



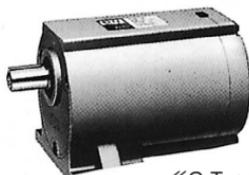
Small Size/ Small Water-resistant Gearmotor

15W ■ 25W ■ 40W ■ 60W ■ 90W

Instruction Manual



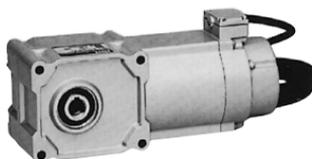
《F2 Series》



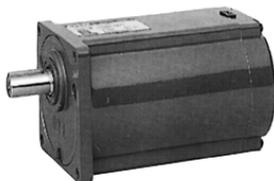
《G-Type》



《H-Type》



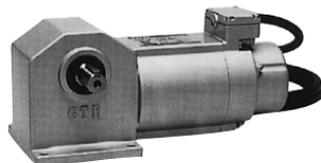
《F2 Series · Water-resistant》



《GT-Type》



《G-type · Water-resistant》



《H-Type · Water-resistant》

For Safe Operation

- The Gearmotor should be operated by a skilled and qualified person. And the contents of this Instruction Manual should be carefully read and understood before operating this product.
- This Instruction Manual should be delivered to a person who actually operates this product.
- This Instruction Manual should carefully be kept in a convenient place for the operator's easy reference.

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Thank you for your purchasing our product.

In this Manual, injuries and damages anticipated in case of mishandling of the equipment, are classified into two categories, "Danger" and "Caution". The definition of the classification are given below with the corresponding graphic symbols.

 Danger	The case that mishandling of the equipment may result in dangerous situation and may lead to serious or fatal injury to personnel.
 Caution	The case that mishandling of the equipment may result in dangerous situation and may lead to medium to light injury, or the case that may result in damage to the equipment.

Please be aware that even items marked with "CAUTION" may cause fatal accidents. Therefore, be sure to follow the instruction, for every item described is very important.

 Danger
<ul style="list-style-type: none">● Be sure to use an explosion-proof motor where any explosive or flammable gases exist. Failure to observe this warning may cause explosion, spark, fire, electric shock, physical injury, and/or damage to the equipment.● The operators in charge of transportation, installation, wiring, operation, maintenance, and inspection of the equipment should have enough knowledge and technical skill for the product. Failure to observe this warning may cause explosion, spark, fire, electric shock, physical injury, and/or damage to the equipment.● Do not repair or wire the equipment with the electric power on. be sure to cut the power off the power supply before getting to work. Failure to observe this warning may cause electric shock.● If the equipment is to be used in a system for human transport, be sure to furnish it with a protective device for safety. Failure to observe this warning may cause physical injury and/or damage to the equipment by accidental falling.● If the equipment is to be used with an elevator, be sure to furnish with a safety device to prevent the elevator from accidental falling. Failure to observe this warning may cause physical injury and/or damage to the equipment.● Be sure not to get water or oil/grease into the brake unit Failure to observe this warning may cause accidental falling and/or runaway accident by the decreased brake torque. (In case of water-resistant type, at the time of adjusting brake gap)

Caution

- Do not use a gearmotor under conditions other than specified in the nameplate or the product specifications. Failure to observe this warning may cause electric shock, physical injury and/or damage to the equipment.
- Do not insert your fingers or any other object into the aperture of the gearmotor. Failure to observe this warning may result in electric shock, physical injury, fire and/or damage to the equipment.
- Do not use the damaged gearmotor. Failure to observe this warning may result in physical injury and/or fire.
- Do not take off the nameplate.
- The manufacturer will not warrant and will not be responsible for the product modified or repaired by the user himself.

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1 Check at the unpacking

When unpacking a carton, please check up the followings. If you have any problems or questions, please do not hesitate to contact the dealer from which the product was supplied or a sales office.

Caution

Check whether the product is the same product as ordered. Installing a wrong equipment may cause physical injury and/or damage to the equipment.

- (1) The ordered products and the contents indicated in the nameplate are correct. (Type, Reduction ratio, Motor capacity, Voltage, Frequency, etc.)
- (2) No accidental damage to the product during transportation exist.
- (3) Screws or nuts are not loose.
- (4) In case of gearmotor attached with brake, rectifier is enclosed.
(Not necessary in case of gearmotor with built-in rectifier attached with terminal box.)
- (5) In case of gearmotor with clutch/brake, one rectifier and two surge suppressor are enclosed.
- (6) In case of single-phase motor, capacitor is enclosed.
- (7) In case of F2 series, safety cap is enclosed.

2 Transportation

Danger

- When a product is lifted up for transportation, be sure not to enter underneath of the lifted product. Falling of product may cause serious injury.

Caution

- Be careful when transporting products to avoid falling down.
- Before lifting the gearmotor up, be sure to confirm it's weight by nameplate, packing box, external configuration, catalogue, etc. Do not lift up gearmotor which has more weight than the one specified in the lift. Failure to observe this warning may cause physical injury by breaking of bolt, falling or tumbling of product, and/or damage to the equipment.

3 Storage

● Location for storage

In case of storing gearmotors for more than 6 months, be sure to store them indoors well ventilated and dry, free from direct sunlight, excessive temperature change, humidity, dust and corrosive gas.

- (1) Be sure not to put gearmotors directly on the ground.

Bearings may be damaged by fretting corrosion caused by vibrations during storage, therefore be sure to store gearmotors in the location free from vibration.

● Duties during storage

- (1) In order to avoid any oxidization on bearings, be sure to give a trial run every 6 month to confirm if they rotate smoothly or if there is any abnormal noise.
- (2) Be sure to measure the insulating-resistance by 500V tester(megger) every 6 month to make sure if it shows more than 1 M Ω .
- (3) Be sure to provide anticorrosive treatment every 6 month on the machined surface such as output shaft and flange surface not painted.

● Operations just after storage

- (1) Before operation, be sure to measure the insulating-resistance by 500V tester (megger) to make sure if it shows more than 1 M Ω .
- (2) Check if there is any abnormal noise, vibration or temperature rise at the start of operation.
- (3) In case of gearmotor with brake, be sure to confirm if the brake functions properly. In any abnormality, please contact our office nearest to you.

4 Installation

Proper installation of a product will ensure reliable service and maximum life.

Caution

- Do not place any object inflammable near the gearmotor. Failure to observe this warning may cause fire.
- Do not place any object which may interfere with the ventilation around the gearmotor. Failure to observe this warning may result in abnormal overheating caused by the block off of the cool air, which may cause burn injury and/or fire.
- Do not step on a gearmotor or hang to it. Failure to observe this warning may cause physical injury.
- Do not touch the edge of the shaft of gearmotor or key groove in the bore with bare hands. Failure to observe this warning may cause physical injury.
- In equipments like food machines, which must avoid oil or grease, furnish with protective devices like oil pan, in order to protect from the oil leakage caused by failure or life of the manufactured products. Leaking oil may cause defective products.
- There is possibility scatter the wear debris or iron powders.
In case of installing to equipment which will have any issue due to contamination of foreign substance such as food equipment, please install preventive equipment. This could harm the products.
- Vibrations come out from the installation surface of gearmotor or from other source should be minimized to under about 0.5G.
- In the hot and humid environment, when ambient temperature changes suddenly, internal condensation may occur in the terminal box. Especially, in the ocean transport of the machine by vessel, condensation may occur, therefore, pay careful attention to the transport atmosphere. Internal condensation is a phenomenon that in the hot and humid environment, if temperature suddenly drops from high to low, or if a reducer is suddenly moved from low-temperature place to hot and humid place, steam condensation occurs and the droplet land on the terminal.
- In the low temperature of below 0 °C, pay careful attention to the freezing. The droplets land on the terminal by condensation or by abnormally high humidity atmospheres, and when temperature drops below freezing point, the droplets become ice. This is what we call “Freezing”. You must note that there is a danger of electrification caused by the short circuit between terminals by freezing.

(1) Proper location for installation

Ambient Temperature: -10°C to 40°C

Ambient Humidity: 85% max.

Altitude: Sea level to 1,000m max.

Environment:

[Standard Type]: Well ventilated place free from corrosive gas, explosive gas, vapor and/or dust.

[Water -resistant Type]: Place free from corrosive gas and explosive gas.
Operation in water or in the high-hydrostatic pressure environment is not permitted.

Installation Location: Indoors

(2) Direction of Installation

This product can be installed in any direction due to a grease lubrication system.

(3) Method for Installation

① Attaching the mounting foot and flange

Fix the product with the four bolts on a flat and machined surface free from vibration.
(Roughness of the surface should be less than 0.3mm.)

② Attaching the shaft

● gearmotor's weight should be supported by the driven shaft.

(Forces other than turning reactive force should never be imposed to the torque arm.)

● In case start/stop and forward/reverse actions are frequent, tightn up the torque arm with bolts to keep the locking hole not loose.

fixing hole	bolt size	tightening torque	
6.5mm	M6	4.9N · m	{ 0.5kgf · m}
8.5	M8	13	{ 1.3}
11	M10	25	{ 2.6}
13	M12	44	{ 4.5}
15	M14	69	{ 7.0}
18	M16	108	{ 11.0}

5 Connecting with other equipment

Caution

● When connecting the gearmotor with a load, make sure of the alignment of shaft, the tension of the belt and parallelism of pulleys. In direct coupling, be sure to check whether the alignment of shaft is extremely precise.

If a belt is to be used, be sure to adjust its tension properly.

Also, before operation, inspect whether the setting bolts for pulleys and coupling are securely tightened. Failure to observe this warning may cause serious injury and/or damage to the equipment due to broken parts.

● Safe guards should be furnished around rotating parts to avoid danger to persons.

Loose fit is recommended for the couplers such as couplings, sprockets, pulleys, gears, etc., when attaching to the reducer, using the designated key materials.

1 Direct Connection

Connect the reducer to the other equipment precisely, so that the center of the shaft of both machines will be fully aligned.

2 Attaching Chains, V-Belts, Gears, etc.

- (1) In any connection, connect the units precisely, so that the center of the shaft of the reducer and that of the other equipment are parallel.
- (2) The tension of the Chains/V-Belts and the coupling of the gear must be perpendicular to the center of the shaft.
- (3) Tension of the V-Belt: Excessive tensioning may result in damage to the bearings of the shaft.
Tension of the Chain: Excessive tensioning may result in damage to the bearings of the shaft. If the chain is installed loosely, shock load will occur when the drive shaft starts rotation, and this can result in damage to the reducer and the other equipment. Therefore, adjust the tension of the chain properly.

3 Attaching and Removing of F2 Series Hollow Shaft

① Attaching to Hollow Shaft

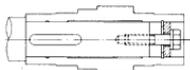


Note:

- 1) At attaching, apply agent such as molybdenum disulfide on the driven shaft and the bore of the hollow shaft to avoid seizing.
- 2) In case the fitting is too tight, tap the edge of the hollow drive shaft with wooden hammer. With this device, smooth insert can be obtained.
- 3) The bore of the hollow shaft is machined to conform to "JIS H8" tolerance. If strong impact or heavy radial load is to be imposed to the shaft, the fit should be tighter. In general, loose fit is recommended for the fit tolerance of driven shaft
- 4) The key should be conformed to "JIS B 1301-1976" or equivalent. Refer to the JIS standard B 1301-1976 for the details.

③ Fixing to Hollow Shaft

Ⓐ In case the driven shaft has a shoulder

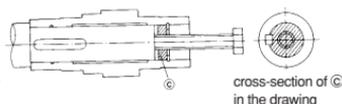


Ⓑ In case of no shoulder on the driven shaft



Note: Firmly fix the driven shaft to the hollow shaft.

② Removing from Hollow Shaft



Note: In order for smooth removing, design the driven shaft shorter with the length equal to the amount of the thickness of Ⓒ.

● Specifications for the fixing parts of driven shaft

	Bolt Size	Measurement of Spacer			Nominal Designation of the C-Type Snap Ring
		Outer Diameter	Bore	Width	
F2S-12	M 5	φ11.5	φ 6	3	12
F2S-15	M 6	φ14.5	φ 7	3	15

6 Direction of Rotation

⚠ Caution

Before coupling with the other machine, be sure to check the direction of rotation. Unexpected operation in wrong direction may cause serious injury and/or damage to the equipment.

In the GTR Reducer, the relations between the input shaft and the output shaft are as shown below:

●G-Type

1/5~1/60 same direction 1/80~1/1800 counter direction

●H-Type

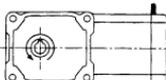
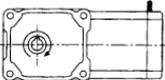
15W·25W	1/10~1/60	And 1/300~1/1800	15W·25W	1/80~1/240
40W·60W	1/10~1/60	And 1/300~1/900	40W·60W	1/80~1/240 And 1/1200~1/1800
90W	1/10~1/60	And 1/300~1/450	90W	1/80~1/240 And 1/600~1/1800



●G-Type

15W·25W	1/5~1/25	same direction	1/30~1/200	counter direction
40W	1/5~1/30	same direction	1/40~1/200	counter direction
60W	1/5~1/15	same direction	1/20~1/120	counter direction

●F2 Series

1/5~1/60			1/80~1/240		
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7 Wiring

⚠ Danger

- When connecting the machine to the power cable, be sure to follow the instructions shown in the connection diagram in the terminal box or in the Instruction Manual. Failure to observe this warning may cause electric shock or fire. (In case of the type of no terminal box, be sure to insulate a wire at the terminal area.)
- Do not bend, pull or tuck down power cables, motor lead wires or cab tire cable forcibly. Failure to observe this warning may cause electric shock.
- Be sure to ground the terminal of the earth wire. Failure to observe this warning may cause electric shock.
- Be sure to use the electric current source specified in the name plate. Failure to observe this warning may cause burnout of the motor and/or fire.
- Do not damage the lead wire inside when peeling off the outer sheath of cabtyre cable. Failure to observe this warning may cause electric shock or fire.
- Be sure to avoid any water to the terminal or power rectifier of cabtyre cable or capacitor. Failure to observe this warning may cause electric shock, damage to the equipment or fire.

[Note] Do not open the cover of the water and dust-resistant box.

Failure to observe this warning may cause electric shock, damage to the equipment or fire caused by lack of water and dust-resistant function.



Caution

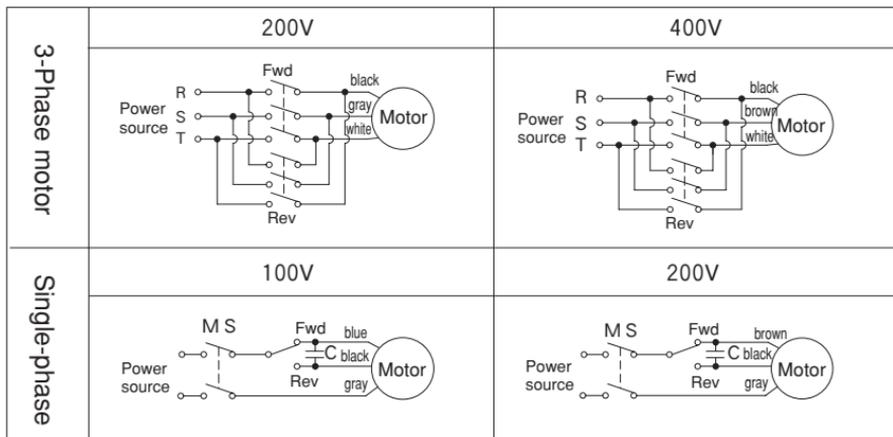
- Do not touch terminals when inspecting the insulation resistance.
Failure to observe this warning may cause electric shock.
 - Wiring should be properly made under the specified electrical equipment engineering standard or the safety code. Failure to observe this warning may cause electric shock, fire or physical injury.
 - Our motor is not equipped with protective devices. The electrical equipment engineering standards provide that an overload protection device should be installed in a unit. Other protection devices such as circuit breaker are also recommended to be installed. Failure to observe this warning may cause damage to the equipment, electric shock, fire or physical injury.
 - When rotating gearmotor alone, take off the key attached temporarily to the output shaft.
Failure to observe this warning may cause physical injury.
 - Check up the direction of rotation before connecting with the other machine. Rotation in wrong direction may cause physical injury and/or damage to the equipment.
 - If a 400V class inverter is employed for motor drive, be sure to attach a control filter or a reactor to the inverter. The breakdown of insulation may cause damage to the equipment or fire.
 - Do not misuse a capacitor for starting as the one for continuous motor running. This misuse may cause damage to the capacitor.
 - Do not hurt the vinyl coating of starter capacitor. The hurt may cause electric shock.
 - Voltage drops in the wiring should be kept within 2%. Excessive length of wiring may cause steep voltage drop and this makes the motor disable to start up.
 - When reversing a gearmotor is required in operation, be sure to stop rotating and then start reversing. Reversing without complete rest may cause damage to the equipment.
 - As for a gearmotor with brake, do not energize continuously to the brake unit during the rest of motor. The continuous supply may cause burning of the brake coil and fire.
 - If a gearmotor with brake is used for the application such as lift, "DC Switching" wiring should be employed to avoid accidental falling.
- (1) As the rectifier unit contains diodes, improper wiring may cause fatal short-circuiting and breakage of the unit. So, special care should be taken for wiring.
 - (2) In case of DC switch is adopted, DC110V, contact rated DC13 class is recommended in order to cut off the inductive load (DC coil). Please contact us for details.
Also, in case of employing a noncontact relay, it is recommended to use the rated voltage of AC240V equivalent (Half-wave rectification switching available).
* Contact rated DC13 class is the categorized in JIS C 8201-5-1 for low-pressure switchgear and control device.
 - (3) In case of gearmotor with clutch/brake use the relay with the capacity of more than the rated current of 1A(DC110V) at the contact point of brake and clutch.
 - (4) The direction of rotation of the output shaft varies according to the speed reduction ratio of the gear head. Therefore, be sure to confirm the speed reduction ratio before wiring.
 - (5) The voltage between the capacitor terminals of the single-phase motor will become nearly twice as much as that in the power source of the motor. Therefore be sure to insulate wires at the terminals for safety.

2 Wiring of gearmotor

For standard gearmotors, wirings described below are recommended:

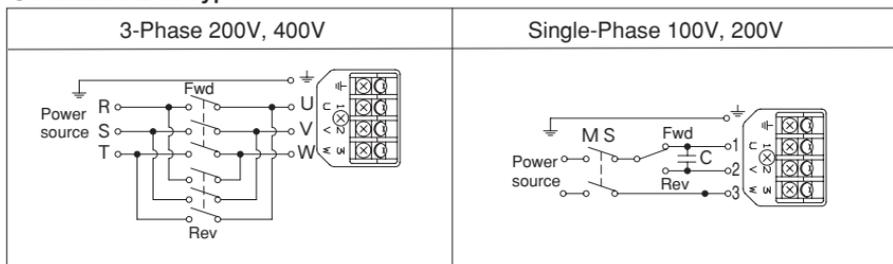
The direction of rotation shown below is as viewed from the backward of the motor. In the 3-phase motor, the forward rotation is a counterclockwise direction, and in the single-phase motor, the forward rotation is a clockwise direction.

●Lead Wire Type



MS: Electro-Magnetic Switch C: Capacitor

●Terminal Box Type



MS: Electro-Magnetic Switch C: Capacitor

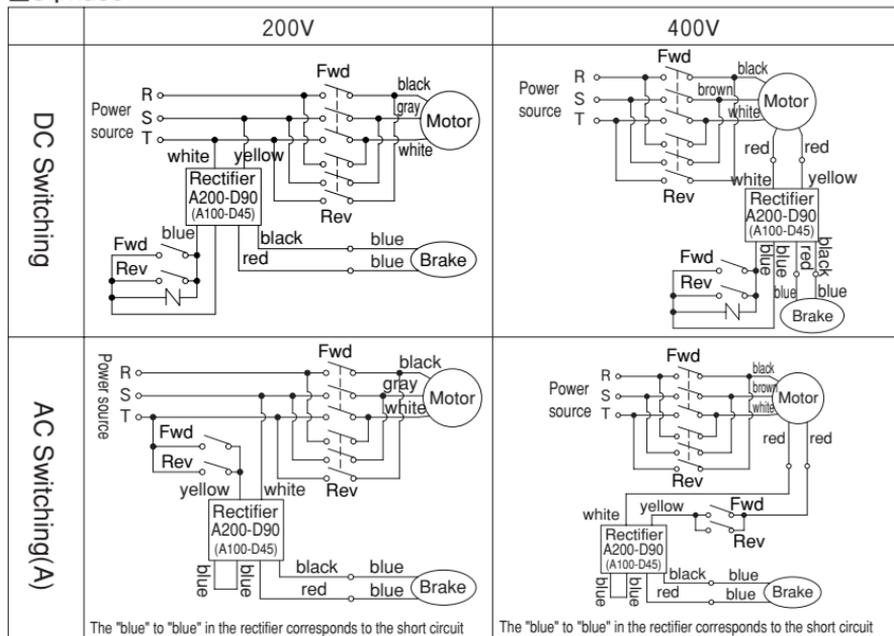
3 Wiring for gearmotor with brake

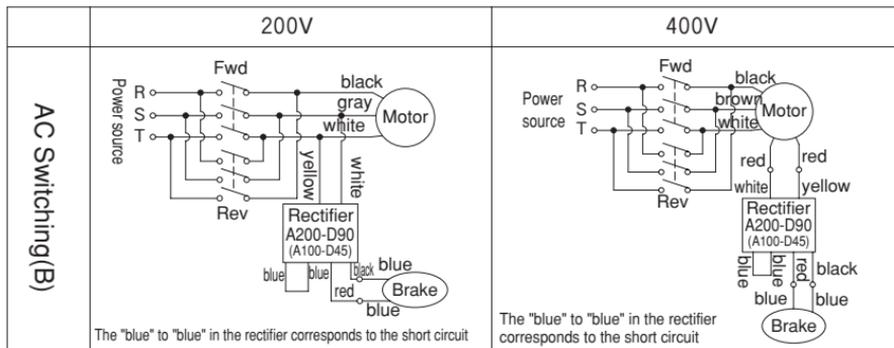
- (1) If a gearmotor is used in the applications where quick braking is required, such as lift, "DC Switching" wiring should be employed.
- (2) In case of "DC Switching" wiring, it is recommended to insert the surge suppressor in-between the connecting points. (varistor voltage 423 517V)
- (3) The brake voltages are DC90V in case of 3-phase and single-phase 200V, and DC45V in case of single-phase 100V.
- (4) In case of single-phase 100V, the voltage of the input terminal of rectifier (A200-D90[A100-D45]) corresponds to AC100V, and the voltage of the output terminal corresponds to DC45V.
- (5) In case of DC switch is adopted, DC110V, contact rated DC13 class is recommended in order to cut off the inductive load (DC coil). Please contact us for details.
Also, in case of employing a noncontact relay, it is recommended to use the rated voltage of AC240V equivalent (Half-wave rectification switching available).
* Contact rated DC13 class is the categorized in JIS C 8201-5-1 for low-pressure switchgear and control device.
- (6) As the rectifier unit contains diodes, improper wiring may cause fatal short-circuiting and breakage of the unit. So, special care should be taken for wiring.
- (7) When wiring special voltage of over 220V, since the 200V terminal (red, red) is taken out of the motor, connect this 200V terminal with the input terminal of the rectifier (white, yellow). Also, be sure not to connect the power source of over 220V directly to the input terminal of the rectifier.
- (8) When operating the machine with inverter, please refer to the "Cautions in operation with inverter" in page 17.
- (9) Brake lag (second)

DC Switching	0.005~0.015
AC Switching (A)	0.03~0.10
AC Switching (B)	0.1~0.2

- This is the time consumed from the moment of "switch off" to the moment of start braking, and is different from the braking time.
- The length of time varies from that of the water-resistant gearmotor with brake.

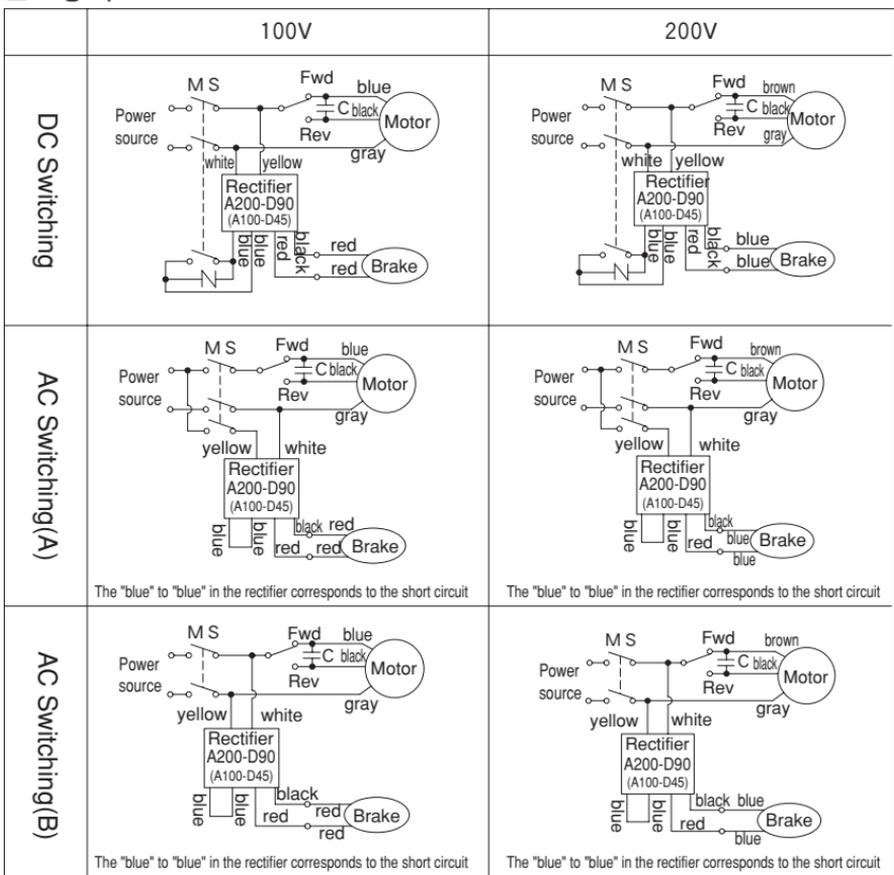
■3-phase





—N— : Surge Suppressor (option)

■ Single-phase

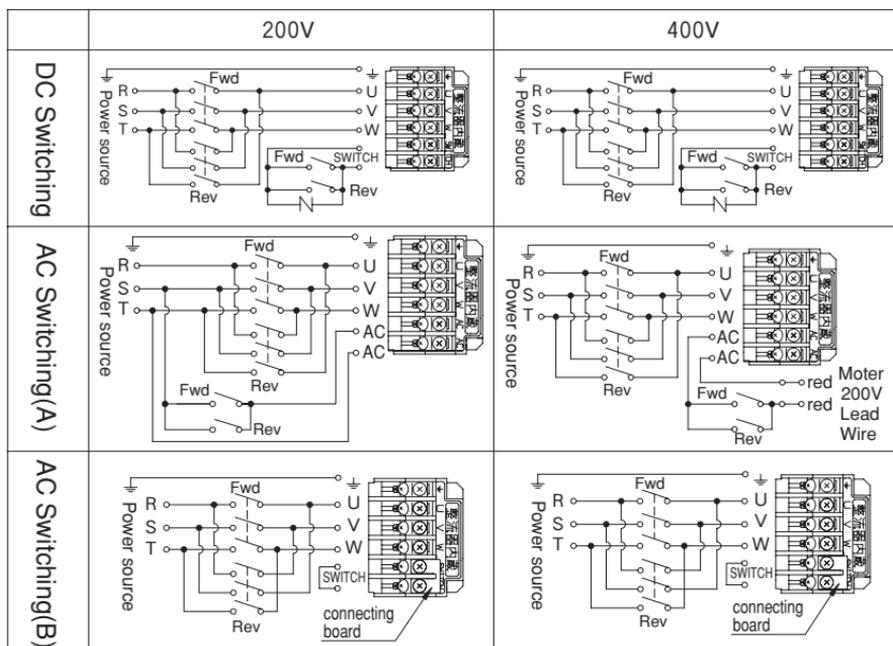


MS: Electro-Magnetic Switch C: Capacitor —N— : Surge Suppressor(option)

●Wiring method to a terminal box

- (1) In a terminal box, a rectifier is built-in, so that the wiring is set as "AC Switching(B)". Therefore, the brake becomes effective only by connecting the terminal to 3-phase current or single-phase current. (The connecting board is attached to the switch.)
- (2) When changing to "DC Switching" wiring, remove the connecting board.
- (3) In case of 3-phase "AC Switching(A)"400V, the 200V terminal (red lead wire) is taken out from the motor. (But it is not fixed to the terminal board.)
- (4) When using inverter, connection between "AC Switching(B)" and "DC Switching" is not feasible. For details, please refer to the wiring diagram of the gearmotor with brake in operation with inverter (page 17) or the handling manual of inverter. (This does not apply to the single-phase.)

■3-phase



—N— : Surge Suppressor (option)

Single-phase

	100V	200V
DC Switching	<p>Wiring diagram for DC Switching at 100V. It shows a power source connected to terminals 1, 2, 3, and B. Terminal 1 is labeled 'Fwd', terminal 2 is labeled 'C' (Capacitor), and terminal 3 is labeled 'Rev'. A switch labeled 'MS' (Electro-Magnetic switch) is connected to terminal 1. A capacitor 'C' is connected between terminals 1 and 2. A surge suppressor 'N' (option) is connected between terminals 1 and 2. A switch labeled 'SWITCH' is connected to terminal 3. Terminal B is connected to ground.</p>	<p>Wiring diagram for DC Switching at 200V. It shows a power source connected to terminals 1, 2, 3, and B. Terminal 1 is labeled 'Fwd', terminal 2 is labeled 'C' (Capacitor), and terminal 3 is labeled 'Rev'. A switch labeled 'MS' (Electro-Magnetic switch) is connected to terminal 1. A capacitor 'C' is connected between terminals 1 and 2. A surge suppressor 'N' (option) is connected between terminals 1 and 2. A switch labeled 'SWITCH' is connected to terminal 3. Terminal B is connected to ground.</p>
AC Switching(A)	<p>Wiring diagram for AC Switching(A) at 100V. It shows a power source connected to terminals 1, 2, 3, and B. Terminal 1 is labeled 'Fwd', terminal 2 is labeled 'C' (Capacitor), and terminal 3 is labeled 'Rev'. A switch labeled 'MS' (Electro-Magnetic switch) is connected to terminal 1. A capacitor 'C' is connected between terminals 1 and 2. A surge suppressor 'N' (option) is connected between terminals 1 and 2. A switch labeled 'SWITCH' is connected to terminal 3. Terminal B is connected to ground. A 'connecting board' is indicated at the bottom.</p>	<p>Wiring diagram for AC Switching(A) at 200V. It shows a power source connected to terminals 1, 2, 3, and B. Terminal 1 is labeled 'Fwd', terminal 2 is labeled 'C' (Capacitor), and terminal 3 is labeled 'Rev'. A switch labeled 'MS' (Electro-Magnetic switch) is connected to terminal 1. A capacitor 'C' is connected between terminals 1 and 2. A surge suppressor 'N' (option) is connected between terminals 1 and 2. A switch labeled 'SWITCH' is connected to terminal 3. Terminal B is connected to ground. A 'connecting board' is indicated at the bottom.</p>
AC Switching(B)	<p>Wiring diagram for AC Switching(B) at 100V. It shows a power source connected to terminals 1, 2, 3, and B. Terminal 1 is labeled 'Fwd', terminal 2 is labeled 'C' (Capacitor), and terminal 3 is labeled 'Rev'. A switch labeled 'MS' (Electro-Magnetic switch) is connected to terminal 1. A capacitor 'C' is connected between terminals 1 and 2. A surge suppressor 'N' (option) is connected between terminals 1 and 2. A switch labeled 'SWITCH' is connected to terminal 3. Terminal B is connected to ground. A 'connecting board' is indicated at the bottom.</p>	<p>Wiring diagram for AC Switching(B) at 200V. It shows a power source connected to terminals 1, 2, 3, and B. Terminal 1 is labeled 'Fwd', terminal 2 is labeled 'C' (Capacitor), and terminal 3 is labeled 'Rev'. A switch labeled 'MS' (Electro-Magnetic switch) is connected to terminal 1. A capacitor 'C' is connected between terminals 1 and 2. A surge suppressor 'N' (option) is connected between terminals 1 and 2. A switch labeled 'SWITCH' is connected to terminal 3. Terminal B is connected to ground. A 'connecting board' is indicated at the bottom.</p>

MS : Electro-Magnetic switch C : Capacitor -N : Surge Suppressor (option)

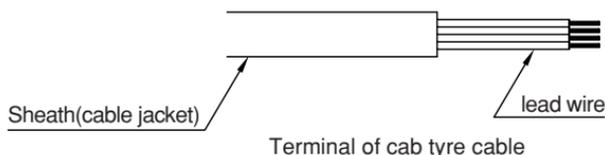
4 Wiring for the water-resistant gearmotor

- (1) Be sure not to damage the lead wire inside when peeling off the outer sheath of cabtype cable.
- (2) When using the machine in the circumstance where water may spatter during operation, it is recommended to use circuit beaker for safety.
- (3) Do not open the cover of the water/dust-resistant box. Failure to observe this warning may result in lack of water/dust-resistant function.
- (4) The voltage between the capacitor terminals of the single-phase motor will become nearly twice as much as that in the power source of the motor. Therefore be sure to insulate wires at the terminals for safety.

3-phase200V	single-phase100V
<p>Wiring diagram for 3-phase200V. It shows a power source with three phases: R, S, and T. Terminal 1 is labeled 'Fwd', terminal 2 is labeled 'C' (Capacitor), and terminal 3 is labeled 'Rev'. The motor terminals are labeled 'black', 'gray', and 'white'. A switch labeled 'MS' (Electro-Magnetic switch) is connected to terminal 1. A capacitor 'C' is connected between terminals 1 and 2. A surge suppressor 'N' (option) is connected between terminals 1 and 2. A switch labeled 'SWITCH' is connected to terminal 3. Terminal B is connected to ground.</p>	<p>Wiring diagram for single-phase100V. It shows a power source connected to terminals 1, 2, 3, and B. Terminal 1 is labeled 'Fwd', terminal 2 is labeled 'C' (Capacitor), and terminal 3 is labeled 'Rev'. The motor terminals are labeled 'blue', 'black', and 'gray'. A switch labeled 'MS' (Electro-Magnetic switch) is connected to terminal 1. A capacitor 'C' is connected between terminals 1 and 2. A surge suppressor 'N' (option) is connected between terminals 1 and 2. A switch labeled 'SWITCH' is connected to terminal 3. Terminal B is connected to ground.</p>

MS: Electro-Magnetic switch C: Capacitor

- (5) Be sure to protect the terminal of cab tyre cable from splashing water. Splashed water may penetrate through the sheath of cab tyre cable and reach to the inside of motor, which may cause trouble in motor.

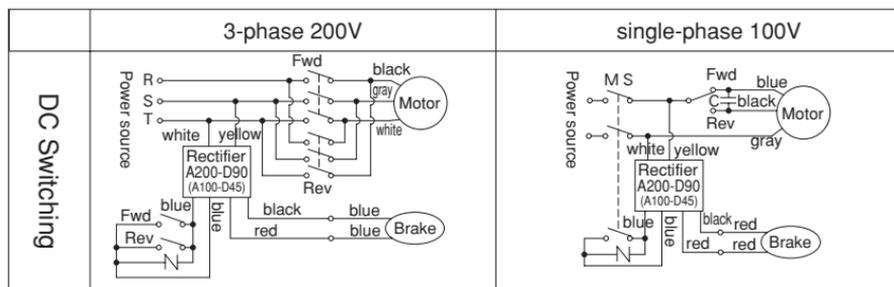


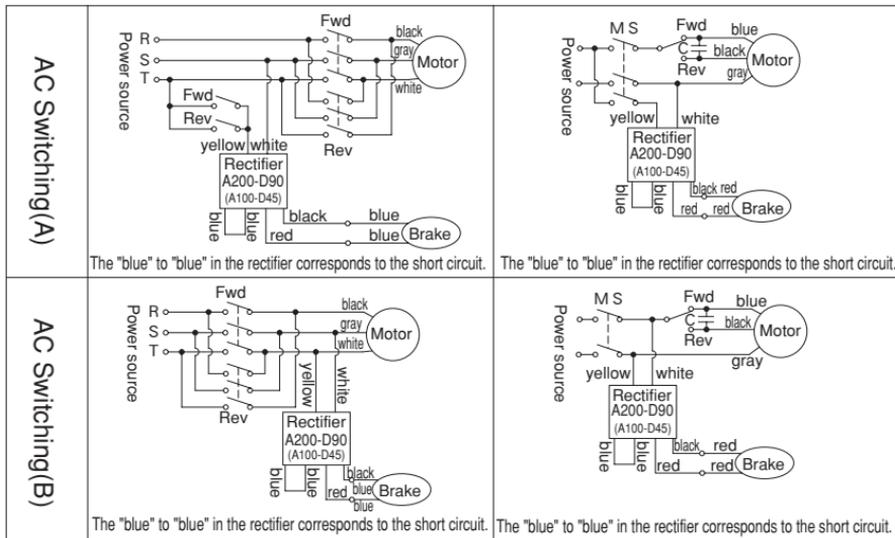
5 Wiring for the gearmotor with water-resistant brake

- (1) When a gearmotor is used in the applications where quick braking is required, such as lift, "DC Switching" wiring should be employed.
- (2) In case of "DC Switching" wiring, it is recommended to insert the surge suppressor in-between the connecting points. (varistor voltage 423~517V)
- (3) The brake voltages are DC90V in case of 3-phase and DC45V in case of single-phase.
- (4) In case of single-phase, the voltage of the input terminal of rectifier (A200-D90[A100-D45]) corresponds to AC100V, and the voltage of the output terminal corresponds to DC45V.
- (5) In case of DC switch is adopted, DC110V, contact rated DC13 class is recommended in order to cut off the inductive load (DC coil). Please contact us for details.
Also, in case of employing a noncontact relay, it is recommended to use the rated voltage of AC240V equivalent (Half-wave rectification switching available).
* Contact rated DC13 class is the categorized in JIS C 8201-5-1 for low-pressure switchgear and control device.
- (6) As the rectifier unit contains diodes, improper wiring may cause fatal short-circuiting and breakage of the unit. So, special care should be taken for wiring.
- (7) The rectifier does not correspond to water-resistant structure.
- (8) Brake lag (second)

DC Switching	0.01~0.02
AC Switching(A)	0.05~0.15
AC Switching(B)	0.1~0.2

- This is the time consumed from the moment of "switch off" to the moment of start braking, and is not the braking time.
- The length of time varies from that of the non water-resistant gearmotor.

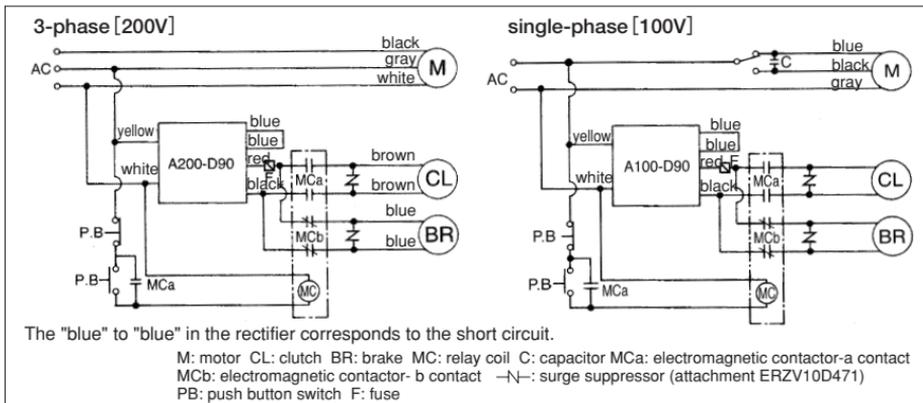




MS : Electro-Magnetic Switch C : Capacitor -N- : Surge Suppressor (option)

6 Wiring for the gearmotor with clutch/brake

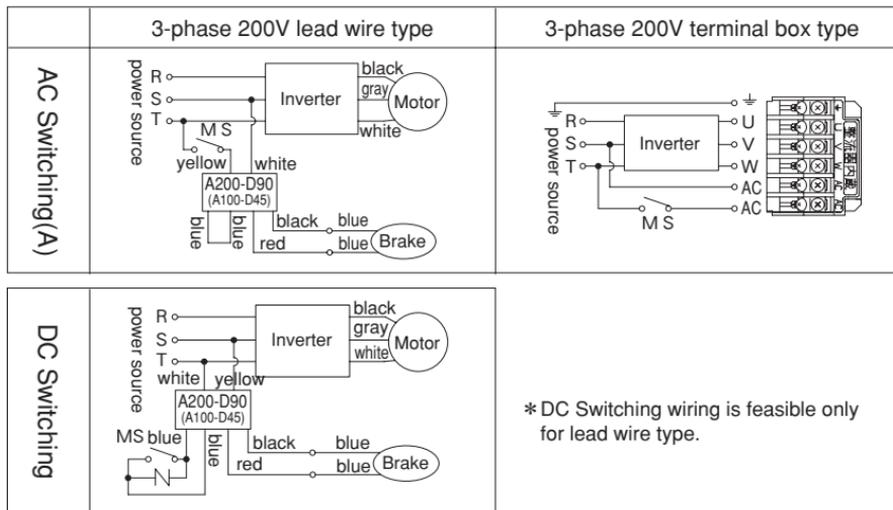
- (1) In case of wiring motor with voltage of over 200V, since the 200V terminal (red, red) is taken out of the motor, connect this 200V terminal with the input terminal of the rectifier(white, yellow).
Also, be sure not to connect the power source of over 220V directly to the input terminal of the rectifier.
- (2) Brake voltage corresponds to DC90V.
- (3) Be sure to avoid the usage of up and down operations. (Failure to observe this warning may cause accidental falling when power cut occurred.)
- (4) In case of energizing continuously to the clutch or brake, be sure to ask our local office.



7 Cautions in operation with inverter

- (1) Higher temperature rise, noise and vibration than that from the general power source will be observed. Especially, low speed rotation which naturally reduce the fan effect, may cause abnormal rise of temperature. (More than 90°C at the surface of the motor)
- (2) In the gearmotor with brake or with clutch/brake, malfunction of the brake may be observed due to the voltage drop. In order to avoid this disadvantage, be sure to bypass the inverter when wiring the brake and clutch.
- (3) It is not feasible to use inverter in the single-phase motor.
- (4) When using inverter in the 3-phase 400V motor with brake, do not use the 200V terminal (red lead wire) taken out from the motor.

Examples of wiring in the gearmotor with brake when using inverter



—N— : Surge Suppressor (option)

8 Operation

⚠ Danger

- Do not operate gearmotors with the terminal box cover opened. Be sure to close the cover just after the wiring is completed. Failure to observe this warning may cause electric shock.
- Do not approach or touch rotating parts such as a shaft while the machine is running. Failure to observe this warning may cause wind-in and physical injury.
- If power cut occurs, be sure to switch off the power supply of a machine promptly, otherwise unexpected recovery of electric service may cause physical injury and/or damage to the equipment.

Caution

- The gearmotor becomes rather hot during operation, so do not touch it with bare hands. Failure to observe this warning may cause burn injury.
- When a gearmotor is found abnormal, stop running immediately. Failure to observe this warning may cause electric shock, physical injury or fire.
- Do not overload a gearmotor. Failure to observe this warning may cause physical injury and/or damage to the equipment.
- Do not touch the current-carrying part of the starter capacitor in single-phase motor until it has been discharged completely. Failure to observe this warning may cause electric shock.
- When a single-phase motor is to be reversed, be sure to start reversing after complete rest of the motor. Otherwise, direction of rotation may not change and may cause running out of control.
- Do not stop a motor forcibly. It may cause damage to the connecting machine. In a single-phase motor, this may make the motor rotate in the opposite direction and may cause running out of control.

1 Check up matters before turning the power switch on:

- (1) Wirings and connections are done properly.
- (2) Fuses and thermal relays of proper capacities are used.
- (3) Installations and the connections with other machines are properly done.
- (4) Earth terminal is properly grounded.

[Note] When using the water-resistant motor in the circumstance where water may spatter during operation, it is recommended to use circuit breaker for safety.

2 Check up matters at test running:

- (1) Confirm the direction of rotation for 1~2 seconds after starting the motor with unloaded condition. When you find the rotation in the opposite direction, change the wiring according to the diagrams shown in page 10.
- (2) Practice running-in of the motor with unloaded condition. When no defect is observed, add load gradually and eventually start operation with full load.

3 Check up matters during operation:

- (1) Confirm that there is no abnormal noise and vibration at all. When such defects are observed, stop operation immediately. Failure to observe this warning may cause physical injury and/or damage to the equipment.
- (2) Confirm if the surface temperature of the gear case or motor frame does not exceed 90°C. Do not touch the surface with bare hands. Failure to observe this warning may cause burn injury.

9 Inspection and Adjustment



Danger

- When inspecting and/or adjusting the machine while it is in operation, do not touch rotating parts such as a shaft. Failure to observe this warning may cause wind-in and physical injury.
- Do not remove the cover of inspection window while the machine is in operation. Otherwise, blowout of hot lubricant may cause burn injury.
- When inspecting the gear touch surface, be sure to lock up the drive and driven units beforehand. Failure to observe this warning may cause wind-in to the gear-teeth and physical injury.
- In case of getting into closed equipment to inspect its condition, be sure to lock up drive and driven units and confirm whether the equipment is sufficiently cooled down beforehand. Also, keep on ventilating while inspecting inside. Furthermore, while inspection, be sure to staff supporting personnel outside to watch the safety conditions and keep in touch with the inspector inside. It can be very slippery with lubricant inside the equipment, so special attention should be given to safety. Failure to observe this warning may cause physical injury.
- Do not operate the equipment with the safe guard off for inspection. Failure to observe this warning may cause wind-in and physical injury.

[Inspection and Maintenance of Brake Part]

- Before actual operation of the equipment, make sure the brake is functioning properly by turning the switch on and off. Failure to observe this warning may cause accidental falling and run out of control.
- Do not operate the equipment without fan cover (or brake cover) after inspection and adjustment of brake gap. Failure to observe this warning may cause wind-in and physical injury.
- Do not release the brake while the equipment is being loaded in the application such as lift. Failure to observe this warning may cause accidental falling.

Caution

- When measuring the insulation resistance, do not touch the terminals. Failure to observe this warning may cause electric shock.
- Surface of a gearmotor becomes very hot. Therefore, do not touch it with bare hands. Failure to observe this warning may cause burn injury.
- When operation being found abnormal, diagnose the fault according to the instruction manual. Do not operate the machine until the causes of fault are found and proper measures are taken.
- Repairing, disassembling and assembling of the equipment should be done by an experienced technician. Failure to observe this warning may cause electric shock, physical injury or fire, etc.

[Note] In case you need to change grease, oil seal or o-ring for the purpose of maintenance or inspection, be sure to ask our local office nearest to you. Please be noted that we will not be responsible for the defects caused by user's changing of above lubricant or parts.

1 Daily Inspection: Following items should be inspected every few days.

Inspection Item	Method	Details of inspection
Load current	Ammeter	Within the rated current specified in the name plate.
Noise	Hearing by person Detection rod	No abnormal sound such as rumbling sound or periodic sound. Acoustic detection rod makes it easier to catch the abnormal sound.
Vibration	Touching by person.	No abnormal vibration in the gear case and motor frame.
Surface temperature	Thermometer	Should be less than 90°C.
Oil Leak	Visual Check	No lubricant leakage from the joint part such as case, oil seal or bracket, etc.

2 Periodic Inspections: (In case of operating 8 hours a day)

Inspection Item	Interval	Details of inspection
Fixing Bolt	6 months	Check the looseness of bolt and retighten.
Chain and V-Belt	6 months	Check the tension(loose or tight) and adjust it to the proper tension.
Insulation Resistance of Motor	6 months	Should be more than 1M Ω when insulation resistor shows 500V.
Brake	Brake Gap (Clearance)	1 year or 1~1.5 million cycles Check if the gap is within the allowable limit of proper gap. (Refer to Page 22) Adjustment should be done according to the instruction described in page 22.
	Friction Disk	1 year Check the thickness of the Friction Disk. When the thickness of the friction disk becomes less than 1.5mm, replace it with new disk or repair it in the authorized factory.

When any abnormality is found during the daily inspection, take proper measures according to the “Troubleshooting” (page 23) of this Instruction Manual.

(Note) Do not open the cover of the water and dust-resistant box. Failure to observe this warning may lose these functions.

3 Method for brake gap adjustment



Danger

- 1 When adjusting the gap, be sure to disconnect the motor from the power source. Failure to observe this warning may cause physical injury.
- 2 After inspection and adjustment of the gap, be sure to confirm if the brake functions properly by turning the switch on and off. Failure to observe this warning may cause accident by falling or run out of control.
- 3 After inspection and adjustment of the gap, do not operate the motor with the fan cover (or brake cover) open. Failure to observe this warning may cause wind-in and physical injury.

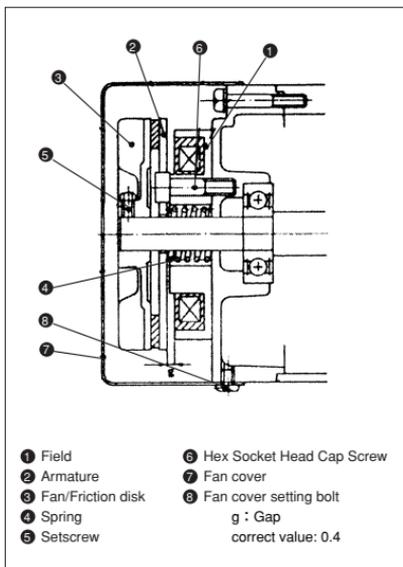
(1) Method for brake gap adjustment for gearmotor with brake

After operation for an extended period of time, the friction disk of brake becomes abraded and the gap (g) increases. When the gap clearance becomes greater than the limit of gap to inhale, armature inhaling becomes difficult by magnet, making it impossible to release the brake. When using the motor continuously with this condition, the operation with brake-on causes excessive temperature rise and finally causes brake failure. In order to operate this machine safely, it is recommended to check or adjust the brake gap periodically (Every 1 year or every 1 ~1.5 million cycles). Do not open the cover of the water and dust-resistant box.

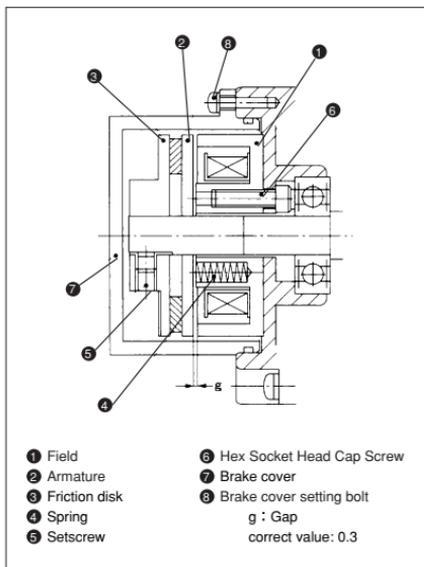
■ Method for Gap Adjustment

- ① Remove fan cover (brake cover).
 - ② Loosen setscrew.
(Locking agent for protecting loosening is applied.)
 - ③ Insert a plate 0.3~0.4mm thick in the gap between the field and the armature. Then put on and press down the friction disk assembly.
 - ④ Fix the fan/friction disk with setscrew. and seal it with locking agent.
 - ⑤ Install fan cover. (In case of water-resistant motor, check if there is any damage in the oring of the brake cover before installation. If damage exists, replace it with new one.)
- [Note] Do not allow grease or dust to attach on the friction disc. Failure to observe this warning may cause decreasing of brake function.

[Standard Type]



[Water-resistant type]



After operation for an extended period of time, the brake gap(g) become greater than 0.8mm, making it impossible to release the brake.

Therefore, be sure to practice periodical inspection and gap adjustment.

(2) Method for brake gap adjustment for gearmotor with brake/clutch

In the clutch and brake of this gearmotor, the automatic gap adjusting system which is our exclusive product, has already been installed. Therefore, gap adjustment caused by wearing is not necessary.

4 Grease, Oil seal and O-Ring

- (1) All of our small gearmotors employ grease lubrication and they are sealed with determined quantity of lubricant when shipping from our factory. Therefore, machines are available for immediate use.
- (2) Replacement or refill of the lubricant is hardly necessary. However, replacing it once in 10,000 hours may help prolong the life of the reducers. For replacement of lubricant, be sure to use authorized factory.
- (3) Our machines are protected from grease leakage by oil seal or o-ring, however, it is recommended to protect the machine by oil pan for safety sake. Grease leakage may cause damage to the machine. (Grease leakage may be observed when machine is in trouble or at the end of life.)
- (4) The life of oil seal may vary according to the condition of use. Therefore replacement may be needed even within 10,000 hours use. For replacement of oil seal, be sure to use authorized factory.

10 Troubleshooting

1 Troubleshooting for gearmotor

Trouble	Cause	Troubleshooting
The motor does not run even in the unloaded condition.	Failure of power supply	Check the power source. Contact the power supply company
	Disconnection of wire	Check the electric circuit.
	Poor contact of switch	Repair or replace the relay.
	Disconnection of stator coil.	Repair at authorized factory.
	3-phase motor runs as single-phase motor	Check the terminal voltage.
Broken gear, shaft and bearing	Repair at authorized factory.	
The motor does not run in the loaded condition.	Voltage drop	Check the length of wire.
	Worn out gear	Repair at authorized factory.
	Overload operation	Reduce the load.
Abnormal rise in temperature	Overload operation	Reduce the load.
	High frequency of start and stop	Reduce the frequency.
	damage to bearings	Repair at authorized factory.
	Overvoltage or low voltage	Check the voltage.
Abnormal noise	Continued noise- defective bearing, worn out gear	Repair at authorized factory.
	Intermittent noise—damaged gear or foreign substances inside the motor	Repair at authorized factory.
Excessive vibration	Worn out gear or bearing	Repair at authorized factory.
	Improper installation or slacked bolts	Tighten the bolts.
Grease leakage	Loosened bolts/nuts/screws	Tighten the bolts/nuts/screws.
	Damaged oil seal	Repair at authorized factory.

2 Troubleshooting for gearmotor with brake

Trouble	Cause	Troubleshooting
Brake does not work	Wrong wiring	Check the wiring.
	Damaged switch	Replace or repair the switch
Brake function is not enough. Long braking time	Foreign substances or oil are adhered to the friction disk.	Remove foreign substances or oil or repair at authorized factory.
	Life of the friction disk.	Replace the friction disk or repair at authorized factory.
	Excessive moment of load inertia.	Reduce the load.
	AC Switching wiring	Change to DC Switching wiring.
Motor does not run. (Rotating speed does not increase.) Overheated motor. Thermal relay trips. Abnormal noise in braking.	Wrong brake wiring.	Check the wiring.
	Larger brake gap.	Adjust the brake gap.
	Failure of the rectifier.	Replace the rectifier.
	Disconnection or short circuit of brake coil.	Replace the brake coil. or repair at authorized factory.
	Poor contact of switch.	Repair or replace the switch.
Excessive rise in temperature.	High frequency of braking.	Reduce the frequency.
	Excessive load torque or moment of load inertia.	Reduce the load.

3 Troubleshooting for gearmotor with brake/clutch

Trouble	Cause	Troubleshooting
Clutch and brake do not work.	Wrong wiring	Check the wiring.
	Failure of the rectifier.	Replace the rectifier.
	Disconnection or short circuit of clutch/brake coil.	Repair at authorized factory.
	Defective switch	Repair or replace the switch.
Slow starting of rotation. Ineffective braking function.	Foreign substances or oil are adhered to the friction disk.	Disassemble and clean up the brake/clutch.
	Life of the friction disk.	Repair or replace the friction disk.
	Excessive load torque or moment of load inertia.	Reduce the load.

4 Parts for replacement

Contact our nearest sales office for the replacement brake parts. Please note that we will not warrant any defect caused by improper replacement done by customer.

11 Disposal



Caution

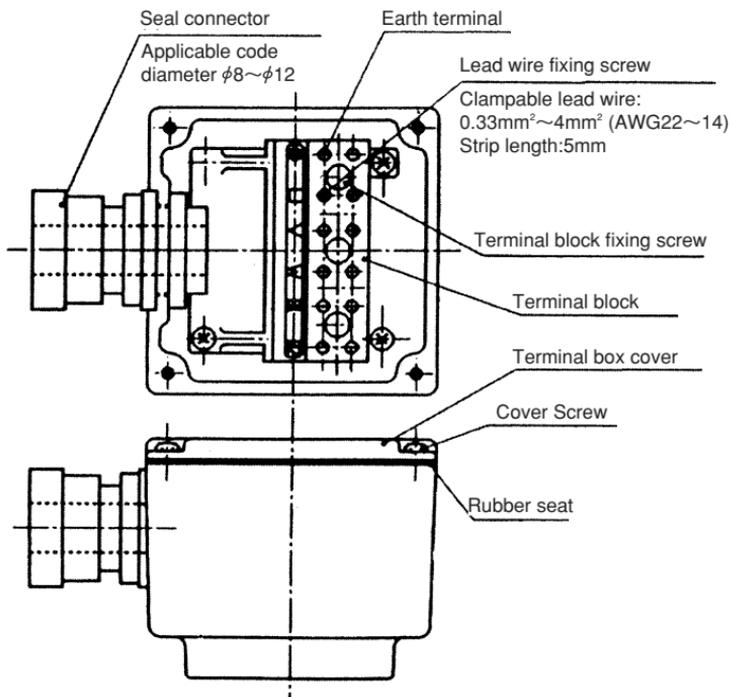
Gearmotors and lubricant should be disposed as general industrial waste.

12 Appendix (Gearmotor certified by TÜV)

When using this gearmotor, attention should be given to the followings in addition to the items 1~10 previously described:

1 GTR-E

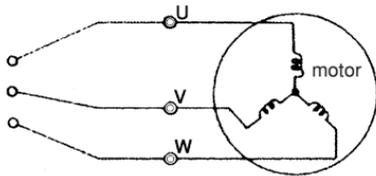
(1) Terminal box specifications



	Screw tightening torque
Lead wire fixing screw	0.4~0.6N·m (4 ~ 6 kgf·cm)
Terminal block fixing screw	0.4~0.6N·m (4 ~ 6 kgf·cm)
Cover Screw	0.4~0.6N·m (4 ~ 6 kgf·cm)

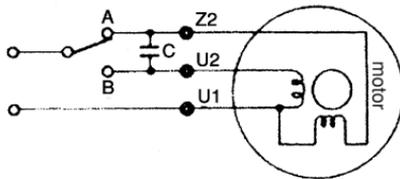
(2) Wiring for gearmotor

3-phase motor



To reverse, exchange any two of these connections.

single-phase motor



To reverse, exchange A and B.

(3) Wiring for gearmotor with brake

Refer to the wiring diagram shown in page 11. A rectifier is not built in. (A rectifier is supplied separately.) Terminals are indicated as B1 and B2.

2 Overload (Thermal) protector

① 3-phase motor

Motor should be protected by the thermal relay, which is certified for use in Europe.

The thermal set value should be the same as the current value specified in the name plate.

② Single-phase motor

A thermal protector is built in.

Once the thermal protector has tripped, be sure to inspect it after turning the power switch off.

(Trip temperature: $120^{\circ}\text{C} \pm 5^{\circ}\text{C}$, Reset temperature: under 105°C)

3 Grounding

① Ground should be connected to the provided ground terminal.

② Lead (Conductor) cross-section of the earth wire should be AWG18 (0.87mm)min.

③ The earth wire should be longer than the lead wire for the power source of the motor.

4 Range of use

This product is manufactured in accordance with the rated value of the overvoltage category II and Pollution degree 2 defined in the IEC664. The equipment should be energized through a transformer.

5 TÜV Certified Products

This motor has been certified as a product conform to the EN Standard by the TÜV PRODUCT SERVICE.

GTR-E Certificate No.: B 02 12 25470 002

13 Warranty

1. 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.

2. Scope of Warranty

- 1) The scope of our warranty is limited to our manufacture.
- 2) In case that any failures on the product by which proper functions of the product cannot be obtained arise during the above warranty term, although the product is properly operated under the condition that the product is properly installed in, connected to the machine, treated (including inspection and maintenance) in accordance with this Instruction Manual, we will provide appropriate repair on the product free of charge, except as stipulated in the Exception for Warranty as described below.

3. Exception for Warranty

This warranty shall not be applied to the problems, troubles or damages on the product which are caused by:

- 1) any repairs to the losses or damages caused by the disassemble, modification, change of parts or the substituted product delivered which are rendered by customer.
 - 2) customer's improper operation of the product not in conformity with the rated data specified in our catalogues or the specifications mutually agreed.
 - 3) any failures in the transmission part to customer's equipment (alignment of the shaft when coupling with other machine, etc.)
 - 4) disaster (earthquake, thunder, fire, flood, etc.) or human error such as wrong operation of the product.
 - 5) secondary failure caused by the damage of customers equipment.
 - 6) any losses caused by the parts, driving units (examples: electric motor, servomotor, hydraulic motor, etc.) which are supplied by customer.
 - 7) improper storage and maintenance of the product, or improper handling of the product.
 - 8) any other troubles, problems or damages on the product which are not attributable to our product liability.
 - 9) We are not responsible for the compensation against the loss of shutdown and/or for the damage to the equipments which are not produced by us, caused by the interruption of operation of our product.
- The items stipulated above are premised to apply to the transactions and specifications in domestic Japan. In case of the specifications in other countries, all the conditions are settled by the prior discussion between customer and our Sales Department.

NISSEI CORPORATION

Sales, Overseas Division

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