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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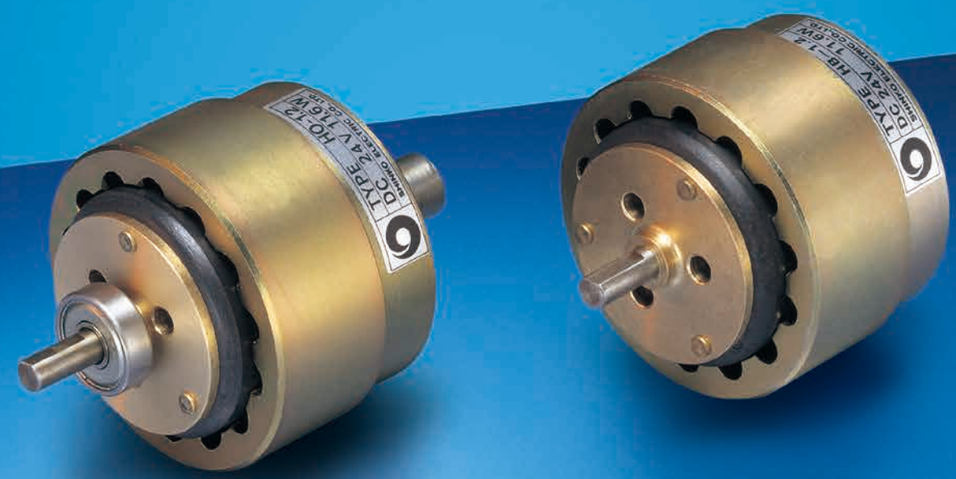
ELECTROMAGNETIC CLUTCHES AND BRAKES

HYSTERESIS 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.

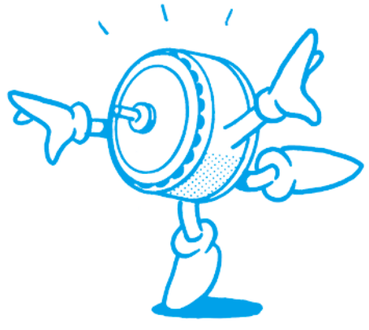
Hysteresis Clutches/Brakes

Hysteresis type Series

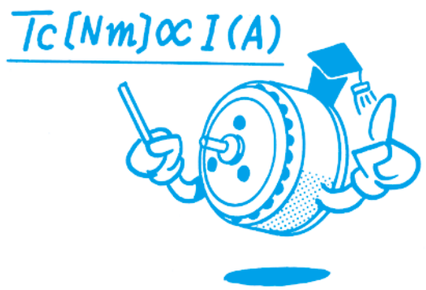
If you need torque control or speed control with strict precision requirements, our hysteresis series fits the bill. To achieve such stable results, we produced a "pure electromagnetic linkage" clutch where the torque is transmitted and controlled using only electromagnetic force. Amongst non-contact clutches, we have achieved remarkable precision and constant torque.
By design, this product is used exclusively in low-torque applications, but its extraordinary constant torque characteristics and controllability are simply unmatched by friction or claw type clutches.

Features

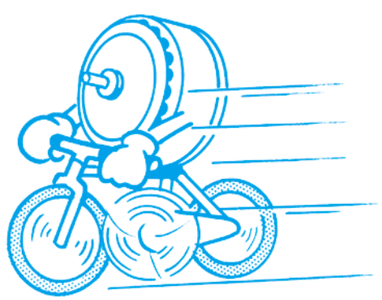
1. Constant torque characteristics with excellent precision
Stable, constant torque regardless of the slip revolution speed.



2. Correct, flexible proportion adjustment
The torque is exactly proportional to the exciting current allowing high precision, flexible torque control.

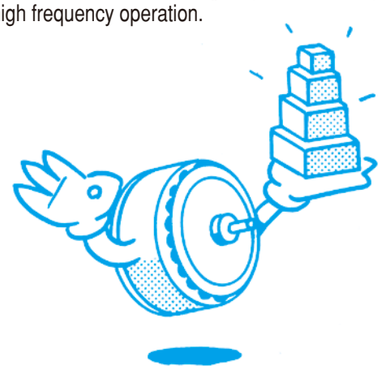


3. High-speed rotation
The performance is not limited by the revolution speed because of the pure non-contact electromagnetic connection, easily enabling high-speed machinery.

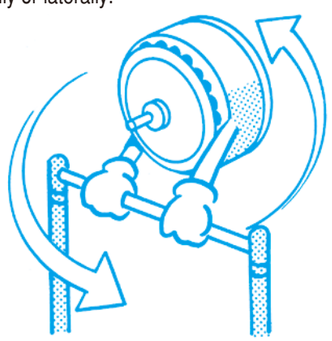


4. Near-permanent life cycle
Since there is neither mechanical contact nor abrasion, this part is essentially permanent.

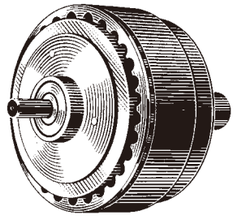
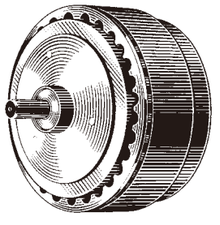
5. Smooth linkage and correct repeatability
Due to the electromagnetic connection, it experiences no shock. Furthermore, it exhibits high repetition and repeatability under high frequency operation.



6. Flexible mounting and operation orientation
Featuring simple mounting mechanics, it can be positioned longitudinally or laterally.



List of Models

Type	Clutch	Brake
	HO	HB
Appearance		

Models Names

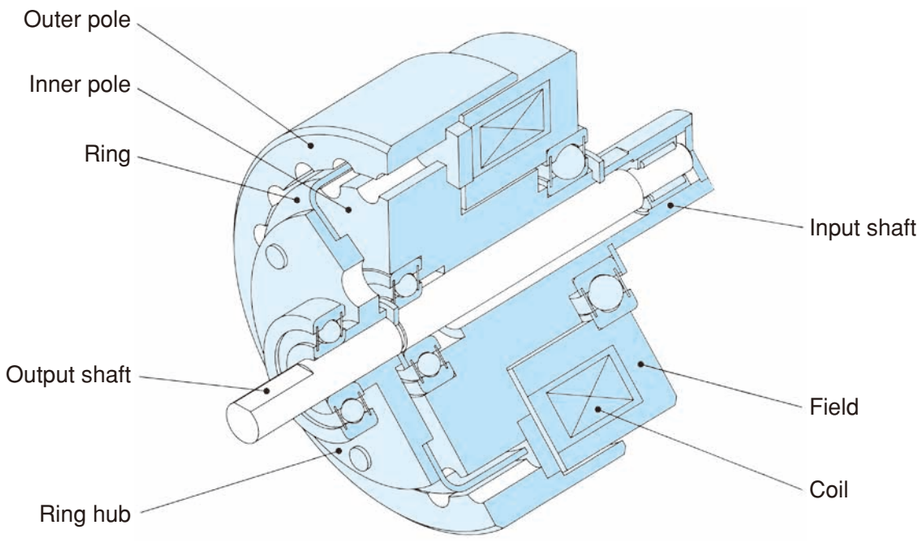
HO-0.6

Nominal number

Model symbol
HO: Hysteresis clutch
HB: Hysteresis brake

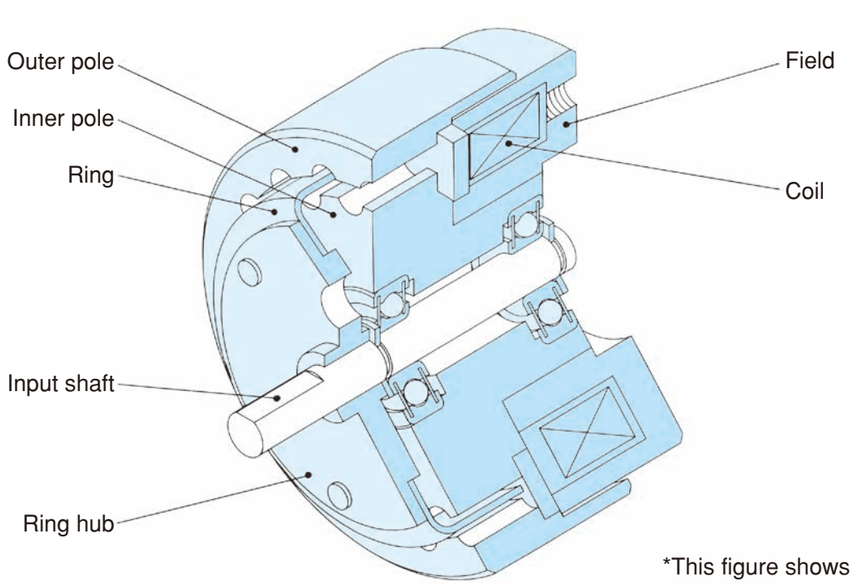
Structure

Clutch



*This figure shows HO types

Brake



*This figure shows HB types

Clutch or Brake Selection Guide

1. To use in the state of continuous slip

To use in a state of a constant torque, a constant rpm and continuous slip for tension control, etc., of a winding clutch and a start up winding brake using a hysteresis clutch/brake with high precision constant torque and accurate repetitive property, the continuous slip power is calculated by the following formula. Here, it is possible to use the required clutch/brake torque by adjusting the rated torque in the range of 3~100%.

Ps=0.103 x T x n (W)
T: set torque of clutch or brake (Nm)
n: rpm of brake shaft (r/min)
In case of a clutch
ni: (relative speed)=No−Ns (r/min)
No: clutch input speed
Ns: clutch output speed

Example
(Conditions)
Set torque of brake: T=0.3 (Nm)
rpm of brake:n=3600 (r/min)
Select the brake for the above state.

(1) Temporarily select one having the rated torque 0.5 (Nm) from the set torque 0.3 (Nm).

(2) Calculate the slip power.
Ps=0.103×0.3×3600≠111W
The type having the slip power of 111W or more.

(3) From the allowable slip power diagram, HB-5 cannot be used, so look at HB-10, the allowable slip power of HB-10 is 140W.
(111W < 140W)
Therefore, HB-10 can be used.

2. To make tension control

To make constant tension control with a continuous slip using a winding clutch and a start up winding brake, calculation is made using the following formula. This section mentions only selection when a brake is used. When a clutch is used, refer to the catalogue of powder clutches/brakes.

Principal data dimensions of application conditions necessary for exarmination:
1. Line speed:
Maximum Vmax. Minimum Vmin (m/min)
2. Start up wIndlng 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 hysteresis brake, following points should be examined:

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

$$T=\frac{Fmax\times Dmax}{2}\times 10^{-3}(Nm)$$

$$N=\frac{Vmax}{\pi\times Dmax}\times 10^{3}(r/min)$$

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

$$T=\frac{Fmin\times Dmin}{2}\times 10^{-3}(Nm)$$

$$N=\frac{Vmin}{\pi\times Dmin}\times 10^{3}(r/min)$$

(3) Maximum rpm (Nmax)

$$Nmax=\frac{Vmax}{\pi\times Dmin}\times 10^{3}(r/min)$$

(4) Minimum rpm (Nmin)

$$Nmin=\frac{Vmin}{\pi\times Dmin}\times 10^{3}(r/min)$$

(5) Minimum brake torque (Tmin)

$$Tmin=\frac{Fmin\times Dmin}{2}\times 10^{-3}(Nm)$$

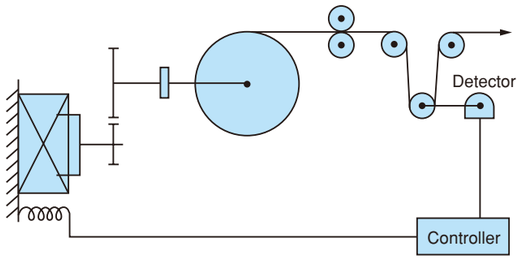
(6) Maximum brake torque (Tmax)

$$Tmax=\frac{Fmax\times Dmax}{2}\times 10^{-3}(Nm)$$

(7) Maximum slip power (Pmax)

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

(Example)
[Conditions]
1.Line speed:
Maximum Vmax=350m/min
Minimum Vmin=250m/min
2.Start up winding dia.:
Maximum Dmax=ø550mm
Minimum Dmin=ø100mm
3.Set tension:
F=5(N) constant
Select the brake for the above state.



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

$$T=\frac{5\times550}{2}\times10^{-3}=1.38(Nm)$$

• The brake shaft is used for the double speed-up shaft.

$$T=1.38\times\frac{1}{2}=0.69(Nm)$$

$$N=\frac{350}{\neq\times550}\times10^{3}=202.7(r/min)$$

• The brake shaft is used for the double speed-up shaft.

N=202.7×2=405.4(r/min)

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

$$T=\frac{5\times100}{2}\times10^{-3}=0.25(Nm)$$

• The brake shaft is used for the double speed-up shaft.

$$T=0.25\times\frac{1}{2}=0.125(Nm)$$

$$N=\frac{350}{\neq\times100}\times10^{3}=1115(r/min)$$

• The brake shaft is used for the double speed-up shaft.

N=1115×2=2230(r/min)

(3) Maximum rpm (Nmax)

$$Nmax=N=\frac{350}{\neq\times100}\times10^{3}\times2=2230(r/min)$$

(4) Minimum rpm (Nmin)

$$Nmin=\frac{250}{\neq\times550}\times10^{3}=145(r/min)$$

• The brake shaft is used for the double speed-up shaft.

Nmin=145×2=290(r/min)

(5) Minimum brake torque (Tmin)

$$Tmin=\frac{5\times100}{2}\times10^{-3}\times\frac{1}{2}=0.125(Nm)$$

(6) Maximum brake torque (Tmax)

$$Tmax=\frac{5\times550}{2}\times10^{-3}\times\frac{1}{2}=0.69(Nm)$$

(7) Maximum slip power (Pmax)

Pmax= 0.0164×5×350=28.7 (W)

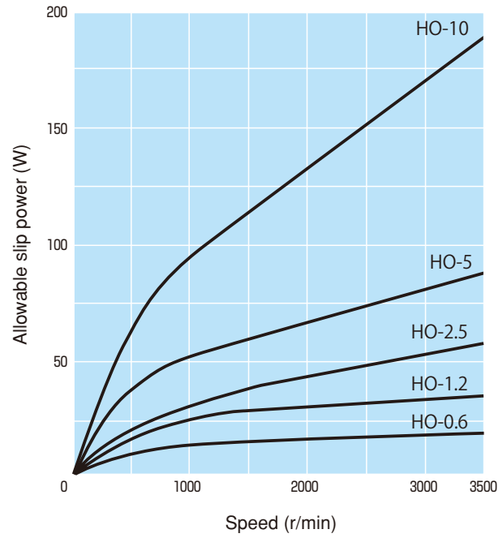
Slip power of 28.7W or more and torque of 0.69Nm or more may be required.

(8) The allowable slip power of HB-10 is 38W (28.7W<38W, 0.69Nm<1Nm) according to the Allowable Slip Power Diagram (see page 6), so HB-10 is available.

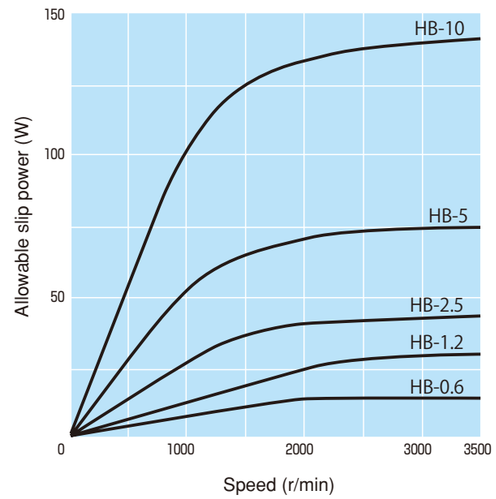
Characteristics

1. Allowable slip power characteristics

• HO clutches

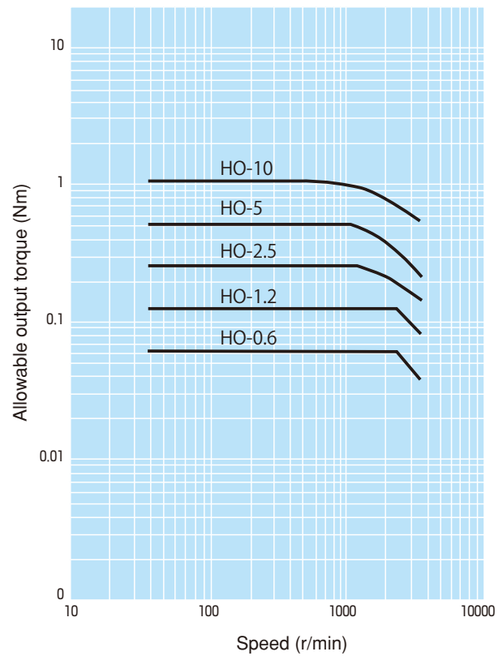


• HB brakes

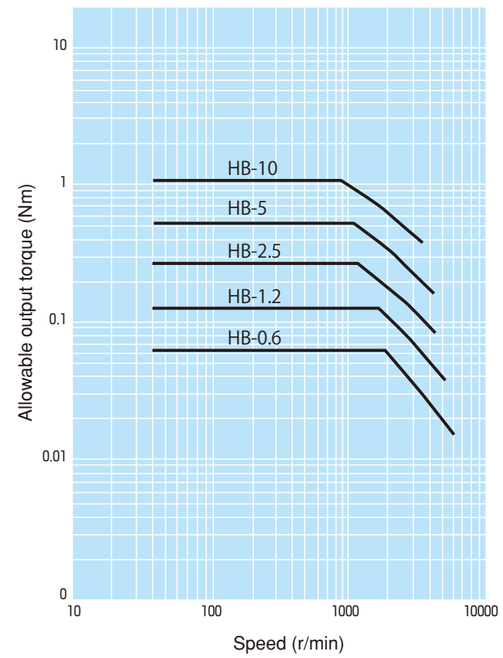


2. Allowable continuous slip torque characteristics

• HO clutches



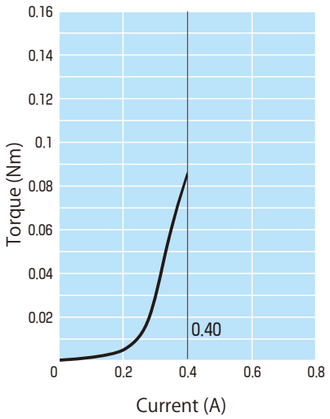
• HB brakes



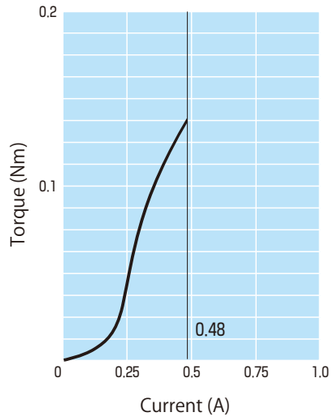
3. Current – Torque characteristics

Clutches

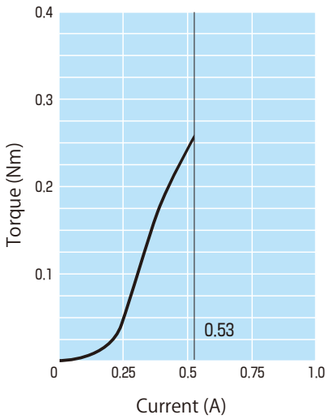
• **HO-0.6**



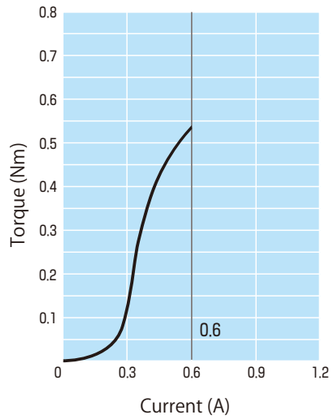
• **HO-1.2**



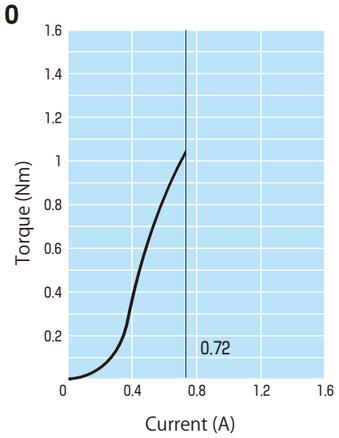
• **HO-2.5**



• **HO-5**

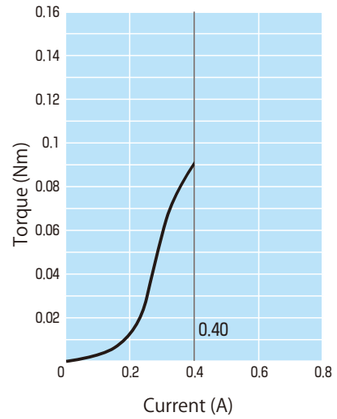


• **HO-10**

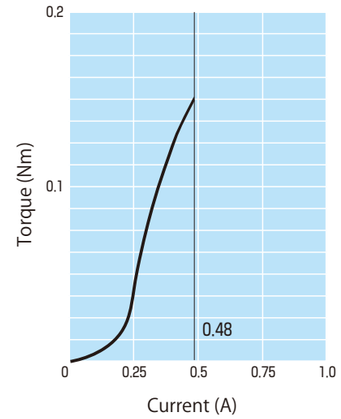


Brakes

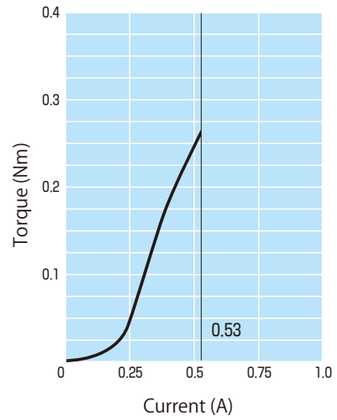
• **HB-0.6**



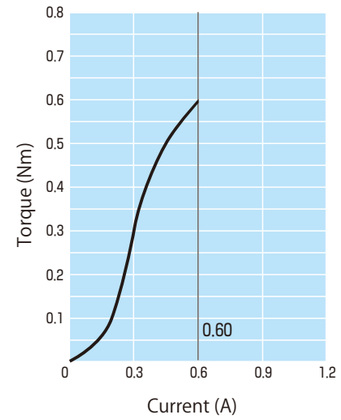
• **HB-1.2**



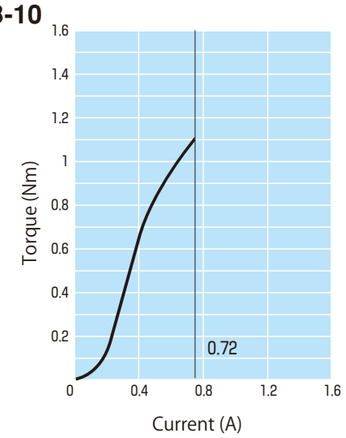
• **HB-2.5**



• **HB-5**



• **HB-10**



4. Maximum rpm moment of enertia

• HO type

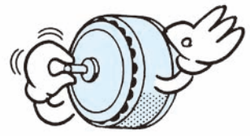
TYPE	Max speed (r/min)	J(kgm²)	
		Input side	Output side
HO-0.6	3600	0.608	0.08
HO-1.2	3600	1.25	0.15
HO-2.5	3600	2.48	0.275
HO-5	3600	7.88	0.70
HO-10	3600	20.25	2.28

• HB type

TYPE	Max speed (r/min)	J(kgm²)
		Output side
HB-0.6	3600	0.08
HB-1.2	3600	0.15
HB-2.5	3600	0.275
HB-5	3600	0.70
HB-10	3600	2.28

Cautions for handling

Pre-installation precautions
Does the shaft rotate smoothly without contact?



Installation precautions
(1) Select couplings used for the input and output parts without backlash or play. It may cause torque pulsation.

(2) Apply adhesives like LOCTITE on set screws, mounting bolts to prevent them from loosening.

(3) Pay attention to the squareness and the concentricity of the mounting stand with the shaft core for the field and the rotor not to contact. And provide a shoulder to press the outer ring of the bearing.

(4) Assemble the mounting stand so as not to apply unreasonable force on the bearing.

(5) When using the input and output shafts for hanging a pulley, keep it within the allowable overhang load.

Post-installation precautions
(1) If the clutch/brake is turned off at halt or low speed, remanent magnetism remains on the hysteretic ring and may generate remaining torque. When turning off, gradually reduce and cut off the electric current while keeping the relative rotation. Take about 2 to 5 seconds for a gradual decrease of the electric current as a guide.

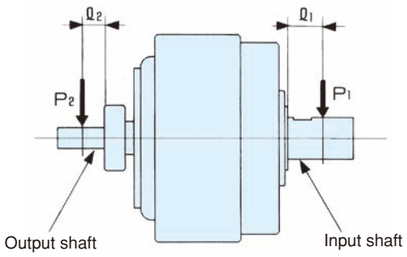
(2) To use it at low speed, torque ripple may occur, so consult us before using at 100 r/min or less.

Allowable overhand load
At the time of overhang drive using a pulley and the like, keep it within the allowable overhang load. The overhang load that actually acts can be obtained by the following formula.

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

Where, F : load (N) {kgf}
T : transfer torque (Nm) {kgf}
D: pitch diameter of a pulley, etc. (cm)
f: load factor (2~4 in case of a belt)

• HO clutches



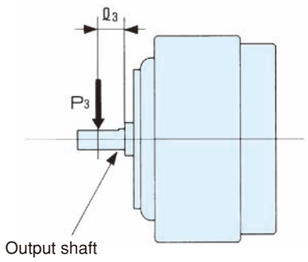
Input side

TYPE	ℓ1(mm)	P1(N)
HO-0.6	9	86
HO-1.2	10	119
HO-2.5	11	179
HO-5	12	198
HO-10	13.4	229

Output side

TYPE	ℓ2(mm)	P2(N)
HO-0.6	6.5	40
HO-1.2	7	46
HO-2.5	8	93
HO-5	9	104
HO-10	11	160

• HB brakes



TYPE	ℓ3(mm)	P3(N)
HB-0.6	6.5	47
HB-1.2	7	59
HB-2.5	8	120
HB-5	9	120
HB-10	11	150

(Note) 1. This table is based on 2000r/min, and a bearing life 16000 hours as a standard.
2. This table shows a case without thrust load.
3. Multiply the coefficient in the following table according to the rotation speed or application.
When the multiplied value exceeds 10, use 10 as the value.

• Speed coefficient

No.of revolition (r/min)	Speed coeffiction
50	3.42
100	2.72
200	2.14
400	1.71
600	1.50
800	1.36
1000	1.25
1200	1.19
1400	1.11
1600	1.08
1800	1.03
2000	1.00
3000	0.88
3600	0.83

• 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

List of bearings in use

• HO hysteresis clutches

Type	Input part		Field part		Output part	
	Bearing model No.	Quantity	Bearing model No.	Quantity	Bearing model No.	Quantity
HO-0.6	HK0306	1	6000ZZ	1	625ZZ	2
HO-1.2	HK0408	1	6001ZZ	1	626ZZ	2
HO-2.5	HK0509	1	6002ZZ	1	627ZZ	2
HO-5	HK0609	1	6003ZZ	1	628ZZ	2
HO-10	HK0709	1	6004ZZ	1	6000ZZ	2

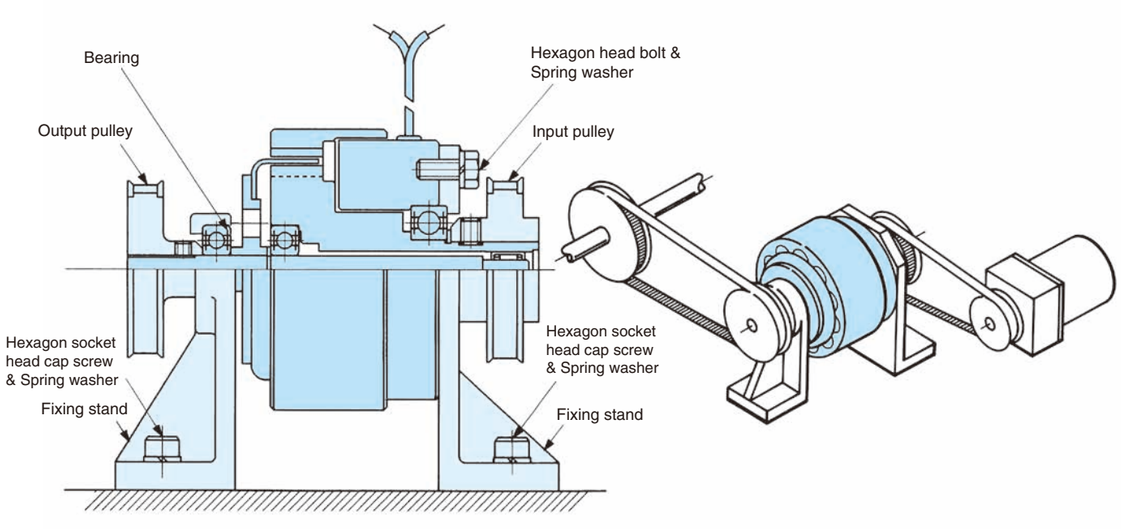
• HB hysteresis brakes

Type	Output part	
	Bearing model No.	Quantity
HB-0.6	625ZZ	2
HB-1.2	626ZZ	2
HB-2.5	627ZZ	2
HB-5	628ZZ	2
HB-10	6000ZZ	2

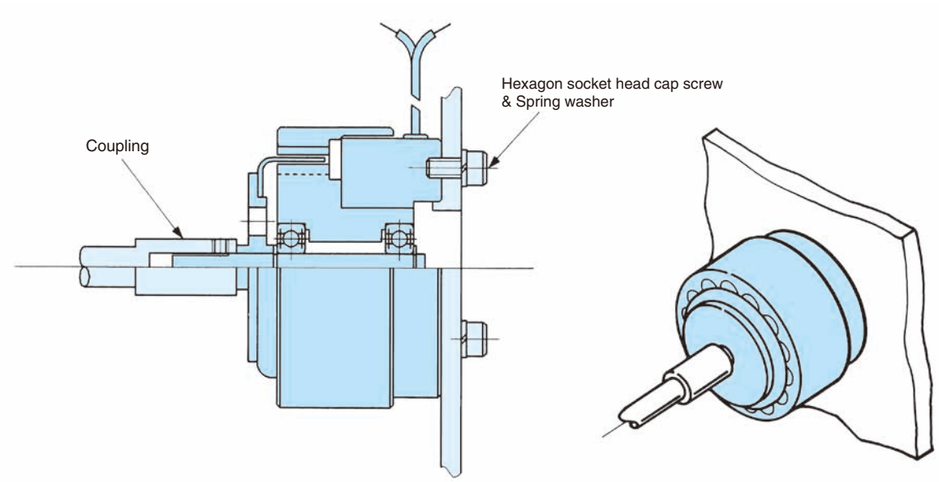
Remarks: Heat resistant grease is used for all models as filling grease.

Installation Example

HO

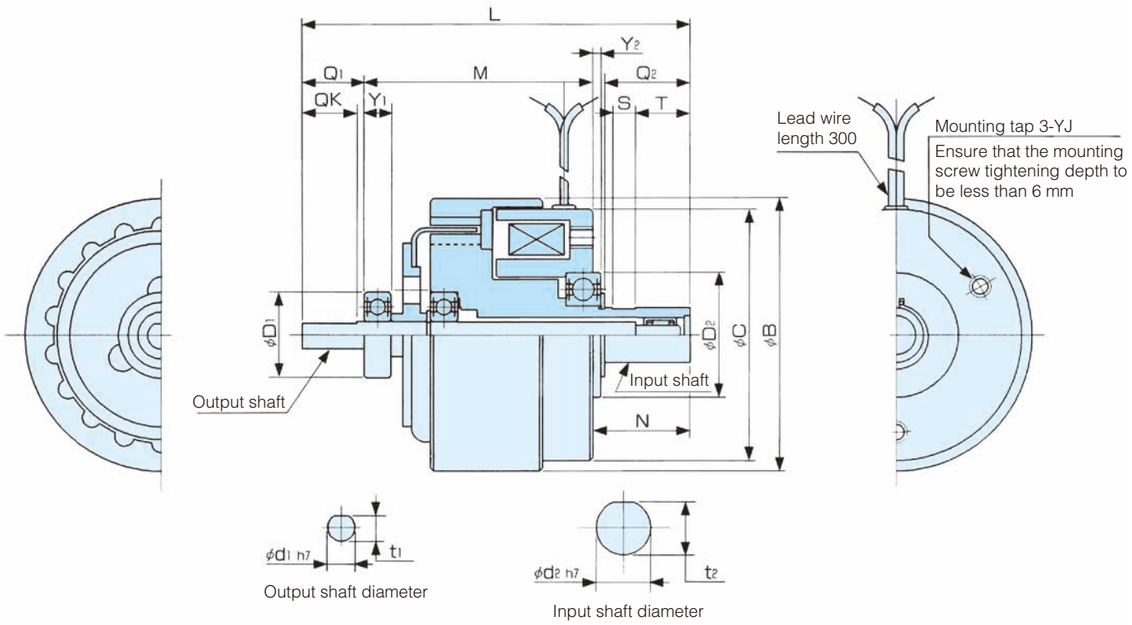


HB



HO-0.6, 1.2, 2.5, 5, 10

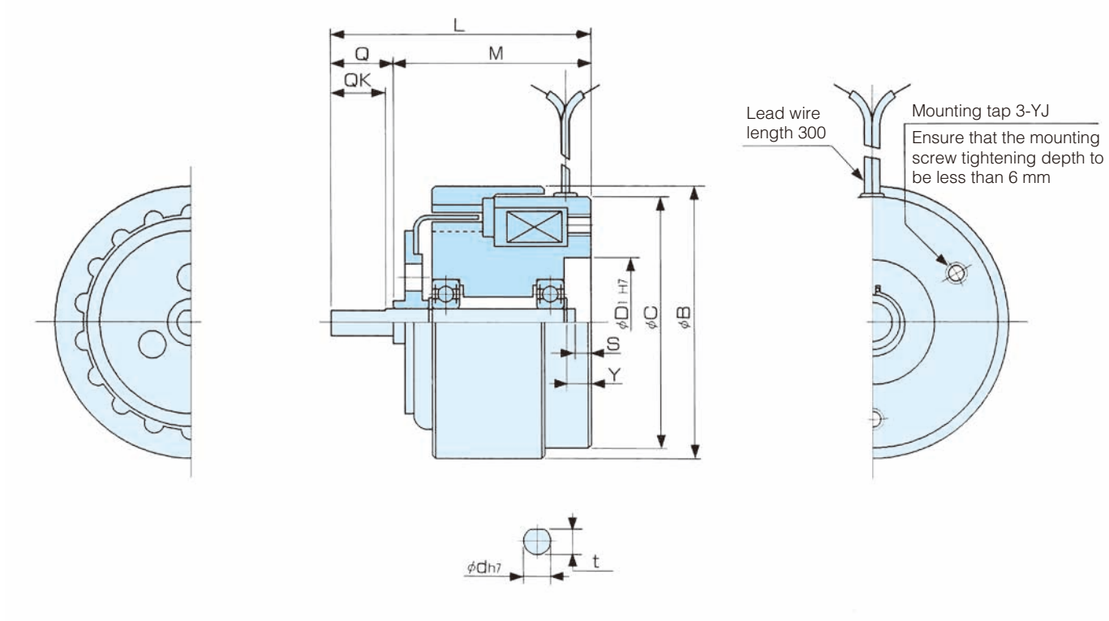
Model	Static friction torque(Nm)	Rated voltage(DC-V)	Power consumption at75℃(W)	Mass(kg)
HO-0.6	0.06	24	9.6	0.46
HO-1.2	0.12	24	11.6	0.70
HO-2.5	0.25	24	12.8	1.0
HO-5	0.5	24	14.6	1.7
HO-10	1	24	17.4	4.0



Model	Diameter direction				Shuft direction							Attachment YJ		Shuft end						
	B	C	D1	D2	L	M	N	S	T	Y1	Y2	P.C.D	Tap	Q1	Q2	QK	d1	d2	t1	t2
HO-0.6	52	48	16	26	81	47	21	6	10	5	2	36	M5×6	13	18	11	5	10	4.5	9.5
HO-1.2	60	56	19	28	92	55	23	6	12	6	2	40	M5×6	14	20	12	6	12	5.5	11.5
HO-2.5	70	64.6	22	32	100	59	25	6	14	7	2	50	M5×6	16	22	14	7	14	6.5	13.5
HO-5	85	78	24	35	110	64	28	6	16	8	3	60	M5×6	18	24	16	8	16	7.5	15.5
HO-10	112	105	26	42	121	68	31	6	18	8	3	70	M5×6	22	26.8	20	10	18	9.5	17.5

HB-0.6, 1.2, 2.5, 5, 10

Model	Static friction torque(Nm)	Rated voltage(DC-V)	Power consumption at75℃(W)	Mass(kg)
HB-0.6	0.06	24	9.6	0.45
HB-1.2	0.12	24	11.6	0.60
HB-2.5	0.25	24	12.8	0.90
HB-5	0.5	24	14.6	1.5
HB-10	1	24	17.4	3.7



Model	Diameter direction			Shuft direction				Attachment DJ		Shuft end			
	B	C	D1	L	M	S	Y	P.C.D	Tap	Q	QK	d	t
HB-0.6	52	48	26	54	41	3	6	36	M5×6	13	11	5	4.5
HB-1.2	60	56	28	62	48	3	6	40	M5×6	14	12	6	5.5
HB-2.5	70	64.6	32	67	51	4	7	50	M5×6	16	14	7	6.5
HB-5	85	78	35	73	55	4	7	60	M5×6	18	16	8	7.5
HB-10	112	105	42	81	59	6	9	70	M5×6	22	20	10	9.5