MITSUBISHI ELECTRIC

MITSUBISHI PREMIUM GEARED MOTOR

MODEL
GM-LJP
INSTRUCTION MANUAL

■Read this instruction manual carefully and use the product properly. Especially be sure to read “SAFETY PRECAUTIONS” before operation.

■After reading, store this manual in an appropriate place so that everyone can read this 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.

In this instruction manual, each safety precaution is categorized as ether "DANGER" or "CAUTION"

⚠ DANGER — When a dangerous situation may occur from improper use leading to fatal or major injuries.

⚠ CAUTION — When a dangerous situation may occur from improper use leading to moderate or minor injuries or physical damage.

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

⚠ DANGER

General

- Before starting use of the geared motor always read this manual and the nameplate(s).

Operation conditions and ambient conditions

- Do not place any objects flammable near the geared motor. Failure to observe this warning may cause a fire or an explosion. If you have to place an organic solvent or explosive powder near the geared motor for some reason, use an explosion-proof geared motor.
- Do not use the geared motor for an 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 install a safety device to prevent the elevator from an accidental fall. Failure to observe this warning may cause physical injury and damage to the equipment.
- For use outdoors, please use an outdoor model. If you use an indoor model outdoors, rainwater can seep into the geared motor, which can cause leakage or poor lubrication. Also, for use in rain with strong wind, please put a cover on the geared motor or use a waterproof model.

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 electrical equipment or interior wiring code as instructed by the corresponding electric power company.
- Install an optimum motor protector on each motor. Without a protector, the motor may catch a fire when there is a problem.
- Be sure to supply the specified voltage to the geared motor. If the voltage is too high, a fire may occur.
- Always follow the connection drawing located 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. 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.
- Never go near or touch the rotating parts (shaft, etc) during operation. Failure to observe this could lead to entanglement or injury.
- Operate only under the specified rotation speed as described in Outline drawings, Specifications, or Catalogue. Otherwise, the geared motor may explode or suffer severe damage.

⚠ CAUTION

General

●When lifting the geared motor equipped with eyebolts or eyeplates, be sure to use the eyebolts or eyeplates to lift and transfer.

Operation conditions and ambient conditions

● If the surrounding equipment must avoid oil or grease, supply the geared motor with protective devices, such as an oil pan, in order to protect them from oil leakage caused by failure of the geared motor or from lifting the geared motor.

●Safe guards should be furnished around the rotating parts of the geared motor to avoid danger to personnel.

●Do not place any object which may interfere with ventilation around the geared motor. Failure to observe this warning may prevent cooling, which may cause burns, injury and/or fire.

●When replacing a previous geared motor model, since the starting current may increase, please reconsider the design of the wiring. Also, since the rotation speed may be faster and the power consumption may increase, please consider the necessity of countermeasures such as setting the rotational speed of the load machine to the same as the previous one by changing the sprocket ratio or the output frequency of the inverter.

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 excessively, 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.

Maintenance and modification

●The manufacturer will not honor a warranty and will not be responsible for any product modified or repaired by the user himself.

●Be sure to turn off the power before inspecting or repairing the motor.

●Geared motor will become quite hot during operation. Take care not to touch the geared motor with your hands or body. Failure to observe this could lead to burns, etc.

Disposal

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

Contents

1. Receiving

(1) Check the nameplate on the unit to ensure the unit matches the specifications of your order.
(2) When unpacking, check thoroughly to see if the unit suffered any damage during transportation.
(3) Check if any screws or bolts are loose.

2. Operation conditions and ambient conditions

(1) Do not place any objects flammable near the geared motor. Failure to observe this warning may cause a fire or an explosion. If you have to place an organic solvent or explosive powder near the geared motor for some reason, use an explosion-proof geared motor.
(2) Do not use the geared motor for an elevator for human transport. Use of a geared motor for such a purpose is prohibited by the Building Standard Law of Japan.
(3) If the equipment is to be used with an elevator, be sure to install a safety device to prevent the elevator from an accidental fall. Failure to observe this warning may cause physical injury and damage to the equipment.
(4) If the output shaft rotates at a higher speed than the rating rotation speed, install a safety device on the load machine so that the output shaft is not rotated at a higher speed than the rating rotation speed.
(5) For use outdoors, use an outdoor model. If you use an indoor model outdoors, rainwater can seep into the geared motor, which can cause leakage or poor lubrication. Also, for use in rain with strong wind, put a cover on the geared motor or use a waterproof model.
(6) When replacing a previous geared motor model, since the starting current may increase, reconsider the design of the wiring. Also, since the rotation speed may be faster and the power consumption may increase, consider the necessity of countermeasures such as setting the rotational speed of the load machine to the same as the previous one by changing the sprocket ratio or the output frequency of the inverter.

3. Storing

When it is necessary to store the unit for any length of time before installation, take care of the following.

3-1 Temporary storage

(1) Store in a location with these conditions: clean and dry, ambient temperature -15～+40℃, humidity below 90% and no possibility of freezing.
(2) When the unit is stored in an outdoor or area with high humidity , cover with a sheet.

3-2 Long term storage

Besides 3-1, take care of the following.

(1) Monthly, operate with no load for several minutes, and measure the insulation resistance of the motor.
(2) Periodically, check for rust on the surface of the unit. If any rust is found, spray the unit with a rust preventive spray.
(3) Before operating the unit measure the insulation resistance of the motor. Then confirm no noise comes from the unit while operating with no load

4. Guidelines for replacing a previous geared motor model

When replacing a previous geared motor model, please note the following:

(1) Except for ones with a reduction ratio of 1/10 and 11kW, 22kW and 30kW, all models are compatible with the previous mount, however the total length is longer. During installation, check for interference from surrounding devices.

(2) Reconsider the design of the wiring equipment of the breakers and etc since the starting current may increase.
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 the previous one by changing the sprocket ratio or the output frequency of the inverter.

(3) Reconsider the acceptable number of starts per hour and the acceptable number of starts per lifetime, since the moment of inertia may increase.

(4) When using non-brake geared motors, the period of free-run may be longer. Also, when considering brake-in geared motors, especially one using the simultaneous braking method, the brake motion delay period may be longer. Therefore if necessary, adopt the separated braking method or the direct current (quick) braking method.

5. Lubrication

(1) All GM-LJP series geared motors are oil lubricated models. They are shipped without oil.
Units must be filled with recommended oil prior to start-up referring to Table 1.

Table 1 Recommended lubricating oil (JIS K2219 Class 2)

Manufacturer	Ambient Temp	-15～0℃	0～40℃
	JIS K2219	Class2 ISO VG150	Class 2 ISO VG220
JXTG Nippon Oil & Energy Corporation		Bonnock ®TS 150	Bonnock ®TS 220

※ The above oil name is a registered trademark of the JXTG Nippon Oil & Energy Corporation.
※ Other brands of gear oil equivalent to Class 2 gear oil for industrial use (specified in JIS K2219) can be used, but the oil could foam when agitated by the gears during operation and leak from the air breather. Always check the gear oil before using.
※If the ambient temperature is out of specified range (see the above table), please contact us.

(2) The quantity of oil varies depending on the mount direction. Check the oil quantity referring to Table 2.
Note that the geared motor should not be mounted vertically with the motor part on the upper side.

Table 2 Approximate Quantity of Lubricant (Oil: L)

Reduction Ratio		1/3, 1/5	1/10	1/15	1/20	1/30	1/45	1/60
Output (KW)	11	1.5	2.5(10)	2.5(10)	2.5(10)	5(12.5)	6.7(15.5)	10(21)
	15	2.5	2.5(10)	5(12.5)	5(12.5)	6.7(15.5)	10(21)	—
	22	3.8	6.7(15.5)	6.7(15.5)	6.7(15.5)	10(21)	10(21)	—
	30	—	10(21)	10(21)	10(21)	10(21)	—	—
	37	—	10(21)	10(21)	10(21)	10(21)	—	—

※ The values in parenthesis are for the vertical models.
※ The values shown above are approximate ones. Fill oil to the middle of the oil level gauge.

6. Installation

(1) When lifting the geared motor equipped with eyebolts or eyeplates, be sure to use the eyebolts or eyeplates to lift and transfer.

(2) If the surrounding equipment must avoid oil or grease, supply the geared motor with protective devices, such as oil pan, in order to protect them from oil leakage caused by failure of the geared motor or from lifting the geared motor.

(3) Safe guards should be furnished around the rotating parts of the geared motor to avoid danger to personnel.

(4) Install in a location with these conditions: clean and dry, ambient temperature -15～+40℃, humidity below 80% and no possibility of freezing.

(5) Install on a foundation that has high thermal conductivity and enough rigidity with bolts of Bolt Strength Class higher than 8.8. The flatness degree of the mounting surface should be equal to or less than 0.2mm

(6) For horizontal models, there are limits for mounting positions as showed in Table 3 and Fig. 1.

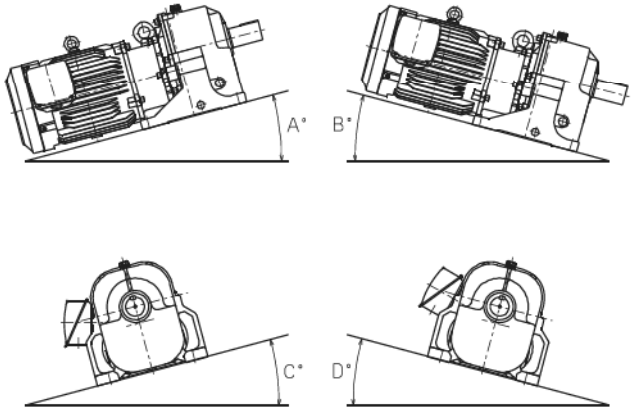


Fig. 1 Limits of angularity

Table 3 Limits of angularity

Gear Size	Limits of angularity (°)			
	A°	B°	C°	D°
SM, SN, SP	30	6	5	5
L	13	17	17	17
M	4	7	5	5
N, TN	4	7	7	7
P, TP	5	6	7	7

7. Coupling with the driven equipment

(1) To properly connect the geared motor to the machine, reduce the eccentricity between the motor and the machine to 0.05 mm or less. Use a flexible coupling to easily connect the motor to the machine (refer to Fig.2).

(2) Adjust the deflection amount of the chain to 4% of the span (refer to Fig.3). If the deflection amount is too large, a considerable shock may occur when starting, and the geared motor may be damaged by the shock.

(3) To prevent damage caused by 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.4).

(4) The tolerance for the holes of the sprocket, coupling, etc. should be H8. Carefully install the sprocket, coupling etc. using the tap on the output shaft (refer to Fig.5)

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

(6) To use a slide rail, install stretch bolts across the motor in the opposite direction of the external force. (Refer to Fig. 6)

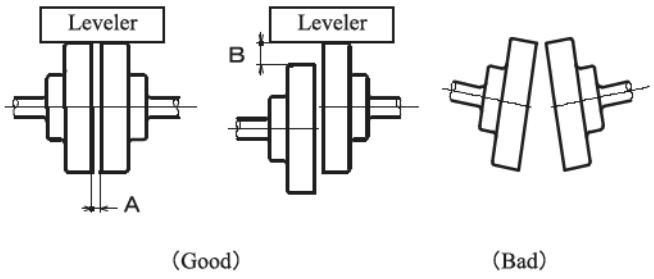


Fig. 2 Aligning the Couplings

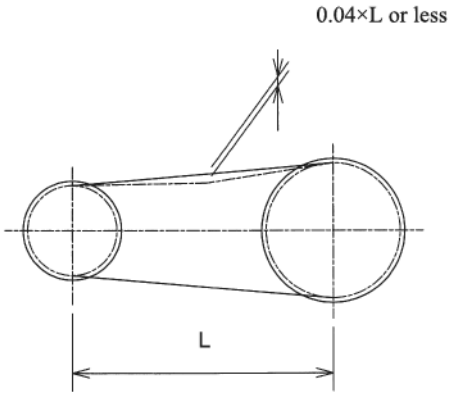


Fig. 3 Deflection amount of chain

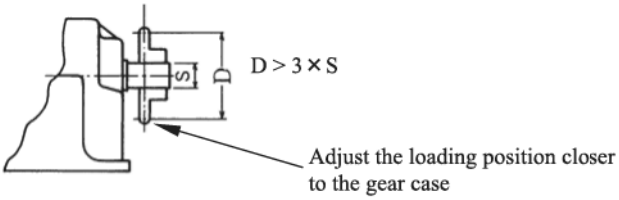


Fig. 4 Sprocket mounting position

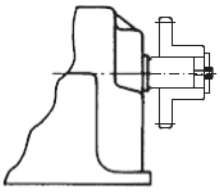


Fig. 5 Sprocket installation

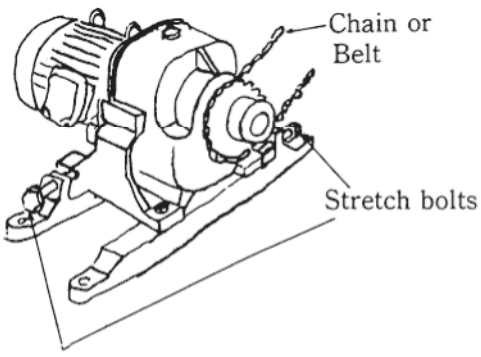


Fig. 6 Slide Rail

8. Wiring

(1) 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.

(2) To wire the geared motor, use high-quality wiring parts, and be sure to observe the technical standards for electrical equipment or interior wiring code as instructed by the corresponding electric power company. The outline is shown in Table 4. If the wiring distance is long, note that the voltage drop will be larger.

(3) Install an optimum motor protector on each motor. Without a protector, the motor may catch a fire when there is a problem.

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

(5) When replacing a previous geared motor model, reconsider the design of the wiring equipment of the breakers and etc since the starting current may increase.

Table 4 Motor Wiring (3-phase induction motor) ※ Ref. Indoor wiring regulations 3705

Output (kW)	Minimum wire thickness (mm^2) (See Note 1)		Maximum wire line length (m) (See Note 2)		Overcurrent breaker (A)(Note 3)				Over scale ammeter (A)		Minimum grounding wire thickness (mm^2)	
					Full-voltage starting		Use starters (Star-delta starting)					
	200V	400V	200V	400V	200V	400V	200V	400V	200V	400V	200V	400V
11	14	5.5	37	57	125	75	75	40	60	30	8	5.5
15	22	8	43	65	125	100	100	50	60	30	8	5.5
22	38	22	51	124	150	125	125	75	100	60	8	8
30	60	22	62	92	200	125	175	100	150	60	14	8
37	100	38	86	126	250	125	225	125	200	100	22	8

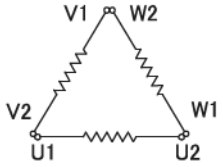
Note 1: The "minimum wire thickness" is for when three wires are placed in a conduit (full-voltage starting).

Note 2: Maximum wire line length is a measure of when the voltage drop is 2% or less.

Note 3: Overcurrent breaker is for power distribution. For the motor breaker used for motor protection, select the one that conforms to the motor rated output.

9. Wiring and Output shaft Rotational Direction

(1) To rotate the 3-phase motor in the opposite direction, switch the wires between two connected terminals (2 of 3wires; R, S, and T).

<table>
<tr><th>Output (kW)</th><th>Connection diagram</th><th>Terminal connection</th><th>Starting method</th><th colspan="2">Wire connection method</th></tr>
<tr><td rowspan="2">11～37</td><td rowspan="2"> 
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 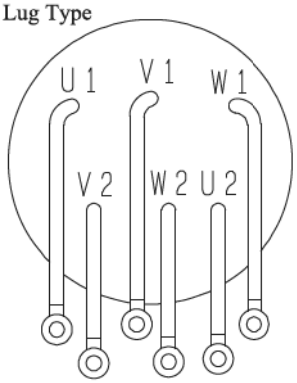
</td><td>Full-voltage starting</td><td colspan="2"> 
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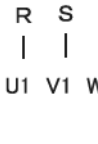
<tr><td>Y-Δ starting</td><td>Starting (Y connection)
 
</td><td>Driving (Δconnection)
 
</td></tr>
</table>

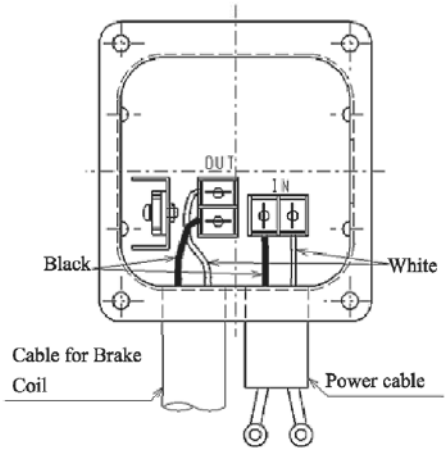
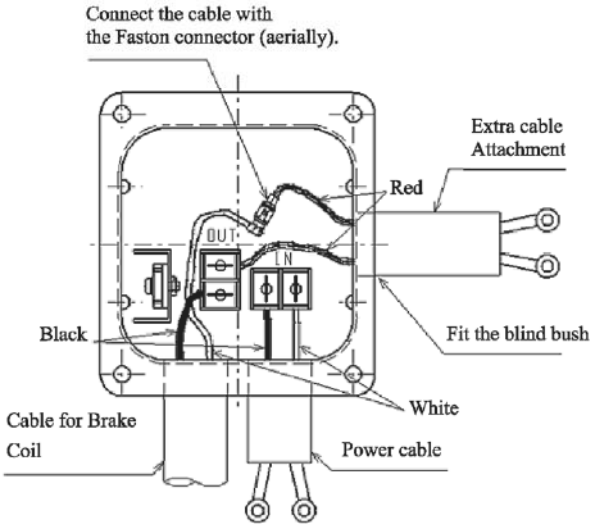
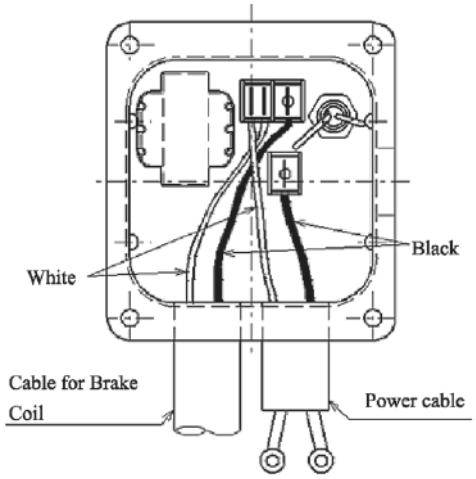
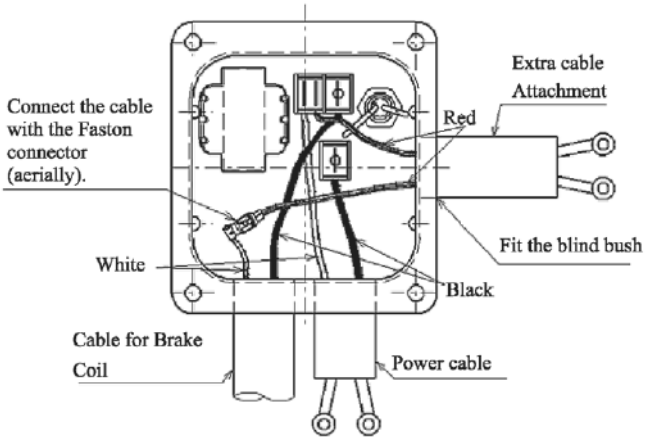
(2) Rotational direction for each gear ratio

Output (kW)	Gear ratio	Number of stages of gear unit	Rotation direction (viewed from output shaft end)
11	1/3, 1/5	1	Clockwise
	1/10～1/30	2	CounterClockwise
	1/45, 1/60	3	Clockwise
15	1/3, 1/5	1	Clockwise
	1/10～1/30	2	CounterClockwise
	1/45, 1/60	3	Clockwise
22	1/3, 1/5	1	Clockwise
	1/10～1/45	2	CounterClockwise
30	1/10～1/30	2	CounterClockwise
37	1/10～1/30	2	CounterClockwise

10. Brake Wiring (11kW～22kW)

(1) For wiring between the brake coil and the power supply unit, refer to Table 5 and Table 6.

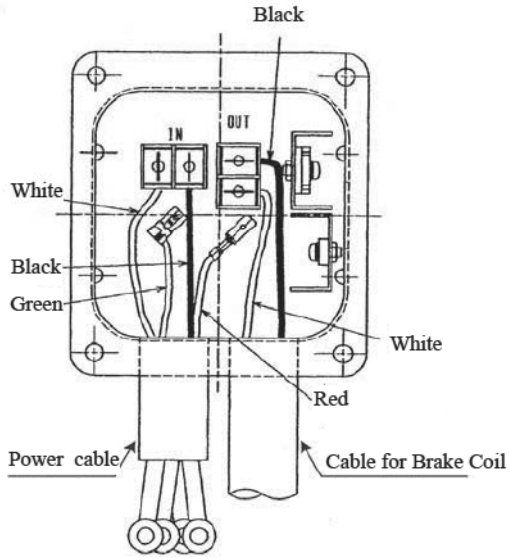
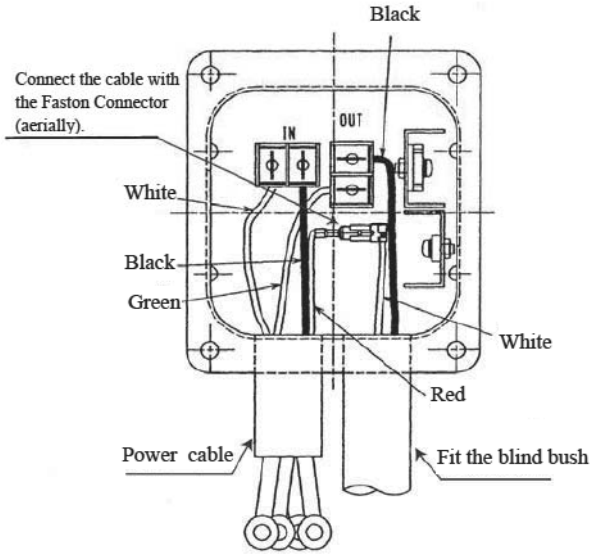
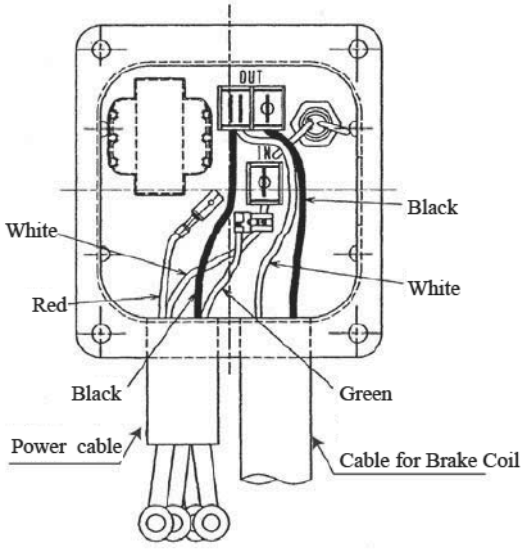
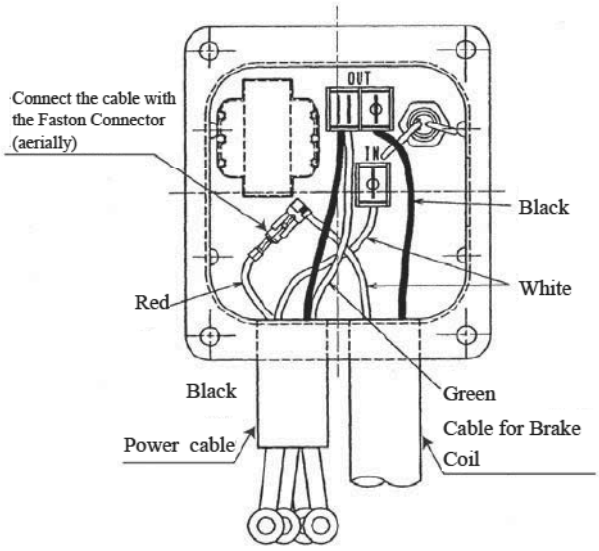
Table 5 Brake Wiring (Indoor)

	Factory shipment	Direct current (quick) braking method
200V		
400V		

※ The white and black lines can be connected to any phases (in case of 200V only).

※ IN represents the power side, and OUT represents the motor side.

Table 6 Brake Wiring (Outdoor)

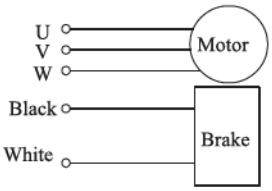
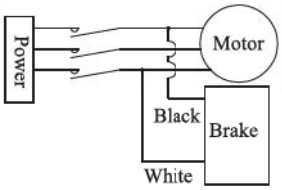
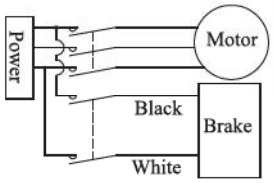
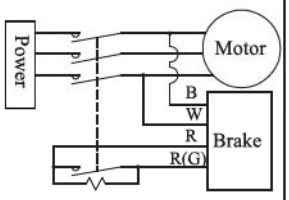
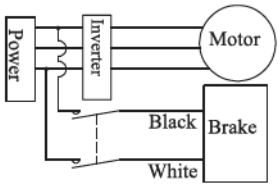
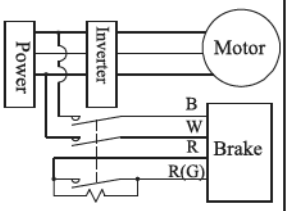
	Factory shipment	Direct current (quick) braking method
200 V		
400V		

※For the Simultaneous braking method or the Direct separated braking method, remove the red lead and the green lead since they are not needed.

※The white and black lines may be connected to any phases (in the case of 200V only).

※IN represents the power side, and OUT represents the motor side.

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

Motor Input	Motor Output	At Shipment		Simultaneous braking method	Separated braking method	Direct current(quick) braking method
3 Phases	11 ∫ 22 kW		circuit			 B: Black W: White R: Red G: Green (Outdoor type)
			Motion Delay time	1.2～2.0 seconds※	0.1～0.3 seconds	0.01～0.03 seconds
Inverter Drive		Note There are 6 leads wires; (U1,V1,W1,U2,V2,W2) Carefully connect the wires	circuit			 B: Black W: White R: Red G: Green (Outdoor type)
			Motion Delay time		0.1～0.3 seconds	0.01～0.03 seconds

※ With the Simultaneous braking method, the brake motion delay period may be longer. Therefore if necessary, adopt the Separated braking method or the Direct current (quick) braking method.

11. Brake Structure (11kW～22kW)

(1) Structure and operation

The brake is composed of a DC electromagnet with a disk type brake plate, that not only rapidly stops the revolution of the motor but also prevents the motor from reverse revolution.

When the switch is turned ON, the current will flow in the brake coil to draw the movable core toward the fixed core. The brake spring will be compressed to release the brake plate from the pressure of the spring. Then, the brake is released, allowing the motor shaft to rotate.

When the switch is turned OFF, the drawing force of the brake coil is released, and the movable core is pressed with the pressure from the brake spring. Thus, the motor shaft will decelerate due to the friction between the movable core and the brake lining.

For the structure, refer to the drawing in Fig. 7.

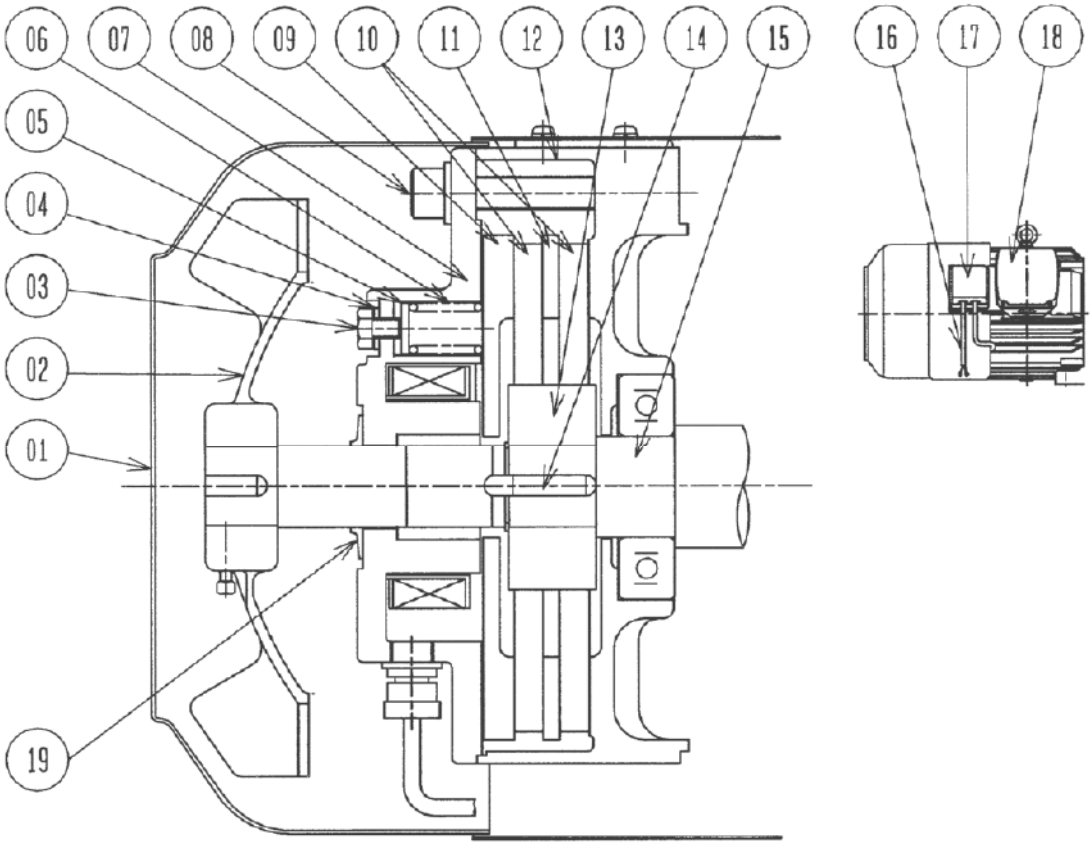


Fig. 7 Brake Structure

Item	Description	Item	Description	Item	Description
1	Fan Cover	8	Hex. socket head bolt	15	Motor shaft
2	Fan	9	Movable Core	16	Brake lead
3	Brake torque adjusting bolt	10	Brake lining	17	Power Supply
4	Spacer	11	Friction plate	18	Terminal Box
5	Washer	12	Brake box	19	Flinger (Outdoor)
6	Brake spring	13	Brake hub		
7	Fixed Core	14	Key		

(2)Brake specifications

Brake Model	Output	Number of poles	Power Supply Voltage (V)	Brake voltage (V)	Brake current (A)	Brake Torque (Nm)※2	Lining thickness (mm per each)	Brake coil resistance (Ω at 20℃)
LB-15LP	11kW	4	AC200 / AC400	APROX DC180/32 ※1	3.5/0.7	143	14.5	43.2
	15kW							
LB-22LP	22kW					210		

※1 Since this brake is the over-excitation type, both the over-excitation voltage and normal excitation voltage are shown in the table.
※2 The brake torque values shown in the above table are the static friction torque values. The dynamic friction torque values will be approximately 80% of the static friction torque values
※3 During the first operation or after replacing the brake lining, the brake 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) Brake torque adjustment

The brake torque can be adjusted by the spacers used with the brake torque adjusting bolts as shown in the structure drawing Fig. 3.
Table 7 shows the relationship between the brake torque and the number of spacers. Select the suitable number of spacers according to the required brake torque.
The brake torque can be adjusted up to 80% by the provided spacers.

Table 7 Relationship between Brake Torque and Number of Spacers

Brake model	Output	Relationship between Brake Torque and Number of Spacers(50Hz)					
		At shipment		After adding spacers			
		Number of spacers	Brake torque	Total number of spacers	Brake torque	Total number of spacers	Brake torque
LB-15LP	11kW	1	204%	2	Approx 136%	3	Approx 109%
	15kW	1	150%	2	Approx 100%	3	Approx 80%
LB-22LP	22kW	0	150%	1	Approx 100%	2	Approx 80%

※For releasing the brake, just remove all the brake torque adjusting bolts and then the brake is released.

(4) Maintenance and Inspection

Be sure to maintain and inspect the brake of the geared motor since the brake is especially important.

3-month inspection

※Monthly in case of frequent operation; 200 times/ hr or more.

	Inspection item	Description
1	Bolts, etc. for looseness	Fixed core fastening area
2	Fan for looseness	Coupled state between shaft and fan

Yearly inspection

※6 months in case of frequent operation; 200 times/hr or more.

	Inspection item	Description
1	Thickness of brake plate	Replace if the total wear of the two plate (stepped area) is 2 mm or more.
2	Brake hub and brake spring for rust and damage	Derust or replace if excessively rusted.
3	Brake box inside for water entering mark	Replace the brake plate if any water entering mark is observed.
4	Suction surface for rust and damage	Derust or replace if the movable or fixed core is rusted.

Following the replacement of the brake plate(s) alone, the specified torque may not be achieved. In this case, fit the friction surfaces of the brake by applying the brake several times with a light load.

12. Operation

●While a load is lifted, do not release the brake. The load may be dropped.

●During inverter operation, be sure to observe the frequency range specified in the catalogue. If the frequency is out of the specified range, the motor may be damaged.

Before Operation

(1) Check the bolt tightening condition at each section.

Check that 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.

(3) Check the lubricant

Check that the designated oil is filled to the indicated level.

Trial Operation

(1) Check the rotational direction

Check if the output shaft rotates in the proper direction. If it rotates in the wrong direction, change the wiring.

In the case that the wrong directional rotation may damage the driven machine, be sure to check this without coupling to the driven machine.

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 excessively, 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.

1. Check for vibration and abnormal noise.
   Check if there is an abnormal vibration or noise.
2. Check the current
   Confirm that the maximum load current is below the value of the current described in the nameplate.
3. Check to ensure that there is no leakage.

Other

(1) At the start, apply a light load. When the motor reaches full speed, apply the specified load.

(2) To stop operation, be sure to turn off the power switch.

13. Maintenance and Inspection

●Do not modify the geared motor.

●Be sure to turn off the power before inspecting or repairing the motor.

(1) Daily Inspection

Item	Method	Detail of inspection
Load Current	Ammeter	Within the rated current specified on the nameplate.
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 20℃ to 30℃.
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 loose or too tight. Also check that the chain moves smoothly.

(2) Periodic Inspection

Periodically inspect the motor and replace the damaged parts by referring to the table below (In case of operating 8 hours a day)

Item	Interval	Detail of inspection
Oil	1st replacement: After 250 hours of operation 2nd and subsequent replacements: Every 2,000 hours of operation	At first, change the oil after 250 hours of operation. After that, change the oil every 2,000 hours of operation. ※For the recommended oil, refer to Page 4.
Oil seal	Every 8,000 hours (About 3 years)	Every 8,000 hours of operation or if the lubricant leaks from the seal, replace the oil seal.
Chain tension	Every 6 months	If the chain is loose, readjust the tension.
Looseness of Bolts	Every 6 months	If the bolts are loose, retighten the bolts.
Bearing	Every 8,000 hours (About 3 years)	Every 8,000 hours of operation or if a bearing generates an abnormal noise, replace the bearing.
Insulation resistance	Every 6 months	Check the insulation resistance using a 500V megger. The insulation resistance should be 1MΩ or more. If the resistance is less than 1MΩ, dry the coil at 90℃or less in an oven
O-ring Change	Every 1 year	When disassembling, replace the O-rings.

Note: For some models, a sealant is applied to the tip of each motor clamping through bolt. After disassembly, be sure to replace the through bolts with new ones, or apply liquid packing (Three Bond ®1104D) to the tip of each through bolt before tightening the bolts.

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

(3) Others

When oil oozes from the seam of the motor, if it does not spread, the motor can be used as is because it poses no problem to performance. When oil poses a problem, wipe off the oil before using the geared motor. This oil is a grease ingredient applied in a very small quantity at the time of assembly in the factory.

14. Disassembly and Reassembly（Refer to Construction drawings）

14. 1 Before disassembly, prepare the necessary parts, such as the oil seal, bearings, and packing G.

14. 2 Draining Oil

If the geared motor is the oil lubrication model, remove the plug from the oil drain port to drain the oil first, and then disassemble the geared motor

14. 3 Handling oil seal

The oil seal is an important component of the geared motor because it can prevent oil leak. When you disassemble and reassemble the geared motor, carefully handle the oil seal while observing the following items

(1) To reinsert the oil seal, use an insertion tool. As shown in Fig. 8, attach the disc to the oil seal, and then push the oil seal with the insertion tool or pipe to insert the seal into the hole.

(2) Observe the oil seal insertion direction shown in Fig. 9. If the oil seal is inserted in the opposite direction, it may cause oil leak.

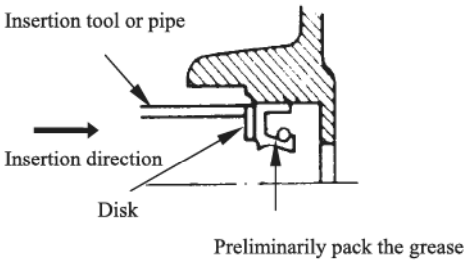


Fig. 8 Oil seal insertion Method

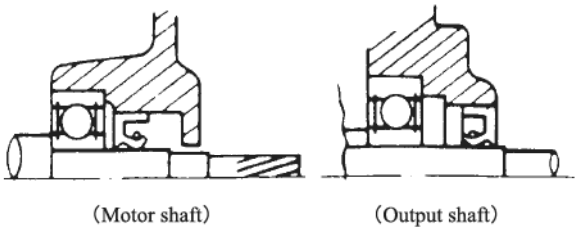


Fig. 9 Oil seal insertion Method

(3) Lip of Oil seal

Carefully insert the oil seal. Do not damage or peel the lip of the oil seal during insertion.

(4) Oil seal sliding surface

To ensure smooth sliding, the oil seal sliding surface on the corresponding shaft is polished. Do not damage the sliding surface when you insert the oil seal.

(5) Oil resistance of oil seal

The oil seal is resistant to grease, but not resistant to gasoline, light oil, or kerosene. Do not use these types of oil. To clean the gears, bearings, etc. using gasoline or light oil, be careful not to clean the oil seal. If you clean the oil seal using gasoline by mistake, completely wipe the gasoline off the oil seal, and then dry the oil seal.

14. 4 Fitting O-rings

During disassembly replace the O-rings with new ones. During assembly, when fitting an O-ring, be careful not to let it get jammed by the surrounding components.

14. 5 Fitting ball bearing

To fit the grease sealed ball bearing to the shaft, tap the bearing via a shock absorber, or preliminarily heat the bearing to approximately 70℃ using dry hot air or an induction heater.

14. 6 D-Bearing and E-Bearing

For D-Bearing（the bearing on the output shaft at the motor side） and E-Bearing (the bearing on the output shaft at the load side), use class 2 No.2 grease designed for ball bearings or another equivalent grease.

14. 7 Bearing LS（D-Bearing）

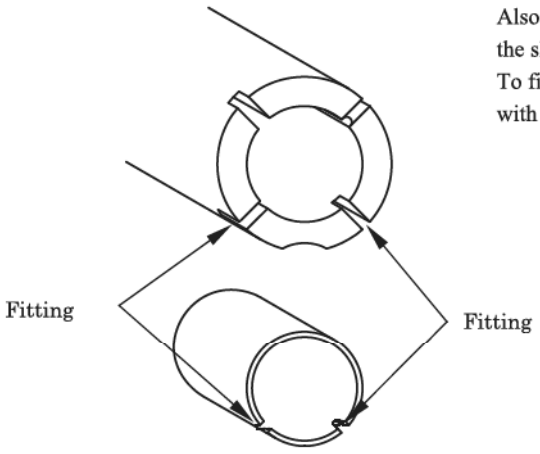


Fig. 10 Fitting bearing LS

Also apply the grease mentioned above to the sliding surface of bearing LS.
To fit bearing LS, align the notches with each other as shown in Fig.10

Table 8 Bolt Tightening Torque

Screw size	Torque(Nm)
M4	2.2
M5	4.2
M6	7.2
M8	17.2
M10	34.3
M12	60.0
M16	143.1
M20	280.3
M24	471.4

14. 8 G Packing

Replace G packing with a new one. To use the old G packing for some reason, be sure to apply liquid packing (Three Bond ®1104D) to the mating surfaces.

14. 9 Tightening bolts

For some models, a sealant is applied to the tip of each motor clamping through bolt. After disassembly, be sure to replace the through bolts with new ones, or apply liquid packing (Three Bond ®1104D) to tip of each through bolt before tightening the bolts.

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

14. 10 Lubrication

Before starting operation, be sure to fill the lubricant.

15. Troubleshooting

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

Problem	Cause	Solution
Oil leak from through hole of output shaft	(1)Filled with too much oil (2)Damaged oil seal	(1)Reduce oil level to the normal height (2)Replace the oil seal
Oil leak from cast surface	(1)Blowholes or cracks on cast surface	(1)Replace the cast part.
Oil leak from mating face of gear case, bracket G, etc.	(1)Filled with too much oil (2)Loose clamp bolt (3)Distorted cast Part	(1)Reduce oil level to the normal height. (2)Tighten the clamp bolt. (3)Replace the cast part
Oil leak into motor	(1) Filled with too much oil (2)Damaged oil seal	(1)Reduce the oil level to the normal height. (2)Replace the oil seal. （If the oil leaks to the stator coil, send the motor for repair to the motor manufacturing factory.）
Abnormal noise from bearing	Dust or foreign material is caught in the bearing	Replace the bearing.
Abnormal noise from gear	(1) The gear caught foreign material (2) The gear is abraded due to overload.	(1) Replace the gear, (2) Reduce the load until the current is below the rated current value
Other problems	(1)Resonance occurs because the geared motor installation base is not rigid enough (2) The vibration of the driven machine is transferred to the geared motor. (3) The eccentricity between the driven machine and the geared 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 0.05mm or less.
Non-rotating output shaft	(1)Power source connection error (2)Damaged gear or shaft	(1)Check the power source (2)Check the load
Extreme rise of temperature	(1)Overload operation (2)The starting frequency is too high (3)The ambient temperature is 40℃ or above.	(1)Reduce the load until the current is below the rated current value (2)Lower the frequency. (3)Ventilate the room to lower the ambient temperature.
Abnormal noise from motor	(1)Foreign material (2)Damaged bearing (3)Brake torque adjustment error (4)Abraded brake lining (5)Burnt brake coil (6)Failure of the rectifier	(1)Remove the foreign material. (2)Replace the bearing (3)Adjust the brake torque. (4)Replace the brake lining. (5)Replace the entire brake unit (6)Replace the rectifier
Brake failure	(1)Foreign material (2)Abraded brake lining (3)Overload	(1)Remove the foreign material. (2)Replace the brake lining. (3)Reduce the load until the current is below the rated current value

16. 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 cases (ⅰ , ⅱ , ⅲ , ⅳ , ⅴ , ⅵ , ⅶ , ⅷ and ⅸ) , 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.

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

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

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

ⅳ)The problem is caused because periodical inspection is not performed.

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

ⅵ)The 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.

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

ⅷ)The 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.

ⅸ)Other cases where you are responsible for the problem.

<u>These services are applied only in Japan.The foreign country is unavailable.We appreciate your understanding.</u>

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.

17. List of Bearings and Oil seals

(1) Motor section

Table 9 Motor section

Frame Number	Output (kW)	Bearing			Oil seal
		F-Bearing		A-Bearing	
		Without brake	With brake		
160M	11	6310ZZ-EAM	6310DDU-EAM	6312ZZ-EAM	S50689
160L	15			6313ZZ-EAM	
180M	22	6312ZZ-EAM	6312DDU-EAM	6315ZZ-EAM	Ratio 1/3 : S7510013 / Else : S658812
180LD	22(6P)※		–	6316ZZ-EAM	S658812
	30				
200LD	37			6317ZZ-EAM	

※For 22kW (1/45), the motor with 6 poles is used.
(1)All the bearings are grease sealed ball bearings with EAM grease as lubricant.
(2)The bearing radial clearance for electric motor application is used.

(2) Reducer section: For the number of reduction stages, see Table 11 and 12.

Table10 Reducer section

Gear Size	Bearing						Oil seal
	B-Bearing	C-Bearing	D-Bearing	E-Bearing	X-Bearing	Y-Bearing	
SM	30209	30210	—	—	—	—	HTCY50689
SN	30210	32211	—	—	—	—	D55729
SP	30211	30212	—	—	—	—	D60829
L	6208ZZ-SRL	6309ZZ-SRL	Metal ※1	6314ZZSH2	—	—	D70928
M	30207	30208	32211	30215	—	—	D7510013
N	30209	30209	32213	30217	—	—	D8511013
P	30210	32210	32214	30219	—	—	D9512013
TN	30209	30209	32213	30217	32007	32007	D8511013
TP	30210	30210	32214	30219	32008	32008	D9512013

※ 1 Metal is one made specially for our products.
Note: Every vertical use model is fitted with 2 oil seals.

Table 11 Number of reduction stages and Reference Drawing (Horizontal models)

Speed (r/min)	50Hz	500	300	150	100	75	50	33	25
	60Hz	600	360	180	120	90	60	40	30
ratio		1/3	1/5	1/10	1/15	1/20	1/30	1/45	1/60
Output (kW)	11	SM	SM	L	L	L	M	TN	TP
	15	SN	SN	L	M	M	N	TP	-
	22	SP	SP	N	N	N	P	P	-
	30	-	-	P	P	P	P	-	-
	37	-	-	P	P	P	P	-	-

Number of stages	1 stage	2 stages	2 stages	3 stages
Reference Drawing	Fig. 13	Fig. 11	Fig. 12	Fig. 12 + Fig. 14

Table 12 Number of reduction stages and Reference Drawing (Vertical models)

Speed (r/min)	50Hz	500	300	150	100	75	50	33	25
	60Hz	600	360	180	120	90	60	40	30
ratio		1/3	1/5	1/10	1/15	1/20	1/30	1/45	1/60
Output (kW)	11	-	-	L	L	L	M	TN	TP
	15	-	-	L	M	M	N	TP	-
	22	-	-	N	N	N	P	P	-
	30	-	-	P	P	P	P	-	-
	37	-	-	P	P	P	P	-	-

Number of stages	2 stages	2 stages	3 stages
Reference Drawing	Fig. 15	Fig. 16	Fig. 14 + Fig. 15

18. Construction drawings

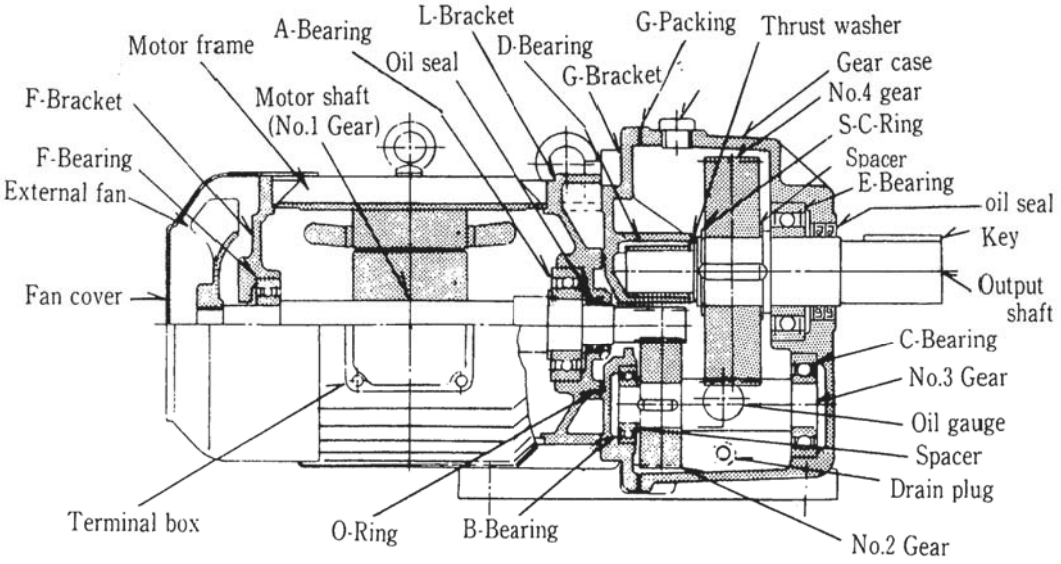


Fig. 11

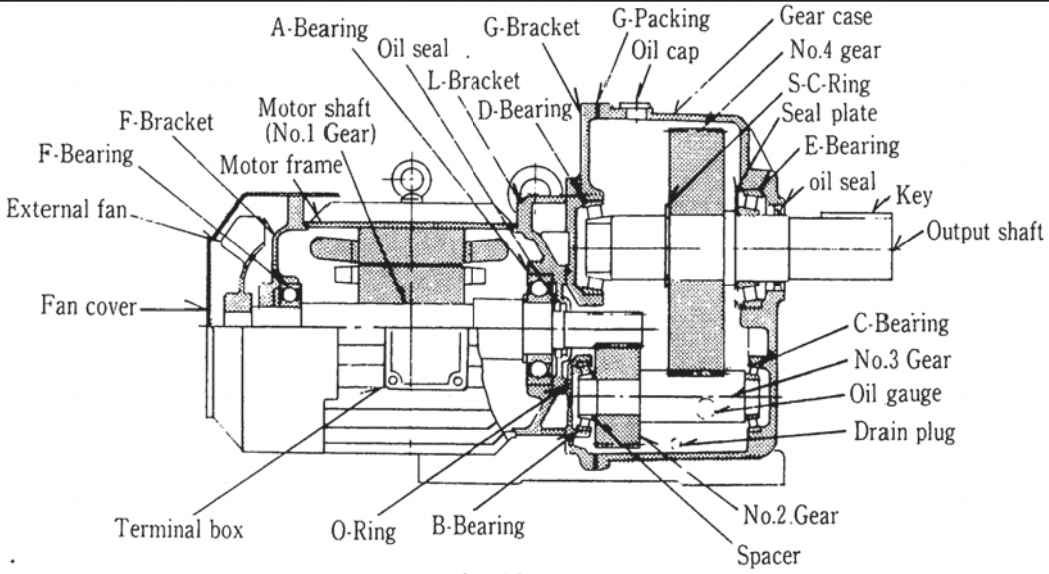


Fig. 12

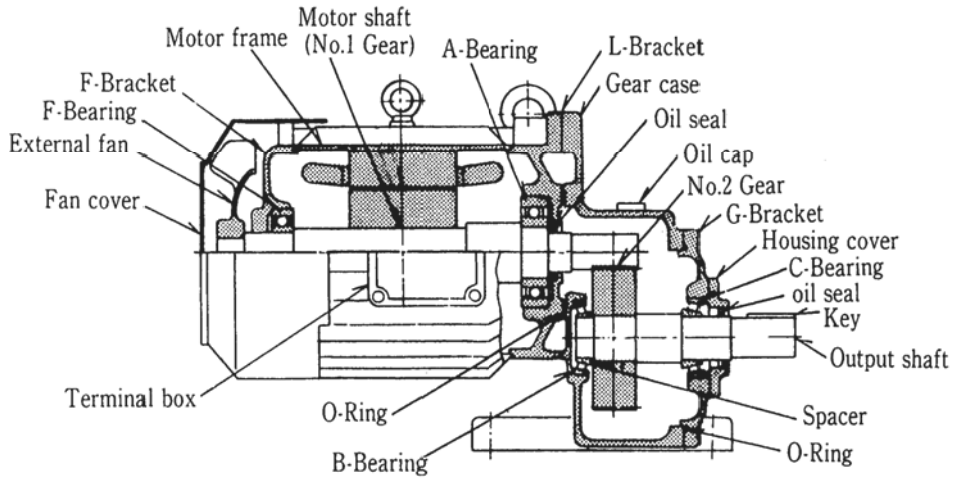


Fig. 13

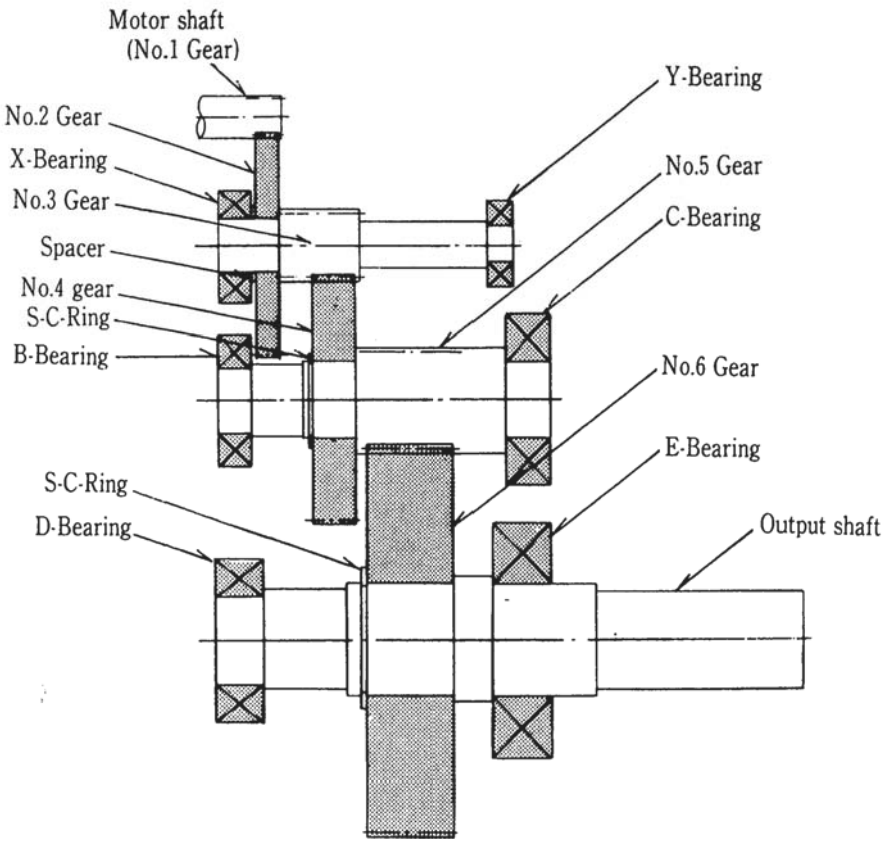


Fig. 14

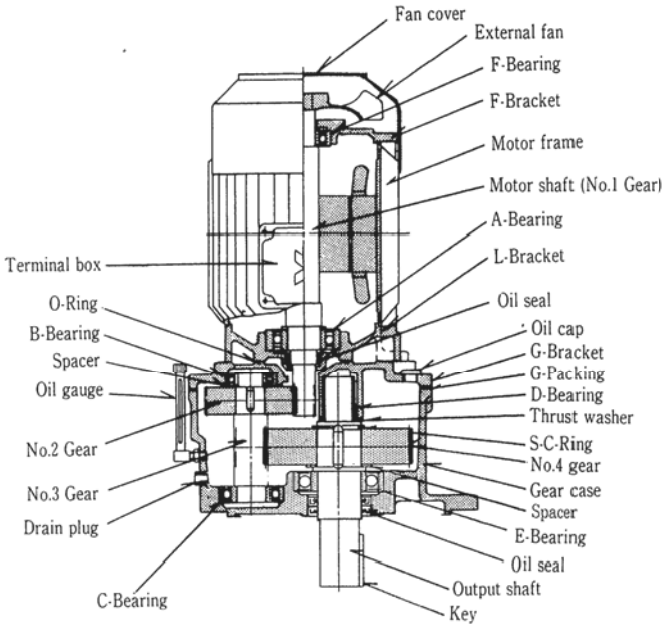


Fig. 15

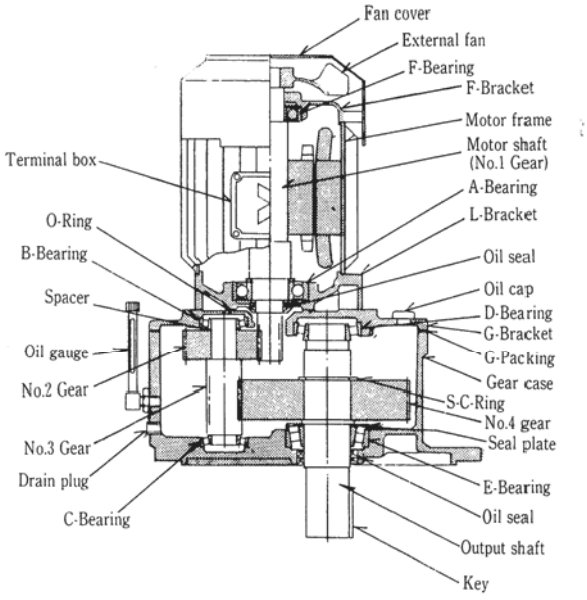
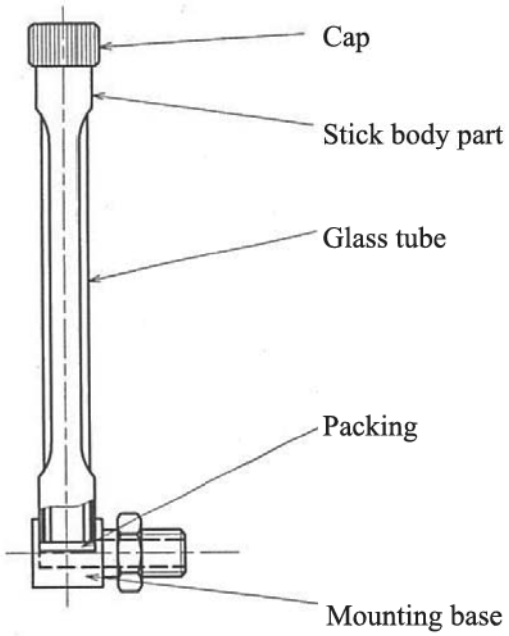


Fig. 16

19. Stick Shaped Oil Level Gauge

When installing the stick shaped oil level gauge on the reduction gear box, if some part of the gear box interferes with the stick part of the oil gauge making installation difficult, separate the stick body part from the mounting base as described below.

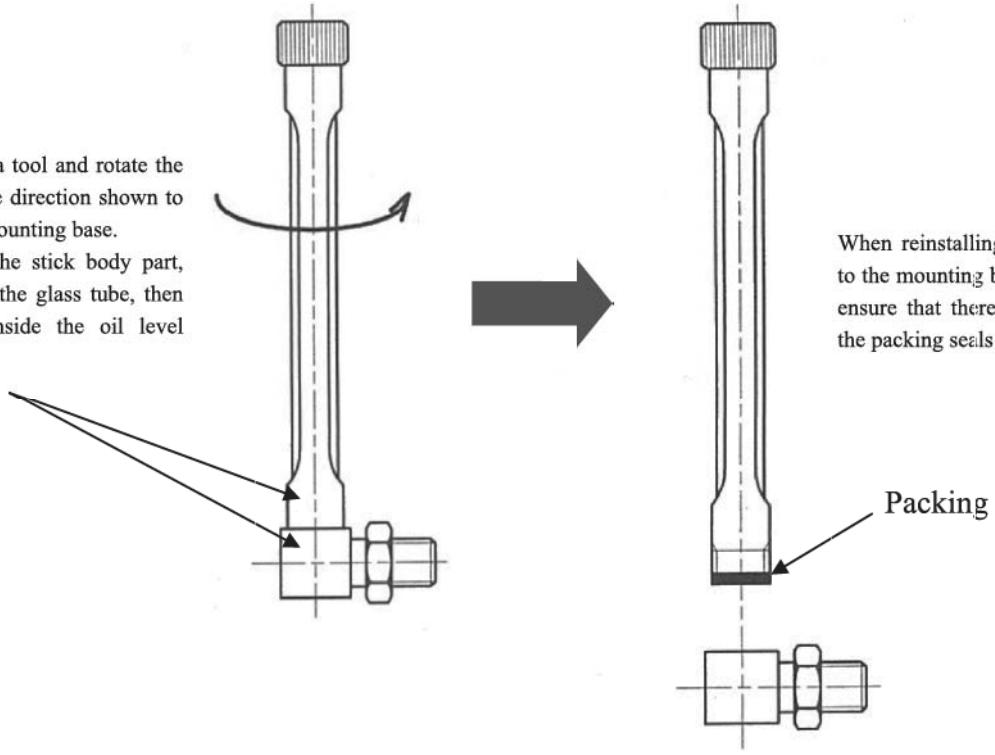
(1)Construction of stick shaped oil level gauge



(2)Disassembly

Grab this area with a tool and rotate the stick body part in the direction shown to remove it from the mounting base.

Before reinstalling the stick body part, remove the cap from the glass tube, then remove the liquid inside the oil level gauge.



When reinstalling the stick body part to the mounting base, do it in a way to ensure that there is no leakage while the packing seals the part.

20. 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。

Inspection Certificate

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

This document was issued in July 2022.
Note that product specifications may be subject to change without prior notice.

MITSUBISHI ELECTRIC FA INDUSTRIAL PRODUCTS CORPORATION

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