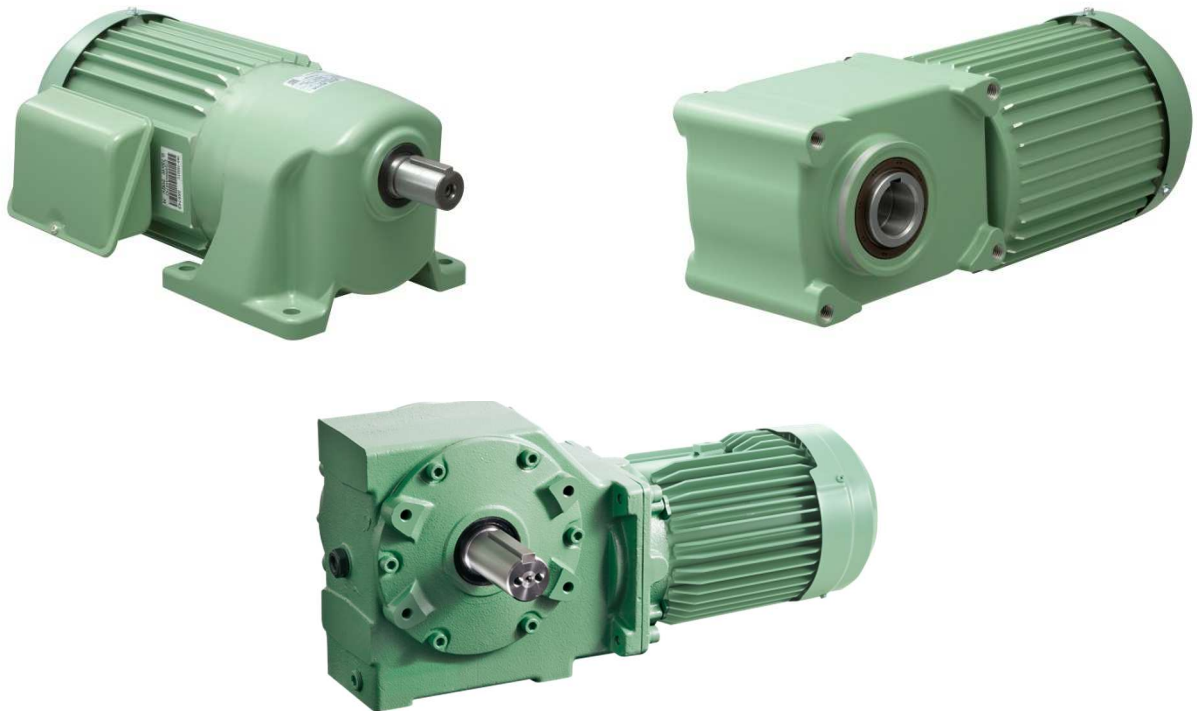


TSUBAKI

Gearmotor
Hypoid Motor
Croise Motor
< TR Series >

3 Phase 0.75kW to 5.5kW

Instruction Manual



- Thank you for choosing Tsubaki gearing products. Your Gearmotor/Hypoid Motor/Croise 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/ Croise 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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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.
 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/Croise 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/Croise Motor at live-wire operations . Switch off the power supply prior to operating to prevent electrical shock. ● When the Gearmotor/Hypoid Motor/ Croise 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/Croise 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/Croise Motor. Return to tsubakimoto chain for detailed inspection.

 CAUTION
● Do not use the Gearmotor/Hypoid Motor/Croise 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/ Croise Motor. Otherwise electrical shock, injury, fire or damage to the device may occur. ● Do not use damaged Gearmotor/Hypoid Motor/Croise 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/ Croise Motor

1-1. Upon delivery Gearmotor/Hypoid Motor/Croise Motor

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

	SERIES
TYPE	TYPE (P5)
RATIO	RATIO
DRAWING No.	DWG No.
MFG No.	MFG No.
TSUBAKIMOTO CHAIN CO. JAPAN N104K	
	

NAMEPLATE OF REDUCER

3 PHASE INDUCTION MOTOR	
POWER kW	POLES
VOLTS	TYPE
Hz	TH. CLASS
AMP.	RATING
min ⁻¹	APPLICABLE STANDARD
IE CODE	PROTECTION
EFF. (%)	MFG No.
TSUBAKIMOTO CHAIN CO.	
	

NAMEPLATE OF MOTOR

1-2. Contacting Tsubakimoto Chain

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

GMTR 075 – 38 L 75 □ □□□ □□
 ① ② ③ ④ ⑤ ⑦ ⑧ ⑨
HMTR 075 – 38 L 50 L □ □□□ □□
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① Series	GMTR HMTR	Gearmotor IE3 Class Hypoid Motor IE3 Class
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 H	Foot mount Face mount Flange mount Hollows shaft type
⑤ Reduction ratio (example)	50 75	1/50 1/75
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 symbols	No symbol B CB K BE	No brake, clutch-brake or encoder Brake type Clutch-brake type 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.L2~L6 7.V2~V7 8.N 9.H 10.Q 11.M 12.A1 13.A2 14.G1	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 200 V class Different voltage(Table 1-4.) 400 V class Different voltage(Table 1-4.) CE marking Hard terminal box (only for 0.75kW) One-touch manual release type Manual shaft type Heat-proof type Cold-proof type No. 1 grease specification
⑨ Option code B	P1 P2 P3 P5 P6 F1 F2 F3 C0 C1 C2 C3 S1 S2 S3 S4 S5 S6 S7	Terminal box position: 90° swing (Gearmotor 1.5kW to 5.5kW, Hypoid Motor 0.75kW to 5.5kW) Terminal box position: 180° swing (Gearmotor 1.5kW to 5.5kW, Hypoid Motor 0.75kW to 5.5kW) Terminal box position: 270° swing (Gearmotor 1.5kW to 5.5kW, Hypoid Motor 0.75kW to 5.5kW) Terminal box position: 60° swing (Gearmotor 0.75kW only) Terminal box position: 120° swing (Gearmotor 0.75kW 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 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

Table 1-4. Different voltage

200 V class		400 V class	
L2	230V60Hz	V2	380V60Hz
L4	210V60Hz	V3	415V50Hz
L6	240V60Hz	V4	460V60Hz
		V5	415V60Hz
		V7	420V60Hz

(2) Croise Motor

CSMR 075 – 28 0 L 20 T B □□□ □□□
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

① Series	CSMR HCMR	Single reduction type with IE3 motor Double reduction type with IE3 motor
② Motor power (example)	075 220	3-phase 0.75 kW 3-phase 2.2 kW
③ Frame number (example)	28	Frame No.28
④ Installation code	0 to 6	Refer to the installation codes and mounting direction guide on page 9
⑤ Mounting	L U H	Foot mount Face mount Hollows shaft type
⑥ Reduction ratio (example)	20	1/20
⑦ Shaft arrangement	L T R No code	Left sided output shaft viewed from motor side both sided output shaft Right sided output shaft viewed from motor side Hollow output shaft type
⑧ Specification code	No code B BE	No brake, clutch-brake or encoder Brake type Encoder type
⑨ Option code A	1.LG RG 2.W 3.J 4.V 5.L2~L6 6.V2~V7 7.N 8.H 9.Q 10.M	With mechanical overload protection device(Left sided installation viewed from motor side) With mechanical overload protection device(Right sided installation viewed from motor side) Outdoor type Water-proof type 380/400/400/440V·50/50/60/60Hz 200 V class Different voltage(Table 1-4.) 400 V class Different voltage(Table 1-4.) CE marking Hard terminal box (only for 0.75kW) One-touch manual release type Manual shaft type
⑩ Option code B	P1 P2 P3 P4 P5 P6 P7 F1 F2 F3 C0 C1 C2 C3	Terminal box position: 90°swing(CSMR 0.75kW to 5.5kW, HCMR 1.5kW to 5.5kW) Terminal box position: 180°swing(CSMR, HCMR 0.75kW to 5.5kW) Terminal box position: 270°swing(CSMR 0.75kW to 5.5kW, HCMR 1.5kW to 5.5kW) Terminal box position: 60°swing(HCMR 0.75kW) Terminal box position: 120°swing(HCMR 0.75kW) Terminal box position: 240°swing(HCMR 0.75kW) Terminal box position: 300°swing(HCMR 0.75kW) 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

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 product 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/Croise 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/Croise 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/Croise 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/Croise 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 atmosphere, 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/Croise Motor. Fire may occur.
- Never place any obstacles that block ventilation around the Gearmotor/Hypoid Motor/Croise Motor to prevent overheating which can cause burns, fire or other such accidents.
- Never climb or hang onto the Gearmotor/Hypoid Motor/Croise Motor to avoid possible injury.
- Do not touch the shaft keyway with bare hands, to avoid possible injury.
- When the Gearmotor/Hypoid Motor/Croise 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°C to 40°C (Gearmotor/Hypoid Motor) 5°C to 40°C (Croise Motor)
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°C to 40°C, in a well ventilated space, with as little humidity and dust as possible.
Degree of protection of the Gearmotor/Hypoid Motor/ Croise Motor is;
3-phase No brake: IP44, With brake: IP20, With clutch&brake: IP12
- Outdoor type
Install outdoors at ambient temperature of −20°C to 40°C, and avoid dust as much as possible.
Degree of protection of the Gearmotor/Hypoid Motor/ Croise Motor is;
In the case of horizontal installation: IP55 (with brake and no brake)
For other installation positions, contact Tsubakimoto Chain
- 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)
HSBC Screw (JIS B1051, Strength Class 10.9)	HSBC Screw (JIS B1051, Strength Class 10.9)

HSBC : 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)

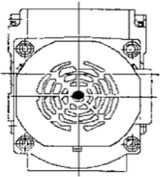
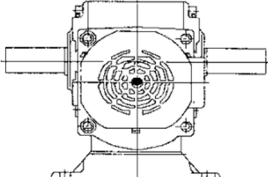
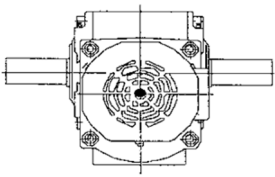
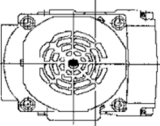
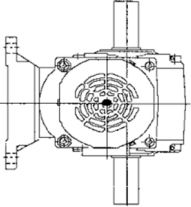
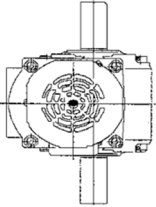
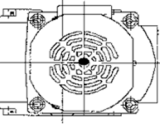
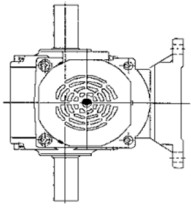
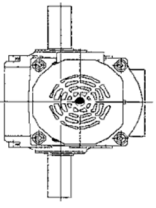
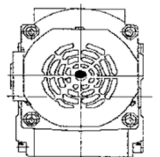
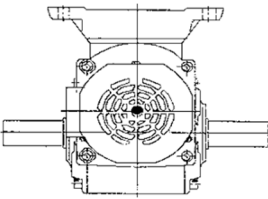
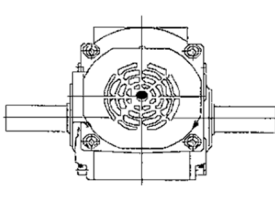
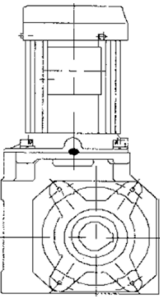
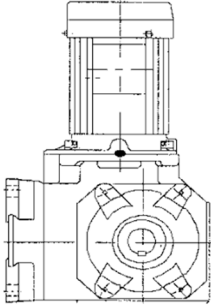
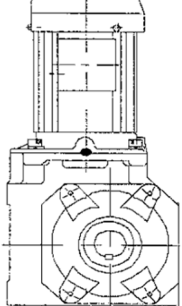
Make the Gearmotor is firmly secured to the flange plate.

3-3. Mounting direction (Croise motor only)

Refer to the mounting direction guide below when mounting the motor.

Table of mounting direction numbers indicated on the nameplate

CSMR Series		HCMR Series			
Frame No. 22 to 28		Frame No. 28		Frame No. 32 to 50	
Mounting No.	Mounting direction	Mounting No.	Mounting direction	Mounting No.	Mounting direction
0	No restrictions on mounting direction	0	Standard	1	Standard
			Left side up	2	Left side up
			Right side up	3	Right side up
			Upside down	4	Upside down
		5	Input up	5	Input up
		6	Other	6	Other

Mounting direction	Mounting direction		
	Hollow shaft type	Foot mount type	Face mount
Down ← → Up Standard			
Down ← → Up Left side up			
Down ← → Up Right side up			
Down ← → Up Upside down			
Down ← → Up Input up			
Down ← → Up Other	Mounting direction specified when ordering		

【4】 Connecting to machinery

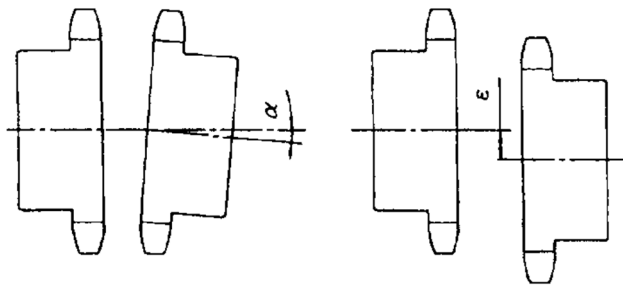


CAUTION

- When connecting Gearmotor/Hypoid motor/Croise Motor to another machinery, pay attention to centering, belt tension, and pulley 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°C. 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.

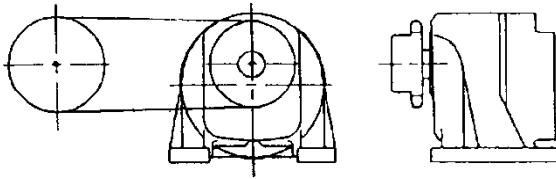
4-1. Direct coupling



- 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)

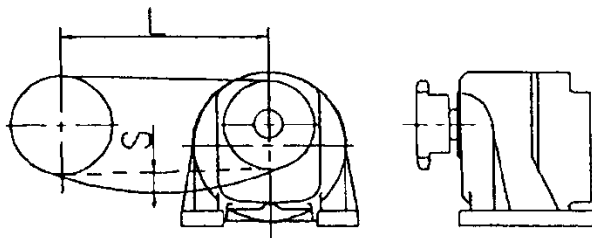
4-2. Chain or Belt

Correct



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

Incorrect

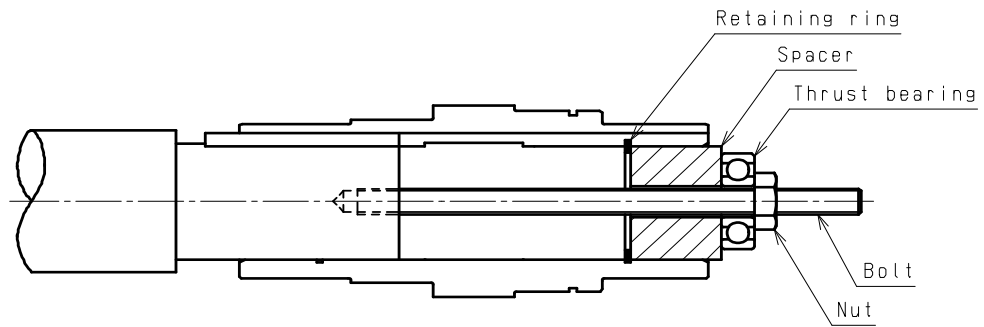


- Direction of sprocket is opposite. Tooth is located at the end of the shaft.
- Tension of the chain is too loose. For roller chain transmission, S should be approx. 4% of length L (span between two axes).

4-3. Installing/Uninstalling of hollow shaft

(1) Inserting to the driven shaft

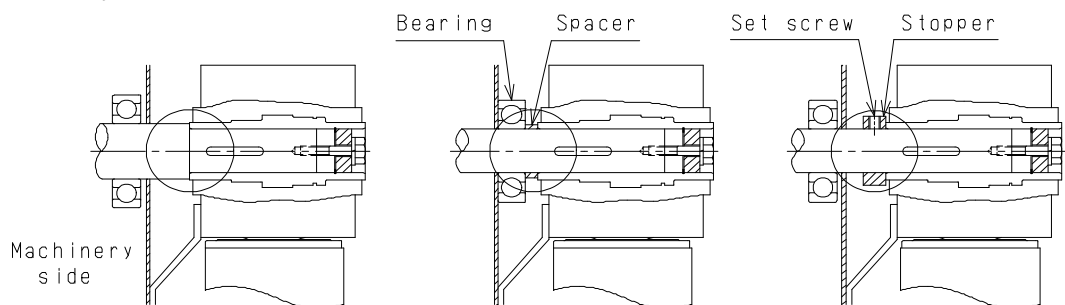
- Tolerance of hollow shaft bore is fixed at JIS H8. That of the driven shaft should be around h7. If shock or radial load is large, make it tight with js6 or k6.
- To insert to the driven shaft, coat its inner and outer surface with molybdenum disulfide grease.
- If make a jig shown below, the driven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



(2) Fixing the Hypoid Motor/Croise Motor to the driven shaft

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

Following methods prevent Hypoid Motor/Croise Motor from moving towards the machinery.

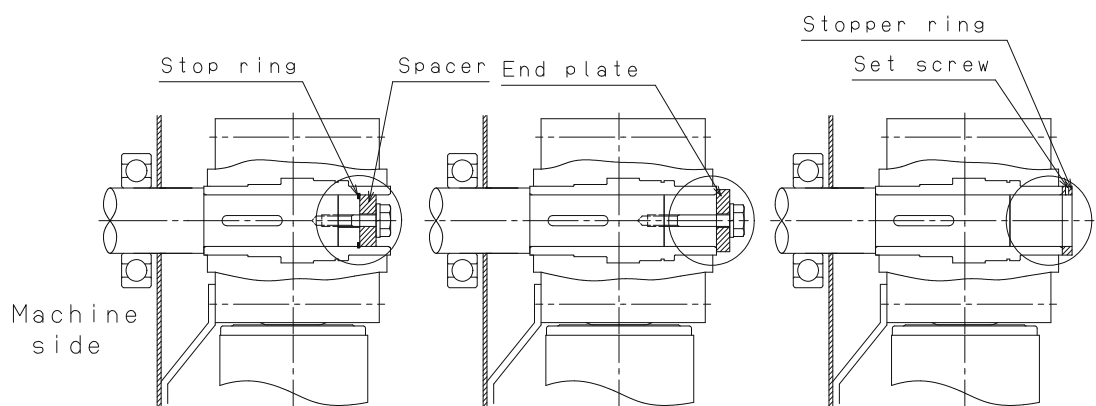


Fixed by step
of the driven shaft

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/Croise 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

Figure 4-1

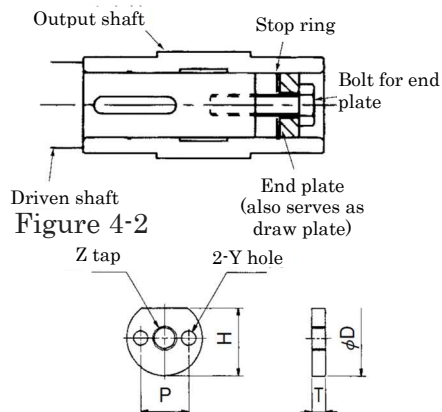
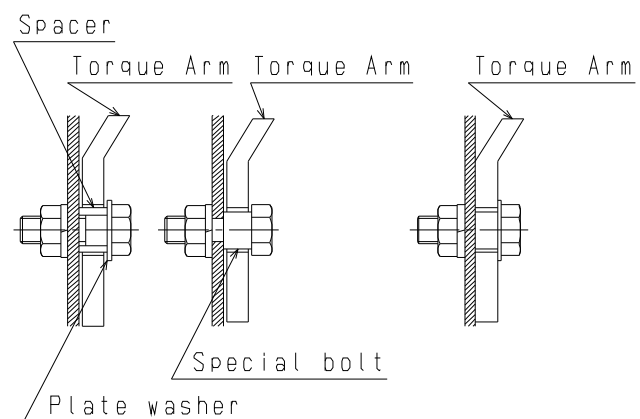
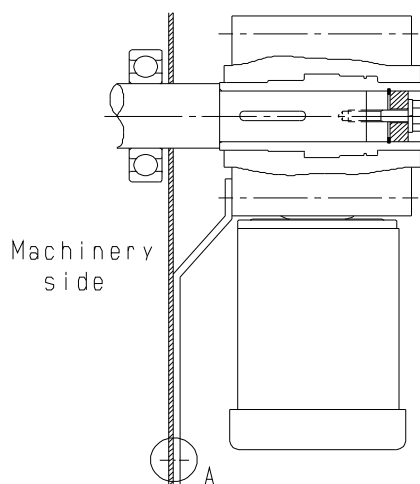


Table 1. Recommended dimensions for end plates(Croise motor):See Figure 4-1.4-2.

Hollow output shaft bore diameter	Plate						Bolt for plate (with spring washer)	Stop ring size
	ϕD	T	H	Z	2-Y hole	P		
$\phi 20$	19.6	6	16	M8	-	-	1-M6 x 24	C20
$\phi 25$	24.6	9	20	M10	-	-	1-M8 x 35	C25
$\phi 30$	29.6	9	25	M12	-	-	1-M10 x 40	C30
$\phi 40$	39.6	12	34	M12	6.6	24	2-M6 x 40	C40
$\phi 50$	49.6	12	44	M16	9	30	2-M8 x 45	C50
$\phi 55$	54.6	14	48	M16	11	32	2-M10 x 55	C55
$\phi 70$	69.5	14	62	M24	14	44	2-M12 x 60	C70

(3) Anti-rotation by Torque Arm

- Install Torque Arm at the driven side of the Hypoid Motor/Croise 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) Mounting to machine (Croise motor)

- Use spigot facing for flange mount type.
- The end plate is not required when mounting a reducer by its flange to a fixed driven shaft. Take measures to prevent the key from falling out.
Note) If the end plate is used to fix the hollow output shaft, the bearing may be damaged due to the stress on the bearing on the hollow output shaft.
- When fixing the driven shaft to the reducer by its flange, mount the reducer so that the driven shaft is free in the thrust direction before fixing the thrust direction of the driven shaft.
- When mounting the motor to the machine by its base, use the recommended bolts in Table 2.

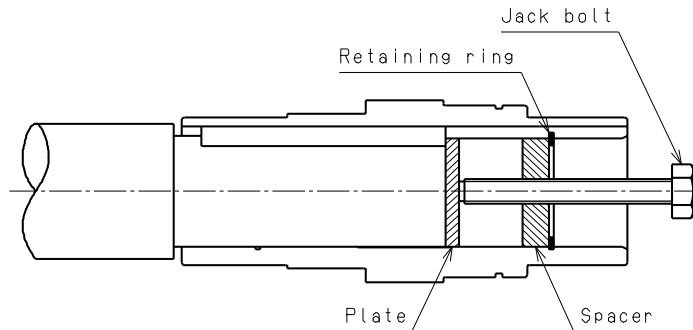
Table 2. Recommended Mounting Bolts (Equivalent to JIS strength 4.8 hex bolts)

Reducer frame No.	Bolt size	Reducer frame No.	Bolt size
13	M6 x 20	32	M12 x 40
16	M8 x 25	40	M14 x 45
22	M10 x 35	50	M16 x 50
28	M12 x 40		

Note: Recommended bolts are the same for all Croise motors with the same reducer frame number, regardless of motor power or reduction ratio.

(5) 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/Croise 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. 6 is as follows:

Table 5-1 Rotational direction of output shaft at the wiring of Fig. 6

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. 6 is as follows:

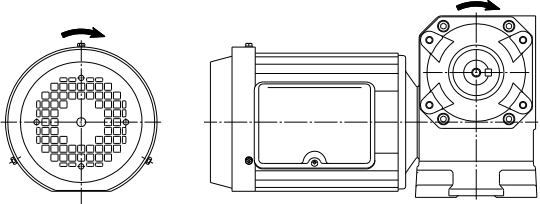
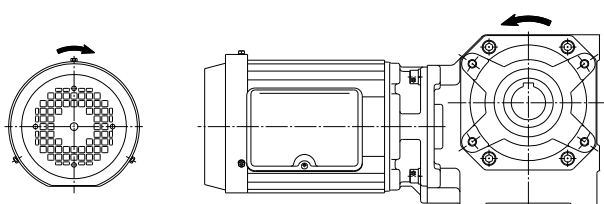
Table 5-2 Rotational direction of output shaft at the wiring of Fig. 6

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.

5-3. Croise motor

Table 5-3. Direction of rotation of output shaft when motor is wired as shown in Fig. 6

CSMR Series	Direction of rotation	HCMR Series	Direction of rotation
	(Clockwise when viewed from opposite side to motor load)		(Clockwise when viewed from opposite side to motor load)

【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/Croise 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/Croise 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/Croise 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/Croise 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/Croise Motor.

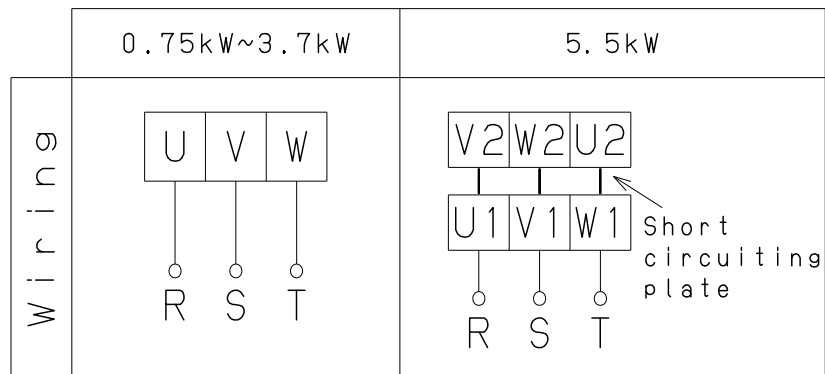


Fig.6 Wiring method

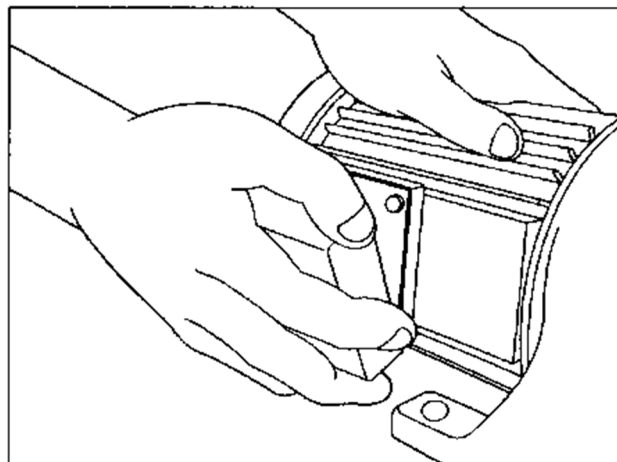
Carry out the following wiring for standard Gearmotor/Hypoid Motor/ Croise motor.

Star-delta startup is only possible with 5.5kW. Remove short-circuit plate and connect with starter.

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/ Croise 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.

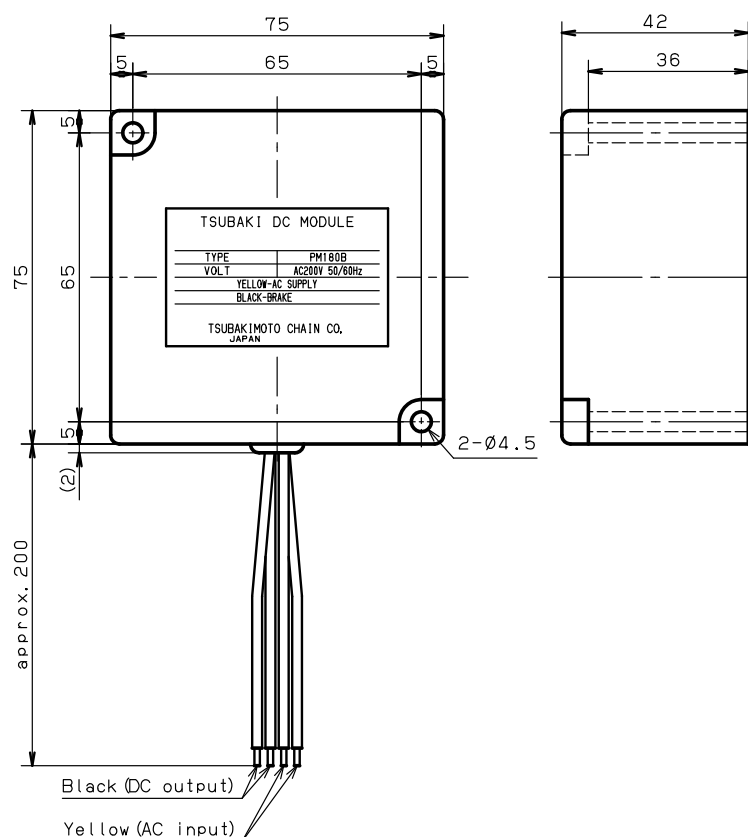
Table 6-2 Wiring for brake type

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	3.7kW	5.5kW
AC internal wiring	0.20 - 0.24	0.30 - 0.45	0.50 - 0.70	0.20 - 0.30
AC external wiring	0.10 - 0.13	0.10 - 0.13	0.20 - 0.40	0.03 - 0.05
AC external operation	0.10 - 0.13	0.10 - 0.13	0.20 - 0.40	0.03 - 0.05
DC external wiring	0.04 - 0.06	0.04 - 0.06	0.02 - 0.04	

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



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

	Purpose	0.75kW to 3.7kW	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 1.5kW to 3.7kW	
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 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 3.7kW	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 at *4	
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, PM180B: DC Module

Note 1) DC module (PM180B) for 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 19.

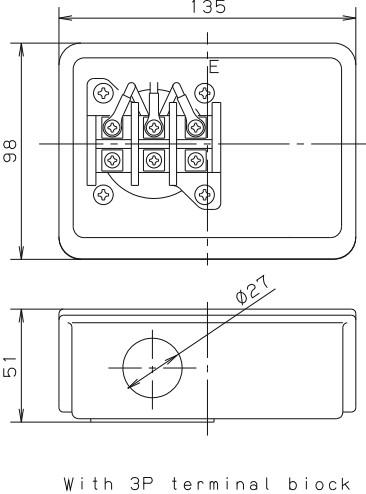
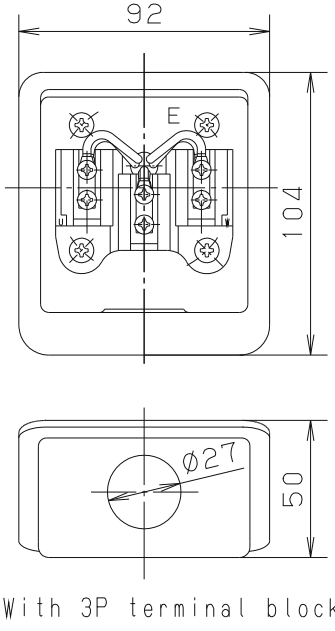
Note 2) Since DM400D has the varistor inside, to install the varistor in the circuit diagram is not needed.

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

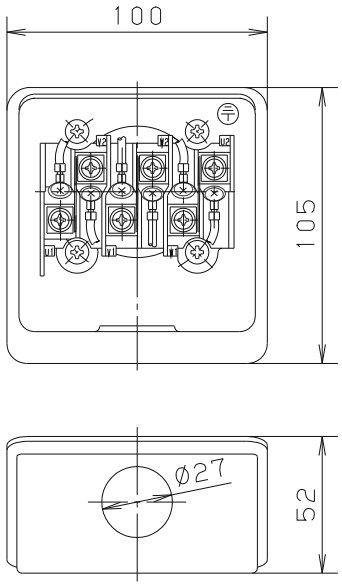
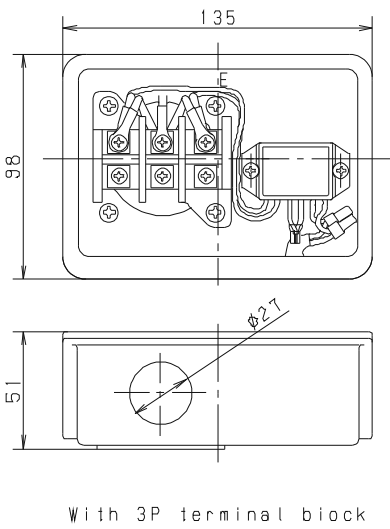
Note 4) PM180B is used for 5.5kW. Due to built-in relays type, do not set DC external wiring.

6-4.Dimensions of terminal box

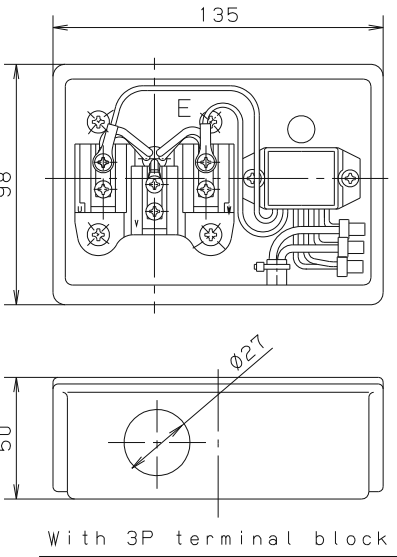
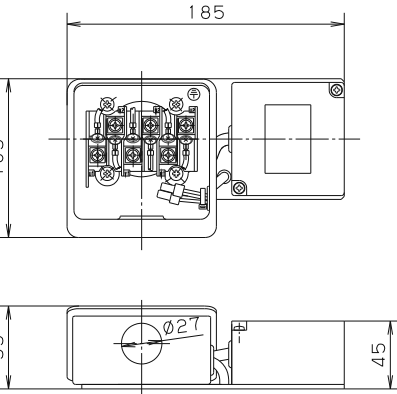
● Standard terminal box

kW	Type		Dimensions
0.75 kW	No brake	Indoor 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 terminalScrew size : M5 Tighteningtorque: 2.0 N·m{ Ref. 0.20 kgf·m }
1.5 kW to 3.7 kW	No brake	Indoor type	 1.Material : SPCC 2.Terminal screw size : M4 Tightening torque : 1.4 to 1.65 N·m { Ref. 0.14 to 0.165 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 }

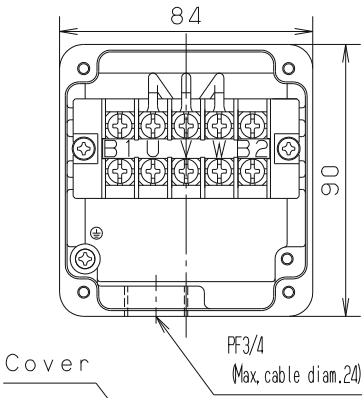
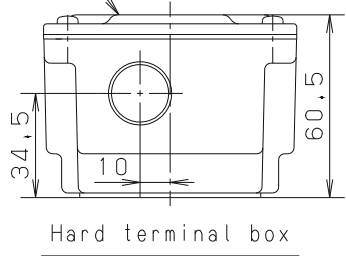
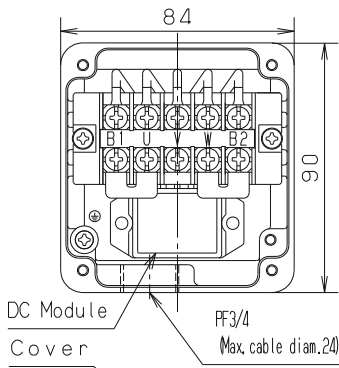
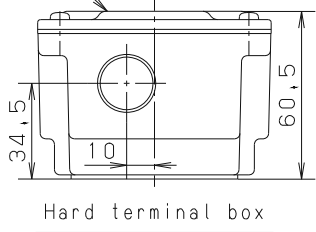
● Standard terminal box

kW	Type		Dimensions
5.5 kW	No brake	Indoor Type	 1. Material : SPCC 2. Terminal screw size : M4 Tightening torque : 1.4 to 1.65 N·m { Ref. 0.14 to 0.165 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 : 2.0N·m{ Ref. 0.20 kgf·m }
0.75 kW	With brake	Indoor 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. 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 }

● Standard terminal box

kW	Type	Dimensions
1.5 kW to 3.7 kW	With brake	Indoor type  1.Material : SPCC 2.Terminal screw size : M4 Tightening torque : 1.4 to 1.65N·m { Ref. 0.14 to 0.165 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 : M5 Tightening torque : 2.0Nm{Ref. 0.2kgf·m }
5.5 kW	With brake	Indoor type  1.Material : SPCC 2.Terminal screw size : M4 Tightening torque : 1.4 to 1.65N·m { Ref. 0.14 to 0.165 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 : M5 Tightening torque : 2.0Nm{Ref. 0.20kgf·m }

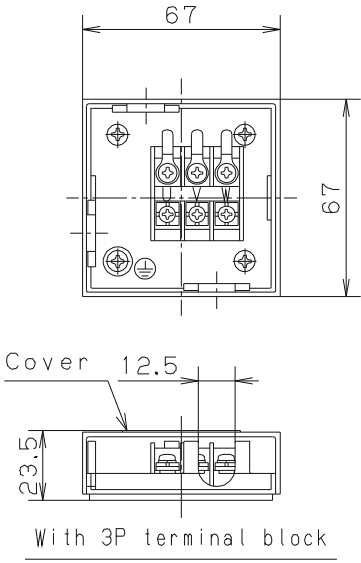
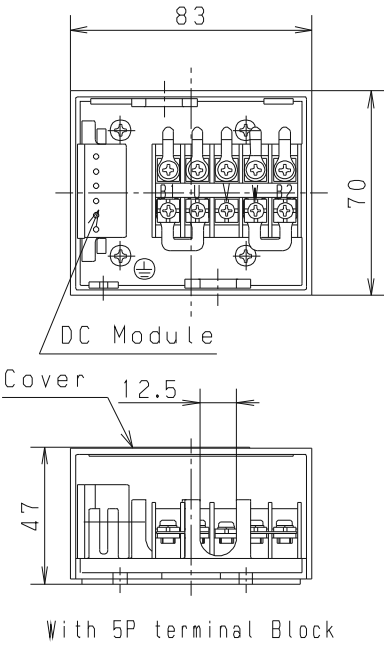
● Outdoor standard terminal box (outdoor type)

kW	Type		Dimensions	
0.75 kW	No brake	Outdoor Type		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 }
		Indoor Type (Option)		
0.75 kW	With brake type	Outdoor Type		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 }
		Indoor Type (Option)		

● Outdoor standard terminal box (outdoor type)

kW	Type	Type	Dimensions
1.5 kW to 3.7 kW	No brake	Outdoor Type	1. Material : SPCC 2. Terminal screw size : M4 Tightening torque : 1.4 to 1.65N·m { Ref. 0.14 to 0.165 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 : M4 Tightening torque : 1.4 to 1.65N·m { Ref. 0.14 to 0.165 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)

kW	Type	Dimensions
0.75 kW	No brake Indoor type	 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 }
0.75 kW	With brake type Indoor Type (200V class only)	 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 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 }

【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 /Croise 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/Croise 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/Croise Motor may be changed when the voltage or frequency fluctuate. Fluctuation of voltage within $\pm 10\%$ of the rated voltage is allowed.

(3) Trial operation

Shipped products have not undergone trial operation. For Croise motors in particular, to demonstrate proper performance, a trial run should be conducted for a period of about one day by applying a load on the order of one-half to one-third of full load.

(4) Load

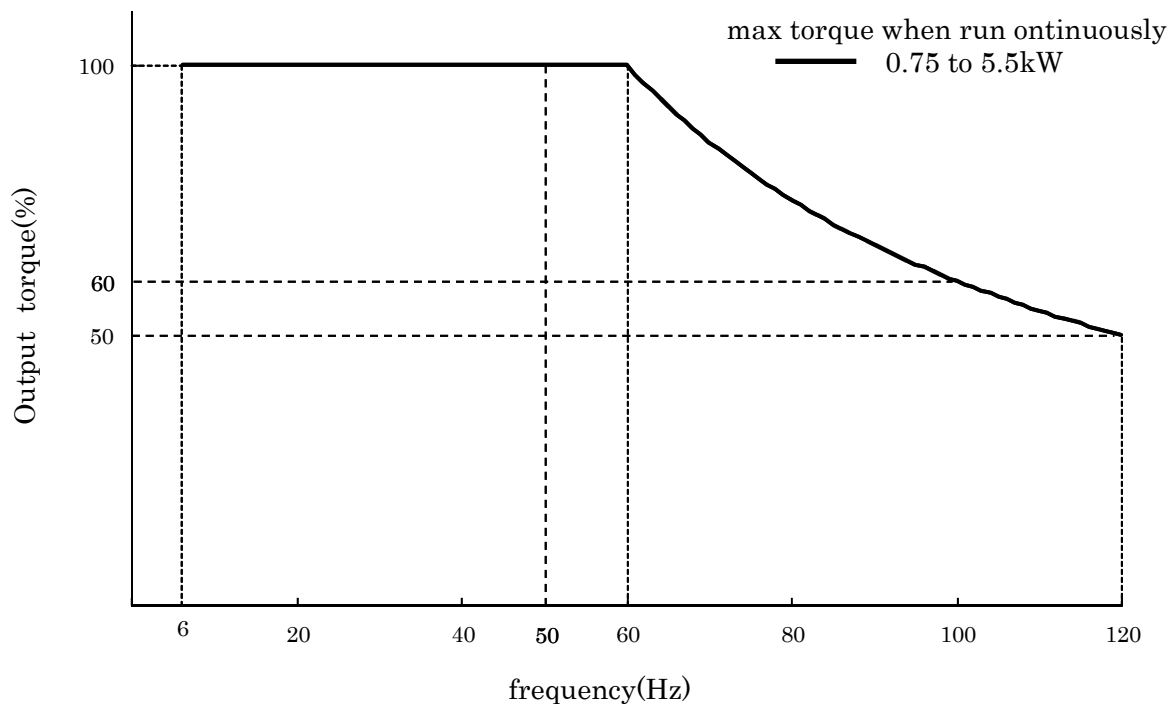
Overload may damage the Gearmotor/Hypoid Motor/Croise Motor and reduce its operating life. Be sure the current does not exceed that printed on the nameplate. Check after starting operation

(5) 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)

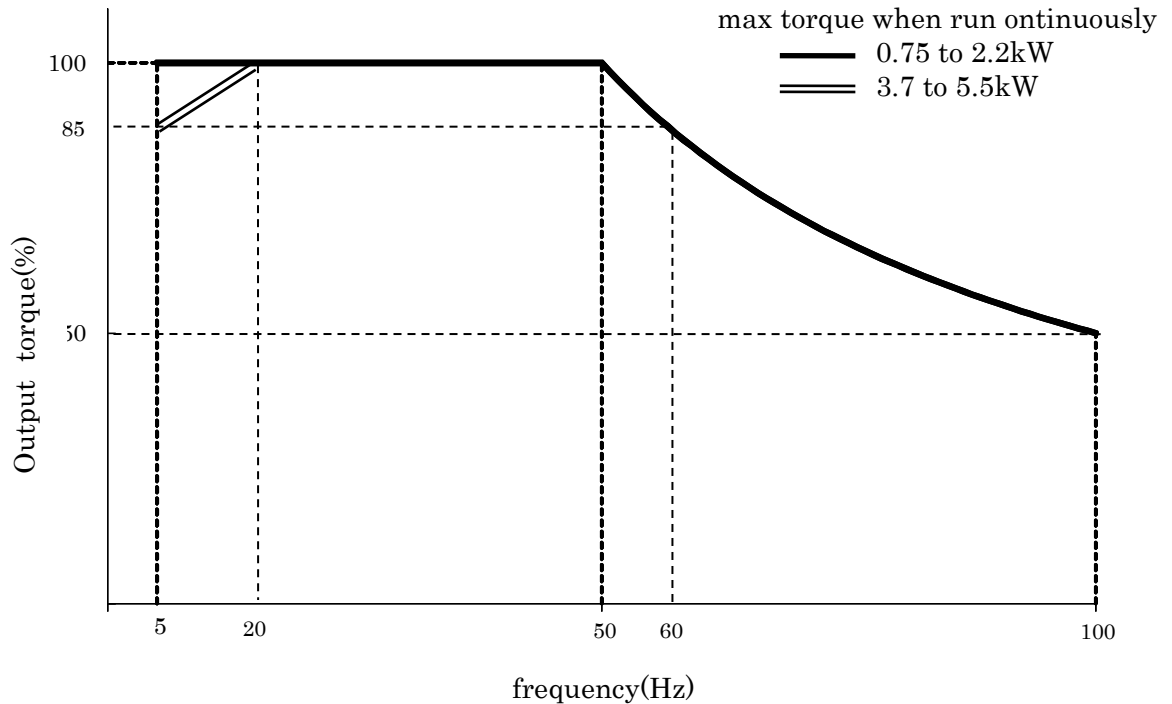


Output torque(%):100% is the torque of motor rated at 60Hz
(Base frequency:60Hz)

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 31-32. Activation of brake greater than 60 Hz, can damage the brake lining.
- ⑨ Torque characteristics shown here are only for the motor itself. The efficiency of the worm gear must be taken into consideration particularly when using a Croise motor.
- ⑩ When using a VFD with a 400V class motor, high voltage spikes (micro surges) occur as the VFD switches, which can result in insulation failure. Because the motor must be protected against micro surges, Tsubakimoto Chain provides protection against micro surges for all standard 400V class motors, even if not instructed to do so. However, if the level exceeds 1250V, install suppression filters and reactors on the inverter side.
- ⑪ Temperature rise, noise, and vibration levels will be higher than when using mains service power.

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



Output torque(%):100% is the torque of motor rated at 50Hz
(Base frequency:50Hz)

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

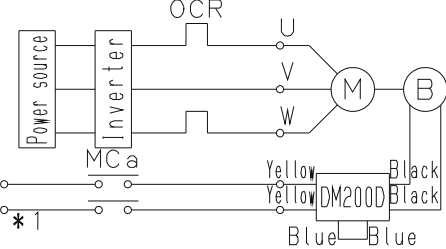
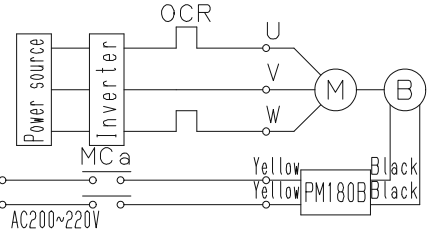
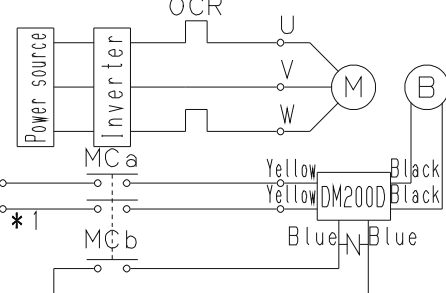
These motors deliver constant torque from 5 to 50Hz, with the continuous operating torque at 50Hz. (On 3.7kW and 5.5kW motors, the torque is at 85% at 5Hz. If 100% torque is required, use automatic torque boost or vector control VFD.)

- 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 31 - 32. Activation of brake greater than 50 Hz, can damage the brake lining.
- ⑨ Torque characteristics shown here are only for the motor itself. The efficiency of the worm gear must be taken into consideration particularly when using a Croise motor.

- ⑩ When using a VFD with a 400V class motor, high voltage spikes (micro surges) occur as the VFD switches, which can result in insulation failure. Because the motor must be protected against micro surges, Tsubakimoto Chain provides protection against micro surges for all standard 400V class motors, even if not instructed to do so.
However, if the level exceeds 1250V, install suppression filters and reactors on the inverter side.
- ⑪ Temperature rise, noise, and vibration levels will be higher than when using mains service power.

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

(1) 200V class

Purpose		0.75kW to 3.7kW	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 to 3.7kW	 Set the supply voltage to the brake denoted by *1 to: AC200V-AC220V for 0.75kW AC200V-AC230V for 1.5kW to 3.7kW
	• 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 to 3.7kW	

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.19

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 5.5kW. Due to built-in relays, DC external wiring is prohibited.

(2) 400V class

	Purpose	0.75kW to 3.7kW	5.5kW
AC external wiring	General inverter drive	Use auxiliary relays (MCa) of contact voltage AC400v to AC440v and inductive load 1A and more.	
DC external wiring + AC external wiring	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 AC400V to AC440V and inductive load 1A and more.	

M: Motor B: Brake MC: Magnetic contactor MCa, MCb: Auxiliary relay
OCR: Overcurrent relay DM200D, PM180B: DC Module

Note 1) For DC external wiring, connect surge absorption device. --- refer to p.19

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.

Note 4) PM180B is used for 5.5kW. Due to built-in relays, DC external wiring is prohibited.

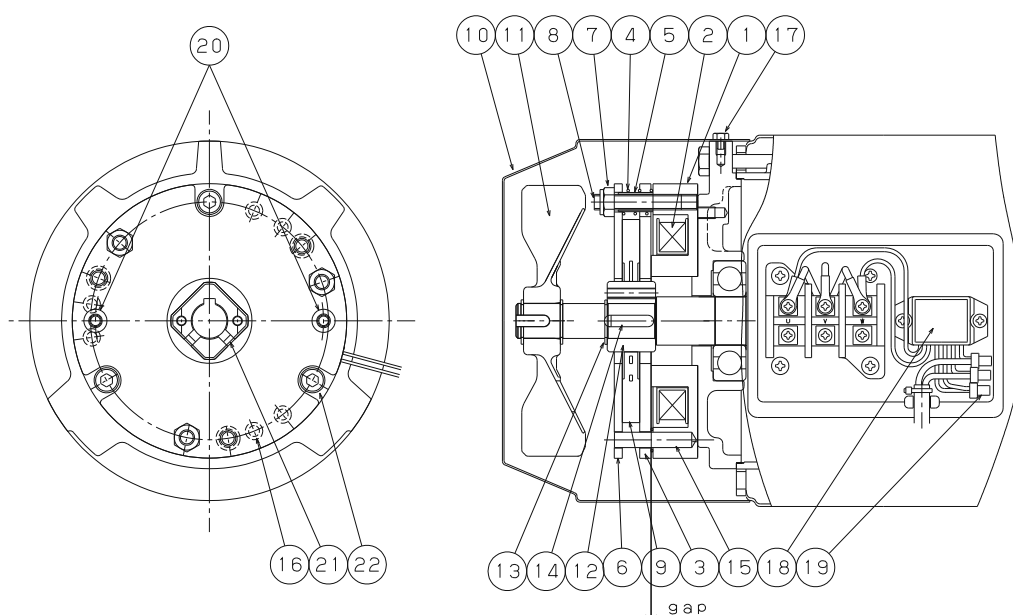
7-4. SLB brake (0.75kW to 2.2kW with brake) specification, structure and brake gap adjustment

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	36.6	37.3	37.3

② SLB brake structure



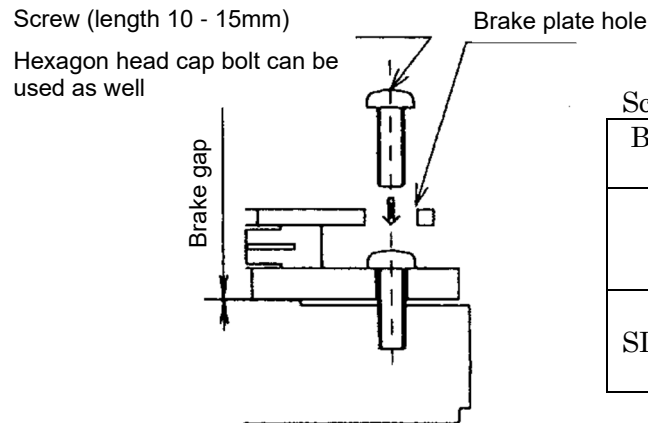
1	Counter-load bracket with yoke	12	Square hub
2	Coil	13	Retaining ring
3	Armature	14	Key
4	Spring	15	Spring pin
5	Collar	16	Brake spring
6	Brake plate	17	Set screw to fix the fan cover
7	U-nut	18	DC Module
8	Guide bolt	19	Closed-end splice
9	Lining	20	Hole for manual releasing
10	Fan cover	21	Leaf spring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

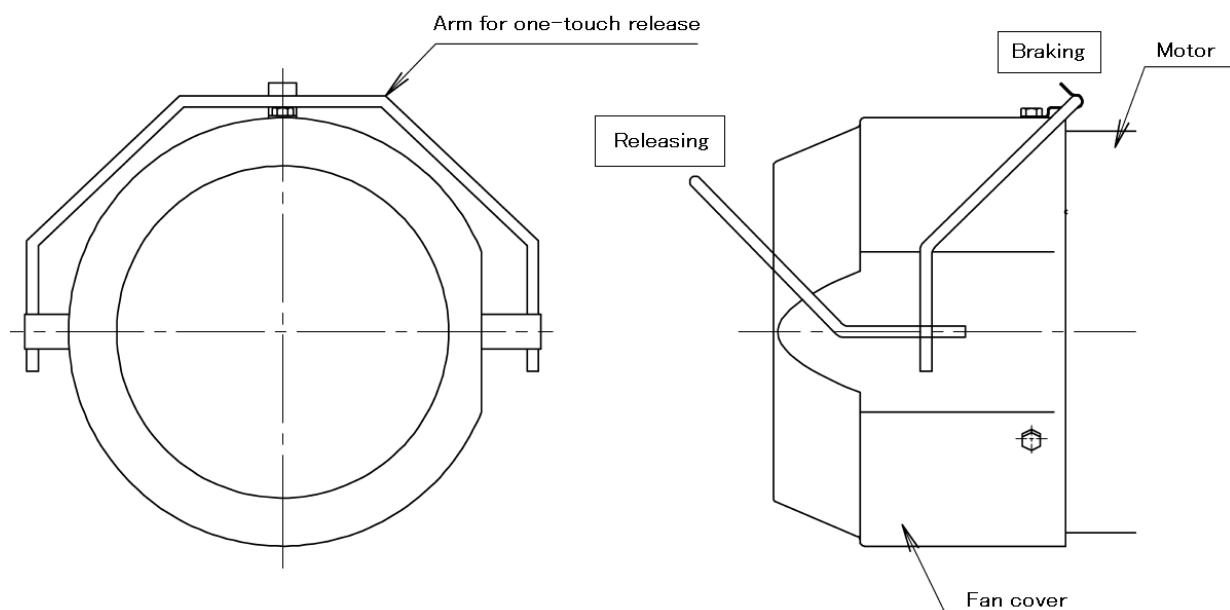
● Adjustment method (Refer to the brake structure drawing)

- Remove the fan cover ⑩
- 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.)
- 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)



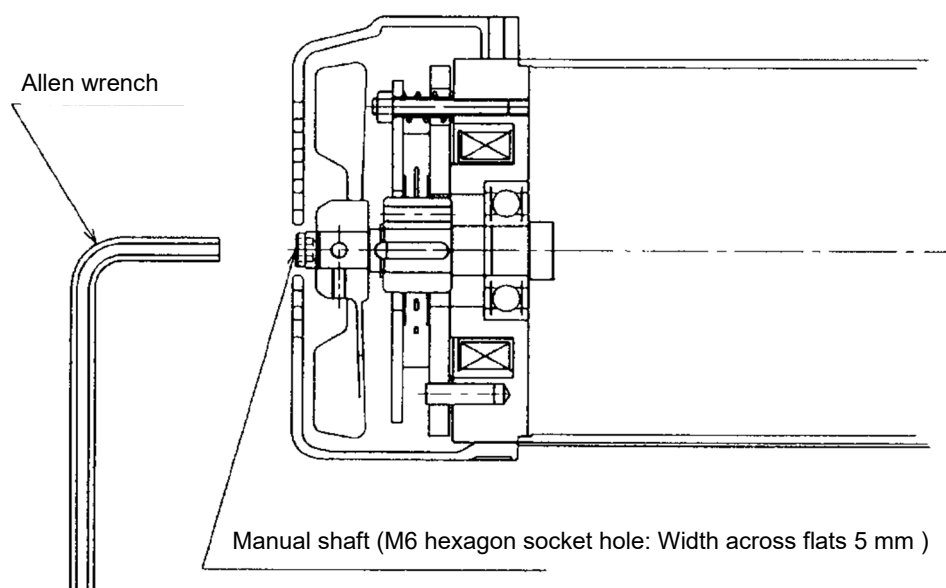
* In the case of 0.75kW, the angle of arm between releasing position and braking position is smaller than above figure as shown.

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]

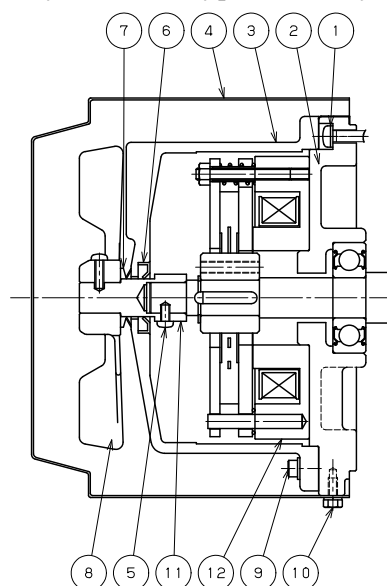


Operate by turning the hexagonal socket hole (M6, Width across the flats 5mm) located in the center of the motor fan cover with Allen wrench. Make sure that the brake is released manually when operating. Never turn it while the motor is running.

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.

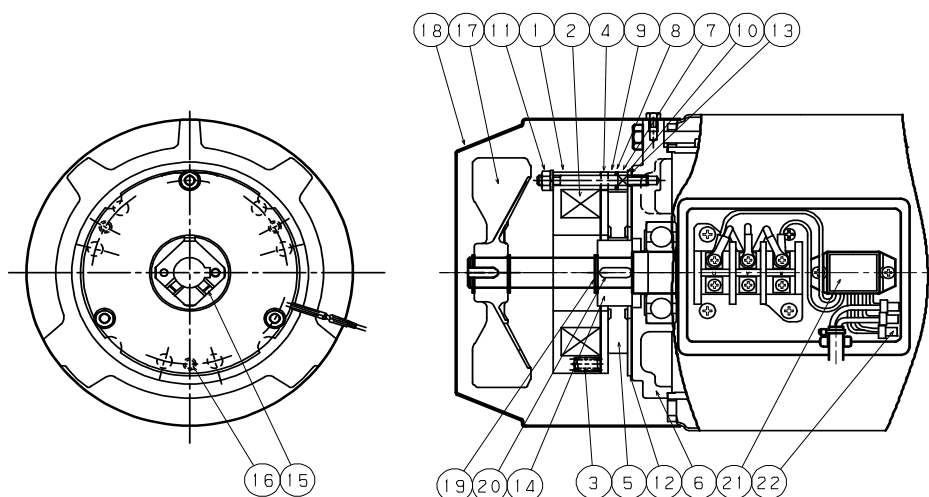
7-5. VNB brake (3.7kw and 5.5kW with brake) Structure/specification and gap adjustment

① Specification

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

Motor kW		3.7Kw	5.5kW
Brake Model No.		VNB371K NB-31190 (VNB371KV NB-31192)	VNB55K NB-31191
DC module type		DM200D (DM400D)	PM180B (-)
Rated static friction torque	N·m	36.0	55.0
Rated dynamic friction torque	N·m	29.0	44.0
DC module voltage		DC90V(DC180V)	Instant 180V Always DC50V (-)
Current (A) at 20°C		0.261 (0.135)	0.253
Capacity (W) at 20°C		26.1 (27.0)	12.6
A volume of total braking work	x10 ⁷ J	135 (135)	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

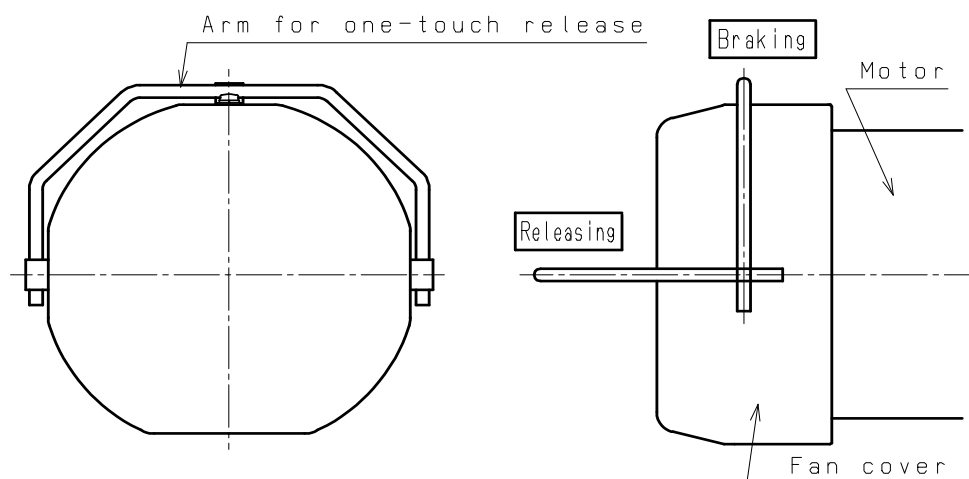
Motor kW	Brake type	Gap (mm)		Lining thickness (mm)	
		Initial setting	Limit	Initial setting	Limit
3.7	VNB371K NB-31190	0.3	0.7	12	9
5.5	VNB55K NB-31191	0.35	1.2	* 13	* 11.5

* : the value is for per one lining

● Brake gap adjustment (refer to the brake structure)

- Remove Hexagon Nut ⑪.
- 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.
- 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

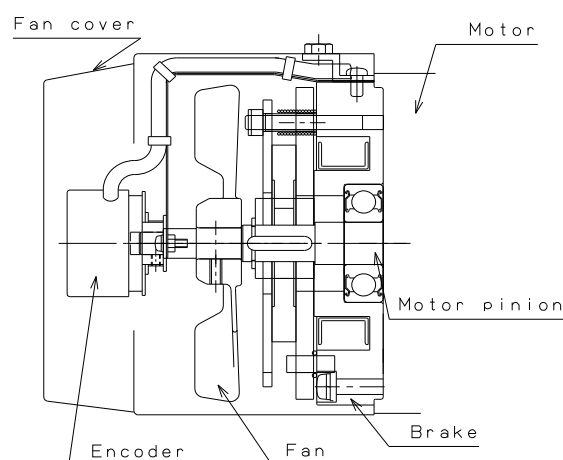
During normal operation, one touch release arm is located on the braking position shown above. If this arm moves, the brake is released. After completion of the work, return the arm to its original braking position.

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
Blue	Signal A
White	Signal B
Yellow	Signal Z
Shielded	NC

■ Specifications of encoder

Power source voltage	DC4.5 to 30V
Pulse	100Pulse
Output type	Open collector output (NPN-type)
Output circuit	
Power consumption	30mW or less
Output voltage	0.5V or less (in Maximum incoming)
Maximum incoming current	40mA MAX
Signal startup and fall time	1 μ s or less
Maximum response frequency	240 kHz
Withstanding voltage for output circuit	50V MAX
Cable length	0.5m

■ Environmental conditions

Ambient temperature	-10 to 40°C
Ambient humidity	85% or less; non-condensing
Installation angle	At any angle, such as horizontal, vertical, or inclined
Vibration	4.9m/s ² {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/Croise 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/Croise Motor. ● Surface temperature of Gearmotor/Hypoid Motor/Croise 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.
- 【Maintenance and Safety check for brake】**
- When a Gearmotor/Hypoid Motor/Croise 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

● Gearmotor/Hypoid Motor

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.)

● Croise Motor

Croise motors are filled with high-grade lubrication oil (Daphne Alpha Oil TE260) before shipment. They can be used without adding oil.

Always install the included pressure vent after checking the installation position for motors with reducer frame numbers 32 to 50. After installing the pressure vent, check the oil level in the oil gauge. If the mounting number will be anything other than 1, please indicate when ordering.

• Replacing lubrication oil

As motors with reducer frame numbers 13 to 28 employ an enclosed structure, in most case it is not necessary to replace or replenish lubrication oil. However, in cases where lubrication oil deteriorates rapidly due to usage conditions, extended life can be expected if lubrication oil is replaced about every 2,500 hours. Maintain motors with reducer frame numbers 32 to 50 following the guidelines below.

- ① Replace lubrication oil for the first time 1,000 hours after commencing operation.
- ② Although exact timing will differ according to operating conditions, from the second time onward replace lubrication oil about every 5,000 hours.

• Precautions when replacing lubrication oil

Take care when draining lubrication oil as it is extremely dangerous to do so immediately after operation because the oil is likely to be hot. For this reason, check that the temperature of the housing has cooled to around 40 to 50°C before draining the oil.

Use only recommended lubrication oil. Do not mix the oil with other brands. When changing to a different brand of oil, clean out the interior of the housing with kerosene or wash it thoroughly with the new brand of lubrication oil, before filling with the prescribed volume of lubrication oil. Fill with the standard oil volume indicated in 5-1 or check the oil gauge.

• Operating temperature

The motor may generate heat during the first two or three days of operation. This is expected and is not a problem. However, if the surface of the Croise motor's reducer unit housing reaches or exceeds 93°C, this may be due to insufficient Croise motor capacity or an excess/lack of lubrication oil, so stop the machine/equipment immediately. To prevent burn injuries, do not touch the Croise motor directly with your hands.

(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) Approximate oil volume for Croise motors (ℓ)

Reducer frame No.	CSMR Series			HCMR Series		
	Foot mount type	Face mount type	Hollow shaft type	Foot mount type	Face mount type	Hollow shaft type
22	0.36	0.30	0.30	0.7	0.7	0.6
28	0.55	0.55	0.55	1.4	1.4	1.2
32	1.0	1.0	1.0	1.8	1.8	1.4
40	1.2	1.2	1.2	2.8	2.8	2.5
50	3.3	3.3	3.3	5.3	5.3	4.7

Note 1: The above oil volumes are for motors mounted in the standard direction (mounting number 0 or 1). Oil volume is the same for all Croise motors with the same reducer frame number, regardless of motor power or reduction ratio.

Note 2: The oil volume for HCMR Series motors mounted in accordance with mounting number 5 is 60% more than each value indicated above.

(Approximate oil volume (up to check plug or oil gauge position))

(5) 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

(6) Recommended lubrication oil (Croise motor): Grade 2 of industrial gear lubricant (worm gear)
ISO VG320

Exxon Mobil : Mobil 600W Cylinder Oil
Esso : Spartan EP 320
Showa Shell : Omala S2 G
Idemitsu : Daphne CE Compound 320S

Notes

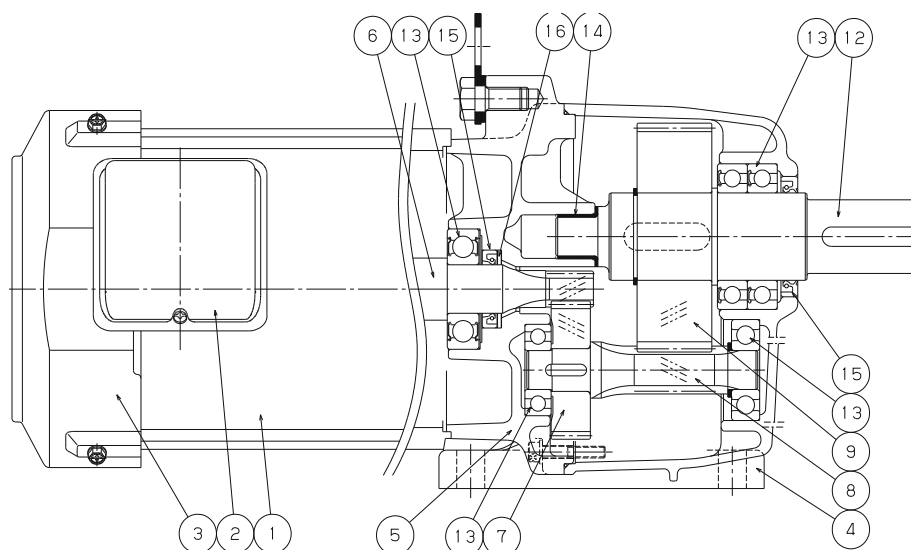
- Follow these guidelines to determine when to replace the above recommended lubrication oil (for Croise motors):
 - ① Replace lubrication oil for the first time 500 hours after commencing operation.
 - ② Although exact timing will differ according to operating conditions, from the second time onward replace lubrication oil about every 2,500 hours.

(7) Oil-seals

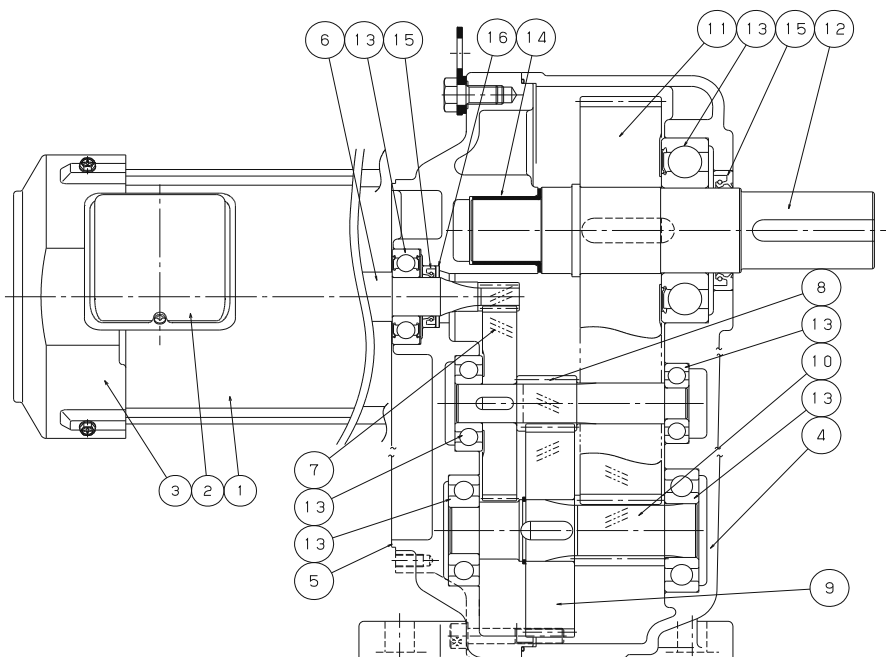
Life of the oil seal depends on the operation conditions. In some cases, replacement may be required, even within 10,000 hours of operation. For equipment such as food processing machinery where prevention of oil leakage is crucial, a device such as an oil pan is recommended.

【9】 Structure of Gearmotor and Hypoid Motor

(1) Structure of Gearmotor



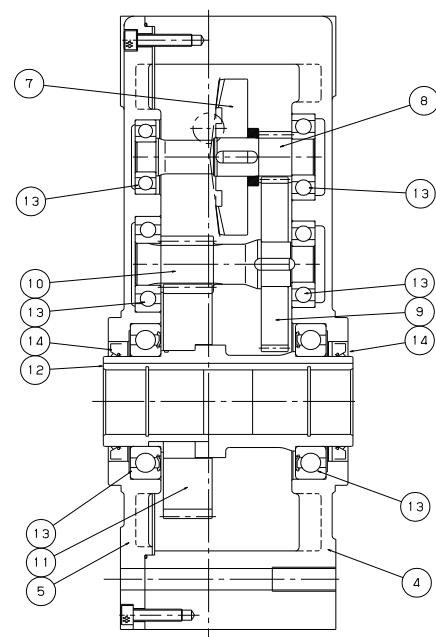
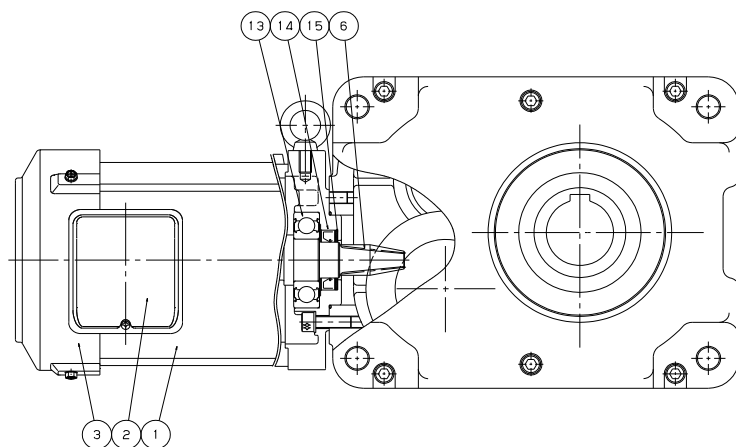
GMTR150-38L30



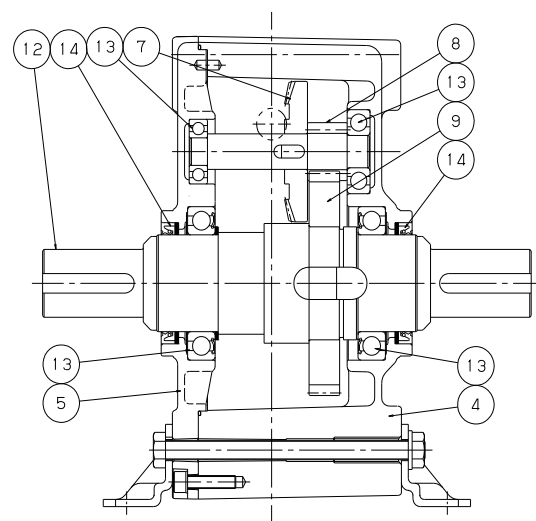
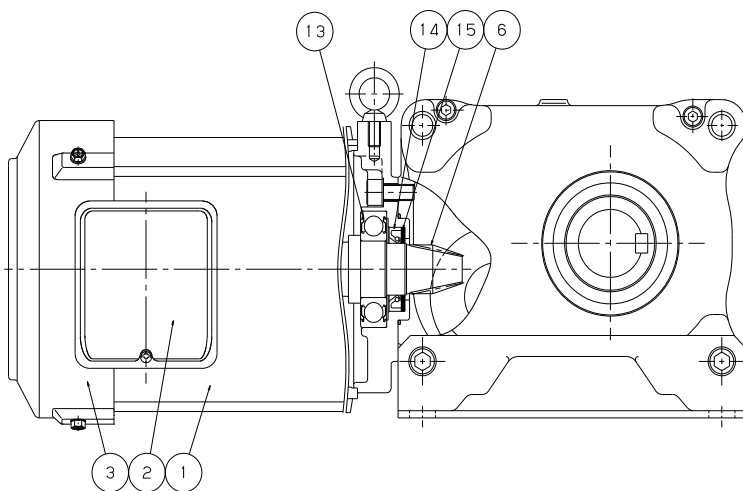
GMTR150-50L200

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

(2) Structure of Hypoid Motor



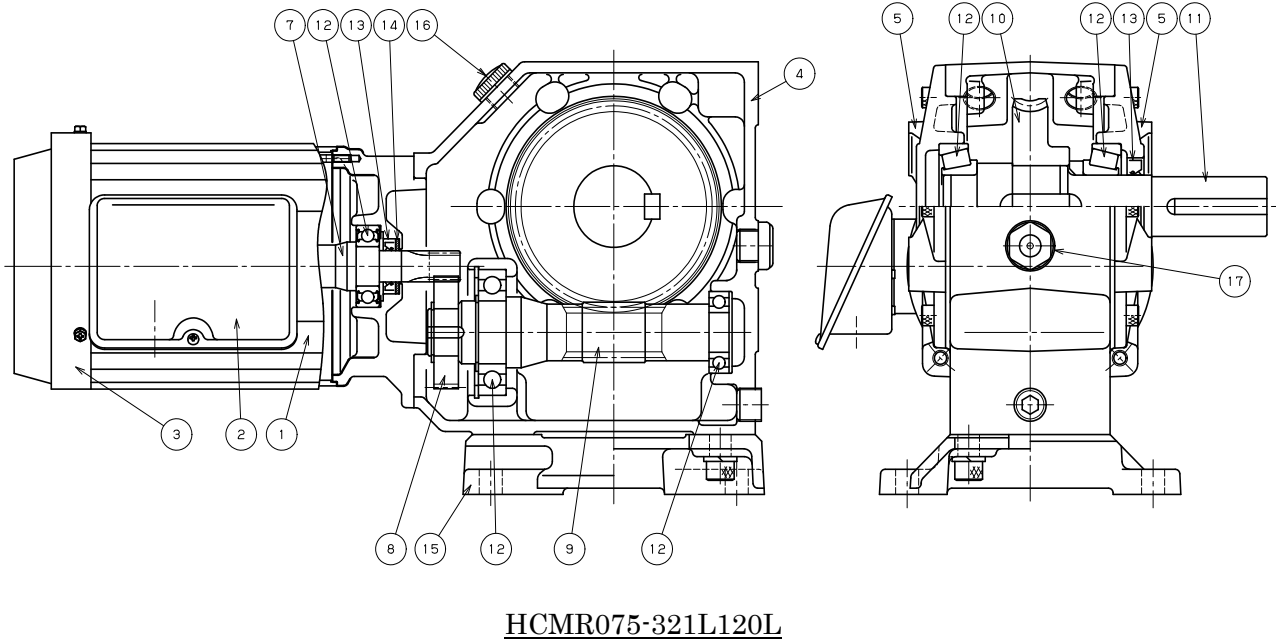
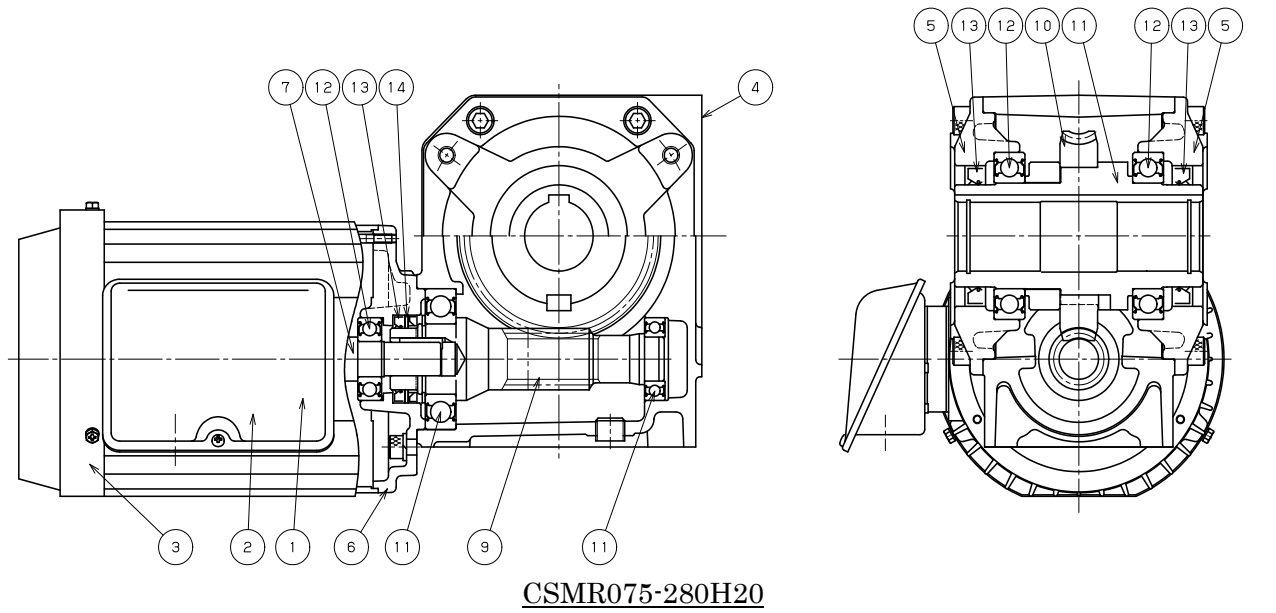
HMTR150-55H200



HMTR150-42L25L

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

(3) Croise motor construction

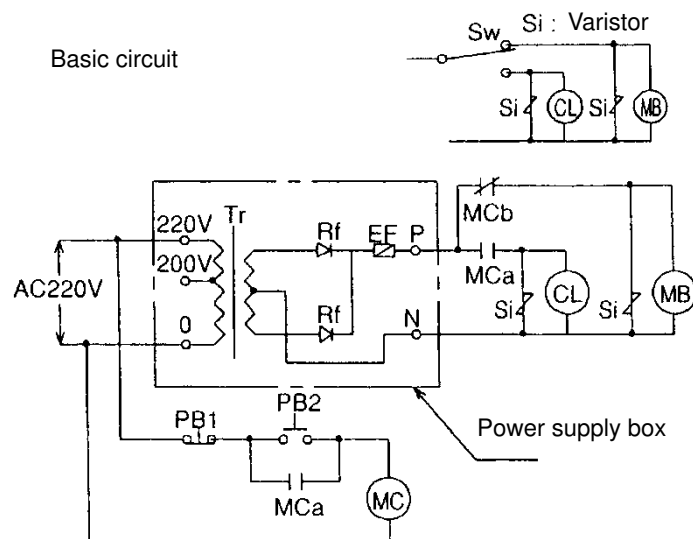


1	Motor	7	Motor pinion	13	Oil seal
2	Terminal box	8	1st-stage wheel	14	Filter
3	Fan cover	9	WG worm	15	Base
4	Housing	10	WG wheel	16	Pressure vent
5	Output bearing support	11	Output shaft	17	Oil gauge
6	Motor Flange	12	Bearing		

10-1. Wiring for Clutch-Brake Type Gearmotor

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		

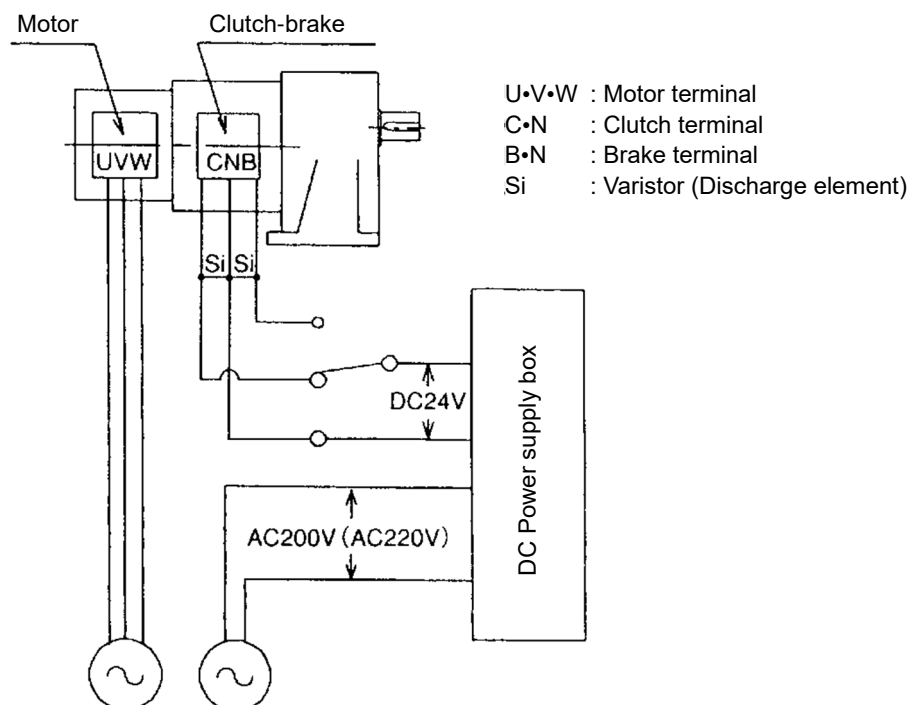
- **Voltage**
Because the torque of clutch-brake varies depending on the voltage, supply appropriate voltage (DC24V). Limit fluctuation of voltage within $\pm 10\%$ of rated voltage. Because the terminal voltage of the clutch and brake drop due to line resistance when wiring is too long, check voltage 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

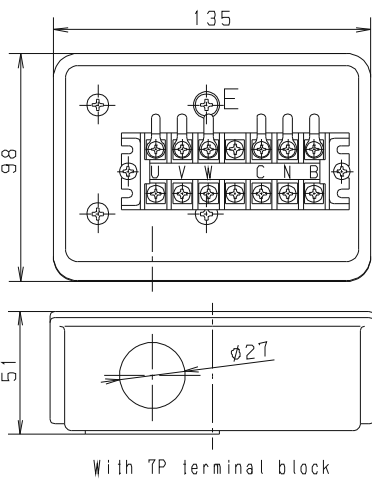
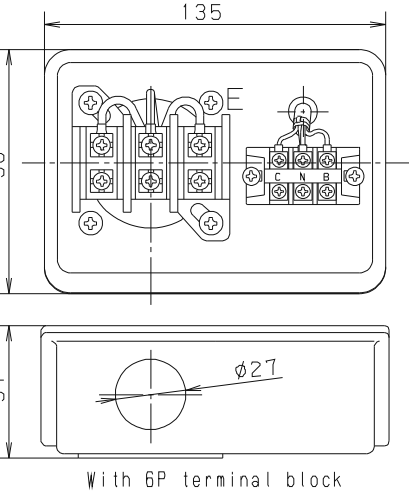
Operational voltage for clutch-brake is DC24V. Use DC power supply box to convert commercial AC power, and connect according to the following diagram:



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.
	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	 With 7P terminal block 1. Material : SPCC 2. Terminal screw size : M3.5 Tightening torque : $0.8 \text{ N}\cdot\text{m}$ { Ref. $0.08 \text{ kgf}\cdot\text{m}$ } 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 : $1.2 \text{ N}\cdot\text{m}$ { Ref. $0.12 \text{ kgf}\cdot\text{m}$ }
1.5kW to 2.2kW	With clutch-brake type	Indoor type	 With 6P terminal block 1. Material: SPCC 2. Terminal screw size: For motor: M4 Tightening torque: $1.2 \text{ N}\cdot\text{m}$ {Ref. $0.12 \text{ kgf}\cdot\text{m}$ } For CB: M3 Tightening torque: $0.5 \text{ N}\cdot\text{m}$ {Ref. $0.05 \text{ kgf}\cdot\text{m}$ } 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: $2.0 \text{ N}\cdot\text{m}$ {Ref. $0.20 \text{ kgf}\cdot\text{m}$ }

【11】 CE Marking Motor (Optional 0.75kW to 5.5kW)

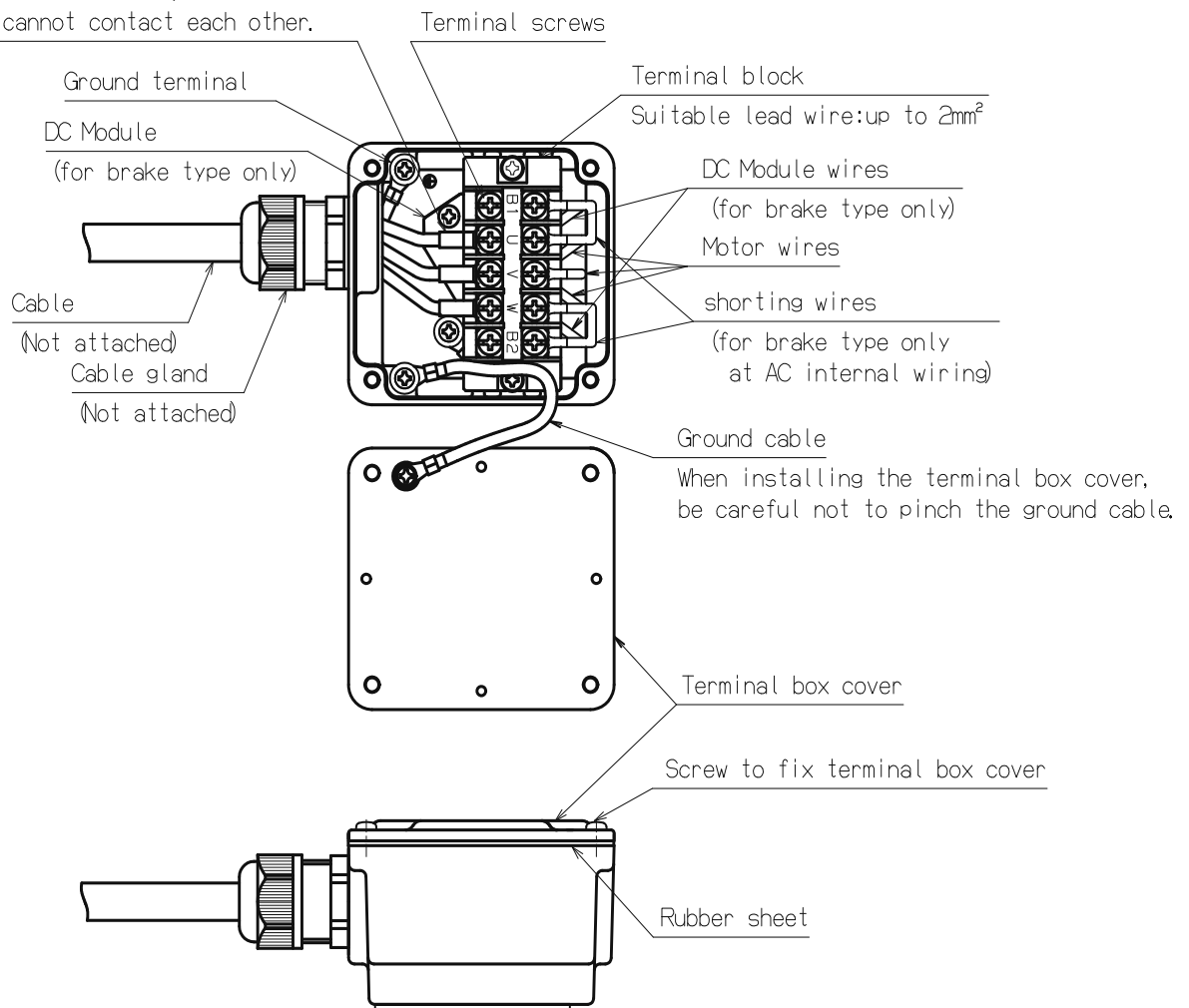
When using this product, please pay close attention to the following as well as to the explanations in Sections 1 to 10.

Rated voltage: N 200/200/220V, 50/60/60 Hz
 VN 380/400/400/440V, 50/50/60/60 Hz
 Degree of protection: IP55 (0.75kW – 5.5kW; outdoor type)
 IP44 (0.75kW – 5.5kW; indoor type)
 IP20 (0.75kW; brake type)
 Thermal class: 155(F) (0.75kW)
 130(B) (1.5kW to 5.5kW)
 Time rating: S1(continuous)

(1) Specifications of terminal box (0.75kW)

Material: Aluminum die-casting

Insulate here with mark tube, etc. so that the terminals cannot contact each other.



	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 6 (page18). (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.

Please note that a ground cable is attached to the terminal box and cover. There is a risk of electric shock when a ground cable is not attached to the terminal box and cover and start the operation. Applying an excessive force may damage the cover and cable.

When putting on the cover to the box, make sure that all the wires are set inside the box and do not stick out and the cover lays flat. There is a risk of electric shock, injury, or fire when the wires are stuck out.

(6) Application

The Gearmotor/Hypoid Motor/Croise motor is designed for Over voltage Category III. Degree of Pollution defined by IEC664.

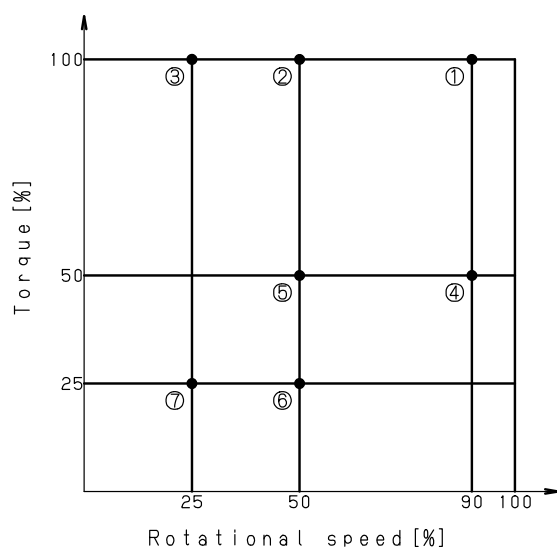
Supply power to the motor via transformer.

May use inverter to drive. However inverter drive is not recognized by EN Standards.

(7) Losses at 7 operating points, (EU) 2019/1781

Please refer to the material in below link.

<https://tt-net.tsubakimoto.co.jp/tecs/pdct/gen/pdf/TA40.00TS.pdf>



【12】 UL Listed Motor (optional, 0.75 to 5.5 kW)

When using this product, please pay close attention to the following as well as to the explanations in Sections 1 to 10.

Rated voltage:	N2	230V 60 Hz
	VN2	460V 60 Hz
Degree of protection:		IP44 (indoor type) IP20 (brake type)
Insulation class:	F	(0.75kW to 5.5kW)
Time rating:	cont. (continuous)	
Efficiency:	IE3	
Capacity range	Without brake	0.75kW to 5.5kW
	With brake	0.75kW to 3.7kW

(1) Specifications of terminal box

Terminal box:

0.75kW : Terminal boxes on page 25 do not have terminal block.

1.5kW to 5.5kW : Terminal boxes on page 26 do not have terminal block.

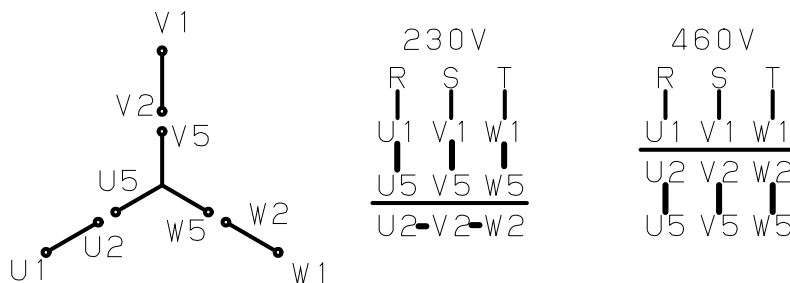
Note: Insulate wiring with Electrical tape to prevent terminals from directly touching each other.

Ground cable(0.75kW only):

As with the page 45 CE marking motor, the motor frame and terminal box, terminal box and terminal box lid are connected with a ground cable.

(2) Motor/ brake wiring

Refer to the below figure and connect with attached screws.



(3) Direction of rotation of motor

When using the wiring configurations shown in Fig. 6 (pages 18), the direction of rotation of the motor is clockwise when viewed from the opposite side of the load. (The direction of rotation of the motor is the same as standard motors.)

(4) Overload (overheat) protection device

Be sure to install a thermal relay to protect against motor burnout.

Use the amperage listed on the nameplate for the thermal setting.

(5) Grounding

An ground terminal is provided, so be sure to ground the product.

Please note that a ground cable is attached to the terminal box and cover. There is a risk of electric shock when a ground cable is not attached to the terminal box and cover and start the operation. Applying an excessive force may damage the cover and cable.

When putting on the cover to the box, make sure that all the wires are set inside the box and do not stick out and the cover lays flat. There is a risk of electric shock, injury, or fire when the wires are stuck out.

【13】 Motors for China (optional, 0.75 to 5.5 kW)

※0.75kW is also CCC compliant.

Please take into consideration the following items in addition to sections 1 to 10 when using the product.

Rated voltage : N3 200V 50Hz
VN3 380V 50Hz
Protection : IP44 (Indoor type)
: IP55 (outdoor type)
: IP20 (brake type)
Thermal class: 155(F) (0.75kW)
130(B) (1.5kW to 5.5kW)
Time rating: S1(continuous)
Efficiency: IE3(=GB2)

(1) Terminal box specifications

0.75Kw: Same as specifications for standard terminal box on page 25.

1.5kW to 5.5kW: Same as specifications for standard terminal box on page 22 and 23.

Note: Insulate wiring with marked tubes to prevent terminals from directly touching each other.

(2) Motor/brake wiring

Refer to standard type.

(3) Direction of rotation of motor

When using the wiring configurations shown in Fig. 6 (pages 18), the direction of rotation of the motor is clockwise when viewed from the opposite side of the load. (The direction of rotation of the motor is the same as standard motors.)

(4) Overload (overheat) protection device

Be sure to install a thermal relay to protect against motor burnout.

Use the amperage listed on the nameplate for the thermal setting.

(5) Grounding

An ground terminal is provided, so be sure to ground the product.

【14】 China RoHS Instruction

本资料是中国ROHS的必备资料 (China RoHS requisite document)
GMTR、HMTR

零部件名称 (Part Name)	有害有毒物质或者元素(Hazardous Substances or Elements)					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
电动机 (Motor)	×	○	○	○	○	○
铝制减速机箱体 (Aluminum Reducer Case)	×	○	○	○	○	○

本表格依据SJ/T 11364 的规定编制
(This document is prepared in conformity with SJ/T11364.)

○：表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下
(Shows that the concentration of the hazardous substance does not exceed the concentration limits specified in GB/T26572.)

×：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求
(Shows that the concentration of the hazardous substance exceeds the concentration limits specified in GB/T26572.)

本资料是中国ROHS的必备资料(China RoHS requisite document)
CSMR、HCMR

零部件名称 (Part Name)	有害有毒物质或者元素(Hazardous Substances or Elements)					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
电动机 (Motor)	×	○	○	○	○	○
铝制减速机箱体 (Aluminum Reducer Case)	×	○	○	○	○	○
蜗轮 (Worm Wheel)	×	○	○	○	○	○

本表格依据SJ/T 11364 的规定编制。
(This document is prepared in conformity with SJ/T11364.)

○：表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下
(Shows that the concentration of the hazardous substance does not exceed the concentration limits specified in GB/T26572.)

×：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求
(Shows that the concentration of the hazardous substance exceeds the concentration limits specified in GB/T26572.)

【15】 Motors for South Korea (optional, 0.75 to 5.5 kW)

Please take into consideration the following items in addition to sections 1 to 10 when using the product.

Rated voltage : N8 220V 60Hz
 VN8 440V 60Hz
Protection : IP44 (Indoor type)
 : IP55 (outdoor type)
 : IP20 (brake type)
Thermal class: 155(F) (0.75kW)
 130(B) (1.5kW to 5.5kW)
Time rating: S1(continuous)

(1) Terminal box specifications

0.75Kw: Same as specifications for standard terminal box on page 22.

1.5kW to 5.5kW: Same as specifications for standard terminal box on page 22 and 23.

Note: Insulate wiring with marked tubes to prevent terminals from directly touching each other.

(2) Motor/brake wiring

Refer to standard type.

(3) Direction of rotation of motor

When using the wiring configurations shown in Fig. 6 (pages 18), the direction of rotation of the motor is clockwise when viewed from the opposite side of the load. (The direction of rotation of the motor is the same as standard motors.)

(4) Overload (overheat) protection device

Be sure to install a thermal relay to protect against motor burnout.

Use the amperage listed on the nameplate for the thermal setting.

(5) Grounding

An ground terminal is provided, so be sure to ground the product.

【16】 Structure and operation of mechanical overload protection device (optional)

16-1. Features of mechanical overload protection device

This type of motor is equipped with a mechanical safety device developed especially for hollow output shaft models. The device operates when an unexpected overload occurs to protect the machine. It is extremely compact and easy to handle.

(1) Single-position type

The array of ball-and-pocket-type torque transmission elements is a unique configuration that only engages in a single location.

(2) Automatic recovery

Once the cause of the overload has been removed, the overload protection device can be automatically re-engaged with the motor simply by turning the drive side.

(3) Simple torque adjustment

Trip torque can be freely adjusted simply by turning the adjustment nut.

(4) Standard-type overload detection sensor

A combination of non-contact TG sensors can detect overload and stop the motor or generate an alarm.

Construction/operating principle

[When engaged]

Torque is transmitted in the sequence below:

Output shaft ⇒ Center plate ⇒ Steel ball ⇒ Driven flange ⇒ Driven shaft

[When tripped]

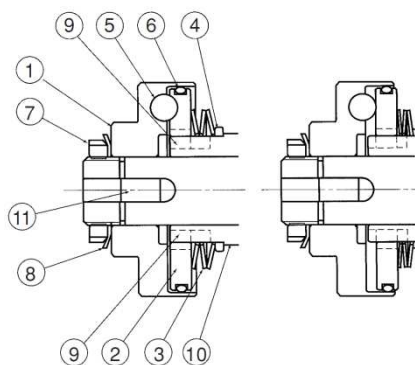
- When an overload occurs, force greater than the disk spring load acts in the direction of thrust.

- This disengages the center plate and the steel ball, and the center plate starts idling.

16-2. Determining trip torque

- A Croise motor with an overload protection device is a Gear motor with a function that protects the machine by activating when an unexpected overload occurs. It is therefore necessary to determine a limit value beyond which torque must not be applied based on the strength, load, and other conditions of the machine/equipment, and set this value as the trip torque.

- If the limit value is not clear, set it to around 1.5 times the allowable output shaft torque of the Croise motor.



【When engaged】 【Trip】

- 1: Driven flange
- 2: Center plate
- 3: Disk spring
- 4: Stop collar
- 5: Steel ball
- 6: O-ring
- 7: Shaft nut
- 8: Shaft washer
- 9: Parallel key
- 10: Hollow shaft
- 11: Parallel key (to be provided by customer)

16-3. Handling instructions and precautions

(1) Mounting to a driven shaft

- The overload protection device is fixed to the output shaft side (right or left depending on the arrangement of the shaft) of the Croise motor by a steel plate using the taps in the housing. Insert it directly into the driven shaft. Insertion method and precautions are the same guidelines as for hollow shaft models. (Refer to pages 11 and 12.)
- After inserting the overload protection device into the driven shaft, remove the steel plate used to attach it, install the key, and temporarily assemble it with the shaft washer and the shaft nut.
- Ensure that the thrust load does not act on the driven shaft.

(2) Procedure for setting trip torque

- The trip torque of the overload protection device is set by adjusting the tightening angle of the adjustment nut.
 1. After inserting the overload protection device into the driven shaft, tighten the adjustment nut by hand and take the point where there is no longer any looseness as the 0 point.
 2. Read the adjustment nut tightening angle corresponding to the set trip torque from the "Tightening Amount - Torque Correlation Diagram" (page 53), and tighten the nut accordingly. The best way is to find the appropriate tightening amount for the machine in question by tightening the adjustment nut slightly loosely (referring to the graph as a guide) and then performing a test run.
 3. After setting the torque, fix the adjustment nut using the shaft washer.
 4. Do not turn the adjustment nut more than the maximum value indicated in the "Tightening Amount - Torque Correlation Diagram". Doing so may result in the motor locking due to a loss of flex in the disk spring when the overload protection device is tripped.

(3) Precautions when operating the overload protection device

- While there should be no noise or vibration during normal operation, large noise and vibration may occur in the event of an unexpected overload. If this occurs, immediately stop the device.
- In such cases, it is recommended to use a TG sensor.

(4) Recovery

The overload protection device automatically recovers, so simply restarting the drive side of the motor automatically resets it.

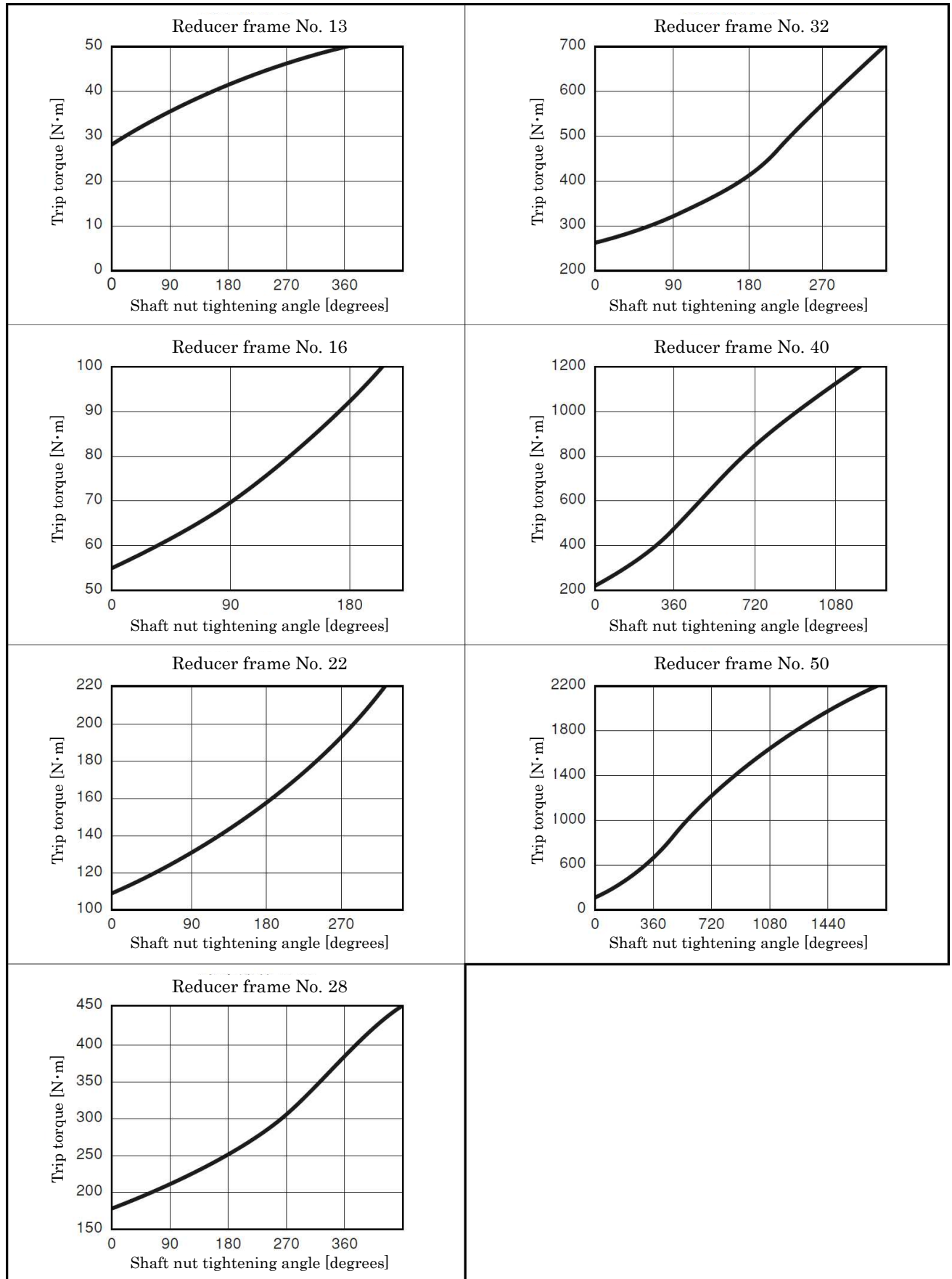
1. When the overload protection device is activated due to an overload, stop the motor and remove the cause of the overload.
2. When recovering the device, reset it (re-engage it with the motor) by setting the input speed to 50 r/min or lower, or by inching the motor.

In the event that it is difficult to reset the device, apply a little load when inching the motor. Do not reset the device by manually rotating the overload protection device or shaft, etc., as it is dangerous to do so.
3. When the ball slots into the pocket, you should hear a click.

(5) Mounting precautions

- When mounting a flange-mounted unit, take care to that undue force is not applied to the bearings. Contact Tsubakimoto Chain if you are unsure.

• Tightening Amount - Torque Correlation Diagram



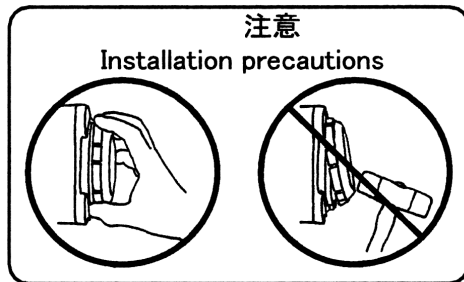
【17】 Safety cover (Option for the Hypoid Motor Hollow Shaft type)

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 HM140CAP, 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.

【18】 Heat-proof type ・ Cold-proof type

18-1. Heat-proof type

Specifications;

Apply for: Gearmotor and Hypoid motor (No brake:0.75-2.2kW, 0.75kW with brake)

Protection: IP44 (0.75 to2.2kW), IP20 (0.75kW with brake)

Ambient temperature: 0°C to 60°C

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 40 to page 41.)

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.

18-2. 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°C to 40°C

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 40 to page 41.)

Nippon Grease Co., Ltd.: NIGTIGHT LTS 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

【19】 Troubleshooting

(1) Gearmotor/Hypoid Motor/Croise 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.
	1-phase operation for 3-phase motor	Check terminal voltage.
	Damage of gear, shaft, bearing	Repair at Tsubakimoto Chain.
Does not rotate when load is applied	Voltage drop	Check the length of wiring.
	Wear of gears	Repair at Tsubakimoto Chain.
	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.
	Intermittent noise: gear is damaged/foreign particles are inside.	Repair at Tsubakimoto Chain.
Large vibration	Wearing of gear/bearing	Repair at Tsubakimoto Chain.
	Incorrect installation/loosened bolts	Retighten loosened bolts.
Grease leakage	Loosening of tightened portion	Re-tighten loosened portion.
	Oil-seal is damaged	Replace.

Gearmotor/Hypoid Motor/Croise 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.
	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.

At the inquiry, inform us of the followings.

- (1) MFG No.
- (2) Type
- (3) Motor kW
- (4) Ratio or Output speed
- (5) Drawing No.

【20】 Scrapping



CAUTION

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

【21】 Storage

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.

【22】 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. Repairs outside of warranty
If the product malfunctions due to any of the following situations, even within the warranty period, the product will be examined and repaired at a cost to the customer.
 - (1) The customer did not correctly install the product in accordance with the instruction manual.
 - (2) The customer did not provide proper maintenance and did not operate the product correctly.
 - (3) The product malfunctioned due to a problem with it being connected to another device.
 - (4) The construction of the product was changed due to alterations by the customer.
 - (5) The product was repaired by a company other than Tsubaki or by a company not specified by Tsubaki.
 - (6) The product was used outside the proper operation environment as specified in the instruction manual.
 - (7) The product malfunctioned due to disasters or other acts of God, or unlawful acts by a third party.
 - (8) A malfunction on the customer’s equipment caused secondary damage to the product.
 - (9) The product malfunctioned due to parts received and mounted by the customer, or parts specified and used by the customer.
 - (10) The product malfunctioned due to faulty wiring by the customer or faulty parameter settings input by the customer.
 - (11) The product has reached the end of its service life due to usage conditions.
 - (12) Damage occurs due to factors outside the responsibility of Tsubaki.

4. Dispatch of Tsubaki engineers

Customers will be charged for services such as examination, adjustment, and trial operation performed by Tsubaki engineers dispatched to the customer's location.



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