TE075E.00TS-4
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TSUBAKI

Gearmotor

Hypoid Motor

< TE Series >

3 Phase 0.75kW to 5.5kW

Instruction Manual

- Thank you for choosing Tsubaki gearing products. Your Gearmotor/Hypoid Motor is a high quality, sophisticated unit which should be handled only by experienced engineers. To ensure you obtain optimum performance, read and follow the entire instructions and safety precautions.
- This manual should remain with the Gearmotor/Hypoid Motor at all time, including when re-distributed.
- To ensure safety, this manual should be kept as an easy reference to anyone using the units at all time.

TSUBAKIMOTO CHAIN CO.

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Gearmotor/Hypoid Motor

Safety precautions in this manual are classified into two categories: “WARNING” and “CAUTION”. These are defined as follows:

WARNING	Death or serious injury may result from misusing the product without following the instructions.
CCC **CAUTION**	Minor or moderate injury, as well as damage to the product may result from misusing the product without following the instructions.

Notice that although categorized under “CAUTION”, subjects discussed may lead to serious results depending on the situation.

WARNING

- Do not use the Gearmotor/Hypoid Motor in an explosive atmosphere. Use explosion-proof type motors in such environment. Otherwise explosion, ignition, fire, electrical shock, injury or damage to the device may occur.
- Transporting, installing, wiring, maintaining or inspecting must be carried out by skilled and professional engineers. Otherwise explosion, ignition, fire, electrical shock, injury or damage to the device may occur.
- Do not handle the Gearmotor/Hypoid Motor at live-wire operations . Switch off the power supply prior to operating to prevent electrical shock.
- When the Gearmotor/Hypoid Motor is used with vehicles for transporting people, install a suitable protection device on the vehicle. Otherwise it could run out of control/fall and result in injury accidents and damages to the equipments.
- When the Gearmotor/Hypoid Motor is used for an elevator, install a suitable safety device on the elevator. Otherwise it could fall and result in injury accidents and damage to the equipments.
- Keep the brake free from water and oil. Otherwise it could fall due to lowering brake torque and result in injury accidents and damage to the equipments.
- Skilled engineering is required to overhaul Gearmotor/Hypoid Motor. Return to Tsubakimoto Chain Co. for detailed inspection.

CAUTION

- Do not use the Gearmotor/Hypoid Motor beyond its capacity, specified on the nameplate. Otherwise electrical shock, injury or damage to the device may occur.
- Do not insert fingers or other objects in the opening of the Gearmotor/Hypoid Motor. Otherwise electrical shock, injury, fire or damage to the device may occur.
- Do not use damaged Gearmotor/Hypoid Motor. Otherwise injury or fire may occur.
- Do not remove the nameplate.
- Problems due to remodeling by the customer are not covered by our warranty and therefore we cannot be held responsible.

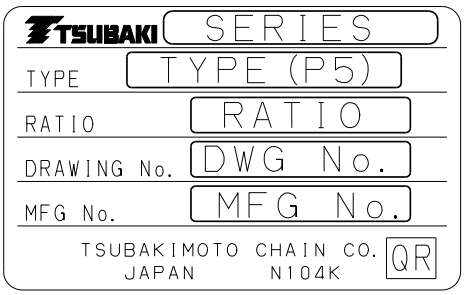
【1】 Upon delivery of Gearmotor/Hypoid Motor

1-1.Upon delivery Gearmotor/Hypoid Motor

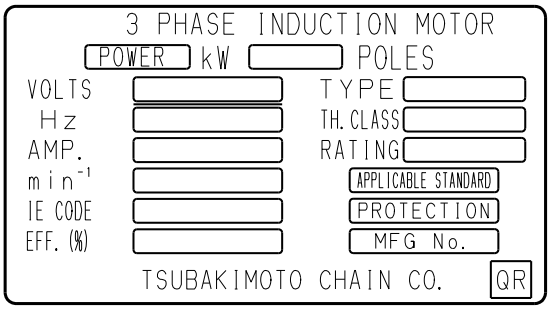
Upon delivery, all parts to the reducer should be carefully recorded to determine any shortages or damages. Immediately notify Tsubakimoto Chain Co. or your distributor for any such shortages or damages.

⚠ CAUTION
● Be sure the unit delivered matches your order. This will prevent you from unexpected accidents or injuries upon opening the package. ● Be sure the package is in upright position prior to opening. Otherwise injury may occur.

(1) Confirm whether the motor power, reduction ratio, model, voltage, etc. printed on the nameplate correspond to your request.
(2) Check for any possible damages done to the product during transportation.
(3) Be sure the screws and bolts are securely fastened.
(4) For Clutch-Brake Type Gear Motor, be sure the two pieces of varistors are included.



NAMEPLATE OF REDUCER



NAMEPLATE OF MOTOR

1-2. Contacting Tsubakimoto Chain Co.

If the reducer delivered do not match the contents printed on the nameplate, or if ordering spare/repair parts, please provide the following information.

(1) Manufacturing No. (MFG NO.)
(2) Model No. (TYPE)
(3) Drawing No. (DRAWING NO.)
(4) Reduction ratio (RATIO) or rotational speed (OUTPUT SPEED)

1-3. Lubrication

Reducers are filled with grease in the factory. Thus initial lubrication is not necessary and use as it is.

1-4. Nomenclature

(1) Gearmotor

GMTE ① 075 ② – 38 ③ L ④ 75 ⑤ □ ⑥ □□□ ⑦ □□□ ⑧

① Series	GMTE	Motorized
② Motor power (example)	075 220	3-phase 0.75 kW 3-phase 2.2 kW
③ Frame number (example)	38	Frame No.38
④ Mounting	L U F	Foot mount Face mount Flange mount
⑤ Reduction ratio (example)	75	1/75
⑥ Specification symbols	No symbol B CB FI BE	No brake, clutch-brake or encoder Brake type Clutch-brake type Adapter type(only for 3.7kW and 5.5kW) Encoder type
⑦ Option code A	1.W 2.WC 3.P 4.J 5.V 6.V1 7.V2 8.V3 9.V4 10.N 11.H 12.Q 13.M 14.A1 15.A2	Outdoor type Outdoor type(with brake, continuous rating) Plastic terminal box(for 0.75kw w/o brake only) Water-proof type 380/400/400/440V・50/50/60/60Hz….0.75-2.2kW 400/400/440/460V・50/60/60/60Hz……3.7-5.5 kW 380/400/400/440V・50/50/60/60Hz……3.7-5.5 kW (with brake) 380V/50Hz (for 3.7kW and 5.5kW) 380V/60Hz 415V/50Hz 460V/60Hz (for 0.75-2.2kW) CE marking Hard terminal box (only for 0.75kW) One-touch manual release type Manual shaft type Heat-proof type Cold-proof type
⑧ Option code B	P1 P2 P3 P4 P5 P6 P7 F1 F2 F3 C0 C1 C2 C3	Terminal box position: 90° swing (3.7kW to 5.5kW only) Terminal box position: 180° swing (1.5kW to 5.5kW only) Terminal box position: 270° swing (3.7kW to 5.5kW only) Terminal box position: 60° swing (1.5kW to 2.2kW only) Terminal box position: 120° swing (0.75kW to 2.2kW only) Terminal box position: 240° swing (0.75kW to 2.2kW only) Terminal box position: 300° swing (1.5kW to 2.2kW only) Terminal box outlet direction: 90° swing Terminal box outlet direction: 180° swing Terminal box outlet direction: 270° swing Paint color: Light gray (Munsell N7.5) Paint color: Light silver metallic Paint color: Ivory white Paint color: Dark silver metallic

(2) Hypoid Motor

HMTE 075 – 38 L 50 L □ □□□ □□□
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① Series	HMTE	Motorized
② Motor power (example)	075 220	3-phase 0.75 kW 3-phase 2.2 kW
③ Frame number (example)	38	Frame No.38
④ Mounting	L U H	Foot mount Face mount Hollows shaft type
⑤ Reduction ratio (example)	50	1/50
⑥ Shaft arrangement	L T R S No code	Left sided output shaft viewed from motor side both sided output shaft Right sided output shaft viewed from motor side One sided (face mount side)output shaft(only for face mount) Hollow output shaft type
⑦ Specification code	No code B FI K BE	No brake, clutch-brake or encoder Brake type Adapter type(only for 3.7kW and 5.5kW) Power lock type (only for hollow shaft type) Encoder type
⑧ Option code A	1.W 2.WC 3.P 4.J 5.V 6.V1 7.V2 8.V3 9.V4 10.N 11.H 12.Q 13.M 14.A1 15.A2	Outdoor type Outdoor type(with brake, continuous rating) Plastic terminal box(for 0.75kw w/o brake only) Water-proof type 380/400/400/440V･50/50/60/60Hz….0.75-2.2kW 400/400/440/460V･50/60/60/60Hz……3.7-5.5 kW 380/400/400/440V･50/50/60/60Hz……3.7-5.5 kW (with brake) 380V/50Hz (for 3.7kW and 5.5kW) 380V/60Hz 415V/50Hz 460V/60Hz (for 0.75-2.2kW) CE marking Hard terminal box (only for 0.75kW) One-touch manual release type Manual shaft type Heat-proof type Cold-proof type
⑨ Option code B	P1 P2 P3 F1 F2 F3 C0 C1 C2 C3 S1 S2 S3 S4 S5 S6 S7	Terminal box position: 90°swing Terminal box position: 180°swing Terminal box position: 270°swing Terminal box outlet direction: 90°swing Terminal box outlet direction: 180°swing Terminal box outlet direction: 270°swing Paint color: Light gray (Munsell N7.5) Paint color: Light silver metallic Paint color: Ivory white Paint color: Dark silver metallic Hollow shaft hole diameter: ϕ20 Hollow shaft hole diameter: ϕ25 Hollow shaft hole diameter: ϕ30 Hollow shaft hole diameter: ϕ35 Hollow shaft hole diameter: ϕ40 Hollow shaft hole diameter: ϕ45 Hollow shaft hole diameter: ϕ50

1-5. Caution by replacing to the premium efficiency motor (IE3)

(1) The size of motor will be bigger than previous IE1 motor.
Please check the fitting dimension and interference of related equipment.

(2) The rated rotational speed of motor will be higher than previous IE1 motor.
The energy consumption tends to be increased, due to increasing the rotational speed of motor in some case.

(3) The starting current tends to be larger.
To recheck the capacity of electrical devices, such as circuit breaker, magnetic contactor, relay, and so on, may be needed.

(4) The torque generated by motor tends to be larger.
Recheck the strength of customer's equipment, due to increasing potential motor output power.

(5) In the case of any load fluctuation, such as compressor, textile machine, etc.
The generation of heat tends to be larger by the rotational speed fluctuation. The inertia of driven equipment including load fluctuation should be reconsidered.

(6) Regarding the motor

- Motor rotational speed
  The rated rotational speed of the motor will be higher than the previous IE1 motor, because the premium efficiency motor (IE3) has low slip due to controlling the loss on the motor.
  Ex) The rated rotational speed: from 1710 to 1740 r/min
- Motor current
  The starting torque and starting current on the premium efficiency motor (IE3) will increase compare with previous IE1 motor, because the coil resistance is designed at lower for dropping copper loss. Therefore, redesigning of device in the control box, such as the circuit breaker, and size change of reducer capacity may be needed.
- Energy consumption
  The energy consumption may be increased, because the motor output power is increasing, though the motor efficiency is high.
  Ex) The motor output power will be increasing, in the case of such as the load in the pump application. (The load using pump for liquid will increase proportional to cube of rotational speed) Because the rotational speed of motor will increase by replacing to the premium efficiency motor.

(7) Please check the following points, when the motor is operated directly by commercial power supply. In the case of inverter operation, can be used as before.

- Check the gear ratio, when the actual speed on previous IE1 motor cannot be increased.
- Check the service factor and reducer size, in case of frequent starting and stopping application.
- Check the motor capacity, in the case of continuous operation with light loads.

【2】 Transportation

WARNING

- Never step under the product when it is elevated for transportation, otherwise either the poduct or load may fall, causing accidents resulting in death or injury.

CAUTION

- When transporting equipment, caution must be taken to prevent the load from falling or overturning. When lifting rings are used, make sure they are securely fastened. After the Gearmotor/Hypoid Motor is installed to other equipment however, do not lift the motor by using these lifting rings to prevent accidents caused by overload.
- Be sure the weight of the motor, based on the diagram and catalog provided, does not exceed that of the rated maximum assigned to the lifting device. Also, do not hold the Gearmotor/Hypoid Motor by the terminal box or it may fall off.
- If packed in a wooden case, lifting by fork lift is not stable. Secure package by belts, if fork lifting is necessary.

【3】 Installation

The operating life of the Gearmotor/Hypoid Motor is determined by correct installation. Take careful note of the following instructions.
Grease bath lubrication requires no specific installation positioning. (horizontal, vertical or any other direction)

WARNING

- Do not use the Gearmotor/Hypoid motor in an explosive atmosphere. In such cases, use explosion-proof type motor. Otherwise explosion, ignition, electrical shock, injury, fire, or damage to the device may occur.
- When necessary, use explosion-proof type motor suitable for such an environment to prevent possible explosion, ignition, electrical shock, injury, fire and damage to the device.
- When driving a flame-proof motor by inverter, be sure to use a verified motor including inverter. Install the inverter in a non-explosive atomosphere, because inverter itself is a non-explosive structure. This will prevent explosion, ignition, electrical shock, injury, fire and damage to the device.
- Safety increased type explosion proof motor cannot be driven by inverter.

CAUTION

- Never place any flammables around the Gearmotor/Hypoid Motor. Fire may occur.
- Never place any obstacles that block ventilation around the Gearmotor/Hypoid Motor to prevent overheating which can cause burns, fire or other such accidents.
- Never climb or hang onto the Gearmotor/Hypoid Motor to avoid possible injury.
- Do not touch the shaft keyway with bare hands, to avoid possible injury.
- When the Gearmotor/Hypoid Motor is used for food processing machinery, install a device such as an oil pan, to prevent grease from leaking. Lubricant oil can damage food or other such products.

3-1. Installation site

Ambient temperature	−20℃ to 40℃
Ambient humidity	Less than 85%
Altitude	Less than 1000 m
Environment	No corrosive or explosive gas/steam. Must be well ventilated and free from dust.

- Indoor type
  Install indoors at ambient temperature of −20℃ to 40℃, in a well ventilated space, with as little humidity and dust as possible.
  Degree of protection of the Gearmotor/Hypoid Motor is;
  3-phase No brake: IP44, With brake: IP20, With clutch&brake: IP12

- Outdoor type
  Install outdoors at ambient temperature of −20℃ to 40℃, and avoid dust as much as possible.
  Degree of protection of the Gearmotor/Hypoid Motor is;
  In the case of horizontal installation: IP55 (with brake and no brake)
  For other installation positions, contact Tsubakimo Chain Co.

- Water-proof type
  Can be used at IP65 environment (however, IP55 is specified in the nameplate, due to the standard)

3-2. Installation

- Foot Mount type

Use an installation table that is flat and stable, and that is not easily affected by vibrations.
Dust off the installation table and use the surface to firmly fix the motor with 4 bolts.
It is recommended to use a stopper at the foot portion to protect against indirect drives or frequent starting and stopping of the motor.

- Face Mount and Hollow Shaft types

Note the following when installing Face Mount and Hollow Shaft types.

① Installation
Tap holes in the reducer units will be damaged if the bolt and tap fitting length are too short or tightening torque is too large. While the bolt tightening torque is too small, bolts may loosen due to the shock when starting and stopping.

② Installation bolts
a) Specifications

Installation using the tapped (thread) holes	Installation using the through holes
Hexagon Head Bolt (JIS B1051, Strength Class 4.6)	Hexagon Head Bolt (JIS B1051, Strength Class 8.8)
HSHC Screw(JIS B1051, Strength Class 10.9)	HSHC Screw(JIS B1051, Strength Class 10.9)

HSHC : Hexagon Socket Head Cap

b) Bolt lengths
Bolt lengths depend on the flange thickness plus fitting length of thread based on the following table, if using the tapped holes to install.
*In case of Hypoid Motor M8-28mm, add 10mm more.

Gearmotor Face Mount type

When using tapped holes	
Depth of tapped hole	Length of thread
M8 - 26 mm	Over and 18 mm
M10 - 32 mm	Over and 22 mm
M12 - 38 mm	Over and 26 mm
M16 - 34 mm	Over and 24 mm

Hypoid Motor Face Mount type/Hollow Shaft type

When using tapped holes		When using through holes	
Depth of tapped hole	Length of thread	Through hole size	Bolt length
M8 - 28 mm*	Over and 25 mm	M6	Over and 95 mm
M10 - 34 mm	Over and 31 mm	M8	Over and 120 mm
M12 - 46 mm	Over and 43 mm	M10	Over and 150 mm
M16 - 44 mm	Over and 41 mm	M12	Over and 170 mm
M20 - 52 mm	Over and 50 mm	M16	Over and 200 mm

③ Bolt tightening torque

Tighten the bolts with the torques shown in the following table

Screw Size	Hexagon Head Bolt		Hexagon Socket Head Cap Screw	
	N·m	{Ref. kgf·m}	N·m	{Ref. kgf ·m}
M6	4.1 – 4.3	{0.40 – 0.42}	4.1 – 8.2	{0.40 – 0.80}
M8	9.8 - 10.3	{1.0 - 1.05}	9.8 - 19.6	{1.0 - 2.0}
M10	19.6 - 20.6	{2.0 - 2.1}	19.6 - 39.2	{2.0 - 4.0}
M12	34.3 - 36.3	{3.5 - 3.7}	34.3 - 68.6	{3.5 - 7.0}
M16	84.3 - 88.2	{8.6 - 9.0}	84.3 - 168.6	{8.6 - 17.2}
M20	132.3 – 139.2	{13.5 – 14.2}	132.3 – 264.6	{13.5 – 27.0}

Note) When installing the optional flange to a face mount Gearmotor (U-type), be sure to use the attached bolts and conical spring washers.

- Flange type (Gearmotor)

Make the Gearmotor is firmly secured to the flange plate.

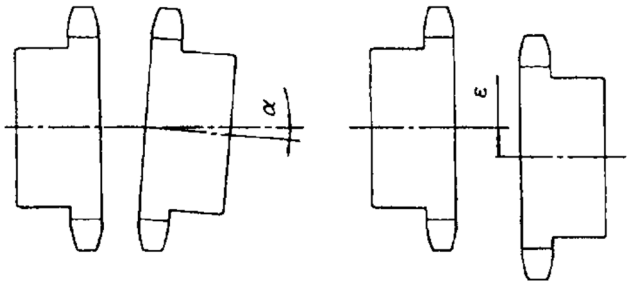
【4】 Connecting to machinery

CAUTION

- When connecting Gearmotor/Hypoid motor to another machinery, pay attention to centering, belt tension, and pully parallelism. For direct coupling, be sure to connect accurately. When using belt-drive, secure the belt to appropriate tension. Before operating, firmly tighten the bolts of the pulley or coupling to avoid injury or damage to the device due to flying apart of broken piece.
- Install a cover to prevent access to any rotating parts. Otherwise injury may occur.

Do not hammer on sprocket or gear. Tolerance of output shaft is fixed at h6. Fit the sprocket and gear by interference fit. Conduct by shrinking at approximately 100℃. In case phase adjustment is required, use of Power Lock (key less locking device) is recommended. Center belts and chains correctly, and do not exceed maximum overhang load specified.

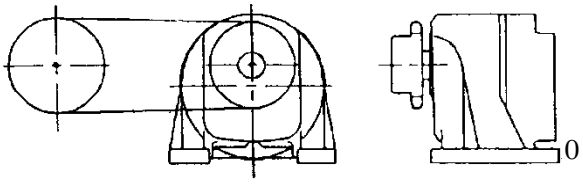
4-1. Direct coupling



- Displacement value α and ε should be small as possible.
- Value α and ε depend on the coupling device (e.g. Tsubaki Roller Chain Coupling: α = up to 1°, ε = up to 2% of the chain pitch)

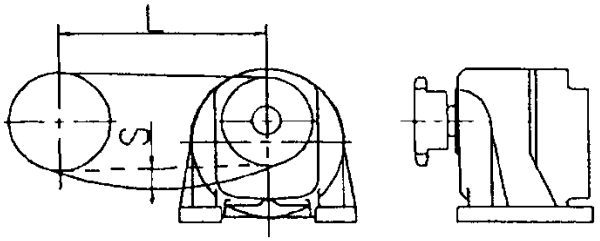
4-2. Chain or Belt

Correct



- Correct tension of belt or chain.
- Correct direction of sprocket or pulley.

Incorrect

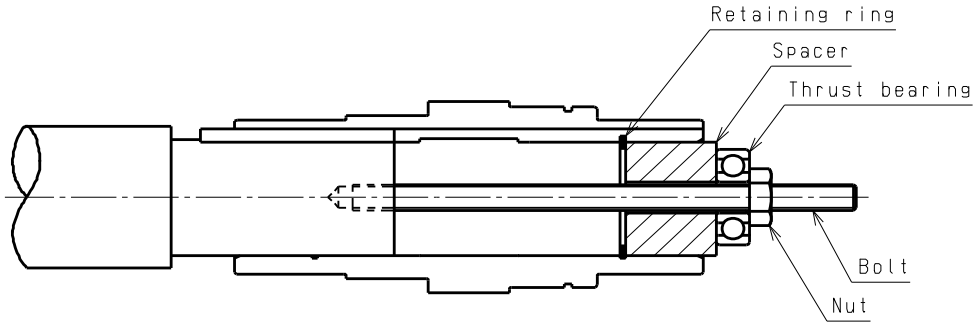


- Direction of sprocket is opposite. Tooth is located at the end of the shaft.
- Tension of the chain is too loose. For roller chain transmission, S should be approx. 4% of length L (span between two axes).

4-3. Installing/Uninstalling of hollow shaft

(1) Inserting to the driven shaft

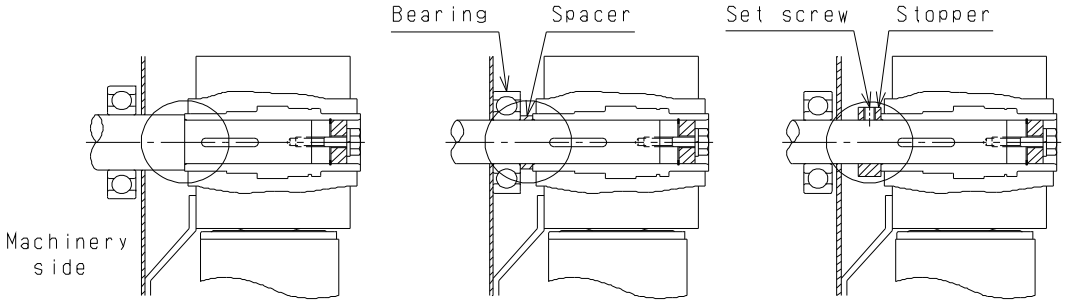
- Tolerance of hollow shaft bore is fixed at JIS H8. That of the driven shaft should be around h7. If shock or radial load is large, make it tight with js6 or k6.
- To insert to the driven shaft, coat its inner and outer surface with molybdenum disulfide grease.
- If make a jig shown below, the driven shaft can be inserted smoothly.



(2) Fixing the Hypoid Motor to the driven shaft

- Make sure to fix the Hypoid Motor to the driven shaft.

Following methods prevent Hypoid Motor from moving towards the machinery.

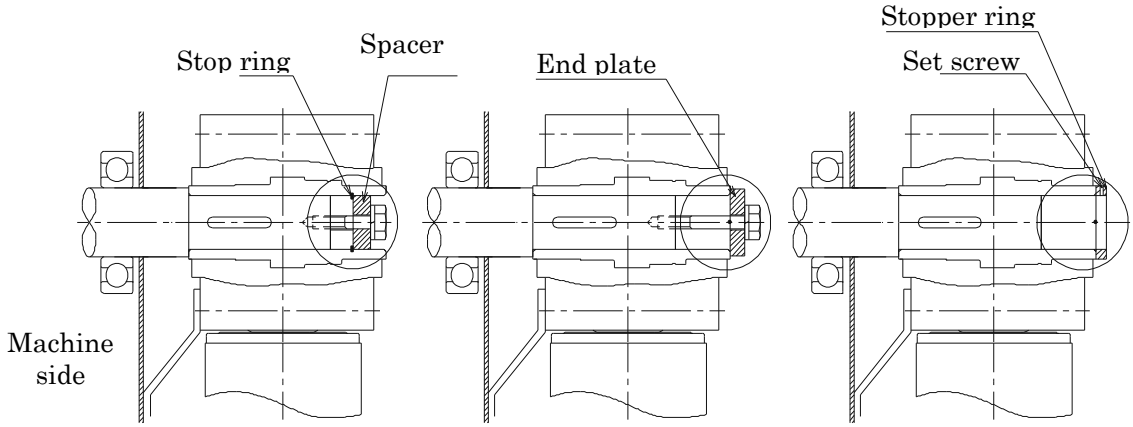


Fixed by step of the driven shaft

Fixed by spacer (No step at the driven shaft)

Fixed by stopper and set screw (No step at the driven shaft)

Following methods prevent Hypoid Motor from moving towards the opposite side of machinery.



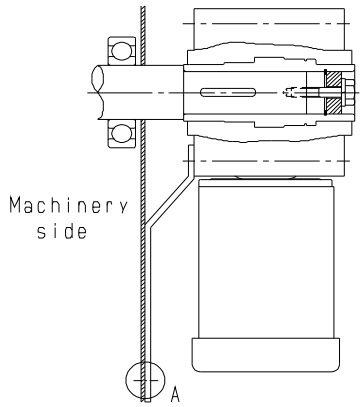
Fixed by spacer and snap ring

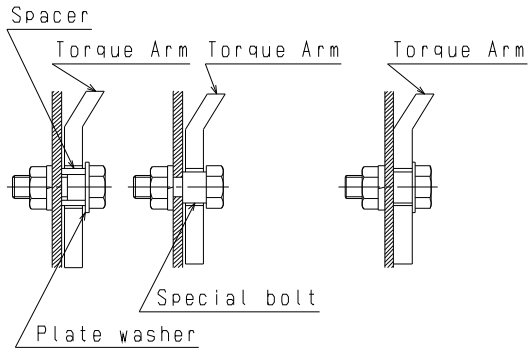
Fixed by end plate

Fixed by stopper and set screw

(3) Anti-rotation by Torque Arm

- Install Torque Arm at the driven side of the Hypoid Motor housing. Use Hex Head bolt for installation. Must leave flexibility at anti-rotation portion of Torque Arm to avoid excessive force between the Hypoid Motor and driven shaft. Do not fix the torque arm onto machinery. For high frequency starting/stopping or forward/reverse rotations, place rubber bush between torque arm and bolt (or spacer) to absorb shock.





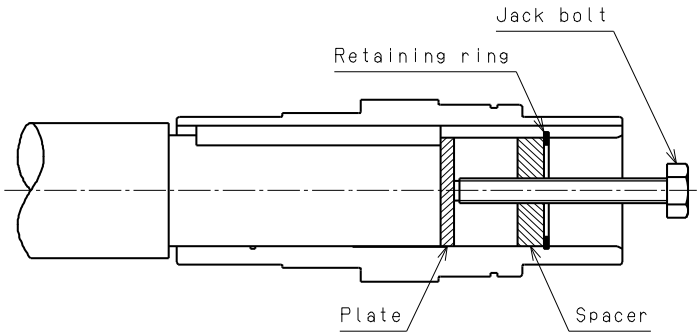
Correct

Incorrect
(No flexibility at Torque Arm)

Details of "A", anti-rotation of the Torque Arm

(4) Uninstalling from the driven shaft

- When pulling out the driven shaft from hollow shaft, do not apply excessive force between the housing and hollow shaft.
- With the jig shown below, the driven shaft can be pulled out smoothly, without damage to the hollow shaft.



【5】 Rotational direction

CAUTION
● Before connecting to machinery, check the rotational direction of the output shaft of Gearmotor/Hypoid Motor. Incorrect rotational direction may cause injury or damage to the device.

5-1. Gearmotor

Rotational direction of output shaft with the wiring at Fig. 5-1 is as follows:

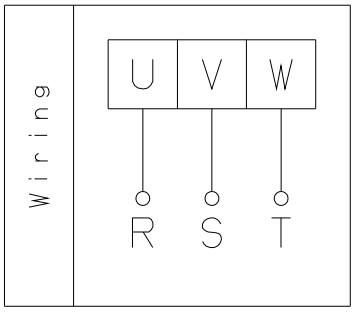
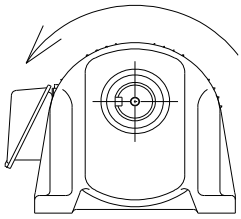
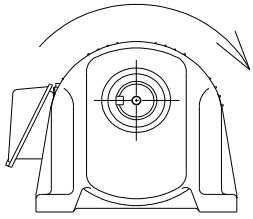


Table 5-1 Rotational direction of output shaft at the wiring of Fig. 5-1

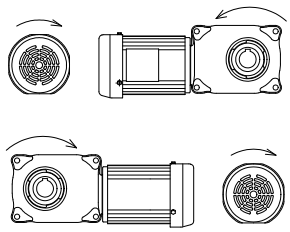
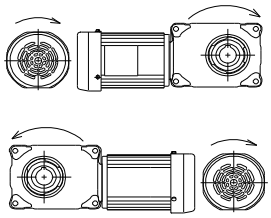
Rotational direction viewed from output shaft			
kW	Reduction ratio (2 stages)	Reduction ratio (4 stages)	Reduction ratio (3 stages)
0.75	5 to 30	300 to 450	40 to 200
1.5	5 to 30	—	40 to 200
2.2	5 to 30	—	40 to 200
3.7	5 to 30	—	40, 50
5.5	5 to 30	—	—

Rotational direction of 3-phase motor can be changed, by switching any two of U, V and W.

5-2. Hypoid Motor

Rotational direction of output shaft with the wiring at Fig. 5-1 is as follows:

Table 5-2 Rotational direction of output shaft at the wiring of Fig. 5-1

Rotational direction viewed from output shaft					
kW	Frame	Install.	Reduction ratio (2 stages)	Reduction ratio (4 stages)	Reduction ratio (3 stages)
0.75	38,42,50	L / U	5 to 30	300 to 480	40 to 200
	35,45,55	H			
1.5	42,50	L / U	5 to 30	—	40 to 200
	45,55	H			
2.2	42,50	L / U	5 to 20	—	25 to 120
	45,55	H			
3.7	50	L / U	5 to 20	—	25 to 60
	55	H			
5.5	50	L / U	5 to 20	—	25 to 40
	55	H			

Rotational direction of 3-phase motor can be changed, by switching any two of U, V and W.

【6】 Wiring

WARNING

- Connect power cable according to the wiring diagram on the terminal box or this instruction manual, otherwise electrical shock or fire may occur. (In case of no terminal box, insulate terminals completely.)
- Do not bend, pull or pinch the power cable or motor lead wires to avoid possible electrical shock.
- Ground the earth terminal, otherwise electrical shock may occur.
- Make sure to earth and install earth leakage breakers for each Gearmotor/Hypoid Motor, to avoid electrical shock.
- Install motor protection device for each unit to prevent possible fire.
- Always supply power as specified on the nameplate to prevent possible fire or burnouts.

CAUTION

- Do not touch the terminals when measuring insulation resistance.
- Wire according to the technical standards of Electrical Installations or company rules, to prevent burnout, electrical shock, fire or injury.
- Protection devices are not attached to the Gearmotor/Hypoid Motor. Installation of the overload protection device is mandatory under the technical standards for Electrical Installations. Installation of other protection devices (such as earth leakage breaker, etc.) in addition to the overload protection device is recommended to prevent electrical shock, fire, injury or damage to the motor.
- If the Gearmotor/Hypoid Motor is run independently, remove the temporary key attached to the output shaft.
- Before connecting to machinery, check the rotational direction of output shaft. Incorrect rotational direction may injure a personnel or damage equipment.
- Do not confuse the starter and driving capacitor. Capacitor will be damaged if the starter is used for driving.
- Do not damage the vinyl cover of the starter capacitor, otherwise electrical shock may occur.
- Keep the voltage drop in wiring within 2%, otherwise the Gearmotor/Hypoid Motor may not start.
- When you change rotational direction, stop the motor completely before restarting. Otherwise plugging may cause damage to equipment.
- For brake types, do not supply power to the brake coil continuously while the motor is stopped. The brake coil may burnout and cause fire.
- When brake type is used for an elevator, carry out DC external wiring.
- Diodes are used for DC module. If a short circuit occurs due to incorrect wiring, diodes will be damaged. Pay full attention to wiring.

6-1. Wiring

Supply power as specified on the nameplate.
Carry out the following wiring for standard Gearmotor/Hypoid Motor.

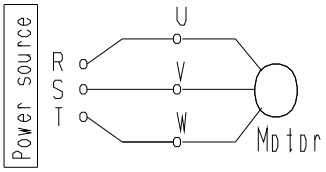
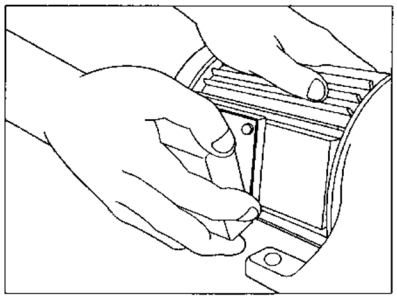


Table 6-1 Color of lead wires

	0.75 kW	1.5 kW to 5.5 kW
U	Red	Red
V	White	White
W	Black	Blue

6-2. Attaching and removing the terminal box cover (For 3-phase, 0.75 kW as for optional)

(1) Removing
Hold the terminal box and pull the cover towards you, as shown below.



(2) Attaching
Press the cover onto the terminal box housing until you hear click sound.

6-3. Wiring for brake type

AC internal wiring is used for any unit unless otherwise specified. For general purposes, the Gear/Hypoid Motor can be used as it is. Change in wiring is required, for purposes, such as inverter driving or shortening stop time. Perform wire adjustments based on the diagrams to follow. Also, be sure to use the protection devices and other electrical parts described in the notes. If wiring is carried out incorrectly, DC module will be seriously damaged.

Table 6-2 Wiring for brake type

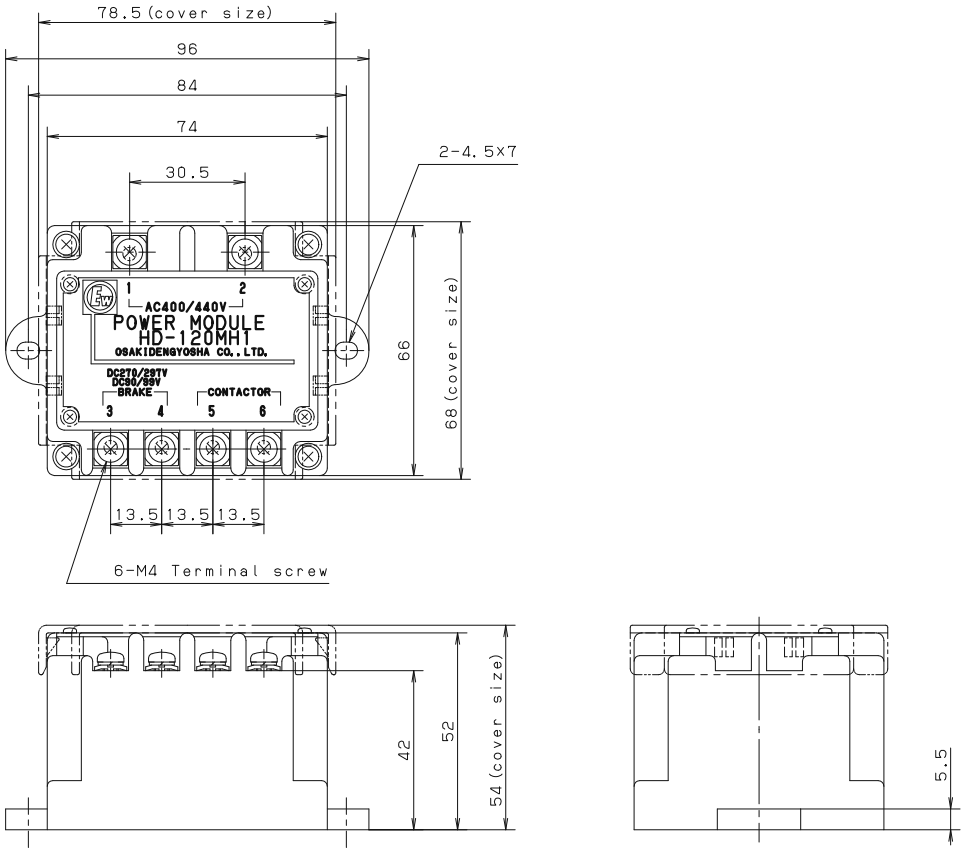
Wiring	Purpose
AC internal wiring	For general
AC external wiring	Shorten stop time Install phase advance condenser
AC external operation	Inverter driving or operate brake externally. In case of inverter driving, brake at up to 60Hz. Do not brake at over 60Hz, to avoid abnormal wearing of brake lining, and heating.
DC external wiring	Elevator (negative load) High stopping accuracy is required

- Reference value of time delay to start braking

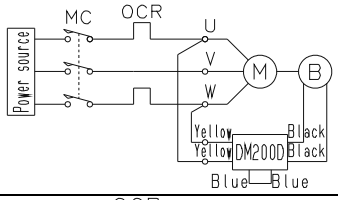
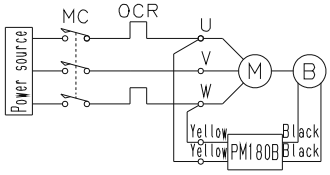
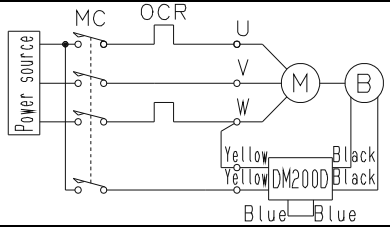
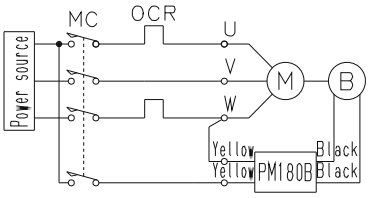
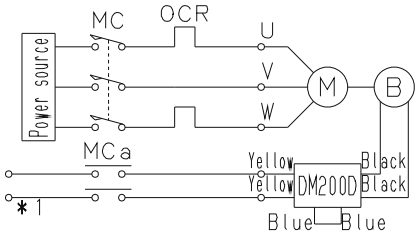
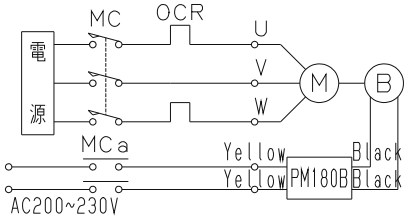
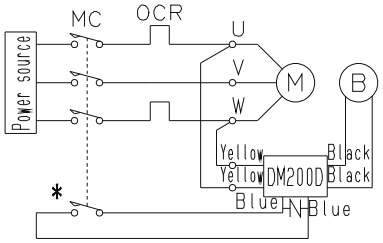
Time (seconds) to start braking after turning off power.
(It is not braking time.)

	0.75 kW	1.5, 2.2 kW	3.7, 5.5kW
AC internal wiring	0.20 - 0.24	0.30 - 0.45	0.20 - 0.30
AC external wiring	0.10 - 0.13	0.10 - 0.13	0.03 - 0.05
AC external operation	0.10 - 0.13	0.10 - 0.13	0.03 - 0.05
DC external wiring	0.04 - 0.06	0.04 - 0.06	

The Power Module (DC Module) for 3.7 and 5.5kw is over-excitation type.



- **Wiring for 3-phase brake type (0.75 kW to 5.5 kW, 200V)**

	Purpose	0.75kW to 2.2kW	3.7, 5.5kW
AC internal wiring	·For general purpose ·Standard specification for shipment		
AC external wiring	·To shorten the stopping time ·To install phase advance condenser		
AC external operation	·In case an external brake operation is to be performed Note: Use auxiliary relays (MCa) of contact rating over and AC200V7A (resistance load).	 Set the supply voltage to the brake denoted by *1 to: AC200-220V for 0.75kW AC200-230V for 1.5, 2.2kW	
DC external wiring	·In case an elevator and stopping accuracy is required Note: Use auxiliary contacts or relays of contact rating over and AC200V10A (resistance load) at*.		

M: Motor B: Brake MC: Magnetic contactor MCa: Auxiliary relay OCR: Overcurrent relay
DM200D/PM180B:DC Module -N-: Varistor

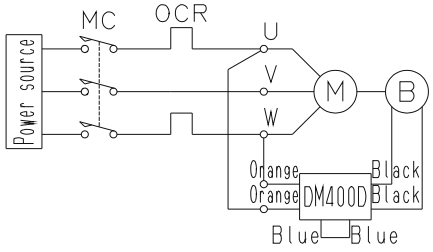
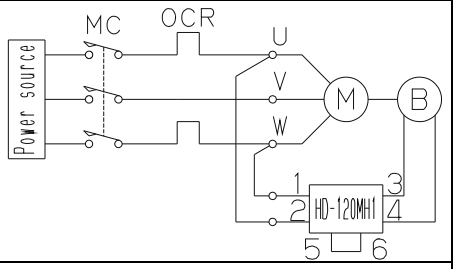
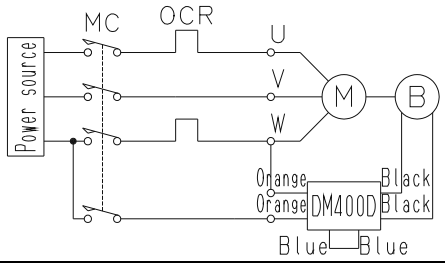
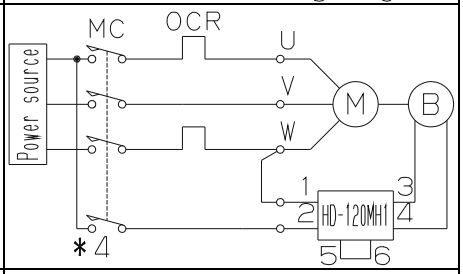
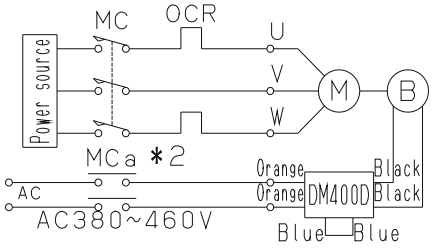
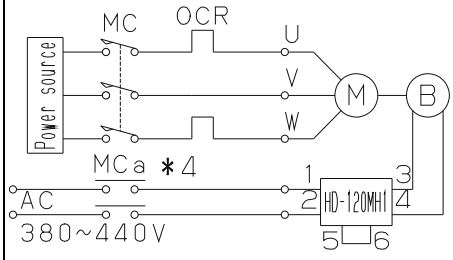
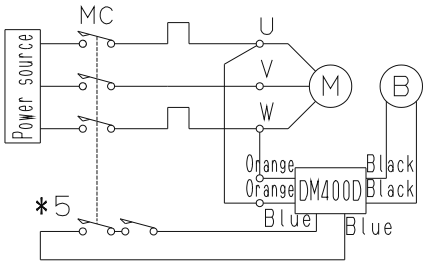
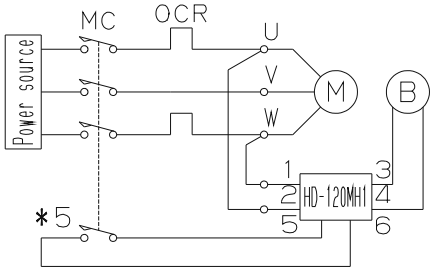
Note 1) Brake voltage is DC90V (when AC200V is supplied to DC module)

Note 2) For DC external wiring, the length and method of wiring, type of relay, may damage the DC module. Place surge absorption device between the terminals of DC external wiring. Connecting near DC module (blue wires) will be more effective. Recommended varistors are shown in the following table. As for varistor voltage, select 470V for DM200D. (DM400D is built-in varistor type.)

Product	Manufacturer	Type
		DM100A, DM200D
Surge absorber	Panasonic	ERZV14D471
Z-TRAP	Fuji Electric Device Technology Co., Ltd.	ENE471D-14A
Ceramic Varistor	NIPPON CHEMI-CON	TND14V-471KB00AA0

Note 3) PM180B is used for 3.7, 5.5kW. Due to built-in relays type, do not set DC external wiring.

- **Wiring for 3-phase brake type (0.75 kW to 5.5kW, 400V)**

	Purpose	0.75kW to 2.2kW	3.7, 5.5kW
AC internal wiring	·For general purpose ·Standard specification for shipment		
AC external wiring	·To shorten the stopping time ·To install phase advance condenser		
AC external operation	·In case an external brake operation is to be performed	 Use the auxiliary relay (MCa) of contact rating AC400-440V,1A (inductive load)	 Use the auxiliary relay (MCa) of contact rating AC400-440V,1A (inductive load)
DC external wiring	·In case an elevator and stopping accuracy is required		

M: Motor B: Brake MC: Magnetic contactor MCa: Auxiliary relay OCR: Overcurrent relay DM400D, HD-120MH1: DC Module

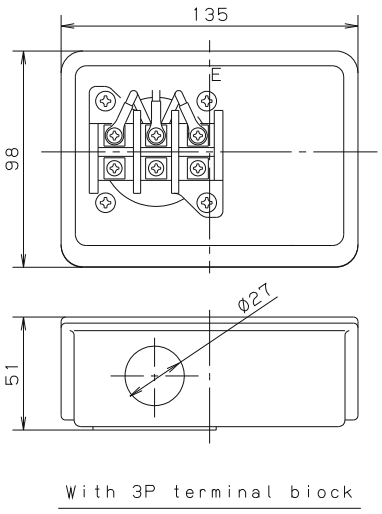
Note 1) DC module (HD-120MH1) for 3.7kW and 5.5kW is delivered separately from the product. It is needed to be wired by customer. The dimension of the DC module is showed on page 16.

Note 2) Since DM400D has the varistor inside, to install the varistor in the circuit diagram is not needed.

Note 3) Use two or three auxiliary relays (Mca) in series AC400 to 440V contact voltage, over and 1A inductive load at *5.

6-4.Dimensions of terminal box

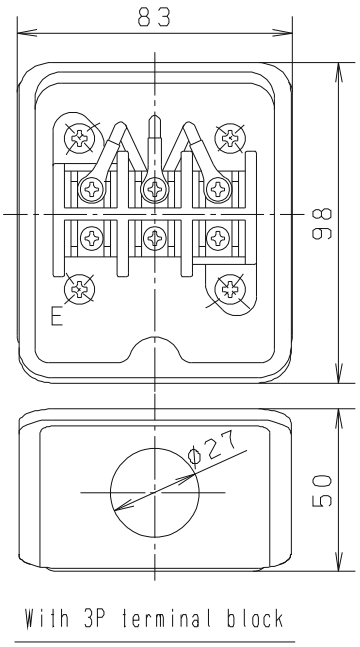
- Standard terminal box

<table>
<tr><th>kW</th><th colspan="2">Type</th><th>Dimensions</th></tr>
<tr><td>0.75
kW</td><td>No
brake</td><td>Indoor
type</td><td> 

1.Material : SPCC
2.Terminal screw size : M4
Tightening torque :
1.2 N･m{ Ref. 0.12 kgf･m }
3.Suitable terminals
Ring tongue (R-type)
2 - 4 , 3.5 - 4
Insulated ring tongue
2 - 4 , 3.5 - 4
4. The terminal box can be turned 90, 180 and 270 degrees.
5. Ground terminal screw size : M5

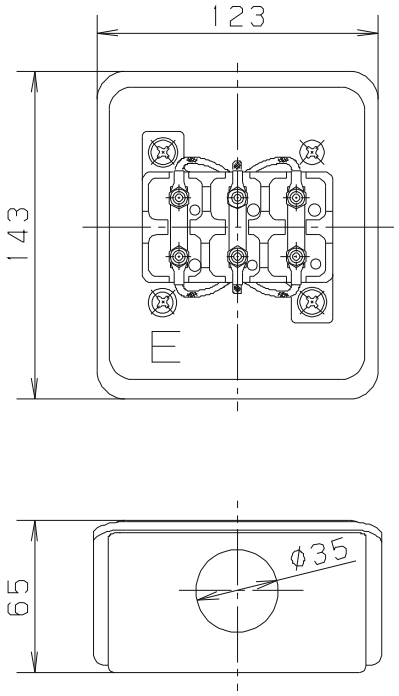
Tightening torque:
2.0 N･m{ Ref. 0.20 kgf･m }</td></tr>
<tr><td>1.5
kW

to

3.7
kW</td><td>No
brake</td><td>Indoor
type</td><td> 

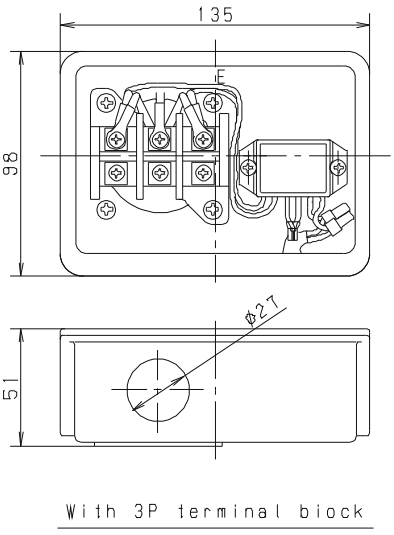
1.Material : SPCC
2.Terminal screw size : M4
Tightening torque :
1.2 N･m{ Ref. 0.12 kgf･m }
3.Suitable terminals
Ring tongue (R-type)
2 - 4 , 3.5 - 4
Insulated ring tongue
2 - 4 , 3.5 - 4
4.The terminal box can be turned
90, 180 and 270 degrees.
5.Ground terminal
screw size : M5
Tightening torque :
2.0 N･m{ Ref. 0.20 kgf･m }</td></tr>
</table>

● Standard terminal box

<table>
<tr><th>kW</th><th colspan="2">Type</th><th>Dimensions</th></tr>
<tr><td>5.5
kW</td><td>No
brake</td><td>Indoor
Type</td><td> 

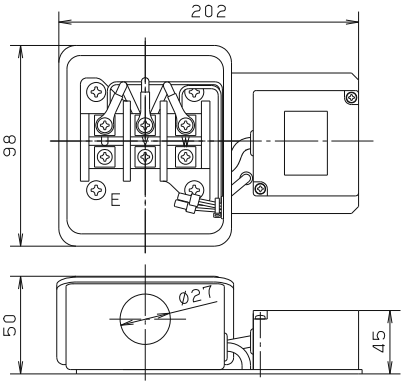
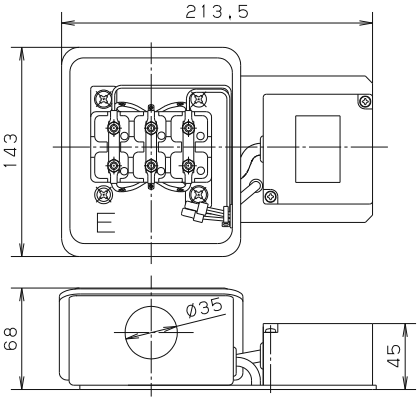
1. Material : SPCC
2. Terminal screw size : M5
Tightening torque :
2.0 N·m{ Ref. 0.20 kgf·m }
3. Suitable terminals
For star-delta startup
Ring tongue (R-type)
5.5 - 5
Insulated ring tongue
5.5 - 5
For full voltage starting
Ring tongue (R-type)
14 - 5
Insulated ring tongue
14 - 5
4. The terminal box can be turned 90, 180 and 270 degrees.
5. Ground terminal screw size : M5
Tightening torque :
2.5 N·m{ Ref. 0.26 kgf·m }</td></tr>
<tr><td>0.75
kW

to

2.2kW</td><td>With
brake</td><td>Indoor
Type</td><td> 

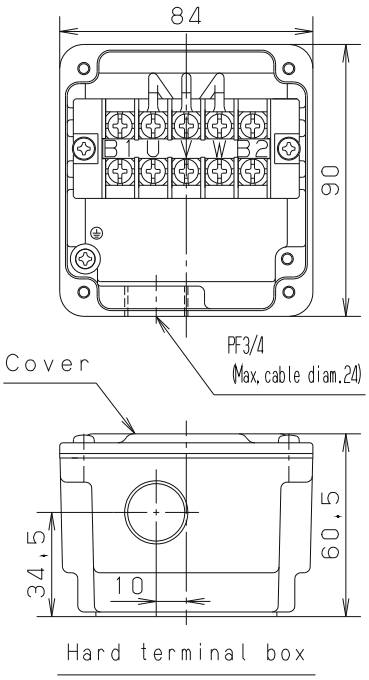
1.Material : SPCC
2.Terminal screw size : M4
Tightening torque :
1.2 N·m{ Ref. 0.12 kgf·m }
3.Suitable terminals
Ring tongue (R-type)
2 - 4 , 3.5 - 4
Insulated ring tongue
2 - 4 , 3.5 - 4
4. The terminal box can be turned 90, 180 and 270 degrees.
5. The size of DC module for 400V class is different from 200V class.
6. Ground terminal screw size : M5
Tightening torque:
2.0 N·m{ Ref. 0.20 kgf·m }</td></tr>
</table>

● Standard terminal box

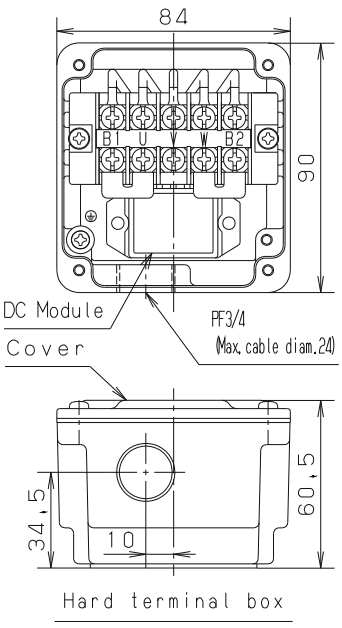
kW	Type		Dimensions
3.7 kW	With brake	Indoor type	 1.Material : SPCC 2.Terminal screw size : M5 Tightening torque : 2.0 N·m{ Ref. 0.20 kgf·m } 3.Suitable terminals For star-delta startup Ring tongue (R-type) 5.5 - 5 Insulated ring tongue 5.5 - 5 For full voltage starting Ring tongue (R-type) 14 - 5 Insulated ring tongue 14 - 5 4. The terminal box can be turned 90, 180 and 270 degrees. 5. DC module for 400V class is delivered separately from the product. 6. Ground terminal screw size : M6 Tightening torque : 2.5Nm{Ref. 0.26kgf·m }
5.5 kW	With brake	Indoor type	 1.Material : SPCC 2.Terminal screw size : M5 Tightening torque : 2.0 N·m{ Ref. 0.20 kgf·m } 3.Suitable terminals For star-delta startup Ring tongue (R-type) 5.5 - 5 Insulated ring tongue 5.5 - 5 For full voltage starting Ring tongue (R-type) 14 - 5 Insulated ring tongue 14 - 5 4. The terminal box can be turned 90, 180 and 270 degrees. 5. DC module for 400V class is delivered separately from the product. 6. Ground terminal screw size : M6 Tightening torque : 2.5Nm{Ref. 0.26kgf·m }

- Outdoor standard terminal box (outdoor type)

<table>
<tr><th>kW</th><th colspan="2">Type</th><th>Dimensions</th></tr>
<tr><td>0.75
kW</td><td>No
brake</td><td>Outdoor
Type

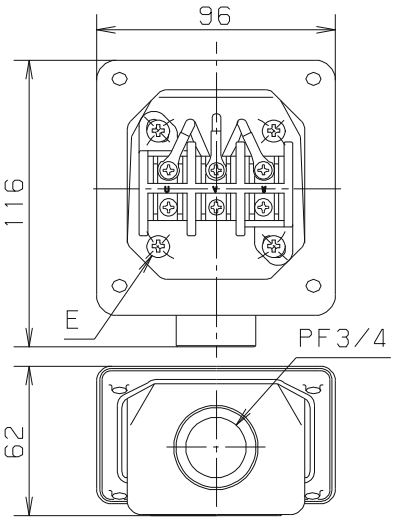
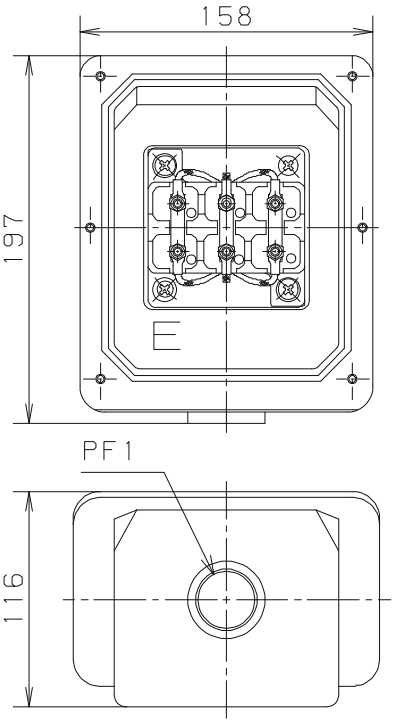
Indoor
Type
(Option)</td><td> 

1.Material :
Aluminum die-casting
2.Terminal screw size : M4
Tightening torque :
1.8 N･m{ Ref. 0.18 kgf･m }
3.Suitable terminals
Ring tongue (R-type)
1.25 - 4 , 2 - 4
Insulated ring tongue
1.25 - 4, 2 - 4
4.The terminal box can be turned 90, 180 and 270 degrees.
5.The port is counter load side when shipped.
6.Tighten a cable gland with specified torque for outdoor use.
7.Ground terminal
screw size : M4
Tightening torque :
1.2 N･m{ Ref. 0.12 kgf･m }</td></tr>
<tr><td>0.75
kW</td><td>With
brake
type</td><td>Outdoor
Type

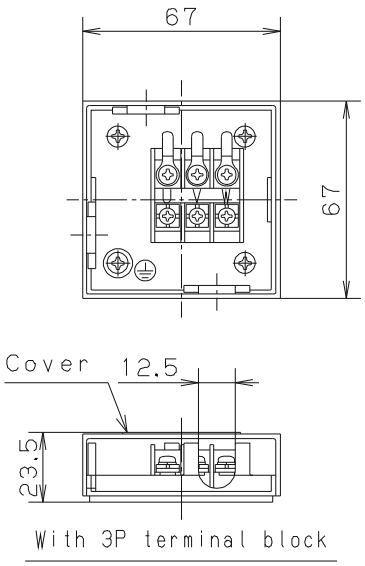
Indoor
Type
(Option)</td><td> 

1.Material :
Aluminum die-casting
2.Terminal screw size : M4
Tightening torque :
1.8 N･m{ Ref. 0.18 kgf･m }
3.Suitable terminals
Ring tongue (R-type)
1.25 - 4 , 2 - 4
Insulated ring tongue
1.25 - 4 , 2 - 4
4.The terminal box can be turned 90, 180 and 270 degrees.
5.The port is counter load side when shipped.
6. DM200D, DC Power Supply for brake, is built-in in the terminal box with AC Internal Wiring. Refer to page 17, 18 for the detail of wiring.
7.Ground terminal
screw size :M4
Tightening torque :
1.2 N･m{ Ref. 0.12 kgf･m }</td></tr>
</table>

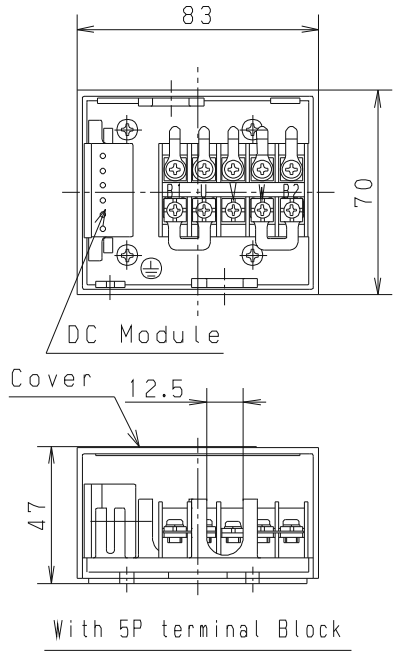
● Outdoor standard terminal box (outdoor type)

kW	Type		Dimensions
1.5 kW to 3.7 kW	No brake	Outdoor Type	 1.Material : SPCC 2.Terminal screw size : M4 Tightening torque : 1.2 N·m{ Ref. 0.12 kgf·m } 3.Suitable terminals Ring tongue (R-type) 2 - 4, 3.5 - 4 Insulated ring tongue 2 - 4, 3.5 - 4 4.The terminal box can be turned 90, 180 and 270 degrees. 5. Ground terminal screw size : M5 Tightening torque : 2.0 N·m{ Ref. 0.20 kgf·m }
5.5 kW	No brake	Outdoor type	 1. Material : SPCC 2. Terminal screw size : M5 Tightening torque : 2.0 N·m{ Ref. 0.20 kgf·m } 3. Suitable terminals For star-delta startup Ring tongue (R-type) 5.5 - 5 Insulated ring tongue 5.5 - 5 For full voltage starting Ring tongue (R-type) 14 - 5 Insulated ring tongue 14 - 5 4. The terminal box can be turned 90, 180 and 270 degrees. 5. Ground terminal screw size : M6 Tightening torque : 2.5 N·m{ Ref. 0.26 kgf·m }

- Plastic terminal box (Option for 0.75kW)

<table>
<tr><th>kW</th><th colspan="2">Type</th><th>Dimensions</th></tr>
<tr><td>0.75
kW</td><td>No
brake</td><td>Indoor
type</td><td> 

1.Material : Plastic
2.Terminal screw size : M3.5
Tightening torque :
0.8 N･m{ Ref. 0.08 kgf･m }
3.Suitable terminals
Ring tongue (R-type)
1.25 - 3.5 , 2 - 3.5
1.25 - 4 , 2 - 4
Insulated ring tongue
1.25 - 3.5 , 2 - 3.5
1.25 - 4 , 2 - 4
4.The terminal box can be turned
90, 180 and 270 degrees.
5.Wiring can be inserted from three directions by turning the cover.
6.Ground terminal
screw size : M4
Tightening torque :
1.2 N･m{ Ref. 0.12 kgf･m }</td></tr>
<tr><td>0.75
kW</td><td>With
brake
type</td><td>Indoor
Type

(200V
class only)</td><td> 

1.Material : Plastic
2.Terminal screw size : M3.5
Tightening torque :
0.8 N･m{ Ref. 0.08 kgf･m }
3.Suitable terminals
Ring tongue (R-type)
1.25 - 3.5 , 2 - 3.5
1.25 - 4 , 2 - 4
Insulated Ring tongue
1.25 - 3.5 , 2 - 3.5
1.25 - 4 , 2 - 4
4. The terminal box can be turned
90, 180 and 270 degrees.
5. Wiring can be inserted from two Directions (top or bottom) by turning the cover.

6. DM200D, DC Power Supply for brake, is built-in the terminal box with AC Internal Wiring. Refer to page 17, 18 for the detail of wiring.
7.Ground terminal
screw size :M4
Tightening torque :
1.2 N･m{ Ref. 0.12 kgf･m }</td></tr>
</table>

【7】 Operation

7-1. Operation

⚠ WARNING

- Do not operate while the cover of terminal box is removed. After work, fix the terminal box cover to its original place, to prevent electrical shocks.
- Avoid contact with any rotating parts (shaft, etc.).
- In case of power failure, be sure to turn off power. Power may be restored without notice and could injure personnel or damage the device.

⚠ CAUTION

- During operation, surface temperature of the Gear / Hypoid Motor becomes considerably high. Avoid contact with the motor.
- Immediately stop operating when any trouble is suspected to avoid possible electrical shock, injury or fire.
- Do not operate under higher than rated load, otherwise injury or damage to the device may occur.
- Avoid contact with energized circuits of the starter condenser for 1-phase motor until discharged completely. Electrification may occur.
- When changing the rotating direction, be sure to stop the motor completely, otherwise the direction may not change and runaway may occur.

(1) Safety check before operating

After installation and wiring are completed, check the following before turning on the power:

- Proper brake and over-current relay are installed
- Wiring is correct
- Grounding wire is connected

In order to prevent any damage/danger, take precautions against all possible hazardous situations. Even if the malfunction on Gearmotor/Hypoid Motor happens, take necessary measures to avoid the dangerous situation at machine side.

(2) Fluctuation of voltage and frequency

Performance of the Gearmotor/Hypoid Motor may be changed when the voltage or frequency fluctuate. Fluctuation of voltage within ±10% of the rated voltage is allowed.

(3) Load

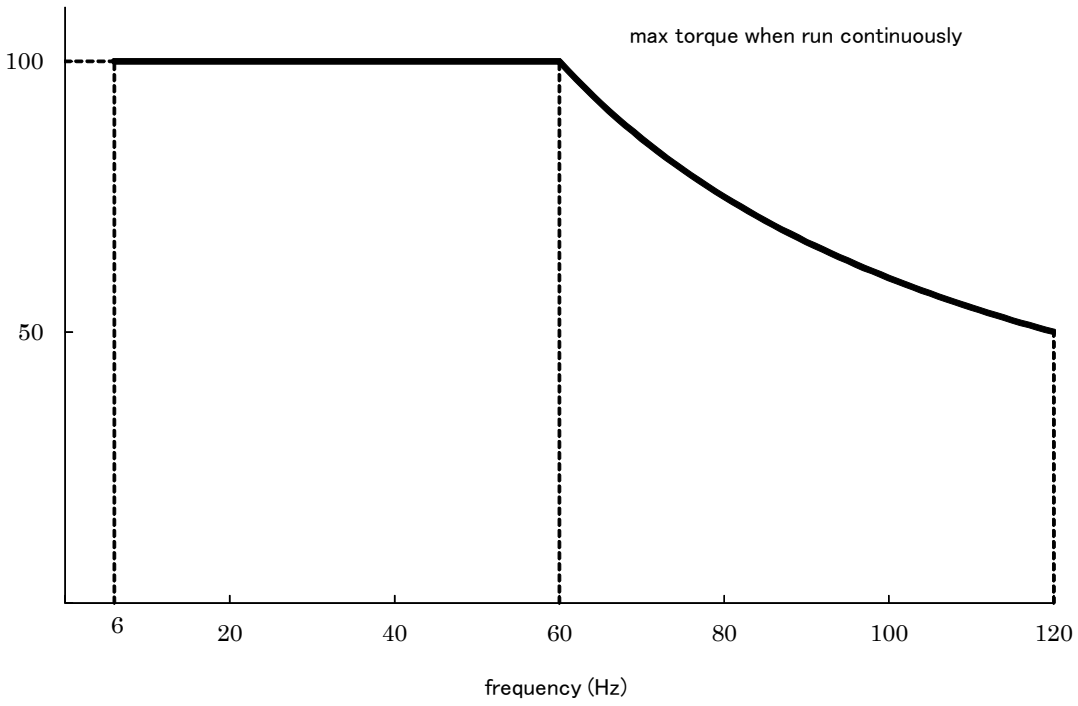
Overload may damage the Gearmotor/Hypoid Motor and reduce its operating life. Be sure the current does not exceed that printed on the nameplate. Check after starting operation

(4) Check the following after starting operation:

- Rotational direction is correct
- Maximum current does not exceed the rated current
- Vibration and noise are normal
- Frequency of starting is not too high
- No shocks

7-2. Inverter driving

(1) Standard motor driven by inverter (V/F control) continuously (Based on 60Hz)

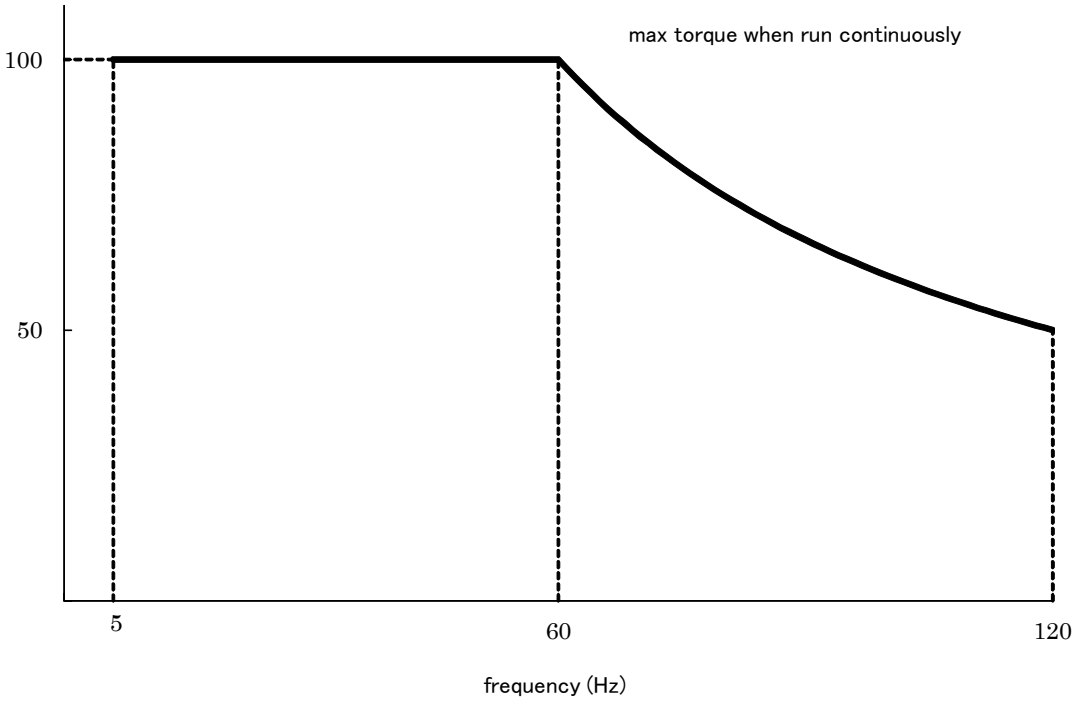


Output torque(%):100% is the torque of motor rated at 60Hz
(Base frequency:60Hz)

Can be used at continuously with 100% torque at 60Hz in the range of 6-60Hz.

① Allowable torque is reduced at 60Hz through 120Hz. Please be careful for the load torque.
② Set the parameter of base voltage and frequency to match with each parameter shown on the nameplate.
③ The base frequency on inverter should be 60Hz.
④ Please use the function of torque boost in the inverter, if 100% torque is needed at the low frequency. Be careful for long time operation with much enough torque boost, it may cause over heat on the motor.
⑤ The motor may vibrate sympathetically, due to the specific frequency. In the case of continuously operation, should avoid to use in the range of resonance frequency by changing carrier frequency and/or so on.
⑥ Under low load in the test run as example, the motor current may be shown at higher value. It may cause from motor characteristic and it is not abnormal. The motor current can be lower by changing the parameter on inverter, such as decreasing the torque boost, decreasing V/F, and/or using vector control.
⑦ In order to protect the motor from overheating, use electronic thermal and set as done for standard motor or install thermal relay between inverter and motor.
⑧ For brake type, refer to the wiring diagrams on pages 27 - 28. Activation of brake greater than 60 Hz, can damage the brake lining.

(2) Standard motor driven by inverter (V/F control) continuously (based on 50Hz)



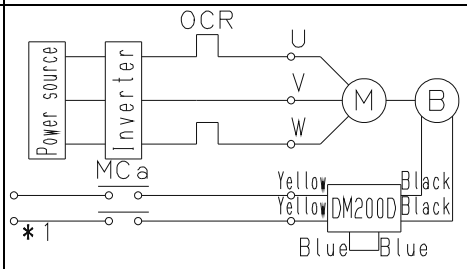
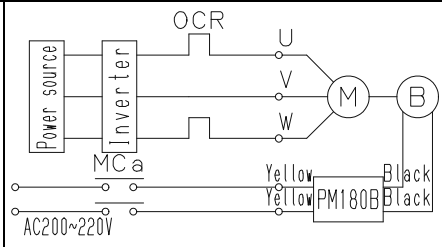
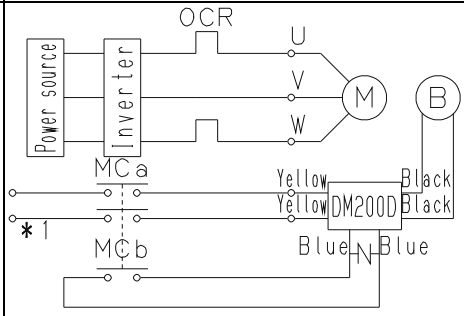
Output torque(%):100% is the torque of motor rated at 60Hz
(Base frequency:60Hz)

Can be used at continuously with 100% torque at 60Hz in the range of 5-50Hz.

① Allowable torque is reduced at 50Hz through 100Hz. Please be careful for the load torque.
② Set the parameter of base voltage and frequency to match with each parameter shown on the nameplate.
③ The base frequency on inverter should be 50Hz.
④ Please use the function of torque boost in the inverter, if 100% torque is needed at the low frequency. Be careful for long time operation with much enough torque boost, it may cause over heat on the motor.
⑤ The motor may vibrate sympathetically, due to the specific frequency. In the case of continuously operation, should avoid to use in the range of resonance frequency by changing carrier frequency and/or so on.
⑥ Under low load in the test run as example, the motor current may be shown at higher value. It may cause from motor characteristic and it is not abnormal. The motor current can be lower by changing the parameter on inverter, such as decreasing the torque boost, decreasing V/F, and/or using vector control.
⑦ In order to protect the motor from overheating, use electronic thermal and set as done for standard motor or install thermal relay between inverter and motor.
⑧ For brake type, refer to the wiring diagrams on pages 27 - 28. Activation of brake greater than 60 Hz, can damage the brake lining.

7-3. Wiring for 3 Phase brake type driven by inverter.

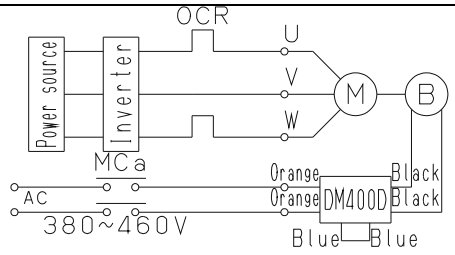
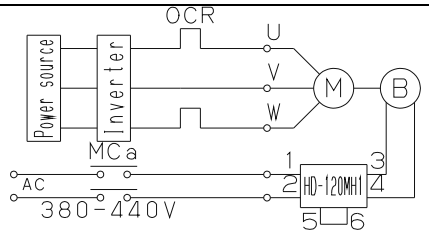
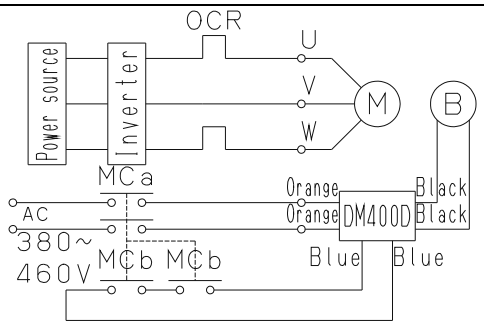
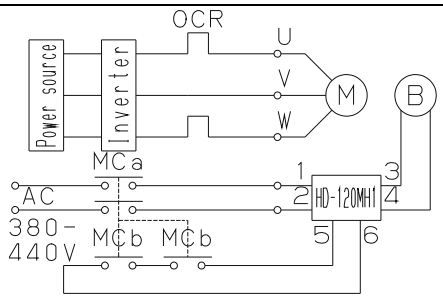
(1) **200V class**

	Purpose	0.75kW to 2.2kW	3.7kW to 5.5kW
AC external operation	・General inverter drive Note: Use auxiliary relays (MCa) of contact rating over and AC200V7A (resistance load).	 Set the supply voltage to the brake denoted by *1 to: AC200V－AC220V for 0.75kW AC200V－AC230V for 1.5kW/2.2kW	
DC external wiring + AC external operation	・In case an elevator and stopping accuracy is required Note: Use MCa of contact rating over and AC200V7A (resistance load),while MCb of contact rating over and AC200V10A (resistance load).	 Set the supply voltage to the brake denoted by *1 to: AC200V－AC220V for 0.75kW AC200V－AC230V for 1.5kW/2.2kW	

M:Motor B:Brake MC: Magnetic contactor MCa/MCb: Auxiliary relay
OCR: Overcurrent relay DM200D/PM180B:DC Module -N-: Varistor

Note 1) Brake voltage is DC90V (when AC200V is supplied to DC module)
Note 2) For DC external wiring, connect varistor (surge absorption device). --- refer to p.14
Note 3) Be sure the power source for the brake is from the input side of the inverter, and synchronize brake operation and motor ON/OFF.
Note 4) Closing or opening MCa requires interlock with the inverter. Refer to the instruction manual for the inverter.
Note 5) PM180B is used for 3.7 and 5.5kW. Due to built-in relays, DC external wiring is prohibited.

(2) **400V class**

	Purpose	0.75kW to 2.2kW	3.7kW to 5.5kW
AC external operation	・General inverter drive	 Use auxiliary relays (MCa) of contact voltage AC400v to AC440v and inductive load 1A and more.	 Use auxiliary relays (MCa) of contact voltage AC400v to AC440v and inductive load 1A and more.
DC external wiring + AC external	・In case an elevator and stopping accuracy is required	 Use auxiliary relays (MCa) of contact voltage AC400v to AC440v and inductive load 1A and more. Connect in series two or three auxiliary relays (MCb) of contact voltage AC400Vto AC440V and inductive load 1A and more.	 Use auxiliary relays (MCa) of contact voltage AC400v to AC440v and inductive load 1A and more. Connect in series two or three auxiliary relays (MCb) of contact voltage AC400Vto AC440V and inductive load 1A and more.

M:Motor B:Brake MC: Magnetic contactor MCa, MCb: Auxiliary relay
OCR: Overcurrent relay DM200D, HD-120MH1: DC Module

Note 1) For DC external wiring, connect surge absorption device. --- refer to p.14 Note 2)
Note 2) Be sure the power source for the brake is from the primary side of the inverter, and synchronize brake operation and motor ON/OFF.
Note 3) Closing or opening MCa requires interlock with the inverter. Refer to the instruction manual for the inverter.

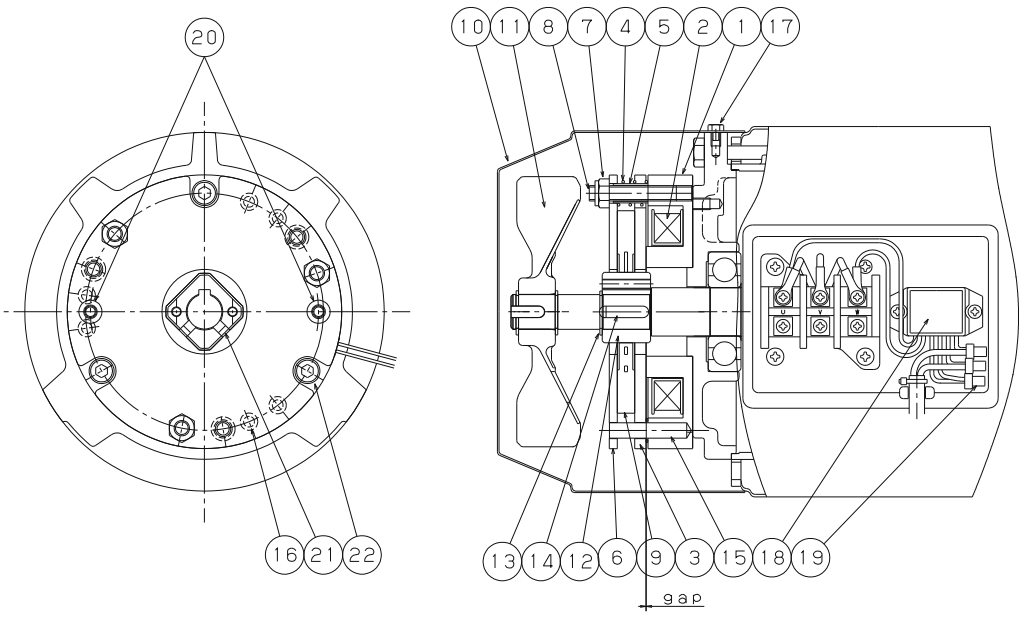
7-4. SLB brake (0.75kW to 2.2kW with brake) specification, structure and brake gap adjustment

① SLB brake capability and specification

Reference value in { } 400V class value in ( )

Motor capacity		0.75kW	1.5kW	2.2kW
Cord no. of brake		SLB07E (SLB07E180V)	SLB15 (SLB15 180V)	SLB22 (SLB22 180V)
Brake type		Non-excitation type/DC electromagnetic brake		
DC module		DM200D(DM400D)		
Rated static friction torque	N・m {kgf・m}	7.35 {0.75}	15.0 {1.50}	22.0 {2.20}
Rated dynamic friction torque	N・m {kgf・m}	5.88 {0.60}	12.0 {1.22}	17.6 {1.79}
DC Module voltage		DC90V(DC180V)		
Amperage	A at20℃	0.273 (0.142)	0.289 (0.145)	0.289 (0.145)
Capacity	W at20℃	24.6 (25.5)	26.0 (26.1)	26.0 (26.1)
Total break total work volume	X10^{7}J {X10^{7}kgf・m}	36.6 {3.73}	108 {11.0}	108 {11.0}

② SLB brake structure



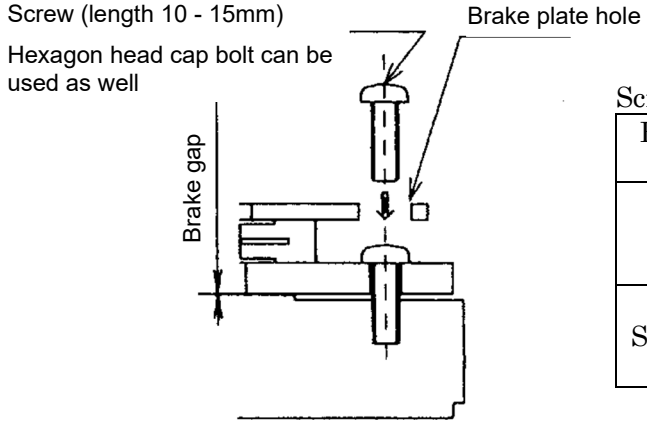
1	Counter-load bracket with yoke	12	Square hub
2	Coil	13	Retaining ring
3	Armature	14	Key
4	Spring	15	Spring pin
5	Collar	16	Brake spring
6	Brake plate	17	Set screw to fix the fan cover
7	U-nut	18	DC Module
8	Guide bolt	19	Closed-end splice
9	Lining	20	Hole for manual releasing
10	Fan cover	21	Leaf spring
11	Fan	22	Socket bolt

③ Manual release

Remove the fan cover ⑩. Insert the following bolt or hexagon head cap bolts (Effective length 10 - 15 mm), into the manual release holes ⑳ and screw them in. When the screws or bolts begin to tighten, screw them a further 1/3 to 1/2 rotation. The brake gap is now almost zero and the brake is released. A fan ⑪ of range 0.2kw to 2.2kW is installed. If one of the holes ⑳ is hidden by the fan, insert the screw and slightly release the brake. Then gently turn the fan by hand and insert the other screw. After completing work, make sure to remove the screws from the brake body. Put the fan cover and start operating.

Do not operate while the brake is released.

Never "manual release" by loosening the U-Nut ⑦.



Screw size for the brake manual release

Brake Model No.	Screw size for manual release
SLB07E	M5 screw or M5 hexagon head cap screw
SLB15/SLB22	M6 screw or M6 hexagon head cap screw

④ Brake gap adjustment

When the gap becomes the limit, the brake can not be released. When the gap comes close the limit, check and adjust. As a reference, adjust the gap for every 1 year or every 1,000,000 of the usage of the brake. Depending on the usage condition, the limit may come earlier.

Brake gap value and lining dimensions ( ): Outside value

Motor kW	Brake Model No.	Gap (mm)		Lining thickness (mm)	
		Initial value	Limit value	Initial thickness	Limit thickness
0.75kW	SLB07E	0.15～0.2 (1.05～1.10)	0.5 (1.4)	8	7
1.5kW	SLB15			9	8
2.2kW	SLB22				

- Adjustment method (Refer to the brake structure drawing)

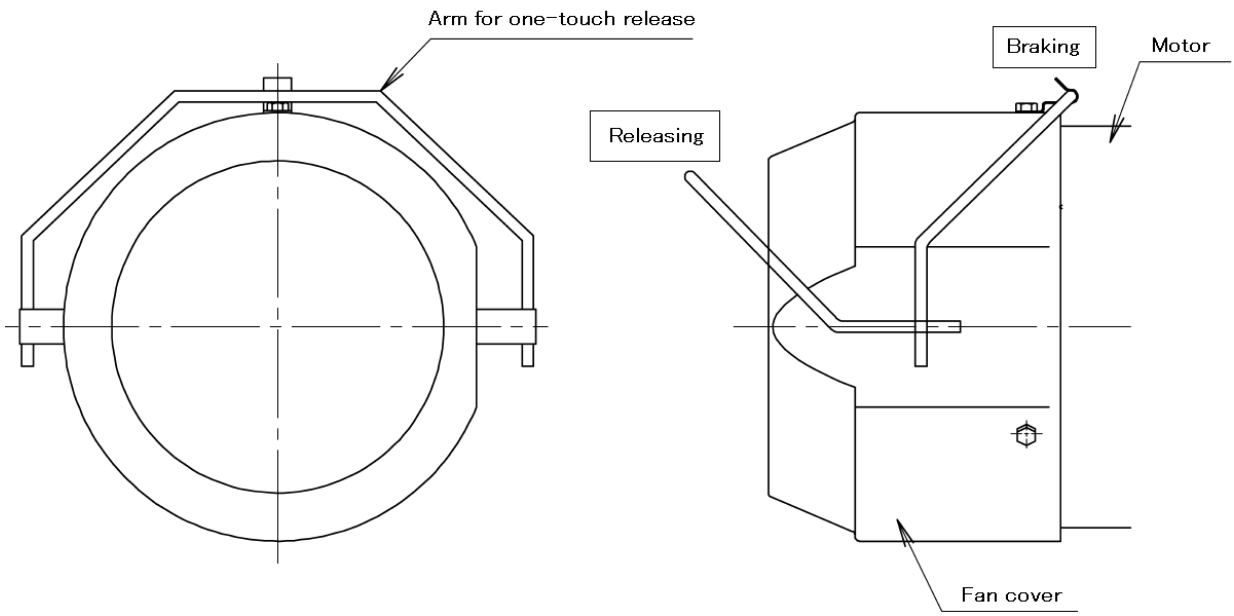
a. Remove the fun cover ⑩

b. Tighten the 3 U-nuts to the right evenly. Adjust the 3 U-nuts on the all circumference to be the beginning gap. Then apply the locking agent. (Loosen and tightening an U-nuts repeatedly, U-nuts are broken or the loss of an effective for locking.)

c. Apply the power source into the motor with brake. While the motor rotates, make sure that the armature and brake plate to rotate normally without making contact with brake lining. In case making a contact, adjust the gap a little larger.

Note: When rotating the U-nut, rotate it after fixing the guide bolt, putting the hexagon wrench into the hexagon socket. Otherwise the guide bolt may loose due to the rotation together. Replace the U-nut to the new one, in case removing it or loosening and tightening it repeatedly. (SLB07E: size M5xP0.8, SLB15/SLB22: M8xP1.25) Use the U-nut to which the locking agent is applied, removing the grease from the guide bolt and U-nut. Do not disassemble the brake, because it may be impossible to reassemble the brake correctly or the unusual condition at the brake due to the wrong assembly may cause.

⑤ Structure of One-touch Manual Release Type (optional)

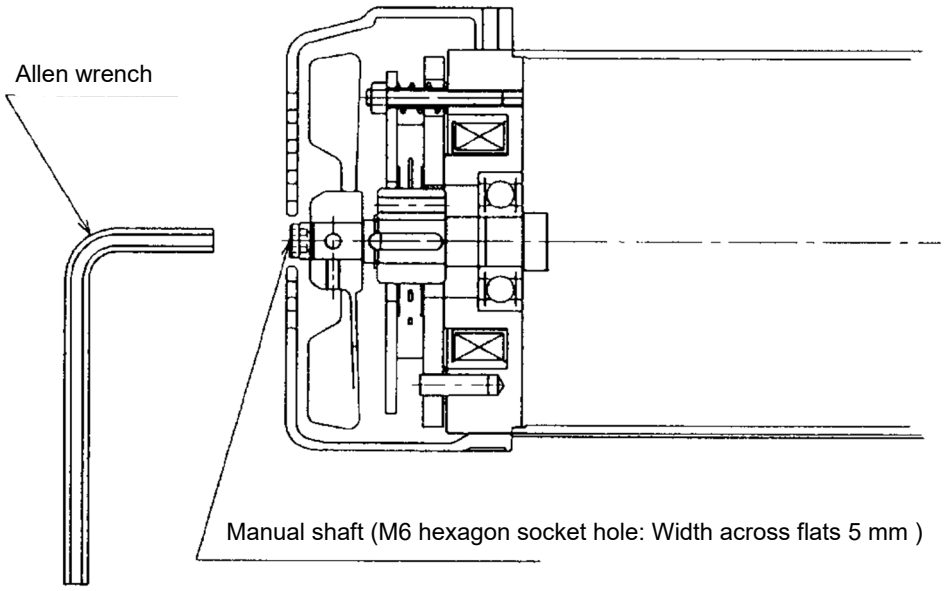


* In the case of o.75kW, the angle of arm between releasing position and braking position is smaller than above figure as shown.

During normal operation, the arm for one-touch release is located at the braking position shown in the above figure. When this arm is moved to release position, the brake will be released. After completion of the work, make sure to return the arm to its original braking position.

Note: Release manually when no load is applied to the output shaft.
Arm for one touch release may be broken in case too much turn is applied.

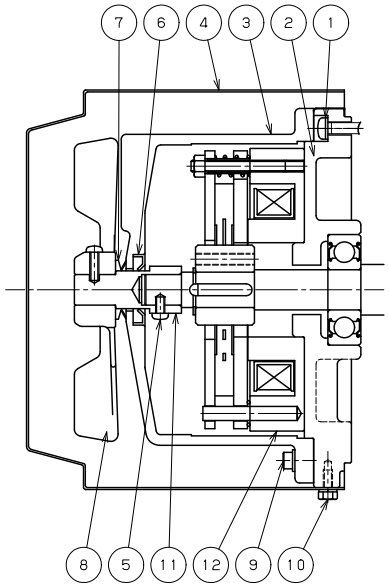
⑥ Structure of Manual Shaft Type (optional) [only 0.75kW]



Operate by turning the hexagonal socket hole (M6, Width across the flats 5mm) located in the center of the motor fan cover with Allen wrench. Make sure that the brake is released manually when operating. Never turn it while the motor is running.
Note: Work when no load is applied to the output shaft.

⑦ Structure of the outdoor type with break [only 0.75kW]

Totally Enclosed type　Totally Enclosed Fan Cooled type



1	Through bolt
2	Bracket
3	Brake cover
4	Fan cover
5	Screw for coupling
6	Oil seal
7	V-ring
8	Fan
9	Bolt
10	Screw for fan cover
11	Coupling
12	Brake

Same method as standard, gap adjustment and manual release become possible after removal of the brake cover on the Totally Enclosed type and the fan cover, fan and brake cover on the Totally Enclosed Fan Cooled type.
When reassemble the brake cover, be careful not to adhere the dust and be scratched to the v-ring. Water may penetrate into the brake due to the damage of the sealing performance when the v-ring has the nick or dust adhered. As well, when the v-ring becomes hardened, the sealing performance is damaged. In this case, replace the v-ring as necessary.
In addition, when the V-ring or oil-seal becomes worn, the sealing performance is damaged and water may penetrate into brake. In this case, replace them as necessary also.

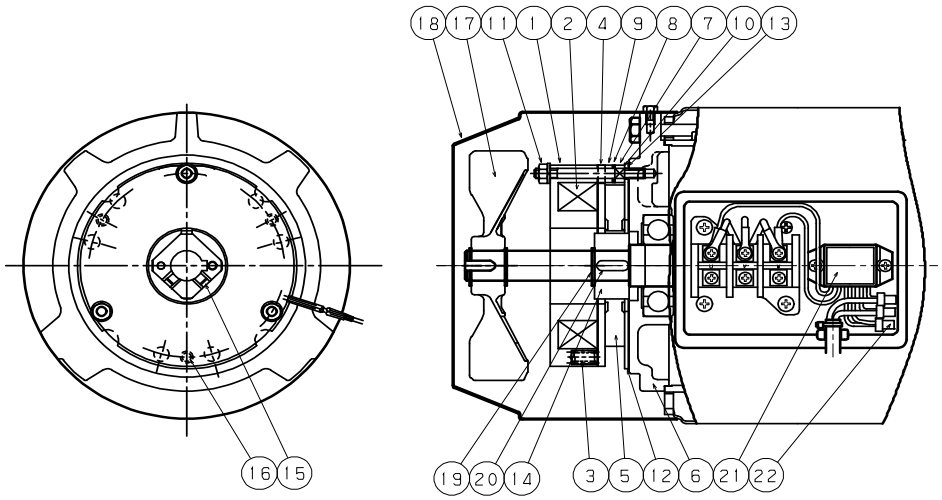
7-5. VNB brake (3.7kw and 5.5kW with brake) Structure/specification and gap adjustment

① Specification

The number of { } is reference value　The number of ( ) is 400V class

Motor kW		3.7	5.5
Brake Model No.		VNB371KE	VNB55KE
DC module type		PM180B (HD-120MH1)	PM180B (HD-120MH1)
Rated static friction torque	N・m {kgf・m}	37 {3.78}	55 {5.61}
Rated dynamic friction torque	N・m {kgf・m}	29.6 {3.02}	44.4 {4.53}
DC module voltage		Instant 180V Always DC50V (Instant 270V Always DC90V)	Instant 180V Always DC50V (Instant 270V Always DC90V)
Current (A) at 20℃		0.171 (0.307)	0.253(0.452)
Capacity (W) at 20℃		8.5 (27.6)	12.6 (40.7)
A volume of total braking work	x10^7J	118 (132)	247(247)

② Structure



1	Yoke	9	Distance collar	17	Fan
2	Coil	10	Protecting liner	18	Fan cover
3	Spring	11	Hexagon nut	19	Retaining ring
4	Armature	12	Brake plate	20	Key
5	Lining	13	Sheet packing	21	DC Module
6	Counter-load bracket	14	Center hub	22	Closed-End splice
7	Stud bolt	15	Noise absorption metal		
8	Liner	16	O-ring		

③ Gap adjustment

When the gap reaches its limit value, the brake is not able to be released. When the gap approaches its limit, inspect and adjust. Limit value may be reached early depending on the conditions of operation.

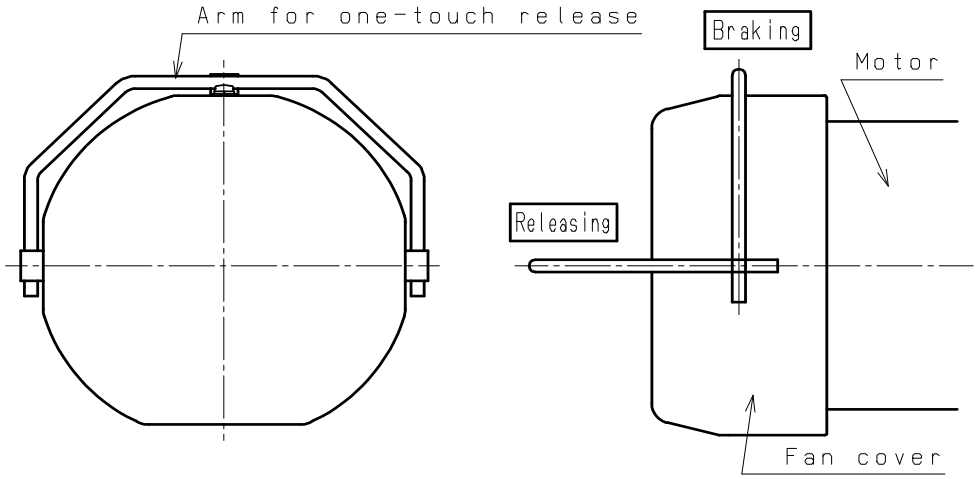
- Brake gap value and lining dimension

Motor kW	Brake type	Gap (mm)		Lining thickness (mm)	
		Initial setting	Limit	Initial setting	Limit
3.7	VNB371KE	0.3	1.1{1.2}	12	9
5.5	VNB55KE	0.35	1.2{1.2}	* 13	* 11.5

* : the value is for per one lining

- Brake gap adjustment (refer to the brake structure)
  a) Remove Hexagon Nut ⑪.
  b) Adjust gap to normal value by removing the same quantity of Protection Liner ⑧ from each Stud Bolt ⑦ which are inserted 5 to 7 pieces between Stud Bolt ⑦ and Distance Collar ⑨.
  c) Tighten Hexagon Nut securely, after adjusting the gap.

④ Structure of One-touch Manual Release Type (optional)



* Braking and release is reverse in 5.5kW

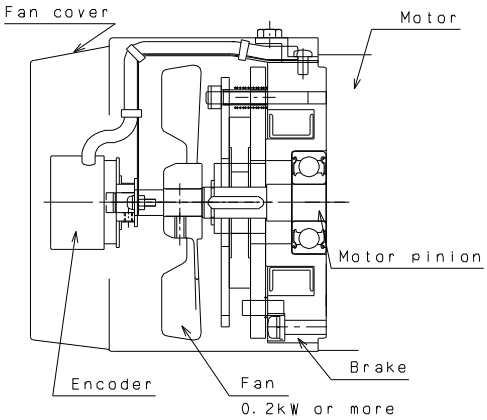
During normal operation, one touch release arm is located on the braking position shown above. If this arm moves, the brake is released. After completion of the work, return the arm to its original braking position.

Note: Release manually when no load is applied to the output shaft.
Arm for one touch release may be broken in case too much turn is applied.

approaches its limit, inspect and adjust. Limit value may be reached early depending on the conditions of operation.

- Brake gap adjustment (refer to the brake structure)
  a) Remove the fan cover ⑬.
  b) Remove the 2 hexagon socket bolts ⑨.
  c) Adjust the gap within the specified value with the adjustment plate ⑤
  d) Apply anti-loosening agent to the hexagon socket bolts ⑨ and tighten them with the torque at 2.94 to 3.92N･m (30 to 40kgf･cm) to fix the brake plate.
  e) Install the fan cover ⑬
  f) Power on and make sure the armature and lining do not interfere with each other.

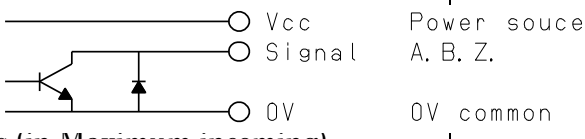
7-6. Structure of Encoder Type (optional)



■ Connection table

Color	Connection
Red	Power source
Black	0V common
Green	Signal A
White	Signal B
Yellow	Signal Z
Shielded	NC

■ Specifications of encoder

Power source voltage	DC10.8 to 26.4V
Pulse	100Pulse
Output type	Open collector output (NPN-type)
Output circuit	
Power consumption	60mW or l
Output voltage	0.5V or less (in Maximum incoming)
Maximum incoming current	20mA MAX
Signal startup and fall time	1 μs or less
Maximum response frequency	200 kHz
Withstanding voltage for output circuit	50V MAX
Cable length	0.5m

■ Environmental conditions

Ambient temperature	-10 to 40℃
Ambient humidity	85% or less; non-condensing
Installation angle	At any angle, such as horizontal, vertical, or inclined
Vibration	4.9m/s² {0.5G} or less (20 to 50Hz)

【8】 Maintenance and Safety check

WARNING

- When performing maintenance or inspection during operation, avoid contact with rotating parts (i.e. shaft etc.), otherwise accidents resulting in death or injury may occur.
- When inspecting gear teeth while motor is stopped, perform only after the rotation of the driving and driven sections are also completely stopped. Otherwise accidents resulting in death or injury may occur.
- Overload may damage and shorten the life of Gearmotor/Hypoid Motor.

【Maintenance and Safety check for brake】

- Do not operate while brake is released manually. Otherwise, falling or runaway accident may occur.
- Before starting the operation, turn power on/off to make sure the brake activates. Otherwise, falling or runaway accident may occur.
- After checking or adjusting brake gap, make sure the fan cover is back on to prevent possible injuries.
- When using with an elevator, do not release brake while loaded. Otherwise, the elevator may fall and cause serious injuries and damage to equipment.

CAUTION

- Avoid contact with terminals when measuring insulation resistance. Otherwise electrical shock may occur.
- To change lubricants, follow the instruction manual. Be sure to use recommended lubricants, others may damage the Gearmotor/Hypoid Motor.
- Surface temperature of Gearmotor/Hypoid Motor can severely increase. Do not touch with bare hands to prevent burns and other such injuries.
- Do not lubricate during the operation or immediately after stopping the motor. Burn injury may happen.
- When measuring insulation resistance of explosion-proof motors, make sure there are no gas,

steam or other explosives in the vicinity, to prevent possible explosions and fire.

- For abnormal operation, perform diagnosis based on the instructions provided in this manual. Never resume operation until the cause of the problem is investigated and countermeasures are taken.
- Any repair, disassembly and assembly except adjusting the brake gap, should be carried out by Tsubakimoto Chain Co.

【Maintenance and Safety check for brake】

- When a Gearmotor/Hypoid Motor with brake is used for an elevator, use DC external wiring. Otherwise, falling accident may occur.

8-1. Maintenance

For daily maintenance, it is enough to rely on the five senses〔touch, taste, hearing, eyesight, and smell〕or simple instruments to judge the conditions of operation as outlined below.

Noise: Is the noise louder than usual? Is there any periodic and unusual noise?
Vibration: Is there any unusual vibration?
Temperature: Is the motor temperature higher than usual?

8-2. Lubrication

(1) Lubricant

These reducers are factory filled with grease, thus initial lubrication is not necessary. In most cases, there is no need to change grease. However, you can extend the life of these units by changing the grease every 20,000 hours.
Use high- grade grease for gears, equivalent to Consistency No. 000 or No. 00.
The Gearmotor/Hypoid Motor is lubricated with NIGTIGHT LMS No.000 made by Nippon Grease Co., Ltd. (As for No.1 grease specifications, NIGLUBE EP-1K made by Nippon Grease Co., Ltd. is filled.)

(2) Amount of grease for Gearmotor

Motor kW	Reduction ratio	Amount of Grease (kg)
0.75 kW	5 - 25	0.5
	30 - 75	1.1
	100 - 200	1.3
	300 - 450	2.8 + (1.0)
1.5 kW	5 - 30	1.3
	40 - 75	1.4
	100 - 200	2.8
2.2 kW	5 - 30	1.3
	40 - 75	2.8
	100 - 200	4.2
3.7 kW	5 - 30	2.8
	40 - 50	2.8
5.5 kW	5 - 30	3.3

Note) The value in ( ) is amount of grease for the first-stage reduction section.

(3) Amount of grease for Hypoid Motor

● Hollow shaft type (H), Face mount type (U), Foot mount type (L)

Motor power	Frame		Reduction ratio	Amount of Grease(kg)
	H	U, L		
0.75kW	35	38	5 – 30	0.67
			40 – 50	0.53
	45	42	60 – 200	1.15
	55	50	300 – 480	3.7 +(0.7)
1.5kW	45	42	5 – 30	1.4
			40 – 80	1.15
	55	50	100 – 200	3.8
2.2kW	45	42	5 – 20	1.4
			25 – 60	1.15
	55	50	80 – 120	3.8
3.7kW	55	50	5 – 20	3.7
			25 – 60	3.4
5.5kW	55	50	5 – 20	3.7
			25 – 40	3.4

Note) The value in ( ) is amount of grease for the first-stage reduction section.

(4) Recommended grease

Nippon Grease Co., Ltd.: NIGTIGHT LMS No.000 (initially filled in)
SHOWA SHELL SEKIYU, K.K.: Albania EP Grease R000
JXTG Nippon Oil & Energy: Piloknock Universal 000

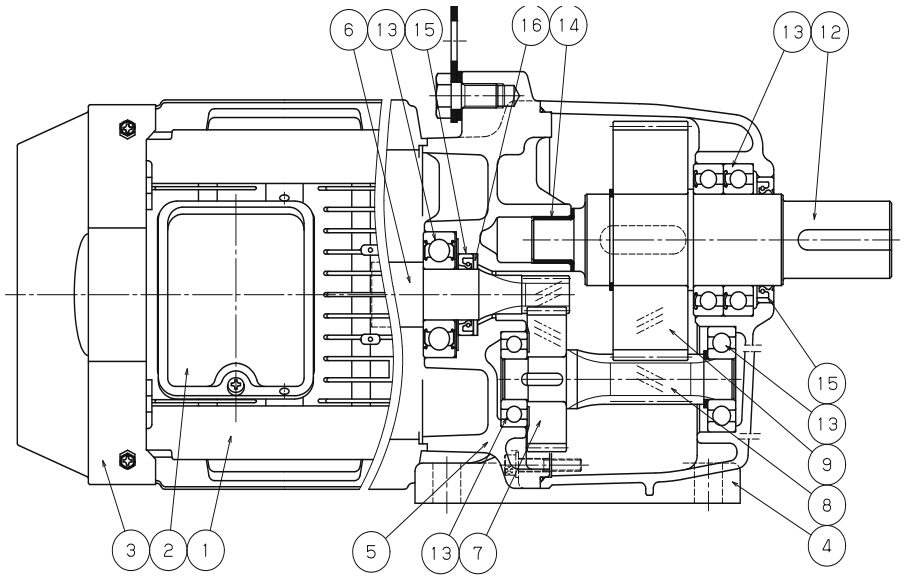
In case of No.1 grease specifications;
Nippon Grease Co., Ltd.: NIGTIGHT LYS No. 1, NIGLUBE EP-1K
SHOWA SHELL SEKIYU, K.K.: Albania EP Grease No. 1

(5) Oil-seals

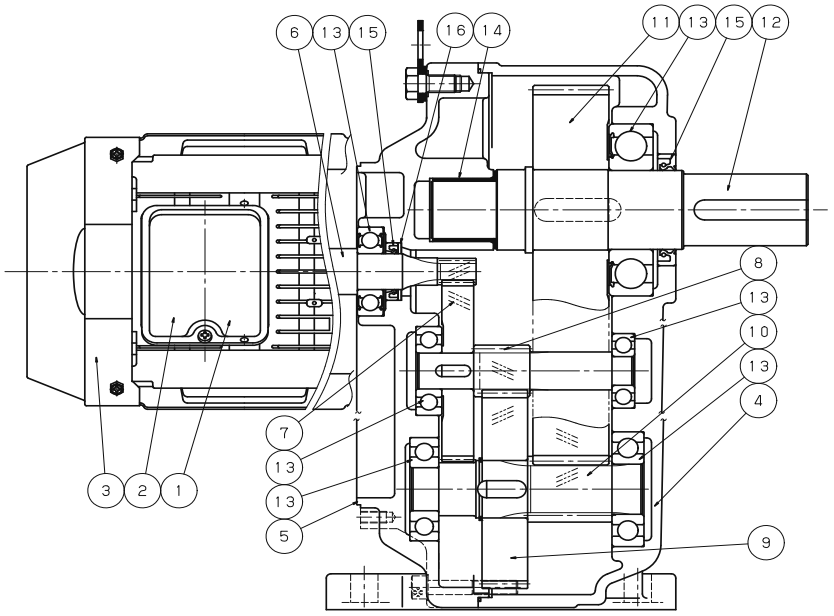
Life of the oil seal depends on the operation conditions. In some cases, replacement may be required, even within 10,000 hours of operation. For equipment such as food processing machinery where prevention of oil leakage is crucial, a device such as an oil pan is recommended.

【9】 Structure of Gearmotor and Hypoid Motor

(1) Structure of Gearmotor



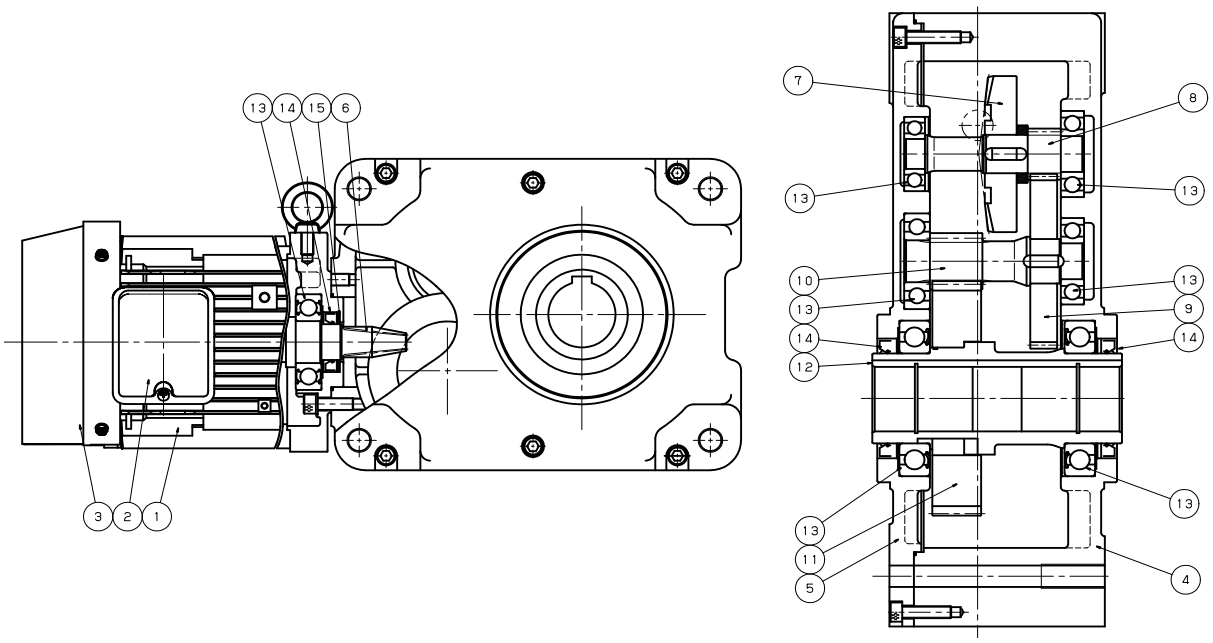
GMTE150-38L30



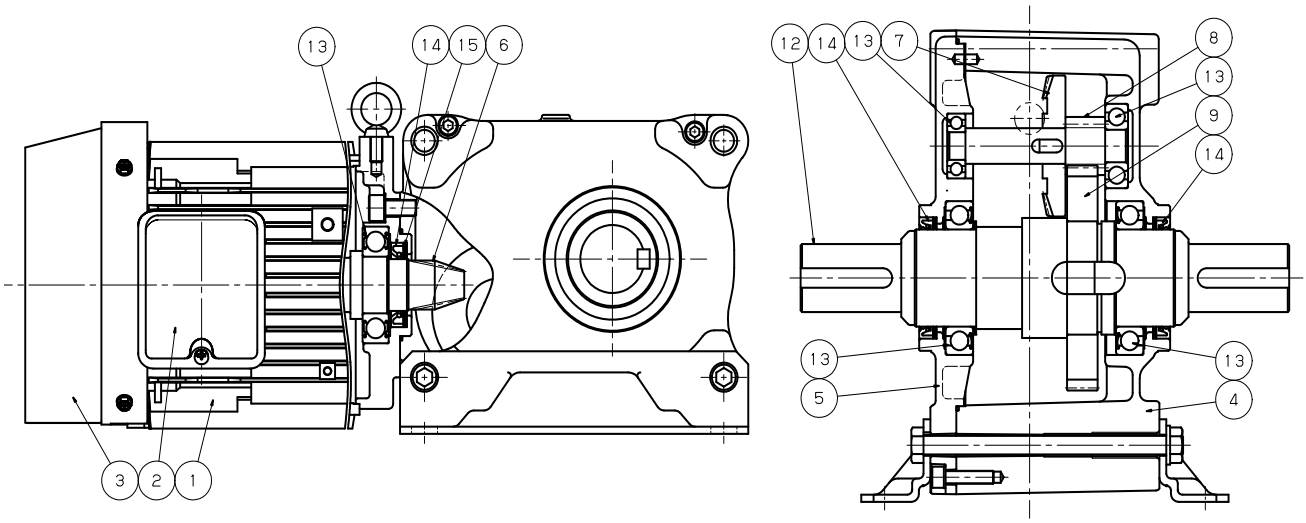
GMTE150-50L200

1	Motor	7	1st. reduction wheel	13	Bearing
2	Terminal box	8	2nd. reduction pinion	14	Metal
3	Fan cover	9	2nd. reduction wheel	15	Oil-seal
4	Gear housing	10	3rd. reduction pinion	16	Filter
5	M bracket	11	3rd. reduction wheel		
6	Motor pinion	12	Output shaft		

(2) Structure of Hypoid Motor



HMTE150-55H200



HMTE150-42L25L

1	Motor	6	Motor pinion	11	3rd. Reduction wheel
2	Terminal box	7	1st. Reduction wheel	12	Output shaft
3	Fan cover	8	2nd. Reduction pinion	13	Bearing
4	Gear housing A	9	2nd. Reduction wheel	14	Oil-seal
5	Gear housing B	10	3rd. Reduction pinion	15	Filter

【10】 Clutch-Brake Type Gearmotor

10-1. Wiring for Clutch-Brake Type Gearmotor

(1) Specifications of clutch-brake

Motor (kW)	Clutch-brake Type	Part	Static friction torque [N・m] { Ref. kgf・m }	Power consumption (W)	Gap (mm)	Exiting voltage
0.75	NC-1.2AG-081	Clutch	11.8 {1.2}	11	0.2 – 0.5	DC24V
	NB-0.75AG-002	Brake	7.35 {0.75}	8		
1.5	NC-2.5AG-062	Clutch	24.5 {2.5}	17		
	NB-1.5AG-002	Brake	14.7 {1.5}	12		
2.2	NC-2.5AG-062	Clutch	24.5 {2.5}	17		
	NB-2.2AG-002	Brake	21.6 {2.2}	16		

(2) Control circuit

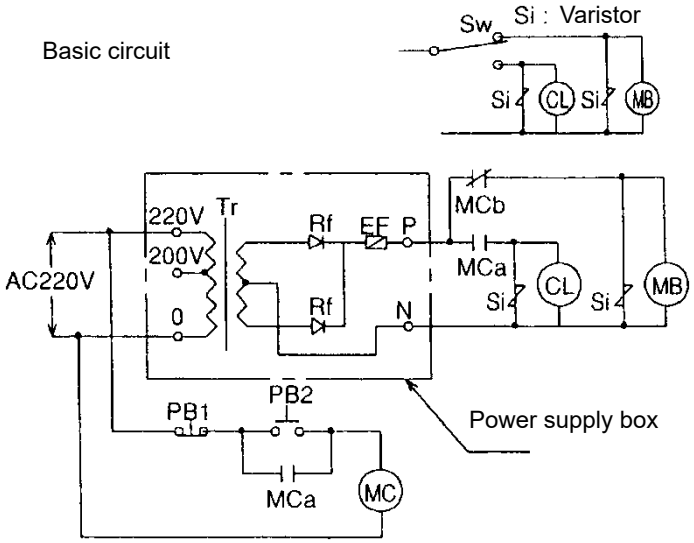
- Voltage
  Because the torque of clutch-brake varies depending on the voltage, supply appropriate voltage (DC24V). Limit fluctuation of voltage within ±10% of rated voltage. Because the terminal voltage of the clutch and brake drop due to line resistance when wiring is too long, check voltage at the terminals when power is applied.
  The power supply boxes of DMP and TMP types yield about DC40V voltage when clutch-brake is not connected, and DC24V when connected.

- Power supply
  Supply power of 130% or greater, of the power consumption of clutch.

- Switching
  Switching must always be performed on DC side.

- Discharging circuit
  Because clutch-brake is inductive load type, it accumulates electromagnetic energy while power is applied and yields counter-electromotive voltage (back surge) when switched off. It requires connecting proper protective elements and placing discharge circuit to maintain insulation of coil and to prevent over-heating. There are many methods of discharge circuit. Two pieces of varistors attached to the Clutch-Brake Type Gear Motor can be used. (Discharge circuit is already built-in when TMP type control device is used. No varistor required in this case.)

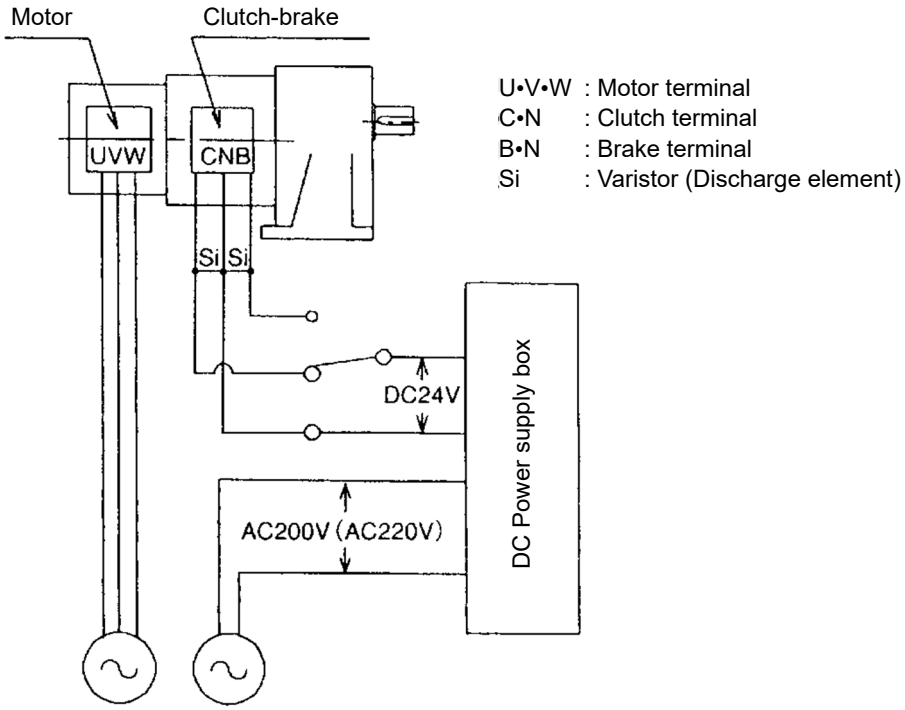
- Inverter drive
  In case of inverter drive, motor speed when connecting of clutch and brake, motor rotational speed must be 1800 r/min (60Hz) and slower.
  Connection or braking at the speed higher than 1800 r/min may cause of abnormal wear of clutch and brake lining, breakage of gear or shaft due to shock load.



Tr: Transformer Rf: Silicon rectifier EF: Fuse PB1, PB2: Push button switch
Si: Varistor CL: Electromagnetic clutch MB: Electromagnetic brake MC: Coil
MCa, MCb: Electromagnetic contactor Sw: Switch

- Wiring for Clutch-Brake Type Gear Motor

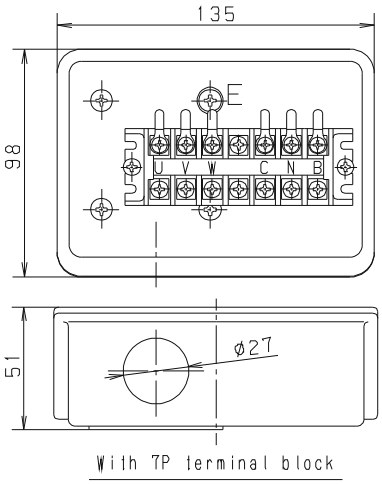
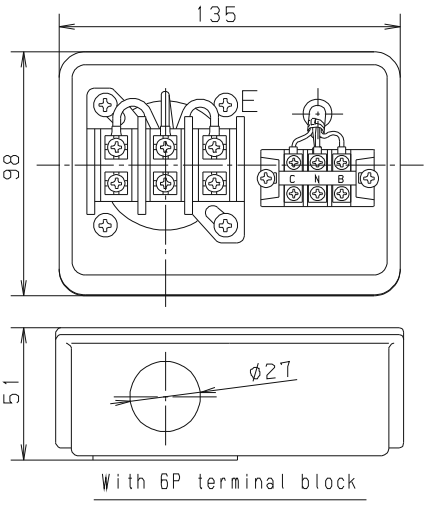
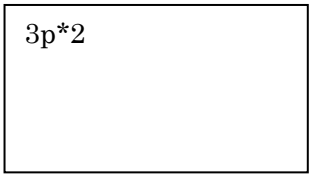
Operational voltage for clutch-brake is DC24V. Use DC power supply box to convert commercial AC power, and connect according to the following diagram:



10-2. Troubleshooting for Clutch-Brake Type Gearmotor

Trouble	Cause	Countermeasures
Clutch and brake does not work	Incorrect wiring	Check connection.
	Failure of power supply box	Replace.
	Disconnecting or short-circuit of clutch-brake coil	Repair at Tsubakimoto Chain Co.
	Defective contactor	Repair or Replace.
Bad rotation at start-up Braking is not effective enough	Grease, dust, etc. stuck to friction surface	Disassemble and clean-up.
	End of lining life	Repair or Replace.
	Torque or inertia load is too large	Reduce load.

10-3. Standard terminal box of Clutch-Brake Type Gearmotor

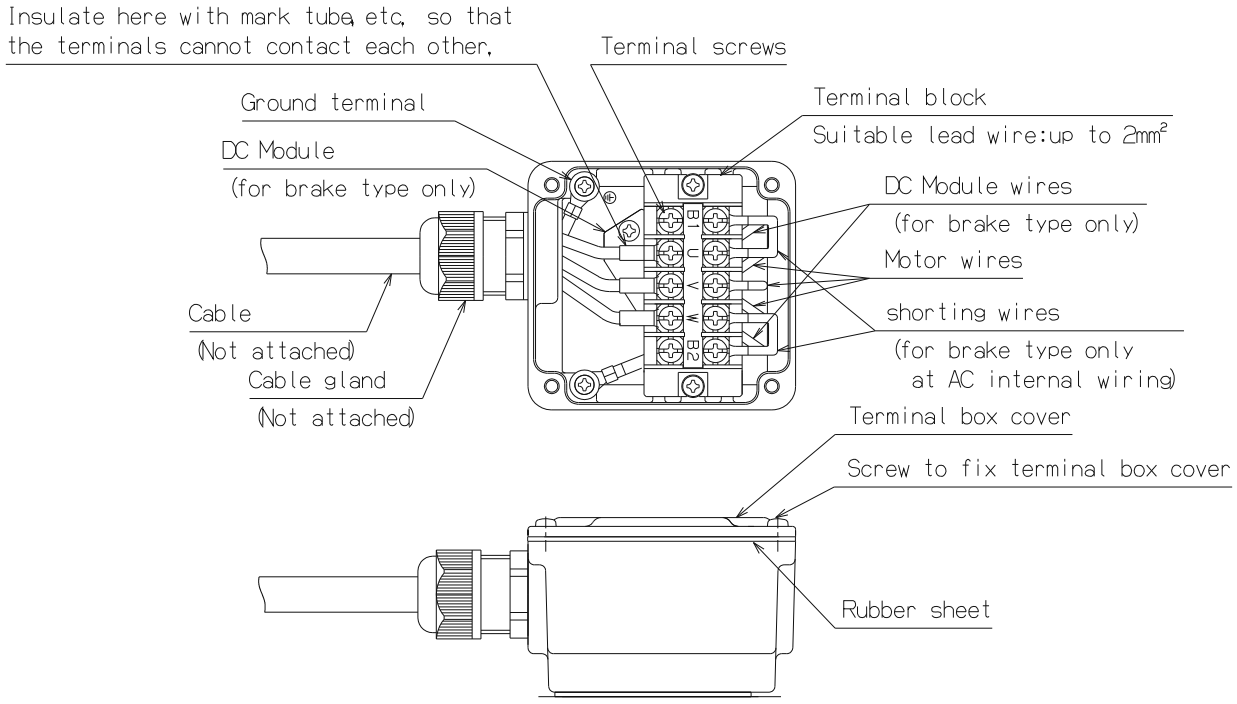
Output	Classification		Dimensions	
0.75kW	With clutch-brake type	Indoor type		1. Material : SPCC 2. Terminal screw size : M3.5 Tightening torque : 0.8 N·m{ Ref. 0.08 kgf·m } 3. Suitable terminals Ring tongue (R-type) 1.25 - 3.5 , 2 - 3.5 1.25 - 4 , 2 - 4 Insulated ring tongue 1.25 - 3.5 , 2 - 3.5 1.25 - 4 , 2 - 4 4. Ground terminal screw size : M4 Tightening torque : 1.2 N·m{ Ref. 0.12 kgf·m }
1.5kW to 2.2kW	With clutch-brake type	Indoor type	 	1. Material: SPCC 2. Terminal screw size: For motor: M4 Tightening torque: 1.2 N·m {Ref. 0.12 kgf·m} For CB: M3 Tightening torque: 0.5 N·m {Ref. 0.05 kgf·m} 3. Suitable terminals For motor: Ring tongue (R-type) 2 - 4, 3.5 - 4 Insulated ring tongue 2 - 4, 3.5 - 4 For CB : Ring tongue (R-type) 1.25 - 3.5 , 2 - 3.5 1.25 - 4 , 2 - 4 Insulated ring tongue 1.25 - 3.5 , 2 - 3.5 1.25 - 4 , 2 - 4 4. Ground terminal screw size: M5 Tightening torque:

			2.0 N·m {Ref. 0.20 kgf·m}

【11】 CE Marking (Optional 0.75kW to 2.2kW)

When using this product, please pay close attention to the following as well as to the explanations in Sections 1 to 12.
Degree of protection:
IP55 (0.75kW – 2.2kW; outdoor type)
IP44 (0.75kW – 2.2kW; indoor type)
IP20 (0.75kW; brake type)
Thermal class: 155(F) Time rating: S1, continuous

(1) Specifications of terminal box (0.75kW)
Material: Aluminum die-casting



	Tightening torque	
	N・m	kgf・m
Terminal screws	1.8	0.18
Screws for Ground terminal	1.2	0.12
Screws for Terminal box cover	1.2	0.12

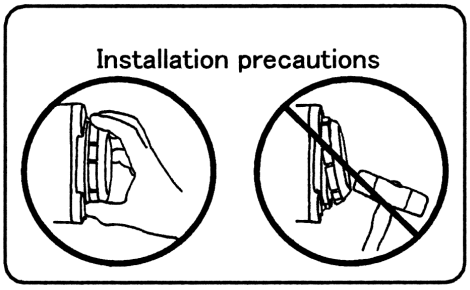
(2) Wiring for motor/brake
Refer to standard type.
(3) Motor rotation direction
The motor rotational direction is clockwise, view from the counter load side, in wiring at the chart 5-1 (page12, page13). (The motor rotational direction is the same as the standard.)
(4) Overload (overheat) protection device
Install the thermal relay certified in Europe. Set the thermal within rated current printed on the nameplate.
(5) Grounding
Make sure to connect to ground using the ground terminal.
(6) Application
The Gearmotor/Hypoid Motor is designed for Over voltage Category III. Degree of Pollution defined by IEC664.
Supply power to the motor via transformer.
May use inverter to drive. However inverter drive is not recognized by EN Standards.

【12】 Safety cover (Option for the Hypoid Motor Hollow Shaft type)

Installation

(1) Safety cover HM70CAP, HM90CAP

Compress the safety cover right to the mounting surface, putting it to the mounting surface.
Do not install aslant or hammering. Safety cover may be damaged.
Example of (1)



(2) Safety cover HM140CA, HM90CAP-PL

Compress the safety cover right to the mounting surface, putting it to the mounting surface.
When it is hard to compress the safety cover, putting it lightly with the hammer.
Safety cap may be damaged, compressing it slant or putting it strongly with the hammer.

【13】 Heat-proof type・Cold-proof type

13-1. Heat-proof type

Specifications;

Apply for:	Gearmotor and Hypoid motor (No brake:0.75-2.2kW, 0.75kW with brake)
Protection:	IP44 (0.1~2.2kW), IP20 (0.1~0.75kW with brake)
Ambient temperature:	0℃ to 60℃
Ambient humidity:	Less than 85%
Oil seals:	Heat-proof type
Altitude:	Less than 1000 m

Environment: No corrosive or explosive gas/steam. Must be well ventilated and free from dust.

Recommended grease: (Amount of Grease: Refer to page 38 to page 39.)

Idemitsu Kosan Co., Ltd : DAPHNE EPONEX SR No.1 (initially filled in)

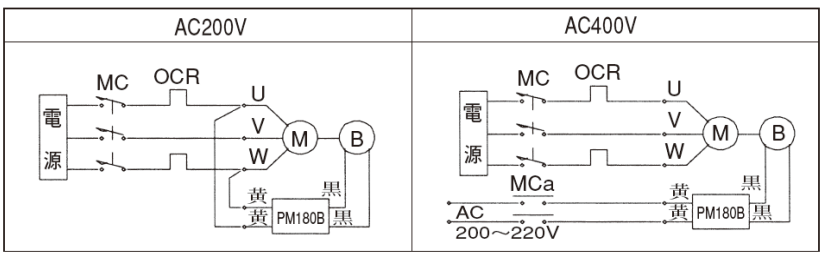
Nippon Grease Co., Ltd.: NIGACE HT-DX No.1

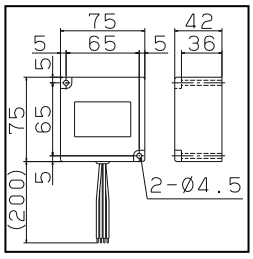
JXTG Nippon Oil & Energy : Piloknock Universal No.0

Note 1) Inverter motor type is not available.

Note 2) For brake type, install attached DC module in the location below 40 degrees Celsius referring to the connecting diagram.

DC module (PM180B).





13-2. Cold-proof type

Specifications;
Apply for: Gearmotor and Hypoid motor (No brake:0.75-2.2kW, 0.75kW with brake)
Protection: IP65 (Output shaft must be installed at horizontally)
Ambient temperature: -30℃ to 40℃
Ambient humidity: Less than 85%
Oil seals: Cold-proof type
Altitude: Less than 1000 m
Environment: No corrosive or explosive gas/steam. Must be well ventilated and free from dust.
Recommended grease: (Amount of Grease: Refer to page 38 to page 39.)
Nippon Grease Co., Ltd.: NIGTIGHT LYW No.00 (initially filled in)
Idemitsu Kosan Co., Ltd : DAPHNE XLA No.0

Note 1) Efficiency of Gearmotor / Hypoid Motor may be decreased in case of operation after stopping for a long period of time, or less frequently operation.
Note 2) Non condensing

【14】 Troubleshooting

(1) Gearmotor/Hypoid Motor

Trouble	Cause	Countermeasures
Does not rotate under non-load conditions	Power failure	Check power source. Contact electric company.
	Disconnecting of connecting wire	Check circuit.
	Disconnection of switch	Repair or replace.
	Disconnecting of stator coil	Repair at Tsubakimoto Chain Co.
	1-phase operation for 3-phase motor	Check terminal voltage.
	Damage of gear, shaft, bearing	Repair at Tsubakimoto Chain Co.
Does not rotate when load is applied	Voltage drop	Check the length of wiring.
	Wear of gears	Repair at Tsubakimoto Chain Co.
	Over-load operation	Reduce load.
Abnormal temperature rise	Over-load operation	Reduce load.
	Frequency of starting/stopping is too high	Reduce frequency.
	Damage of bearing	Repair or replace.
	Voltage is too high or too low	Check voltage.
Loud noise	Continuous noise: bearing is damaged/gear has worn out.	Repair at Tsubakimoto Chain Co.
	Intermittent noise: gear is damaged/foreign particles are inside.	Repair at Tsubakimoto Chain Co.
Large vibration	Wearing of gear/bearing	Repair at Tsubakimoto Chain Co.
	Incorrect installation/loosened bolts	Retighten loosened bolts.
Grease leakage	Loosening of tightened portion	Re-tighten loosened portion.
	Oil-seal is damaged	Replace.

(2) Gearmotor/Hypoid Motor with brake type

Trouble	Cause	Countermeasures
Brake does not work	Incorrect wiring	Check wiring.
	Failure of contactor	Replace or repair.
Braking is not effective enough Braking time is too long	Grease/dust, etc. stuck to lining	Disassemble and clean-up.
	End of lining life	Repair or replace.
	Inertia load is too large	Reduce inertia of load.
	AC internal wiring	Change to DC external wiring.
Motor does not rotate Unusual heating of motor Thermal relay works Braking noise too loud	Incorrect wiring of brake	Check wiring.
	Brake gap is too large	Adjust gap.
	Failure of DC module	Replace or repair.
	Disconnecting or short of brake coil	Repair at Tsubakimoto Chain Co.
	Defective contactor	Repair or replace.
Unusual temperature rise	Braking frequency is too high	Reduce braking frequency.
	Torque or inertia of load is too large	Reduce the load.

The above table shows the causes and countermeasures for the trouble which happen ordinarily.
If you have any other troubles, please feel free to contact with Tsubakimoto Chain Co.
At the inquiry, inform us of the followings.
(1) Mfg No.
(2) Type
(3) Motor kW
(4) Ratio or Output speed
(5) Drawing No.

【15】 Scrapping

CAUTION
● When scrapping the Gearmotor/Hypoid Motor or disposing of the lubricant, dispose as general waste.

【16】 Storage

16-1. Operation after Storage

Non-metallic parts like oil seals, oil gauges, and oil plugs wear easily from environmental conditions such as extreme temperatures and ultraviolet rays. Make sure to inspect these parts and replace them if damaged, before operation.

【17】 Limited Warranty

Tsubakimoto chain Co.: hereinafter referred to as “Seller”
Customer: hereinafter referred to as “Buyer”
Goods sold or supplied by Seller to Buyer: hereinafter referred to as “Goods”

1. Warranty period without charge
   18 months effective the date of shipment or 12 months effective the first use of Goods, including installation of Goods to Buyer’s equipment or machine - whichever comes first.

2. Warranty coverage
   Should any damage or problem with the Goods arise within the warranty period, given that the Goods were operated and maintained according to the instructions provided in the manual, Seller will repair and replace at no charge once the Goods are returned to the Seller.
   This warranty does not include the following:
   1) Any costs related to removal of Goods from the Buyer’s equipment or machine to repair or replace parts.
   2) Cost to transport Buyer’s equipment or machines to the Buyer’s repair shop.
   3) Costs to reimburse any profit loss due to any repair or damage and consequential losses caused by the Buyer.

3. Warranty with charge
   Seller will charge any investigation and repair of Goods caused by:
   1) Improper installation by failing to follow the instruction manual.
   2) Insufficient maintenance or improper operation by the Buyer.
   3) Incorrect installation of Goods to other equipment or machine.
   4) Any modifications or alterations of Goods by the Buyer.
   5) Any repair by engineers other than the Seller or those designated by the Seller.
   6) Operation in an inappropriate environment not specified in the manual.
   7) Force Majeure or forces beyond the Seller’s control such as natural disasters and injustices done by a third party.
   8) Secondary damage or problem incurred by the Buyer’s equipment or machine.
   9) Defected parts supplied or specified by the Buyer.
   10) Wear, tear or deterioration of parts including bearings and oil seal.
   11) The end of life cycle of the Goods under normal usage.

4. Dispatch service
   Service to dispatch a Seller’s engineer to investigate, adjust or trial test Seller’s Goods is at the Buyer’s expense.

5. Disclaimer

1) In our constant efforts to improve, Tsubakimoto Chain Co. may make changes to this document or the product described herein, without notice.
2) Considerable effort has been made to ensure that the contents of this document are free from technical inaccuracies and errors. However, any such inaccuracies or errors reported will be gladly examined and amended as necessary.

【MEMO】

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http://www.ustsubaki.com/

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Tsubakimoto Europe B.V.
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Tsubaki of Canada Limited
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Taiwan Tsubakimoto Co.
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Tsubakimoto U.K. Ltd.
http://tsubaki.eu/

Tsubaki Australia Pty. Limited
http://tsubaki.com.au/

Tsubakimoto Chain (Shanghai) Co., Ltd.
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