HYOJOON
ELECTRO MAGNETIC CLUTCH / BRAKE

BANDOBEARING

LIST

ELECTROMAGNETIC

OVERVIEW

Electromagnetic clutches operate electrically but transmit torque mechanically. This is why they used to be referred to as electro-mechanical clutches. Over the years, EM became known as electromagnetic versus electro-mechanical, referring more about their actuation method versus physical operation. Since the clutches started becoming popular over 60 years ago, the variety of applications and clutch designs has increased dramatically, but the basic operation remains the same today.

Single-face clutches make up approximately 90% of all electromagnetic clutch sales.

Electromagnetic clutches are most suitable for remote operation since no mechanical linkages are required to control their engagement, providing fast, smooth operation. However, because the activation energy dissipates as heat in the electromagnetic actuator when the clutch is engaged, there is a risk of overheating. Consequently, the maximum operating temperature of the clutch is limited by the temperature rating of the insulation of the electromagnet. This is a major limitation. Another disadvantage is higher initial cost.

Applications

Machinery

This type of clutch is used in some lawnmowers, copy machines, and conveyor drives. Other applications include packaging machinery, printing machinery, food processing machinery, and factory automation.

Vehicles

When the electromagnetic clutch is used in automobiles, there may be a clutch release switch inside the gear lever. The driver operates the switch by holding the gear lever to change the gear, thus cutting off current to the electromagnet and disengaging the clutch. With this mechanism, there is no need to depress the clutch pedal. Alternatively, the switch may be replaced by a touch sensor or proximity sensor which senses the presence of the hand near the lever and cuts off the current. The advantages of using this type of clutch for automobiles are that complicated linkages are not required to actuate the clutch, and the driver needs to apply a considerably reduced force to operate the clutch. It is a type of semi-automatic transmission.

Electromagnetic clutches are also often found in AWD systems, and are used to vary the amount of power sent to individual wheels or axles.[1]

Most, but not all, automobile air conditioning systems are switched on and off by using an electromagnetic clutch. To activate the compressor the clutch is activated. This connects the air conditioning compressor's shaft end to a pulley driven by the engine's crankshaft through a belt.

Electromagnetic clutches have been used on diesel locomotives, e.g. by Hohenzollern Locomotive Works.

ELECTROMAGNETIC

Electromagnetic brakes or **EM brakes** are used to slow or stop vehicles using electromagnetic force to apply mechanical resistance (friction). They were originally called electro-mechanical brakes but over the years the name changed to "electromagnetic brakes", referring to their actuation method which is generally unrelated to modern electro-mechanical brakes. Since becoming popular in the mid-20th century, especially in trains and trams, the variety of applications and brake designs has increased dramatically, but the basic operation remains the same.

Both electromagnetic brakes and eddy current brakes use electromagnetic force, but electromagnetic brakes ultimately depend on friction whereas eddy current brakes use magnetic force directly.

Applications

1. In locomotives, a mechanical linkage transmits torque to an electromagnetic braking component.

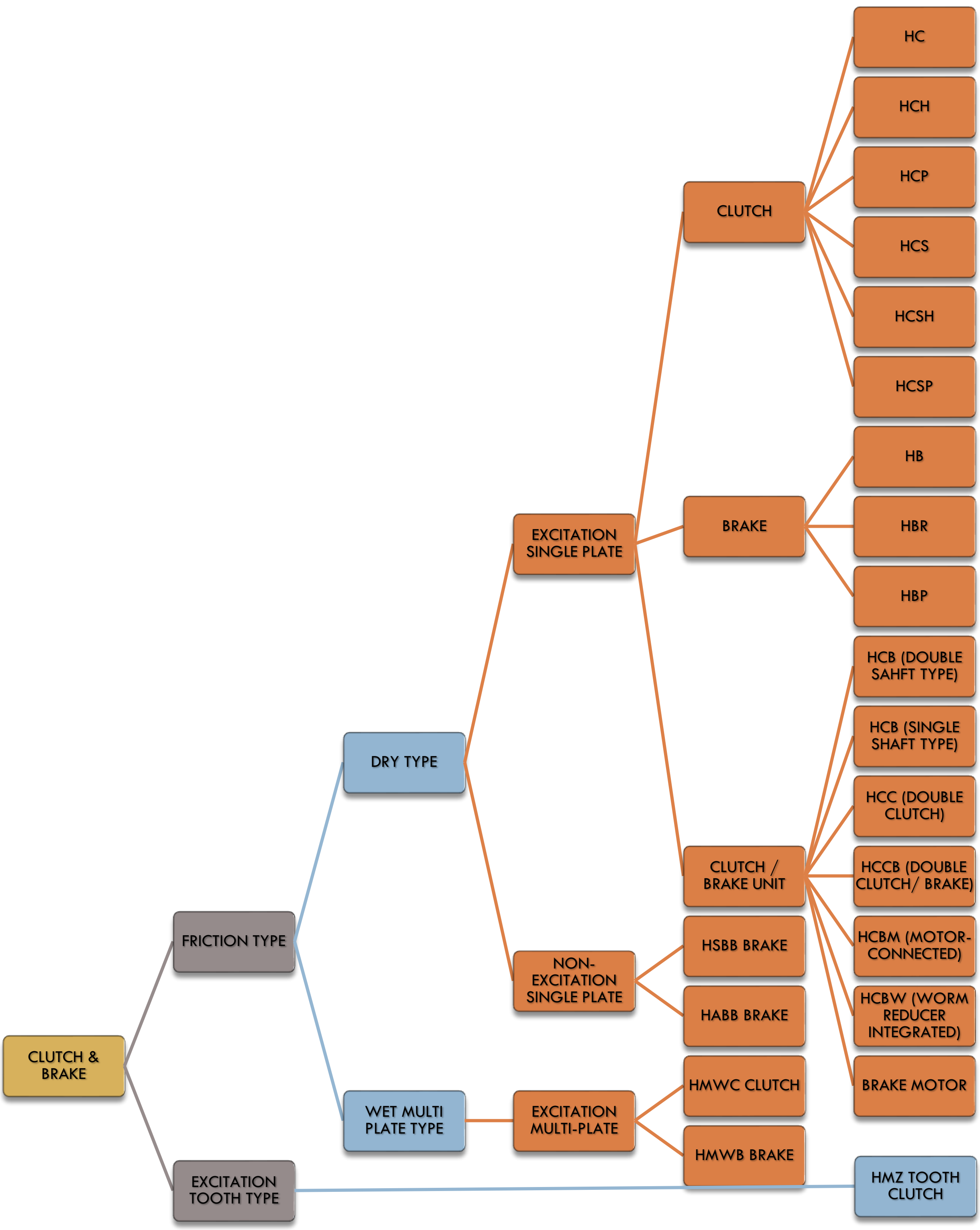
2. Trams and trains use electromagnetic track brakes where the braking element is pressed by magnetic force to the rail. They are distinguished from mechanical track brakes, where the braking element is mechanically pressed on the rail.

3. Electric motors in industrial and robotic applications also employ electromagnetic brakes.

4. Recent design innovations have led to the application of electromagnetic brakes to aircraft applications. In this application, a combination motor/generator is used first as a motor to spin the tires up to speed prior to touchdown, thus reducing wear on the tires, and then as a generator to provide regenerative braking.

ELECTROMAGNETIC

PRODUCT CONFIGURATION



HYOJOON ELECTROMAGNETIC PRODUCTS

TYPES (CLUTCH)

HC

HCH

HCP

HCS

HCSH

HCSP

TYPES (BRAKE)

HB

HBR

HBP

HYOJOON ELECTROMAGNETIC PRODUCTS

TYPES (CLUTCH / BRAKE UNIT)

HCB (DOUBLE SHAFT)

HCB (DOUBLE SHAFT)

HCC (DOUBLE CLUTCH)

HCCB (DOUBLE CLUTCH/BRAKE)

HCBM (MOTOR DIRECTLY CONNECTED)

HCBW (WORM REDUCER INTEGRATED)

BRAKE MOTOR

HYOJOON ELECTROMAGNETIC PRODUCTS

TYPES (WET MULTI-PLATE TYPE)

HMWC (CLUTCH)

HMWB (BRAKE)

TYPES (TOOTH CLUTCH)

HMZ

NON-EXCITATION SINGLE PLATE

HSBB BRAKE

HYOJOON

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DRY TYPE SINGLE PLATE ELECTROMAGNETIC CLUTCH/ BRAKE

HS SERIES

OVERVIEW

Electromagnetic clutches and electromagnetic brakes are devices that control power and rotary movement using an electromagnetic force generated by energizing coils. Clutches connect and disconnect with power while brakes brake and maintain rotary movement. It is possible to divide these into electromagnetic actuated types and spring actuated types depending on that method of operation.
Electromagnetic clutches and brakes that operate with an electromagnetic force are used for industrial purposes and are most frequently used in general among these types.

FEATURES, APPLICATION, TORQUE RANGE

Adjustable Torque: Adjustable torque is used primarily for slip clutches and torque limiters. Users can adjust the torque at which the clutch disengages or slips.
Zero Backlash: There is no play or backlash during the engagement of the load and no load disengagement during a direction reversal.
Washdown Capable: The housing is rated for washdown cleaning.
Bi-directional: Devices can be set-up to rotate in either direction.
Automatic Re-engagement: The clutch re-engages the load when the torque drops to an acceptable level.
Slip Indication: Slip indication can move a pin radially when an overload occurs, or send an electrical signal to the drive motor.
Feedback: Feedback provides an electrical or electronic signal for monitoring parameters such as position, speed, torque, lockup, or slip status

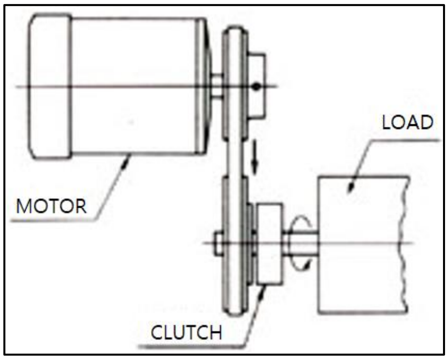
Electromagnetic clutches are used in many applications, including:

- Conveying power from a motor to a conveyor
- Transmission torque through pressing together friction materials
- Generating larger torque than engagement type tooth clutches
- Paper ejection systems, paper conveyers, and positioning of paper in printers
- Drive and stop of printers

Torque range is from 0.24KGM to 38KGM

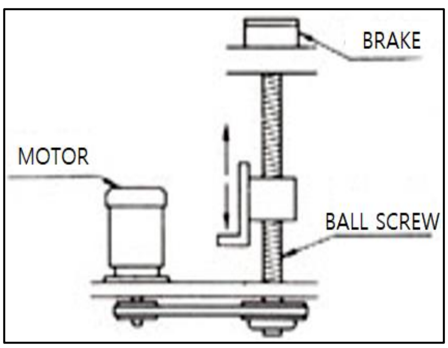
HS SERIES

CLUTCH & BRAKE BASIC USAGE



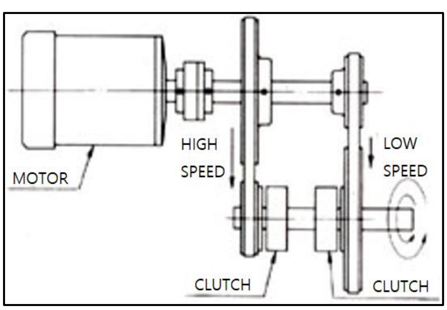
1. Coupling / Releasing

- The clutch is installed between driving part and driven part, it couples or releases the driven part without any halt to the driving part.



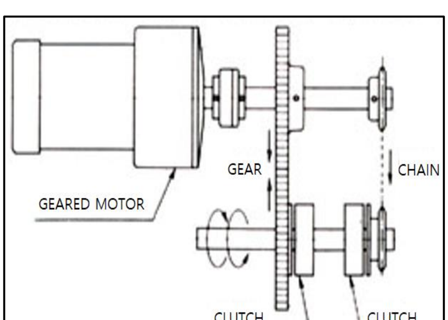
2. Braking / Holding

- The brake is for halting the below cases:
  - The load inertia
  - Machine in emergency or during operation



3. Shifting speeds

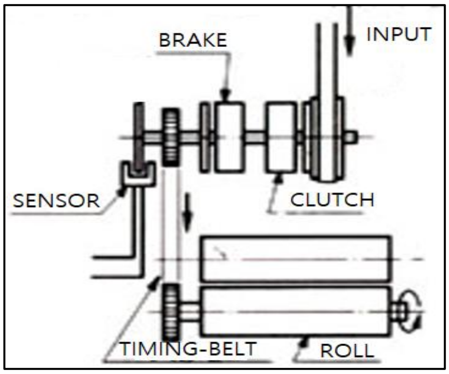
- When you want to shift the speeds, the clutch can help the shift without halting the driving part.



4. Rotating / Rewinding

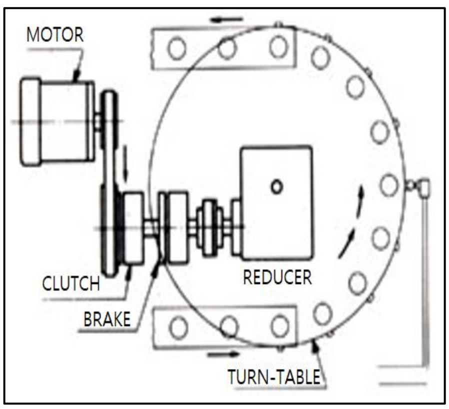
- Combination of clutches can shift the rotation of the load side. At this moment, the driving part rolls to forward direction, while the load side can be shifted to forward or backward.

HS SERIES



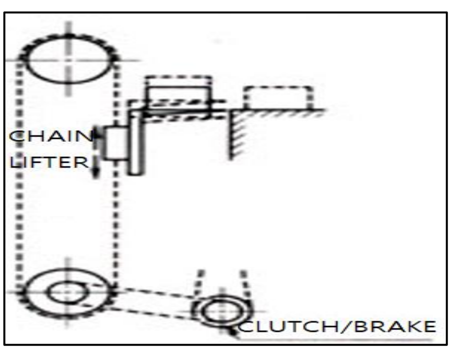
5. High Speed Operation

- Hyper speed cycle generates the limitation of repetitive ON&OFF function at motor. Application of Clutch & Brake enables the motor to halt. This application can be temporary, instant, and precious.



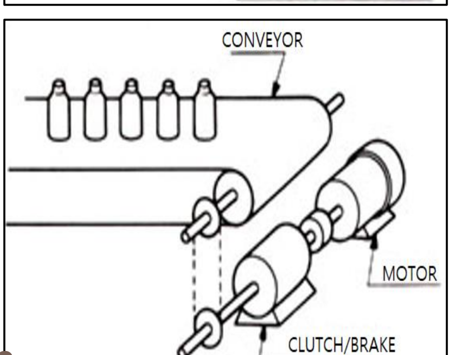
6. Positioning / Indexing

- The clutch / brake allows automatic and high precision positioning which is required for pre-set positioning and pre-determined feeding operations.



7. Inching

- The clutch / brake enables jogging when starting machines or positioning.



8. Soft starting / Stopping operation

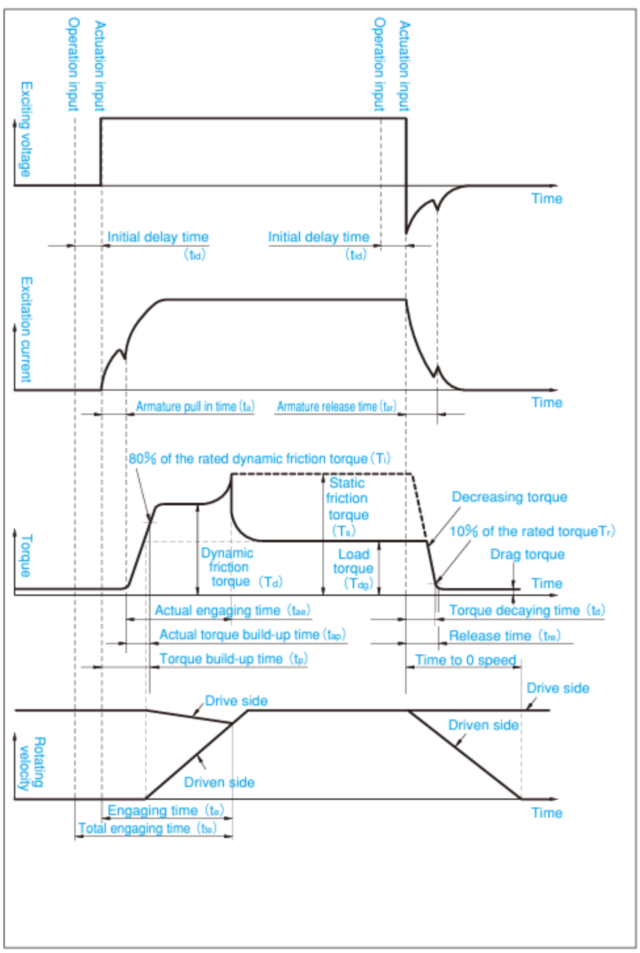
- Soft starting and stopping operations are insured with the torque adjusted to mitigate impact on loads. In this case, slip time has to be shortened to prevent overheating.

CHARACTERISTICS

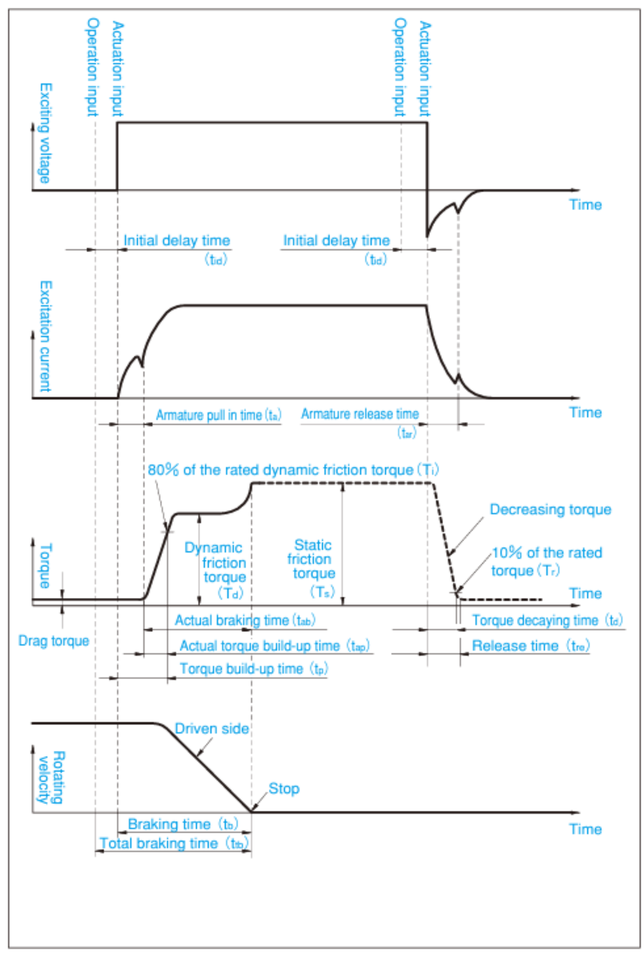
1. Characteristics on Torque by Current

- The following figure shows the transient phenomena of torque and current when the clutch and brake is connected (braking) and released. It is generally called operating characteristics. When applying a voltage through the clutch and brake, the current increases according to the time constant that is determined by the coil. When the current reaches a certain value, the armature is suctioned and the friction torque is generated. The frictional torque increases as the current increases, and reaches the rated value. As well as when releasing the clutch and brake, the armature starts separation by the releasing action of the plate spring as the current decreases, and torque fades away.

Clutch operating characteristics



Brake operating characteristics



T_a: Armature pull in time: Time from when the current is applied till when the armature is pulled in and torque is generated.

T_{ap}: Actual torque build-up time: Time from when torque is generated till when it becomes 80% of the rated torque.

T_p: Torque build-up time: Time from when the current is applied till when the torque becomes 80% of the rated torque.

T_d: Torque decaying time: Time from when the current is shut off till when the torque decreases to 10% of the rated torque.

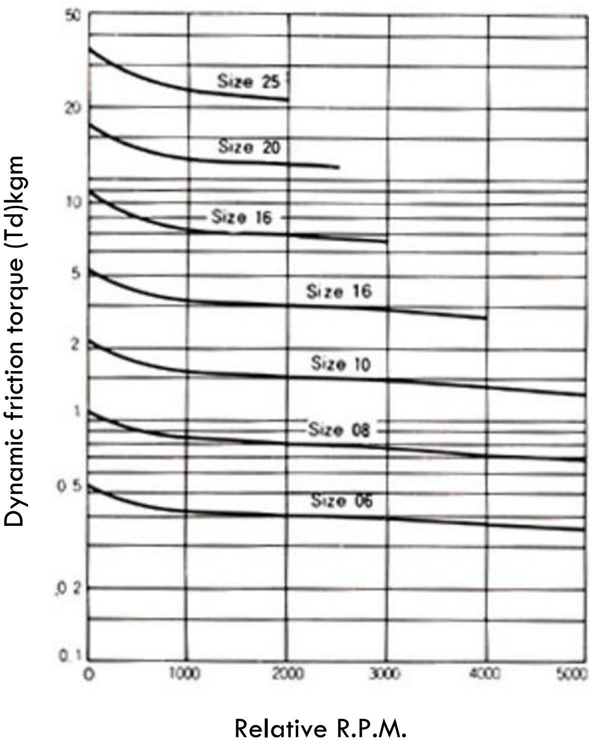
T_{id}: Initial delay time: Time from when the operation input is on by the clutch and brake till when the actuating input or releasing input is on for the clutch or brake body.

T_{ae}: Actual engaging time: Time from when torque is generated by clutch till when connection is completed.

T_{ab}: Actual braking time: Time from when torque is generated by brake till when braking is completed.

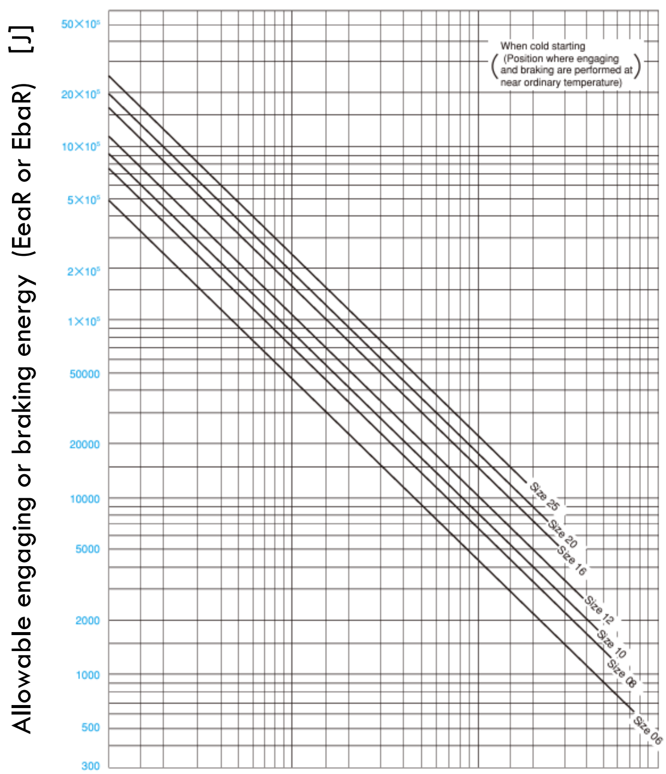
2. Dynamic friction torque characteristics

- The relationship between relative sliding velocity and dynamic friction torque is indicated in the below diagram. As indicated in the diagram, the difference between the static friction torque and the dynamic friction torque is small, which indicates that the effect in actual use becomes small.



3. Allowable engaging or braking energy

- When accelerating or decelerating a load by clutch and brake, heat is generated by sliding friction. The amount of heat changes according to the use condition. A clutch and brake works best if the heat can be dissipated. However, if the core temperature exceeds the operational temperature limit, this may cause an operation trouble or damage. As stated above, the limit of frictional load by heat is called allowable work. The tolerance is specified for each size. Heat dissipation depends on the mounting condition, rpm's and environment. When accelerating or decelerating a large load, heat generation of the friction surface is greatly increased due to the intensive slippage. The friction material or armature could be damaged by single connection.
- Despite its operation frequency, if the work volume is large, apply the value much below the indicated value. For the standard size, apply below the limit line of the following diagram.



4. Total amount of energy before air gap readjustment (Et,kgm)

SIZE	05	06	08	10	12	18	20
Et	$9X10^5$	$35X10^5$	$60X10^5$	$130X10^5$	$250X10^5$	$470X10^5$	$10X10^7$

SELECTION

1. Points for selection

Due to the high controllability, clutches and brakes are used not only for on-off control but also complex operation. If the size is determined simply by its torque, an unexpected trouble may occur. When selecting the size, a careful examination from several points of view such as load characteristic or layout of the mechanism where the clutch and brake is assembled is required. This section describes the situational selection methods, calculation examples and required information.

- **Motor and clutch & brake**

1) Relationship between motor output and torque

Motor HP is indicated by output, but it is indicated by torque in clutches and brakes.The following relationship is formed between the torque and motor output.

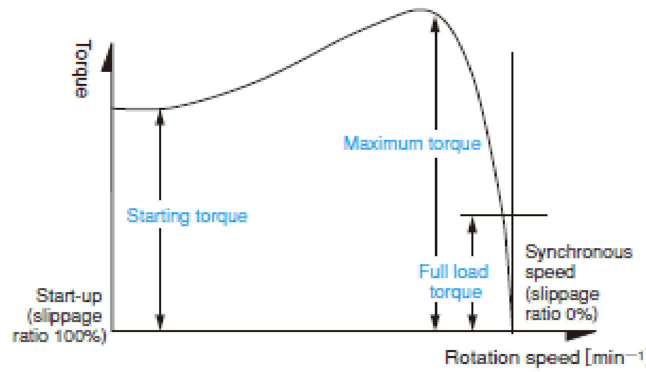
$$T_M = \frac{9550 \cdot P}{n_r} \eta \ [N \cdot m] \quad \cdots\cdots ①$$

P: Motor HP ［kW］
nr: RPM of the clutch and brake shaft ［min^{-1}］
η: Transmission efficiency from the motor to clutch and brake

2) **Difference of characteristic**

Motor and clutch & brake have different torque characteristics.
Therefore, if a motor is used as a drive source and the start-and-stop control of load is performed by a clutch and brake, the selection must be done in consideration of respective characteristics.

A) Motor characteristics
A motor can generate over 200% of the full-load torque at start-up. After passing through the maximum torque while accelerating, it drives the load near the full-load torque until stable operation can be obtained. When the load increases while running the motor RPM will be reduced, the motor momentum will continue to drive the load and the motor will generate additional torque. The following diagram indicates the relationship between motor torque and rotating velocity characteristic.

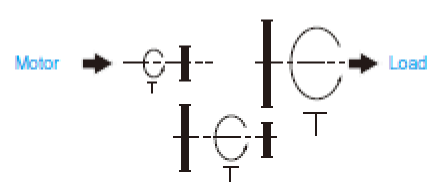


B) Clutch and brake characteristics
As described in the section of torque characteristics, the upper limit of coupling and braking torque is determined, and if more of the load torque is applied, it slips on the friction surface. An appropriate selection can be performed by confirming the difference of characteristic in advance. For a wide range of application, a clutch and brake with a torque value of 200~250% of the full load torque of the motor is recommended.

- **Relationship between torque and RPM**

1) Difference of characteristic

The shaft in the machine with a high RPM can be rotated by a small force, but the decelerated low-speed shaft needs a large force to rotate. That is, torque is inverse proportion to RPM. This is very important in selecting a clutch and brake. The size or operating life changes depending on the RPM of the shaft.



2) Combination with a speed changer

Like a non-stage speed changer, when a clutch and brake is used in the mechanism that can change the RPM, the torque requirement during low speed and the responsiveness and operating life requirement during high speed must be considered in advance.

- **Understanding of load characteristics**

The coupling time or wear life of clutch and brake varies depending on the coupling and braking load characteristics. Therefore, to understand the load characteristics is important to maintain a consistent operation. However, the load characteristics vary in definition and a complete understanding is difficult. As it is now, the size is often determined from an experimental point of view.

1) Importance of safety factor

When the size of clutch and brake is determined, the required torque is evaluated by multiplying the factor empirically. If the driving part is already set, use the factor K empirically depending on the motor to be used. When the factor is too small, it could cause trouble such as slippage when worsening of the condition.
Conversely, if the factor is too big, the motor load increases. An excessive load may lead to motor problems.

	Motor/ Turbine	Gasoline engine	Diesel engine (1~2 cylinder gasoline engine)
K	2~2.5	2.5~2.8	2.8~3.4

2) Load torque and moment of inertia

In load torque, there are resistance forces in machine and resistance forces added after coupling (such as cutting resistance). Since load torque is difficult to evaluate the size selection is sometimes calculated incorrectly, this may cause torque insufficiency in the case of clutch. The selection must be done with due caution. Moment of inertia is also called flywheel effect, which indicates the amount of power required to stop or start a rotating object. Overload of clutch and brake can be prevented by reducing the load on the clutch as much as possible. In the design phase apply a measurably larger load for brake. In addition this will minimize the inertia moment and improve responsiveness and operating life. Be sure include the inertia of clutch and brake in your inertia calculations.

2. Simplified selection graph

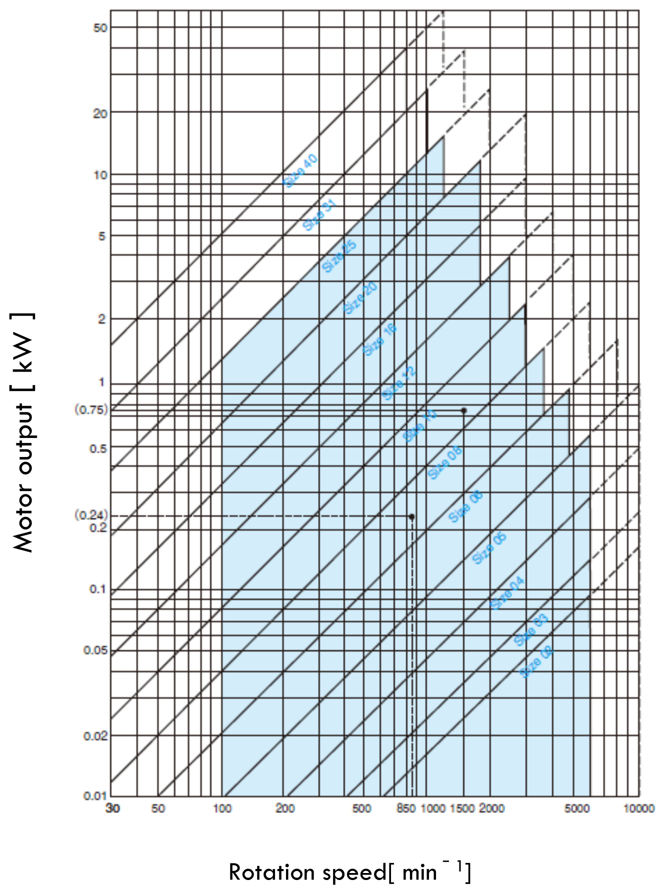
This selection graph is applied to a relatively light load and low frequency and when a motor is used as a drive source. The size of clutch and brake can be determined by a simplified way if the motor to be used is set appropriately to the load condition, and when there is no complicated mechanism or large inertial system to help the drive between the motor and clutch and brake. The safety factor K is 2.5 in this graph.
If other factors are required, use the value evaluated by multiplying the motor output by K/2.5 as kW of the vertical axis.

[Selection Example]

- When the motor output is 0.75 kW and the clutch and brake rotating velocity is 1500min^{-1}, select the size 10 where the ntersecting point is.
- When the motor output is 0.4kW, the clutch and brake rotating velocity is 850min^{-1}, and the safety factor is 1.5,

$$0.4\ [kW] \times \frac{1.5}{2.5} = 0.24\ [kW]$$

evaluate the value as below. The point at intersection of 0.24kw of the vertical axis and 850min-1 is in the range of the size 08.



* Perform the selection within the 'BLUE' range. If the intersecting point is in the dashed line, the amount of work, heat dissipation or wear could become below the specified level.
For the heavy-line frame of below 100min-1, confirm the required torque by the formula.
* For the size 31 and 40, contact us for further information.

3. Study of torque

- **Full load torque of motor (T_M)**

The full load torque converted to the clutch and brake mounting shaft is;

$$T_M = \frac{9550 \cdot P}{n_r} \eta \ [N \cdot m] \quad \text{①}$$

P: Motor output [kW]
nr: Rotating velocity of the clutch and brake shaft [min^{-1}]
η: Transmission efficiency from the motor to clutch and brake

- **Load torque (T_ℓ)**

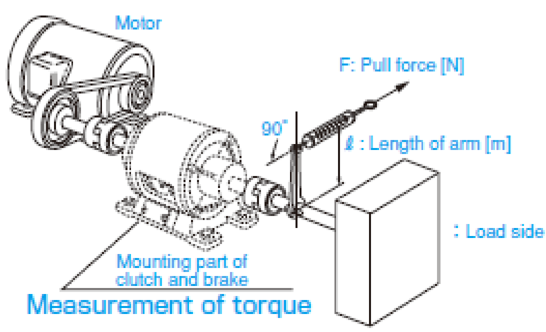
Load torque is difficult to evaluate by a formula. Therefore, the value is estimated empirically or evaluated by measuring directly.

1) Determine from the motor capacity
Assume that the motor is correctly selected for the load condition. Use the evaluated value TM of ① as its load torque.

$$T_\ell = T_M \ [N \cdot m] \quad \text{②}$$

2) In a case of direct measurement
A correct T_ℓ can be determined by actual measurement of load.
For the measurement, use a torque wrench or rotate the shaft
to mount the clutch and brake, and evaluate the product of F
(force when the load starts to rotate) and ℓ (length of the arm).

$$T_\ell = \ell \cdot F \ [N \cdot m] \quad \text{③}$$



Measurement of torque

3) Load torque sign
In the formula, the load torque is indicated by a plus-minus (+/-) sign. In a case of clutch, the load torque works on the direction of counteracting the rotation so that it is subtracted from the clutch torque T_d. In a case of brake, the load torque works on the direction of enhancing the braking so that it is added to the brake torque T_d. (It is relatively rare, but it may work the other way. In such a case, change the sign to calculate.) In the
formula, it is indicated as $\pm T_\ell$.

- **Acceleration/deceleration torque (Ta)**

1) The required torque to accelerate the load is;

$$T_a = \frac{J \cdot n_r}{9.55 t_{ae}} \ [N \cdot m] \quad \text{④}$$

t_{ae}: Actual coupling time of clutch (Acceleration time) [s]
J: Total amount of inertia moment engaged by clutch [kg・m^2]

2) The required torque to accelerate the load is;

$$T_a = \frac{J \cdot n_r}{9.55 t_{ab}} \ [N \cdot m] \quad \text{⑤}$$

t_{ab}: Actual braking time of clutch (Acceleration time) [s]
J: Total amount of inertia moment engaged by brake [kg・m^2]

- **Required torque (T)**

The required torque to drive (brake) the load by condition is as follows.
1) When engaged and when J and T_ℓ are applied together

$$T = (T_a \pm T_\ell) K \ [N \cdot m] \quad \text{⑥}$$

K is a factor by load condition. Refer to the table below and select the value empirically. In a case of clutch, the load torque works on the direction of counteracting the drive so that T_ℓ is plus (+). In a case of clutch, the load torque works on the direction of enhancing the braking so that T_ℓ is minus (-).
2) When engaged and when J and T_ℓ are applied together

$$T = T_\ell \cdot K \ [N \cdot m] \quad \text{⑦}$$

3) When J is mostly applied

$$T = T_a \cdot K \ [N \cdot m] \quad \text{⑧}$$

4) In a case of stational engagement

If the clutch is coupled during stationary state and the load is accelerated by a motor, the required torque to prevent a slip of lutch during acceleration is;

$$T=\left\{\frac{J_\ell}{J_d+J_\ell}(T_M-T_\ell)+T_\ell\right\}K\ [N\cdot m] \quad \text{⑨}$$

J_d: Total amount of J on the driving side from the clutch [kg・m^2]

J_ℓ: Total amount of J on the loading side from the clutch [kg・m^2]

Safety factor by load condition: K

Use condition		Factor K
Light load	Low-frequency use of a small inertial body	1.5
	High-frequency use of a relatively small inertial body	2~2.2
	General use of a standard inertial body	
	High-frequency use	2.2~2.4
Standard load	Low-frequency use of a small inertial body	2~2.4
	General use of a standard inertial body	2.4~2.6
	Drive a large inertial body	2.7~3.2
Heavy load	Operation that involved impact (Large load fluctuations)	3.5~4.5

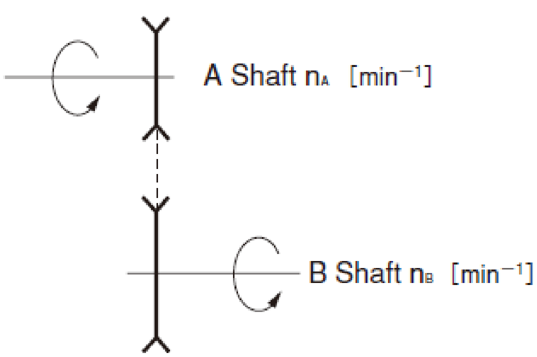
5) Conversion of torque to the other shaft

To convert the torque of B shaft to the A shaft

$$T_A=T_B\cdot\frac{n_B}{n_A}\ [N\cdot m] \quad \text{⑩}$$

T_A: Torque of A shaft, TB: torque of B shaft

n_A: Rotation speed of A shaft, n_B: Rotation speed of B shaft



3. Study of energy

- **Engaging or braking energy(E_e,E_b)**

The work volume of single coupling or braking by clutch and brake is;

1)During acceleration, the engaging energy E_e is;

$$E_e=\frac{J\cdot n_r^2}{182}\cdot\frac{T_d}{T_d-T_\ell}\ [J] \quad \text{⑪}$$

2) During deceleration, the braking enery E_b is;

$$E_b=\frac{J\cdot n_r^2}{182}\cdot\frac{T_d}{T_d+T_\ell}\ [J] \quad \text{⑫}$$

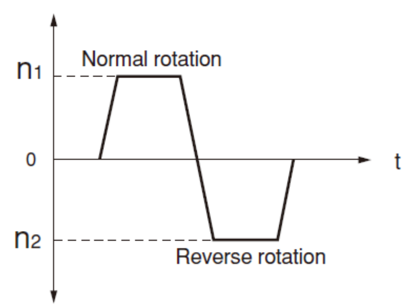
3) Normal/Reverse rotation

The clutch engaging energy when the rotational direction is switched by clutch is;

$$E_e=\frac{J}{182}\left\{(n_1^2+2\cdot n_1\cdot n_2)\frac{T_d}{T_d+T_\ell}+n_2^2\frac{T_d}{T_d-T_\ell}\right\}[J] \quad \text{⑬}$$

n_1: Normal rotation velocity [min^{-1}]

n_2: Reverse rotation velocity[min^{-1}]



4) Energy during slip

$$E_e=\frac{2\pi}{60}\cdot n\cdot t\cdot T_d\ [J] \quad \text{⑭}$$

$$E_b=\frac{2\pi}{60}\cdot n\cdot t\cdot T_d\ [J] \quad \text{⑮}$$

t : Slipping time [s]

n: Rotating velocity to slip min^{-1}]

T_d: Dynamic torque at n [min^{-1}][N・m]

When clutch and brake is used while slipping, an undesirable condition such as heat generation may occur.

5) Allowable energy

The allowable work E_{eal} and E_{bal} are the values under and ideal condition that the values of E_e and E_b must be sufficiently smaller than them.

$$E_e \ll E_{eal} \quad \text{......} ⑯$$

$$E_b \ll E_{bal} \quad \text{......} ⑰$$

* For the values of E_{eal} and E_{bal}, refer to the page of heat dissipation characteristics.

- **Energy rate**

A clutch and brake repeats an on-off operation with a high frequency that examination of capability of heat dissipation is important.

1) Engaging energy rate (P_e)

$$P_e = \frac{E_e \cdot S}{60} \ll P_{eal} \ [W] \quad \text{......} ⑱$$

2) Braking energy rate (P_b)

$$P_b = \frac{E_b \cdot S}{60} \ll P_{bal} \ [W] \quad \text{......} ⑲$$

S: Operation frequency [operations/min]

The allowable energy rate P_{eal} and P_{bal} are the values under an ideal condition. Therefore, determine Ee and Eb and S in order that they become sufficiently smaller than them.

* For the values of E_{eal} and E_{bal}, refer to the page of heat dissipation characteristics.

- **Engaging/braking frequency (S_a)**

The allowable operation frequency determined by heat dissipation Sa is;

$$S_a \ll \frac{60 P_{eal}}{E_e} \text{[operations/min]} \quad \text{......} ⑳$$

$$S_a \ll \frac{60 P_{bal}}{E_b} \text{[operations/min]} \quad \text{......} ㉑$$

This allowable frequency is determined only by heat dissipation. For actual use, consider the operating time also.

4. Study of operating time

- **Total engaging and total braking time (t_{te}, t_{tb})**

The engaging and braking time of load by clutch and brake is the sum of the clutch and brake operating time itself and the accelerating and decelerating time of load.

1) Total engaging time

$$t_{te} = t_{id} + t_a + t_{ae} \ [s] \quad \text{......} ㉒$$

t_{id}: Initial delay time
t_a: Armature pull in time [s]
t_{ae}: Clutch actual engaging time (Acceleration time)[s]

2) Total braking time

$$t_{tb} = t_{id} + t_a + t_{ab} \ [s] \quad \text{......} ㉓$$

t_{id}: Initial delay time
t_a: Armature pull in time [s]
t_{ab}: Brake actual braking time [s]
t_{ae} and t_{ab} are evaluated by the formulas below by the condition.

3) During acceleration/deceleration

Actual engaging time is;

$$t_{ae} = \frac{J \cdot n_r}{9.55\,(T_d - T_l)} \ [s] \quad \text{......} ㉔$$

Actual braking time is;

$$t_{ab} = \frac{J \cdot n_r}{9.55\,(T_d + T_l)} \ [s] \quad \text{......} ㉕$$

4) During normal rotation

The actual engaging time (acceleration time) when switched the normal rotation into reverse rotation is;

$$t_{ae} = \frac{J}{9.55} \left(\frac{n_1}{T_d - T_l} + \frac{n_2}{T_d + T_l} \right) \ [s] \quad \text{......} ㉖$$

n_1: Normal rotation velocity [min - $_1$]
n_2: Reverse rotation velocity [min - $_1$]

- **The coupling/braking time when the coupling/ braking is completed in the process of torque rise**

In this case, the coupling/braking time is the sum of the armature suction time t_a and t_{ae}' or ta and t_{ab}'.

1) Total coupling time

$$t_{te}=t_{id}+t_a+t_{ae}' \text{ [s]} \quad \cdots\cdots (27)$$

$$t_{ae}'=\sqrt{\frac{J\cdot n_r}{4.77}\cdot\frac{t_{ap}}{0.8\cdot T_d}} \text{ [s]} \quad \cdots\cdots (28)$$

2) Total braking time

$$t_{tb}=t_{id}+t_a+t_{ab}' \text{ [s]} \quad \cdots\cdots (29)$$

$$t_{ab}'=\sqrt{\frac{J\cdot n_r}{4.77}\cdot\frac{t_{ap}}{0.8\cdot T_d}} \text{ [s]} \quad \cdots\cdots (30)$$

They are applied in the case of $T\ell = 0$. Generally, the above formulas are used when the load torque ($T\ell$) is small in full measure. Besides, if the calculated value becomes $t_{ae}'>t_{ap}$, $t_{ab}'>t_{ap}$, apply the formula ㉒ ~ ㉖.

5. Study of maximum operation number

The available amount of energy of clutch and brake before air gap adjustment is determined. If more volume is required, the space adjustment is necessary.

The operable number before space adjustment is;

1) In a case of clutch

$$L_e=\frac{E_T}{E_e}\text{[operation]} \quad \cdots\cdots (31)$$

E_T: Total amount of energy before space readjustment [J]

2) In a case of brake

$$L_b=\frac{E_T}{E_b}\text{[operation]} \quad \cdots\cdots (32)$$

6. Study of stopping accuracy

To evaluate the stopping accuracy by a formula is difficult since the friction energy or control system variation is involved.

Generally, it is evaluated empirically by the formula below to use as a measure.

- **Stopping angle (θ)**

$$\theta=6n_r\left(t_{id}+t_p+\frac{1}{2}t_{ab}\right) \text{ [°]} \quad \cdots\cdots (33)$$

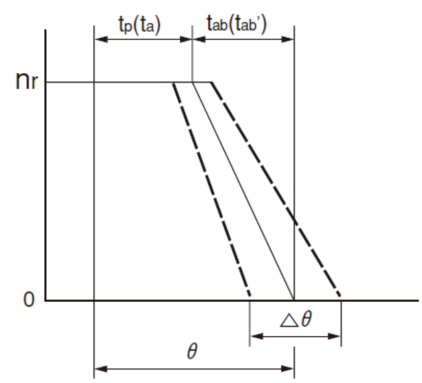
$$\text{OR } \theta=6n_r\left(t_{id}+t_a+\frac{2}{3}t_{ab}'\right) \text{ [°]} \quad \cdots\cdots (34)$$

- **Stopping accuracy ($\triangle\theta$)**

$$\triangle\theta=\pm0.15\theta \text{ [°]} \quad \cdots\cdots (35)$$

If there is a factor to disturb the braking effect such as load fluctuation, change the constant of the formula ㉟ to 0.2~ 0.25.

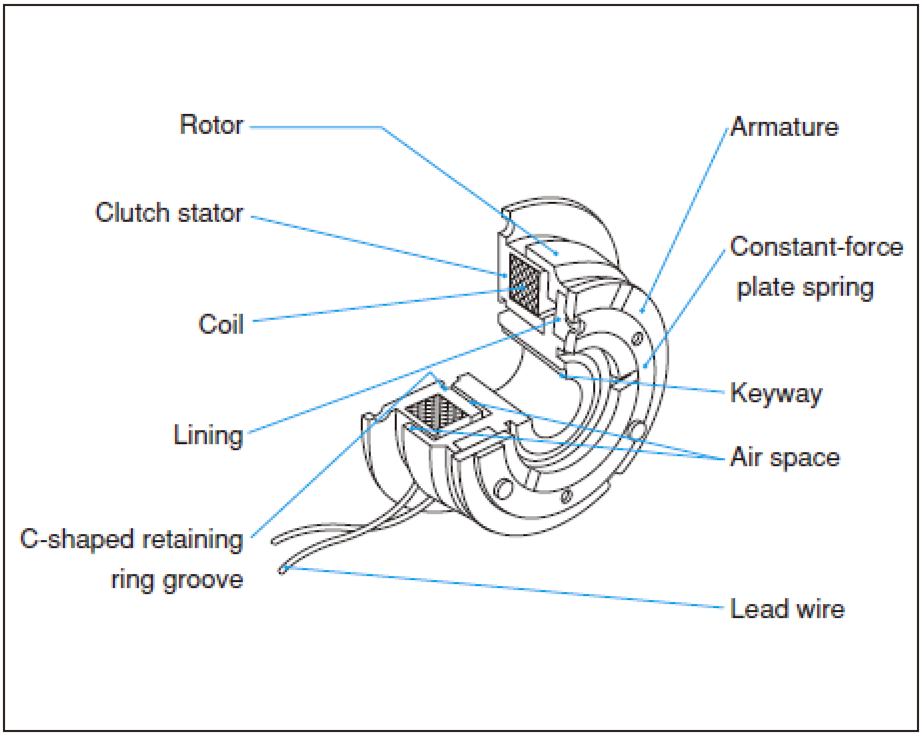
The system delay or variation caused by a backlash of chain or gear is not included in the stopping angle and accuracy.



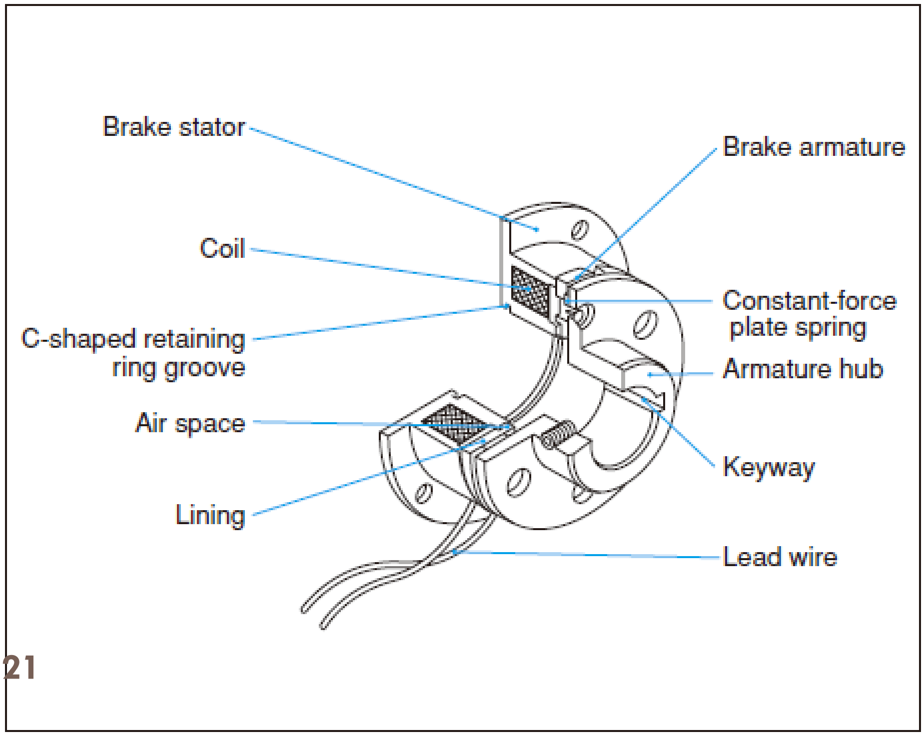
HS SERIES

BASIC STRUCTURE

HC-TYPE CLUTCH

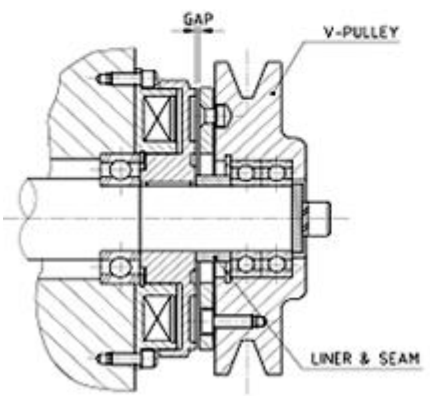


HBP-TYPE BRAKE

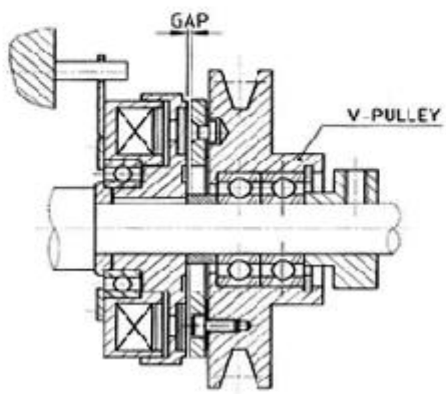


HS SERIES

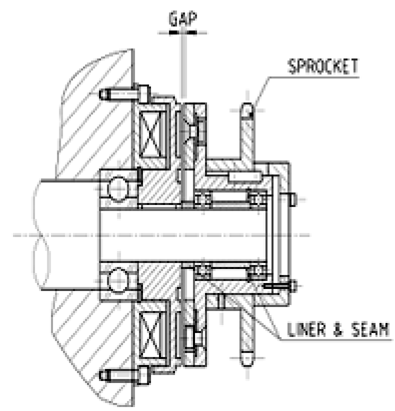
EXAMPLE ON INSTALLATION



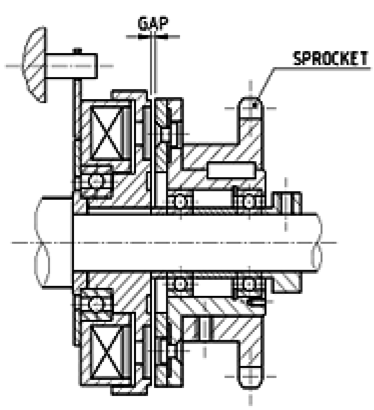
HC-Series: The clutch is mounted on wall, with a V-pulley fitted with an armature.



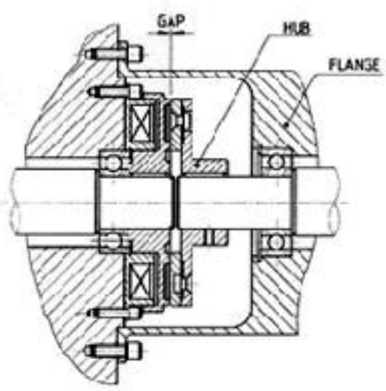
HCS-Series: The clutch is mounted on a through-shaft, with a V-pulley fitted with an armature.



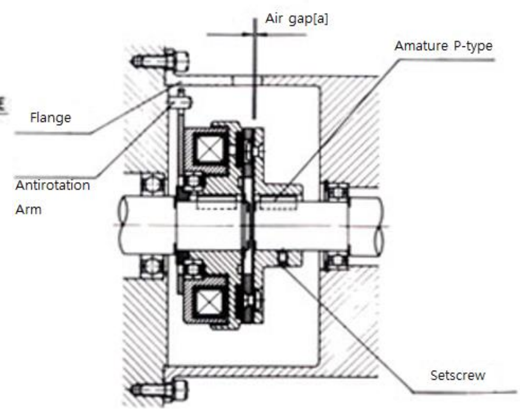
HCH-Series: The clutch is mounted on wall, with a sprocket fitted with an armature.



HCSH-Series: The clutch is mounted on a through-shaft, with a sprocket fitted with an armature.



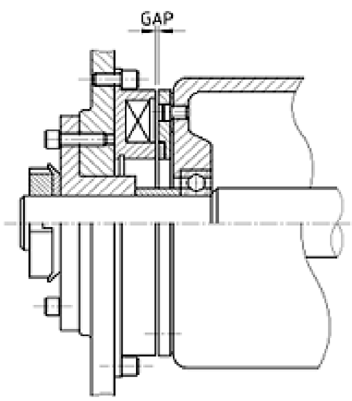
HCP-Series: The clutch is mounted on the split-shaft, and aligned with the flange-set up.



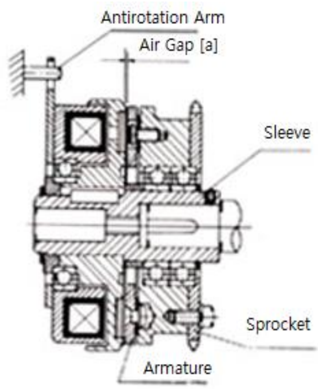
HCSP-Series: The clutch is mounted on the split-shaft, and aligned with the flange-set up.

HS SERIES

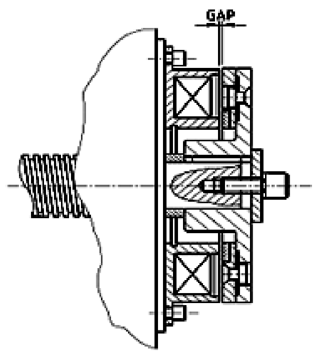
EXAMPLE ON INSTALLATION



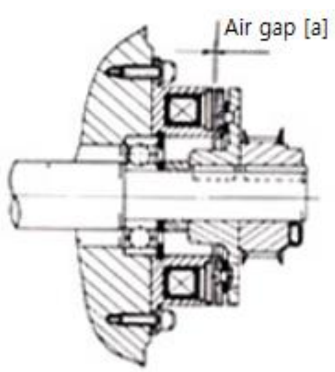
HB-Series: The brake is mounted with slight gap between roll and wall.



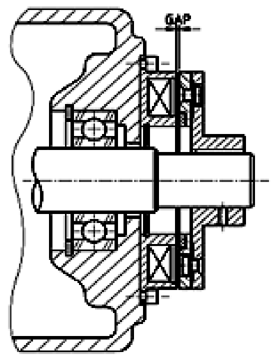
HCS-Series: The clutch is assembled with sprocket.



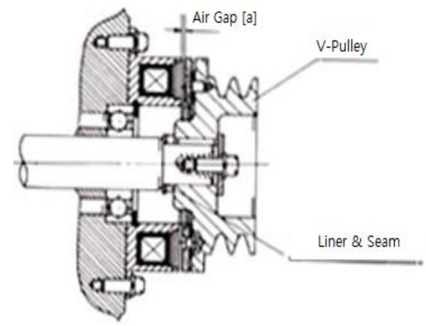
HBR-Series: The brake is mounted on upper thread and of vertical shaft.



HBR-Series: The brake is mounted on wall with timing pulley.



HBP-Series: The brake is mounted in shaft-end.



HB-Series: The brake is assembled with V-pulley.

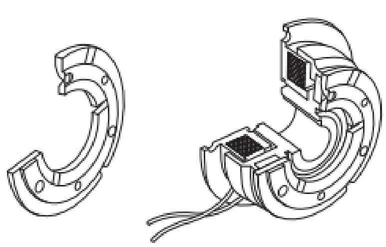
HS SERIES

HC TYPE CLUTCH- Flange-mounted

Stator and rotor are combined and directly mounted on stationary parts, such as frames, and fixed in place. These are short in the axial direction and can make effective use of space near windows. Select the armature according to the coupling type used (through-shaft, butt shaft, etc.).

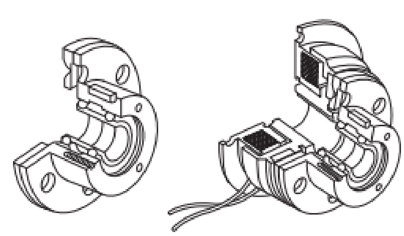
Configuration	Stator	Flange-mounted type
	Armature	HC type: for through-shaft or butt shaft
		HCH type: through-shaft(coupled by winding around parallel shaft) type
		HCP type: butt shaft
Torque	0.24~40kg. m	
Size	8 size	

Types for through-shaft or butt shaft



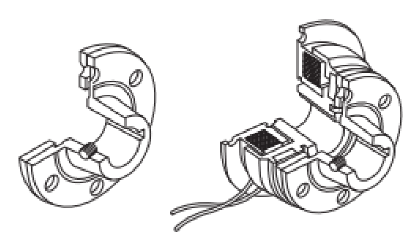
HC-TYPE

Through-shaft (coupled by winding around parallel shaft) type



HCH-TYPE

Butt shaft type



HCP-TYPE

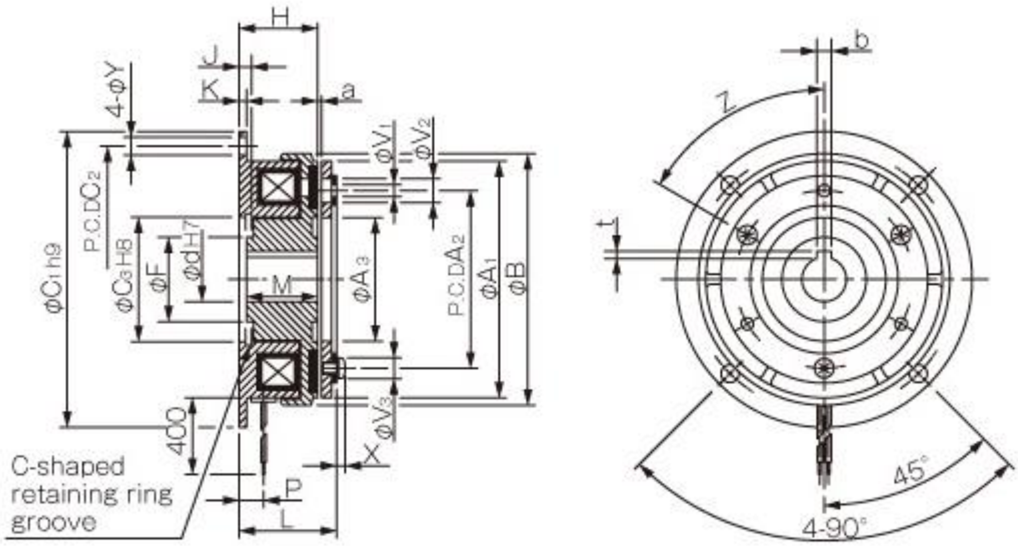
HC TYPE CLUTCH- Flange-mounted

- **Specifications**

Model	Size	Dynamic friction torque Td [N·m]	Static Friction torque Ts N・m]	Coil (at 20℃) Voltage V]	Coil (at 20℃) Capacity W]	Coil (at 20℃) Current A]	Coil (at 20℃) Resistance Ω]	Heat resistance class	Lead wire UL style	Lead wire Size	Max. rotation speed (min^{-1})	Rotating part moment of inertia J Rotor kg・m^2]	Rotating part moment of inertia J Armature kg・m^2]	Total work performed until readjustment of the air gap ET J]	Armature pull-in time ta s]	Torque build-up time tp s]	Torque decaying time td s]	Mass kg]
HC	06	5	5.5	24 DC	11	0.46	52	B	UL3398	AWG22	8000	7.35×10^{-5}	4.23×10^{-5}	36×10^{6}	0.020	0.041	0.020	0.46
HCH	06	5	5.5	24 DC	11	0.46	52	B	UL3398	AWG22	8000	7.35×10^{-5}	1.05×10^{-4}	36×10^{6}	0.020	0.041	0.020	0.66
HCP	06	5	5.5	24 DC	11	0.46	52	B	UL3398	AWG22	8000	7.35×10^{-5}	6.03×10^{-5}	36×10^{6}	0.020	0.041	0.020	0.5
HC	08	10	11	24 DC	15	0.63	38	B	UL3398	AWG18	6000	2.24×10^{-4}	1.18×10^{-4}	60×10^{6}	0.023	0.051	0.030	0.83
HCH	08	10	11	24 DC	15	0.63	38	B	UL3398	AWG18	6000	2.24×10^{-4}	3.00×10^{-4}	60×10^{6}	0.023	0.051	0.030	1.19
HCP	08	10	11	24 DC	15	0.63	38	B	UL3398	AWG18	6000	2.24×10^{-4}	1.71×10^{-4}	60×10^{6}	0.023	0.051	0.030	0.91
HC	10	20	22	24 DC	20	0.83	29	B	UL3398	AWG18	5000	6.78×10^{-4}	4.78×10^{-4}	130×10^{6}	0.025	0.063	0.050	1.5
HCH	10	20	22	24 DC	20	0.83	29	B	UL3398	AWG18	5000	6.78×10^{-4}	9.45×10^{-4}	130×10^{6}	0.025	0.063	0.050	2.11
HCP	10	20	22	24 DC	20	0.83	29	B	UL3398	AWG18	5000	6.78×10^{-4}	6.63×10^{-4}	130×10^{6}	0.025	0.063	0.050	1.66
HC	12	40	45	24 DC	25	1.04	23	B	UL3398	AWG18	4000	2.14×10^{-3}	1.31×10^{-3}	250×10^{6}	0.040	0.115	0.065	2.76
HCH	12	40	45	24 DC	25	1.04	23	B	UL3398	AWG18	4000	2.14×10^{-3}	2.75×10^{-3}	250×10^{6}	0.040	0.115	0.065	3.8
HCP	12	40	45	24 DC	25	1.04	23	B	UL3398	AWG18	4000	2.14×10^{-3}	1.81×10^{-3}	250×10^{6}	0.040	0.115	0.065	3.05
HC	16	80	90	24 DC	35	1.46	16	B	UL3398	AWG18	3000	6.30×10^{-3}	4.80×10^{-3}	470×10^{6}	0.050	0.160	0.085	5.1
HCH	16	80	90	24 DC	35	1.46	16	B	UL3398	AWG18	3000	6.30×10^{-3}	9.05×10^{-3}	470×10^{6}	0.050	0.160	0.085	6.9
HCP	16	80	90	24 DC	35	1.46	16	B	UL3398	AWG18	3000	6.30×10^{-3}	6.35×10^{-3}	470×10^{6}	0.050	0.160	0.085	5.4
HC	20	160	175	24 DC	45	1.88	13	B	UL3398	AWG16	2500	1.93×10^{-2}	1.37×10^{-2}	10×10^{8}	0.090	0.250	0.130	9.3
HCH	20	160	175	24 DC	45	1.88	13	B	UL3398	AWG16	2500	1.93×10^{-2}	2.65×10^{-2}	10×10^{8}	0.090	0.250	0.130	13
HCP	20	160	175	24 DC	45	1.88	13	B	UL3398	AWG16	2500	1.93×10^{-2}	1.90×10^{-2}	10×10^{8}	0.090	0.250	0.130	10.5
HC	25	320	350	24 DC	60	2.5	9.6	B	UL3398	AWG16	2000	4.48×10^{-2}	3.58×10^{-2}	20×10^{8}	0.115	0.335	0.210	17
HCH	25	320	350	24 DC	60	2.5	9.6	B	UL3398	AWG16	2000	4.48×10^{-2}	7.45×10^{-2}	20×10^{8}	0.115	0.335	0.210	23.6
HCP	25	320	350	24 DC	60	2.5	9.6	B	UL3398	AWG16	2000	4.48×10^{-2}	4.83×10^{-2}	20×10^{8}	0.115	0.335	0.210	18.7

HC SERIES: Flange-mounted

HC-□□ : for direct mounting



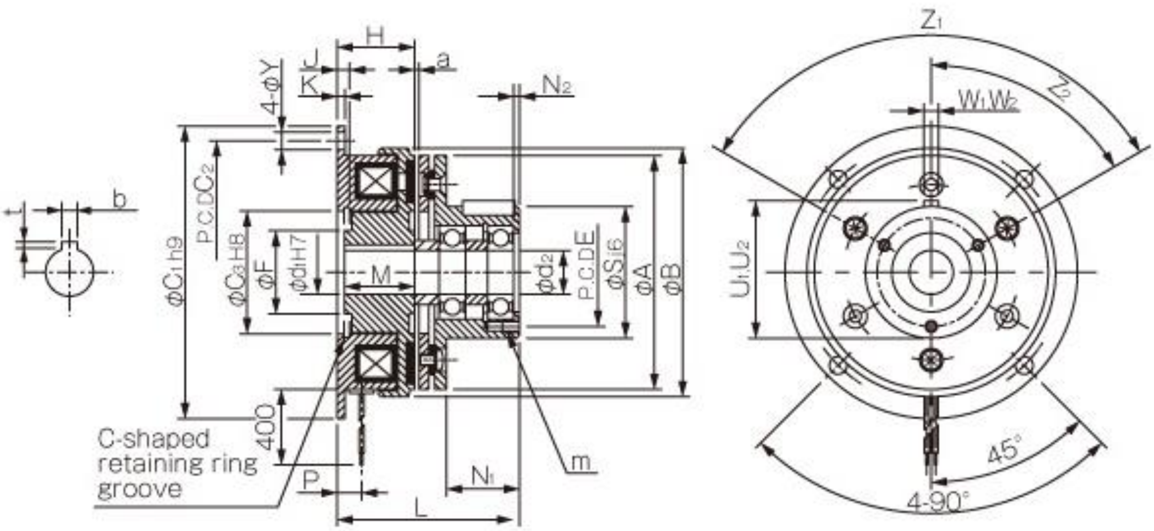
Unit [mm]

Size	Radial direction dimensions													Axial direction dimensions							
	A1	A2	A3	B	C1	C2	C3	F	V1	V2	V3	Y	Z	H	J	K	L	M	P	X	a
06	63	46	34.5	67.5	80	72	35	23	3-3.1	3-6.3	3-5.5	5	6-60°	24	3.5	2.1	28	22	7.3	2.5	$0.2^{\pm 0.05}$
08	80	60	41.7	85	100	90	42	28.5	3-4.1	3-8	3-7	6	6-60°	26.5	4.3	2.6	31	24	8.3	2.85	$0.2^{\pm 0.05}$
10	100	76	51.5	106	125	112	52	40	3-5.1	3-11	3-9	7	6-60°	30	5	3.1	36.1	27	9	3.3	$0.2^{\pm 0.05}$
12	125	95	61.5	133	150	137	62	45	3-6.1	3-12	3-11	7	6-60°	33.5	5.5	3.6	40.5	30	9.3	3.3	$0.3^{+0.05}_{-0.1}$
16	160	120	79.5	169	190	175	80	62	3-8.2	3-15	3-14	9.5	6-60°	37.5	6	4.1	46.5	34	11.7	3.5	$0.3^{+0.05}_{-0.1}$
20	200	158	99.5	212.3	230	215	100	77	3-10.2	3-18	3-16.2	9.5	6-60°	44	7	5.1	55.4	40	13.4	4.9	$0.5^{0}_{-0.2}$
25	250	210	124.5	264	290	270	125	100	4-12.2	4-22	4-20	11.5	8-45°	51	8	6.1	63.9	47	16	5.5	$0.5^{0}_{-0.2}$

Size	Shaft bore dimensions				
	dH7	Models compliant with JIS standards		Models compliant with the old JIS standards	
		bP9	t	bE9	t
06	12	$4^{-0.012}_{-0.042}$	$1.5^{+0.5}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
08	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
10	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
12	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
16	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
	40	$12^{-0.018}_{-0.061}$	$3^{+0.5}_{0}$	$10^{+0.061}_{+0.025}$	$3.5^{+0.5}_{0}$
20	40	$12^{-0.018}_{-0.061}$	$3^{+0.5}_{0}$	$10^{+0.061}_{+0.025}$	$3.5^{+0.5}_{0}$
	50	$14^{-0.018}_{-0.061}$	$3.5^{+0.5}_{0}$	$12^{+0.075}_{+0.032}$	$3.5^{+0.5}_{0}$
25	50	$14^{-0.018}_{-0.061}$	$3.5^{+0.5}_{0}$	$12^{+0.075}_{+0.032}$	$3.5^{+0.5}_{0}$
	60	$18^{-0.018}_{-0.061}$	$4^{+0.5}_{0}$	$15^{+0.075}_{+0.032}$	$5^{+0.5}$

HC TYPE CLUTCH- Flange-mounted

HCH-□□ : for through-shafts



Unit [mm]

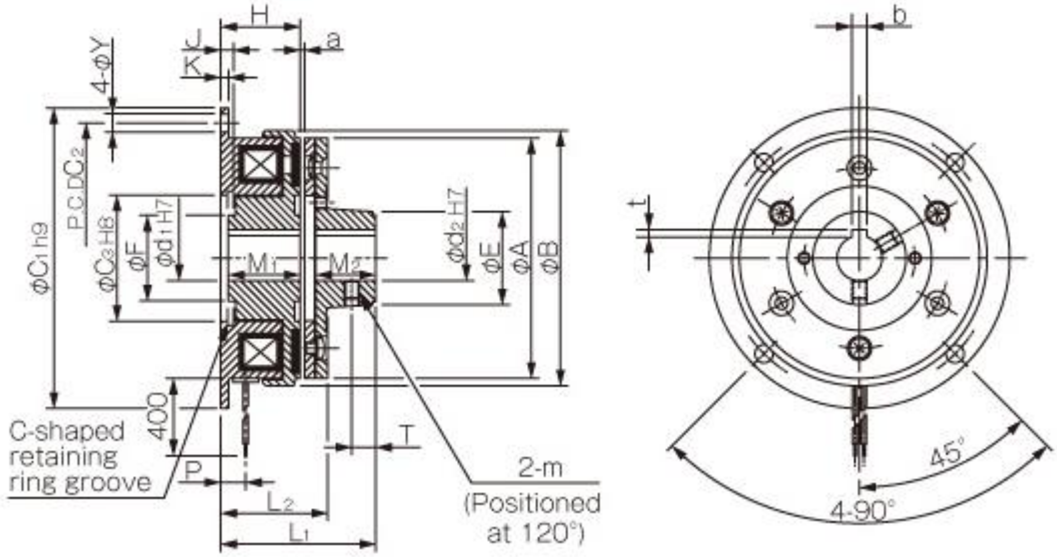
Size	Radial direction dimensions											Axial direction dimensions													
	A	B	C1	C2	C3	E	F	Y	S	Z1	Z2	H	J	K	L	M	N1	N2	P	U1	W1	U2	W2	a	m
06	63	67.5	80	72	35	33	23	5	38	3-120°	60°	24	3.5	2	51.5	22	20	2	7.3	39.5	4	39.5	4	0.2±0.05	3-M4×0.7, length: 4
08	80	85	100	90	42	37	28.5	6	45	3-120°	60°	26.5	4.3	2.5	60	24	25	2	8.3	47	5	47	5	0.2±0.05	3-M4×0.7, length: 6
10	100	106	125	112	52	47	40	7	55	4-90°	45°	30	5	3	71	27	30	3	9	57	5	57.5	6	0.2±0.05	4-M4×0.7, length: 8
12	125	133	150	137	62	52	45	7	64	4-90°	45°	33.5	5.5	3.5	86.5	30	40	2	9.3	67	7	67	8	$0.3^{+0.05}_{-0.1}$	4-M4×0.7, length: 8
16	160	169	190	175	80	62	62	9.5	75	6-60°	30°	37.5	6	4	103.5	34	50	3	11.7	78	7	78	8	$0.3^{+0.05}_{-0.1}$	6-M5×0.8, length: 8
20	200	212.3	230	215	100	74.5	77	9.5	90	4-90°	45°	44	7	5	124.5	40	60	5	13.4	93.5	10	93	10	$0.5^{0}_{-0.2}$	4-M6×1, length: 12
25	250	264	290	270	125	101.5	100	11.5	115	8-45°	22.5°	51	8	6	145	47	70	6	16	118.5	12	118	12	$0.5^{0}_{-0.2}$	8-M6×1, length: 12

Unit [mm]

Size	Shaft bore dimensions					
	d1H7	d2	Models compliant with JIS standards		Models compliant with the old JIS standards	
			bP9	t	bE9	t
06	12	12	$4^{-0.012}_{-0.042}$	$1.5^{+0.5}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
08	15	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
10	20	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
12	25	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
16	30	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
20	40	40	$12^{-0.018}_{-0.061}$	$3^{+0.5}_{0}$	$10^{+0.061}_{+0.025}$	$3.5^{+0.5}_{0}$
25	50	50	$14^{-0.018}_{-0.061}$	$3.5^{+0.5}_{0}$	$12^{+0.075}_{+0.032}$	$3.5^{+0.5}$

HC TYPE CLUTCH- Flange-mounted

HCP-□□: for butt shafts



Unit [mm]

Size	Radial direction dimensions											Axial direction dimensions						
	A	B	C1	C2	C3	E	F	Y	m	H	J	K	L1	L2	M1	M2	P	T	a
06	63	67.5	80	72	35	26	23	5	M4	24	3.5	2.5	43	31.5	22	15	7.3	6	0.2 ± 0.05
08	80	85	100	90	42	31	28.5	6	M5	26.5	4.3	3	51	35	24	20	8.3	8	0.2 ± 0.05
10	100	106	125	112	52	41	40	7	M5	30	5	2	61	41	27	25	9	10	0.2 ± 0.05
12	125	133	150	137	62	49	45	7	M6	33.5	5.5	3.5	70.5	46.5	30	30	9.3	12	$0.3^{+0.05}_{-0.1}$
16	160	169	190	175	80	65	62	9.5	M8	37.5	6	4	84.5	53.5	34	38	11.7	15	$0.3^{+0.05}_{-0.1}$
20	200	212.5	230	215	100	83	77	9.5	M8	44	7	5	100.5	64.5	40	45	13.4	18	$0.5^{0}_{-0.2}$
25	250	264	290	270	125	105	100	11.5	M10	51	8	6	118	75	47	54	16	22	$0.5^{0}_{-0.2}$

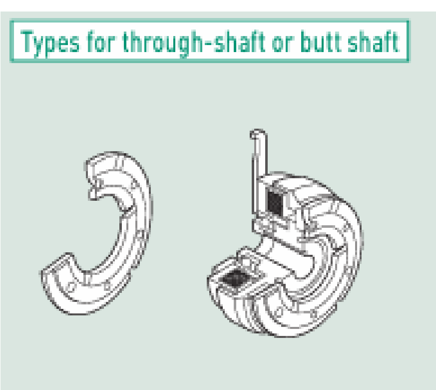
Size	Shaft bore dimensions					
	d1H7	d2H7	Models compliant with JIS standards		Models compliant with the old JIS standards	
			bP9	t	bE9	t
06	12	12	$4^{-0.012}_{-0.042}$	$1.5^{+0.5}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
	15	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
08	15	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
	20	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
10	20	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
	25	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
12	25	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
	30	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
16	30	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
	40	40	$12^{-0.018}_{-0.061}$	$3^{+0.5}_{0}$	$10^{+0.061}_{+0.025}$	$3.5^{+0.5}_{0}$
20	40	40	$12^{-0.018}_{-0.061}$	$3^{+0.5}_{0}$	$10^{+0.061}_{+0.025}$	$3.5^{+0.5}_{0}$
	50	50	$14^{-0.018}_{-0.061}$	$3.5^{+0.5}_{0}$	$12^{+0.075}_{+0.032}$	$3.5^{+0.5}_{0}$
25	50	50	$14^{-0.018}_{-0.061}$	$3.5^{+0.5}_{0}$	$12^{+0.075}_{+0.032}$	$3.5^{+0.5}_{0}$
	60	60	$18^{-0.018}_{-0.061}$	$4^{+0.5}_{0}$	$15^{+0.075}_{+0.032}$	$5^{+0.5}$

HS SERIES

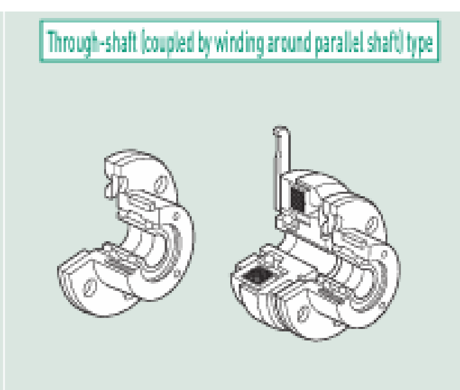
HC TYPE CLUTCH- Bearing-mounted

These integrate the stator and rotor, which are held to the stationary parts of the machine by a drive pin arm; the rotor is locked to the rotation shaft by a key. They are designed to be relatively easy to mount, reducing the processing work required for mounting.

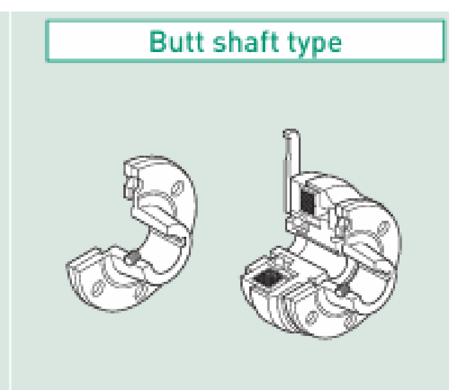
	Stator	Flange-mounted type
Configuration	Armature	HCS type: for through-shaft or butt shaft
		HCSH type: through-shaft(coupled by winding around parallel shaft) type
		HCSP type: butt shaft
Torque	0.5~8kg. m	
Size	5 size	



HCS-TYPE



HCSH-TYPE



HCSP-TYPE

HS SERIES

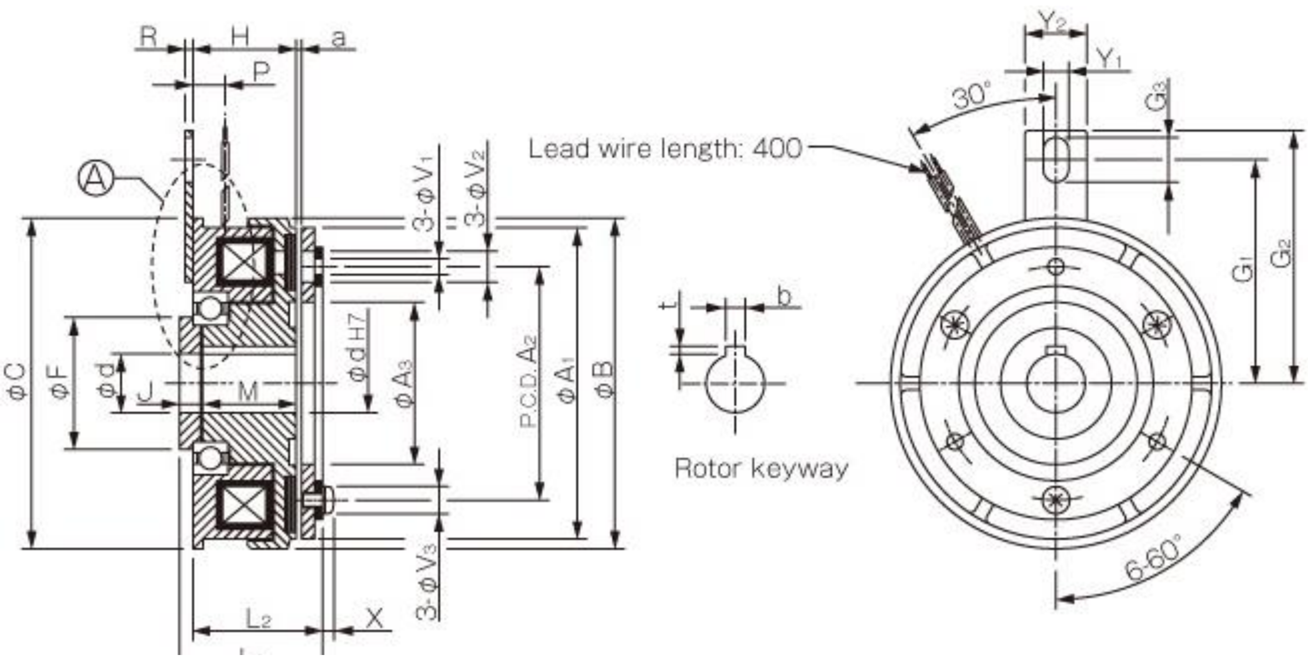
HC TYPE CLUTCH- Bearing-mounted

- **Specifications**

Model	Size	Dynamic friction torque Td [N・m]	Static friction torque Ts [N・m]	Coil (at 20℃)				Heat resistance class	Lead wire		Max. rotation speed [min^{-1}]	Rotating part moment of inertia J		Total work performed until readjustment of the air gap ET [J]	Armature pull-in time ta [s]	Torque build-up time tp [s]	Torque decaying time td [s]	Mass [kg]
				Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]		UL style	Size		Rotor [$kg \cdot m^2$]	Armature [$kg \cdot m^2$]					
HCS	06	5	5.5	DC 24	11	0.46	52	B	UL3398	AWG22	3000	7.35×10^{-5}	4.23×10^{-5}	36×10^{6}	0.020	0.041	0.020	0.50
HCSH	06	5	5.5	DC 24	11	0.46	52	B	UL3398	AWG22	3000	7.35×10^{-5}	1.05×10^{-4}	36×10^{6}	0.020	0.041	0.020	0.70
HCSP	06	5	5.5	DC 24	11	0.46	52	B	UL3398	AWG22	3000	7.35×10^{-5}	6.03×10^{-5}	36×10^{6}	0.020	0.041	0.020	0.54
HCS	08	10	11	DC 24	15	0.63	38	B	UL3398	AWG18	3000	2.24×10^{-4}	1.18×10^{-4}	60×10^{6}	0.023	0.051	0.030	0.87
HCSH	08	10	11	DC 24	15	0.63	38	B	UL3398	AWG18	3000	2.24×10^{-4}	3.00×10^{-4}	60×10^{6}	0.023	0.051	0.030	1.23
HCSP	08	10	11	DC 24	15	0.63	38	B	UL3398	AWG18	3000	2.24×10^{-4}	1.71×10^{-4}	60×10^{6}	0.023	0.051	0.030	0.95
HCS	10	20	22	DC 24	20	0.83	29	B	UL3398	AWG18	3000	6.78×10^{-4}	4.78×10^{-4}	130×10^{6}	0.025	0.063	0.050	1.57
HCSH	10	20	22	DC 24	20	0.83	29	B	UL3398	AWG18	3000	6.78×10^{-4}	9.45×10^{-4}	130×10^{6}	0.025	0.063	0.050	2.18
HCSP	10	20	22	DC 24	20	0.83	29	B	UL3398	AWG18	3000	6.78×10^{-4}	6.63×10^{-4}	130×10^{6}	0.025	0.063	0.050	1.73
HCS	12	40	45	DC 24	25	1.04	23	B	UL3398	AWG18	2000	2.14×10^{-3}	1.31×10^{-3}	250×10^{6}	0.040	0.115	0.065	2.89
HCSH	12	40	45	DC 24	25	1.04	23	B	UL3398	AWG18	2000	2.14×10^{-3}	2.75×10^{-3}	250×10^{6}	0.040	0.115	0.065	3.93
HCSP	12	40	45	DC 24	25	1.04	23	B	UL3398	AWG18	2000	2.14×10^{-3}	1.81×10^{-3}	250×10^{6}	0.040	0.115	0.065	3.18
HCS	16	80	90	DC 24	35	1.46	16	B	UL3398	AWG18	2000	6.30×10^{-3}	4.80×10^{-3}	470×10^{6}	0.050	0.160	0.085	5.3
HCSH	16	80	90	DC 24	35	1.46	16	B	UL3398	AWG18	2000	6.30×10^{-3}	9.05×10^{-3}	470×10^{6}	0.050	0.160	0.085	7.1
HCSP	16	80	90	DC 24	35	1.46	16	B	UL3398	AWG18	2000	6.30×10^{-3}	6.35×10^{-3}	470×10^{6}	0.050	0.160	0.085	5.6

HC TYPE CLUTCH- Bearing-mounted

HCS-□□: for butt shafts



Unit [mm]

Size	Radial direction dimensions														Axial direction dimensions								
	A1	A2	A3	B	C	F	G1	G2	G3	V1	V2	V3	Y1	Y2	H	L1	L2	M	J	P	R	X	a
06	64	46	34.5	67	63	24	42.5	50	9.5	3-3.1	3-6.3	3-5	4.5	14	24	31	28	22	5	7.5	2	2.5	0.2±0.05
08	84	60	41.7	85	80	34	57.5	65	10.5	3-4.1	3-8	3-7.1	5.5	16	26.5	34.8	31.3	24	6	8	3	2.85	0.2±0.05
10	101	76	51.5	106	100	40	62.5	70	11.5	3-5.1	3-10.5	3-9	6.5	16	30	39.5	36	27	6.5	9	3	3.3	0.2±0.05
12	126	95	61.5	133	125	46	77.5	85	11.5	3-6.1	3-12	3-10.5	6.5	16	33.5	44.8	40.8	30	7.5	9	3	3.3	$0.3^{+0.05}_{-0.1}$
16	161	120	79.5	169	160	58	100	112	18.5	3-8.1	3-15	3-13.5	8.5	25	37.5	51	47	34	7.5	11.5	3	3.5	$0.3^{+0.05}_{-0.1}$

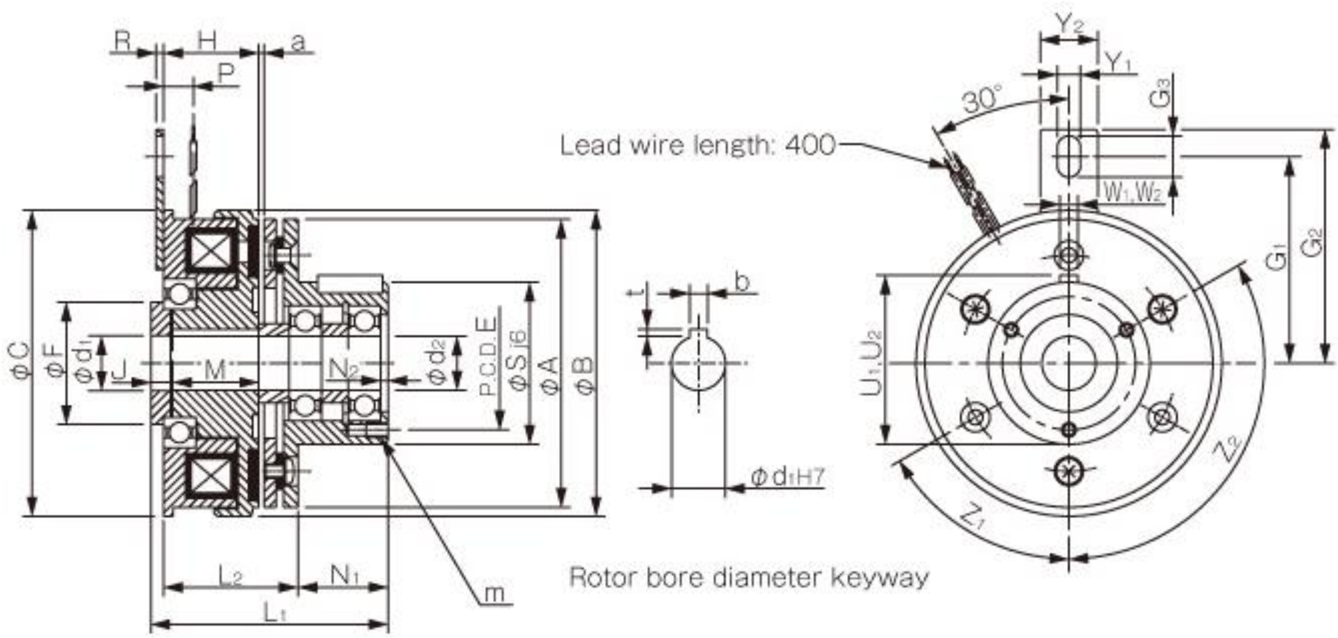
Unit [mm]

Size	Shaft bore dimensions				
	dH7	Models compliant with JIS standards		Models compliant with the old JIS standards	
		bP9	t	bE9	t
6	12	$4^{-0.012}_{-0.042}$	$1.5^{+0.5}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
8	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
10	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
12	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
16	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}$

HS SERIES

HC TYPE CLUTCH- Bearing-mounted

HCSH-□□ : for through-shafts



Unit [mm]

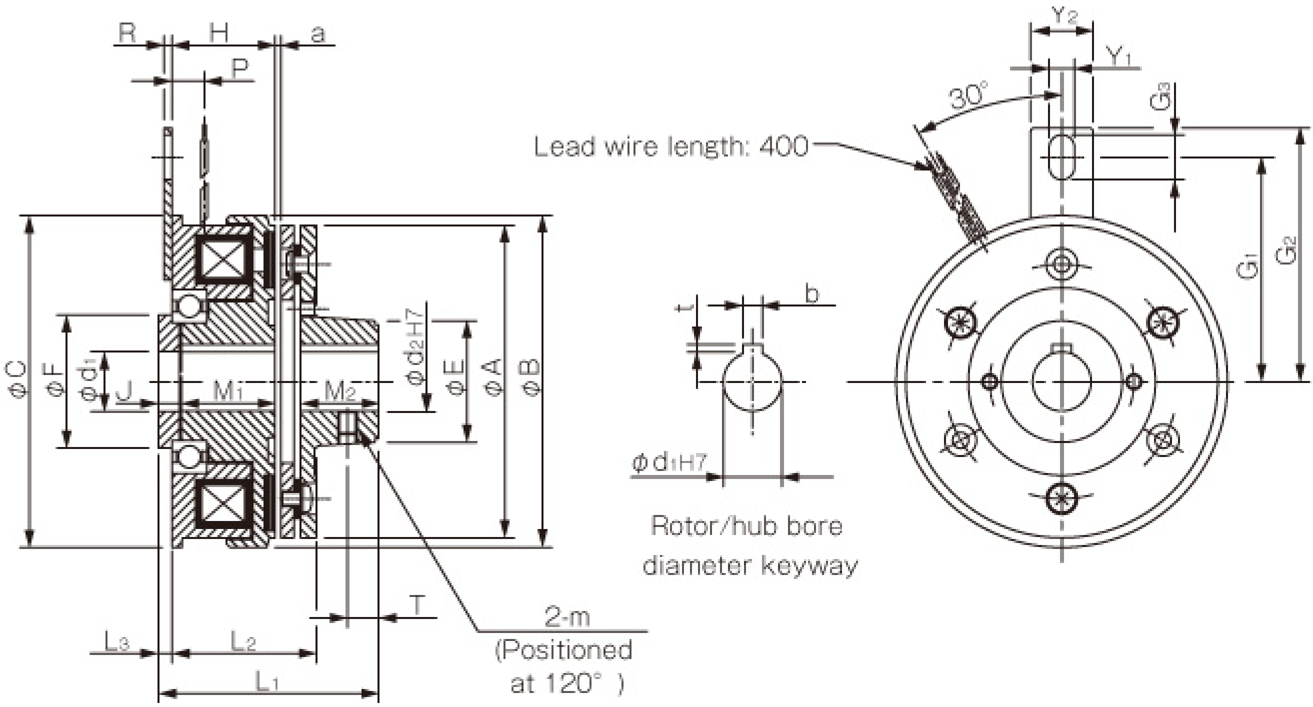
Size	Radial direction dimensions													Axial direction dimensions														
	A	B	C	E	F	G1	G2	G3	S	Y1	Y2	Z1	Z2	H	L1	L2	M	J	N1	N2	P	R	U1	W1	U2	W2	a	m
06	64	67	63	33	24	42.5	50	9.5	38	4.5	14	3-120°	60°	24	54.5	31.5	22	5	20	2	7.3	2	39.5	4	39.5	4	0.2±0.05	3-M4×0.7, lengh:4
08	81	85	80	37	34	57.5	65	10.5	45	5.5	16	3-120°	60°	26.5	64.5	35.8	24	6	25	2	8.3	2	47	5	47	5	0.2±0.05	3-M4×0.7, lengh:6
10	101	106	100	47	40	62.5	70	11.5	55	6.5	16	4-90°	45°	30	75.5	42	27	6.5	30	2	9	2	57	5	57	6	0.2±0.05	4-M4×0.7, lengh:8
12	126	133	125	52	46	77.5	85	11.5	64	6.5	16	4-90°	45°	33.5	90.8	46.8	30	7.5	40	2	9.3	2	67	7	67	8	$0.3^{+0.05}_{-0.1}$	4-M4×0.7, lengh:8
16	161	169	160	62	58	100	112	18.5	75	8.5	25	6-60°	30°	37.5	108.8	54.8	34	7.5	50	3	11.7	3.2	78	7	78	8	$0.3^{+0.05}_{-0.1}$	6-M5×0.8, lengh:8

Unit [mm]

Size	Shaft bore dimensions					
	d1H7	d2	Models compliant with JIS standards		Models compliant with the old JIS standards	
			bP9	t	bE9	t
6	12	12	$4^{-0.012}_{-0.042}$	$1.5^{+0.5}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
8	15	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
10	20	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
12	25	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
16	30	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}$

HC TYPE CLUTCH- Bearing-mounted

HCSP-☐☐ : for butt shafts



Unit [mm]

Size	Radial direction dimensions											Axial direction dimensions										
	A	B	C	E	F	G1	G2	G3	Y1	Y2	m	H	L1	L2	L3	M1	M2	J	P	R	T	a
06	64	67	63	26	24	42.5	50	9.5	4.5	14	M4	24	46	32	3	22	15	5	7.3	2	6	0.2±0.05
08	81	85	80	31	34	57.5	65	10.5	5.5	16	M5	26.5	54.8	35.3	3.5	24	20	6	8.3	3	8	0.2±0.05
10	101	106	100	41	40	62.5	70	11.5	6.5	16	M5	30	64.5	42	3.5	27	25	6.5	9	3	10	0.2±0.05
12	126	133	125	49	46	77.5	85	11.5	6.5	16	M6	33.5	73.8	46.8	4	30	30	7.5	9.3	3	12	$0.3^{+0.05}_{-0.1}$
16	161	169	160	65	58	100	112	18.5	8.5	25	M8	37.5	87.8	54.8	4	34	38	7.5	11.7	3	15	$0.3^{+0.05}$

Unit [mm]

Size	Shaft bore dimensions					
	d1H7	d2H7	Models compliant with JIS standards		Models compliant with the old JIS standards	
			bP9	t	bE9	t
6	12	12	$4^{-0.012}_{-0.042}$	$1.5^{+0.5}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
8	15	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
10	20	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
12	25	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
16	30	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}$

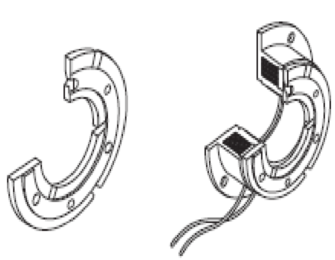
HS SERIES

HB BRAKE

Brakes are used to brake and hold rotating bodies. The flange of the stator is locked securely to a strong stationary part. Select an armature that factors in the mounting space available.

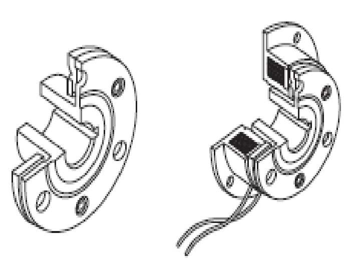
Configuration	Stator	Flange-mounted type
	Armature	HB type: direct-mounted
		HBR type: slim, space-saving
		HBP type: easy-to-use standard-shape
Torque	0.24~40kg. m	
Size	8 size	

Types with many applications



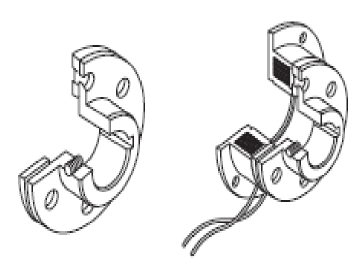
HB-TYPE

Slim, space-saving type



HBR-TYPE

Easy-to-use standard-shape type



HBP-TYPE

HS SERIES

HB BRAKE

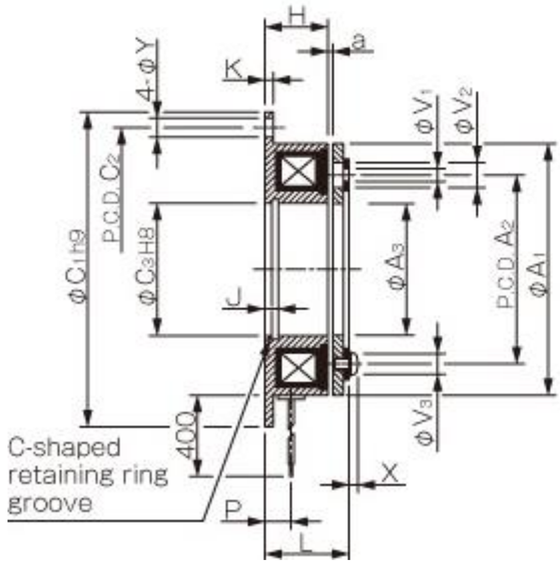
• Specifications

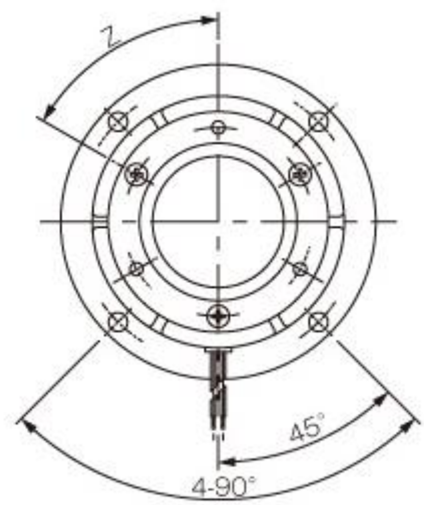
Model	Size	Dynamic friction torque Td [N・m]	Static friction torque Ts [N・m]	Coil (at 20℃)				Heat resistance class	Lead wire		Max. rotation speed [min^{-1}]	Armature Moment of inertia J [kg·m^2]	Total work performed until readjustment of the air gap ET [J]	Armature pull-in time ta [s]	Torque rise time tp [s]	Torque extinction time td [s]	Mass [kg]
				Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]		UL style	Size							
HB	06	5	5.5	DC24	11	0.46	52	B	UL3398	AWG22	8000	4.23×10^{-5}	36×10^{6}	0.015	0.033	0.015	0.28
HBR	06	5	5.5	DC24	11	0.46	52	B	UL3398	AWG22	8000	6.03×10^{-5}	36×10^{6}	0.015	0.033	0.015	0.32
HBP	06	5	5.5	DC24	11	0.46	52	B	UL3398	AWG22	8000	6.03×10^{-5}	36×10^{6}	0.015	0.033	0.015	0.32
HB	08	10	11	DC24	15	0.63	38	B	UL3398	AWG18	6000	1.18×10^{-4}	60×10^{6}	0.016	0.042	0.025	0.5
HBR	08	10	11	DC24	15	0.63	38	B	UL3398	AWG18	6000	1.71×10^{-4}	60×10^{6}	0.016	0.042	0.025	0.58
HBP	08	10	11	DC24	15	0.63	38	B	UL3398	AWG18	6000	1.71×10^{-4}	60×10^{6}	0.016	0.042	0.025	0.58
HB	10	20	22	DC24	20	0.83	29	B	UL3398	AWG18	5000	4.78×10^{-4}	130×10^{6}	0.018	0.056	0.030	0.91
HBR	10	20	22	DC24	20	0.83	29	B	UL3398	AWG18	5000	6.63×10^{-4}	130×10^{6}	0.018	0.056	0.030	1.07
HBP	10	20	22	DC24	20	0.83	29	B	UL3398	AWG18	5000	6.63×10^{-4}	130×10^{6}	0.018	0.056	0.030	1.07
HB	12	40	45	DC24	25	1.04	23	B	UL3398	AWG18	4000	1.31×10^{-3}	250×10^{6}	0.027	0.090	0.050	1.68
HBR	12	40	45	DC24	25	1.04	23	B	UL3398	AWG18	4000	1.81×10^{-3}	250×10^{6}	0.027	0.090	0.050	1.97
HBP	12	40	45	DC24	25	1.04	23	B	UL3398	AWG18	4000	1.81×10^{-3}	250×10^{6}	0.027	0.090	0.050	1.97
HB	16	80	90	DC24	35	1.46	16	B	UL3398	AWG18	3000	4.80×10^{-3}	470×10^{6}	0.035	0.127	0.055	3.15
HBR	16	80	90	DC24	35	1.46	16	B	UL3398	AWG18	3000	6.35×10^{-3}	470×10^{6}	0.035	0.127	0.055	3.45
HBP	16	80	90	DC24	35	1.46	16	B	UL3398	AWG18	3000	6.35×10^{-3}	470×10^{6}	0.035	0.127	0.055	3.45
HB	20	160	175	DC24	45	1.88	13	B	UL3398	AWG16	2500	1.37×10^{-2}	10×10^{8}	0.065	0.200	0.070	5.9
HBR	20	160	175	DC24	45	1.88	13	B	UL3398	AWG16	2500	1.90×10^{-2}	10×10^{8}	0.065	0.200	0.070	7.1
HBP	20	160	175	DC24	45	1.88	13	B	UL3398	AWG16	2500	1.90×10^{-2}	10×10^{8}	0.065	0.200	0.070	7.1
HB	25	320	350	DC24	60	2.5	9.6	B	UL3398	AWG16	2000	3.58×10^{-2}	20×10^{8}	0.085	0.275	0.125	10.5
HBR	25	320	350	DC24	60	2.5	9.6	B	UL3398	AWG16	2000	4.83×10^{-2}	20×10^{8}	0.085	0.275	0.125	12.2
HBP	25	320	350	DC24	60	2.5	9.6	B	UL3398	AWG16	2000	4.83×10^{-2}	20×10^{8}	0.085	0.275	0.125	12.2

HS SERIES

HB BRAKE

HB-□□ : direct-mounted



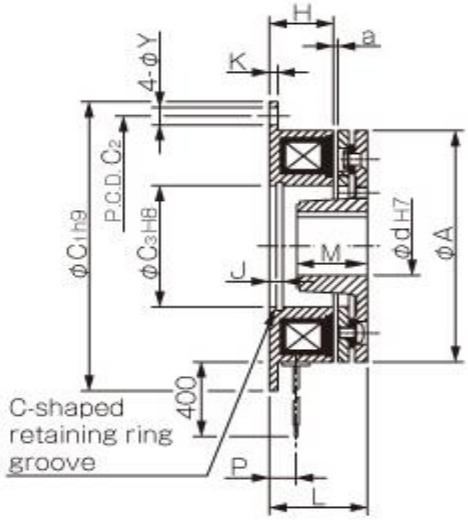


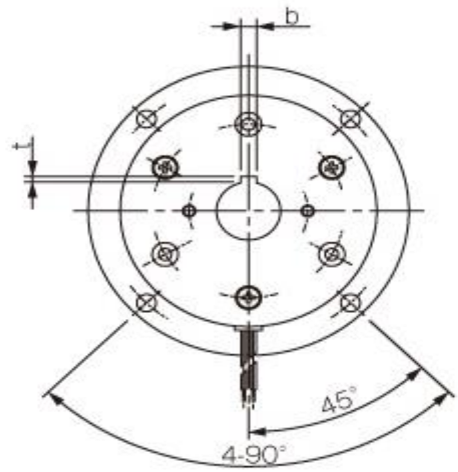
Unit [mm]

Size	Radial direction dimensions											Axial direction dimensions							
	A1	A2	A3	C1	C2	C3	V1	V2	V3	Y	Z	H	J	K	L	P	X	a
06	63	46	34.5	80	72	35	3-3.1	3-6.3	3-5.5	5	6-60°	18	3.5	2.1	22	7.3	2.5	0.2±0.05
08	80	60	41.5	100	90	42	3-4.1	3-8	3-7	6	6-60°	20	4.3	2.6	24.5	8.3	2.85	0.2±0.05
10	100	76	51.5	125	112	52	3-5.1	3-11	3-9	7	6-60°	22	5	3.1	28.1	9	3.3	0.2±0.05
12	125	95	61.5	150	137	62	3-6.1	3-12	3-11	7	6-60°	24	5.5	3.6	31	9.3	3.3	$0.3^{+0.05}_{-0.1}$
16	160	120	79.5	190	175	80	3-8.2	3-15	3-14	9.5	6-60°	26	6	4.1	35	11.7	3.5	$0.3^{+0.05}_{-0.1}$
20	200	158	99.5	230	215	100	3-10.2	3-18	3-16.2	9.5	6-60°	30	7	5.1	41.4	13.4	4.9	$0.5^{0}_{-0.2}$
25	250	210	124.5	290	270	125	4-12.2	4-22	4-20	11.5	8-45°	35	8	6.1	47.9	16	5.5	$0.5^{0}_{-0.2}$

HB BRAKE

HBR-□□ : slim, space-saving





Unit [mm]

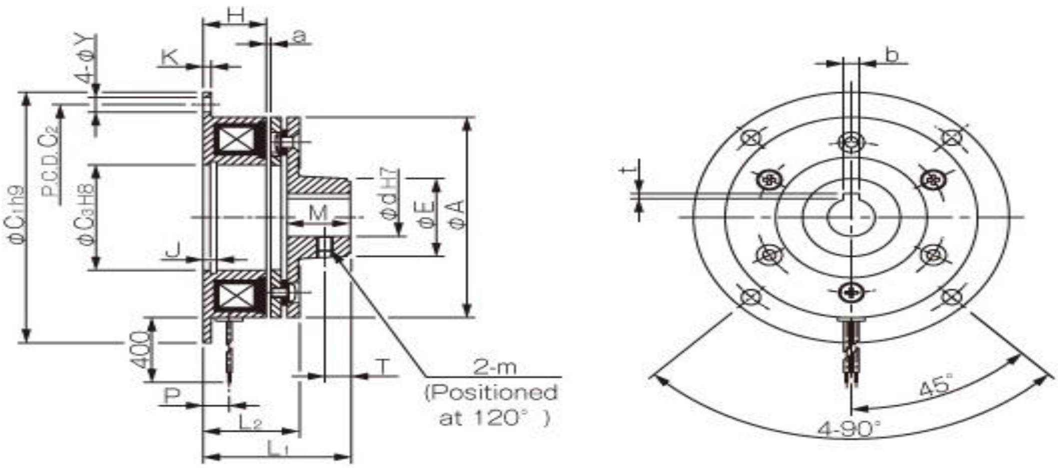
Size	Radial direction dimensions					Axial direction dimensions						
	A	C1	C2	C3	Y	H	J	K	L	M	P	a
06	63	80	72	35	5	18	3.5	2.1	25.5	15	7.3	0.2±0.05
08	80	100	90	42	6	20	4.3	2.6	28.5	20	8.3	0.2±0.05
10	100	125	112	52	7	22	5	3.1	33.1	25	9	0.2±0.05
12	125	150	137	62	7	24	5.5	3.6	37	30	9.3	$0.3^{+0.05}_{-0.1}$
16	160	190	175	80	9.5	26	6	4.1	42	38	11.7	$0.3^{+0.05}_{-0.1}$
20	200	230	215	100	9.5	30	7	5.1	50.4	45	13.4	$0.5^{0}_{-0.2}$
25	250	290	270	125	11.5	35	8	6.1	58.9	54	16	$0.5^{0}_{-0.2}$

Size	Shaft bore dimensions				
	d H7	Models compliant with JIS standards		Models compliant with the old JIS standards	
		b P9	t	b P9	t
06	12	$4^{-0.012}_{-0.042}$	$1.5^{+0.5}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
08	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
10	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
12	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
16	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
	40	$12^{-0.018}_{-0.061}$	$3^{+0.5}_{0}$	$10^{+0.061}_{+0.025}$	$3.5^{+0.5}_{0}$
20	40	$12^{-0.018}_{-0.061}$	$3^{+0.5}_{0}$	$10^{+0.061}_{+0.025}$	$3.5^{+0.5}_{0}$
	50	$14^{-0.018}_{-0.061}$	$3.5^{+0.5}_{0}$	$12^{+0.075}_{+0.032}$	$3.5^{+0.5}_{0}$
25	50	$14^{-0.018}_{-0.061}$	$3.5^{+0.5}_{0}$	$12^{+0.075}_{+0.032}$	$3.5^{+0.5}_{0}$
	60	$18^{-0.018}_{-0.061}$	$4^{+0.5}_{0}$	$15^{+0.075}_{+0.032}$	$5^{+0.5}$

HS SERIES

HB BRAKE

HBP-□□ : easy-to-use standard-shape



Unit [mm]

Size	Radial direction dimensions							Axial direction dimensions								
	A	C1	C2	C3	E	Y	m	H	J	K	L1	L2	M	P	T	a
06	63	80	72	35	26	5	M4	18	3.5	2.1	37	25.5	15	7.3	6	0.2±0.05
08	80	100	90	42	31	6	M5	20	4.3	2.6	44.5	28.5	20	8.3	8	0.2±0.05
10	100	125	112	52	41	7	M5	22	5	3.1	53.1	33.1	25	9	10	0.2±0.05
12	125	150	137	62	49	7	M6	24	5.5	3.6	61	37	30	9.3	12	$0.3^{+0.05}_{-0.1}$
16	160	190	175	80	65	9.5	M8	26	6	4.1	73	42	38	11.7	15	$0.3^{+0.05}_{-0.1}$
20	200	230	215	100	83	9.5	M8	30	7	5.1	86.4	50.4	45	13.4	18	$0.5^{0}_{-0.2}$
25	250	290	270	125	105	11.5	M10	35	8	6.1	101.9	58.9	54	16	22	$0.5^{0}_{-0.2}$

Unit [mm]

Size	Shaft bore dimensions				
	d H7	Models compliant with JIS standards		Models compliant with the old JIS standards	
		b P9	t	b P9	t
06	12	$4^{-0.012}_{-0.042}$	$1.5^{+0.5}_{0}$	$4^{+0.050}_{+0.020}$	$1.5^{+0.5}_{0}$
	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
08	15	$5^{-0.012}_{-0.042}$	$2^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
10	20	$6^{-0.012}_{-0.042}$	$2.5^{+0.5}_{0}$	$5^{+0.050}_{+0.020}$	$2^{+0.5}_{0}$
	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
12	25	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
16	30	$8^{-0.015}_{-0.051}$	$3^{+0.5}_{0}$	$7^{+0.061}_{+0.025}$	$3^{+0.5}_{0}$
	40	$12^{-0.018}_{-0.061}$	$3^{+0.5}_{0}$	$10^{+0.061}_{+0.025}$	$3.5^{+0.5}_{0}$
20	40	$12^{-0.018}_{-0.061}$	$3^{+0.5}_{0}$	$10^{+0.061}_{+0.025}$	$3.5^{+0.5}_{0}$
	50	$14^{-0.018}_{-0.061}$	$3.5^{+0.5}_{0}$	$12^{+0.075}_{+0.032}$	$3.5^{+0.5}_{0}$
25	50	$14^{-0.018}_{-0.061}$	$3.5^{+0.5}_{0}$	$12^{+0.075}_{+0.032}$	$3.5^{+0.5}_{0}$
	60	$18^{-0.018}_{-0.061}$	$4^{+0.5}_{0}$	$15^{+0.075}_{+0.032}$	$5^{+0.5}$

HS SERIES

HCB CLUTCH/BRAKE UNIT –Butt shaft Construction

This design preserves the performance of clutch and brake to the maximum extent. Its construction is sturdy, yet light mass. Its easy-to-use butt-connected construction is drip proof, making it suitable for a variety of general industrial machinery applications. Mounting is simple and service. life is long.

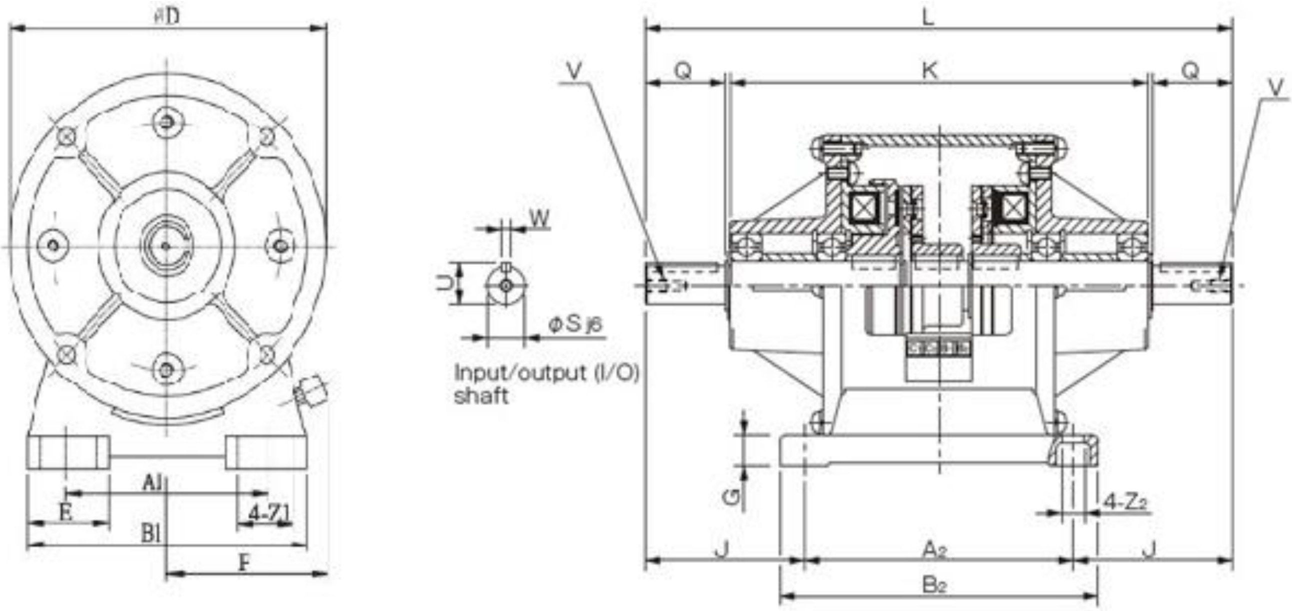
Design	Split-shaft
Form	Drip-proof
Output	Shaft
Input	Shaft
Torque	0.24~18kg.m

- **Specifications**

Model	Size	Dynamic friction torque Td [N・m]	Static friction torque Ts [N・m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed [min^{-1}]	Rotating part moment of inertia J [$kg \cdot m^2$]	Total work performed until readjustment of the air gap ET [J]	Armature pull-in time ta [s]	Torque rise time tp [s]	Torque extinction time td [s]	Mass [kg]
				Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]								
HCB-06-12	06	5	5.5	24 DC	11	0.46	52	B	3000	1.28×10^{-4}	36×10^{6}	C: 0.020/B: 0.015	C: 0.041/B: 0.033	C: 0.020/B: 0.015	2.1
HCB-08-12	08	10	11	24 DC	15	0.63	38	B	3000	3.70×10^{-4}	60×10^{6}	C: 0.023/B: 0.016	C: 0.051/B: 0.042	C: 0.030/B: 0.025	4.2
HCB-10-12	10	20	22	24 DC	20	0.83	29	B	3000	1.40×10^{-3}	130×10^{6}	C: 0.025/B: 0.018	C: 0.063/B: 0.056	C: 0.050/B: 0.030	6.8
HCB-12-12	12	40	45	24 DC	25	1.04	23	B	3000	3.85×10^{-3}	250×10^{6}	C: 0.040/B: 0.027	C: 0.115/B: 0.090	C: 0.065/B: 0.050	12
HCB-16-12	16	80	90	24 DC	35	1.46	16	B	3000	1.35×10^{-2}	470×10^{6}	C: 0.050/B: 0.035	C: 0.160/B: 0.127	C: 0.085/B: 0.055	22
HCB-20-12	20	160	175	24 DC	45	1.86	13	B	2500	4.08×10^{-2}	10×10^{6}	C: 0.090/B: 0.065	C: 0.250/B: 0207	C: 0.130/B: 0.070	49

HS SERIES

HCB CLUTCH/BRAKE UNIT : Butt shaft Construction



Unit [mm]

Size	Dimensions of part														Dimensions of shaft				
	A1	A2	B1	B2	C	D	E	F	G	J	K	L	Z1	Z2	Q	S	U	V	W
06	65	90	90	105	65	100	27.5	61	10	48.5	132	187	13.5	6.5	25	11	12.5	M4×0.7, length: 8	4
08	80	110	110	130	80	125	32.5	72	12	63	171	236	15.5	9	30	14	16	M4×0.7, length: 8	5
10	105	135	140	160	90	150	35	81	15	80	210	295	20	11.5	40	19	21	M4×0.7, length: 8	5
12	135	160	175	185	112	190	42.5	97	15	108	270	376	24.5	11.5	50	24	27	M6×1, length: 11	7
16	155	200	200	230	132	230	45	109	18	145	362	490	28	14	60	28	31	M6×1, length: 11	7
20	195	240	240	270	165	290	47.5	124	20	188	448	616	28	14	80	38	41.5	M10×1.5, length: 17	10

HS SERIES

HCB CLUTCH/BRAKE UNIT : Through-shaft Construction

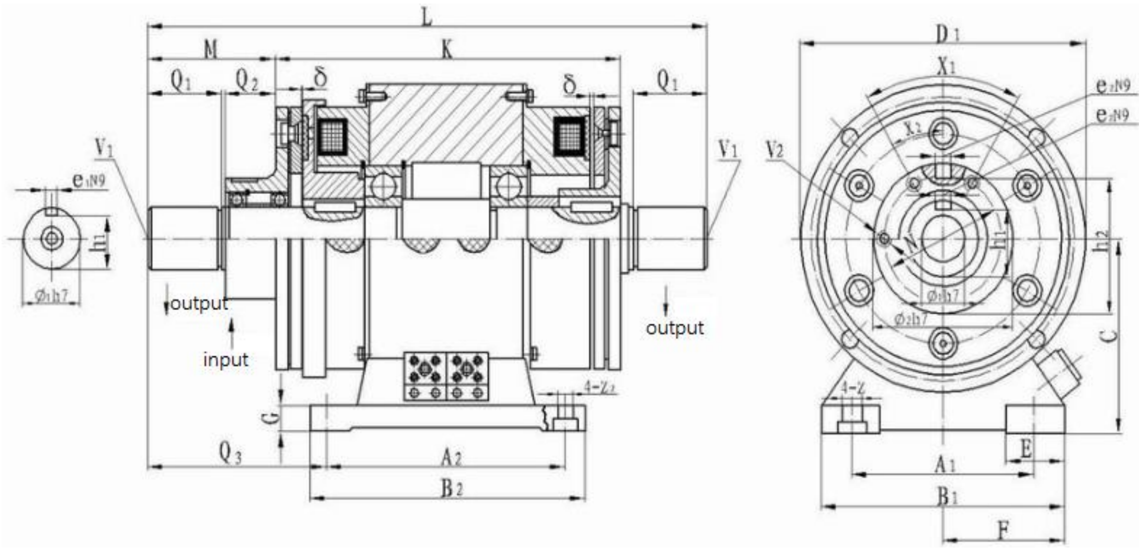
This design preserves the performance of clutch and brake to the maximum extent. Its construction is sturdy, yet light mass. Its compact through-shaft construction is open, making it suitable for a variety of general industrial machinery applications. Mounting is simple and service life is long.

Design	Through-shaft
Form	Open type
Output	Hub at 2 point of shaft
Input	Shaft or hub
Torque	0.5~40kg.m

- **Specifications**

Model	Size	Dynamic friction torque Td [N·m]	Static friction torque Ts [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed [min^{-1}]	Rotating part moment of inertia J [kg·m^2]	Total work performed until readjustment of the air gap ET [J]	Armature pull-in time ta [s]	Torque build-up time tp [s]	Torque decaying time td [s]	Mass [kg]
				Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]								
HCB-06-20	06	5	5.5	24 DC	11	0.46	52	B	3000	1.43×10^{-4}	36×10^{6}	C: 0.020/B: 0.015	C: 0.041/B: 0.033	C: 0.020/B: 0.015	1.5
HCB-08-20	08	10	11	24 DC	15	0.63	38	B	3000	4.23×10^{-4}	60×10^{6}	C: 0.023/B: 0.016	C: 0.051/B: 0.042	C: 0.030/B: 0.025	2.7
HCB-10-20	10	20	22	24 DC	20	0.83	29	B	3000	1.42×10^{-3}	130×10^{6}	C: 0.025/B: 0.018	C: 0.063/B: 0.056	C: 0.050/B: 0.030	5.5
HCB-12-20	12	40	45	24 DC	25	1.04	23	B	3000	4.18×10^{-3}	250×10^{6}	C: 0.040/B: 0.027	C: 0.115/B: 0.090	C: 0.065/B: 0.050	9.6
HCB-16-20	16	80	90	24 DC	35	1.46	16	B	3000	1.34×10^{-2}	470×10^{6}	C: 0.050/B: 0.035	C: 0.160/B: 0.127	C: 0.085/B: 0.055	18.5
HCB-20-20	20	160	175	24 DC	45	1.88	13	B	2500	4.13×10^{-2}	10×10^{8}	C: 0.090/B: 0.065	C: 0.250/B: 0.200	C: 0.130/B: 0.070	35
HCB-25-20	25	320	350	24 DC	60	2.50	9.6	B	2000	1.02×10^{-1}	20×10^{8}	C: 0.115/B: 0.085	C: 0.335/B: 0.275	C: 0.210/B: 0.125	64

HCB CLUTCH/BRAKE UNIT : Through-shaft Construction



Unit [mm]

Size	Dimensions of part																	Dimensions of shaft									
	A1	A2	B1	B2	C	D	E	F	G	J1	J2	K	L	M	N	Z1	Z2	Q1	Q2	S1	S2	U1	U2	V1	V2	X1	X2	W1, 2
6	52.5	75	80	90	55	80	27.5	57	10	65.5	40.5	105.5	181	47	33	13.5	6.5	25	20	11	38	12.5	39.5	M4×0.7, length: 8	3-M4×0.7, length: 4	3-120°	60°	4
8	65	90	90	105	65	100	27.5	60	10	78.5	48.5	126.5	217	57	37	13.5	6.5	30	25	14	45	16	47		3-M4×0.7, length: 6	3-120°	60°	5
10	80	110	110	130	80	125	32	68	12	98	62	154	270	72	47	15.5	9	40	30	19	55	21	57	M6×1, length: 11	4-M4×0.7, length: 8	4-90°	45°	5
12	105	135	140	160	90	150	35	81	15	121	74	184	330	92	52	20	11.5	50	40	24	64	27	67			4-90°	45°	7
16	135	160	175	185	112	190	42	97	15	149	90	221	399	113	62	24.5	11.5	60	50	28	75	31	78	M10×1.5,length: 17	6-M5×0.8, length: 8	6-60°	30°	7
20	155	200	200	230	132	230	45	110	18	187	117	276	504	142	74.5	28	14	80	60	38	90	41.5	93.5		4-M6×1, length: 12	4-90°	45°	10
25	195	240	240	270	160	290	47	129	20	238	154	334	632	183	101.5	28	14	110	70	42	115	45.5	118.5		8-M6×1, length: 12	8-45°	22.5°	12

HS SERIES

HCC DOUBLE CLUTCH UNIT

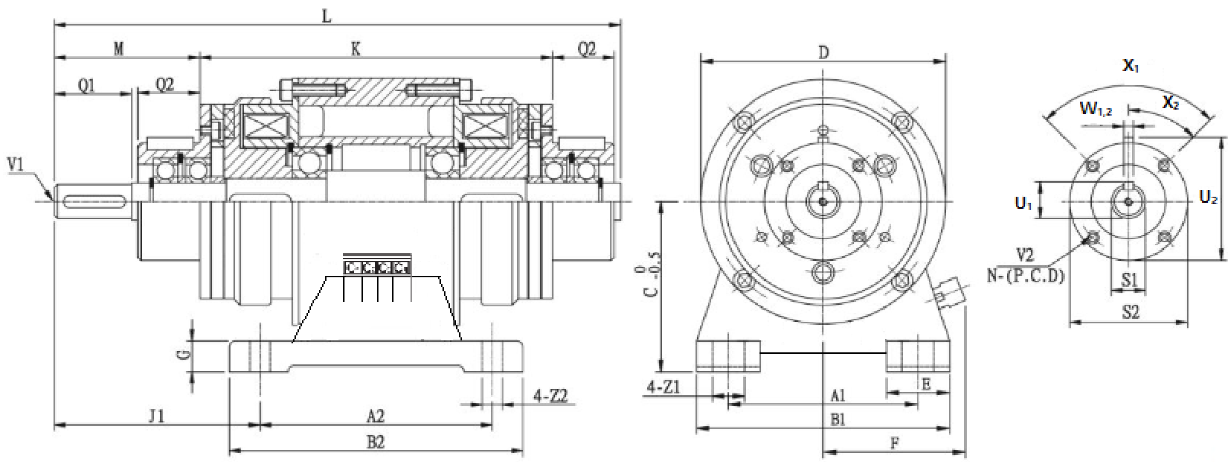
These are compact, open units that place two clutches on a through-shaft. Since one unit can perform many functions, and is also easy to install and handle, the transmission mechanism can be simplified.

Design	Through-shaft
Form	Open type
Output	Hub at 2 points or shaft
Input	Shaft or hub
Torque	0.5~20kg.m

- **Specifications**

Model	Size	Dynamic friction torque Td [N・m]	Static friction torque Ts [N・m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed [min^{-1}]	Rotating part moment of inertia J [kg・m^2]		Total work performed until readjustment of the air gap ET [J]	Armature pull-in time ta [s]	Torque build-up time tp [s]	Torque decaying time td [s]	Mass [kg]
				Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]			For hub input	For shaft input					
HCC-06	06	5	5.5	DC24	11	0.46	52	B	3000	1.55×10^{-4}	1.05×10^{-4}	36×106	C: 0.020/B: 0.015	C: 0.041/B: 0.033	C: 0.020/B: 0.015	1.7
HCC-08	08	10	11	DC24	15	0.63	38	B	3000	4.75×10^{-4}	3.00×10^{-4}	60×106	C: 0.023/B: 0.016	C: 0.051/B: 0.042	C: 0.030/B: 0.025	3.1
HCC-10	10	20	22	DC24	20	0.83	29	B	3000	1.44×10^{-3}	9.45×10^{-4}	130×106	C: 0.025/B: 0.018	C: 0.063/B: 0.056	C: 0.050/B: 0.030	6.5
HCC-12	12	40	45	DC24	25	1.04	23	B	3000	4.50×10^{-3}	2.75×10^{-3}	250×106	C: 0.040/B: 0.027	C: 0.115/B: 0.090	C: 0.065/B: 0.050	10.5
HCC-16	16	80	90	DC24	35	1.46	16	B	3000	1.34×10^{-2}	9.05×10^{-3}	470×106	C: 0.050/B: 0.035	C: 0.160/B: 0.127	C: 0.085/B: 0.055	21
HCC-20	20	160	175	DC24	45	1.88	13	B	2500	4.18×10^{-2}	2.65×10^{-2}	10×108	C: 0.090/B: 0.065	C: 0.250/B: 0.200	C: 0.130/B: 0.070	38.5
HCC-25	25	320	350	DC24	60	2.50	9.6	B	2000	9.80×10^{-2}	7.45×10^{-2}	20×108	C: 0.115/B: 0.085	C: 0.335/B: 0.275	C: 0.210/B: 0.125	70

HCC DOUBLE CLUTCH UNIT



Unit [mm]

Size	Dimensions of part																
	A1	A2	B1	B2	C	D	E	F	G	J1	J2	K	L	M	N	Z1	Z2
06	52.5	75	80	90	55	80	27.5	57	10	65.5	40.5	111.5	181	47	33	13.5	6.5
08	65	90	90	105	65	100	27.5	60	10	78.5	48.5	133	217	57	37	13.5	6.5
10	80	110	110	130	80	125	32	68	12	98	58	162	266	72	47	15.5	9
12	105	135	140	160	90	150	35	81	15	121	71	193	327	92	52	20	11.5
16	135	160	175	185	112	190	42	97	15	149	88	232	397	113	62	24.5	11.5
20	155	200	200	230	132	230	45	110	18	187	105	290	492	142	74.5	28	14
25	195	240	240	270	160	290	47	129	20	238	125	350	603	183	101.5	28	14

Size	Shaft dimensions									
	Q1	Q2	S1	S2	U1	U2	V1	V2	X1	X2	W1, 2
06	25	20	11	38	12.5	39.5	M4×0.7, length: 8	3-M4×0.7, length: 4	3° to 120°	60°	4
08	30	25	14	45	16	47	M4×0.7, length: 8	3-M4×0.7, length: 6	3° to 120°	60°	5
10	40	30	19	55	21	57	M6×1, length: 11	4-M4×0.7, length: 8	4° to 90°	45°	5
12	50	40	24	64	27	67	M6×1, length: 11	4-M4×0.7, length: 8	4° to 90°	45°	7
16	60	50	28	75	31	78	M6×1, length: 11	6-M5×0.8, length: 8	6° to 60°	30°	7
20	80	60	38	90	41.5	93.5	M10×1.5, length: 17	4-M6×1, length: 12	4° to 90°	45°	10
25	110	70	42	115	45.5	118.5	M10×1.5, length: 17	8-M6×1, length: 12	8° to 45°	22.5°	12

HCCB DOUBLE CLUTCH/BRAKE UNIT

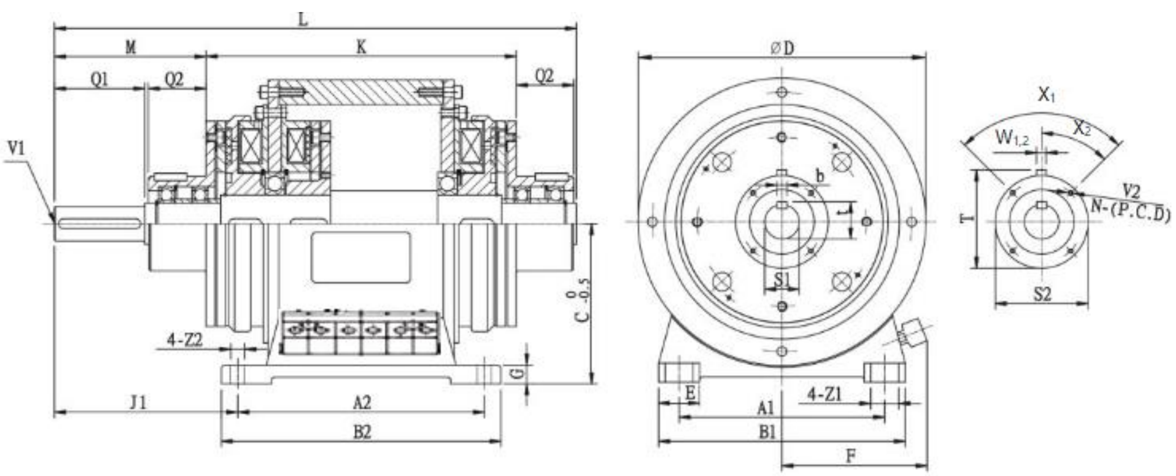
These are units unlike any other, which combine two clutches with a brake in a compact form factor. They provide high-precision positioning and applied control of complex operations from a single unit. Installation and handling are as easy as on other units.

Design	Through-shaft
Form	Open type
Output	Shaft or hub
Input	Hub
Torque	0.5~20kg.m

- **Specifications**

Model	Size	Dynamic friction torque Td [N·m]	Static friction torque Ts [N·m]	Coil (at 20℃)				Heat resistance class	Max. rotation speed [min^{-1}]	Rotating part moment of inertia J [kg·m^2]	Total work performed until readjustment of the air gap ET [J]	Armature pull-in time ta [s]	Torque build-up time tp [s]	Torque decaying time td [s]	Mass [kg]
				Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]								
HCCB-06	06	5	5.5	DC24	11	0.46	52	B	3000	2.19×10^{-4}	36×10^{6}	C: 0.020/B: 0.015	C: 0.041/B: 0.033	C: 0.020/B: 0.015	4
HCCB-08	08	10	11	DC24	15	0.63	38	B	3000	6.55×10^{-4}	60×10^{6}	C: 0.023/B: 0.016	C: 0.051/B: 0.042	C: 0.030/B: 0.025	6
HCCB-10	10	20	22	DC24	20	0.83	29	B	3000	2.12×10^{-3}	130×10^{6}	C: 0.025/B: 0.018	C:0.063 / B:0.056	C: 0.050/B: 0.030	9
HCCB-12	12	40	45	DC24	25	1.04	23	B	3000	6.35×10^{-3}	250×10^{6}	C: 0.040/B: 0.027	C: 0.115/B: 0.090	C: 0.065/B: 0.050	17
HCCB-16	16	80	90	DC24	35	1.46	16	B	3000	1.99×10^{-2}	470×10^{6}	C: 0.050/B: 0.035	C: 0.160/B: 0.127	C: 0.085/B: 0.055	29
HCCB-20	20	160	175	DC24	45	1.88	13	B	2500	6.15×10^{-2}	10×10^{8}	C: 0.090/B: 0.065	C: 0.250/B: 0.200	C: 0.130/B: 0.070	58

HCCB DOUBLE CLUTCH/BRAKE UNIT



Unit [mm]

Size	Dimensions of part																
	A1	A2	B1	B2	C	D	E	F	G	J1	J2	K	L	M	N	Z1	Z2
06	60	90	90	105	65	100	27.5	60	10	73	48	142	211	47	33	13.5	6.5
08	80	110	110	130	80	125	32	68	12	83	53	162	246	57	37	15	9
10	105	135	140	160	90	150	35	81	15	99	59	190	294	72	47	20	11
12	135	160	175	185	112	190	42	97	15	124	74	222	358	93	52	24	11
16	155	200	200	230	132	230	45	110	18	150	90	272	440	114	62	28	14
20	195	240	240	270	160	290	47	129	20	197	114	348	551	143	74.5	28	14

Unit [mm]

Size	Dimensions of shaft										
	Q1	Q2	S1	S2	U1	U2	V1	V2	X1	X2	W1, 2
06	25	20	11	38	12.5	39.5	M4×0.7, length: 8	3-M4×0.7, length: 4	3° to 120°	60°	4
08	30	25	14	45	16	47	M4×0.7, length: 8	3-M4×0.7, length: 6	3° to 120°	60°	5
10	40	30	19	55	21	57	M6×1, length: 9	4-M4×0.7, length: 8	4° to 90°	45°	5
12	50	40	24	64	27	67	M6×1, length: 9	4-M4×0.7, length: 8	4° to 90°	45°	7
16	60	50	28	75	31	78	M6×1, length: 9	6-M5×0.8, length: 8	6° to 60°	30°	7
20	80	60	38	90	41.5	93.5	M10×1.5, length: 17	4-M6×1, length: 12	4° to 90°	45°	10

HS SERIES

HCBM MOTOR-CONNECTED CLUTCH/BRAKE UNIT

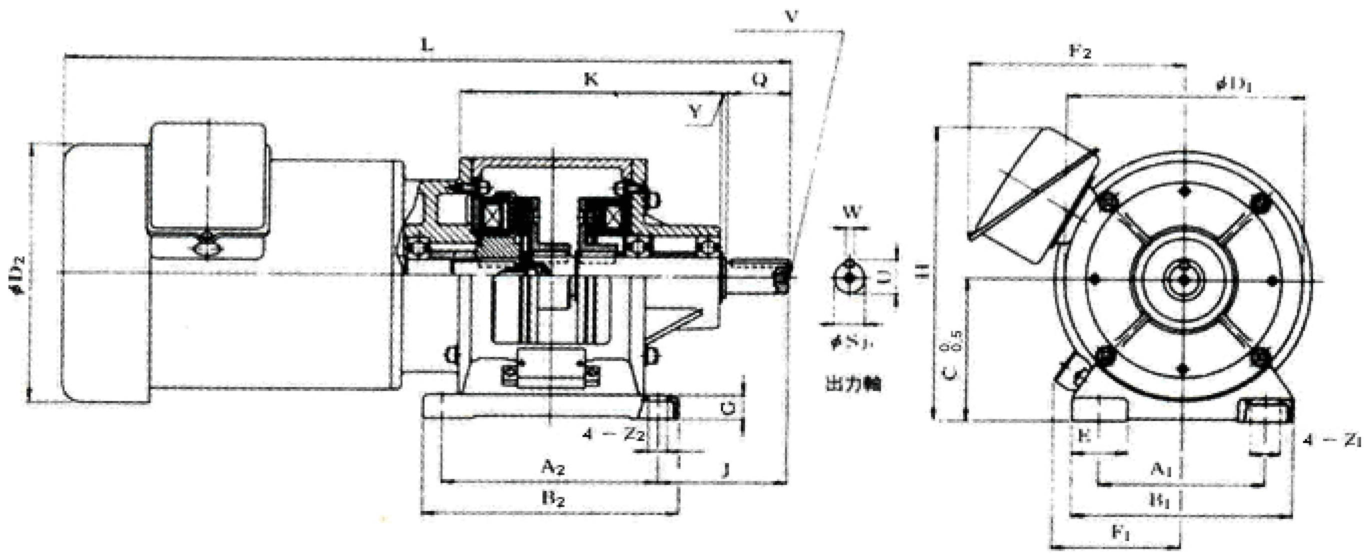
This is a practical unit in which an induction motor is directly connected to clutch/brake units in advance. This type directly connects 3-phase induction motor to clutch/brake units, requiring less installation space and eliminating cumbersome tasks such as centering and processing of mounts. Since the output shaft is simply engaged to the load, handling is easy.

- **Specifications**

Model	Size	Motor output[kW] 4P	Dynamic friction torque Td [N·m]	Static friction torque Ts [N·m]	Coil(at20℃)				Heat resistance class	Rotating part moment of inertia [kg·m^2]	Total work performed until readjustment of the air gap ET[J]	Armature pull-in time ta[s]	Torque build-up time tp[s]	Torque decaying time td[s]	Mass [kg]
					Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]							
HCBM-06-4B	06	0.2	5	5.5	DC24	11	0.46	52	B	1.28×10^{-4}	36×10^{6}	C:0.020 B:0.015	C:0.041 B:0.033	C:0.020 B:0.015	8.9
HCBM-08-4B	08	0.4	10	11	DC24	15	0.63	38	B	3.70×10^{-4}	60×10^{6}	C:0.023 B:0.016	C:0.051 B:0.042	C:0.030 B:0.025	13
HCBM-10-4B	10	0.75	20	22	DC24	20	0.83	29	B	1.40×10^{-3}	130×10^{6}	C:0.025 B:0.018	C:0.063 B:0.056	C:0.050 B:0.030	20
HCBM-12-4B	12	1.5	40	45	DC24	25	1.04	23	B	3.85×10^{-3}	250×10^{6}	C:0.040 B:0.027	C:0.115 B:0.090	C:0.065 B:0.050	41
HCBM-16-4B	16	2.2 3.7	80	90	DC24	35	1.46	16	B	1.35×10^{-2}	470×10^{6}	C:0.050 B:0.035	C:0.160 B:0.127	C:0.085 B:0.055	54 69

HS SERIES

HCBM MOTOR-CONNECTED CLUTCH/BRAKE UNIT



Unit [mm]

Model	Dimensions of part																		Dimensions of shaft				
	A1	A2	B1	B2	C	D1	D2	E	F1	F2	G	J	K	L	H	Y	Z1	Z2	Q	S	U	V	W
HCBM-06-4B	65	90	90	105	65	100	140	27.5	60	-	10	49	108	335	-	3	13.5	6.5	25	11	12.5	M4×0.7length8	4
HCBM-08-4B	80	110	110	130	80	125	140	32.5	68	130	12	63	136	392	165	2.5	15	9	30	14	16	M4×0.7length8	5
HCBM-10-4B	105	135	140	160	90	150	146	35	81	140	15	80.5	163	451	185	3	20	11	40	19	21	M6×1length11	5
HCBM-12-4B	135	160	175	185	112	190	185	42.5	97	153.5	15	108	205	535	-	3	24	11	50	24	27	M6×1length11	7
HCBM-16-4B	155	200	200	230	132	230	220 230	45	110	164 175	18	135 145	268	635 660	-	4	28	14	50 60	24 28	27 31	M6×1length11	7

HS SERIES

HCBW WORM REDUCER INTERGRATED CLUTCH/BRAKE UNIT

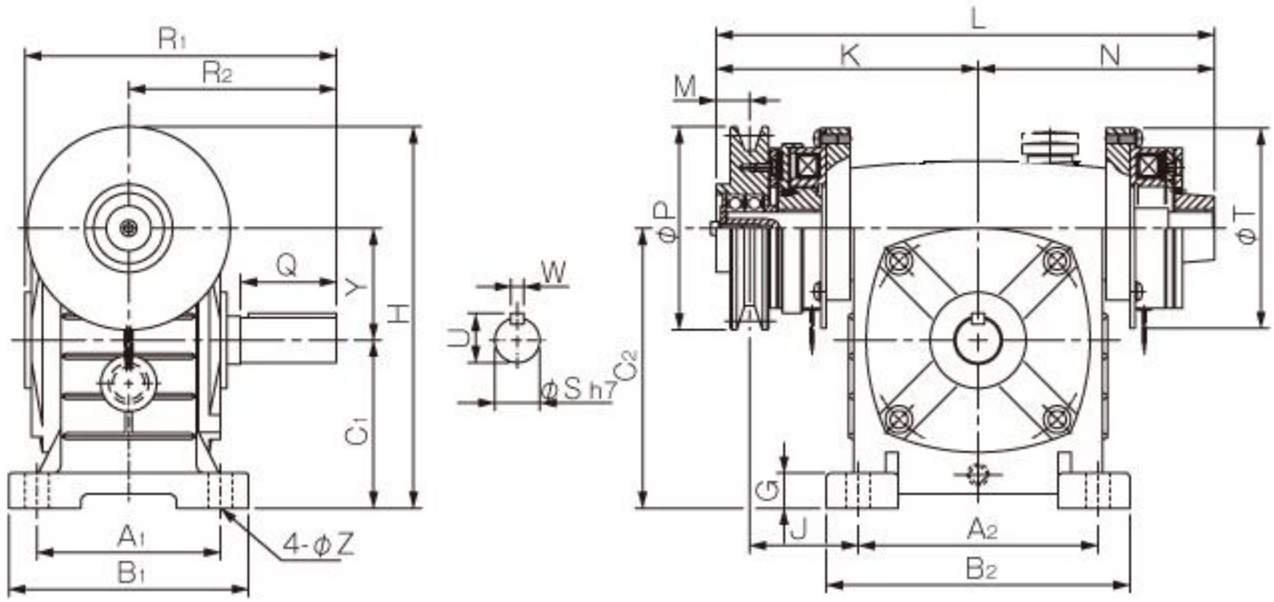
This a practical unit in which the worm reducer is directly connected to clutch/brake units in advance. A standard V belt pulley is installed on the input part of the clutch. Integration keeps self-inertia low, so the efficiency of starting and stopping is good. It can be combined with a speed changer for a wide range of speed changes, and excellent performance can be achieved in many applications, such as 360° rotation stop of the output shaft.

Model	Size	Dynamic friction torque Td [N・m]	Static friction torque Ts [N・m]	Coil (at 20℃) Voltage [V]	Wattage [W]	Current [A]	Resistance [Ω]	Heat resistance class	Max. rotation speed [min^{-1}]	Rotating part moment of inertia J [kg・m²]	Total work performed until readjustment of the gap ET [J]	Armature pull-in time ta [s]	Torque build-up time tp [s]	Torque decaying time td [s]
HCBW-06-SR	06	5	5.5	DC24	11	0.46	52	B	1800	1.56×10^{-4} 1.76×10^{-4}	36×10^{6}	C: 0.020/B: 0.015	C: 0.041/B: 0.033	C: 0.020/B: 0.015
HCBW-08-SR	08	10	11	DC24	11	0.63	38	B	1800	4.70×10^{-4} 4.85×10^{-4}	60×10^{6}	C: 0.023/B: 0.016	C: 0.051/B: 0.042	C: 0.030/B: 0.025
HCBW-10-SR	10	20	22	DC24	15	0.83	29	B	1800	1.48×10^{-3} 1.61×10^{-3}	130×10^{6}	C: 0.025/B: 0.018	C: 0.063/B: 0.056	C: 0.050/B: 0.030
HCBW-12-SR	12	40	45	DC24	25	1.04	23	B	1800	4.23×10^{-3} 4.35×10^{-3}	250×10^{6}	C: 0.040/B: 0.027	C: 0.115/B: 0.090	C: 0.065/B: 0.050

Model	Size	Input part		Speed reducer									Mass [kg]
		Pulley diameter [mm]	Belt model	Type	Output shaft rated values	Speed reduction ratio 1/□						Oil volume [L]	
						10	20	30	40	50	60		
HCBW-06-SR	06	76.2 (3 in.)	A-1	WU50	Torque [N・m]	35	38	44	-	-	-	0.3	9
					O.H.L. [N]	950	1313	1548	-	-	-		
HCBW-06-SR	06	76.2 (3 in.)	A-1	WU60	Torque [N・m]	-	-	-	64	56	56	0.4	11
					O.H.L. [N]	-	-	-	2450	2450	2450		
HCBW-08-SR	08	101.6 (4 in.)	A-1	WU60	Torque [N・m]	56	57	72	-	-	-	0.4	11.5
					O.H.L. [N]	1421	1862	2322	-	-	-		
HCBW-08-SR	08	101.6 (4 in.)	A-1	WU70	Torque [N・m]	-	-	-	143	136	138	0.7	16.5
					O.H.L. [N]	-	-	-	2646	2646	2646		
HCBW-10-SR	10	127 (5 in.)	B-1	WU70	Torque [N・m]	120	126	150	-	-	-	0.7	17.5
					O.H.L. [N]	1490	2077	2440	-	-	-		
HCBW-10-SR	10	127 (5 in.)	B-1	WU80	Torque [N・m]	-	-	-	191	187	167	1.2	23.5
					O.H.L. [N]	-	-	-	3057	3146	3155		
HCBW-12-SR	12	152.4 (6 in.)	B-1	WU80	Torque [N・m]	166	167	213	-	-	-	1.2	25
					O.H.L. [N]	1715	2528	2871	-	-	-		
HCBW-12-SR	12	152.4 (6 in.)	B-1	WU100	Torque [N・m]	-	-	-	373	352	336	2.9	40
					O.H.L. [N]	-	-	-	3665	3783	4126		

HS SERIES

HCBW WORM REDUCER INTERGRATED CLUTCH/BRAKE UNIT



Unit [mm]

Model	Dimensions of part																			Dimensions of shaft			
	A1	A2	B1	B2	C1	C2	G	H	J	K	L	M	N	P	R1	R2	T	Y	Z	Q	S	U	W
HCBW-06-SR(WU50)	95	110	120	140	80	130	15	180	63	133	250	15	117	76.2	145	100	80	50	11	40	20	22	5
HCBW-06-SR(WU60)	105	120	130	150	90	150	20	205	56	131	246	15	115	76.2	165	110	80	60	11	50	22	25	7
HCBW-08-SR(WU60)	105	120	130	150	90	150	15	205	59	137	260	18	123	101.6	165	109	100	60	11	45	22	25	7
HCBW-08-SR(WU70)	115	150	150	190	105	175	15	235	61	154	294	18	140	101.6	195	130	100	70	15	60	28	31	7
HCBW-10-SR(WU70)	115	150	150	190	105	175	17	238	68	164	312	21	148	127	195	120	125	70	15	50	28	31	7
HCBW-10-SR(WU80)	135	180	170	220	120	200	17	265	63	174	332	21	158	127	210	133	125	80	15	65	32	35.5	10
HCBW-12-SR(WU80)	135	180	170	220	120	200	20	275	67.5	179	345	21.5	166	152.4	210	133	150	80	15	58	32	35.5	10
HCBW-12-SR(WU100)	155	220	190	270	150	250	25	327	76.5	210	405	23.5	195	152.4	260	150	150	100	15	65	38	41.5	10

HYOJOON

HMWC/HMWB SERIES: WET-TYPE MULTIPLE DISC ELECTROMAGNETIC CLUTCH/ BRAKE

HMWC/HMWB SERIES

OVERVIEW

A wet type multi-disc electromagnetic clutch is a clutch that uses a set of friction plates and separator plates, which are alternately placed between a clutch case and a clutch hub. The clutch operates by using an electromagnetic force to connect and disconnect power. When the clutch is energized, the plates become magnetized, causing the inner and outer plates to connect and generate friction. When the current is cut off, the clutch is disengaged as the friction plate spring pushes the outer plate away.

FEATURES

HMWB-00

HMWC-00

HIGH-TORQUE COMPACT DESIGN
The HMW series are designed as extremely compact multiple disc units that deliver high torque rates.

LONG LIFE AND LOW MAINTENANCE
The HMW series stationary field design and oil lubrication system significantly reduce wear and maintenance while increasing operational life

QUICK RELEASE TIME
Separator springs between the friction plates allow for quick disconnect when the power is released. These springs also keep the disks from making contact with each other in the disengaged mode.

FAST TORQUE BUILD-UP
An efficiently etched oil path on the friction disk, coupled with special treatment of the friction disks ensures fast response and release time.

HIGH HEAT DISSIPATION
The oil lubrication system provides excellent heat dissipation making the HMW series suitable for heavy duty operation

EASILY CONNECT TO YOUR GEAR PULLEY OR COUPLING
The series is made to be used with the UN drive cup, the cup slides between the friction disk tangs and has a tapped bolt pattern so you can attach your bearing mounted gear pulley.

HMWC/HMWB SERIES

APPLICATIONS & TORQUE RANGE

- **Packaging Machinery**

They're used in packaging lines for precise control during filling, sealing, and labeling processes.

- **Food Processing Equipment**

Wet clutches play a role in food mixers, conveyors, and slicers.

- **Machine Tools**

In metalworking machines, wet clutches enable smooth engagement and disengagement.

- **Office Machinery**

Think of photocopiers, printers, and other office equipment that require precise clutch operation.

- **Industrial Processes**

From steel rolling mills to mining equipment, wet clutches help regulate speed and torque.

- **Marine and Boating**

Wet clutches are essential for marine propulsion systems, allowing smooth shifting and reversing.

- **Conveyors and Hoists**

In material handling systems, wet brakes ensure smooth stops and prevent sudden jolts.

- **Printing Presses**

When your favorite magazine gets printed, wet brakes play a role in precise paper feeding and stopping.

- **Automated Packaging Lines**

From chocolates to gadgets, wet brakes help package things neatly.

- **Rolling Mills and Metal Forming Machines**

When shaping metal, controlled braking is essential.

- **Elevators and Escalators**

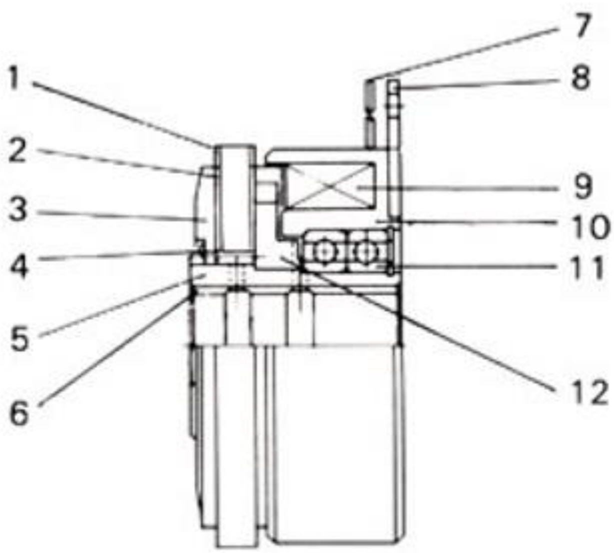
Next time you step into an elevator, thank the wet brakes for that smooth ride.

- **Torque Range**

CLUTCH: 1.2 kgm ~ 600 kgm
BRAKE: 1.2 kgm ~ 160 kgm

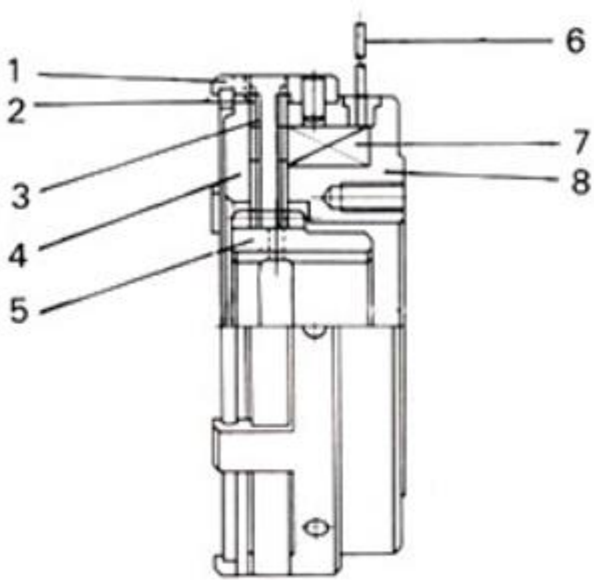
HMWC/HMWB SERIES

STRUCTURE & OPERATION



HMWC TYPE CLUTCH

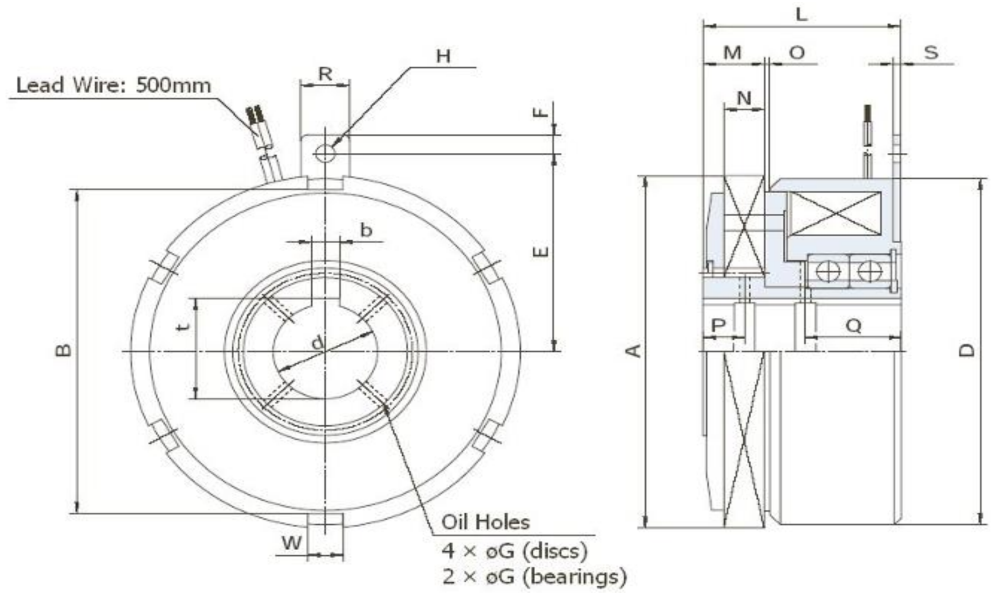
No.	Designation
1	In-plate
2	Out-plate
3	Armature
4	Release Spring
5	Clutch Hub
6	Key Way
7	Lead Wires
8	Anti-rotation Tab
9	Coil
10	Stator
11	Ball Bearing
12	Rotor



HMWB TYPE BRAKE

No.	Designation
1	Coupling
2	Out-plate
3	In-plate
4	Armature
5	Inner Driver
6	Lead Wires
7	Coil
8	Stator

HMWC CLUTCH(1.2~20)



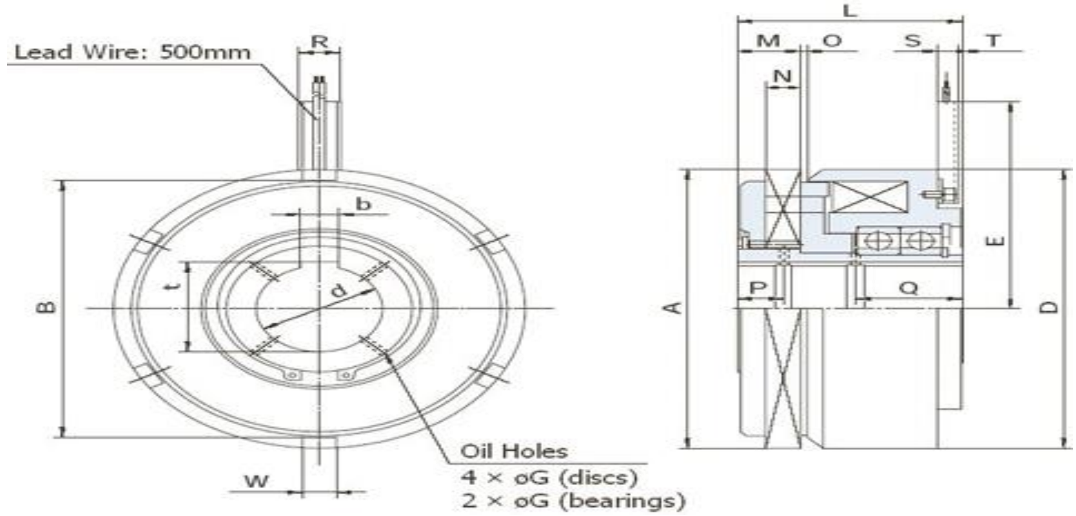
- **Specifications**

MODEL	TORQUE(kgm)		VOLTAGE (DC-V)	COIL(20℃)			ARMATURE PULL-IN TIME (sec)	TORQUE BUILD-UP TIME (sec)	TORQUE DECAY TIME (sec)	MAX. ALLOWABLE SPEED [rpm]	GD²(kgm²)		MASS (kg)
	DYNAMIC	STATIC		WATTAGE (W)	RESISTANCE (Ω)	CURRENT (A)					HUB	OUT-PLATE	
HMWC-1.2	1.2	2.5	24	12	49.5	0.48	0.05	0.12	0.04	4,000	0.0011	0.0002	1.4
HMWC-2.5	2.5	5		17	34.0	0.71	0.06	0.15	0.05	3,600	0.0022	0.0005	2.0
HMWC-5	5	10		22	26.4	0.91	0.07	0.17	0.06	3,200	0.0053	0.0011	3.0
HMWC-10	10	20		36	16.0	1.5	0.08	0.18	0.07	3,000	0.0128	0.0033	4.8
HMWC-20	20	40		45	12.8	1.9	0.10	0.20	0.10	2,800	0.0228	0.0065	7.7

- **Dimensions**

MODEL	SHAFT HOLE			A	B	C	D	E	F	G	H	L	M	N	O	P	Q	R	S	W
	d	b	t																	
HMWC-1.2	20	6	21.7	80	73	71	78	47	6	2	5.5	45	13.5	8.5	2	10	21.5	12	2	8
HMWC-2.5	25	8	26.7	95	87.5	85.5	93	57	6	3	5.5	49	14.8	9.3	2	11	23.5	14	2.3	10
HMWC-5	30	8	32	112	103	101	110	63	6	3	5.5	57	17.7	11.7	1.5	12	27.5	14	2.3	10
HMWC-10	40	12	42.5	132	122	120	130	80	6	3	6.5	63	22	14	2	16	25	16	3	12
HMWC-20	50	14	52.5	157	132	142	155	91	8	3	6.5	73	24.5	14	2	18	28.5	16	3	12

HMWC CLUTCH(40~600)

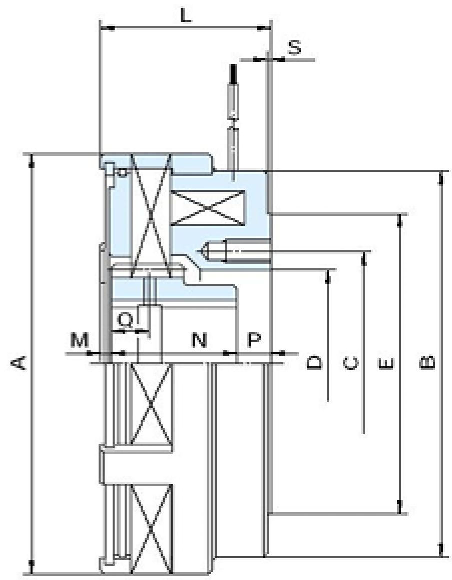


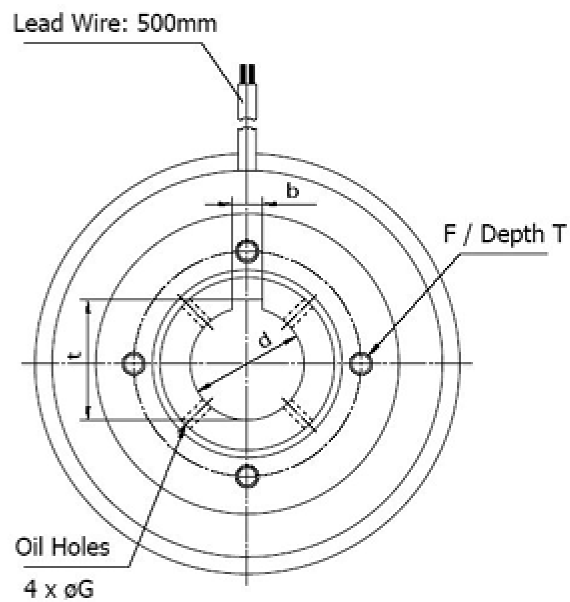
MODEL	TORQUE(kgm)		VOLTAGE (DC-V)	COIL(20℃)			ARMATURE PULL-IN TIME (sec)	TORQUE BUILD-UP TIME (sec)	TORQUE DECAY TIME (sec)	MAX ALLOWABLE SPEED [rpm]	GD²(kgm²)		MASS (kg)
	DYNAMIC	STATIC		WATTAGE (W)	RESISTANCE (Ω)	CURRENT (A)					HUB	OUT-PLATE	
HMWC-40	40	80	24	50	12.0	2.0	0.15	0.32	0.13	2,400	0.103	0.0187	17
HMWC-80	80	160		65	9.6	2.5	0.25	0.60	0.35	2,000	0.285	0.0567	32
HMWC-160	160	320		95	6.5	3.7	0.38	0.70	0.50	1,600	0.793	0.153	56
HMWC-250	250	500		110	5.2	4.6	0.55	0.90	0.70	1,400	1.38	0.273	79
HMWC-320	320	640		130	4.7	5.1	0.70	1.20	1.00	1,200	2.11	0.422	104
HMWC-450	450	900		165	3.3	7.3	1.0	1.50	1.20	1,000	4.1	0.95	140
HMWC-600	600	1200		150	3.9	6.2	1.5	1.80	1.50	900	6.0	2.1	192

MODEL	SHAFT HOLE			A	B	C	D	E	G	L	M	N	O	P	Q	R	S	T	W
	d	b	t																
HMWC-40	60	18	63	195	180	178	195	145	4	107	30.2	16.7	3	22	51	20	10	2	16
HMWC-80	70	20	75	235	218	215	235	160	4	135	40	23.5	4	30	61	20	10	4	22
HMWC-160	90	25	95	290	265	262	290	200	4	170	49	29	5	35	75	25	20	5	30
HMWC-250	100	28	106.5	325	300	297	324	220	5	185	55	32	5	39	84	30	15	11	40
HMWC-320	110	28	119	350	320	318	350	230	5	210	61	36	10	43	97	30	15	10	40
HMWC-450	120	32	130	400	363.5	360	392	250	8	220	63	36	10	45	101	30	15	17	50
HMWC-600	140	35	151	440	400	395	428	270	8	255	80	53	10	54	123	30	15	17	50

HMWC/HMWB SERIES

HMWB BRAKE



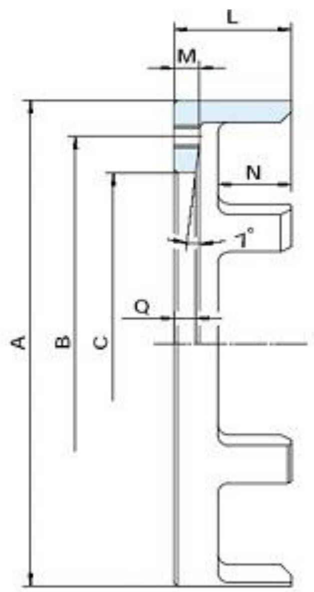


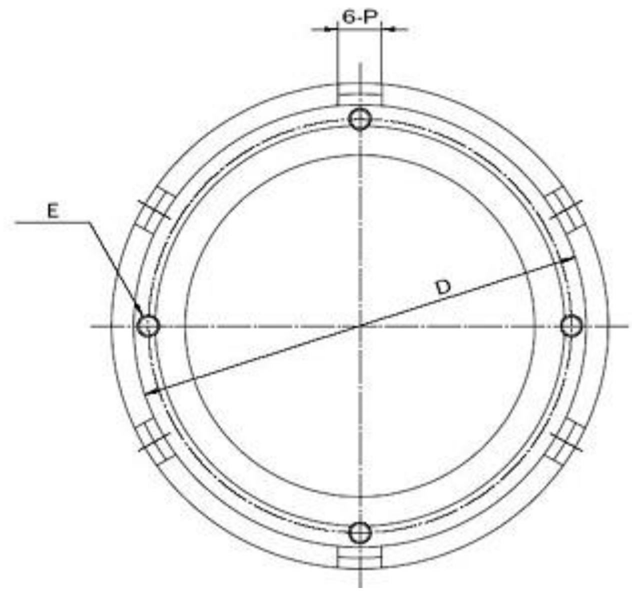
MODEL	TORQUE(kgm)		VOLTAGE (DC-V)	WATTAGE (W)	GD² (kgm²)	MASS (kg)	SHAFT HOLE			SCREW		
	DYNAMIC	STATIC					d	b	T	m	n	Depth
HMWB-1.2	1.2	2.5	24	8	0.0002	0.7	20	6	21.7	M5	4	8
HMWB-2.5	2.5	5		12	0.0004	1.3	25	8	26.7	M6	4	12
HMWB-5	5	10		18	0.0013	2.0	30	8	32	M6	4	12
HMWB-10	10	20		24	0.0038	3.3	40	12	42.5	M8	4	12
HMWB-20	20	40		28	0.0076	4.5	50	14	52.5	M8	4	14
HMWB-40	40	80		36	0.0224	10	60	18	63	M10	4	18
HMWB-80	80	160		45	0.0773	19	70	20	75	M10	4	20
HMWB-160	160	320		80	0.208	33	90	25	95	M12	6	25

MODEL	A	B	C	D	E	F	L	M	N	P	Q	S
HMWB-1.2	80	73	42	32	-	2	30	3.5	23	3.5	7	-
HMWB-2.5	95	87	50	40	-	3	37	4	27	6	8.5	-
HMWB-5	112	103	60	50	80	3	45	3	33	9	10	1
HMWB-10	132	122	70	56	95	3	52	4	35	13	13	1
HMWB-20	157	142	90	75	110	3	53	5	36	12	13	1
HMWB-40	198	180	110	90	130	4	71	6	48	17	16	1
HMWB-80	238	218	144	120	160	4	77.5	8.5	50	19	19	1
HMWB-160	290	262	174	150	200	4	100	11	68	21	22	1

HMWC/HMWB SERIES

CLUTCH COUPLING





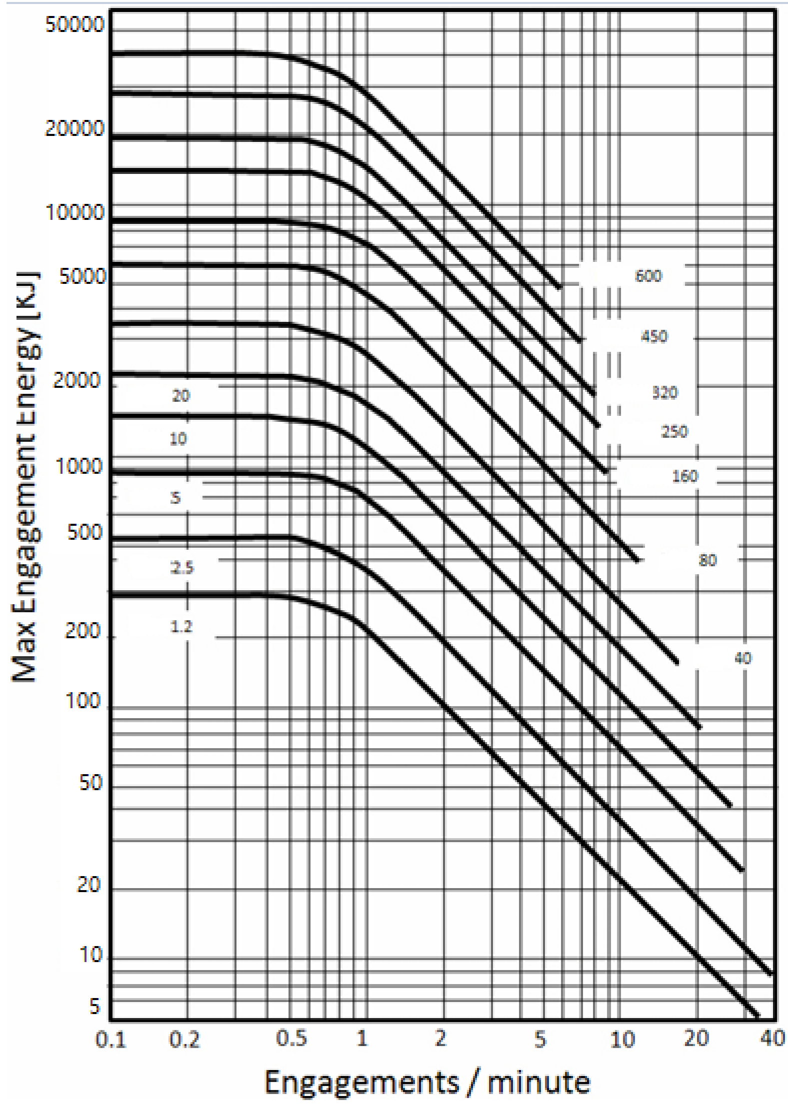
APPLICATION CLUTH		COUPLING TYPE	A	B	C	D	E	L	M	N	P	Q	MASS (kg)
HMWC-1.2		HUN-1.2	82	68	56	74	4-M5	21.5	5.5	13	8	5	0.15
HMWC-2.5		HUN-2.5	97	80	65	88.5	4-M6	23	6	15	10	5	0.22
HMWC-5		HUN-5	114	95	78	104	4-M6	26	6.5	16	10	5.5	0.35
HMWC-10		HUN-10	135	115	95	123	6-M6	32	7	20	12	6	0.51
HMWC-20		HUN-20	160	135	115	146	6-M8	38	10	22	12	9	1.1
HMWC-40		HUN-40	198	160	135	181.5	6-M10	48	12	26	16	10	2.1
HMWC-80		HUN-80	238	200	170	220	6-M12	60	15	34	22	13	3.0
HMWC-160		HUN-160	294	240	200	267	6-M16	75	20	38	30	17	7.4
HMWC-250		HUN-250	330	260	220	304	6-M16	82	20	44	40	17	9.6
HMWC-320		HUN-320	355	280	240	324	6-M18	97	25	52	40	22	13.8
HMWC-450		HUN-450	404	320	280	368	6-M20	105	30	53	50	27	20
HMWC-600		HUN-600	444	360	310	404	8-M20	122	30	72	50	27	25

CHARACTERISTIC

- **Allowable Energy**

When loads are accelerated or decelerated by a clutch/brake, heat will be generated by sliding friction. This is because frictional energy is converted to heat, so the amount of heat will vary with the conditions of use. Clutches and brakes dissipate this heat externally as they work, but if they cannot dissipate all the heat, they accumulate it internally and the temperatures of the components rise. If temperatures exceed allowable values, malfunctions and damage result. The limit for friction work undergone due to this heat is called allowable energy. The allowable energy is predetermined for each size. Heat dissipation is affected by the mounting situation, rotation speed, atmosphere, and the like. When large loads are accelerated or decelerated, violent slipping occurs, and the frictional surface generates larges amounts of heat. The frictional material and armature can be damaged by even a single engagement. Please refer to the right figure.

FIGURE 1



HMWC/HMWB SERIES

CHARACTERISTIC

- **Drag Torque**

1.Definition: Drag torque is the resistive torque that occurs in a clutch when it is disengaged. In wet clutches, this is primarily due to the viscous shearing of the transmission fluid between the clutch plates.

2.Impact of Fluid Dynamics: The presence of transmission fluid in wet clutches leads to drag torque even when the clutch is not engaged. The fluid's viscosity and the relative motion between the clutch plates cause this resistive force.

3.Factors Influencing Drag Torque:

1) **Rotational Speed:** At low speeds, drag torque increases linearly, while at high speeds, it tends to decrease due to the mixing of air with the fluid.
2) **Fluid Flow Rate:** A lower flow rate can help reduce drag torque, as excessive fluid can increase resistance.
3) **Temperature:** Higher temperatures can reduce fluid viscosity, thereby decreasing drag torque.

4.Design Considerations: Engineers must consider these factors when designing wet multi-disc clutches to optimize performance and minimize energy losses due to drag torque.
Understanding these correlations helps in designing more efficient clutch systems, improving overall transmission efficiency and vehicle performance.

HMWC/HMWB series use the special type of the plate to decrease the drag torque. Please refer to Figure 2, 3, and 4.

FIGURE 2

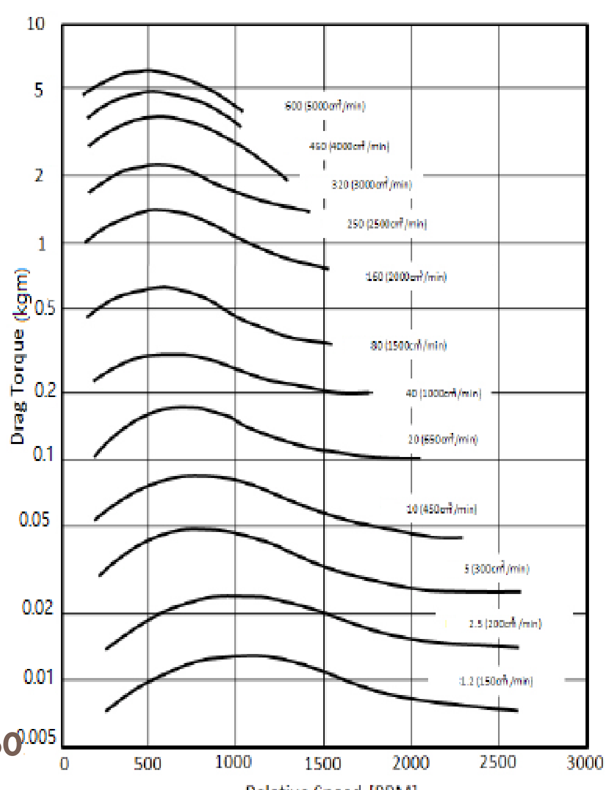


FIGURE 3

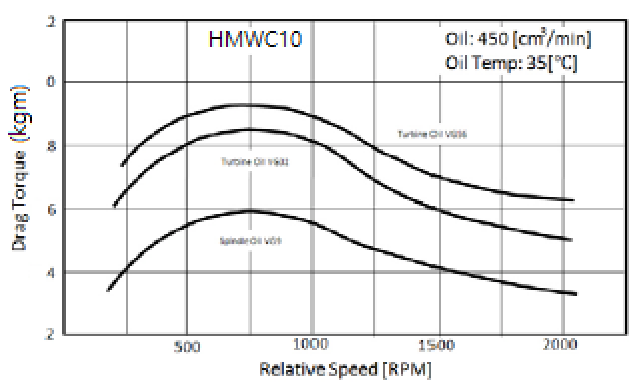
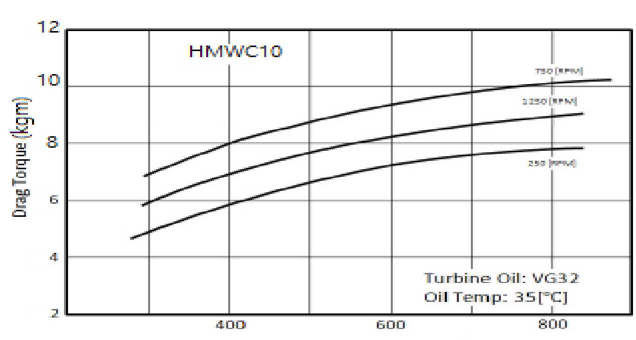


FIGURE 4



HMWC/HMWB SERIES

EXAMPLE ON INSTALLATION(HMWC)

The unit consists of four major components: the field, the rotor/hub assembly, the armature and the multiple friction disks. When the current is applied to the coil, the armature is pulled in, compressing the multiple disks and the friction between the disks transfers torque.

- **Installation Procedure**

1. Slide clutch body onto the shaft (key should already be in place in the key way in the shaft).

2. Make sure the clutch is secured axially from moving on the shaft. This can be done via a step in the shaft, set collar, center bolt or some type of sleeve.

3. The coupling (drive cup) should be attached to, (customer supplied) bearing mounted gear, pulley or direct drive coupling flange.

4. The gap between the clutch hub and the exterior of the coupling (drive cup shown as dimension A in the mounting diagram) should be as follows:

Table 1

Model	1.2	2.5	5	10	20	40
A [inch]	0.217	0.217	0.236	0.256	0.374	0.551
Model	80	160	250	320	450	600
A [inch]	0.670	0.906	0.984	1.181	1.417	1.417

5. Concentricity of the coupling with the shaft should be within .002”.

6. Make sure the drive cup (coupling assembly) is restrained from moving axially on the shaft. The inboard bearing race (via a sleeve or spacer) should contact the face of the clutch and the outboard bearing race or sleeve, should be restrained by a snap ring, retaining ring or some other positive contact device.

7. Make sure that the torque tab is loosely restrained to prevent the field from rotating due to the field bearing drag. Approximately 1/16th of axial and radial clearance should be allowed so that the field bearing is not pre-loaded restraint is loosely connected to the torque tab on the clutch.

- **Maintenance**

1. This clutch is intended to be used wet and, therefore it should be properly lubricated with oil. Turbine oil, ISO VG32~68 is recommended under normal operating conditions. However, when drag torque is an issue
or operating at a particularly high or low speed or under cold temperature, machine oil, ISO VG5~10 is recommended.

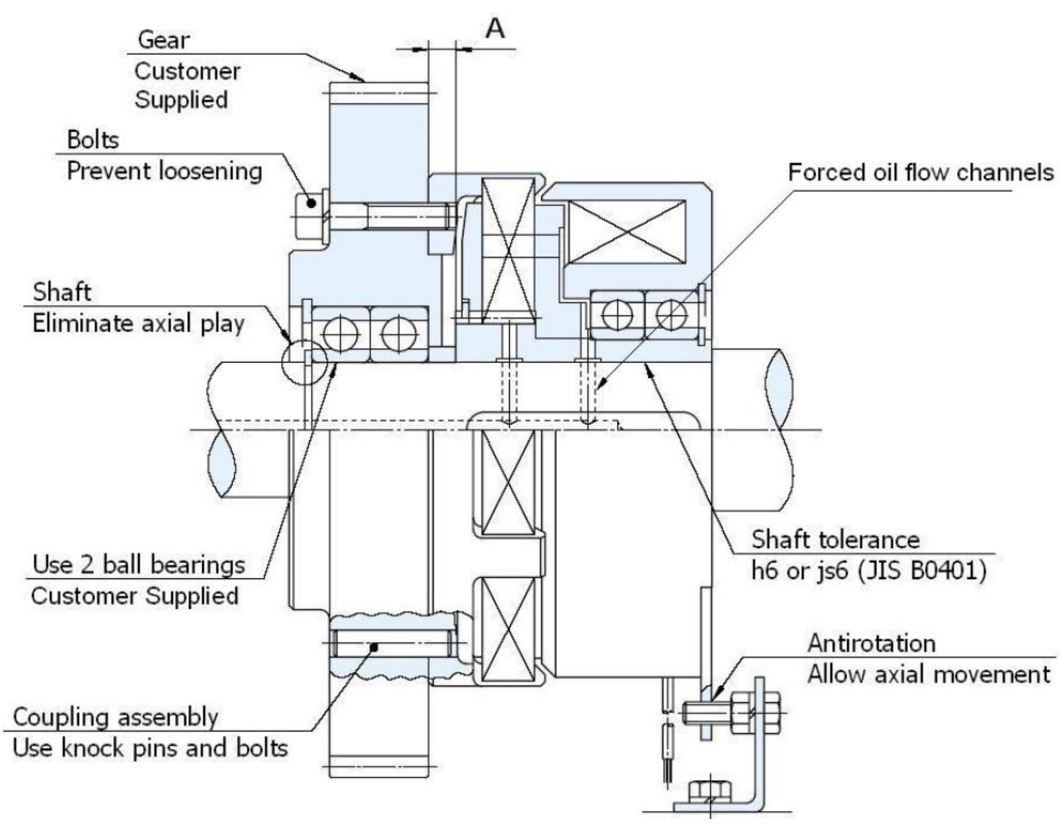
EXAMPLE ON INSTALLATION(HMWC)

2. The torque of clutch is varies with exciting voltage. Make sure that DC24V is always supplied to the clutch. Note that even when the exciting voltage is DC 24V, the clutch terminal voltage can be lowered by the line resistance if the circuit is too long. Check the exciting voltage at the clutch field and make sure you register 24 volts.

3. The clutch slips whenever it is engaged. The clutch discs wear and the wear rate increases gradually. This can be measured in the amount of release (disengaged) travel. The clutch requires no adjustment, but when the discs are very worn and the air gap exceeds the specified values the response time is influenced. At that point the discs in these units can be replaced. The amount of air gap wear rate is listed in Table 2.

Table 2

Model : HMWC	1.2	2.5	5	10	20	40
Initial release [inch]	0.031	0.031	0.039	0.055	0.063	0.071
Wear limit of release [inch]	0.071	0.071	0.079	0.114	0.122	0.126
Model : HMWC	80	160	250	320	450	600
Initial release [inch]	0.075	0.098	0.098	0.110	0.118	0.138
Wear limit of release [inch]	0.134	0.177	0.177	0.189	0.197	0.217



HMWC/HMWB SERIES

EXAMPLE ON INSTALLATION(HMWB)

The unit consists of four major components: the field, the rotor/hub assembly, the armature and the multiple friction disks. When the current is applied to the coil, the armature is pulled in, compressing the multiple disks and the friction between the disks functions as brake.

- **Installation Procedure**

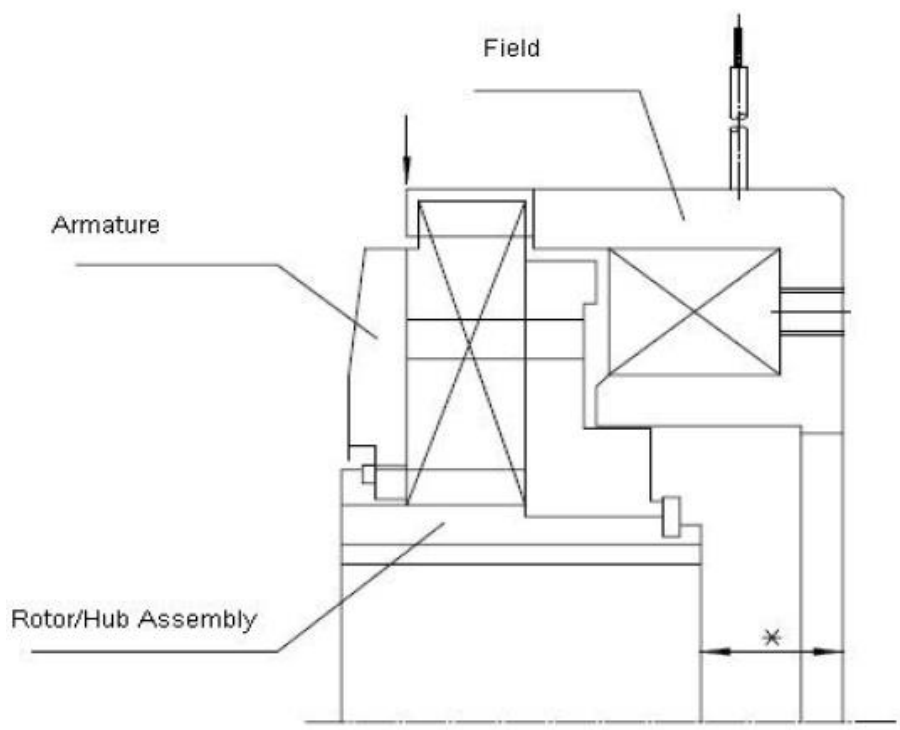
1. Mount the field to the machine frame using the four tapped holes provided. Concentricity of the field with the shaft should be less than 0.008" TIR. The perpendicularity of the field at the mounting surface should be less than 0.004" TIR.

2. Next, the rotor hub assembly should be slid onto the shaft and a spacer (customer supplied) needs to be provided to set the proper distance to align the rotor/hub. Mount the rotor/hub assembly so that the dimension shown with * is as specified in the table 1 (+/- 0.0012"). When the rotor/hub assembly is mounted at the correct position, 6 out stoppers (tangs) from the field OD and the armature contact surface are aligned as shown with the arrow.

3. Once the proper alignment is achieved the inner rotor hub assembly should be held in place via a set collar or other locking mechanism.

Table 1

Model	1.2N	2.5N	5N	10N	20N	40N	80N
Dimension [inch]	0.669	0.709	0.827	0.669	0.709	0.551	0.551



HMWC/HMWB SERIES

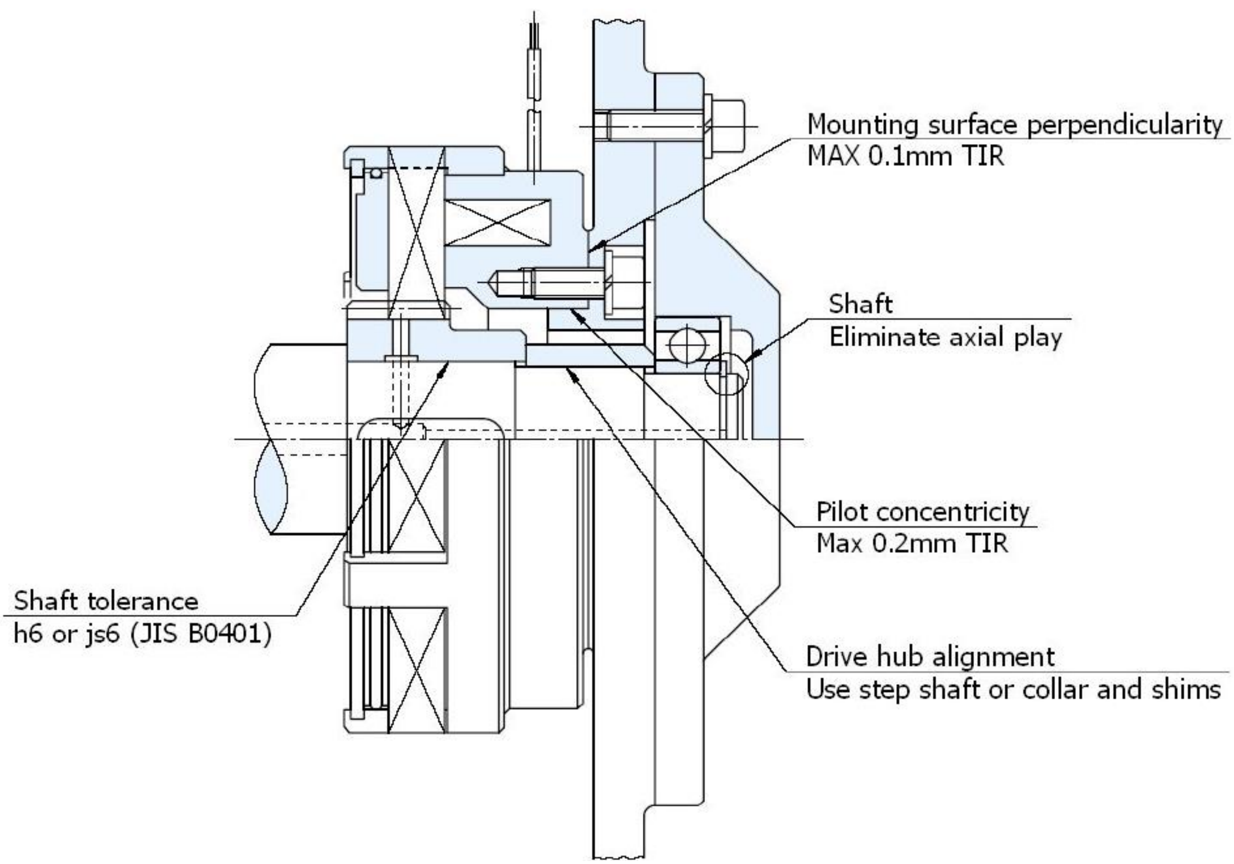
EXAMPLE ON INSTALLATION(HMWB)

- **Maintenance**

The friction disks on this unit wear due to slippage at the engagement, increasing the release. Although this unit does not require adjustments to the gap between the disks, when the release amount reaches the max, it affects the pull-in time. Replacing the friction disks is recommended.

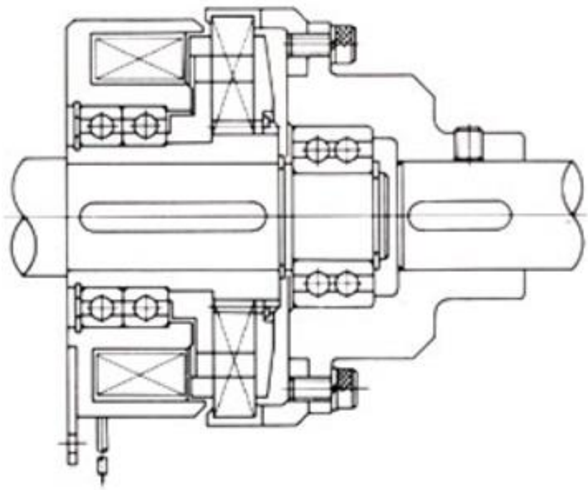
1. Torque of this unit is determined by the voltage. Periodically, it should be checked if the specified voltage is supplied to the unit (When a long wire is used, the voltage at the unit can be lower than the voltage at the power supply).

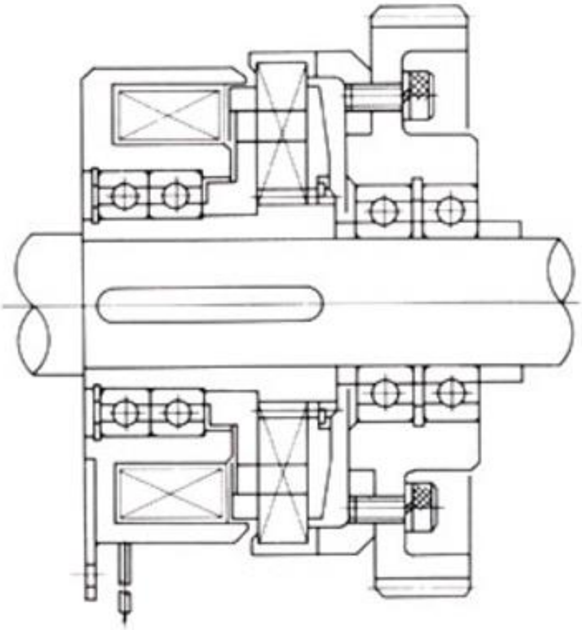
2. This unit is wet type and should be properly lubricated with oil. Turbine oil, ISO VG32~68 is recommended under normal operating conditions. However, when drag torque is an issue or operating at a particularly high or low speed or under cold temperature, machine oil, ISO VG5~10 is recommended.

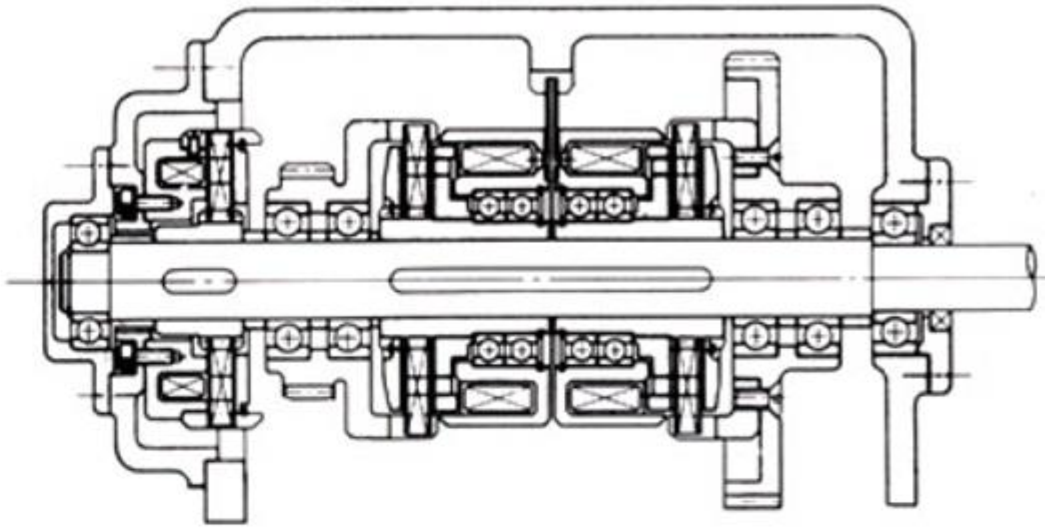


HMWC/HMWB SERIES

EXAMPLE ON INSTALLATION(HMWB)







HYOJOON

ELECTROMAGNETIC TOOTH CLUTCH

HMZ SERIES

OVERVIEW, FEATURES, APPLICATIONS, TORQUE RANGE

- **Definition:**

An **electromagnetic tooth clutch** is a specialized mechanical component designed to transmit torque between rotating shafts. Unlike traditional friction clutches, which rely on friction surfaces, tooth clutches engage positively through interlocking teeth or cogs. When an electric current flows through the clutch coil, it generates a magnetic field, causing the teeth to mesh together. This positive engagement ensures efficient power transfer and precise motion control.

- **Features:**

High Torque Density (Standard Static Torque: 2.5kgm~50kgm)
Compared to typical electromagnetic friction clutches, tooth clutches offer approximately three times more torque within the same diameter. This high torque density makes them advantageous for applications where space is limited, such as medical devices, printing machinery, and compact industrial equipment.

- **Compact Design:**

Despite their impressive torque capacity, electromagnetic tooth clutches maintain a compact form factor. This feature is crucial for integrating them into tight spaces within machinery and systems.

- **Precise Timing and Positioning:**

The interlocking teeth provide precise timing during engagement and disengagement. This accuracy is essential for applications where synchronization matters, such as multi-station machinery.

- **Positive Operation:**

Tooth clutches engage without gradual friction, ensuring minimal slippage and efficient torque transfer. Think of them as puzzle pieces—when the current flows, the teeth lock together; when the current is cut off, they disengage.

- **Applications:**

1. Industrial Machinery: Tooth clutches find widespread use in various industrial settings:
2. Conveyor Systems: For precise control over material movement.
3. Printing Presses: Ensuring accurate paper feeding and registration.
4. Packaging Machinery: Synchronizing packaging processes.
5. Factory Automation: Enabling controlled motion in assembly lines.
6. Automotive Systems: In vehicles, electromagnetic tooth clutches serve several purposes:
1) Differential Locks: Enhancing traction by locking differential gears.
2) Transfer Cases: Allowing seamless switching between 2WD and 4WD modes.
3) Limited-Slip Differentials: Balancing torque distribution between wheels.
7. Robotics and Automation: Precise motion control in robotics relies on tooth clutches.
Robotic arms, CNC machines, and automated handling systems benefit from their positive engagement.
8. Medical Devices:
Tooth clutches are suitable for medical equipment where space constraints and precise motion are critical.
Examples include surgical robots, diagnostic instruments, and imaging devices.
9. Other Applications:
1) Office Equipment: Copiers, printers, and scanners.
2) Textile Machinery: Ensuring synchronized fabric movement.
3) Marine Systems: Controlling propeller pitch and marine winches.

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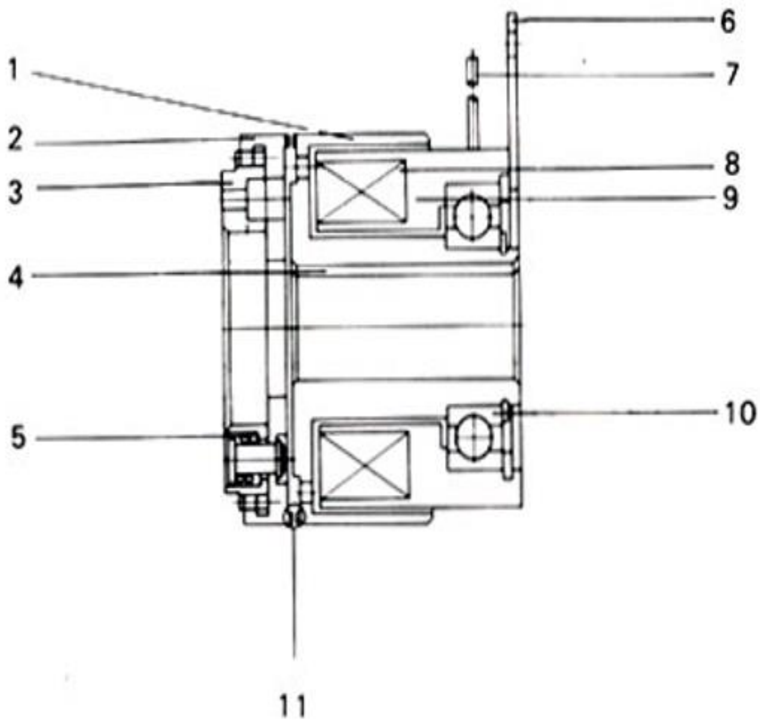
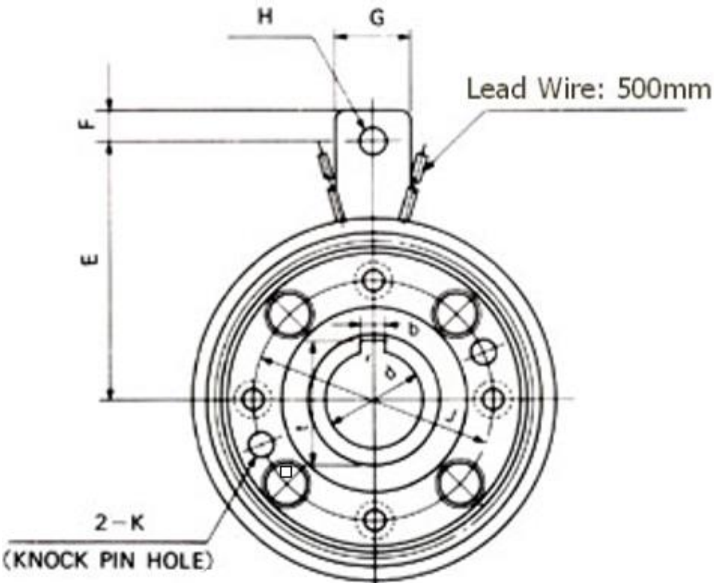
STRUCTURE & DIMENSION

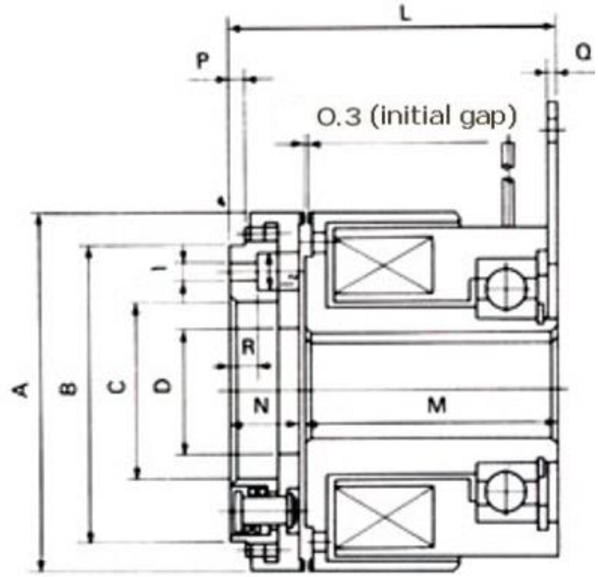


NO.	PART NAME
1	Rotor
2	Armature
3	Armature Hub
4	Key Way
5	Coil Spring
6	Anti-rotation Tab
7	Lead Wires
8	Coil
9	Stator
10	Ball Bearing
11	Tooth

- **Specifications**

MODEL	STATIC TORQUE (kgm)	VOLTAGE (DC-V)	COIL			ARMATURE PULL-IN TIME (sec)	ARMATURE RELEASE TIME (sec)	MAX ALLOWABLE SPEED (rpm)	GD_2(kgm^2)		MASS (kg)
			WATTAGE (W)	RESISTANCE (Ω)	CURRENT (A)				ROTOR	ARMATURE	
HMZ-2.5	2.5	24	15	38.5	0.63	0.06	0.06	5,000	0.0010	0.0010	1.5
HMZ-5	5		23	25	0.96	0.07	0.07	4,500	0.0020	0.0018	2.0
HMZ-10	10		30	19.2	1.25	0.09	0.09	3,800	0.0044	0.0033	3.0
HMZ-16	16		35	16.5	1.46	0.10	0.10	3,500	0.0085	0.0061	5.0
HMZ-25	25		40	14.4	1.67	0.14	0.14	3,200	0.0140	0.0116	5.0
HMZ-50	50		50	11.5	2.08	0.17	0.17	2,700	0.0378	0.0240	8.5



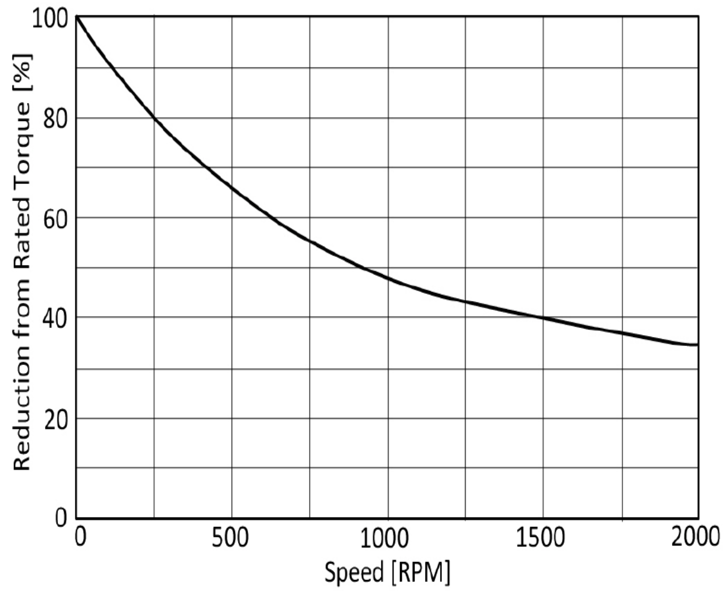


MODEL	SHAFT HOLE			A	B	C	D	E	F	G	H
	d	b	t								
HMZ-2.5	20	5	22	75	62	38	29	54	6	16	5.5
HMZ-5	25	7	28	85	70	45	34	58	6	16	5.5
HMZ-10	30	7	33	100	84	40	40	63	6	16	5.5
HMZ-16	35	10	38.5	110	90	46	46	68	6	16	5.5
HMZ-25	40	10	43.5	120	98	51	51	73	6	16	5.5
HMZ-50	50	12	53.5	140	112	62	62	88	10	24	8.5

MODEL	HOLE			J	K	L	M	N	P	Q	R
	l_1	l_2	QTY								
HMZ-2.5	4.5	8	4	50	4.8	67	52	13.7	3	2	5
HMZ-5	5.5	10	4	58	5.8	72	55	15.5	3	2	6
HMZ-10	6.5	13	4	68	5.8	75	57	16.5	3	2	7
HMZ-16	5.5	10	6	78	7.8	82	62	18.5	3	2	7
HMZ-25	6.5	13	6	82	7.8	92	70	20.5	3	2	8
HMZ-50	8.5	16	6	92	9.8	112	85	25.5	3	2.9	10

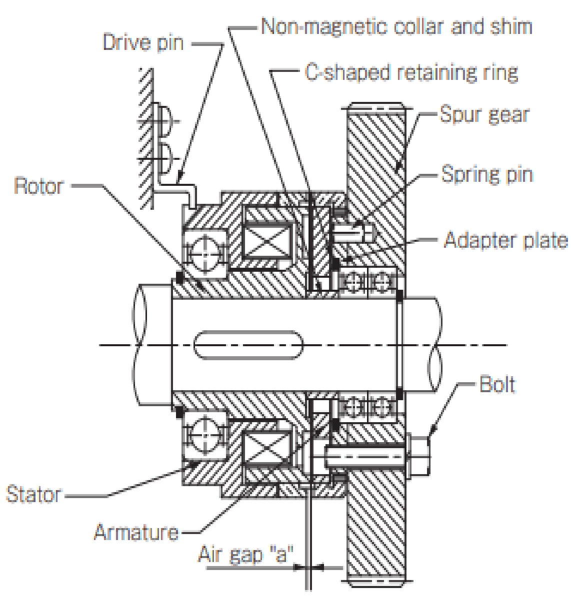
PRECAUTION OF MOUNTING & USE

Please refer to the right figure when you select the size of the tooth clutch.
The tooth clutch is influenced by the way of mounting and vibration. Also, transmission torque will decrease if you increase the RPM. For the safety, it is recommended to refer to the figure.



- **Precaution of Mounting**

This clutch is mounted for a through-shaft. The mounting example shown below is for mounting on an ordinary through-shaft.



Collar lengths when using bearings to center

Size	Dimensions [mm]	Size	Dimensions [mm]
12	7.3	23	15.5
13	8.3	25	17.5
15	10.5	31	22.0
21	15.0	32	23.5

* Process the collar length to the negative tolerance and then make fine adjustments with shims.
* Five shims (0.1 mm in thickness) are provided for each shaft bore diameter.
* If not using the bearing to center, use a different collar design.

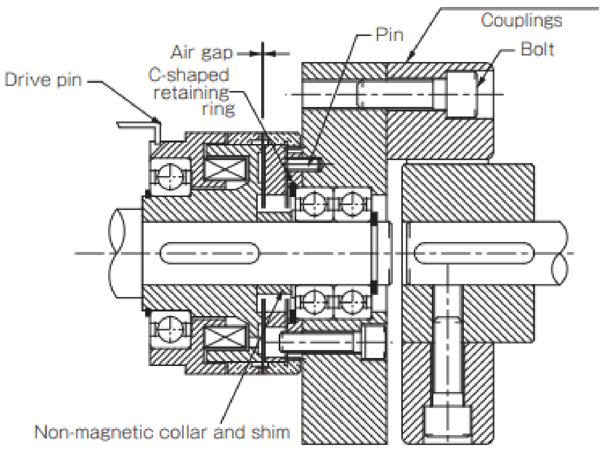
(1) Set the air gap between the teeth tips on the rotor and armature sides so that it is the value “a” in the dimensions table. Shims may be used to facilitate setting of the air gap.

(2) Use a collar made of a non-magnetic material (such as stainless steel or brass) to set the air gap. Use the reference values of the table right for the length of the collar when centering bearings relative to the adapter plate

(3) When mounting, lock it securely in the axial direction so that there is no play (rattle) in the axial direction.
(4) We recommend a tolerance of H7 or h6 for the shaft when mounting.
(5) This clutch is for through-shafts; when using it on butt shafts, align one of the shafts with a bearing. Using a specific coupling makes it relatively easy to find the centers. See the mounting examples next.

HMZ SERIES

PRECAUTION OF MOUNTING & USE



- **Precaution of Use**

(1) Tooth will not mesh together if the inertia on the driven side is too great. In such cases, we recommend lowering the rotation speed.

(2) With single position tooth shapes, drag torque will be generated by contact between tooth tips until the tooth reach their engaging position after pull-in. Tooth clutches are structured, however, so the tooth do not form a magnetic circuit, meaning that drag torque is low and hardly ever a problem. When load torque is very small compared to clutch torque, however, drag turning may occur on the driven side. In such cases, a brake must also be used, to prevent drag turning.

(3) The keyway cannot be aligned with the adapter plate mounting holes in the engaging position. When alignment is necessary, adjust position with the paired side elements of the clutch.

(4) When used in stationary engagement, teeth may fail to engage and come into contact with other tooth tips when pull-in occurs. Rotation in this condition may result in teeth slipping rather than engaging, so adjust the acceleration speed of the drive side to engage.

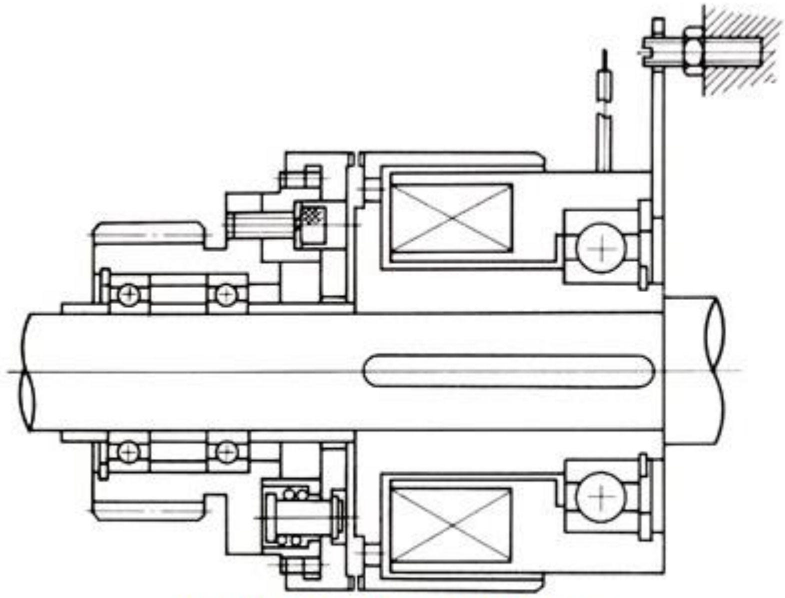
(5) The operating temperature is 0° C to 40° C.

(6) The operating power supply of the clutch is DC 24 V. Keep fluctuations of the applied voltage within -10% to +5%. Since optimal BES model power supplies are available for the tooth clutch, we recommend one of these be used for both.

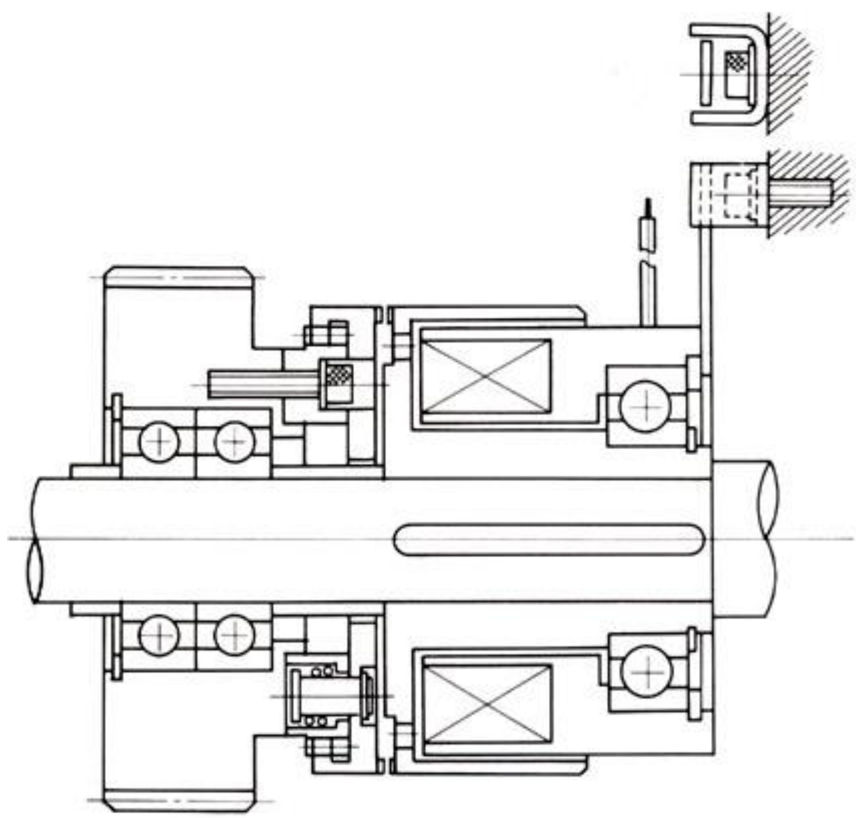
(7) Install a switch on the DC side to turn the clutch on and off. Operating times will be slower if it is installed on the AC side. A varistor to protect contacts should also be connected in parallel to the clutch

HMZ SERIES

EXAMPLE ON MOUNTING



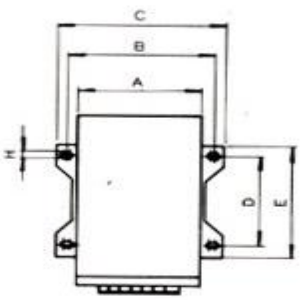
ATTACHED TO SMALL GEAR

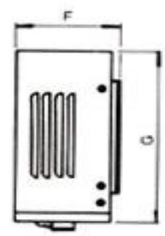


ATTACHED TO LARGE GEAR

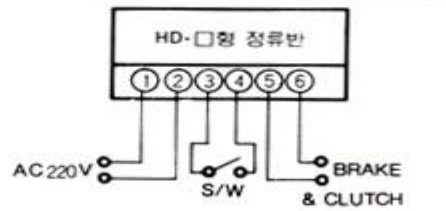
POWER SUPPLY

■ HD 型

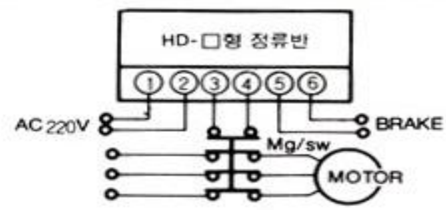




크러치 또는 브레이크만 단독 운전을 할 경우

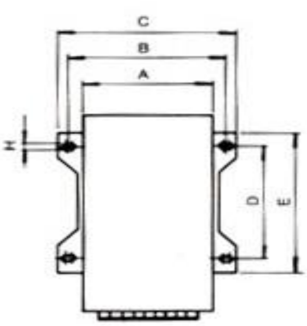


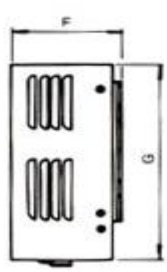
모타와 A type 브레이크를 연동 사용할 경우



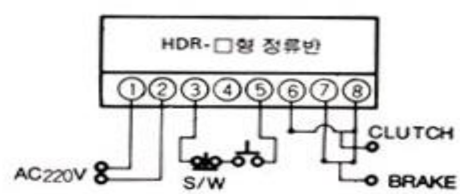
型式	入力電圧	出力電圧	容 量	A	B	C	D	E	F	G	H
HD-3	AC220V	DC24V	30VA	114	132	147	64	76	82	120	5
HD-6			60VA	112	136	154	117	135	81	191	5
HD-8			80VA	143	166	186	90	105	81	150	5

■ HDR 型



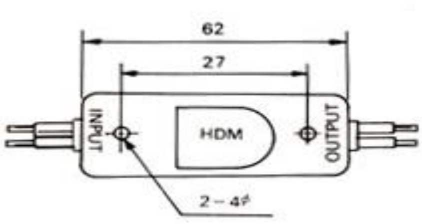


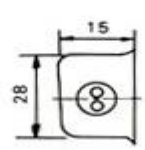
크러치와 브레이크를 복합연동 사용할 경우

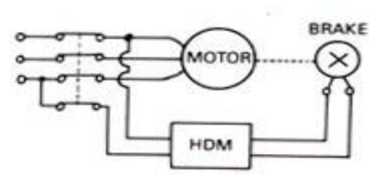


型式	入力電圧	出力電圧	容 量	A	B	C	D	E	F	G	H
HDR-6	AC220V	DC24V	60VA	112	136	154	117	135	81	191	5
HDR-10			100VA	123	151	154	117	135	91	220	5
HDR-13			130VA	123	151	164	117	135	91	220	5

■ HDM 型(入力電圧：AC220V, 出力電圧：DC90V)







INTERCHANGE TABLE

ELECTROMAGNETIC CLUTCH

HYOJOON	MIKIPULLEY	OGURA	CHAIN TAIL
FLANGE-mounted			
HC- ▫ ▫	101- ▫ -13G	-	-
HCH- ▫ ▫	101- ▫ -15G	-	-
HCP- ▫ ▫	101- ▫ -11G	-	-
BEARING-mounted			
HCS- ▫ ▫	CS- ▫ -33G	-	-
HCSH- ▫ ▫	CS- ▫ -35G	-	-
HCSP- ▫ ▫	CS- ▫ -31G	-	-

ELECTROMAGNETIC BRAKE

HYOJOON	MIKIPULLEY	OGURA	CHAIN TAIL
Directed-mounted			
HB-06	111-06-13G	-	CDG0S6AA
HB-08	111-08-13G	-	CDG1S5AA
HB-10	111-10-13G	-	CDG2S5AA
HB-12	111-12-13G	-	CDG005AA
HB-16	111-16-13G	-	CDG010AA
HB-20	111-20-13G	-	CDG020AA
HB-25	111-25-13G	-	CDG040AA
Shaft-mounted			
HBR-06	111-06-12G	-	CG10S6AA(AB)
HBR-08	111-08-12G	-	CG11S5AA(AB)
HBR-10	111-10-12G	-	CG12S5AA(AB)
HBR-12	111-12-12G	-	CG1005AA(AB)
HBR-16	111-16-12G	-	CG1010AA(AB)
HBR-20	111-20-12G	-	CG1020AA(AB)
HBR-25	111-25-12G	-	CG1040AA(AB)
Standard-shape			
HBP-06	111-06-11G	-	CG20S6AA(AB)
HBP-08	111-08-11G	-	CG21S5AA(AB)
HBP-10	111-10-11G	-	CG22S5AA(AB)
HBP-12	111-12-11G	-	CG2005AA(AB)
HBP-16	111-16-11G	-	CG2010AA(AB)
HBP-20	111-20-11G	-	CG2020AA(AB)
HBP-25	111-25-11G	-	CG2040AA(AB)

CLUTCH/BRAKE UNIT

HYOJOON	MIKIPULLEY	OGURA	CHAIN TAIL
Butt shaft construction			
HCB-06-12	125-06-12EG	-	CDA0S6AA
HCB-08-12	125-08-12EG	-	CDA1S5AA
HCB-10-12	125-10-12EG	-	CDA2S5AA
HCB-12-12	125-12-12EG	-	CDA005AA
HCB-16-12	125-16-12EG	-	CDA010AA
HCB-20-12	125-20-12EG	-	CDA020AA
Through-shaft construction			
HCB-06-20	121-06-20G	-	CDB0S6AA
HCB-08-20	121-08-20G	-	CDB1S5AA
HCB-10-20	121-10-20G	-	CDB2S5AA
HCB-12-20	121-12-20G	-	CDB005AA
HCB-16-20	121-16-20G	-	CDB010AA
HCB-20-20	121-20-20G	-	CDB020AA
HCB-25-20	121-25-20G	-	CDB040AA

DOUBLE CLUTCH UNIT

HYOJOON	MIKIPULLEY	OGURA	CHAIN TAIL
HCC-06	121-06-10G	-	CDD0S6AA
HCC-08	121-08-10G	-	CDD1S5AA
HCC-10	121-10-10G	-	CDD2S5AA
HCC-12	121-12-10G	-	CDD005AA
HCC-16	121-16-10G	-	CDD010AA
HCC-20	121-20-10G	-	CDD020AA
HCC-25	121-25-10G	-	CDD040AA

DOUBLE CLUTCH / BRAKE UNIT

HYOJOON	MIKIPULLEY	OGURA	CHAIN TAIL
HCCB-06	122-06-20G	-	-
HCCB-08	122-08-20G	-	CFG1S5AA
HCCB-10	122-10-20G	-	CFG2S5AA
HCCB-12	122-12-20G	-	CFG005AA
HCCB-16	122-16-20G	-	CFG010AA
HCCB-20	122-20-20G	-	CFG020AA

MOTOR-CONNECTED CLUTCH/BRAKE UNIT

HYOJOON	MIKIPULLEY	OGURA	CHAIN TAIL
HCBM- ▫ ▫ -4B	126- ▫ ▫ -4B	-	-

WORM REDUCER INTERGRATED CLUTCH/BRAKE UNIT

HYOJOON	MIKIPULLEY	OGURA	CHAIN TAIL
HCBW- ▫ ▫ -SR	CBW-□N-B□	-	-

WET-TYPE MULTIPLE DISC ELECTROMAGNETIC CLUTCH/ BRAKE

HYOJOON	MIKIPULLEY	OGURA	CHAIN TAIL
Clutch			
HMWC-1.2	-	MWC-1.2	MWJ1S2AA
HMWC-2.5	-	MWC-2.5	MWJ2S5AA
HMWC-5	-	MWC-5	MWJ005AA
HMWC-10	-	MWC-10	MWJ010AA
HMWC-20	-	MWC-20	MWJ020AA
HMWC-40	-	MWC-40	-
HMWC-80	-	MWC-80	-
HMWC-160	-	MWC-160	-
HMWC-250	-	MWC-250	-
HMWC-320	-	MWC-320	-
HMWC-450	-	MWC-450	-
HMWC-600	-	MWC-600	-
Brake			
HMWB-1.2	-	MWB-1.2	MWI1S2AA
HMWB-2.5	-	MWB-2.5	MWI2S5AA
HMWB-5	-	MWB-5	MWI005AA
HMWB-10	-	MWB-10	MWI010AA
HMWB-20	-	MWB-20	MWI020AA
HMWB-40	-	MWB-40	-
HMWB-80	-	MWB-80	-
HMWB-160	-	MWB-160	-

TOOTH CLUTCH

HYOJOON	MIKIPULLEY	OGURA	CHAIN TAIL
HMZ- ▫ ▫	-	MZ- ▫ ▫	-

BANDOBEARING

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