For safe and reliable operation, it is essential to read the user's manual carefully before using this equipment.

We have a new slogan in Japan; "ECOing" a combination of "eco" and "ing". This is to promote eco-friendly technological development and manufacturing. Our ecological activities are of course not limited to Japan and practiced in many countries around the world.

SINFONIA TECHNOLOGY CO., LTD. continually upgrades and improves its products.
Actual features and specifications may therefore differ slightly from those described in this catalog.

Formerly SHINKO ELECTRIC CO., LTD.

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CODE
E75-120

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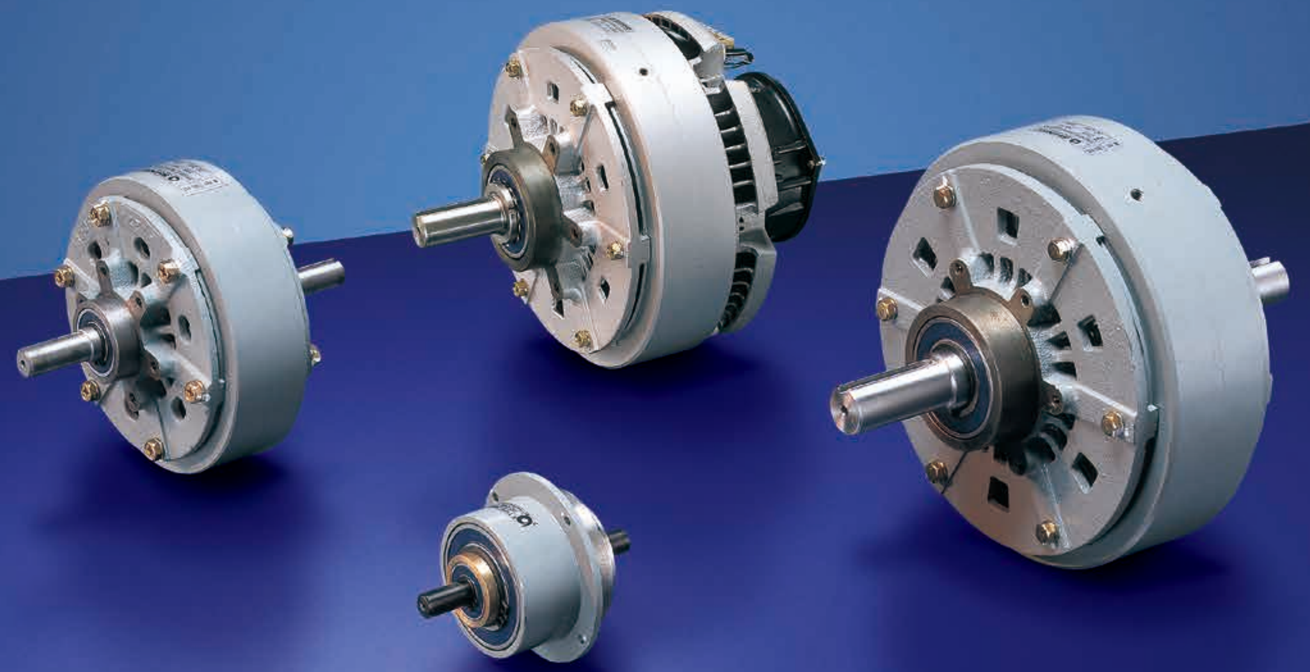
ELECTROMAGNETIC CLUTCHES AND BRAKES

PARTICLE CLUTCHES/BRAKES

Our clutches and brakes used in various equipment including industrial equipment, information equipment and recreation facilities play an important part in automation or motion control systems.



SINFONIA

SINFONIA TECHNOLOGY CO., LTD.
Formerly SHINKO ELECTRIC CO., LTD.

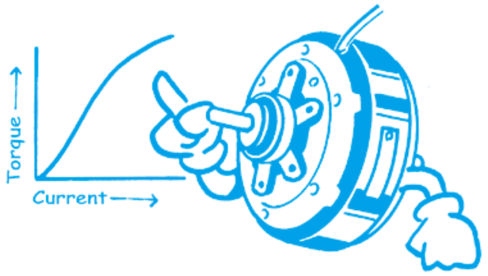
Particle Clutches/Brakes

Particle type Series

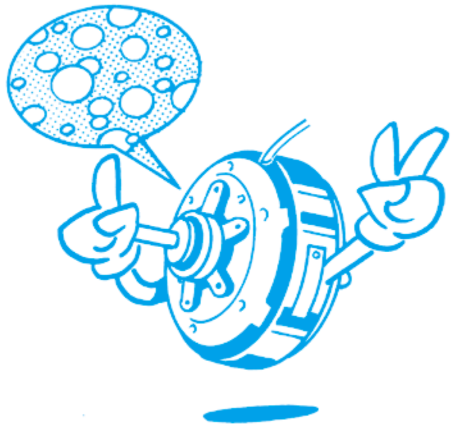
We use a special magnetic powder to transmit and control the torque on this series of clutches/brakes. The original powder and advanced structural design create incomparable performance in torque control and slip usage. Our unique materials and manufacturing expertise produce a high quality, nearly spherical powder, which dramatically improves the performance and reliability of our product, truly making this the ideal powder clutch/brake.

Features

1. High precision torque over a wide range of values
By using efficient magnetic circuitry, the transmitted torque can be varied between 3% and 100% of maximum rated torque.

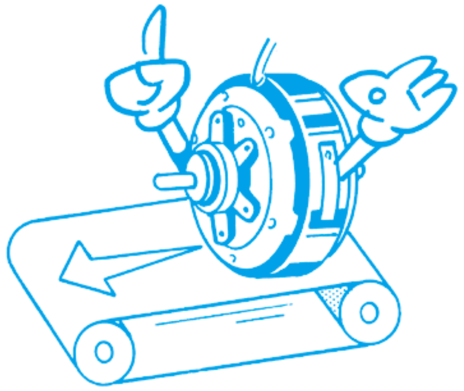


2. Stable torque and long operating life
The ideal spherical powder obtains stable torque and smooth slip operation.



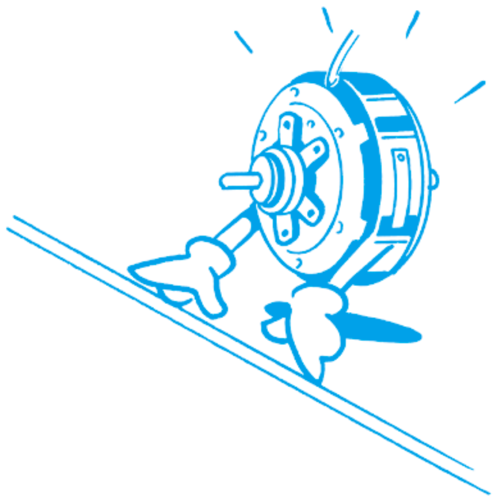
3. High thermal radiation capability
Using a heat resistant powder, and a structure with high thermal radiation capability, our devices are capable of heavy continuous slip operation. slip operation.
Heat pipe powder brake is incredible thermal radiation capability which outperforms water-cooled models.

4. Non-shock, smooth linkage and brake
Achieve an excellent buffer effect with its constant torque and smooth slip torque.

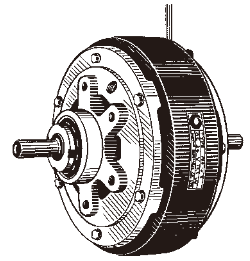
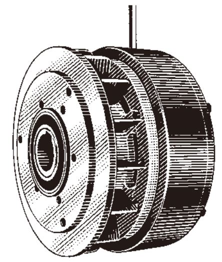
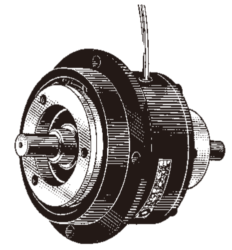
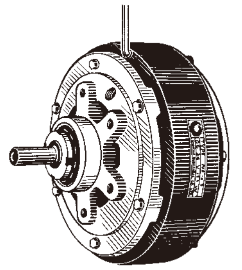
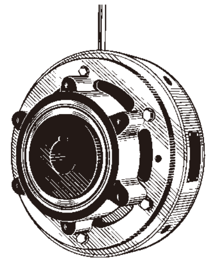
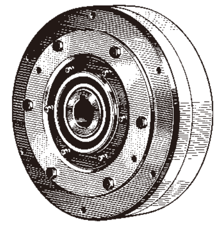
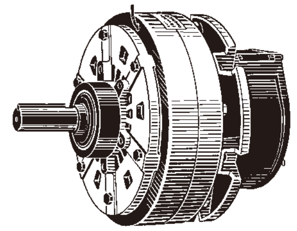


5. Non-abrasive powder and silent operation
Unlike abrasive clutches/brakes there is no wearing powder, and silent operation is possible since there is no linkage sound.

6. Rapid response
The generated magnetic flux operates instantaneously as the effective flux, providing rapid torque response.



List of Models

Type	Clutch			
	Shaft type	Hollow center type	Micro type	
	POC Naturally cooled	PHC-R Self-ventilating	PMC Naturally cooled	
Appearance				
Type	Brake			
	Shaft type	Hollow center type	Hollow center type	Shaft type
	POB Naturally cooled	PHB Naturally cooled	PRB-H Naturally cooled (with side fin)	PTB Heat pipe cooled
Appearance				

Models Names

POB-10

Nominal number

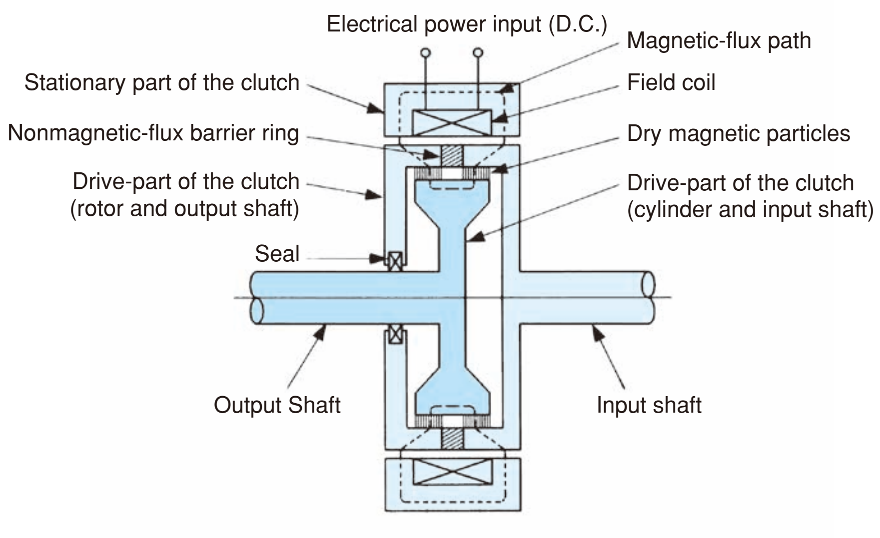
Model symbol
POC: Shaft type / Naturally cooled clutch
PHC: Hollow center type / Self-ventilating clutch
PMC: Micro type / Naturally cooled clutch
POB: Shaft type / Naturally cooled brake
PHB: Hollow center type / Naturally cooled brake
PRB-H: Hollow center type / Naturally cooled brake (with side fin)
PTB: Shaft type / Heat pipe cooled brake

Structure

DESIGN AND OPEFIATION

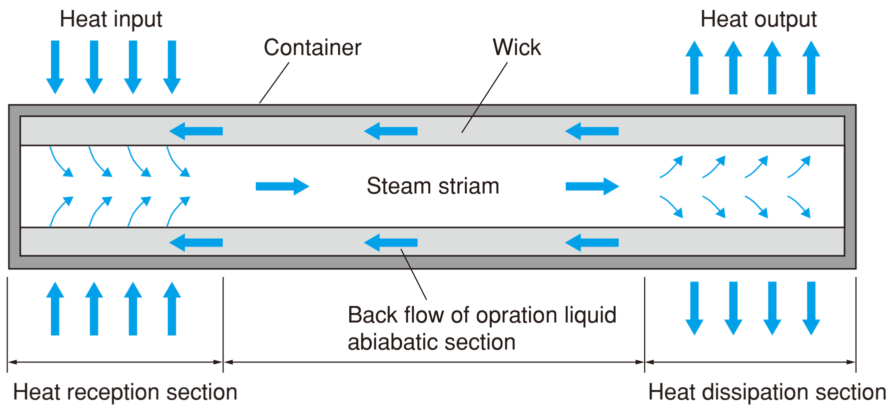
The main components of the clutch/brake are the electromagnetic field (stationary part) containing the coil, the drive-part of the clutch (cylinder and input shaft) and the driven-part of the clutch (rotor and output shaft). The cylindrical space between the cylinder and the rotor is filled with dry magnetic particle. The cylinder is the nonsaturation type incorporating a nonmagnetic-flux barrier ring in the center of its rim. Consequently, its built-up characteristics is excellent.

When the coil is excited with direct current from electrical source, the magnetic flux, as illustrated in the figure below, is established. The magnetized particle contained between the two rotating parts (rotor and cylinder) are solidified into a chainlike configuration, which bind tightly the two rotating parts together. When the coil is deenergized, the magnetic flux instantaneously disappears, the solidified particles disperse, and the transmission of torque ceases immediately. Due to its structural design where the input and output shafts are of the split-shaft type or simple hollowed shaft type, installation of clutches and brakes is simplified. Moreover, since the stationary coil type, no sliping and brush are required. This facilitates inspection and maintenance of the equipment. In the case of the electromagnetic particle brake, the operating principle is identical with that of the clutch. However, the rotor, illustrated in the figure, is fixed to the bracket. When the coil is excited, braking is initiated.

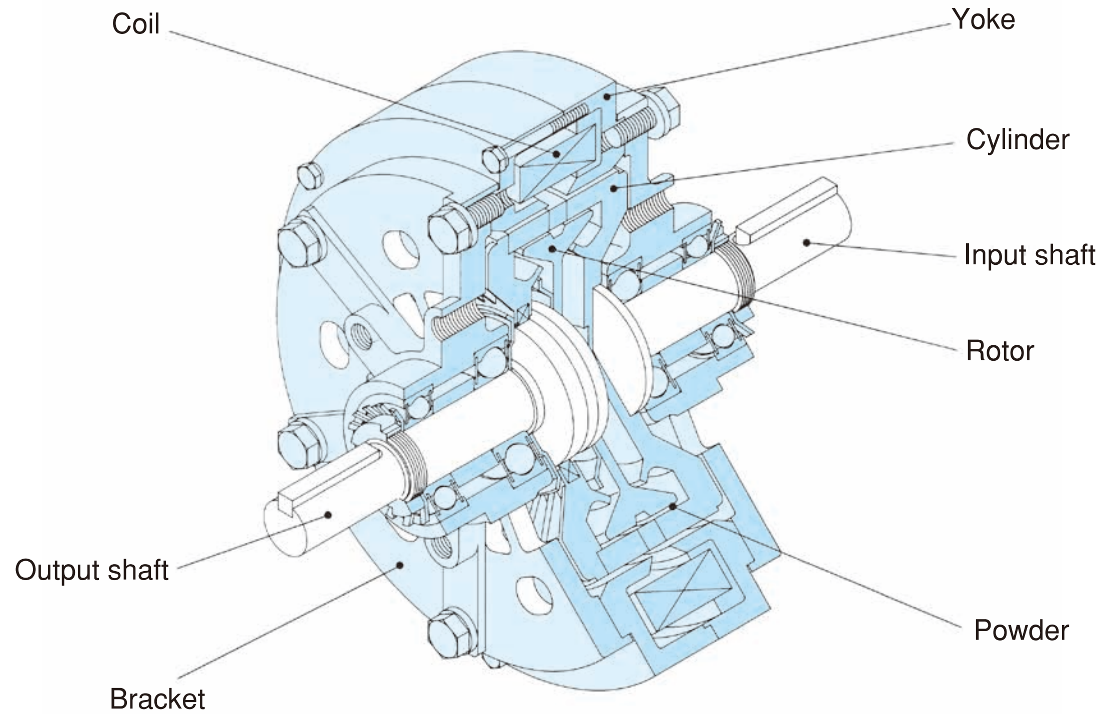


Principle of heat pipe:

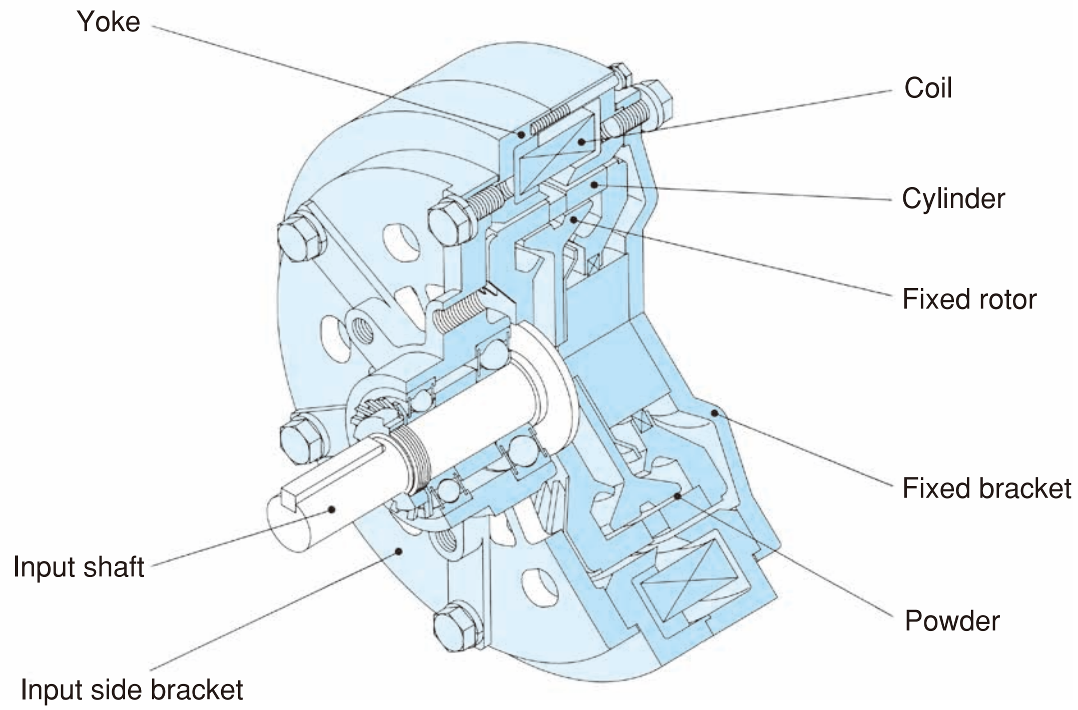
The heat pipe has for the first time been utilized by NASA to cope with incandescence or space ships and heat disslpation of communication devices, a new technology by which a large quantity of heat can be transported rapidly. Its distinguished features are wide spreading over various fields including electrical equipment field.



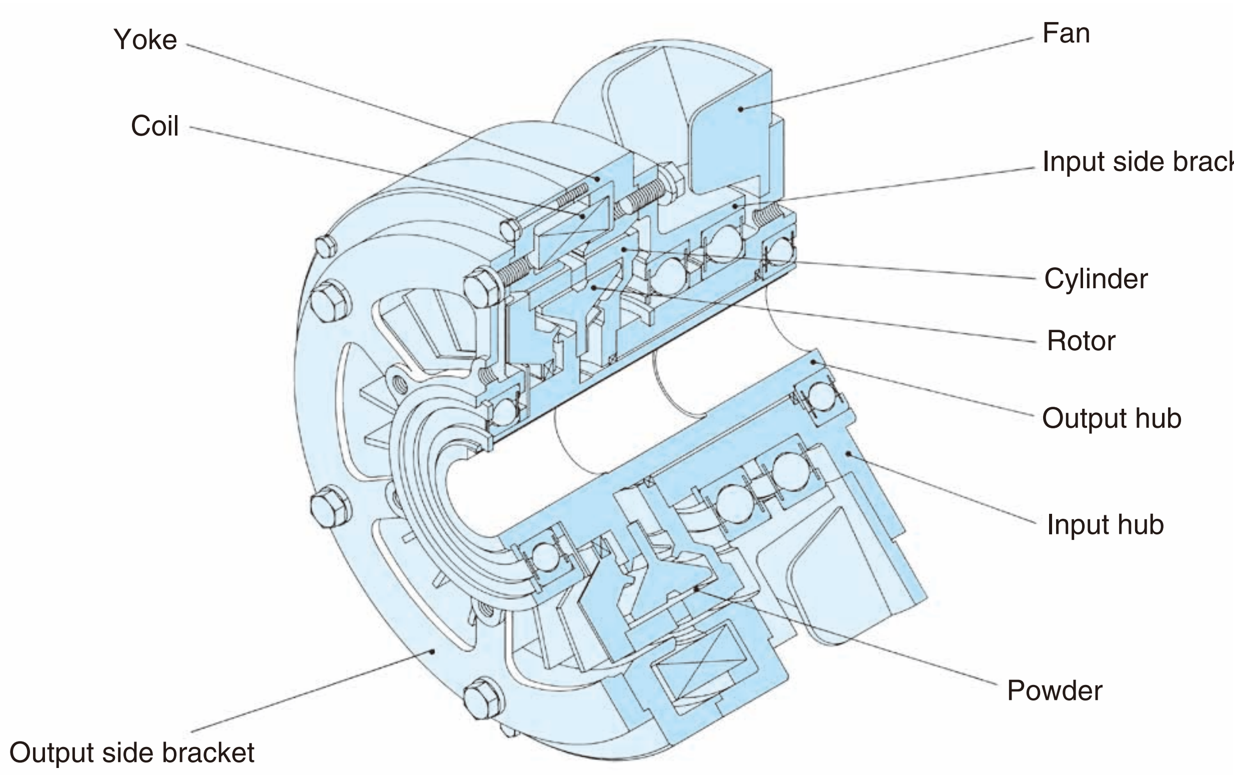
POC



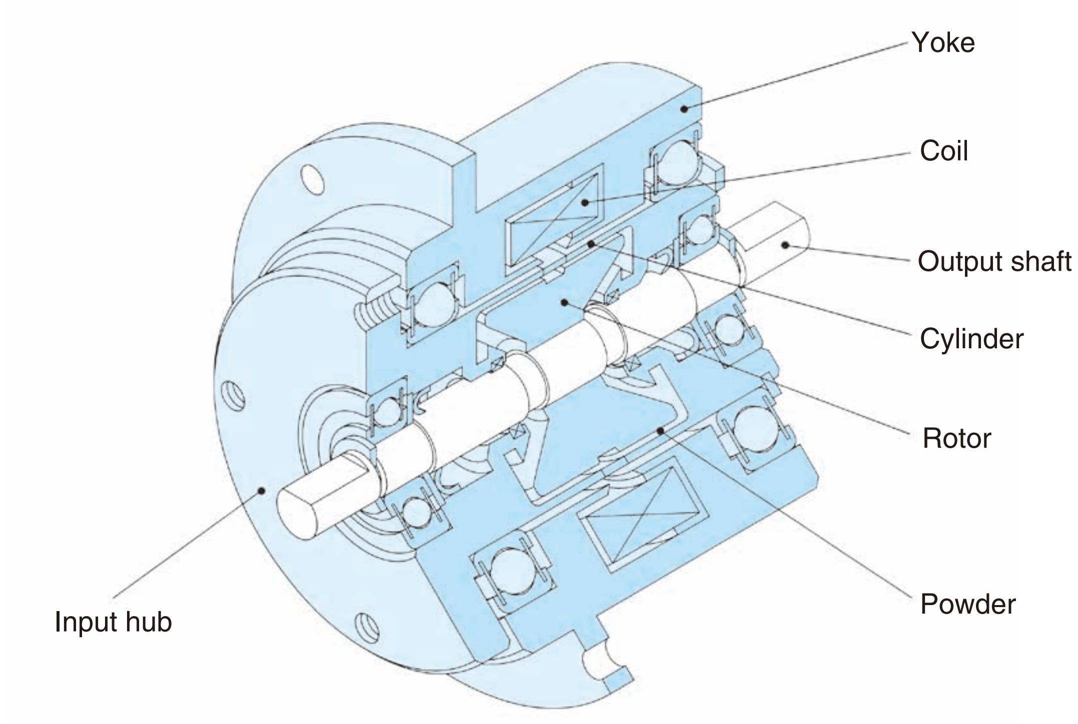
POB



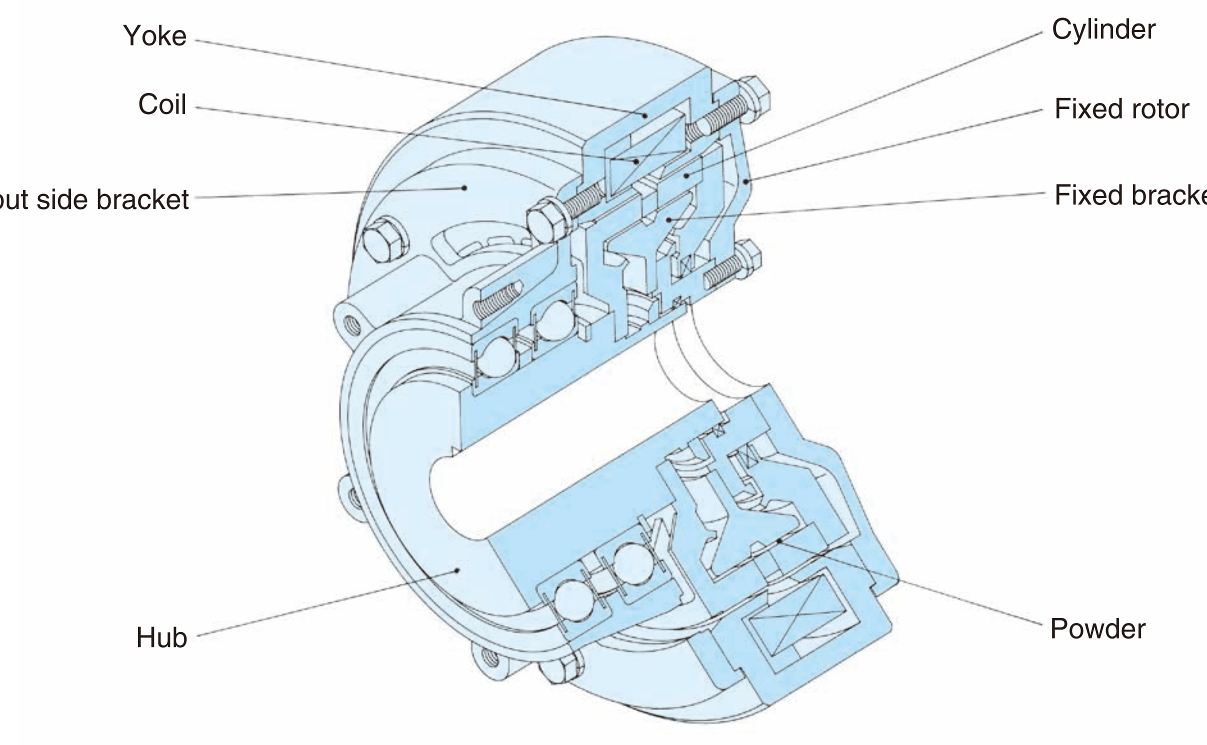
PHC-R



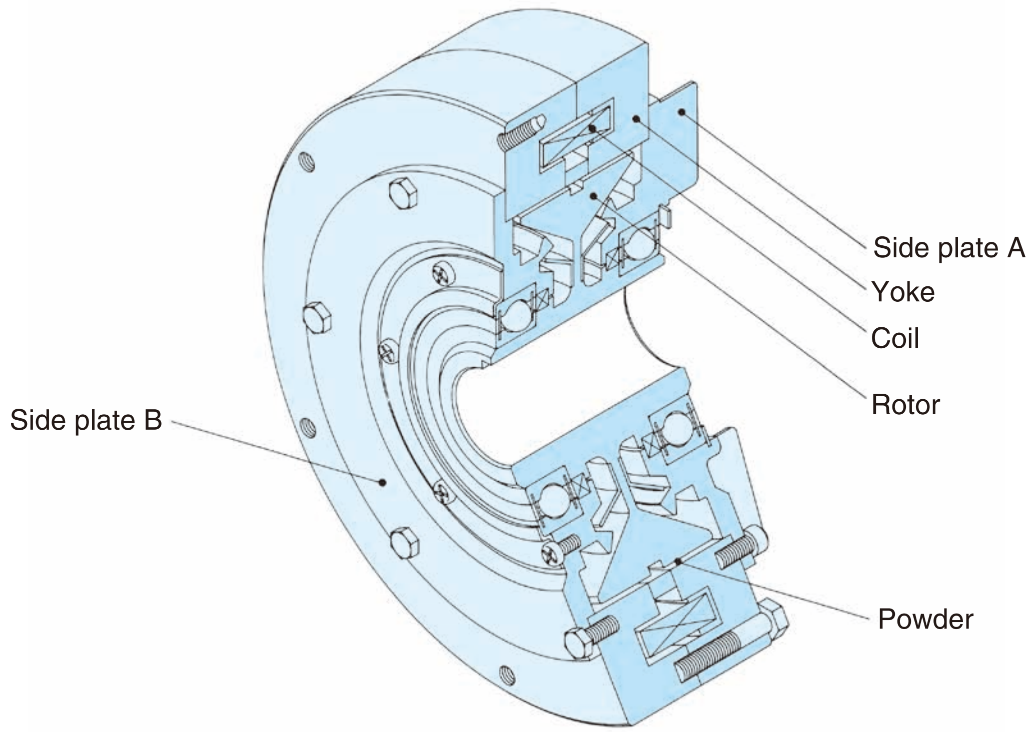
PMC



PHB



PRB-H



Clutch or Brake Selection Guide

1. To use in the state of continuous slip

To use in the state of continuous slip with a constant torque and a constant rpm for tension control of dummy loads and start up windlng brake, the continuous slip power is calculated by the following formula. Here, it is possible to use the required brake torque by adjustirlg the rated torque in the range 3~100%.

Ps=0.103xTxn (W)
T: Set torque of brake (Nm)
n: rpm of brake shah (r/min)

Example
(Conditions)
Set torque of brake: T=35 (Nm)
rpm of brake:n=65(r/min)
Select the brake for the above state.

(1) Temporarily select the one having the rated torqur 50 Nm from the set torque 35Nm.

(2) Calculate the slip power.
$Ps=0.103\times35\times65\fallingdotseq234W$
The type having the slip power larger than 234W is required.

(3) The type may be selected from the allowable slip power diagram:
For the shaft type, the allowable slip power of POB-10 is 270W (234W<270W). Therefore, POB-10 may be used.

(4) The simple selection table below with the continuous slip power considered is based on rpm of 1000 r/min. Therefore, it is required to determine the feasibility of use at this rpm by an allowable slip power diagram.

Simple Selection Table with Slip Power Considered

(1000 r/min)

Model		Rated Torque (Nm) / Cooling System	6	12	25	50	100	200	400
Allowable Slip Power (W)	POC	Natural Cooling System	84	130	180	290	450	800	1900
	POB	Natural Cooling System	84	130	180	290	450	800	1900

2. To make tension control

To make constant tension control with continuous slip applying a start up winding brake, calculation is made using the following formulae:

Principal data dimensions of application conditions necessary for exarmination:
1. Line speed:
Maximum Vmax. Minimum Vmin (m/min)
2. Start up wlndlng dia:
Maximum Dmax. Minimum Dmin (mm ø)
3. Set tension:
Maximum Fmax, Minimum Fmin (N)

1) For start up winding brake
To make start up winding control applying the electromagnet powder brake, following points should be examined:

(1) Required brake torque (T) at start up and rpm of brake (N)

$$T=\frac{Fmax\times Dmax}{2}\times10^{-3}(Nm)$$

$$N=\frac{Vmax}{\pi\times Dmax}\times10^{3}(r/min)$$

(2) Required brake torque (T) at final stage and rpm of brake (N)

$$T=\frac{Fmin\times Dmin}{2}\times10^{-3}(Nm)$$

$$N=\frac{Vmin}{\pi\times Dmin}\times10^{3}(r/min)$$

(3) Maximum rpm (Nmax)

$$Nmax=\frac{Vmax}{\pi\times Dmin}\times10^{3}(r/min)$$

(4) Minimum rpm (Nmin)

$$Nmin=\frac{Vmin}{\pi\times Dmin}\times10^{3}(r/min)$$

(5) Minimum brake torque (Tmin)

$$Tmin=\frac{Fmin\times Dmin}{2}\times10^{-3}(Nm)$$

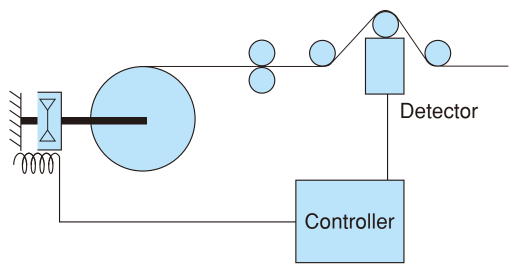
(6) Maximum brake torque (Tmax)

$$Tmax=\frac{Fmax\times Dmax}{2}\times10^{-3}(Nm)$$

(7) Maximum slip power (Pmax)

$$Pmax=0.0164\times Fmax\times Vmax\ (W)$$

(Example)
[Conditions]
1.Line speed:
Maximum Vmax=160m/min
Minimum Vmin=85m/min2.Start up winding dia.:
Maximum Dmax=ø900mm
Minimum Dmin=ø150mm
3.Settension:
F=140(N)constant
Select the brake for the above state.



(1) Required brake torque (T) at start up and rpm of brake (N)

$$T=\frac{140\times900}{2}\times10^{-3}=63(Nm)$$

$$N=\frac{160}{\pi\times900}\times10^{3}=56.6(r/min)$$

(2) Required brake torque (T) at final stage and rpm of brake (N)

$$T=\frac{140\times150}{2}\times10^{-3}=10.5(Nm)$$

$$N=\frac{160}{\pi\times150}\times10^{3}=339.5(r/min)$$

(3) Maximum rpm (Nmax)

$$Nmax=\frac{160}{\pi\times150}\times10^{3}=339.5(r/min)$$

(4) Minimum rpm (Nmin)

$$Nmin=\frac{85}{\pi\times900}\times10^{3}=30.1(r/min)$$

(5) Minimum brake torque (Tmin)

$$Tmin=\frac{140\times150}{2}\times10^{-3}=10.5(Nm)$$

(6) Maximum brake torque (Tmax)

$$Tmax=\frac{140\times900}{2}\times10^{-3}=63(Nm)$$

(7) Maximum slip power (Pmax)

$$Pmax=0.0164\times140\times160=367\ (W)$$

Slip power of 367W or more and torque of 63Nm or more may be required.

(8) The allowable slip power of POB-20 is 430W (367W<430W, 63 Nm<200 Nm) according to the Allowable Slip Power Diagram (see page 234), so POB-20 is available.

1) For start up winding brake
To make start up winding control applying the electromagnet powder clutch, following points should be examined:

(1) Required clutch torque (T) at start up and rpm of output shaft (Ns)

$$T=\frac{Fmax\times Dmin}{2}\times10^{-3}(Nm)$$

$$Ns=\frac{Vmax}{\pi\times Dmin}\times10^{3}(r/min)$$

(2) Required clutch torque (T) at final stage and rpm of output shaft (Ns)

$$T=\frac{Fmax\times Dmax}{2}\times10^{-3}(Nm)$$

$$Ns=\frac{Vmax}{\pi\times Dmax}\times10^{3}(r/min)$$

(3) Maximum rpm (Nmax)

$$Nmax=\frac{Vmax}{\pi\times Dmin}\times10^{3}(r/min)$$

(4) Minimum rpm (Nmin)

$$Nmin=\frac{Vmin}{\pi\times Dmin}\times10^{3}(r/min)$$

(5) Minimum clutch torque (Tmin)

$$Tmin=\frac{Fmin\times Dmin}{2}\times10^{-3}(Nm)$$

(6) Maximum clutch torque (Tmax)

$$Tmax=\frac{Fmax\times Dmax}{2}\times10^{-3}(Nm)$$

(7) Maximum slip power (Pmax)

$$Pmax=0.0164\times Fmax\times Vmax\times\left(\frac{N_0}{Nmax}\times\frac{Dmax}{Dmin}-1\right)(W)$$

N_0 : rpm of clutch input shaft

(Example)
[Conditions]
1.Line speed:
Maximum Vmax=30m/min
Maximum Dmax=ø650mm
Minimum Dmin=ø150mm
3.Settension:
F=120(N)constant
Select the clutch for the above state.

(1) Required clutch torque (T) at start up and rpm of output shaft (Ns)

$$T=\frac{120\times150}{2}\times10^{-3}=9(Nm)$$

$$Ns=\frac{30}{\pi\times150}\times10^{3}=64(r/min)$$

(2) Required clutch torque (T) at final stage and rpm of output shaft (Ns)

$$T=\frac{120\times650}{2}\times10^{-3}=39(\text{Nm})$$

$$Ns=\frac{30}{\neq\times650}\times10^{3}=14.7(\text{r/min})$$

(3) Maximum rpm (Nmax)

$$Nmax=\frac{30}{\neq\times150}\times10^{3}=64(\text{r/min})$$

(4) Minimum rpm (Nmin)

$$Nmin=\frac{30}{\neq\times650}\times10^{3}=14.7(\text{r/min})$$

(5) Minimum clutch torque (Tmin)

$$Tmin=\frac{120\times150}{2}\times10^{-3}=9(\text{Nm})$$

(6) Maximum clutch torque (Tmax)

$$Tmax=\frac{120\times650}{2}\times10^{-3}=39(\text{Nm})$$

(7) Maximum slip power (Pmax)

Since the relative rpm exceeding 30 r/min of the maximum rpm (Nmax) is required for rpm of clutch input shaft No, No is temporarily set to 94 r/min (64 + 30) here.

$$Pmax=0.0164\times30\times120\times\left(\frac{94}{64}\times\frac{650}{150}-1\right)=317(\text{W})$$

Slip power of 317W or more and torque of 39Nm or more are required.

(8) The allowable slip power of POC-20 is 430W (317W<430W, 39 Nm<200 Nm) according to the Allowable Slip Power Diagram (see page 11), so POC-20 is available.

3) To use as torque limiter

To prevent overload of the motor or power engine as well as damage to the machine /product, the clutch is slipped by using the constant torque characteristic of an electromagnetic particle clutch when a torque exceeding a specified one is applied. Calculation is made using the following formula:

Equivalent slip power

$$Pave=\sqrt{\frac{Ps^2\times t_1}{t}}\ (\text{W})$$

$Ps=0.103\times Tc\times ni$ (W)

t1: Slip time during 1 cycle (S)

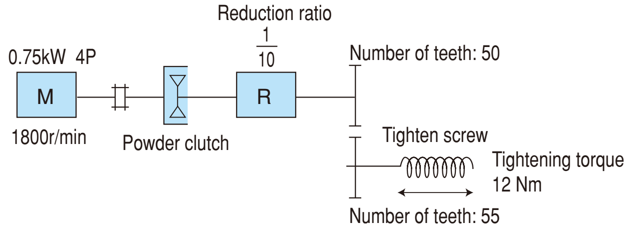
t: Time of 1 cycle (S)

Tc: Set torque of clutch (Nm)

ni: Relative rpm (r/min)

Example

(Condition)



Cycle: 10 sec. (slip for 1 sec. only, motor stop for 9 sec.)

(1) Convert torque to the clutch shaft. (T)

$$T=12\times\frac{1}{10}\times\frac{50}{55}=1.1\ (\text{Nm})$$

(2) Equivalent slip power (Pave)

$$Ps=0.103\times1.1\times1800=204\ (\text{W})$$

$$Pave=\sqrt{\frac{(204)^2\times1}{10}}=64.5(\text{W})$$

(3) The allowable slip power of POC-0.6A is 84W (64.5W<84W, the control range of POC-0.6A is 0.18 to 6 Nm, <3-100%>), so POS-0.6A is available.

4) For simple ON-OFF use

(1) Selecting clutch capacity

When selecting a sutitable electromotor, choose one whose size is adequate for the torque value the clutch shaft must adjusted from 3 to 100% by controlling the exciting current.

$$T=\frac{9550\times P}{n}\times Kt\ (\text{Nm})$$

Kt : Safety coefficient when using clutch.

(2) Selecting brake capacity

$$T=\frac{9550\times P}{n}\times B\ (\text{Nm})$$

B : Brake rate – 80% or 150% is normally used.

(3) Engaging energy rate or braking energy rate

When using for starting and stopping machinery, the engaging frequency must be considered and the engaging energy or the braking energy rate must be examined.

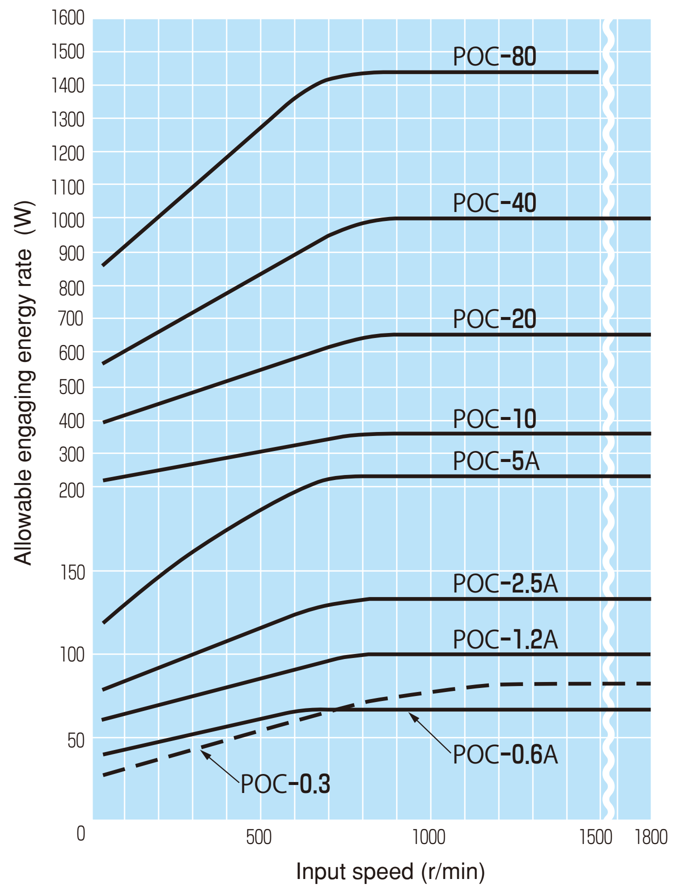
(Engaging energy rate)

$$E=\frac{J\times ni^2}{182}\times\frac{Tc}{Tc-T\ell}\times\frac{N}{60}\ (\text{W})$$

(Braking energy rate)

$$E=\frac{J\times ni^2}{182}\times\frac{Tc}{Tc+T\ell}\times\frac{N}{60}\ (\text{W})$$

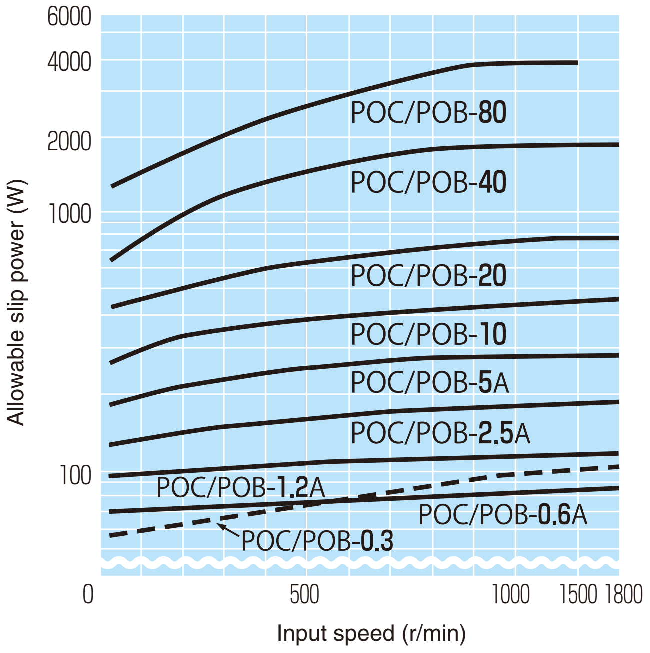
Allowable engaging energy rate characteristics



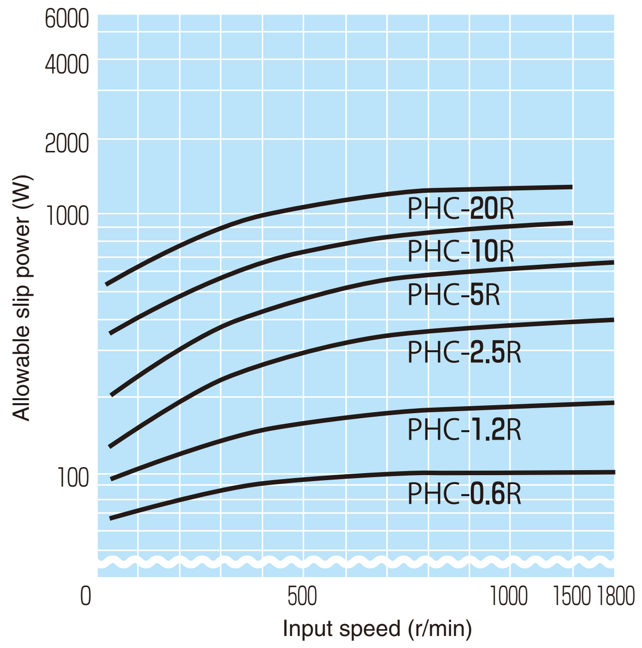
Characteristics

1. Allowable slip power characteristics

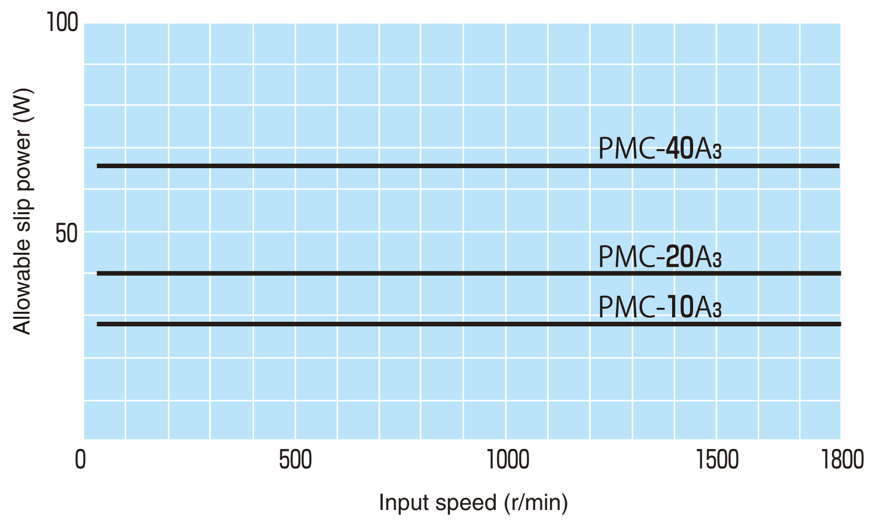
• POC/POB Shaft type / Naturally cooled



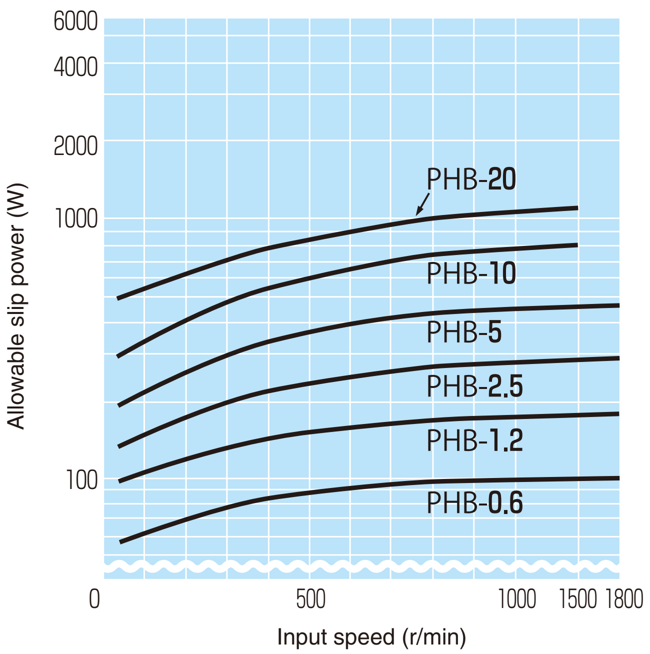
• PHC-R Hollow center type / Self-ventilating



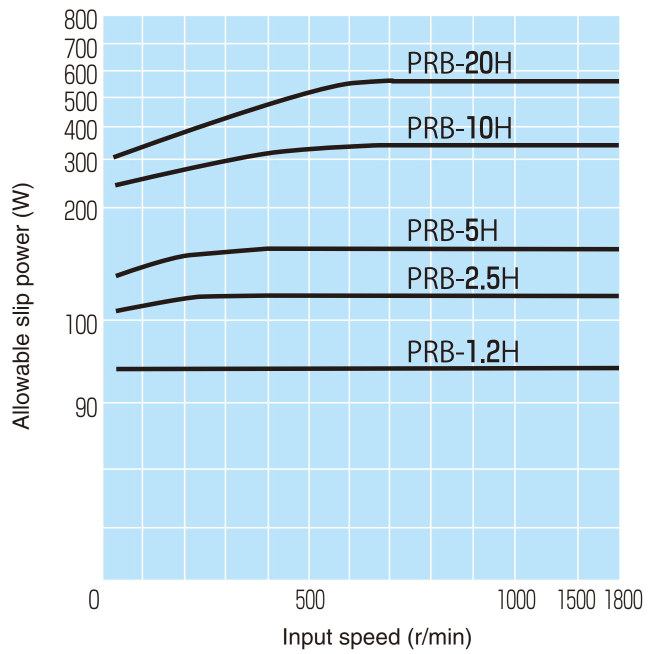
• PMC Micro type / Naturally cooled



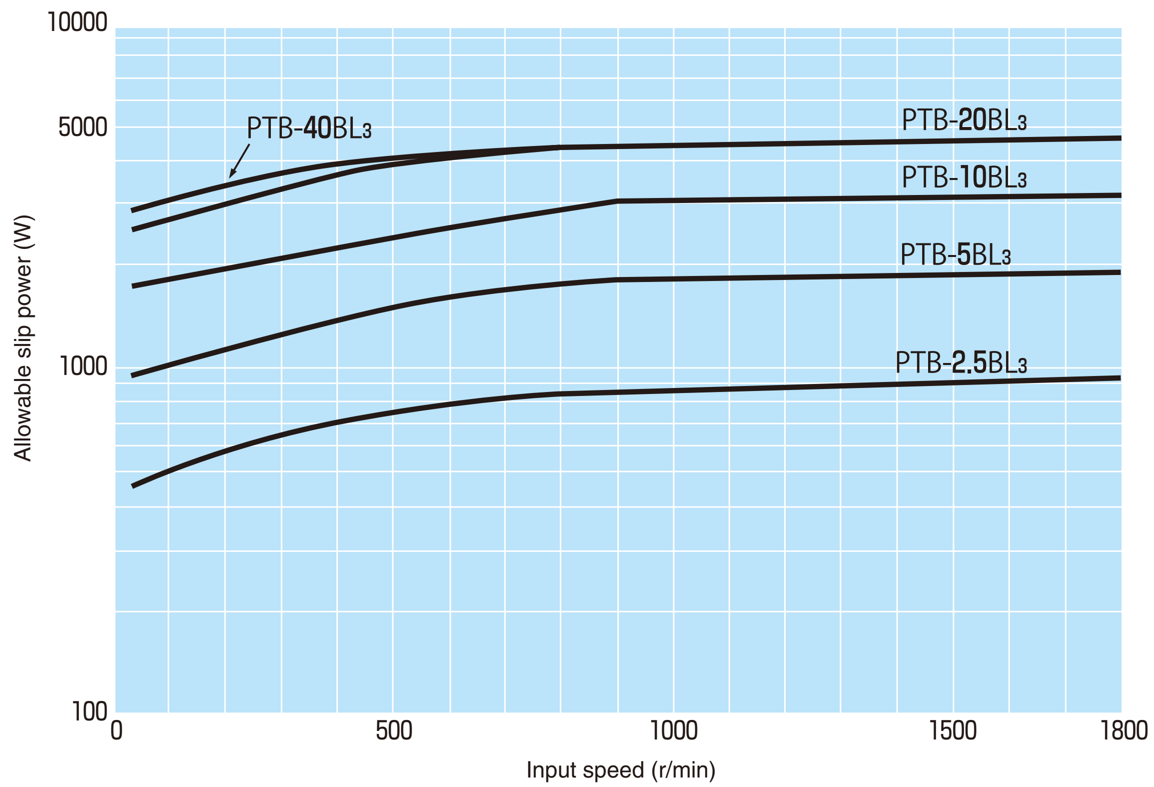
• PHB Hollow center type / Naturally cooled



• PRB-H Hollow center type / Naturally cooled (with side fin)

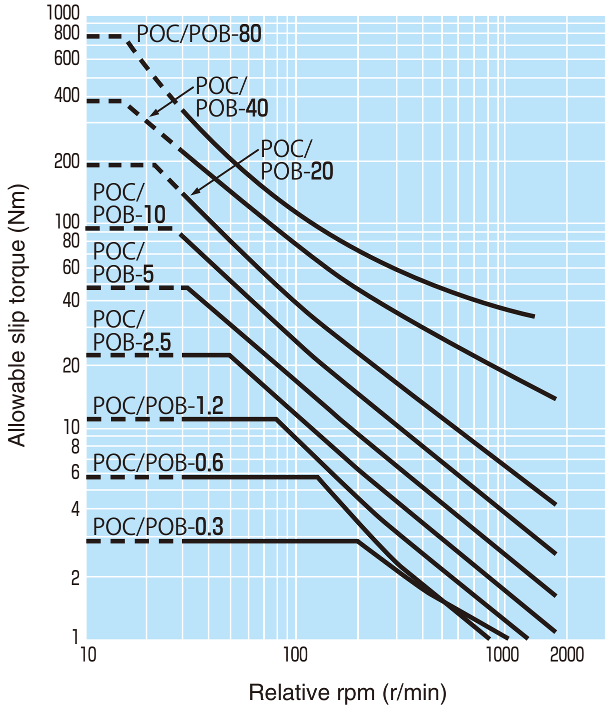


• PTB Shaft type / Heat pipe cooled

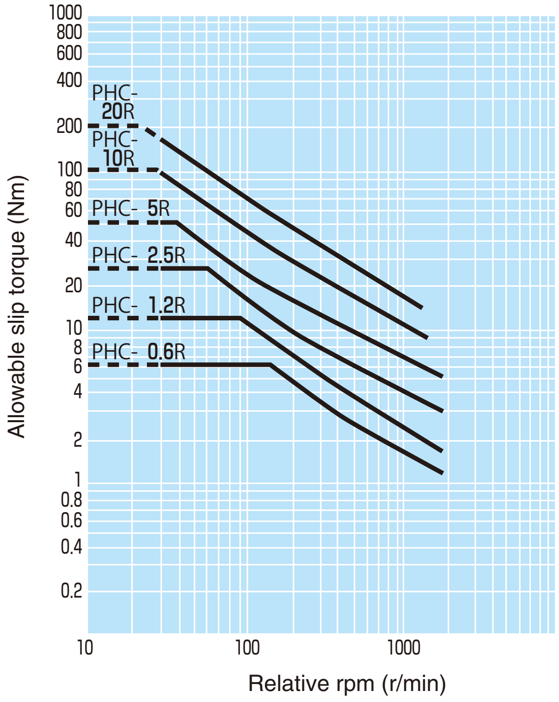


2. Allowable slip torque characteristics

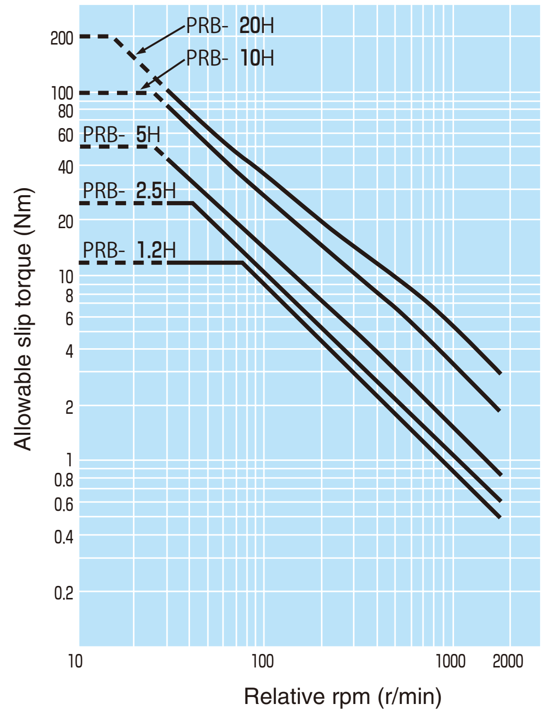
• POC/POB Shaft type / Naturally cooled



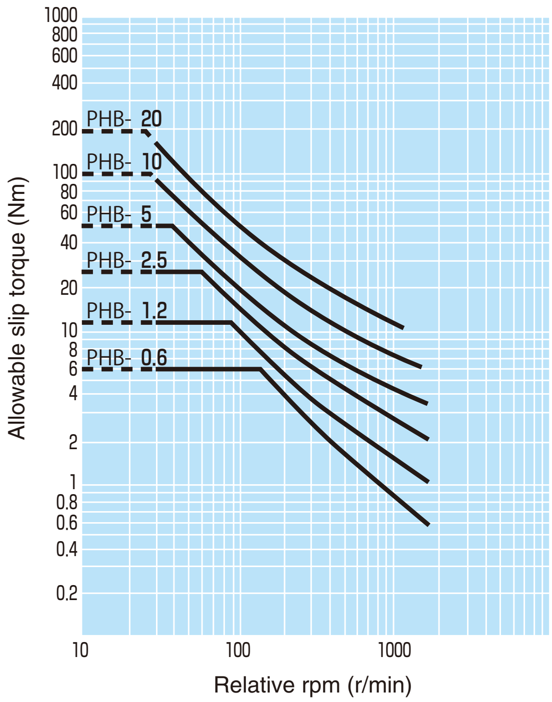
• PHC-R Hollow center type / Self-ventilating



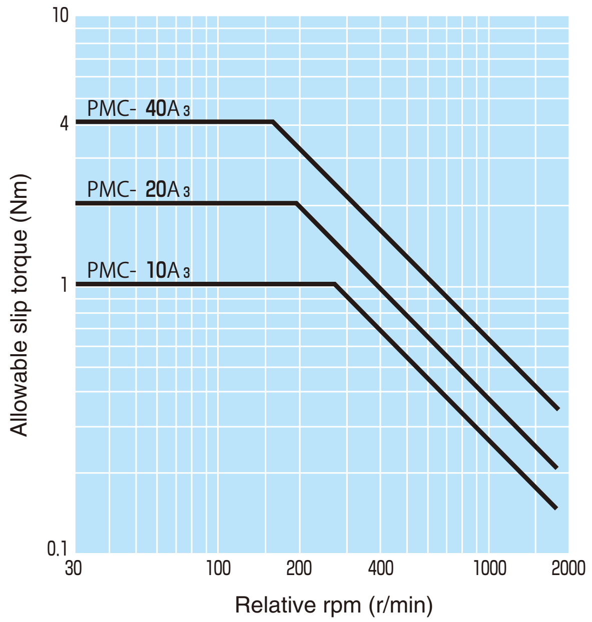
• PRB-H Hollow center type / Naturally cooled (with side fin)



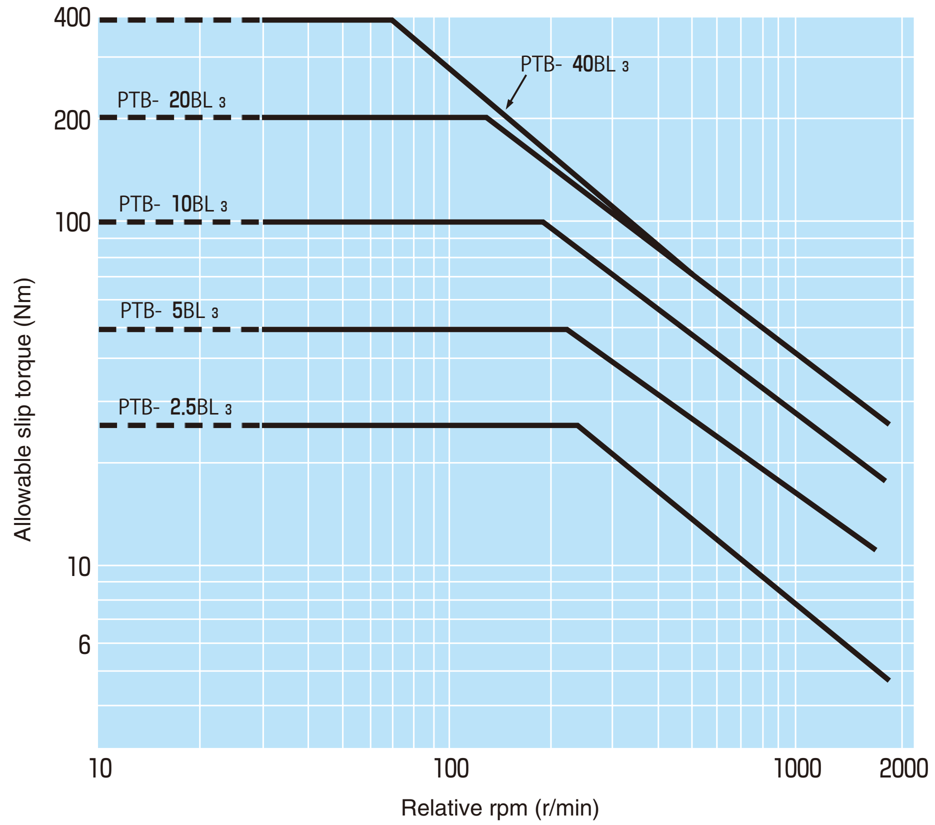
• PHB Hollow center type / Naturally cooled



• PMC Micro type / Naturally cooled

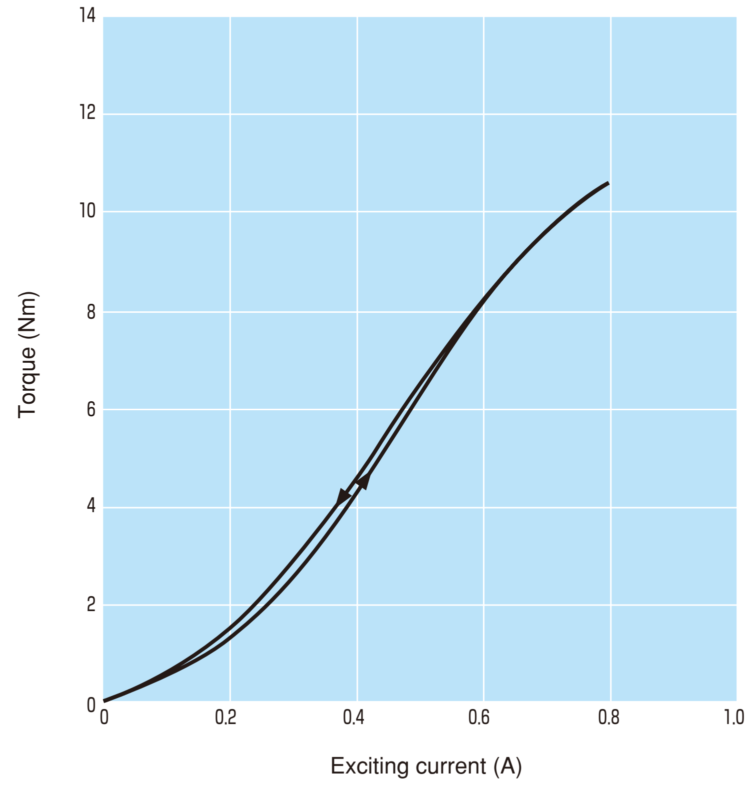


• PTB Shaft type / Heat pipe cooled



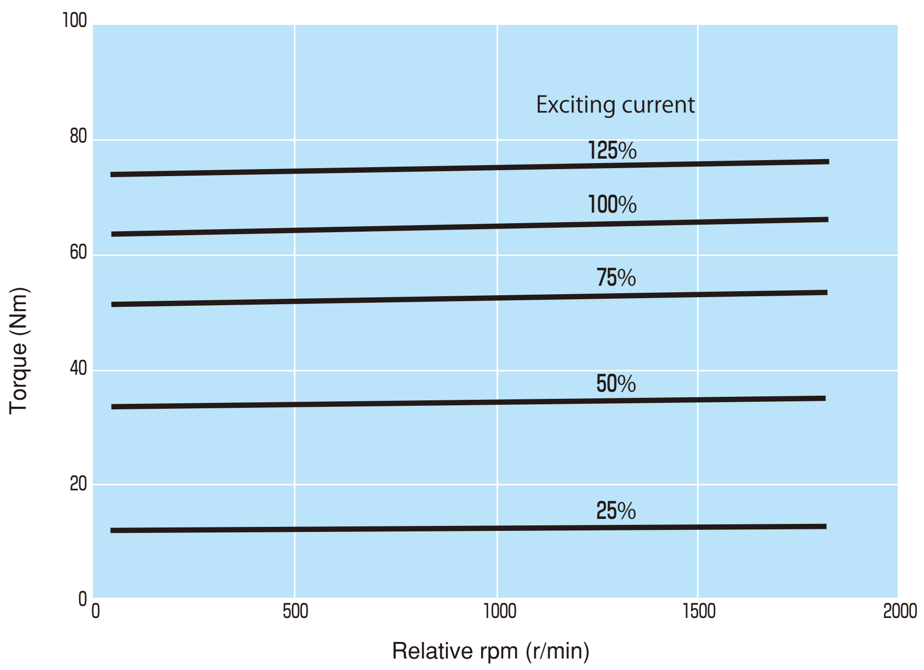
Exciting current – Torque characteristic

Type: POC-0.6A
Speed: 1000r/min
Rated voltage: DC-24V
Rated current: 0.792A



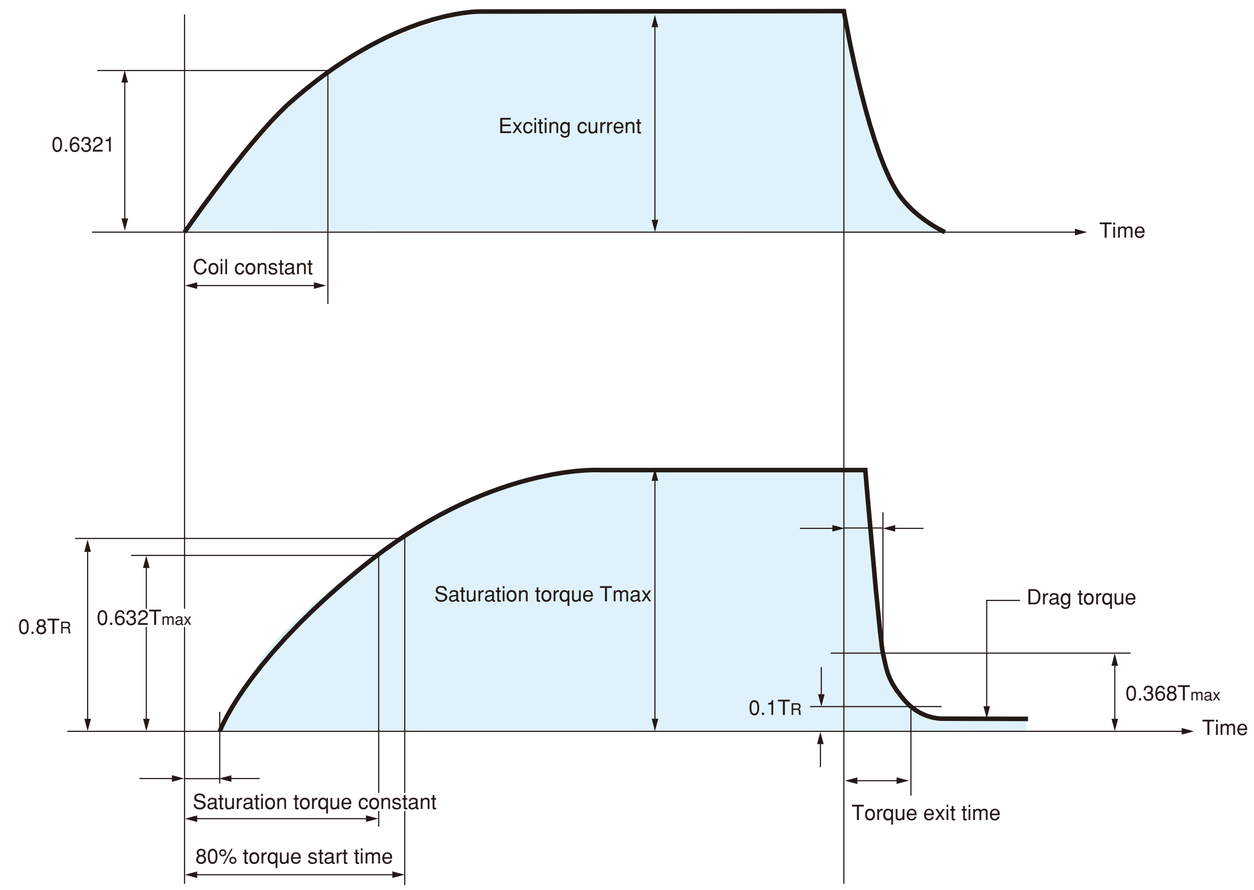
Relative rpm – Torque characteristic

Type: POC-5A
Rated voltage: DC-24V
Rated current: 1.875A



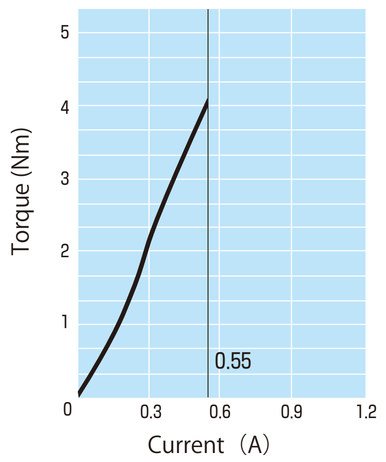
Drag torque characteristic

As the cause of drag torque, the effect of clutch bearing loss, seal part friction loss, windage loss, or residual magnetism is suspected. Drag torque has no effect during continuous slip operation, but large drag torque exerts an adverse effect such as load drag during ON/OFF application.
SINFONIA TECHNOLOGY CO., LTD. reduces drag torque to approximately 1% of the rated torque in consideration of the above.
(Since the value of drag torque varies depending on the model, contact us separately.)

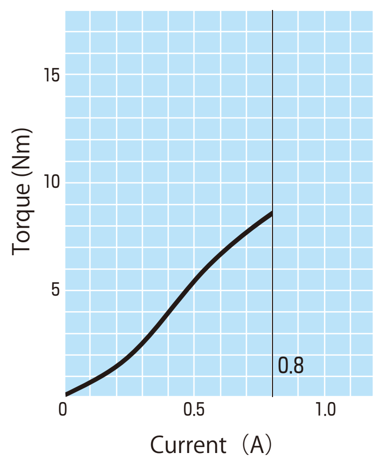


Current – Torque characteristics

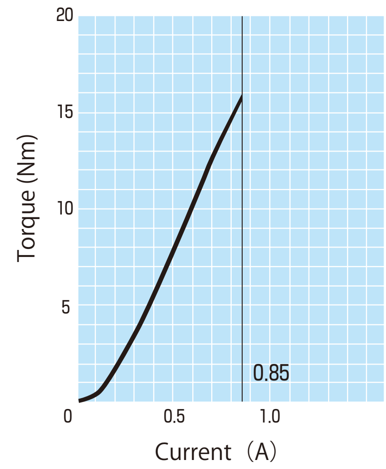
• POC-0.3



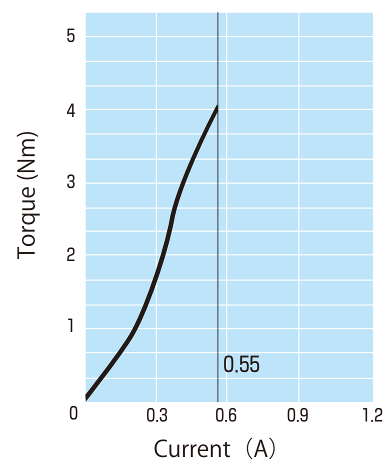
• POC-0.6A



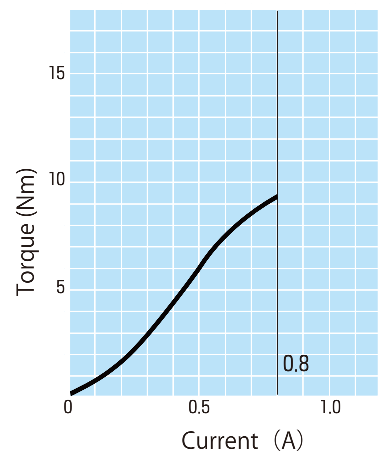
• POC-1.2A



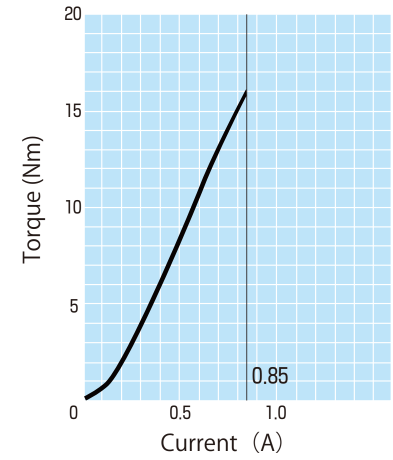
• POB-0.3



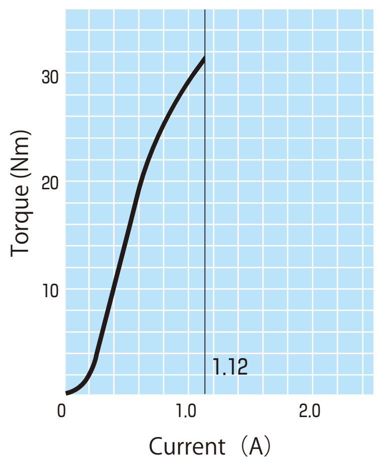
• POB-0.6A



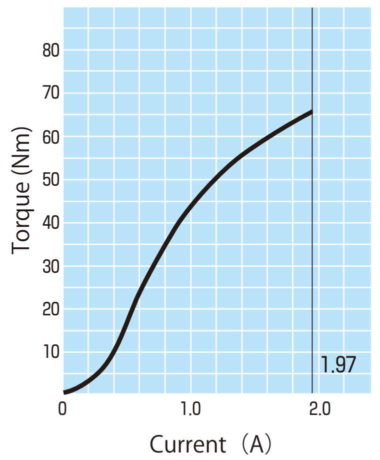
• POB-1.2A



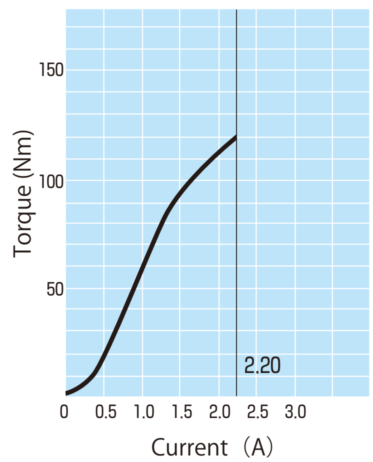
• POC-2.5A



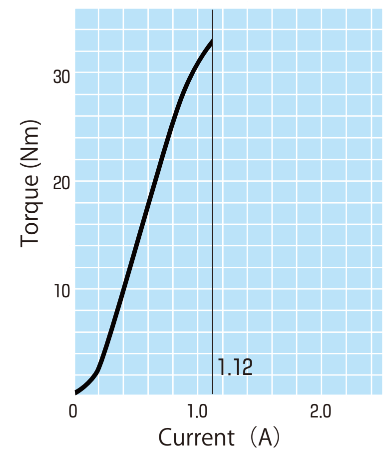
• POC-5A



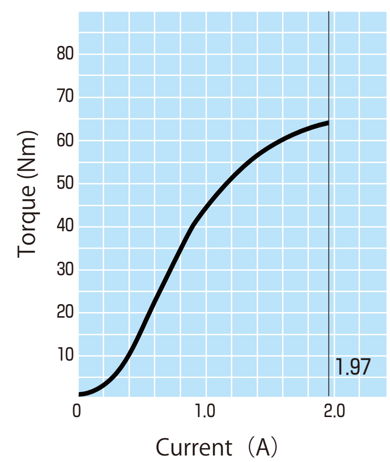
• POC-10



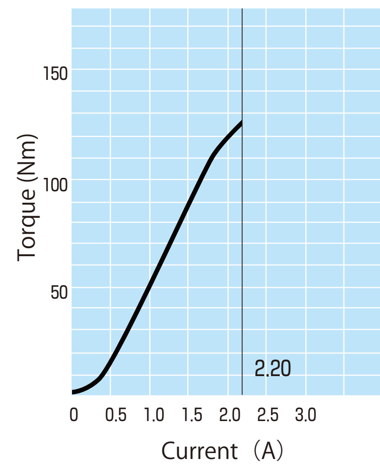
• POB-2.5A



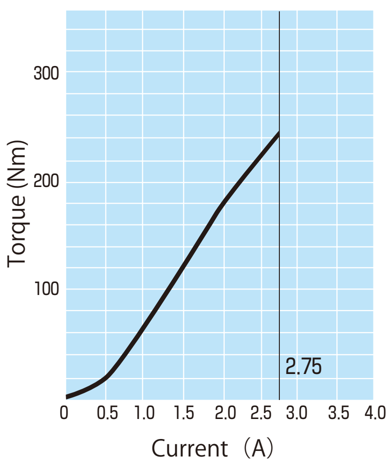
• POB-5A



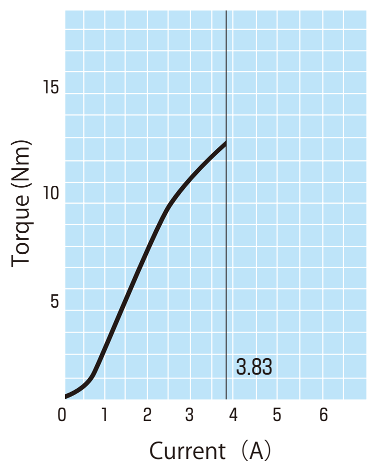
• POB-10



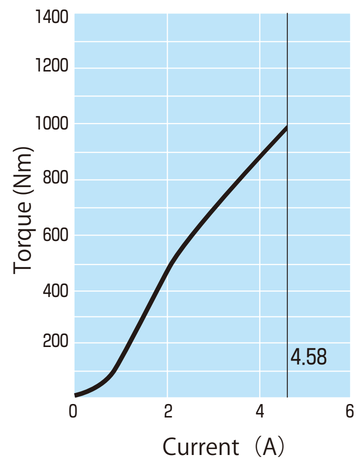
• POC-20



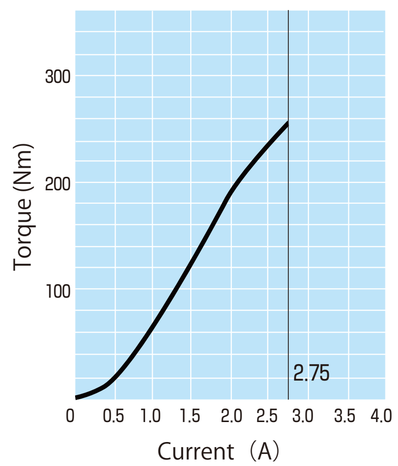
• POC-40



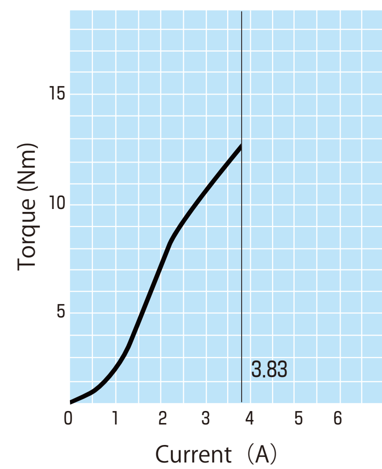
• POC-80



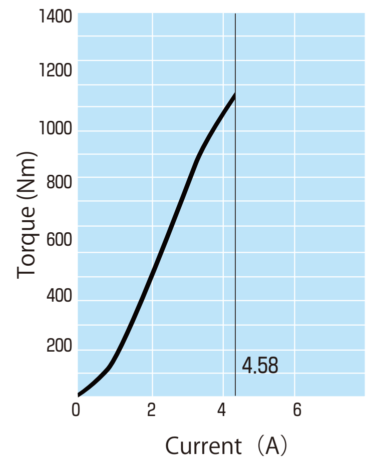
• POB-20



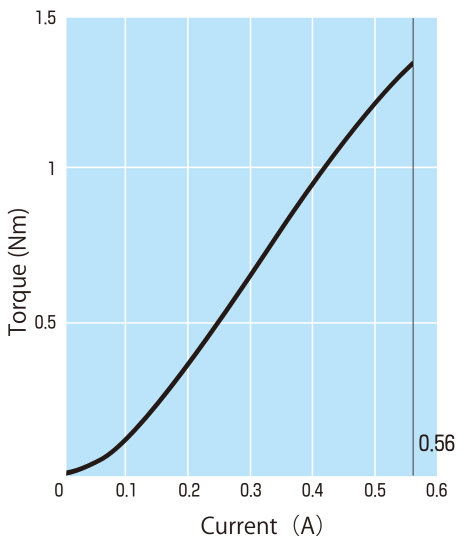
• POB-40



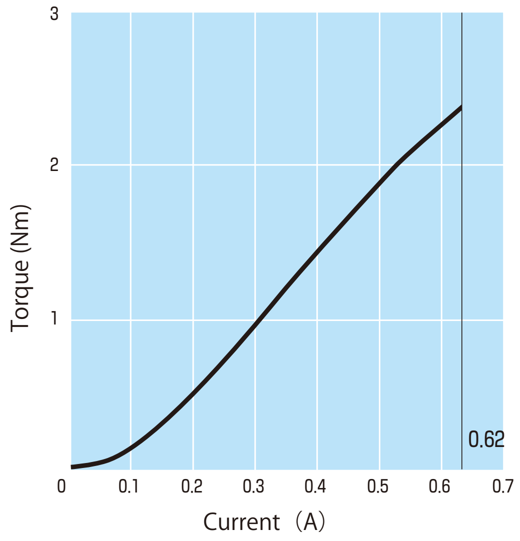
• POB-80



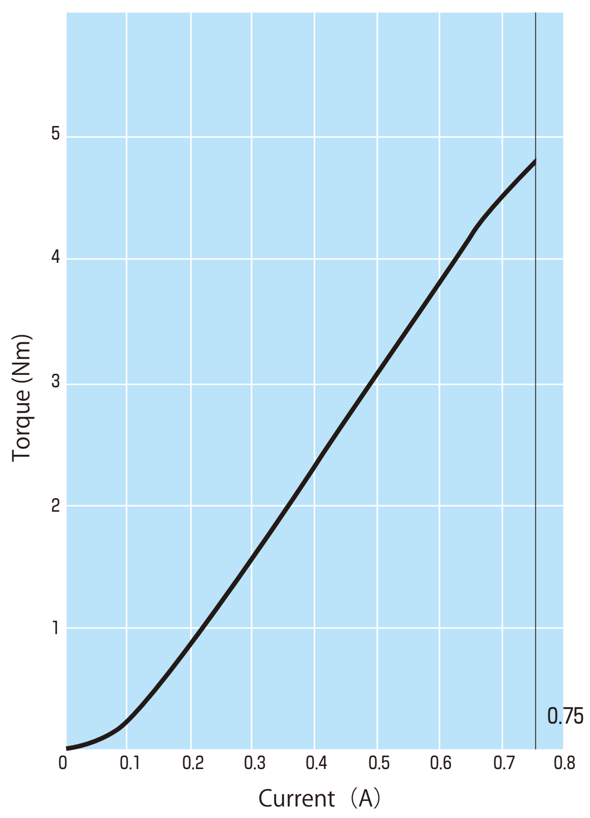
• **PMC-10A3**



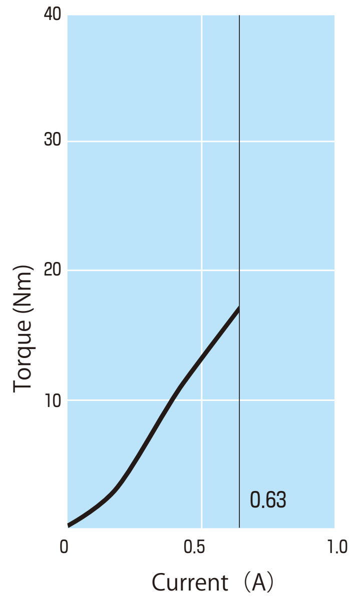
• **MC-20A3**



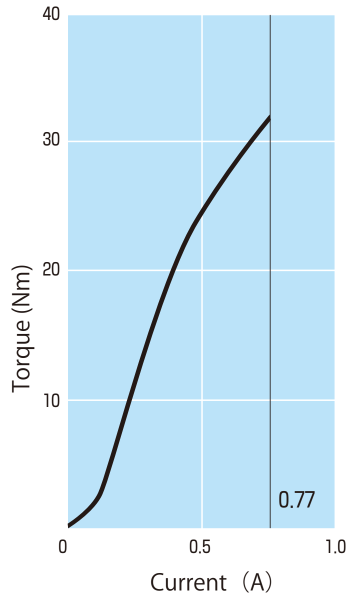
• **PMC-40A3**



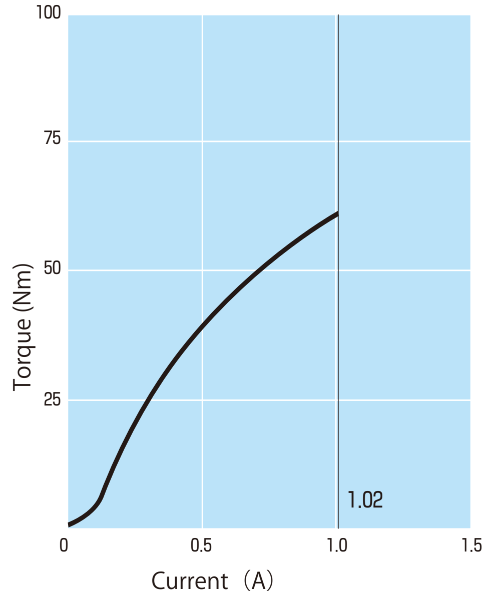
• **PRB-1.2H**



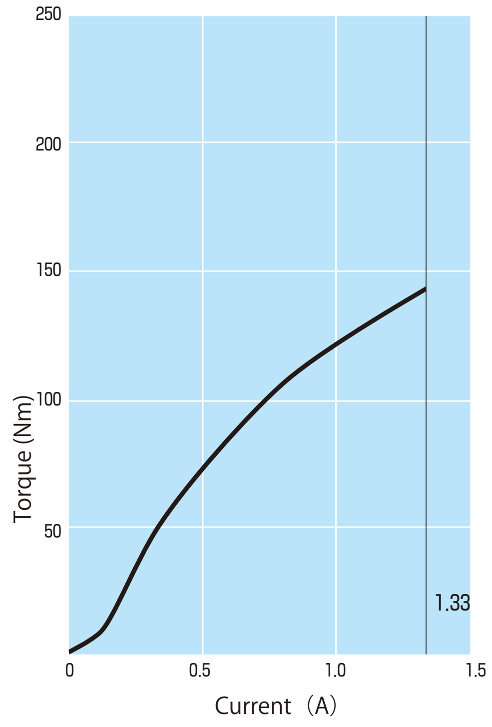
• **PRB-2.5H**



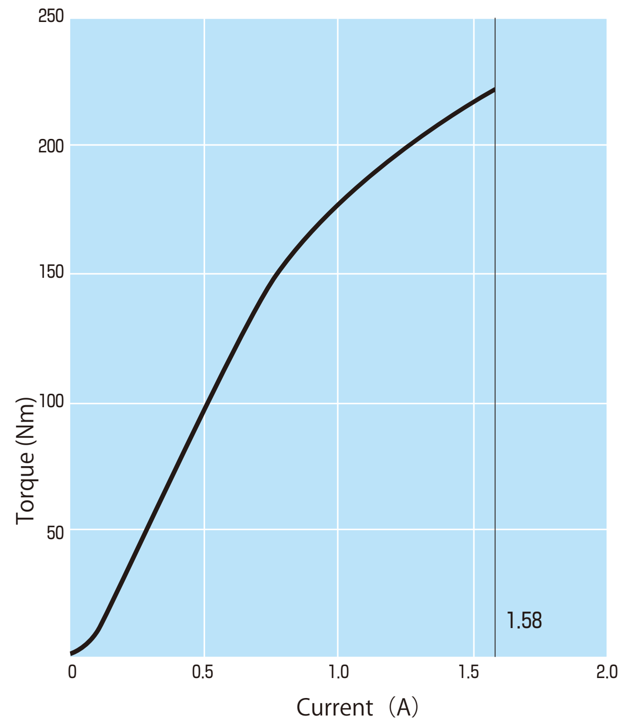
• **PRB-5H**



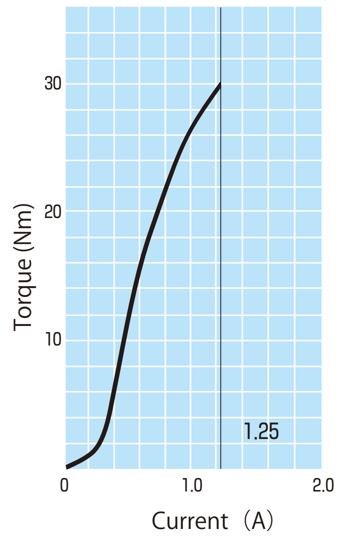
• **PRB-10H**



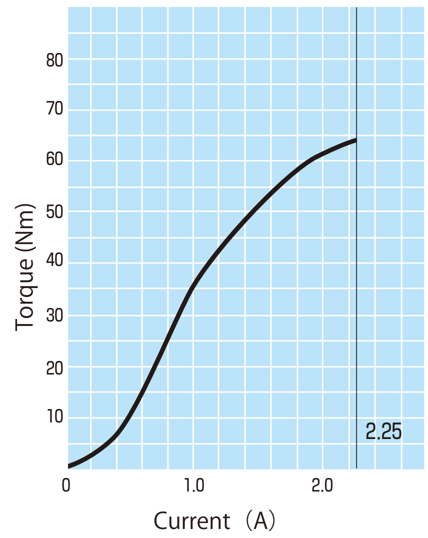
• **PRB-20H**



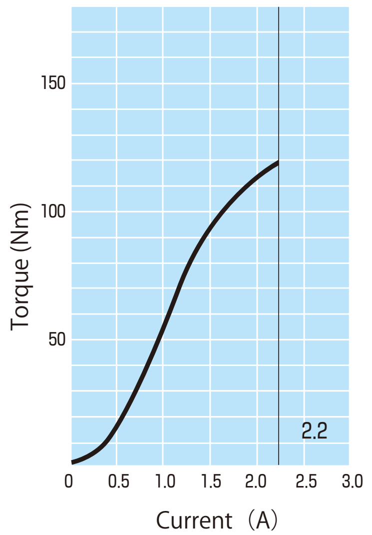
• **PTB-2.5BL3**



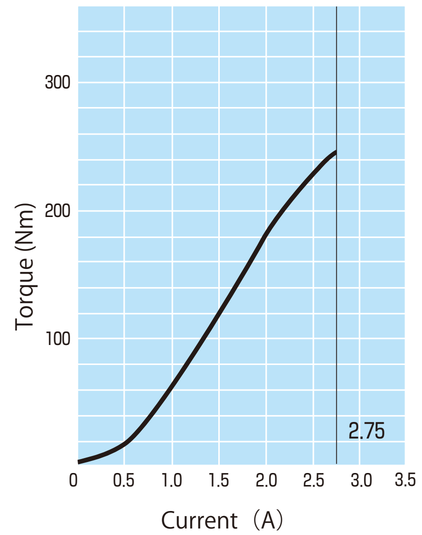
• **PTB-5BL3**



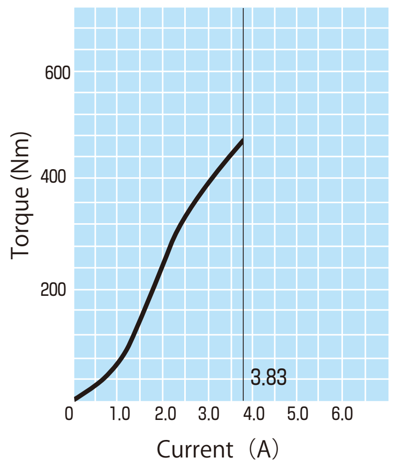
• **PTB-10BL3**



• **PTB-20BL3**



• **PTB-40BL3**



Maximum rpm moment of enertia

• POC Shaft type / Naturally cooled

TYPE	Max speed (r/min)	J(kg m²)	
		Input side	Output side
POC-0.3	1800	5.40×10^{-4}	2.01×10^{-4}
POC-0.6A	1800	7.30×10^{-4}	2.40×10^{-4}
POC-1.2A	1800	1.28×10^{-3}	4.40×10^{-4}
POC-2.5A	1800	4.10×10^{-3}	1.63×10^{-3}
POC-5A	1800	1.05×10^{-2}	4.80×10^{-3}
POC-10	1800	4.40×10^{-2}	1.84×10^{-2}
POC-20	1800	9.40×10^{-2}	5.00×10^{-2}
POC-40	1800	2.50×10^{-1}	1.30×10^{-1}
POC-80	1500	9.90×10^{-1}	6.40×10^{-1}

• PHC-R Hollow center type / Self-ventilating

TYPE	Max speed (r/min)	J(kg m²)	
		Input side	Output side
PHC-0.6R	1800	9.40×10^{-4}	3.00×10^{-4}
PHC-1.2R	1800	1.65×10^{-3}	7.20×10^{-4}
PHC-2.5R	1800	5.30×10^{-3}	2.08×10^{-3}
PHC-5R	1800	1.36×10^{-2}	5.80×10^{-3}
PHC-10R	1500	6.00×10^{-2}	2.60×10^{-2}
PHC-20R	1500	1.27×10^{-2}	5.50×10^{-2}

• PMC Micro type / Naturally cooled

TYPE	Max speed (r/min)	J(kg m²)	
		Input side	Output side
PMC-10A3	1800	0.700	8.50×10^{-2}
PMC-20A3	1800	1.210	2.20×10^{-1}
PMC-40A3	1800	3.350	1.090

• POB Shaft type / Naturally cooled

TYPE	Max speed (r/min)	J(kg m²)
		Input side
POB-0.3	1800	0.54×10^{-3}
POB-0.6A	1800	7.30×10^{-4}
POB-1.2A	1800	1.28×10^{-3}
POB-2.5A	1800	4.10×10^{-3}
POB-5A	1800	1.05×10^{-2}
POB-10	1800	4.40×10^{-2}
POB-20	1800	9.40×10^{-2}
POB-40	1800	2.50×10^{-1}
POB-80	1500	9.90×10^{-1}

• PHB Hollow center type / Naturally cooled

TYPE	Max speed (r/min)	J(kg m²)
		Input side
PHB-0.6	1800	7.50×10^{-4}
PHB-1.2	1800	1.33×10^{-3}
PHB-2.5	1800	4.50×10^{-3}
PHB-5	1800	1.07×10^{-2}
PHB-10	1800	3.70×10^{-2}
PHB-20	1800	9.40×10^{-2}

• PRB-H Hollow center type / Naturally cooled (with side fin)

TYPE	Max speed (r/min)	J(kg m²)
PRB-1.2H	1800	1.10×10^{-3}
PRB-2.5H	1800	1.70×10^{-3}
PRB-5H	1800	4.78×10^{-2}
PRB-10H	1800	1.59×10^{-2}
PRB-20H	1800	4.70×10^{-2}

• PTB Shaft type / Heat pipe cooled

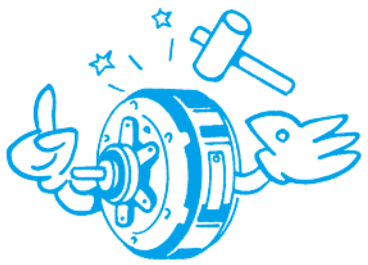
TYPE	Max speed (r/min)	J(kg m²)
PTB-2.5BL3	1800	4.10×10^{-3}
PTB-5BL3	1800	1.05×10^{-2}
PTB-10BL3	1800	4.40×10^{-2}
PTB-20BL3	1800	9.40×10^{-2}
PTB-40BL3	1800	2.50×10^{-1}

Cautions for handling

Before use

(1) Be careful not to the lead wire damage, and be careful of the terminal block, as it is made of resin.

(2) The powder inserted sometimes settles in irregular distributed in the bottom of the unit places, by causing the shock of the transporting, making rotation difficult. In the cases, the unit may be turned upside down and the outside tapped slightly to correct it.



(3) Do not leave the unit in very humid places for a long time.

(4) Take care not to dmage the terminal stand and the electric blower.

At the time of installation

(1) During installation, do not apply excessive force to the shaft especially.

(2) When the shaft type is directly connected with mating shaft, use flexible coupling surely. The concentricity and perpendicularity must be with the tolerance of the coupling used.

(3) When connecting the lead wire to the terminal block, use Amp terminal lug surely and fasten securely, and do not expose changed portions. Be careful not to let the lead wire come into contact with the rotating part.

(4) Be careful not to interfere with the ventilation window with the installing stand.

(5) For installation stand over size 5, install on both sides of the input and output. (Refer to the following for installation procedure)

(6) Provide space around the electric blower so as not to block cooling air.

(7) When the electric blower stops or the ventilation of the electric blower is insufficient, the temperature of the brake will rise causing a danger of burning. Therefore, connect the temperature switch while operating.

(8) Take care that excessive shock is not given to the electric blower.

Allowable overhand load

To connect the clutch/brake unit through pulleys or sprockets, limit the overhang load within the allowable overhang of the input shaft or output shaft load (see Fig.1, Tabel 2 and 3). The overhang load practically acts are obtained by the following expression.

$$F=\frac{2Tf}{D}\ (N)$$

Where, F : load (N) {kgf}
T : transfer torque (Nm) {kgf}
D : pitch dia. (m) of pulleys and sprockets
f : load cofficient (2–4 for belt, 1.2–1.5 for sprocket)

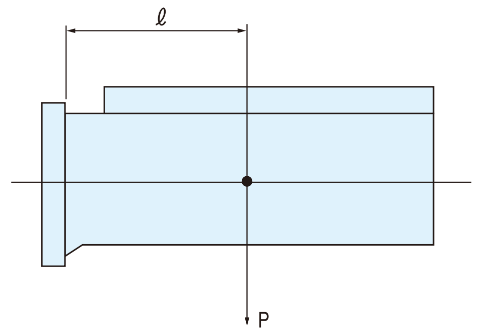


Table 1. Allowable overhand load

TYPE	ℓ (mm)	P (N)	ℓ (mm)	P (N)	ℓ (mm)	P (N)
POC/POB-0.3	10	134	13	125	23	100
POC/POB-0.6A	10	205	13	190	26	130
POC/POB-1.2A	10	235	17	200	34.5	140
POC/POB-2.5A PTB-2.5BL3	10	400	21.5	315	43	220
POC/POB-5A PTB-5BL3	10	930	28.5	615	57	420
POC/POB-10 PTB-10BL3	10	1425	33.5	1065	67	720
POC/POB-20 PTB-20BL3	10	1730	35.5	1200	71	900
POC/POB-40	10	2640	46	1960	92	1470
POC/POB-80	10	3910	55	2940	110	2260

(Note) 1. This table is based on 1000 r/min. and bearing life 6000 Hr.
2. Multiply the value by the coefficient shown on the table depending upon the speed and use cofficient, show as speed coefficient in table 2, use coefficient is table 3.
3. This table shows in the case that the thrust load is not applied.

Table2. Speed coefficient

No.of revolition (r/min)	Speed coefficion	No.of revolition (r/min)	Speed coefficion
50	2.74	1000	1.00
100	2.18	1200	0.95
200	1.72	1400	0.89
400	1.37	1600	0.86
600	1.20	1800	0.82
800	1.09	–	–

Table 3. Use coefficient

Use	Example of use	Use coefficient
Instruments and equipment not required to rotate at all times.	Door opening device etc.	3.00
Machinerycusedcforcacshort time or intermittently, not exerting serious influence even if stopped by an accident.	General factory winding device, general hard winder, etc.	1.50
Machinery not use continuously but for which positive operation is requlred.	Conveyor device, general cargo crane, elevator, etc.	1.22
Machinery operated for 24 hr a day but for which no regular full operation is requlred.	Factory motor, general gearring, etc.	1.00
Machinery fully operated regularly for 8 hr a day.	Regularly operating crane, blower, etc.	0.89
Machinery continuously operated for 24 hr a day.	Compressor, pump, rolling machine, roller conveyor, and others.	0.65
Machinery operated for 24 hr a day and for which stoppage due to accidents is absolutely notallowed.	Pape rmaking machine, chemical production machine, and others.	0.51

Horixontal axis installation

Specification of clutch/brake is performance in a thing of a state of horizontal axis installation, and please use it for a stability axis in principle.

Ralative rpm

Since the relative rpm exceeding 30 r/min, and please consult us when it is equal to or less than it.

Torque range

Adjustirlg the rated torque in the range 3~100%.

Befor the operation

(1) After completing the installation, confirm whether control circuit is adequately functioned and the excited voltage is set within the specified value or not. In this time, do not rotate the clutch or brake and make the excited current to ON-OFF. And also dose the other portion of machine operate smoothly ?

(2) If there is not an error, operate in accordance with the following procedure. As the powder inserted sometimes settles in irregular distributed in the interior of clutch or brake, by causing of the shock the transporting, make the adapting operation to concentrate the powder into operating gap.

• Procedure of preparative operation

A) At the condition of non excited unit, after rotating for 1 minute as high as possible (1000r/min.Max.), the excited current shall be set to 1/4_1/5 rated current, and ON and OFF operation that one cycle consists of 5 sec ON and 10 sec OFF shall be repeated 20 cycles during the rotation.

B) When clutch or brake is in stalled newly, or the equipment in stalled with clutch or brake is transported to the other places, after doing the preparative operation surely, the regular operation shall be done.

C) If the preparative operation is poor, the torque is lower or not stabilized, but if the preparative operation is proper, the powder (Magnetic powder) are evenly distributed into the unit, and so the torque is produced in propotion to the excited current.

(3) The amount of powder to be sealed shall be follows

Size	0.3	0.6	1.2	2.5	5	10	20	40
Amount to be sealed (g)	6.5	10	15	30	60	90	160	270

Maintenance

1. Surface temperatures in the normal operating condition are shown in the following table.

Table 5. Allowable Max. temperature

Type	Cooling system	Portion nomenclature	Maximum allowable temperature
POC/POB	Natural cooled	Yoke surface	80℃ Max.
PHC-R	Self-ventilated	Yoke surface	80℃ Max.
PTB-BL$_3$	Heat pipe with fan motor	Yoke surface	90℃ Max.

2. If the powder absorbts the humidity, the characteristic of unit is hindered. Be careful not to let the water or oil enter to the interior of the clutch/brake. Especially in the case of installing the unit adjacent to the gear box, as the oil will enter to the unit, mediating the shaft, the oil seal must be done perfecitly.

3. Confirm whether the bolts for the installation of clutch/brake, the mounting stand and coupling are loosened or not.

4. While the use, if the following malfunctions are detected, check the ball bearings and there is a trouble, change to the new ball bearings. Shown as the following table 6.
- Rotation is heavy.
- Torque varies at every rotation.
- Noise is made from the bearing.

Table 6. List of bearings used

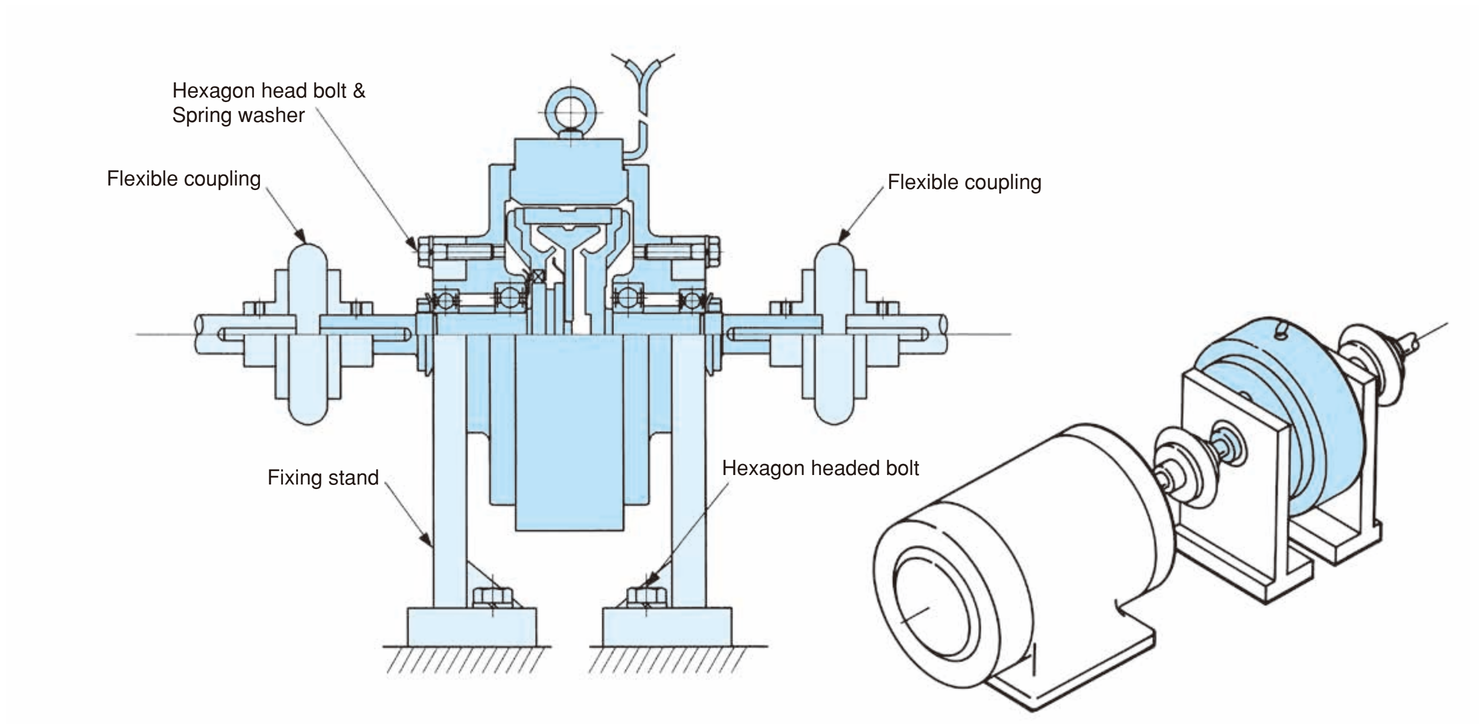
Size	POC/POB	PHC-R	PTB-BL$_3$
0.3	6202	–	–
0.6	6202/6002	6908/6905	–
1.2	6003	6908/6904	6003
2.5	6005	6012/6007	6005
5	6206	6015/6010	6206
10	6308/6307	6018/6012	6308/6307
20	6309/6308	6022/6015	6309/6308
40	6311/6310	–	–
80	6314/6315	–	–

(Note) Sealed grease is Andoc 260, Non-contacting rubber seal (2NK)

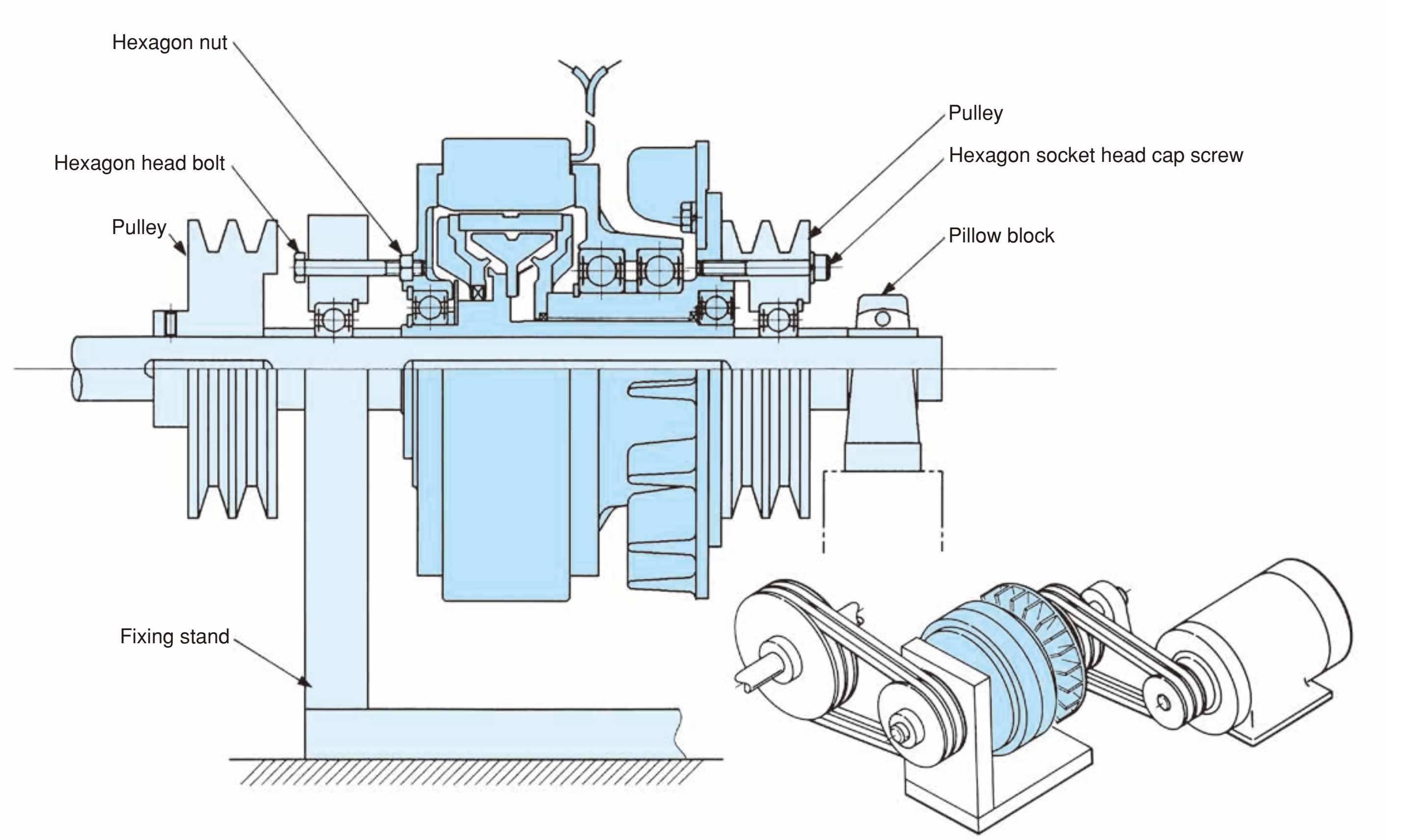
5. Torque may decrease when the clutch or brake is subject to long periods of use under severe working conditions. In such case, changing of the powder will restore the torque. Refer to the next procedures of changing powder.

Installation Example

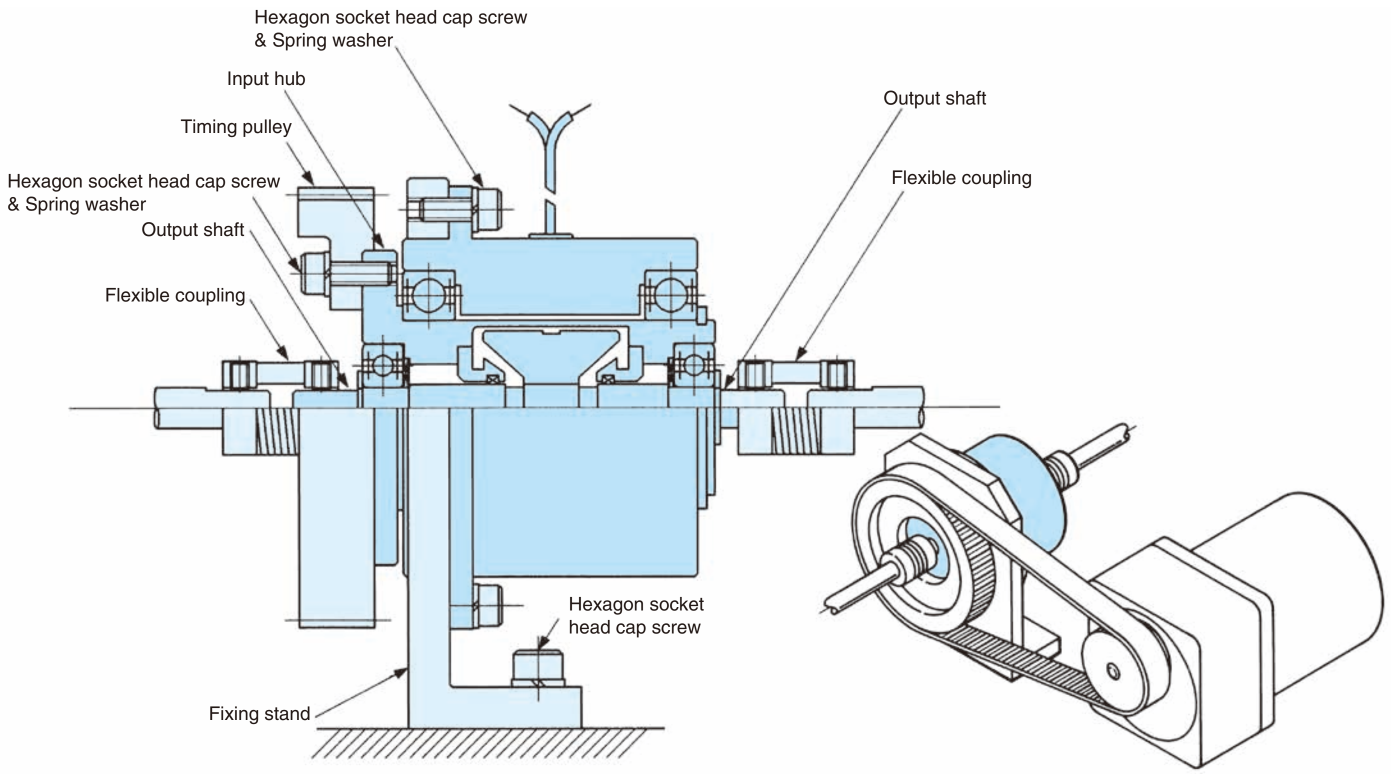
POC



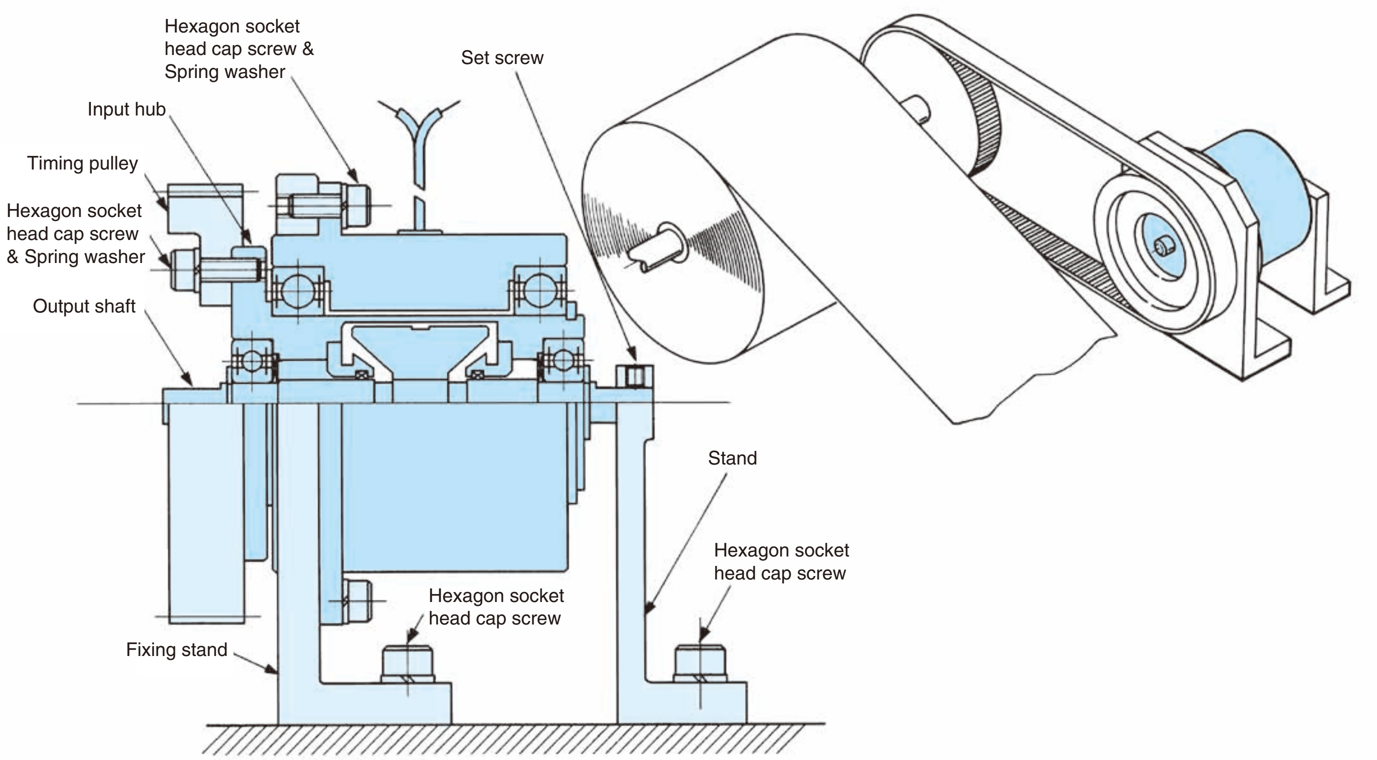
PHC-R



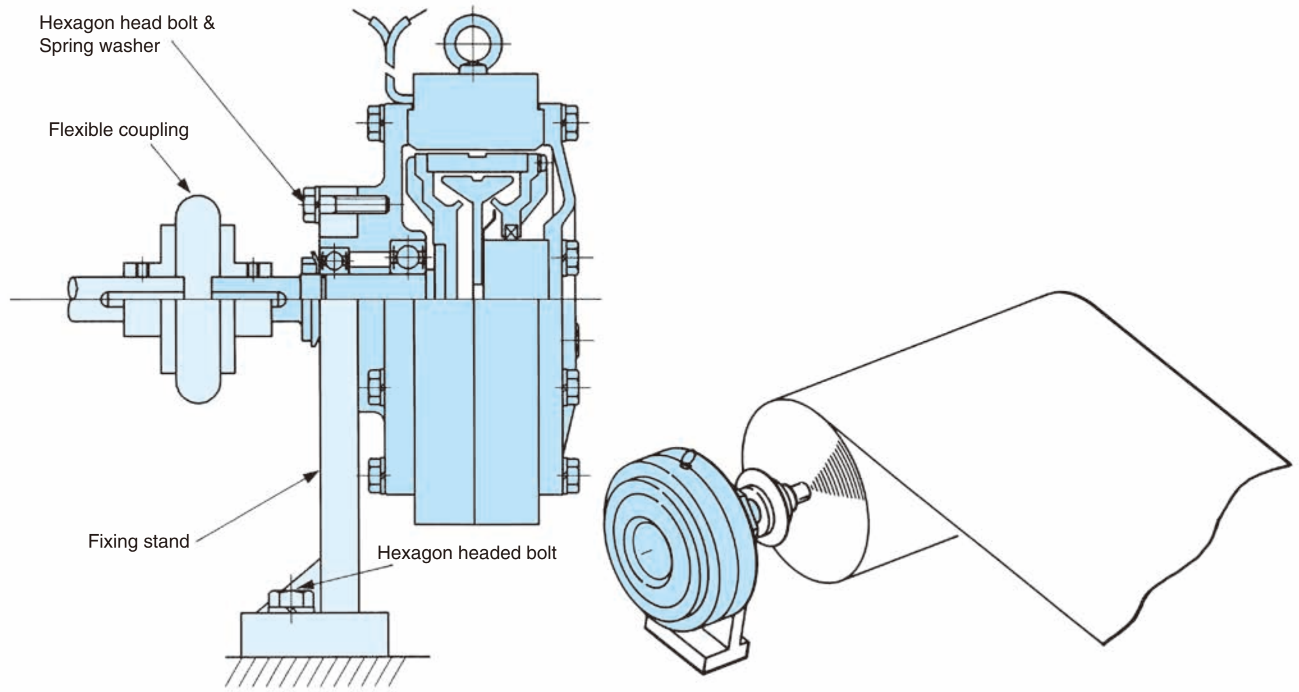
PMC



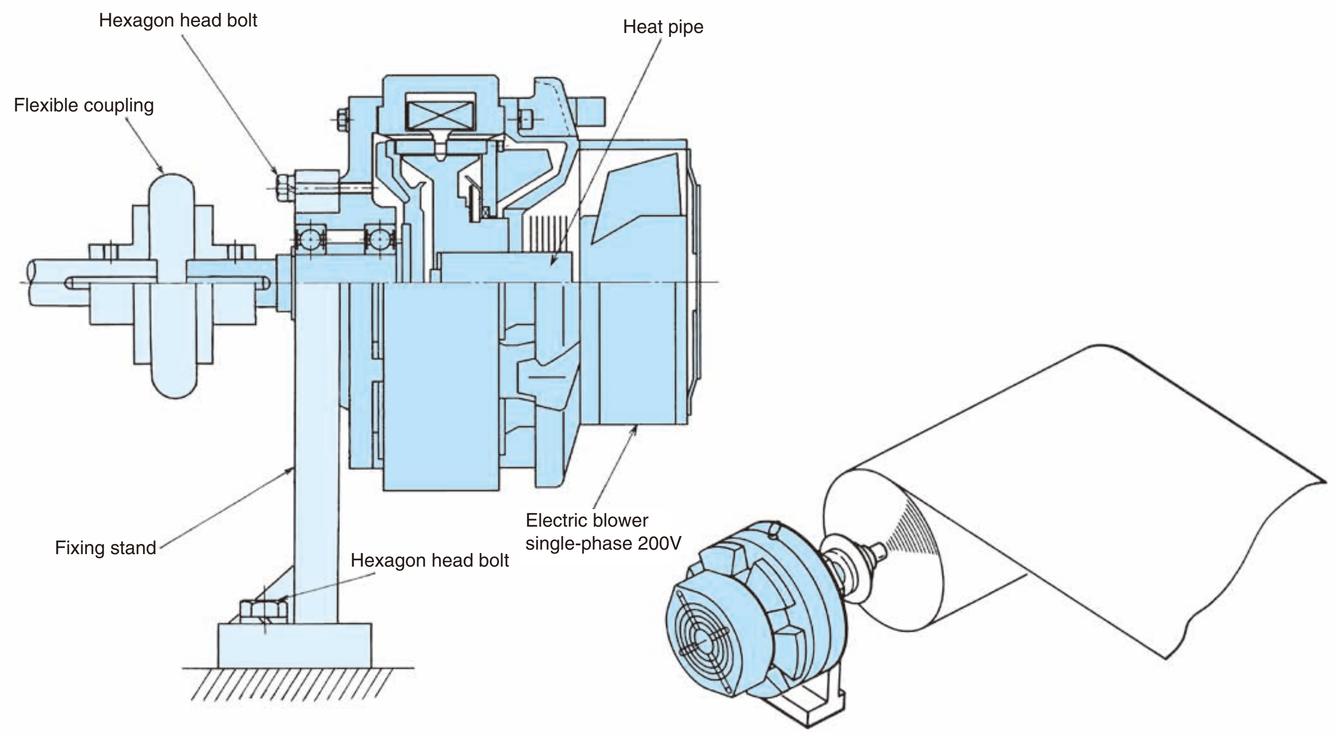
PMC (Brake use)



POB



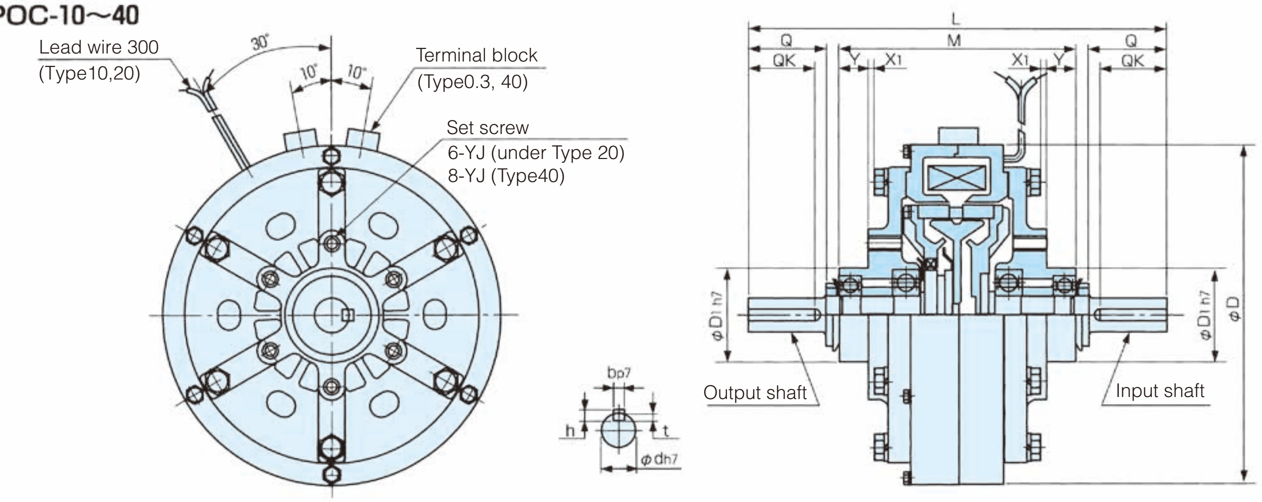
PTB



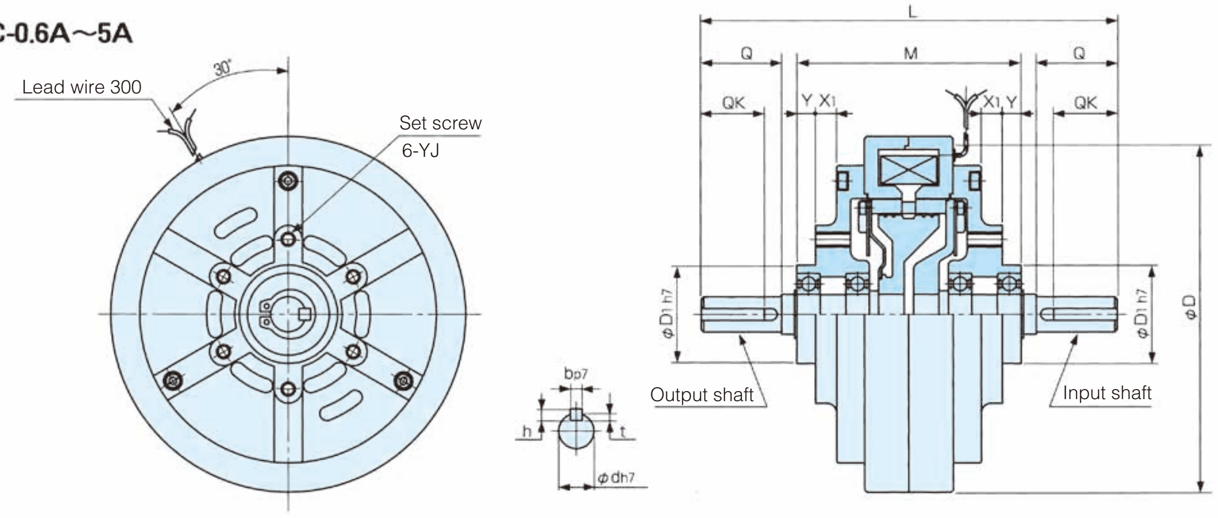
POC-0.3, 0.6A, 1.2A, 2.5A, 5A, 10, 20, 40

Model	Static friction torque(Nm)	Rated voltage(DC-V)	Power consumption at75\C(W)	Mass(kg)
POC-0.3	3	24	13.3	2.5
POC-0.6A	6	24	19.2	3.5
POC-1.2A	12	24	20.4	5.5
POC-2.5A	25	24	26.8	10
POC-5A	50	24	47.3	16.5
POC-10	100	24	52.8	35
POC-20	200	24	66	58
POC-40	400	24	92	100

POC-0.3
POC-10～40



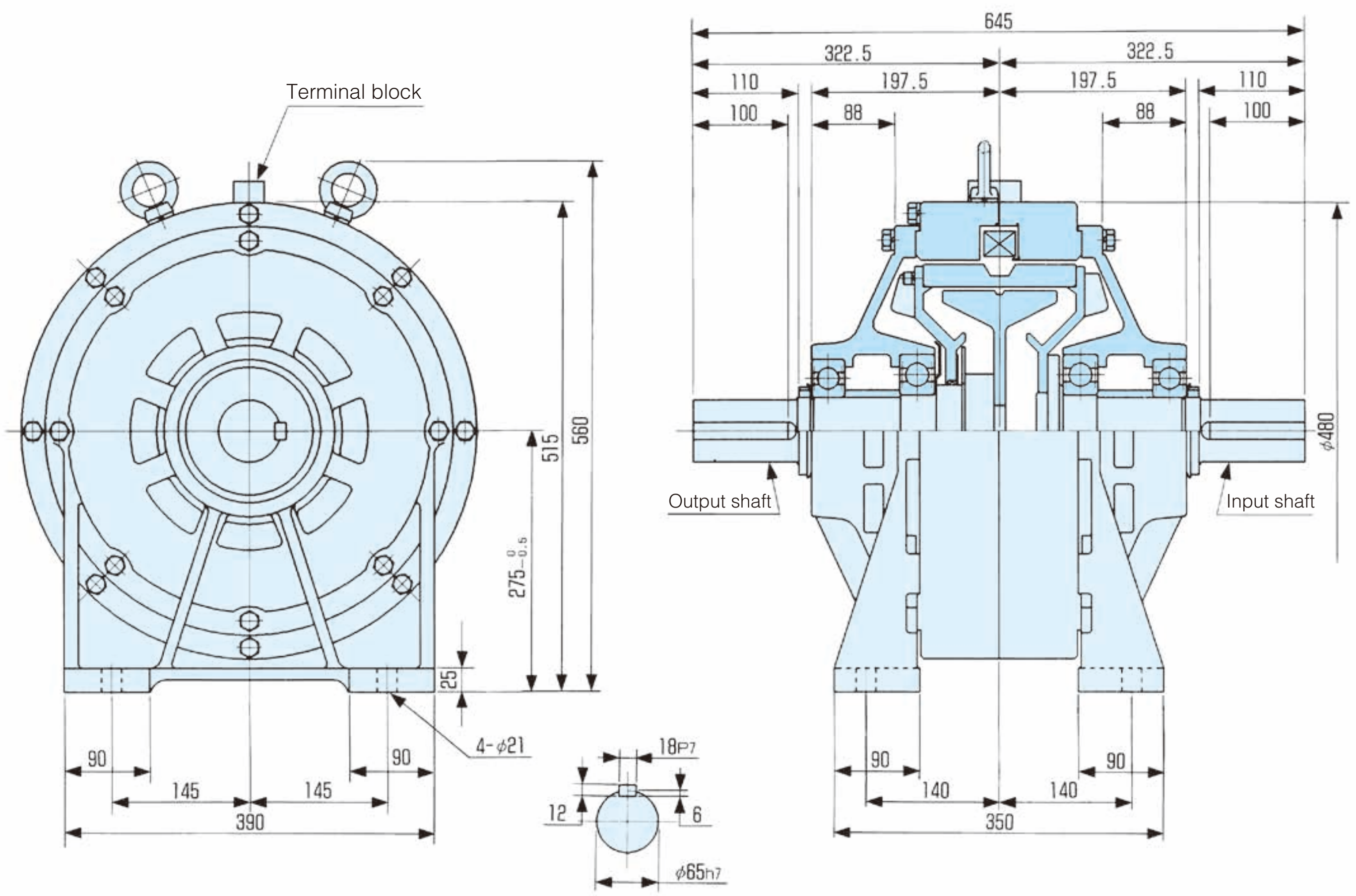
POC-0.6A～5A



Model	Diameter direction		Shuft direction				Attachment YJ		Shuft end					
	D	D1	L	M	X1	Y	P.C.D	Tap	Q	QK	d	b	h	t
POC-0.3	120	42	147	87	5.8	11	64	M5×10	23	20	10	4	4	2.5
POC-0.6A	134	42	151	86	7	8	64	M5×11	26	22	12	4	4	2.5
POC-1.2A	152	42	178	96	9	8	64	M6×13	34.5	27	15	5	5	3
POC-2.5A	182	55	215	111.5	9	9	78	M6×13	43	35	20	5	5	3
POC-5A	219	74	274	141	8	18	100	M6×13	57	47	25	7	7	4
POC-10	290	100	348	192	7.5	25	140	M10×18	67	56	30	7	7	4
POC-20	335	110	382	216	10.5	25	150	M10×18	71	60	35	10	8	4.5
POC-40	395	130	490	278	22.5	33	200	M12×20	92	80	45	12	8	4.5

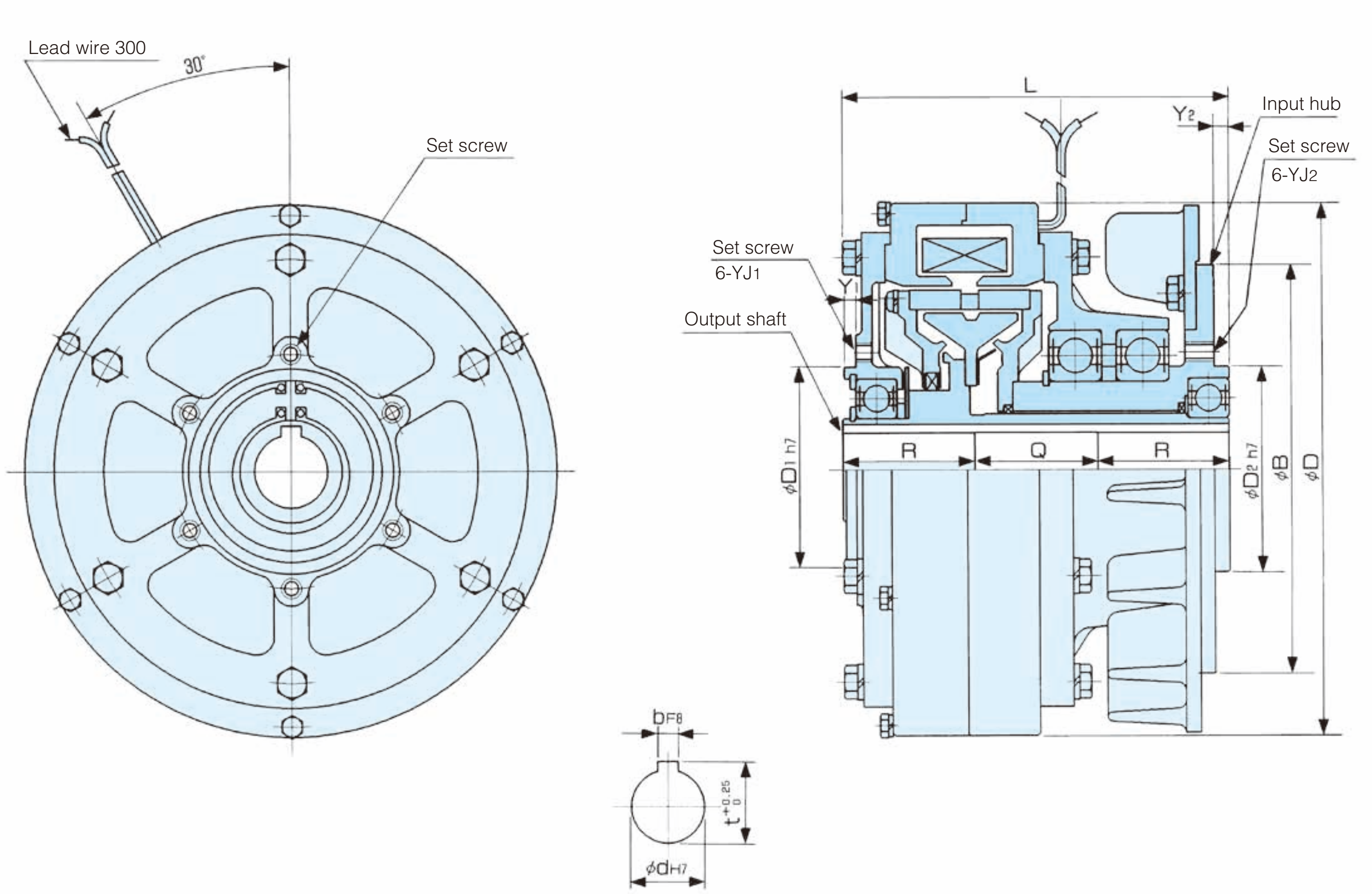
POC-80

Model	Static friction torque(Nm)	Rated voltage(DC-V)	Power consumption at75\C(W)	Mass(kg)
POC-80	800	24	110	250



PHC-0.6, 1.2, 2.5, 5, 10, 20R

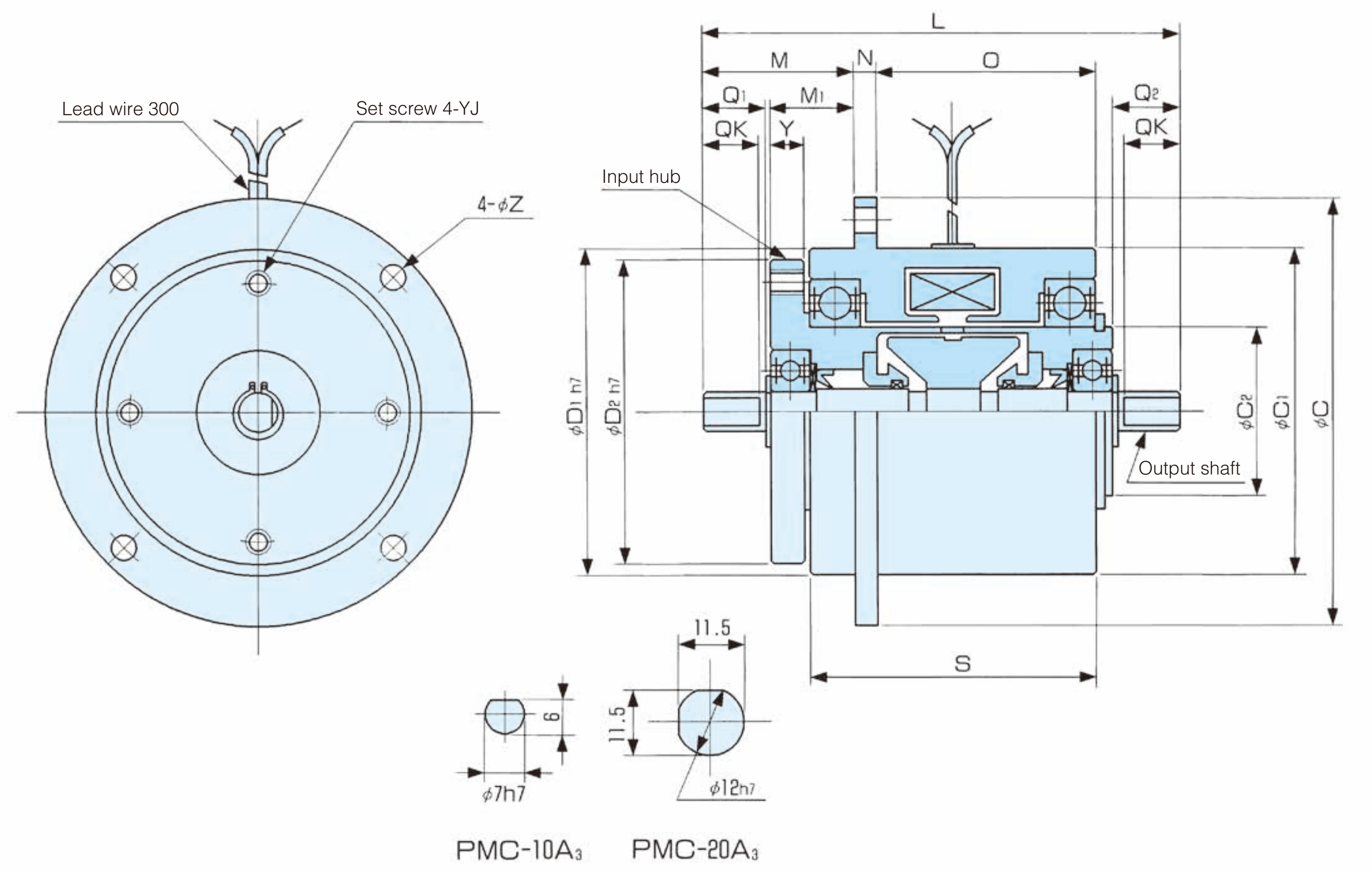
Model	Static friction torque(Nm)	Rated voltage(DC-V)	Power consumption at75℃(W)	Mass(kg)
PHC-0.6R	6	24	22.5	4.2
PHC-1.2R	12	24	23	5.7
PHC-2.5R	25	24	30	10
PHC-5R	50	24	54	17
PHC-10R	100	24	52.8	43
PHC-20R	200	24	66	70



Model	Diameter direction				Shuft direction					Attachment				Shuft hole		
										YJ1		YJ2				
	B	D	D2	D1	L	Q	R	Y1	Y2	P.C.D	Tap	P.C.D	Tap	d	b	t
POC-0.6R	89	134	50	50	93	42	25.5	4	4	60	M4×6	60	M4×6	12	4	13.5
POC-1.2R	89	152	45	70	96	46	25	4	4	80	M4×8	55	M5×6	15	5	17
POC-2.5R	140	182	70	70	132	42	45	4	5	80	M6×9	80	M6×10	25	7	28
POC-5R	165	219	87	87	148	68	40	4	4	102	M8×10	102	M8×10	35	10	38.5
POC-10R	190	290	105	110	183.5	63.5	60	4	6	140	M8×10	120	M10×13	45	12	48.5
POC-20R	220	335	130	130	222	69	75	4	9	150	M10×13.5	150	M10×13.5	55	15	60

PMC-10, 20A3

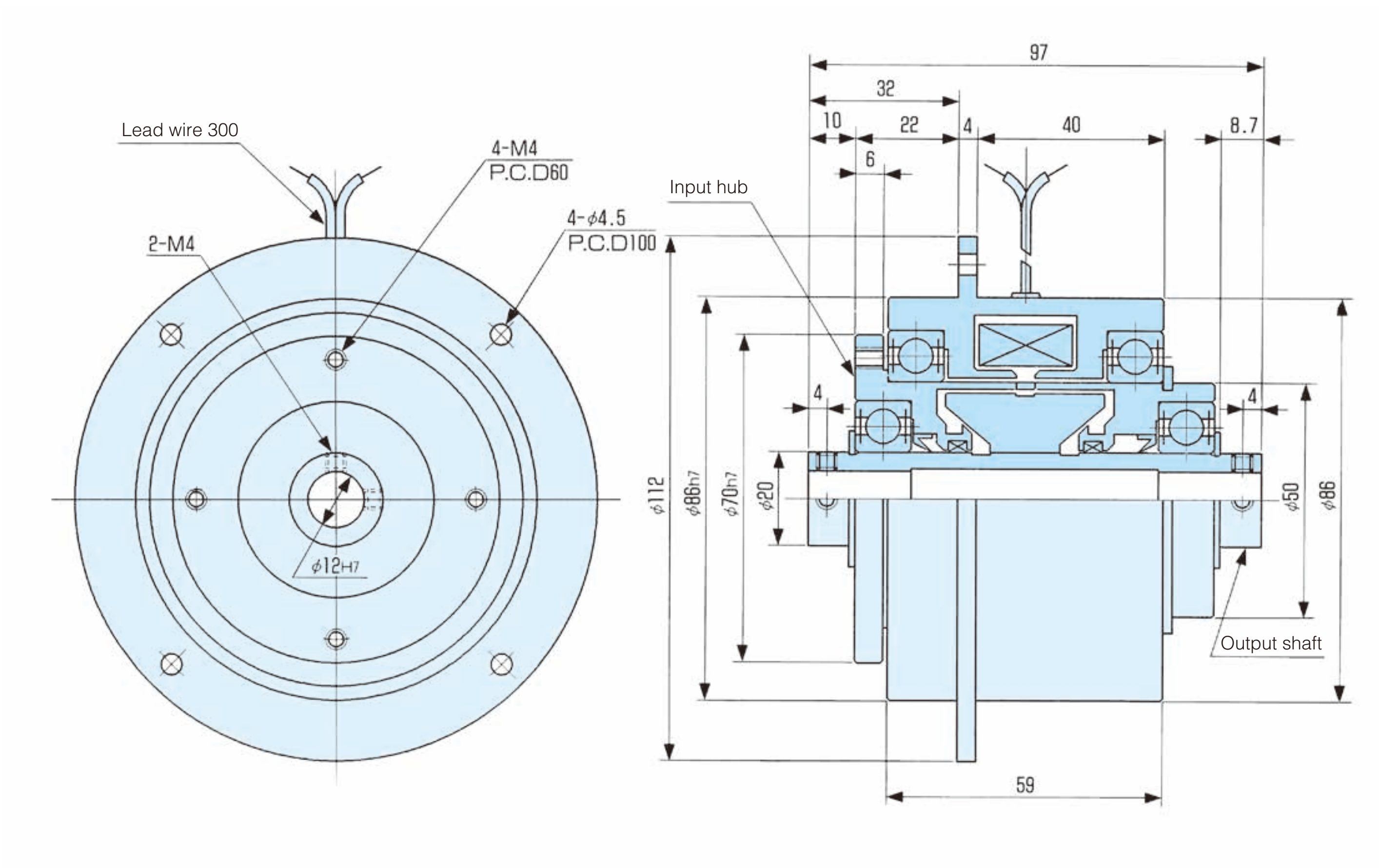
Model	Static friction torque(Nm)	Rated voltage(DC-V)	Power consumption at75℃(W)	Mass(kg)
PMC-10A3	1	24	13.5	0.90
PMC-20A3	2	24	15	1.34



Model	Diameter direction					Shuft direction							Attachment				Shuft end		
													YJ1		YJ2				
	C	C1	C2	D1	D2	L	M	M1	N	O	S	Y	P.C.D	Hole	P.C.D	Tap	Q1	Q2	QK
PMC-10A3	76	58	30	58	54	85	27	15	4	39	51	6	68	4.5	46	M4×6	11	12	10
PMC-20A3	92	69	35	69	54	116	47	22	4	32	51	6	82	4.5	46	M4×6	24	25	20

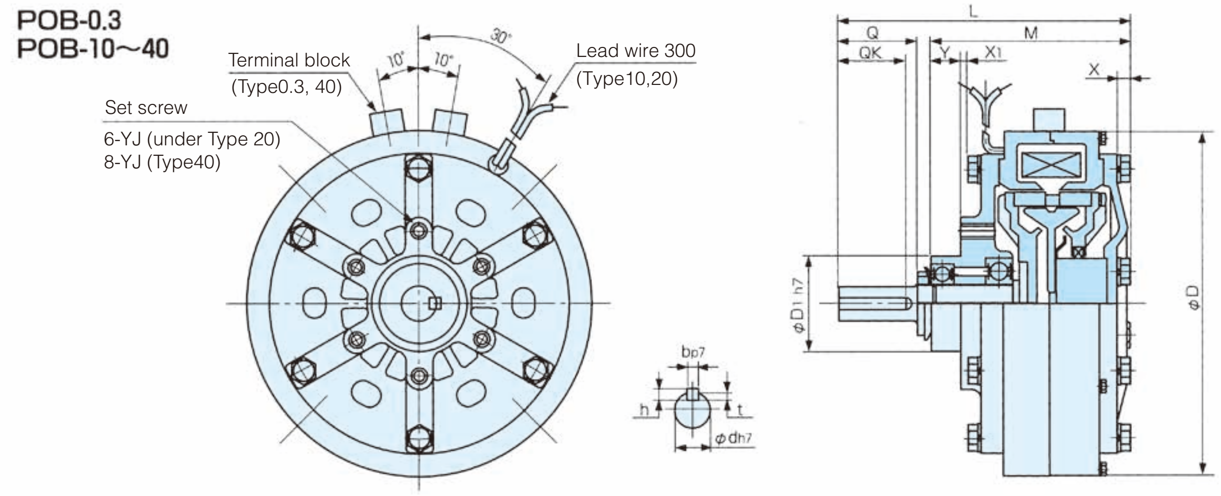
PMC-40A3

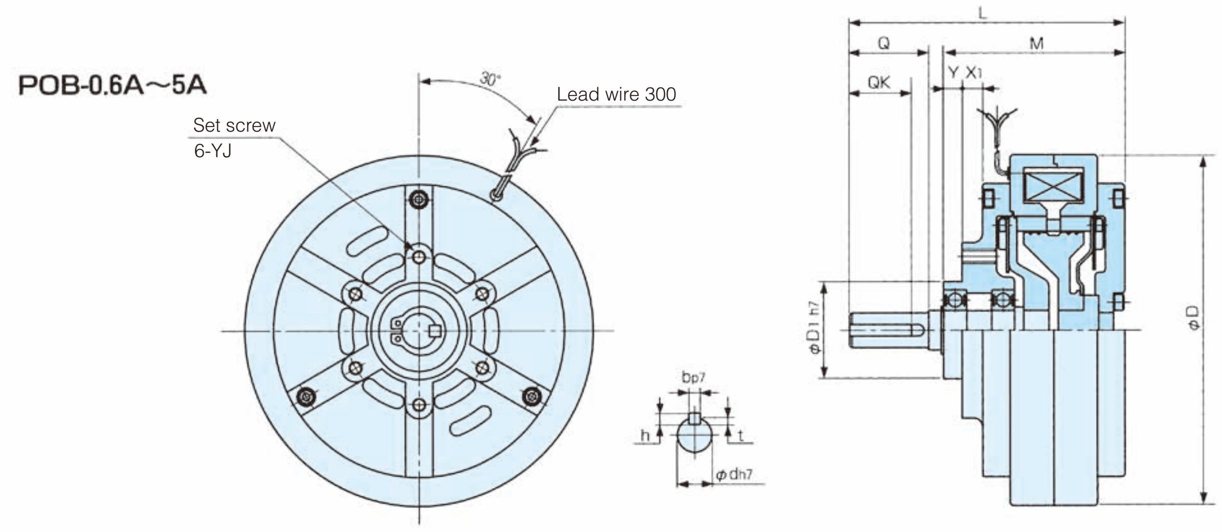
Model	Static friction torque(Nm)	Rated voltage(DC-V)	Power consumption at75℃(W)	Mass(kg)
PMC-40A3	4	24	18	2.5



POB-0.3, 0.6A, 1.2A, 2.5A, 5A, 10, 20, 40

Model	Static friction torque(Nm)	Rated voltage(DC-V)	Power consumption at75℃(W)	Mass(kg)
POB-0.3	3	24	13.3	2.5
POB-0.6A	6	24	19.2	3.3
POB-1.2A	12	24	20.4	4.9
POB-2.5A	25	24	26.8	9
POB-5A	50	24	47.3	15.5
POB-10	100	24	52.8	33
POB-20	200	24	66	48
POB-40	400	24	92	80

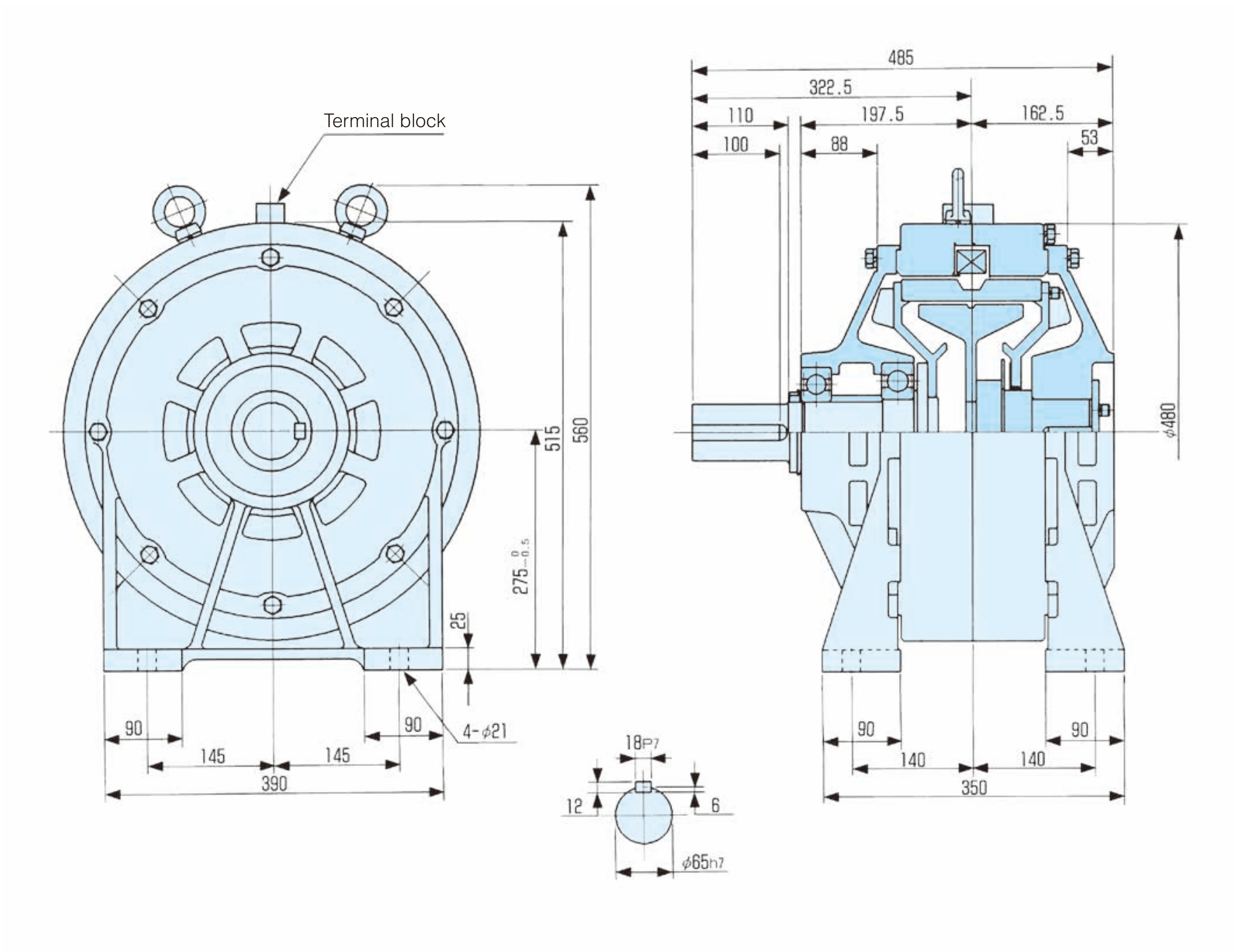




Model	Diameter direction		Shuft direction					Attachment YJ		Shuft end					
	D	D1	L	M	X	X1	Y	P.C.D	Tap	Q	QK	d	b	h	t
POB-0.3	120	42	105	75	8.6	11	11	64	M5×10	23	20	10	4	4	2.5
POB-0.6A	134	42	103.5	71	–	7	8	64	M5×11	26	22	12	4	4	2.5
POB-1.2A	152	42	120	79	–	9	8	64	M6×13	34.5	27	15	5	5	3
POB-2.5A	182	55	145.5	94	–	9	9	78	M6×13	43	35	20	5	5	3
POB-5A	219	74	181	114.5	–	8	18	100	M6×13	57	47	25	7	7	4
POB-10	290	100	233.5	155.5	7.5	7.5	25	140	M10×18	67	56	30	7	7	4
POB-20	335	110	263.5	180.5	9.5	10.5	25	150	M10×18	71	60	35	10	8	4.5
POB-40	395	130	330	224	16.1	22.5	33	200	M12×20	92	80	45	12	8	4.5

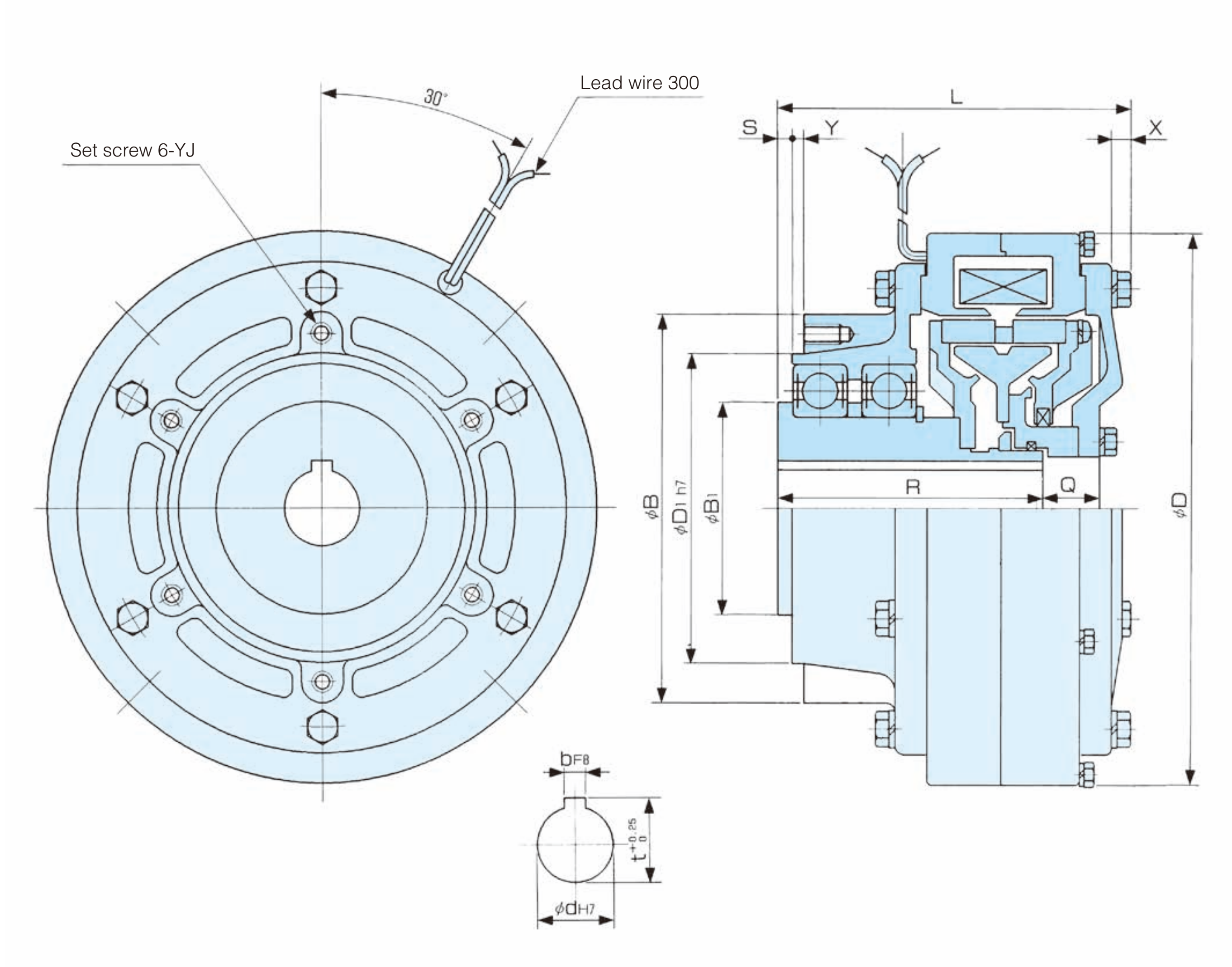
POB-80

Model	Static friction torque(Nm)	Rated voltage(DC-V)	Power consumption at75℃(W)	Mass(kg)
POB-80	800	24	110	260



PHB-0.6, 1.2, 2.5, 5, 10, 20

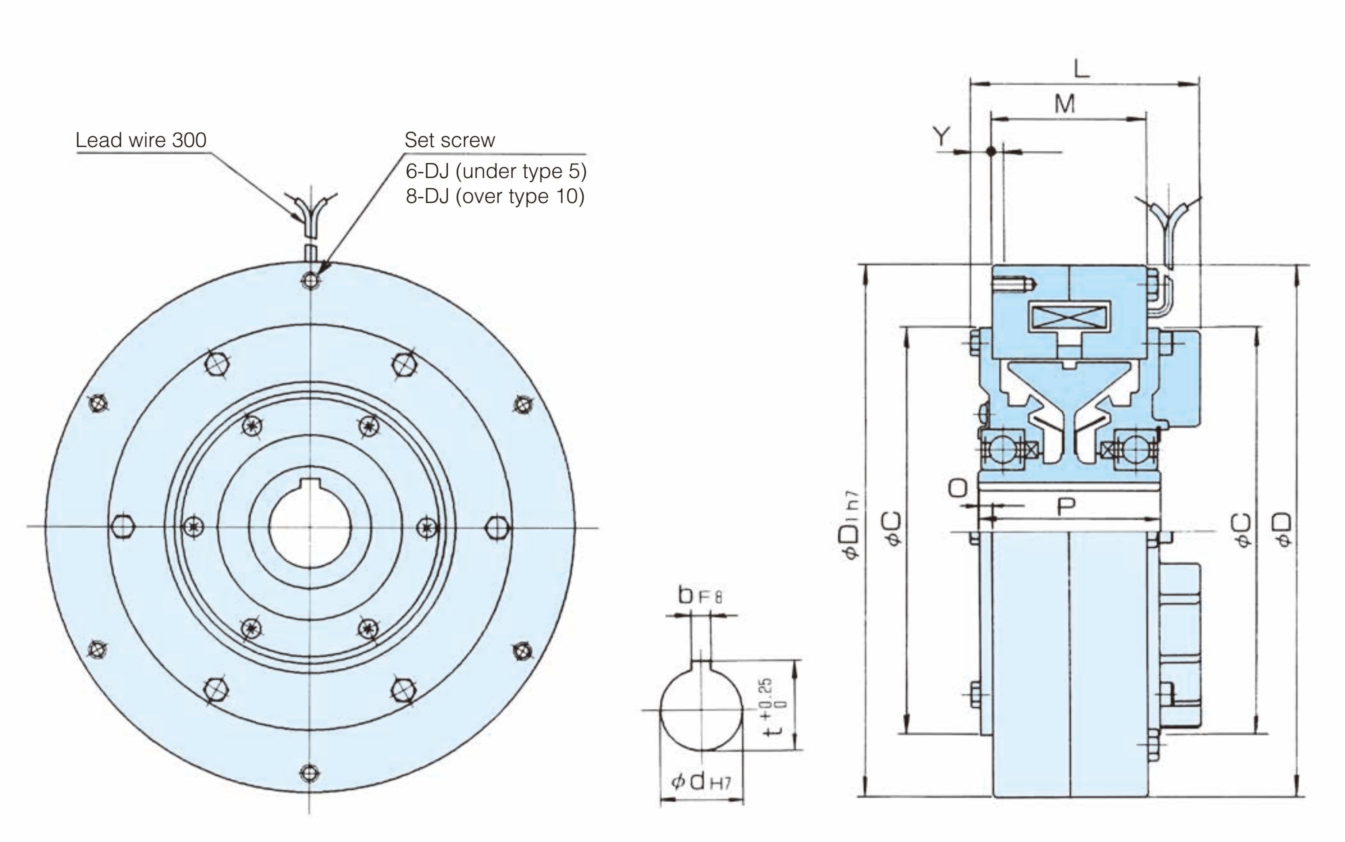
Model	Static friction torque(Nm)	Rated voltage(DC-V)	Power consumption at75℃(W)	Mass(kg)
PHB-0.6	6	24	22.5	4.0
PHB-1.2	12	24	23	5.0
PHB-2.5	25	24	30	9.0
PHB-5	50	24	54	15
PHB-10	100	24	52.8	38
PHB-20	200	24	66	48



Model	Diameter direction				Shuft direction						Attachment K		Shuft hole		
	B	B1	D	D1	L	R	Q	S	Y	X	K	KJ	d	b	t
PHB-0.6	90	45	134	70	82.3	59.5	18	2	3	4.8	80	M5×12	12	4	13.5
PHB-1.2	102	45	152	75	85	59	21	5	4	5.5	88	M6×10	15	5	17
PHB-2.5	129	70	182	102	116	87	19.5	5	4	5.5	115	M6×12	25	7	28
PHB-5	157	85	219	128	133	95.5	35.5	6.5	5	5.5	140	M6×15	32	10	35.5
PHB-10	210	100	290	160	160	114	28.5	5	5	7.5	180	M8×20	42	12	45.5
PHB-20	244	120	335	190	188	130	50	5	5	11	220	M10×20	55	15	60

PRB-1.2, 2.5, 5, 10, 20H

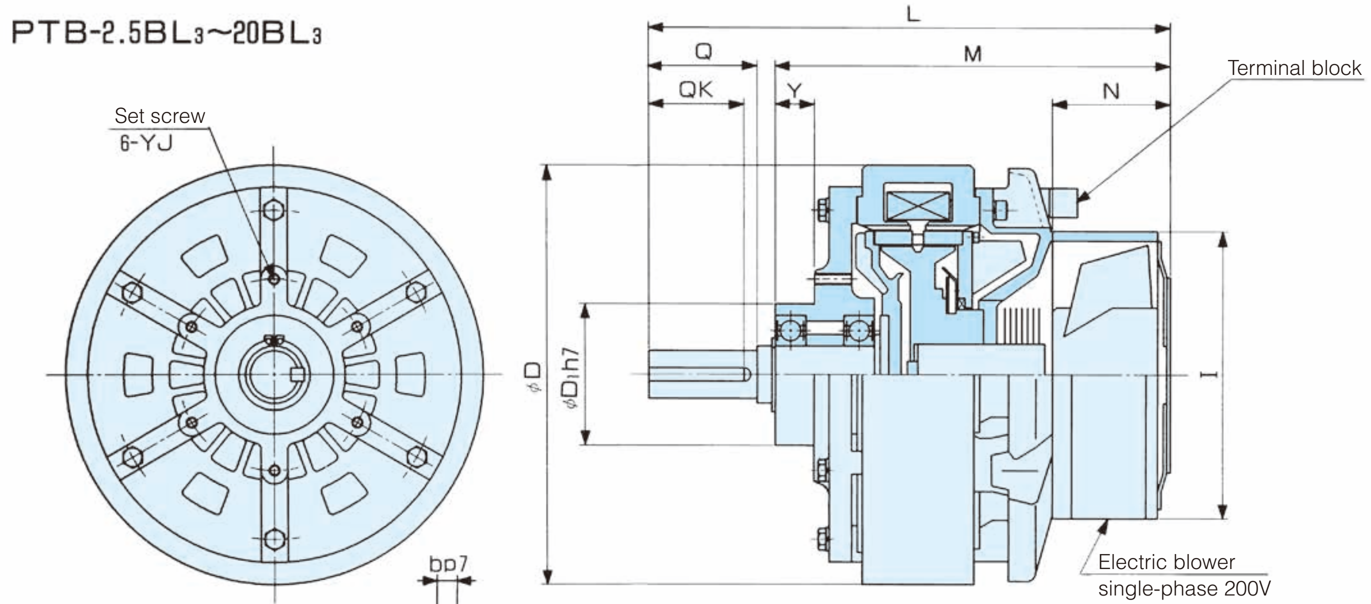
Model	Static friction torque(Nm)	Rated voltage(DC-V)	Power consumption at75℃(W)	Mass(kg)
PRB-1.2H	12	24	15	4
PRB-2.5H	25	24	18.5	5.2
PRB-5H	50	24	24.5	10
PRB-10H	100	24	32	20
PRB-20H	200	24	36	36

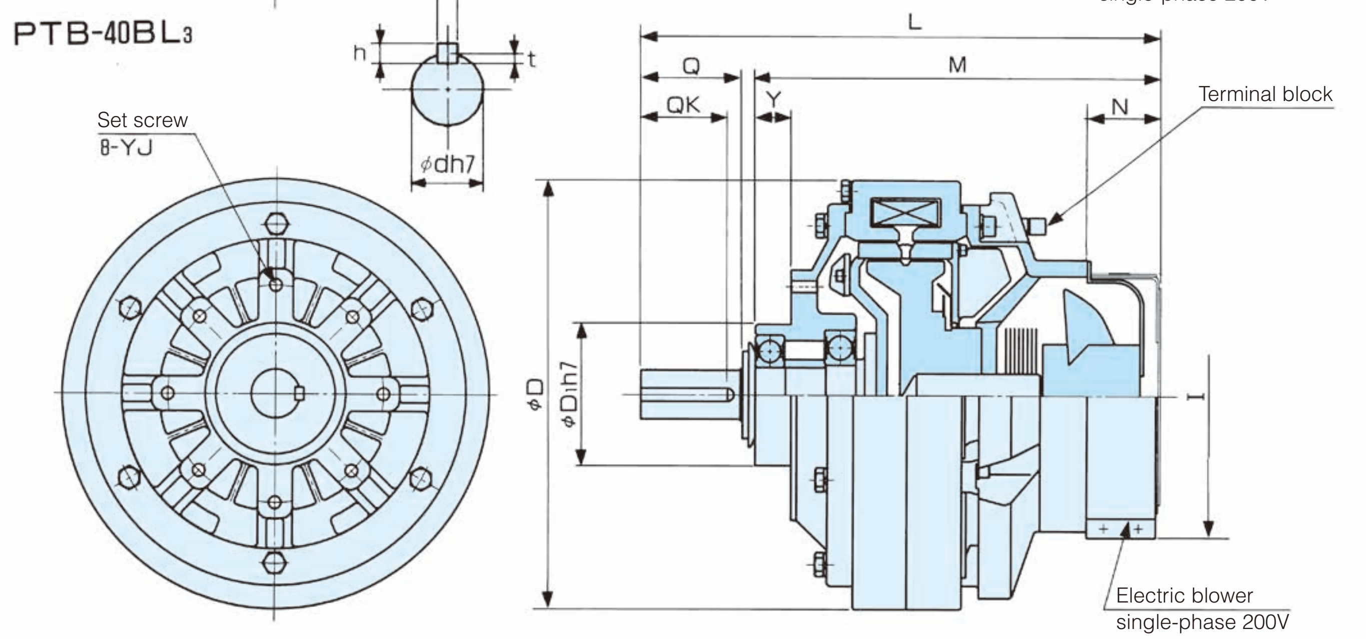


Model	Diameter direction			Shuft direction					Attachment DJ		Shuft hole		
	C	D	D1	L	M	O	P	Y	P.C.D	Tap	d	b	t
PRB-1.2H	109	136	136	63	42	5.5	53	7	125	M5×10	15	5	17
PRB-2.5H	124	160	160	73	47	6.5	60	7.5	148	M5×10	20	5	22
PRB-5H	149	195	195	84.5	57	5	67	8	181	M6×12	30	7	33
PRB-10H	188	250	250	104	68	5	78	8.5	233	M6×12	30	7	33
PRB-20H	234	305	305	128.5	80	7.5	95	12	282	M8×12	40	10	43.5

PTB-2.5, 5, 10, 20, 40BL3

Model	Static friction torque(Nm)	Rated voltage(DC-V)	Power consumption at75℃(W)	Mass(kg)
PTB-2.5BL3	25	24	30	11
PTB-5BL3	50	24	54	17
PTB-10BL3	100	24	52.8	34.5
PTB-20BL3	200	24	66	51.5
PTB-40BL3	400	24	92	85





Model	Diameter direction			Shuft direction				Attachment YJ		Shuft end					
	D	D1	I	L	M	N	Y	P.C.D	Tap	Q	QK	d	b	h	t
PTB-2.5BL3	182	55	120	221.5	169.5	43	15	78	M6×13	43	38	20	5	5	3
PTB-5BL3	219	74	ø150	274.5	208	61.5	23	100	M6×13	57	47	25	7	7	4
PTB-10BL3	290	100	ø150	335	257	61.5	25	140	M10×18	67	56	30	7	7	4
PTB-20BL3	335	110	ø150	352.5	269.5	61.5	25	150	M10×18	71	60	35	10	8	4.5
PTB-40BL3	395	130	ø268	482	376	68	33	200	M12×20	92	80	45	12	8	4.5