MITSUBISHI ELECTRIC

SUPER HELICROSS Series

MITSUBISHI GEARED MOTOR
TYPE:GM-SSY,SSY2,SSYP-R Right Angle Shaft type
TYPE:GM-SHY,SHY2,SHYP-R Right Angle Shaft type

INSTRUCTION MANUAL

■ Before you operate the geared motor, carefully read this manual, and correctly use the motor. Be sure to read the "Precautions Regarding Safety" described in this manual to ensure safety during operation.

■ After reading, store this manual at an appropriate place so that everyone can read the manual whenever necessary.
(Be sure to hand this manual to the operator.)

■ For product information and technical information about our geared motors, please see the following website.
https://www.mitsubishielectric.com/fa/

SAFETY PRECAUTIONS

Carefully operate the Geared Motor. An operation error may cause injury or electric shock.
To ensure operator safety, the safety precautions are ranked as “DANGER” and ”CAUTION” In this instruction manual.

⚠ DANGER	When a dangerous situation may occur if handling is mistaken leading to fatal or major injuries.
⚠ CAUTION	When a dangerous situation may occur if handling is mistaken leading to medium or minor injuries or physical damage.

Note that some items described as ⚠ CAUTION may lead to major results depending on the situation. In any case, important information that must be observed is described.

⚠ DANGER

General

- Before starting use of this Geared Motor always read this manual and the nameplate.

Operation conditions and ambient conditions

- Do not place any object inflammable near the geared motor. Failure to observe this warning may case fire or explode. If you have to place an organic solvent or explosive powder near the geared motor for some reasons, use the explosion-proof geared motor.
- Do not use the geared motor as elevator for human transport. Use of a geared motor for such a purpose is prohibited by the Building Standard Law of Japan.
- If the equipment is to be used with an elevator, be sure to burnish with a safety device to prevent the elevator from accidental falling. Failure to observe this warning may cause physical injury and damage to the equipment.

Wiring

- Be sure to ground the geared motor, and install a circuit breaker for each motor. Without grounding or circuit breaker, you may get an electric or physical injury.
- To wire the geared motor, be sure to observe the technical standards for electric equipment or interior wiring code by the corresponding electric power company.
- Install an optimum motor protector on each motor. Without any protector, the motor may cause a fire at the time of a problem.
- Be sure to supply the specified voltage to the geared motor. If the voltage is too high, a fire may be caused.
- Always follow the connection drawing in the terminal Box or the instruction manual when connecting the power cable.

Operation

- If a load is lifted up, do not release the brake using the manual brake release unit. The load may be dropped
- During inverter operation ,be sure to observe the specified frequency range. If the frequency is out of the specified range. the motor may be damaged.
- Failure observe this warning may cause physical injury and or damage to the equipment.
- Never go near or touch the rotating parts(shaft, etc)during operation, Failure to observe this could load to entanglement or injuries.
- Operate under the specified rotation speed described in Outline drawings, Specifications, or Catalogue. Otherwise, geared motor may explode or damage.

⚠ CAUTION

General:

- If the geared motor is equipped with a hoisting accessory, be sure to use the hoisting accessory to lift and transfer a load.

Operation conditions and ambient conditions:

- If the geared motor malfunctions, the grease may leak from the motor. To protect the environment from the grease, place an oil pan at the leak point.
- Be sure to attach safety covers to the belts, chains, gears, etc.

Operation:

- To operate the geared motor, observe the allowable loading torque range and the allowable starting frequency range.
- During operation, if the motor generates an abnormal noise, vibrates extremely, or shows abnormal characteristics, be sure to stop the motor, and inspect or overhaul the motor.
- During operation, keep your body away from the geared motor. If you touch the geared motor during operation, you may be injured or get burned.
- If the geared motor is equipped with a one-touch manual brake release lever, be sure to lock the brake release lever in the lever holder before starting operation.

Maintenance and modification:

- Do not modify the geared motor.
- Be sure to turn off the power before inspection or repairing the motor.

Disposal:

- Treat the motor as general industrial waste when disposing of it.

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1.Product Check

(1) Check that the model number, output, speed, etc. you specified are written on the nameplate.
(2) Check that the product is not damaged during transportation.
(3) Check the screws and bolts for looseness.

2.Operation Conditions and Ambient Conditions

(1) Do not place any object inflammable near the geared motor. Failure to observe this warning may case fire or explode.
(2) Do not use the geared motor as elevator for human transport. Use of a geared motor for such a purpose is prohibited by the Building Standard Law.
(3) If the equipment is to be used with an elevator, be sure to burnish with a safety device to prevent the elevator from accidental falling. Failure to observe this warning may cause physical injury and damage to the equipment.
(4) Do not rotate the geared motor at a high speed from the load side. The motor may be exploded.
(5) Be careful when a small power low gear ratio model raises operation frequency to 60Hz or more, rotation speed may not rise because of the influence of a machine loss.(Example: When 120Hz operation is performed by 0.1kW gear ratio 1/5,1/7.5 etc.)
(6) Don't use an inside-of-a-house type on a moist place and the outdoors. Generating of rust and the fall of insulation resistance may be caused by dew condensation or permeation of water. Use an outdoor type, when you use under such environment.
(7) Keep in mind that it may result in allophone generating or bearing breakage by electric corrosion if career frequency is highly set up by inverter operation.

3.Installation and Adjustment

(1) If the geared motor is equipped with a hoisting accessory, be sure to use the hoisting accessory to lift and transfer a load.
(2) If the geared motor malfunctions, the grease may leak from the motor. To protect the environment from the grease, place an oil pan at the leak point.
(3) Be sure to attach safety covers to the belts, chains, gears, etc.
(4) The grease lubrication method is adopted for all the motor models. The grease lubrication type geared motors can be installed in any direction. (The grease is full at the time of factory shipment.)
(5) Install the motor at an appropriate place that ensures low humidity and little dust. Check that the ambient temperature is between –15℃ and +40℃, and the relative humidity is 90% or less. Check that the motor cannot be frozen at the installation place. In addition, check the motor cooling condition of the installation place. The motor should not be extremely heated.
(6) Install the motor on a rigid and thermal conductive base using bolts having strength of 8.8 or above. Adjust the flatness of the installation surface to 0.2mm or less. Moreover, put in an attachment pitch into the tolerance shown in Table 2 in the GM-SSY type.
(7) To mount a flange mounting (face mounting) type or foot mounting type geared motor, be sure to use the bolts of the corresponding size as shown in Table 1.
(8) The installation of GM-SSY type must use the size shown in Table 2 respectively bolt. Please use a special washer of the attachment at the flange installation.

Table 1. Various Gear Sizes and Corresponding Bolt Sizes

Deceleration ratio / Output	1/5 1/7.5	1/10～1/60	1/80～1/240	1/300～1/1440	Size of gear	Size of bolt	
						Foot mounting type	Flange mounting（face mounting）type
0.1kW	AT	A	AT	CT	A, AT	Hexagon socket head bolt M8	Hexagon (socket head) bolt M8
0.2kW	AT	A	BT	DT	B, BT	Hexagon socket head bolt M10	Hexagon (socket head) bolt M10
0.4kW	BT	B	CT	DT(*1)	C, CT	Hexagon socket head bolt M12	Hexagon (socket head) bolt M12
0.75kW	C	C	DT	—	D, DT	Hexagon socket head bolt M12	Hexagon (socket head) bolt M16
1.5 k W	DT	D	ET		E,ET	Hexagon socket head bolt M16	Hexagon (socket head) bolt M20
2.2 k W	ET	E	E(*2)				

(*1)The range of the gear ratio of 0.4kW shows 1/300～1/480.(*2) The range of the gear ratio of 2.2kW shows 1/80～1/120.

Table 2. Various Gear Sizes and Corresponding Bolt Sizes

Output	Deceleration ratio	Size of gear	Flange installation		Face mount installation
			Size of bolt	Installation pitch allowance	Size of bolt
0.1kW	1/7.5～1/60	20	Hexagon socket head bolt M6	±0.4	Hexagon (socket head) bolt M8
0.2kW	1/7.5～1/30				
0.2kW	1/40～1/60	25	Hexagon socket head bolt M8	±0.4	Hexagon (socket head) bolt M10
0.4kW	1/7.5～1/30				
0.4kW	1/40～1/60	30	Hexagon socket head bolt M10	±0.4	Hexagon (socket head) bolt M12
0.75kW	1/7.5～1/30				
0.75kW	1/40～1/60	35	Hexagon socket head bolt M12	±0.5	Hexagon (socket head) bolt M16
1.5 k W	1/7.5～1/30				
2.2 k W	1/7.5～1/30	45	Hexagon socket head bolt M16	±0.5	Hexagon (socket head) bolt M20

4.Connection

4.1 When using it as a solid shaft

(1) To properly connect the Geared Motor to the machine, reduce the eccentricity between the motor and machine to 0.05mm or less. Use the flexible coupling to easily connect the motor to the machine.

(2) Adjust deflection amount of the chain to 4% of the span(refer to Fig.1). If the deflection amount is too large, a great shock may be applied at starting, and the geared motor may be damaged by the shock.

(3) To prevent damage caused by the overhang load, adjust the positions of the sprocket, gear, pulley, etc. so that the loading position can be closer to the joint of the output shaft and the gear case (refer to Fig. 2).

(4) The tolerance for the holes of the sprocket, coupling, etc. should be H8. Smoothly install the sprocket, coupling etc. using the tap on the output shaft (refer to Fig. 3).

(5) Do not use any hammer for installation. Application of a large force may damage the bearing, gear, etc.

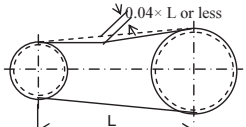


Fig. 1 deflection amount of chain

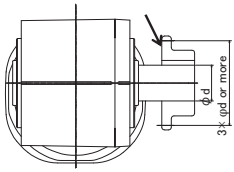


Fig.2 Sprocket position

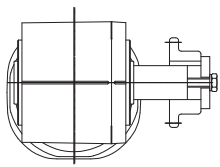


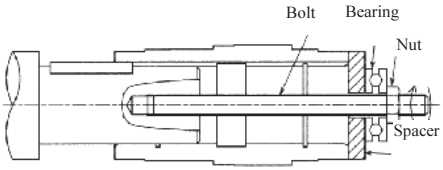
Fig. 3 Sprocket installation

4.2 For hollow shaft

Prepare the parts shown in Fig. 4 to easily connect the motor. We cannot supply any tools necessary for attachment or removal. Please prepare these tools by yourself.

Attach an attached protective cover in an opposite drive side.(Insert striking lightly into the slot processed on the case flange face.)

1.Connection to hollow shaft

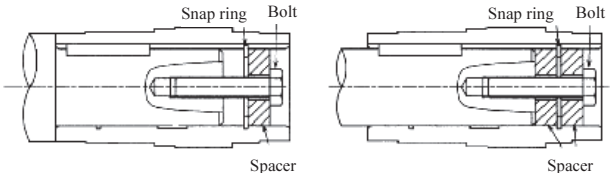


- Before connection, Please insert it after spreading the printing prevention medicine (molybdenum disulfide etc.) on the driven shaft and the inside diameter of the hollow shaft when you insert driven shaft
- If the shafts are too tight to be engaged each other, tap the hollow shaft (output shaft) with a shock-less hammer. If you use the jigs and tools shown in the figure, you can connect the shafts more easily.
- The inner diameer of the hollow shaft is machined while observing the H8 tolerance grade. For general engagement, the tolerance of h7 is recommended for the driven shaft. If a large shock or a large radial load is to be applied to the shafts, tightly engage the shafts.

2.Fixing of hollow shaft

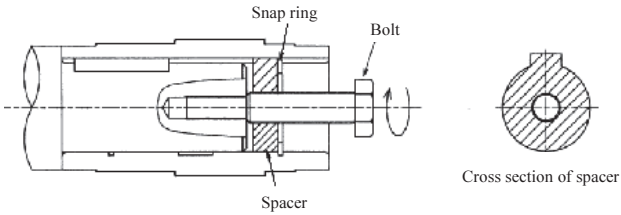
(a) If driven shaft has steps

(b) If driven shaft does not have any steps



- Firmly fix the driven shaft to the hollow shaft.

3.Removal from hollow shaft



- If you manufacture the tools shown in the figure, the shaft can be smoothly removed.

Fig. 4 Hollow shaft and driven shaft

4.3 Installation of torque arm

The torque arm is normally used for fixing of the hollow shft type geared motor. This is because the torque arm can prevent unexpected rotation of the geared motor that may be caused by the reaction force of the driven machime,

① Considering the shock that may be applied at starting or braking, be sure to select a plate thickness and bolt type that can ensure enough strength (refer to Fig. 5).

② Move the end face of the hollow shaft close to section A (torque arm whirl-stop) as far as possible.

③ Check that forces unnecessary for stopping the whirl cannot be applied to the torque arm whirl-stop..

④ Elongate dimension "r" of the torque arm ad long as possible (refer to Fig. 6).

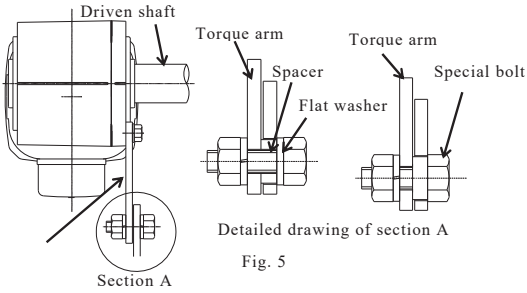
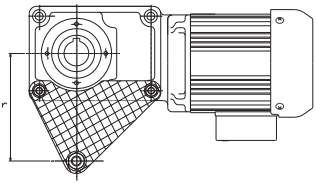


Fig. 5



5. Guidelines for replacing the old geared motor

When replacement of the old geared motor, please note the following.

(1) There is mounting compatible, but the total length will be longer. When installation, please check the interference of surrounding devices. Also, consider ventilation for the motor cooling, please keep a distance between the fan cover and the wall, as in Figure 5 and Table 1. Dimensions FC2 is minimum dimensions of the wall-to-fan cover in consideration of ventilation for motor cooling, however, we recommend to set the wall-to-fan distance so that when conducting brake maintenance or etc, the fan cover can be removed.

(2) Please reconsiders the design of the wiring equipment of the breakers and etc since starting current may increase.

(3) Since the rotation speed may increase and the power consumption increase, please consider the necessity of countermeasures such as setting the rotational speed of the load machine to the same as previous one by changing the sprocket ratio or the output frequency of the inverter.

(4) Please reconsider the acceptable number of starts and the acceptable number of starts per hour, since moment of inertia may increase.

(5) When using non-brake geared motors, period of free-run may be longer. Also, when it comes to brake-in geared motors, especially when simultaneous braking method, brake holding period may be longer. Therefore according to necessity, please adopt separated braking method or Direct current (quick) braking method.

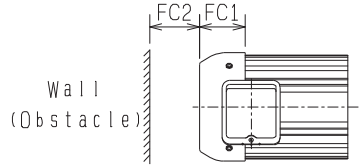


Fig.7 Dimension of the wall-to fan cover

Output (kW)	FC1(mm)	FC2(mm)
0.75	64(127)	20
1.5	73(145)	40
2.2	83(150)	
3.7	95(170)	
5.5	117(197)	
7.5		

6.Wiring

(1) Be sure to ground the geared motor, and install a circuit breaker on each motor. Without grounding or circuit breaker, you may get an electric shock.

(2) To wire the geared motor, use high-quality wiring parts, and be sure to observe the technical standards for electric equipment and the regulations for internal wiring specified by the corresponding electric power company. The outline is shown in Table 1. If the wiring distance is long, adjust the voltage drop to 2% or less.

(3) Install an optimum motor protector on each motor. Without any protector, the motor may cause a fire at the time of a problem.

(4) Be sure to supply the specified voltage to the geared motor. If the voltage is too high, a fire may be caused.

(5) To remove the terminal cover, lift the cover while pulling the cover in the arrow direction shown on the cover.(0.1 to 0.4kW)

Motor type	Output (kW)	Minimum wire thickness(mm) (See Note 1)		Maximum wire line length(m) (See Note 2)		Overcurrent breaker(A) (Note3) Full-voltage starting		Over scale ammeter(A)		Minimum grounding wire thickness(mm)	
		200V	400V	200V	400V	200V	400V	200V	400V	200V	400V
SSY, SSY2	0.1,0.2	1.6	1.6	144	580	15	15	5	5	1.6	1.6
SHY, SHY2	0.4	1.6	1.6	81	326	15	15	5	5	1.6	1.6
SSYP, SHYP	0.75	1.6	1.6	54	217	15	15	5	5	1.6	1.6
	1.5	1.6	1.6	32	130	30	15	10	5	1.6	1.6
	2.2	1.6	1.6	23	94	30	15	10	5	1.6	1.6

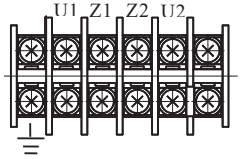
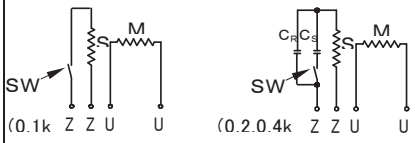
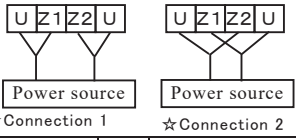
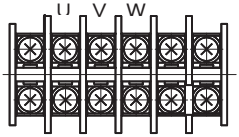
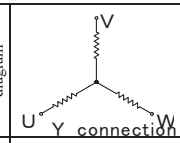
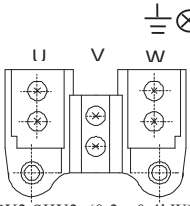
Note1: The "minimum wire thickness" is for when three wires are place in a conduit.

Note2: Maximum wire line length is a measure that voltage drop is 2% or less.

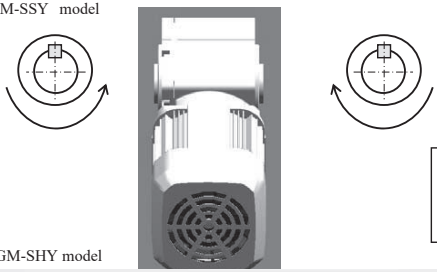
Note3: Overcurrent breaker is for power distribution. Motor breakre for motor protection, please select the ones that conform to the motor rated output.

7.Motor Wiring and Output Shaft Rotational Direction Viewed from Output Shaft

To rotate the 3-phase motor in the opposite direction, exchange the connected terminals between 2 wires(2 of 3 wires, R, S, and T).
For the single-phase motor, select connection 1 or 2 from the following table to determine the rotational direction.

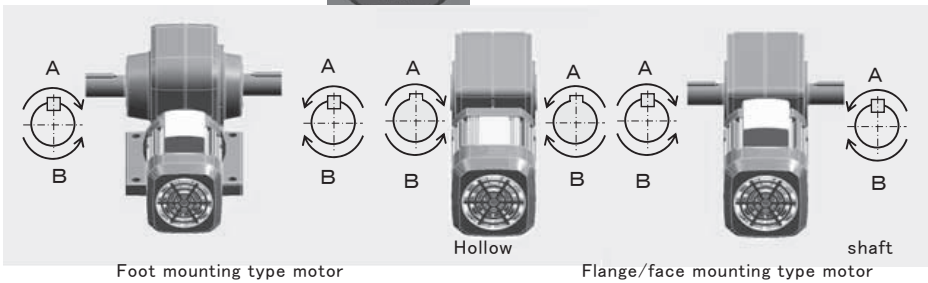
Output (kW)	Terminal connection		Wire connection method
0.1～0.4(Single phase)		Connection diagram	
		Connection method	
0.1～2.2(Three phase)	 SSY,SHY:(0.1～0.4kW)	Connection diagram	
	 SSY2,SHY2:(0.2～0.4kW) SSYP,SHYP:(0.75～2.2kW)	Connection method	U V W R S T

The rotation direction of GM-SSY model



《Caution》
Please warn 0.75kW of GM-SHY in a model partly because rotatory direction is different from GM-HY2.

The rotation direction of GM-SHY model



Foot mounting type motor

0.1～0.4kW	Reduction ratio 1/5,1/7.5,1/80～1/240	Rotational direction B
1.5,2.2kW	Reduction ratio 1/10～1/60 1/300～1/1440(*)	Rotational direction A
0.75kW	Reduction ratio 1/5～1/60	Rotational direction A
	Reduction ratio 1/80～1/240	Rotational direction B

Flange/face mounting type motor

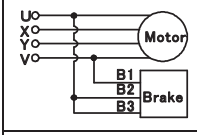
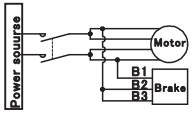
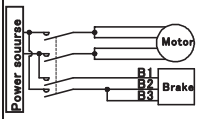
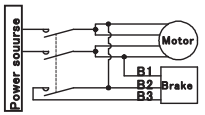
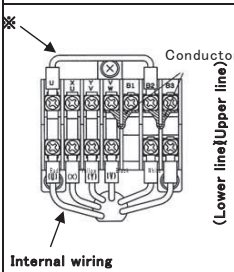
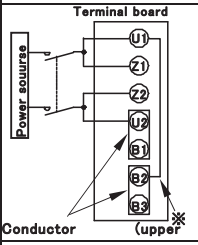
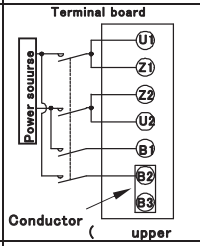
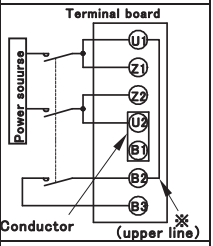
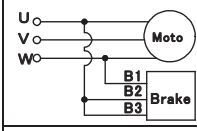
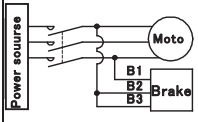
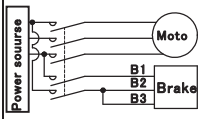
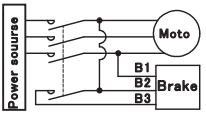
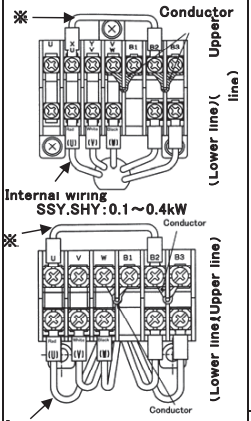
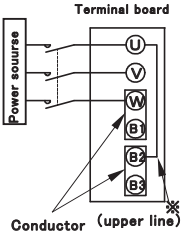
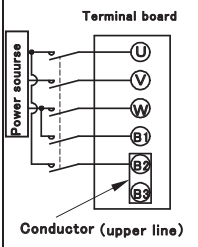
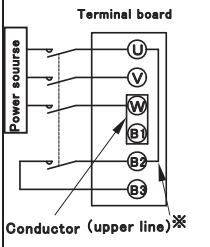
0.1～0.4kW	Reduction ratio 1/5,1/7.5,1/80～1/240	Rotational direction A
1.5,2.2kW	Reduction ratio 1/10～1/60 1/300～1/1440(*)	Rotational direction B
0.75kW	Reduction ratio 1/5～1/240	Rotational direction A

(*)The range of the deceleration ratio of 0.4kW becomes 1/300～1/480.

8.Brake Wiring

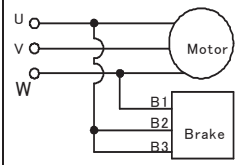
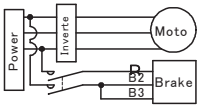
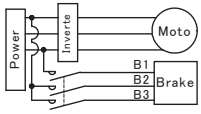
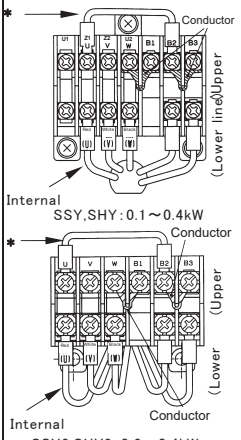
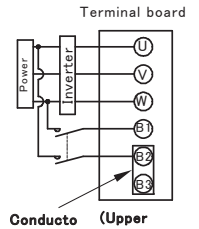
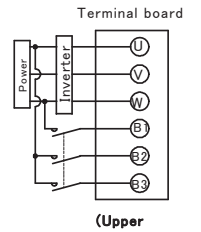
(1) The brake motion delay time (the time before brake start to operate after turning off the power) depends on brake connection method and load specifications. Select appropriated connection method by considering the functions of machine that attached to motor.

(2) Braking wires are connected to simultaneous braking method from factory shipment, for the other braking method, please open the terminal box to change braking connection circuit as shown below.

Motor		Connection condition at delivery		Simultaneous braking	Separate braking	Direct current(immediate braking)
Input	Output					
Single phase	0.1～0.4kW		Circuit			
			Connection terminals			
			Inertia time	0.2～0.55 sec.	0.1～0.3 sec.	0.01～0.03 sec.
Three-phase	0.1～2.2kW		Circuit			
			Connection terminals			
			Inertia time	0.2～0.55 sec.	0.1～0.3 sec.	0.01～0.03 sec.

Notes:

1) Speaking sound, generated from brake lining, is not malfunction and does not affect to performance.
2) For elevator or high accuracy positioning drive, please use direct current (quick) braking method.
3) For simultaneous braking method or direct current (quick) braking method, be sure to connect lead wire (marked with ※) to the terminals U and B2. And, for separated braking method, be sure to disconnect it.
4) For separated braking method or direct current (quick) braking method, remove one of the connection bar as shown above.
5) For 0.1kW to 2.2kW model, terminal block has 2 lines of terminals (upper and lower line). Be sure to connect power supply wires to upper line terminals. If connect to the lower line, brake will not be released.
6) Motion delay time may slightly vary from load specification or from brake torque.
7) The single phase motor cannot produce the outdoor type.
8) Please select the switch in the brake part by the current of 200V class:DC110V（400Vclass：DC220V） and the DC13(L/R=10ms) class ratings when you switch off direct current.

Motor		Connection condition at delivery		Simultaneous braking	Separate braking	Direct current (immediate) braking
Input	Output					
Inverter-driving	0.1～2.2 kW		Circuit			
			Connected points			
			Inertia time		0.1–0.3 sec.	0.01–0.03 sec.

Notes:

1) Braking wires are connected as simultaneous braking method from factory shipment. For inverter driving, please open terminal box to change braking connection circuit to those are shown above. And be sure to disconnect lead wire (marked with ※)
2) For separated braking method or direct current (quick) braking method, remove the connection bar as shown above.
3) Terminal block has 2 lines of terminals (upper and lower line). Be sure to connect power supply wires to upper line terminals. If connect to the lower line, brake will not be released.
4) For inverter driving, connect braking wires directly from power source. do not connect through inverter.
5) When use inverter drive, at low frequency, the noise may be slightly louder. This noise is not malfunction and does not affect to performance.
6) For inverter driving, the power factor improving capacitor cannot be connected to the motor circuit.

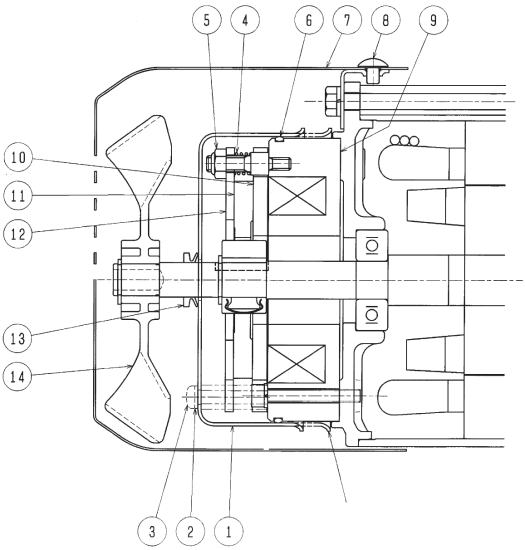
Brake usage precautions

1. Connect only brake power without power the motor may deteriorate the motor.
2. If power-factor improving capacitor is attached, be sure to use separated braking method. For inverter driving, the power factor improving capacitor cannot be connected to the motor circuit.
3. To drive the motor with an inverter or to control the input power, please connect the brake to the power source side of the inverter. (Connecting to the output side of the inverter may deteriorate the power source equipment)
4. In the inverter-driving mode, the noise may be slightly louder in the low-frequency zone. However, this type of noise will not deteriorate any motor functions.
5. To operate motor at frequency of 25Hz or less, observe the rate time of 1 hour or 25% ED.
6. To use inverter-driving for 400V class motor, surge voltage from wiring fixed number may occur between the terminal,and this voltage may deteriorate the insulation of motor. Please use the method below for solution.
   (1) Insulation strengthening method
   Please use 400V class inverter-driving insulation strengthening geared motor.
   In Mitsubishi geared motor, insulation strengthening motor are shown below.
   - Standard geared motor ---0.1～2.2kW
   (2) Inverter side surge voltage controlling method
   At the secondary side of inverter, please connect the filter for control surge voltage of the motor which decrease within 850V. For Mitsubishi inverter-driving, please connect optional surge voltage controlling filter (FR-ASF-H) at the secondary side of inverter.

9. Brake(0.1～0.4kW)

1) Structure and operation

Fig.8 shows the structure of the brake. The non-excitation braking method (spring-driven braking method) is used for all the models



Item	DESCRIPTION
1	Brake cover
2	Seal washer
3	screw
4	spring
5	Hexagon nut
6	O-ring
7	Fan cover
8	Clamp screw
9	Field core
10	Armature
11	Brake lining
12	Side plate
13	End-face V seal (out door type)
14	Fan

The brake cover ① depth size of 0.1kW and 0.2kW differs from 0.4kW.

Fig.8

2)Gap adjustment procedure (Refer to the structural drawing of the brake (Fig.8).

If the brake is abraded due to long use, the gap between the field core and Armature will be larger than the limit gap specified in Table 3. Such a large gap may cause a braking operation error or brake releasing error. For this reason, if the gap is larger than the limit gap, adjust the gap by following the procedure below.

Step 1 Loosen the fan cover clamp screws (4 screws), and then remove the fan cover. The fan is fixed by a C-shaped snap ring. Remove the fan and End-face V seal(outdoor type), and then loosen screws (item 3) to remove the brake cover (item 1).

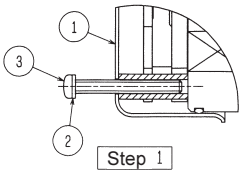
Step 2 Equally adjust the gap (A) between the field core and Armature to the initial gap (refer to Table 3) by tightening the outer hexagon nut (item 5).

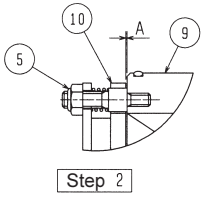
Step 3 Use the specified thickness gauge (initial thickness gauge) to measure the gap. If the lower limit thickness gauge can be inserted into the gap but the upper limit thickness lower limit thickness gauge cannot be inserted into the gap at any point around the cores, judge that gap is properly adjusted.

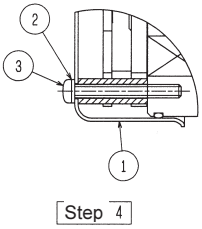
Step 4 Attach the brake cover, and then tighten the screws (item 3) through the seal washers (item 2).

Notes: To adjust the gap, observe the following items.

- Adjust the gap so that the gap difference (difference between the maximum gap and minimum gap) is reduced to 0.05 mm or less.
- Periodically check the gap.
- Be careful not to damage the O-ring (item 6) during adjustment. The waterproofing or soundproofing function may be deteriorated.
- If the thickness of the brake lining is reduced to the limit value specified in Table3, replace the lining.







3） Brake specifications

Table3 shows the standard specifications for the brake.

Table 3 Standard Specifications for Brake

Brake model	Output (kW)	Number of poles (P)	Brake power supply Voltage(V)	Braking voltage DC(V)	Braking Current (A)	Braking torque (Nm) *Note 1 and 2	Gap(mm)		Lining thickness	
							Initial gap	Limit gap	Initial thickness	Limit thickness
SBM 80	0.1,0.2	4	200	90	0.16	1.91	0.15(inserted)-0.25 (not inserted)	0.4	6.0	5.3
SNB 0.4	0.4	4	200	90	0.18	3.82	0.15(inserted)-0.25 (not inserted)	0.4	5.9	4.9

Note 1: The braking torque values shown in the above table are the static friction torque values. Dynamic friction torque values will be approximately 80% of the static friction torque values.

Note 2: At starting first operation or after replacing the brake lining, the braking torque may be less than the specified torque. In this case, fit the friction surfaces of the brake by applying the brake several times with a light load

4） Rectifier specifications

Table 4 shows the standard specifications for the rectifier (for the 200V type).

Table 4 Standard specifications for Rectifier

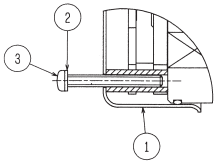
Output (kW)	Power supply voltage (V)	Output voltage DC(V)	Control method	Rating	Ambient temperature and humidity	Installation
0.1,0.2	200	90	Half wave rectification method	Continuous	-15～+40°C 90%RH or less	On terminal block
0.4	200	90				

5） Manual brake releasing procedure

a） Simplified manual brake releasing

Step 1 Loosen the fan cover clamp screws (4 screws), and then remove the fan cover. After that, remove the fan and End-face V seal.(outdoor type); The fan is fixed by a C-shaped snap ring.

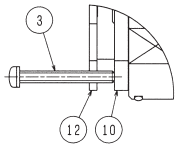
Step 2 Loosen the screws (item 3), and then remove the brake cover (item 1). Screw the machine screws into the threaded holes of the side plate. The machine screws will push the Armature to release the brake. At the completion of manual brake releasing, be sure to reset the brake.



Step 1

Notes: To manually release the brake, observe the following items:

- Be sure to check that the brake is properly released.
  Basically, reducing the gap to zero will release the brake. To check whether the brake is released, manually turn the motor shaft. If you can turn the shaft, judge that the brake is released.
- If a large tightening force is applied to the simplified manual brake release bolt, the Armature or side plate may be distorted or damaged, and normal operation may not be possible. For this reason, carefully tighten the manual release bolt.
- If the manually released brake is not reset, do not operate the motor. Before starting full-scale operation, be sure to check that the brake functions properly.
- For simplified manual brake releasing, up to 50 times of releasing is allowable.



Step 2

b） One-touch manual brake releasing (optional)

・ On the top of the fan cover, there is a brake release lever. Turn the lever 90°to release the brake. (Do not turn the lever more than 90°. The brake may not be released.) At the completion of manual brake releasing, be sure to return the lever to the initial position.

・.For one-touch manual brake releasing, up to 100 times of releasing is allowable.

The gap adjustment (maintenance) point of one-touch manual brake releasing

【The resolution point at the time of the gap adjustment】

① Open a manual lever and exclude combination with the pin of right and left.

② Each right and left pulls up pin.

③ Please refer to the gap adjustment point for the following work.

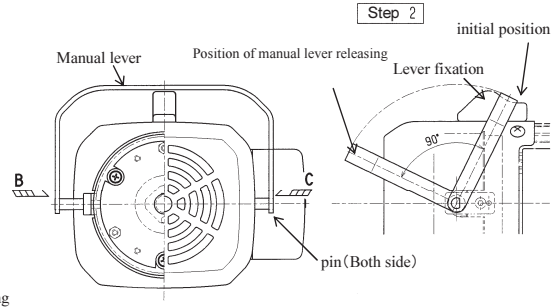
【The point to reassemble after the maintenance】

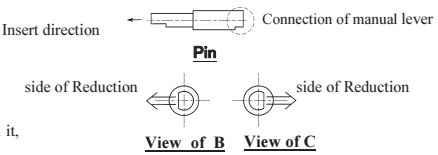
① Confirm it so that a D cut parallelism department of the manual lever combination department turns to the slowdown machine side and insert it from a fan cover hole.

② Open a manual lever and combined with the pin of right and left.

※ Attention

Of the manual lever please be careful to be able to spread too much. A wobble occurs in the combination with the pin when I open too much it, and a manual lever is easy to come to come off.





10. Brake（0.75～2.2kW）

1) Structure and operation

Fig. 9 shows the structure of the brake. The non-excitation braking method (spring-driven braking method) is used for all the models

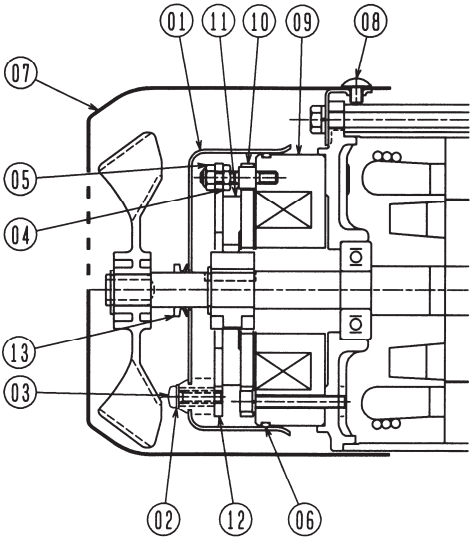
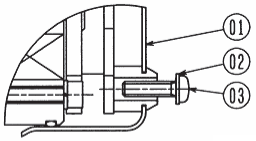


Fig.9

Item	DESCRIPTION
1	Brake cover
2	Flat washer
3	screw
4	Locknut
5	Hexagon nut
6	O-ring
7	Fan cover
8	Clamp screw
9	Field core
10	Armature
11	Brake lining
12	Side plate
13	End-face V seal (Outdoor type)

2) Gap adjustment procedure (Refer to the structural drawing of the brake (Fig.9).

If the brake is abraded due to long use, the gap between the field core and Armature will be larger than the limit gap specified in Table 5. Such a large gap may cause a braking operation error or brake releasing error. For this reason, if the gap is larger than the limit gap, adjust the gap by following the procedure below.

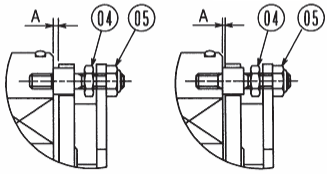


Step 1

Step 1 Loosen the fan cover clamp screws (4 screws), and then remove the fan cover. The fan is fixed by hexagon socket head set screws. Remove the fan and End-face V seal(Outdoor type), and then loosen the screws (item 3) to remove the brake cover (item 1).

Step 2 Inside the brake cover, loosen 3 locknuts(item 4), and then equally adjust the gap(A) between the field core and Armature to the initial gap (refer to Table 5) by tightening the outer hexagon nut(item 5).

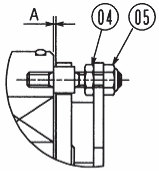
Step 3 Use the specified thickness gauge (initial thickness gauge) to measure the gap. If the lower limit thickness gauge can be inserted into the gap but the upper limit thickness gauge cannot be inserted into the gap at any point around the cores, judge that gap is properly adjusted.



Step 2, 3

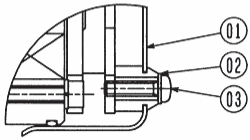
Step 4 Tighten 3 locknuts(item 4)

Step 5 Finally check the gap(A) in the same way as step 3.



Step 4, 5

Step 6 Attach the brake cover, and then tighten the screws (item 3) through the flat washers (item 2).



Step 6

Notes: To adjust the gap, observe the following items.

- After adjusting the gap, be sure to tighten al the nuts.
- After tightening the locknuts (item 4) at step 4, the gap may be slightly changed. For this reason, be sure to check the gap at step 5.
- Adjust the gap so that the gap difference (difference between the maximum gap and minimum gap) is reduced to 0.05 mm or less.
- Periodically check the gap.
- Be careful not to damage the O-ring (item 6) during adjustment. The waterproofing or soundproofing function may be deteriorated.
- If the thickness of the brake lining is reduced to the limit value specified in Table5, replace the lining.

3) Brake specifications

Table 5 shows the standard specifications for the brake.

Table 5 Standard Specifications for Brake

Brake model	Output (kW)	Number of poles (P)	Brake power supply Voltage(V)	Braking voltage DC(V)	Braking Current (A)	Braking torque (Nm) *Note 1 and 2	Gap(mm)		Lining thickness	
							Initial gap	Limit gap	Initial thickness	Limit thickness
SNB 0.8	0.75	4	200	90	0.24	7.16	0.15(inserted)-0.25 (not inserted)	0.5	7.7	6.7
SNB1.5	1.5		200		0.25	14.3	0.20(inserted)-0.30 (not inserted)	0.5	10.0	8.5
SNB2	2.2		200		0.37	21.0	0.20(inserted)-0.30 (not inserted)	0.5	10.0	8.5

Note 1: The braking torque values shown in the above table are the static friction torque values. Dynamic friction torque values will be approximately 80% of the static friction torque values.

Note2: At starting first operation or after replacing the brake lining, the braking torque may be less than the specified torque. In this case, fit the friction surfaces of the brake by applying the brake several times with a light load

4) Rectifier specifications

Table6 shows the standard specifications for the rectifier .

Table6 Standard specifications for Rectifier

Output (kW)	Power supply voltage (V)	Output voltage DC(V)	Control method	Rating	Ambient temperature and humidity	Installation
0.75～2.2	200	90	Half wave rectification method	Continuous	-15～+40℃ 90%RH or less	On terminal block

.

5) Manual brake releasing procedure

a) Simplified manual brake releasing

For this brake releasing method, prepare the brake release bolts shown in Table 7

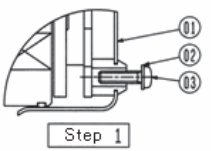
Step 1 Loosen the fan cover clamp screws (4 screws), and then remove the fan cover. After that, remove the fan and End-face V seal(outdoor type). (The fan is fixed by hexagon socket head setscrews.)

Step 2 Loosen the screws (item 3), and then remove the brake cover (item 1). Screw the machine screws into the threaded holes of the side plate. The machine screws will push the Armature to release the brake. At the completion of manual brake releasing, be sure to reset the brake.

Table 7 Simplified manual brake release bolt

Brake model	Simplified manual brake release bolt
SNB0.8	M4×25
SNB1.5	M6 x 40
SNB2	

a) Simplified manual brake releasing (pattern 1)



b) One-touch manual brake releasing (optional)

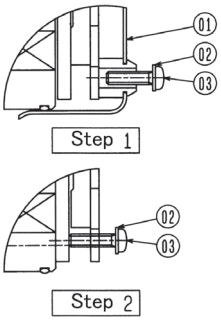
The written contents of one-touch manual brake releasing(optional) are the same as that of 0.1～0.4kW.

Please refer to P9

Notes: To manually release the brake, observe the following items:

- Be sure to check that the brake is properly released.
  Basically, reducing the gap to zero will release the brake. To check whether the brake is released, manually turn the motor shaft. If you can turn the shaft, judge that the brake is released.
- If a large tightening force is applied to the simplified manual brake release bolt, the Armature or side plate may be distorted or damaged, and normal operation may not be possible. For this reason, carefully tighten the manual release bolt.
- If the manually released brake is not reset, do not operate the motor. Before starting full-scale operation, be sure to check that the brake functions properly.
- For simplified manual brake releasing, up to 50 times of releasing is allowable.

b) Simplified manual brake releasing (pattern 2)



11. Dust&Waterproof type

Please confirm the following notes when waterproof GM uses it.

⚠ CAUTION

Labyrinth Plate for output shaft

●Labyrinth plate that rotates with the shaft is installed in the output shaft. Please do not touch Labyrinth board while rotating

Washing(W type or P type)

- Turn off the supply when you wash it.
- Washing by hard thing like a metal brush should avoid. It becomes the cause of paint peeling.
- Please make washing temperature into 80 or less degrees.

Washing(W type only)

- Do not carry out washing by medicine.
- Do not carry out high-pressure washing. It becomes the cause of paint peeling.

Washing(P type only)

- Do not use acid or alkaline solution as much as possible. Rubber parts deteriorate.
- Do not carry out high-pressure(1MPa or more) washing. It becomes the cause of paint peeling.

Connecting wires

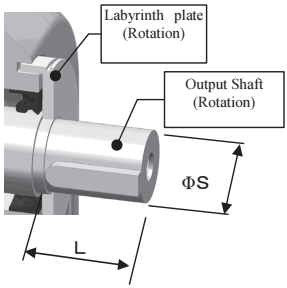
●The cable must use water-proof type. Water might go into it.
●Do the installation and tightening Water proof connector surely. Water might go into it.

1）Labyrinth board

a) Labyrinth plate is installed in the output shaft. Note the rotation with the shaft. Refer to a catalog or externals dimensional drawing for details.

b) Do not add the outside power to Labyrinth plate. It comes in contact with the case and it is likely to damage it.

c) Do not bite the foreign body between Labyrinth plate and the case and do not drive in a crowded state.



2）Inverter driving

In W type, the standard and the range of a low torque are different for the magnetic flux vector control method.

Magnetic flux vector control		
Standard type	W type	P type
3～60Hz	20～60Hz	3～60Hz

3）Wiring work

a) The cable wiring must use water-proof one that is.

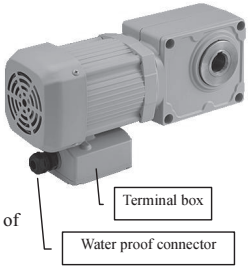
b) It must not be confirmed that Packing is installed, When you tighten terminal box cover.

c) The terminal box cable taking out part installs Water proof connector OA-W1611-13L(Made of ohm electric Ltd.), and note the following.

・The acceptable electric wire diameter is φ 8.5-φ11.5.
Water is infiltrated when the electric wire not suited is used, and there is a possibility of electric breakdown.

・Tighten the Water proof connector surely.(recommended tightening torque 1.2-1.5N・m)

・Paint the seal medicine (Three bond # 1211 etc.) between the entrance of Water proof connector and the cable.

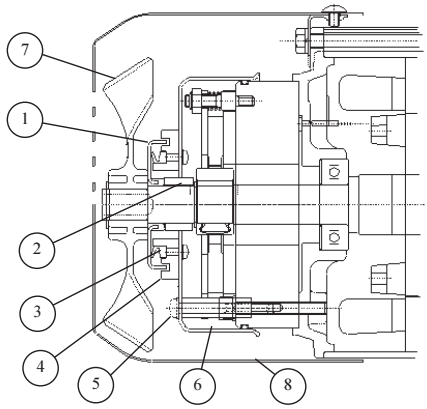


4）Brake gap adjustment

a)W type (IP65)

a-1) Structure and operation

The figure below shows the structure of the brake. The standard and the shaft seal structure are different.



Item	Name of articles
1	Drainer Water proof connector
2	Spacer
3	End-face V seal
4	Seal support
5	Pan small screw
6	Brake cover
7	Fan
8	Fan cover

a-2) Resolution and assembly

The resolution and the assembly when the brake gap is adjusted are the same to standard points. Part only for the waterproof type are installed and note the following point.

Refer to the attached paper manual for the gap adjustment points.

【Resolution】

Detach the Fan cover and the Fan. Loose the pan small screw. And detach the Brake cover together with Drainer Water proof connector and Seal support.

【Assembly】

It is confirmed that Spacer is installed in the shaft and after installing the brake cover, push the Rotation board at Spacer.

When starting and stopping, End-face V seal sound might be generated.(There is no problem on the function. Please spread grease on End-face V seal.)

b) P type (IP67)

b-1) The brake is stored in the brake cover.

Execute it after detaching the bolt and the brake cover when the brake gap adjustment is necessary.

b-2) After adjusting the brake gap, paint the seal medicine (Three Bond® # 1211 etc.) on seal side of the brake of the cover and the bracket.

※Three Bond is a registered trademark of ThreeBond Holdings Co.,Ltd.

5）Others

a) It asks for the maintenance of the output shaft and the output shaft oil seal and motor axis part at our factory or our service center.

b) Please confirm there is not loosening in Capcon in the periodical inspection.

12. Operation

- If a load is lifted up, do not release the brake using the manual brake release unit. The load may be dropped.
- During inverter operation, be sure to observe the frequency range specified in the catalog. If the frequency is out of the specified range, the motor may be damaged.

Before turning on the switch

(1) Check the bolt tightening condition at each section.
Check that the foundation bolts, sprocket bolts, coupling bolts, etc. are tightened properly.

(2) Check the electric system.
Check that the electric system is properly wired, and the terminal box cover is closed. Also check that the breaker capacity and over current protective relay values are properly set.

Operation

(1) To operate the geared motor, observe the allowable loading torque range and the allowable starting frequency range,
(2) During operation, if the motor generates an abnormal noise, vibrates extremely, or shows abnormal characteristics, be sure to stop the motor, and inspect or overhaul the motor.
(3) During operation, keep your body away from the geared motor. If you touch the geared motor during operation, you may be injured or get burned.

Others

(1) At starting, apply a light load. When the motor speed is increased to the full speed, apply the specified load.
(2) To stop operation, be sure to turn off the power switch.

13. Maintenance

●Do not modify the geared motor.
●Be sure to turn off the power before inspecting or repairing the motor.
(1) Daily check

Check item	Check method	Description
Current	Using ammeter	Check that the actual current value is equal to the rated current value specified on the nameplate or less.
Noise	Hearing	Directly check the noise with your ear using a noise detector bar. The motor should not generate any abnormal noise.
Surface temperature	Thermometer	Obtain the motor frame surface temperature rise value by subtracting the ambient temperature value from the motor frame surface temperature value. The temperature rise should be 55℃ to 65℃.
Vibration	Vibration meter	Check the vibration of the gear case and frame. The obtained vibration values should be 4.9m/s^2 or less.
Lubricant leak	Visual check	Check that no grease or oil leaks from the geared motor.
Chain	Visual check	Check that the chain is not extremely sagging or too tight. Also check that the chain moves smoothly.

(2) Periodical inspection
Periodically check the motor and replace the damaged parts while referring to the table below (the table show the standard values determined for daily operation of 8 hours,300days/year):

Check item		Schedule	Description
* Grease replacement		Every10000Hours (4 years)	Replace the grease every 10,000 hours of operation or every 4 or 5 years, whichever is earlier. <Grease> 0.1~0.4kW : NLGI NO.00 of Lithium Complex Grease 0.75~2.2kW : NLGI NO.000 of Urea Grease With Extreme Pressure manufactured by JX Nippon Oil & Energy Corporation
* Oil seal replacement		Every 8000Hours (3 years)	If the grease leaks from the seal, replace the oil seal.
Chain tension		Every 6 months	If the chain is loose, readjust the tension.
Looseness of foundation bolts		Every 6 months	If the foundation bolts are loose, retighten the bolts.
* Bearing replacement		Every8000Hours (3 years)	If the bearing generates an abnormal noise, replace the bearing.
Motor coil insulation resistance		Every 6 months	Check the insulation resistance of the motor coil using a 500V megger. The insulation resistance should be 1 MΩ, dry the coil at 90℃ or less in a drying furnace.
Brake	Gap adjustment	Every 6 months	Adjust the gap to the range specified in Table 3.
	Brake lining thickness	Annually	If the lining thickness is less than the limit thickness specified in Table 3, replace the brake lining.
	O-ring replacement (For brake cover)	Every 8000Hours (3 years)	Periodically check the O-ring. If the O-ring is damaged, replace the O-ring.

For the item marked with an asterisk "*", please contact our system service department.
Notes: Just after replacement of the brake lining, the braking torque may be less than the specified torque. In this case, fit the friction surfaces of the brake by applying the brake several times with a light load.

(3) Others
When oil oozes from set field of motor, if it does not develop, it can be used as it is because there is no problem on a performance. When oil poses a problem, use after wiping off oil. This oil is a grease ingredient applied to very small quantity at the time of the assembly in a factory.

14. Troubleshooting

If the geared motor has a problem, determine the cause and solve the problem while referring to the table below:

Problem	Cause	Remedy
Grease leak from oil seal	Damaged oil seal.	*Replace the oil seal..
Oil leak from mating face of gear case etc.	(1)Loose clamp bolt (2) Damaged O-ring	(1) Tighten the clamp bolt (2) Replace the O-ring
Abnormal noise of bearing	Dust or foreign material is in the bearing.	*Replace the bearing.
*Abnormal noise of gear	(1)The gear catches foreign material. (2) The gear is abraded due to overload.	Contact our system service department.
*Other problems	(1) Resonance is caused because the motor installation base is not rigid. (2) The vibration of the machine is transferred to the motor to cause the problem. (3) The eccentricity between the machine and the motor is too large.	(1) Increase the rigidity of the motor installation base. (2) Increase the rigidity of the motor installation base (3) Readjust the eccentricity to 0.05 mm or less.
*Non-rotating output shaft	(1) Power source connection error. (2) Damaged gear or shaft.	(1) Check the power source. (2) Contact our system service department.
Extreme rise of temperature	(1) Overloaded operation. (2) The starting frequency is too high. (3) The ambient temperature is 40 or above.	(1) Reduce the load by lowering the current to the rated current value. (2) Lower the frequency. (3) Ventilate the room to reduce the ambient temperature.
Abnormal noise of motor	(1) Foreign material. (2) Damaged bearing. (3) Brake gap adjustment error. (4) Abraded brake lining. (5) Seized brake coil. (6) Broken rectifier. (7) Defective centrifugal (governor) switch.	(1) Remove the foreign material. (2) Contact our system service department. (3) Adjust the brake gap. (4) Adjust the brake gap, or replace the brake lining. (5) Replace the entire brake unit. (6) Replace the rectifier. (7) Contact our system service department.
Brake malfunction	(1) Foreign material on brake lining. (2) Abraded brake lining. (3) Unevenly adjusted brake gap. (4) Overload. (5) The manually released brake is not reset.	(1) Remove the foreign material. (2) Adjust the brake gap, or replace the brake lining. (3) Adjust the brake gap. (4) Reduce the load by lowering the current to the rated current value. (5) Reset the brake to the initial condition.

For the items marked with an asterisk “*”, please contact our system service department.

15. Contact us

When you contact us, let us know the following items

(1) SERIAL No.
(2) Model number
(3) Output
(4) Reduction ratio or speed
(5) Part name(see the construction)
(6) Quantity
(7) Desired delivery date

（See the nameplate）

「Warranty」

1. Warranty term and scope of warranty

When failure by the responsibility by the side of our company occurs for a product during the term of a warranty, our company will fix a product gratuitously through the store or the service company of our company which purchased. However, when the business trip repair to overseas from domestic is required, or when the business trip repair to the remote place according to a detached island and this is required, I do the cost price which engineer dispatch takes as onerousness.

【Warranty term】

The warranty term for the product shall be 18 months after the date of delivery or 12 month from the product starting operation, whether be shorter. Moreover, the term of warranty of a repair products does not become long more than the term of warranty before repair.

【Scope of warranty】

(1)Inspection

Please inspect your product by yourself. Our service personal, however, can inspect your product at your request with change to you. If a problem is detected by the inspection ,we will discuss with you to determine whether we are responsible for the problem. If we are responsible for the problem, we will repair your product free of charge.

(2)Repair

In the following cades (①, ②, ③, ④,⑤,⑥,⑦,⑧ and ⑨),we will charge the repair expense, parts replacement expense, and traveling expense to you. In the other cases, we will repair your product free of charge.

①The problem is caused due to inappropriate storage or handling of your product, carelessness, negligence , or operation in inappropriate facility or with inappropriate machine, etc

②The problem is caused because you have modified our product without our approval.

③The problem is caused because you have used lubricating oil other than recommendation of our products.

④The problem is caused because periodical inspection is not performed

⑤The problem is caused because you have used our product while ignoring the product specifications.

⑥The problem is caused because you have used accepted that the consumable parts (Bearing, oil seal, etc.) specified as the instructions manual etc. even if it was a normal operating condition were able to protect when performed maintenance and inspection normally.

⑦The problem is caused because natural disasters, such as an external factor by inevitability, such as a fire and unusual voltage, and an earthquake, thunder, and storm and flood damages.

⑧The problem is caused because the reason which was not able to be foreseen with the level of the technology at the time of our company shipment.

⑨Other cases where you are responsible for the problem

2. Exclusion

Even if a problem of our product causes damage of other manufacturers' machine, etc., we will not compensate any loss caused by the problem of our product or damaged other manufacturers' machines (loss of your company or your customer), even in the warranty period

Since it may change without a notice, please give beforehand the specification indicated to a catalog, an instructions manual, or technical data every knowledge.

3. Repair after stopping production

Even if production of the same model is stopped, we will repair your product for 7 years from the date of production stoppage.

However, the parts manufactured by casting and mold have a case where allowed to consider it as the alternative parts which have the same function.

The product supply after production stoppage cannot respond including spare parts.

4. Change of Product specifications

Specifications listed in our catalogs, manuals or technical documents may be changed without notice.

5. Application and use of the Product

(1) For the use of the product, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in the product, and a backup or fail-safe function should operate on an external system to the product when any failure or malfunction occurs.

(2)The product is designed and manufactured as a general purpose product for use at general industries. Therefore, applications substantially influential on the public interest for such as atomic power plants and other power plants of electric power companies, and also which require a special quality assurance system, including applications for railway companies and government or public offices are not recommended, and we assume no responsibility for any failure caused by these applications when used. In addition, applications which may be substantially influential to human lives or properties for such as airlines, medical treatments, railway service, incineration and fuel systems, man-operated material handling equipment, entertainment machines, safety machines, etc. are not recommended, and we assume no responsibility for any failure caused by these applications when used. We will review the acceptability of the abovementioned applications, if you agree not to require a specific quality for a specific application. Please contact us for consultation.

16. Labeling (product name) based on the Marking for the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment: Geared Motor

(1) Marking for the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment

This mark indicates the environmental protection use period based on the Administrative Measure on the Restricted Use of Hazardous Substances in Electrical and Electronic Equipment applied to electrical and electronic equipment sold in China. To the extent that this product is used under the instructions on safety and usage, it will not cause any serious impact on the environment, human health, and properties for the indicated number of years from the manufacturing date.

Note:

When disposing of the product after proper use, follow local laws and regulations stipulating how to collect and recycle electrical and electronic devices.

Note: This symbol mark is for China only.

(2) Six hazardous substances, names of parts containing the substances, and the contents

The table below lists the six hazardous substances contained in this equipment, names of parts containing these substances, and the contents.

Names of hazardous substances contained in the equipment and the contents

Part Name	Hazardous Substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent chromium (Cr (VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
Structural parts	×	○	○	○	○	○
Stator	○	○	○	○	○	○
Rotor	○	○	○	○	○	○
Brake	×	○	○	○	○	○
Detector	×	○	○	○	○	○

This table is prepared in accordance with the provisions of SJ/T 11364.

○: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.

×: Indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.

(1) 电器电子产品有害物质限制使用标识

根据《电器电子产品有害物质限制使用管理办法》,该标记适用于在中国销售的电器电子产品,其中的数字为产品的环保使用期限。只要遵守本产品在安全和使用方面的注意事项,在自生产日期算起的该年限内,将不会污染环境,也不会给人身和财产带来严重的影响。

(注) 产品正常使用终结废弃时,有关电子电气产品的回收、再利用等要遵守各自治体的法律法规的要求。

Note: This symbol mark is for China only.

(2) 所含有的6种有害物质的名称,含有量,含有部品

本产品中所含有的6种有害物质的名称,含有量,含有部品如下表所示。

产品中有害物质的名称及含量

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
构造部件	×	○	○	○	○	○
转子	○	○	○	○	○	○
定子	○	○	○	○	○	○
制动器	×	○	○	○	○	○
检测器	×	○	○	○	○	○

本表格依据SJ/T11364的规定编制。

○: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。

×: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/T26572规定的限量要求。

MEMO

Inspection Certificate

Thank you for selecting a Mitsubishi geared motor.
This is to certify that your geared motor has been accepted by the specified inspection in our factory.

This document was issued in July 2022.

MITSUBISHI ELECTRIC FA INDUSTRIAL PRODUCTS CORPORATION

IB-2230M