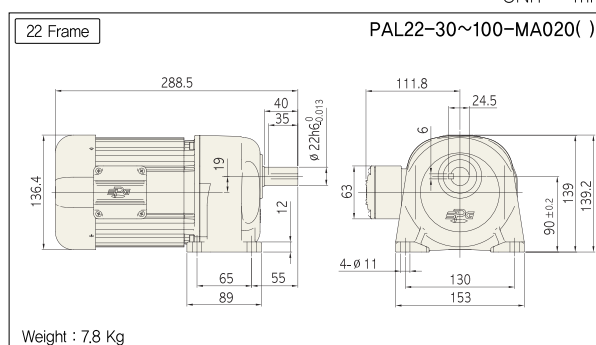
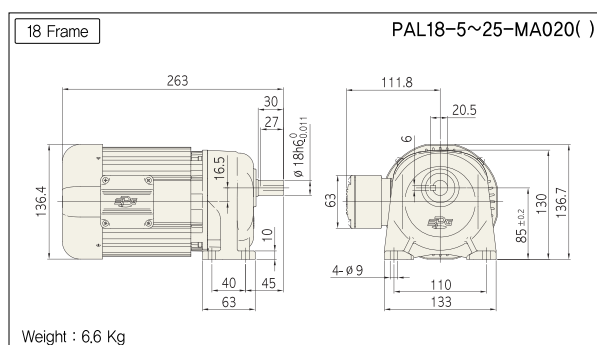
■ GEARED MOTOR – 60Hz

Frame No.		18					22					28				
Reduction Ratio		5	10	15	20	25	30	40	50	60	80	100	100	120	160	200
Rotation Speed (r/min)		360	180	120	90	72	60	45	36	30	22.5	18	18	15	11.2	9
Permissible Torque	kgf · m	0.51	1	1.5	2.1	2.6	3.1	4	5	6	8	8.2	10	11.9	15.9	19.9
	N · m	5	9.8	14.7	20.6	25.5	30.4	39.2	49	58.8	78.4	80.4	98	117	156	195
Permissible O.H.L	kgf	60	90	100	120	130	180	190	200	220	250	250	290	340	350	350
	N	588	882	980	1180	1270	1760	1860	1960	2160	2450	2450	2840	3330	3430	3430

Note) • Application of permissible O.H.L (overhung load) is based on the center of output shaft extraction length.
 • For rotation direction, ■ color is in the same direction as motor rotation direction, and the others are in an opposite direction to the motor rotation direction.

■ PAL TYPE DIMENSIONS [Foot(Leg) Mounted Type]

UNIT = mm

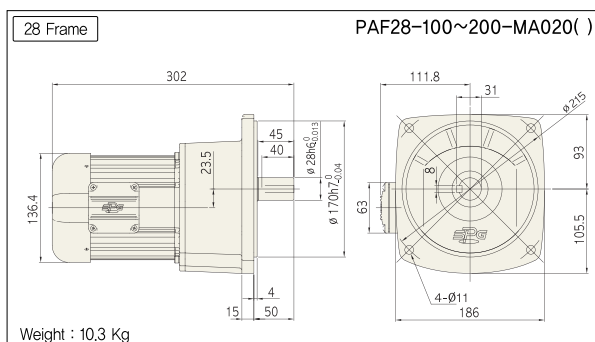
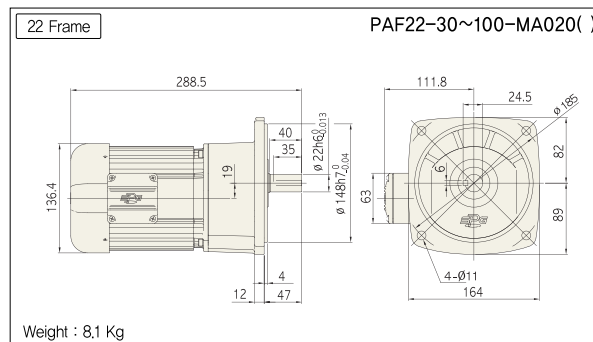
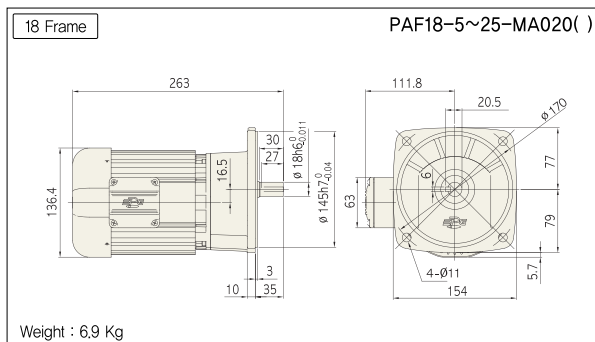




PA Series 3-Phase 0.2kW

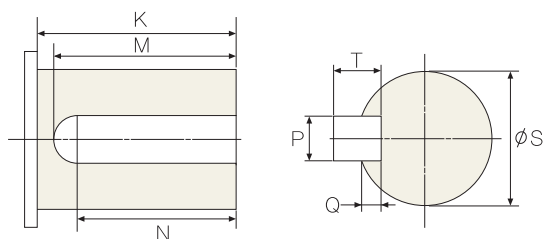
PAF TYPE DIMENSIONS [Flange Mounted Type]

UNIT = mm



Note) • Products of Foot(Leg) Mounted Type and Flange Mounted Type have the same characteristics.
• Products of Foot(Leg) Mounted Type and Flange Mounted Type have the same protective grade(dustproof, waterproof) of IP55.

Output Shaft Key Specs



Type Frame	K	M	N	S (h6)		KEY				Q
						P (h9)		T		
18 Frame	30	27	24	18	$\begin{smallmatrix} 0 \\ -0.011 \end{smallmatrix}$	6	$\begin{smallmatrix} 0 \\ -0.030 \end{smallmatrix}$	6	$\begin{smallmatrix} 0 \\ -0.030 \end{smallmatrix}$	3.5
22 Frame	40	35	32	22	$\begin{smallmatrix} 0 \\ -0.013 \end{smallmatrix}$		8	$\begin{smallmatrix} 0 \\ -0.036 \end{smallmatrix}$	7	
28 Frame	45	40	36	28		10	12	$\begin{smallmatrix} 0 \\ -0.043 \end{smallmatrix}$	8	5
32 Frame	55	50	45	32						
40 Frame	65	60	54	40						

PA Series GEARED MOTOR



PA Series 3-Phase 0.4kW

■ SPECIFICATION

■ MOTOR

Output (kW)	Poles	Motor Capacity Designation	Voltage (V)	Freq. (Hz)	Duty	Rated Load		Insulation Classification	Protective Cooling System
						Current(A)	Speed(r/min)		
0.4	4	040	220/380	60	CONT.	2.0/1.2	1730	F	Totally Enclosed Fan-Cooled

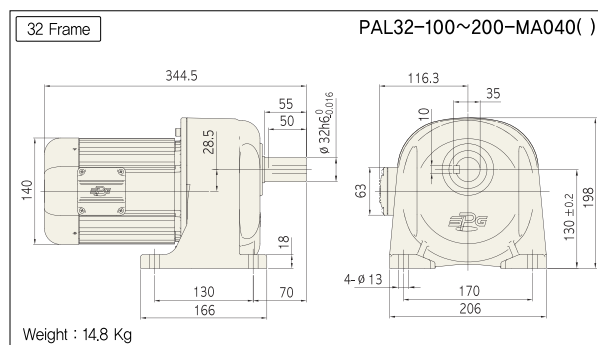
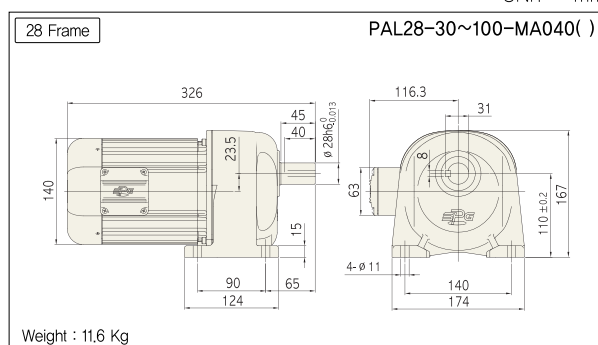
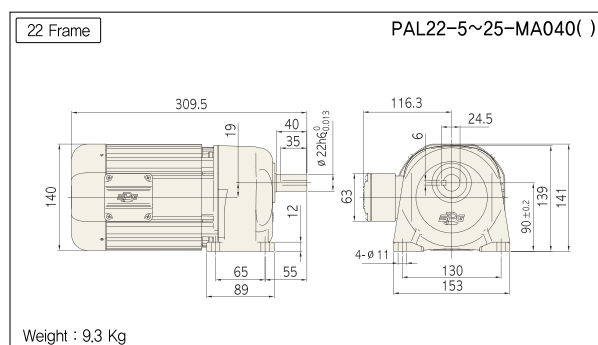
■ GEARED MOTOR – 60Hz

Frame No.		22					28						32			
Reduction Ratio		5	10	15	20	25	30	40	50	60	80	★100	100	120	160	200
Rotation Speed (r/min)		360	180	120	90	72	60	45	36	30	22.5	18	18	15	11,2	9
Permissible Torque	kgf · m	1	2.1	3.1	4.1	5.1	6,2	8	10	11,9	15,9	16,4	19,9	23,9	31,9	39,8
	N · m	10	21	30	40	50	61	78	98	117	156	161	195	234	313	390
Permissible O.H.L	kgf	90	120	140	150	170	260	290	320	350	350	350	500	600	600	600
	N	882	1180	1370	1470	1670	2550	2840	3140	3430	3430	3430	4900	5880	5880	5880

- Note) • Application of permissible O.H.L (overhung load) is based on the center of output shaft extraction length.
 • For products of the “★” marked reduction gear ratio, Permissible Torque is limited.
 • For rotation direction, ■ color is in the same direction as motor rotation direction, and the others are in an opposite direction to the motor rotation direction.

■ PAL TYPE DIMENSIONS [Foot(Leg) Mounted Type]

UNIT = mm

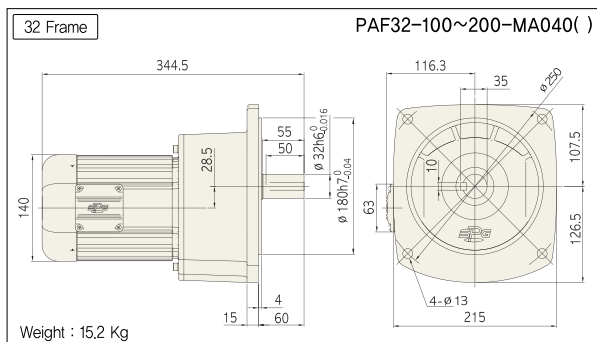
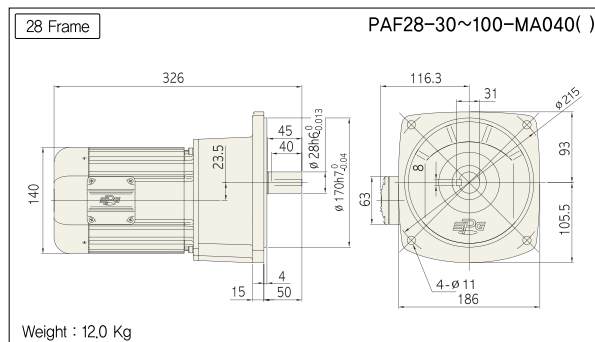
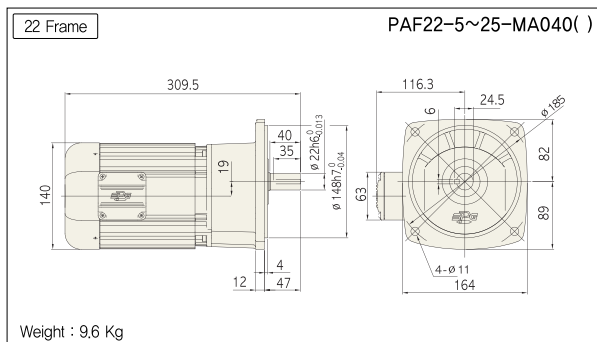




PA Series 3-Phase 0.4kW

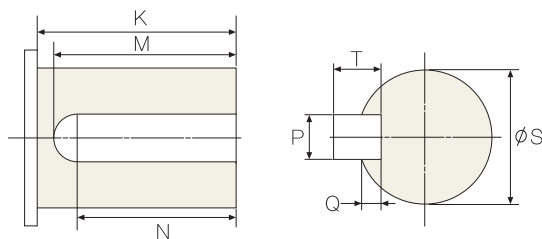
■ PAF TYPE DIMENSIONS [Flange Mounted Type]

UNIT = mm



Note) • Products of Foot(Leg) Mounted Type and Flange Mounted Type have the same characteristics.
• Products of Foot(Leg) Mounted Type and Flange Mounted Type have the same protective grade(dustproof, waterproof) of IP55.

■ Output Shaft Key Specs



Type Frame	K	M	N	S (h6)		KEY				Q
						P (h9)		T		
18 Frame	30	27	24	18	$\begin{smallmatrix} 0 \\ -0.011 \end{smallmatrix}$	6	$\begin{smallmatrix} 0 \\ -0.030 \end{smallmatrix}$	6	$\begin{smallmatrix} 0 \\ -0.030 \end{smallmatrix}$	3.5
22 Frame	40	35	32	22	$\begin{smallmatrix} 0 \\ -0.013 \end{smallmatrix}$		8	$\begin{smallmatrix} 0 \\ -0.036 \end{smallmatrix}$	7	
28 Frame	45	40	36	28	$\begin{smallmatrix} 0 \\ -0.016 \end{smallmatrix}$	10	$\begin{smallmatrix} 0 \\ -0.043 \end{smallmatrix}$	8	5	
32 Frame	55	50	45	32		12				
40 Frame	65	60	54	40						

PA Series GEARED MOTOR



PA Series 3-Phase 0.75kW

■ SPECIFICATION

■ MOTOR

Output (kW)	Poles	Motor Capacity Designation	Voltage (V)	Freq. (Hz)	Duty	Rated Load		Insulation Classification	Protective Cooling System
						Current(A)	Speed(r/min)		
0.75	4	075	220/380	60	CONT.	3.5/2.0	1710	F	Totally Enclosed Fan-Cooled

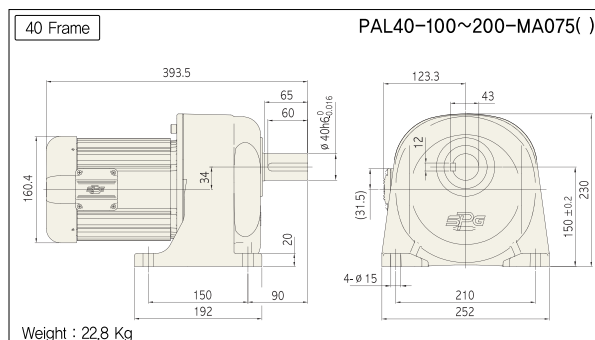
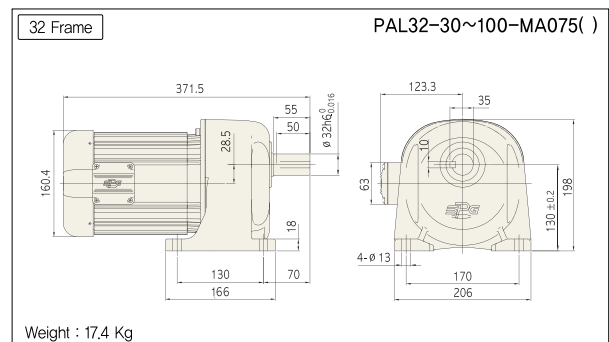
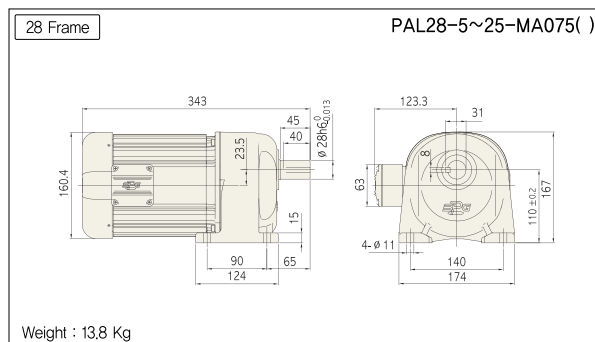
■ GEARED MOTOR – 60Hz

Frame No.		28					32					40				
Reduction Ratio		5	10	15	20	25	30	40	50	60	80	★100	100	120	160	200
Rotation Speed (r/min)		360	180	120	90	72	60	45	36	30	22.5	18	18	15	11.2	9
Permissible Torque	kgf · m	1.9	3.9	5.8	7.7	9.6	11.6	14.9	18.7	22.4	29.9	30.8	37.3	44.8	59.7	74.7
	N · m	19	38	57	75	94	114	146	183	220	293	302	366	439	585	732
Permissible O.H.L	kgf	130	180	220	240	250	410	430	470	560	600	600	720	720	720	720
	N	1270	1760	2160	2350	2450	4020	4210	4610	5490	5880	5880	7060	7060	7060	7060

- Note) • Application of permissible O.H.L (overhung load) is based on the center of output shaft extraction length.
 • For products of the “★” marked reduction gear ratio, Permissible Torque is limited.
 • For rotation direction, ■ color is in the same direction as motor rotation direction, and the others are in an opposite direction to the motor rotation direction.

■ PAL TYPE DIMENSIONS [Foot(Leg) Mounted Type]

UNIT = mm

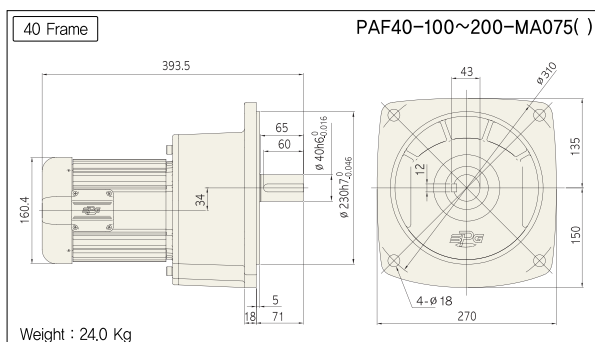
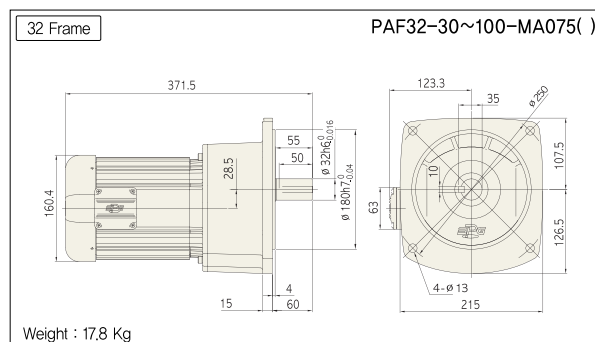
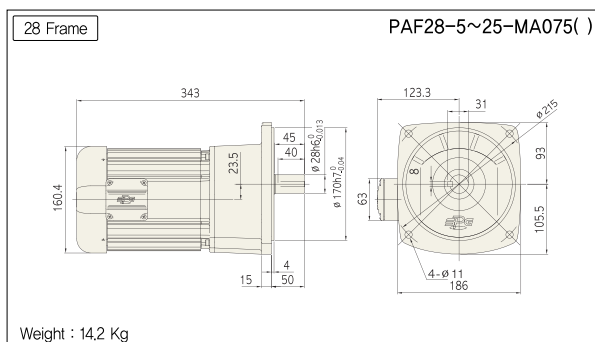




PA Series 3-Phase 0.75kW

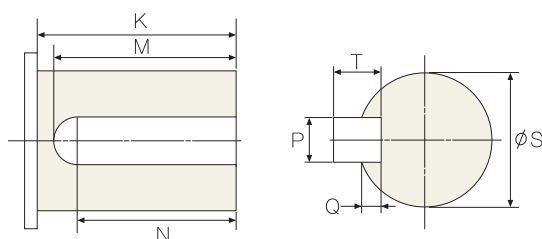
PAF TYPE DIMENSIONS [Flange Mounted Type]

UNIT = mm



Note) • Products of Foot(Leg) Mounted Type and Flange Mounted Type have the same characteristics.
• Products of Foot(Leg) Mounted Type and Flange Mounted Type have the same protective grade(dustproof, waterproof) of IP55.

Output Shaft Key Specs



Frame \ Dimensions	K	M	N	S (h6)		KEY				Q
						P (h9)		T		
18 Frame	30	27	24	18	0 -0.011	6	0 -0.030	6	0 -0.030	3.5
22 Frame	40	35	32	22	0 -0.013		8	0 -0.036	7	
28 Frame	45	40	36	28	0 -0.016	10	0 -0.043	8	5	
32 Frame	55	50	45	32		12				
40 Frame	65	60	54	40						



Industrial Motor

- ▶ Compact Size, High Efficiency.
- ▶ High Reliability & Low Noise by Precise processing.
- ▶ Protection Degree : IP55
- ▶ Insulation Class : Class F

P Series MOTOR

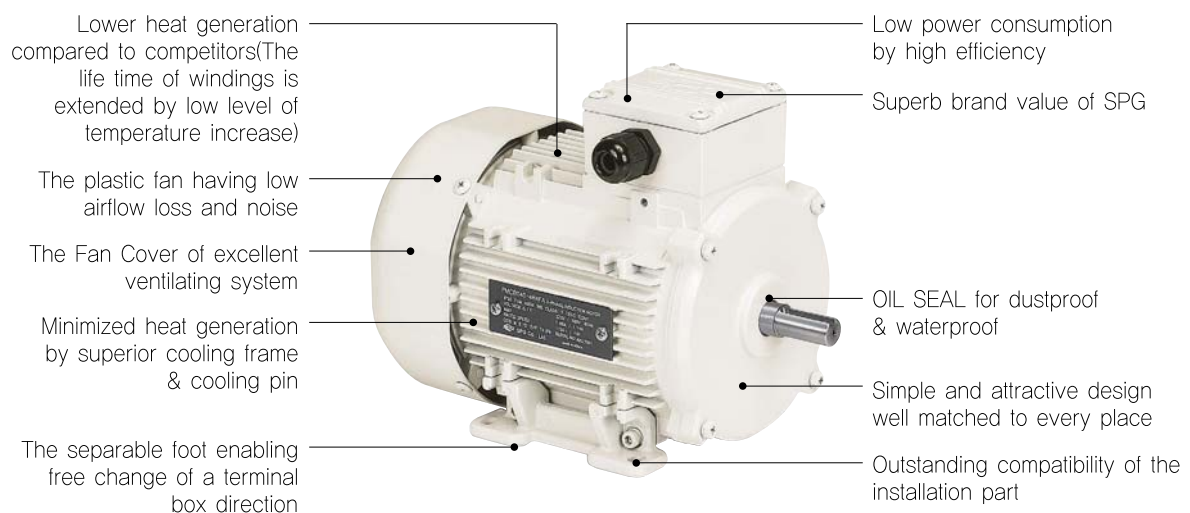
P SERIES MOTOR CODING

SERIES	EFFICIENCY	FRAME NO	OUTPUT	POLE	VOLTAGE	FREQUENCY	MOUNTING	TYPE		
P	M	AB	020	4	R	4	L	A		
Series Name		Frame Number		Pole Type		Frequency Type		Motor Type		
P	Power Induction Motor		AB	0.2kW, 63M		4	3Ph 60Hz		A	Lead Box
		CB	0.4kW, 71M							
		EE	0.75kW, 80M							
Motor Grade			Motor Capacity		Voltage		Type			
M	Standard Efficiency		020	0.2kW		R	AC220/380V		L	Foot(Leg) Mount
			040	0.4kW					F	Flange Mount
			075	0.75kW						

■ CHARACTERISTIC

MOTOR OUTPUT	0.2kW, 0.4kW, 0.75kW
RATED VOLTAGE	3Ph 220V, 380V
MOTOR SHAFT	Ø11, Ø14, Ø19
EFFICIENCY	71.4%, 73.6%, 77.0%
RATED TORQUE	1.2N·m, 2.25N·m, 4.25N·m
PROTECTION DEGREE	IP 55
INSULATION CLASS	Class F

■ P Series MERIT



P Series MOTOR



P Series 3-Phase 0.2~0.75kW

■ SPECIFICATION

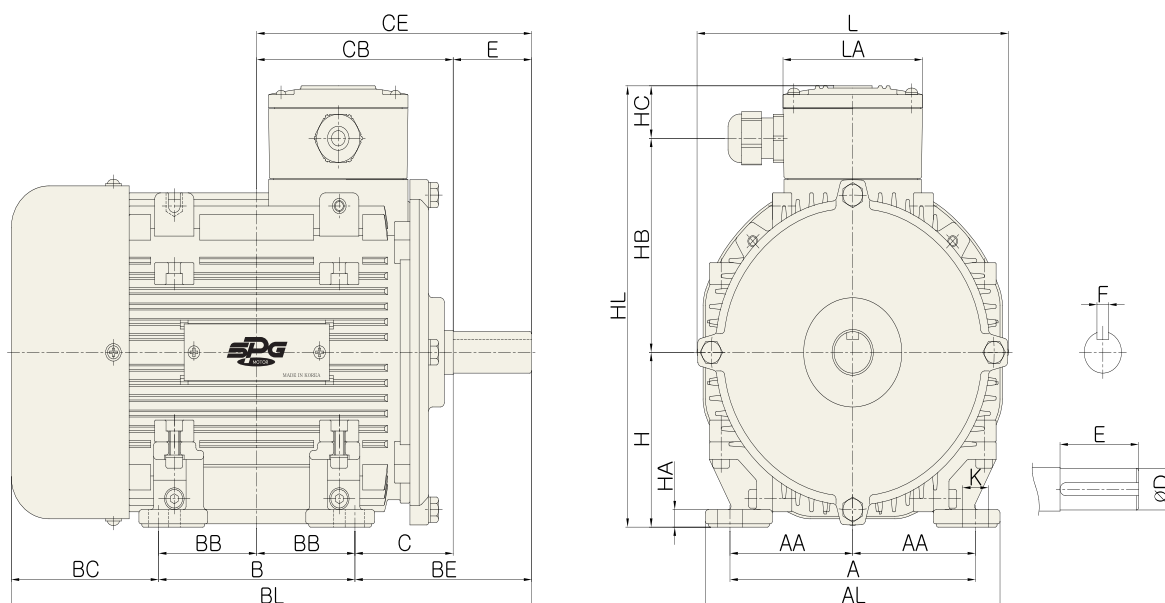
■ MOTOR

Frame No.	Poles	Output (kW)	Voltage (V)	Freq. (Hz)	Duty	Rated Load					Degrees of protection	Insulation Classification	Protective Cooling System
						Current (A)	Speed (r/min)	Torque (kgf·m) (N·m)	Power Factor(p.u.)	Efficiency (%)			
63M	4	0.20	220/380	60	CONT.	1.0/0.6	1,634	0.12 1.2	0.74	71.4	IP55	F	Totally Enclosed Fan-Cooled
71M		0.40				2.0/1.2	1,730	0.225 2.25	0.73	73.6			
80M		0.75				3.2/1.9	1,710	0.425 4.25	0.77	77.0			

Note) • Products of Foot(Leg) Mounted Type and Flange Mounted Type have the same characteristics.

■ PM-L Type DIMENSIONS [Foot(Leg) Mounted Type]

UNIT = mm



NO.	Frame No.	OutPut 4P(kW)	A	AA	AL	B	BB	BC	BE	BL	C	CB	CE	H	HA	HB	HC	HL	K	L	LA	Bearing No.		Shaft End Dia			Weight
																						Load	Unload	ΦD	E	F	
1	63M	0.20	100	50	120	80	40	61	63	204	40	80	103	63	7	79.5	24	166.5	Ø7	127	71	6202ZZ	6202ZZ	11h6	23	4N9	4.35kgf
2	71M	0.40	112	56	132	90	45	74	75	239	45	90	120	71	7	88	24	183	Ø7	140	71	6203ZZ	6203ZZ	14j6	30	5N9	6.43kgf
3	80M	0.75	125	62.5	150	100	50	75	90	265	50	100	140	80	8	98	24	202	Ø10	159	71	6204ZZ	6203ZZ	19j6	40	6N9	9.54kgf

Note) • The whole height of the product differs according to the position where a separable foot is attached.

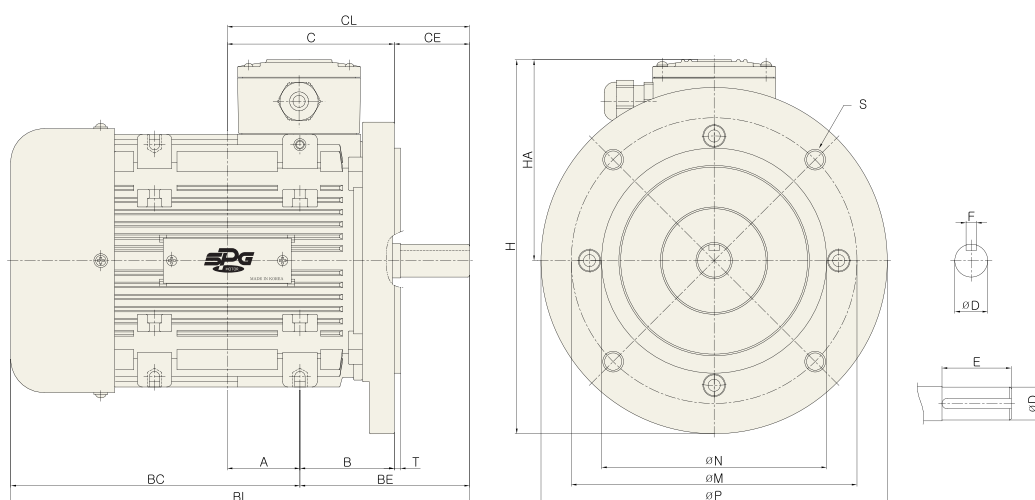
- Key and key way tolerance : KS B 131(JIS B 1301)
- Output shaft ΦD tolerance : KS B 0401(ISO 286-1~2)
- International standard : IEC 60072
- National standard : KS C4202, JIS C4210



P Series 3-Phase 0.2~0.75kW

■ PM-F Type DIMENSIONS [Flange Mounted Type]

UNIT = mm



NO.	Frame No.	OutPut 4P(kW)	A	B	BC	BE	BL	C	CE	CL	H	HA	øN	øM	S	øP	T	Bearing No.		Shaft End Dia			Weight
																		Load	Unload	øD	E	F	
1	63M	0.20	28	49	129	75	204	77	26	103	174	103.5	ø95	ø115	ø10	140	3	6202ZZ	6202ZZ	11h6	23	4N9	4.35kgf
2	71M	0.40	35	51.5	154	85	239	86.5	33.5	120	192	112	ø110	ø130	ø10	160	3.5	6203ZZ	6203ZZ	14j6	30	5N9	6.43kgf
3	80M	0.75	42	54.5	167	98	265	96.5	43.5	140	222	122	ø130	ø165	ø12	200	3.5	6204ZZ	6203ZZ	19j6	40	6N9	9.54kgf

Note) • Key and key way tolerance : KS B 1311(JIS B 1301)
 • Output shaft øD tolerance : KS B 0401(ISO 286-1~2)
 • International standard : IEC 60072
 • National standard : KS C4202, JIS C4210

■ How to select

1. Calculate and select reduction gear ratio.



2. Check the required torque.



3. Check inertia(load inertia) of the device.



4. Check Overhung Load(O.H.L).



5. Select the product of the required output.

1 Calculation of reduction gear ratio

Select reduction gear ratio from the required output shaft RPM. Reduction gear ratio is simply obtained as motor rpm is 1,800 rpm at 60 Hz.

$$i = \text{motor rpm} / \text{required output shaft rotation}$$

2 Calculation of the required torque

Calculate output shaft torque from load torque. In case the load torque is fluctuated, the maximum torque should be calculated.

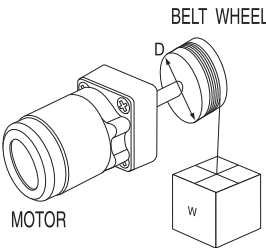
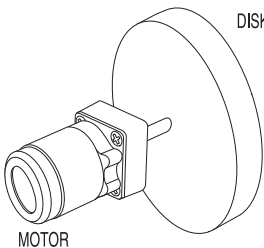
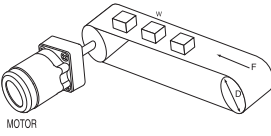
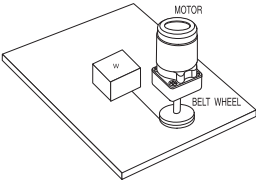
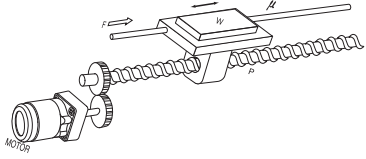
$$T_L = T_E \times S_f \quad T_L : \text{Output shaft torque} \quad T_E : \text{Load torque} \quad S_f : \text{Service Factor (Table 1)}$$

Table 1. Service Factor

Operation Hr. \ Load	U (uniform load)	M (moderate shock load)	H (strong shock load)
Less than 3 hours/day(less than 3Hr/Day)	1	1	1.5
3~10 hours/day (3~10Hr/Day)	1	1.25	1.75
More than 10 hour/day (more than 10Hr/Day)	1.25	1.5	2

※ Driven Machinery Load Classification Reference Table

Load classification	Driven machine name
U (uniform load)	air blower, distillation system, purifier, conveyor(uniform load), crane, elevator, extruder, fan, machine tool(sub), water treatment machine(low load), screen(fluid)
M (moderate impact load)	screening machine, ceramics machine(heavy load), compressor, conveyor(non-uniform load), supplier, food machine, hoist, machine tool(main), rotation mill, mixer, paper-making machine, pump, sugar-manufacturing machine, rubber machine(heavy load), water treatment machine(heavy load), fiber machine
H (high impact load)	ceramics machine (high load), crusher, supplier(reciprocating type), hammer mill, metal processing machine, tumbling barrel, sawing machine, rubber machine(high load), iron works machinery

(1) In case of rolling up a load  BELT WHEEL $T = \frac{1}{2} D \cdot W [\text{kgf} \cdot \text{m}]$ D : Drum diameter [m] W : Weight [kgf]	(2) In case of operation inertia weight  DISK WHEEL $T = \frac{GD^2}{37500} \times \frac{N}{t} [\text{kgf} \cdot \text{m}]$ N : Revolutions per minute [rpm] GD² : Disk wheel effect [kgf · m²] t : Time [sec]
(3) In case of belt conveyor  MOTOR $T = \frac{1}{2} D(F + \mu W) [\text{kgf} \cdot \text{m}]$ D : Drum diameter [m] w : Weight of belt in unit length [kgf] μ : Coefficient of friction F : Cutting force [kgf]	(4) A case of moving an object horizontally on the surface  MOTOR BELT WHEEL $T = \frac{1}{2} D \cdot \mu W [\text{kgf} \cdot \text{m}]$ w : Weight [kgf] μ : Coefficient of friction D : WHEEL diameter
(5) In case of driving a ball screw  MOTOR $T = \frac{1}{2\pi} P(F + \mu W) [\text{kgf} \cdot \text{m}]$ F : Cutting force [kgf] w : Work Weight + Table Weight [kgf] μ : Coefficient of sliding friction in the slide guide surface [0.05~0.2] P : BALL SCREW LEAD [m]	

3 Calculation of load inertia

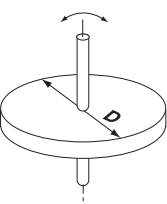
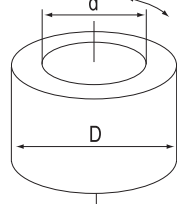
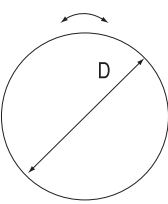
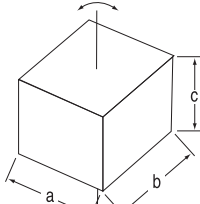
In case of big load inertia & frequent operation, GD² & starting frequency should be allowed for since impact torque is occurred at starting.

– The relation between inertia moment J and flywheel effect GD² is as shown in the following equation.

$$GD^2 = 4 J [\text{kgf} \cdot \text{cm}^2] \quad GD^2 : \text{FLYWHEEL EFFEC} \quad J : \text{INERTIA MOMENT}$$

1 Calculate GD².

① Rotor GD² calculation

	Circular Disk	Hollow	Sphere	Hexahedron
Shape				
GD ² Equation	$GD^2 = \frac{1}{2} W D^2 [\text{kgf} \cdot \text{m}^2]$ W : Weight[kgf] D : Outer Diameter[m]	$GD^2 = \frac{1}{2} W (D^2 + d^2) [\text{kgf} \cdot \text{m}^2]$ W : Weight[kgf] d : Inner Diameter[m] D : Outer Diameter[m]	$GD^2 = \frac{2}{5} W D^2 [\text{kgf} \cdot \text{m}^2]$ W : Weight[kgf] D : Outer Diameter[m]	$GD^2 = \frac{1}{3} W (a^2 + b^2) [\text{kgf} \cdot \text{m}^2]$ W : Weight[kgf] a, b : Length of Side [m]

Technical data

① GD² calculation for a rotor

	POLE	POLE
Shape		
GD ² Equation	$GD^2 = W \left(\frac{D^2}{4} + \frac{L^2}{3} \right) [\text{kgf} \cdot \text{m}^2]$ W : Weight[kgf] D : Outer Diameter[m] L : Length [m]	$GD^2 = \frac{4}{3} WL^2 [\text{kgf} \cdot \text{m}^2]$ W : Weight[kgf] L : Length [m]

② GD² calculation for linear movement

	Linear Motion (Horizontal)	Linear Motion (Vertical)
Shape		
GD ² Equation	$GD^2 = WD^2 [\text{kgf} \cdot \text{m}^2] = \frac{WV^2}{\pi^2 N^2}$ V : CONVEYOR SPEED [m/min] N : DRUM ROTATIO SPEED [rpm] W : WEIGHT OVER CONVEYOR D : DRUM OUTSIDE Diameter[m] (Not included GD2 for belt and drum)	$GD^2 = WD^2 [\text{kgf} \cdot \text{m}^2]$ W : Weight[kgf] D : Outer Diameter[m]

③ Other GD² calculations

	Reducer	Operation of BALL SCREW	GD ² of arbitrary shaft
Shape			
GD ² Equation	a axis component of total GD² $GD_a^2 = GD_1^2 + \left(\frac{n_2}{n_1} \right)^2 \times GD_2^2 [\text{kgf} \cdot \text{m}^2]$ n₁ : Rotation speed of a-axis n₂ : Rotation speed of b-axis Reduction ratio is $\frac{n_1}{n_2}$ (i > 1)	$GD^2 = GD_1^2 + \frac{WP^2}{\pi}$ GD₁ : GD² of BALL SCREW GD²[kgf · m²] P : PITCH of BALL SCREW[m] W : Total weight of table and work	$GD^2 = GD^2 + 4WS^2 [\text{kgf} \cdot \text{m}]$ W : Weight[kgf] D : Outer Diameter[m] S : Radius of Rotation [m]

② Obtain load inertia (GD_L²) by motor shaft conversion.

$$GD_L^2 = \frac{GD^2}{i^2} \quad (i = \text{ratio})$$

③ From Product Characteristics Table, Select appropriate output value that meets torque & reduction gear ratio.

④ Obtain permissible load inertia; GD_M² at motor shaft conversion with reference to Table 2.

Table 2. GDM² for a geared motor (motor shaft conversion)

Output	Permissible load inertia	
	GD ² (kgf · m ²)	J (kg · m ²)
0.2kW	0.004	0.0010
0.4kW	0.006	0.0015
0.75kW	0.012	0.0030

5 Obtain load inertia ratio (Z).

$$Z = \frac{GD_L^2}{GD_M^2}$$

GD_L^2 : load inertia (motor shaft conversion)
 GD_M^2 : inertia of a geared motor (motor shaft conversion)

6 Obtain Service Factor (Sf₂) according to load inertia ratio and starting frequency from Table 3.

Table 3. Coefficient by inertia ratio and starting frequency

Starting frequency / hour	Connection : Direct connection of coupling etc.				Connection : Connection of chain, belt, etc.			
	Z≤0.5	0.5<Z≤1.0	1.0<Z≤2.0	2.0<Z≤3.0	Z≤0.2	0.2<Z≤0.5	0.5<Z≤0.7	0.7<Z≤1.0
1 Cycle	1.00	1.01	1.05	1.10	1.00	1.01	1.03	1.05
5 Cycle	1.01	1.04	1.17	1.26	1.01	1.05	1.10	1.19
10 Cycle	1.02	1.08	1.24	1.36	1.02	1.09	1.17	1.27
20 Cycle	1.04	1.14	1.34	1.47	1.04	1.15	1.24	1.37
50 Cycle	1.07	1.25	1.48	1.62	1.07	1.26	1.37	1.51
100 Cycle	1.10	1.34	1.61	1.76	1.10	1.35	1.47	1.63
150 Cycle	1.14	1.40	1.68	1.85	1.14	1.41	1.53	1.71

7 Required output shaft torque.

Obtain the required output shaft torque(T) of a geared motor.

$$T = T_E \times S_{f1} \times S_{f2}$$

T_E : Load torque S_{f1} : Coefficient by load status S_{f2} : Coefficient by load inertia

4 Calculation of Overhung Load(O.H.L)

The direct installment with a driven machine is the most optimum. However, O.H.L at the shaft should be less than the permissible O.H.L in case of installment with indirective devices such as chain, belt, gear, and etc.

$$O.H.L(kgf) = \frac{2000 \times T_E \times S_{f1} \times S_{f2}}{D} \times \frac{C_f}{L_f}$$

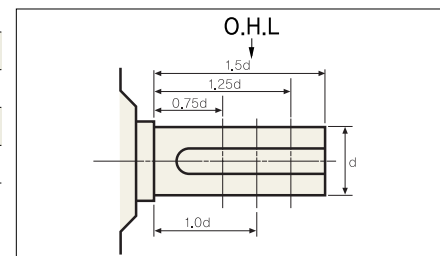
D : Pitch circle diameter ; chain, a pulley, etc. (mm)
 C_f : Coefficient by connection type (Refer Table 4)
 L_f : Coefficient by loading position (Refer Table 5)

Table 4.
Cf (coefficient according to connection type)

Sprocket(insulator)	1.00
Sprocket(recuperator)	1.25
Gear	1.25
V-Belt	1.5
Flat Belt	2.5

Table 5.
Lf (loading Position Coefficient)

0.75d	1.10
1.00d	1.00
1.25d	0.87
1.5d	0.75



※ Thrust Load

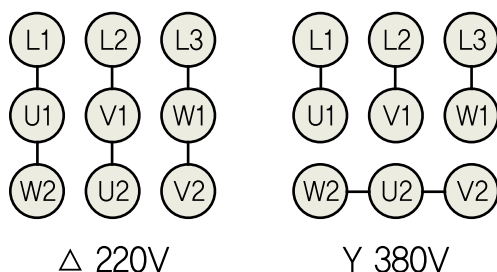
Please design the device with an intermediate connection such as pulley etc. so that thrust load is not given in an axial direction of the product. Even if thrust load is given inevitably, ensure that maximum load is under product weight.

5 Final selection of the product having the required output

Select the product having output, which fully satisfies the required output shaft torque, reduction gear ratio, and load inertia as calculated previously, through comparison in the Products Properties Table.

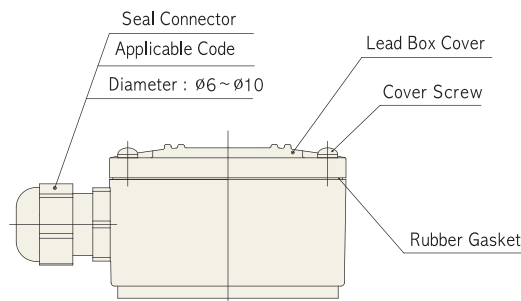
Technical data

■ Wiring diagram



※ For detailed wiring, see the User Manual.

■ LEAD BOX assembly specification



Bolt(Screw) Size	Recommended tightening Torque N · m(kgf · cm)
M4	0.6 ~ 1.0 (6~10)

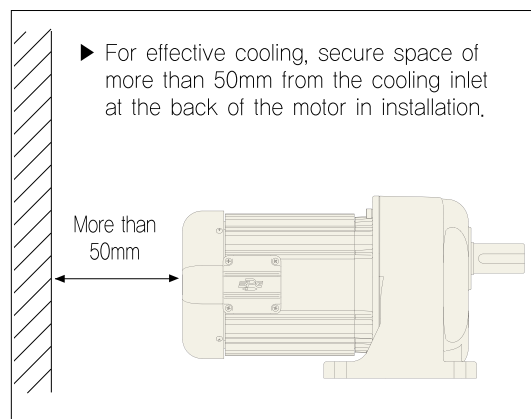
■ Bolt(screw) tightening torque for the installation part

Recommended fastening torque by bolt(screw) size

Hole size (mm)	Bolt(Screw) Size	Recommended tightening Torque N · m(kgf · m)
6.5	M6	4.9 (0.5)
8.5 ~ 10	M8	13 (1.3)
11 ~ 12	M10	25 (2.6)
13	M12	44 (4.5)
15	M14	69 (7.0)
18	M16	108 (11.0)

■ Installation conditions

Item	Specification
Ambient temperature	-10°C ~ +40°C
Ambient humidity	Under 85% (without condensation)
Height(altitude)	1,000 m Max.
Insulating grade	F (155°C)
Installation place	indoor (This product is designed and made for mounting on the device.)
Requirements for the installation	Avoid followings. - where inflammable, explosive, and corrosive gases are, - dusty place - the direct sunlight - unprotected place against heat,



PRIOR TO USE, FULLY ACKNOWLEDGE THE WARRANTY RULE AND BE FAMILIAR WITH WARRANTIES. IN WARRANTIES, THE WARRANTY RULE IS DIVIDED INTO THE WARRANTY PERIOD THE WARRANTY LIMIT.

■ Warranty

A WARRANTY PERIOD AND A WARRANTY LIMIT OF THE PRODUCT IS AS FOLLOWS.

1 Warranty Period

Either 18 months after the delivery or 12 months of an operation period for the product, which reaches earlier, should be applied on condition of use with operation, assembling, and lubrication specified by the Company.

2 Warranty Limit

For a fault by a defect in Company's manufacturing during the above warranty period, repair or exchange of the product should be conducted under Company's responsibilities. However, the following cases are excluded from the Warranty Limit.

- ① Unsuitable handling or use by customers
- ② Remodeling or repair outside of the Company without permission
- ③ A fault resulting from other reasons except the product
- ④ Such fault as attributable to natural disaster etc., which is not the Company's responsibility

Warranty herein means warranty for the product.

Other losses (chance loss by loss of the machine & assembly man-hour, assembly & disassembly, and mounting costs) arising out of a failure of the product are beyond the range of our burdens.

Cautions at use

Prior to use, fully read the User Manual for proper use.

In 'Cautions at use', safety cautions are divided into warnings and cautions as follows.

■ Warnings

- Avoid use in explosive, inflammable, and corrosive atmosphere, a place where water is likely to contact, and around combustibles. There is risk of an electric shock, an injury, and a fire.
- Do not move, connect, and inspect while electric current is applied. Turn off power at work.
- Ensure connection based on the wiring diagram. There is risk of an electric shock or a fire.
- Do not excessively bend, pull, or insert power cable or lead wire. There is risk of an electric shock or a fire..
- If a motor and a control are attached to the device, keep them out of reach or conduct grounding. There is risk of an electric shock.
- Do not operate while the part where electric current is applied is exposed. There is risk of an electric shock.
- Upon an electricity failure and when an overheat protector runs, turn off power. Upon sudden restarting, there is risk of an injury and damage to the device.
- Load is not fixed surely for a brake mechanism of the motor where it is connected. In case of use as a safety brake, take additional safety measures. There is risk of an injury and damage to the device.
- Do not contact the output terminal of the controller for 30 seconds after turning off power. There is risk of an electric shock by residual voltage.

■ Cautions

- Do not use beyond the motor and controller specifications. There is risk of an electric shock, an injury and damage to the device.
- Do not put a finger or an object in the opening of the motor or the controller. There is risk of an electric shock, an injury, and a fire.
- Do not operate with a wet hand. There is risk of an electric shock.
- At transportation, do not grasp the output shaft, the driving part, and the lead wire of the motor. There is risk of an injury by a drop.
- Make sure that the product is as specified in the order. There is risk of an injury or a fire if another product is installed.
- Certainly fix the motor for use. There is risk of an electric shock, an injury and damage to the device.
- Install a cover etc. not to contact the rotating part. There is risk of an injury.
- Check the rotation direction prior to combination with the machine. There is risk of an injury and damage to the device.
- Be careful not to get on or hang on the motor or the controller. There is risk of an injury.
- Do not contact the motor output shaft(key way, hobbing) with a bare hand. There is risk of an injury.
- The protector is not attached to the motor. Install an overload protector.
- Installation of protectors (leakage circuit breaker etc.) except the overload protector is recommended. There is risk of a fire.
- Whenever taking out the power plug, do not grasp the cable. There is risk of an electric shock and a fire.
- Use both the motor and the controller in the designated combination. There is risk of a fire.
- Before starting operation in combination with the machine, set parameters suited to the machine.
- There is risk of an injury.
- When starting operation in combination with the machine, keep a condition of emergency stop all the time. There is risk of an injury.
- Turn off power if there is an abnormal condition. There is risk of an electric shock, an injury, and a fire.
- Do not contact the rotor(output shaft) during operation. It may be rolled up, causing risk of an injury.
- Do not contact a hand or the body to the motor or the controller during or immediately after operation. There is risk of a burn.