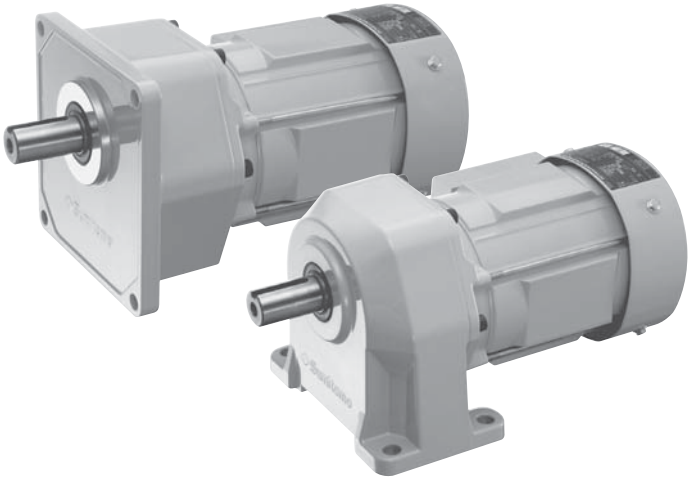
Sumitomo Drive Technologies

Always on the Move

PREST® NEO



- Gearmotors and reducers should be handled, installed and maintained by trained technicians. Carefully read the maintenance manual before use.
- A copy of this maintenance manual should be sent to the actual user.
- This maintenance manual should be maintained by the user for future reference.

Operating and Maintenance Manual No. ZM2302E-2

Safety and Other Precautions

- Carefully read this maintenance manual and all accompanying documents before use (installation, operation, maintenance, inspection, etc.). Thoroughly understand the machine, information about safety, and all precautions for correct operation. Retain this manual for future reference.
- Pay close attention to the "DANGER" and "CAUTION" warnings regarding safety and proper use.

DANGER : Improper handling may result in physical damage, serious personal injury and/or death.

CAUTION : Improper handling may result in physical damage and/or personal injury.

Matters described in **CAUTION** may lead to serious danger depending on the situation. Be sure to observe important matters described herein.

DANGER

- Transport, installation, plumbing, wiring, operation, maintenance, and inspections should be performed by trained technicians; otherwise, electric shock, personal injury, fire, or damage to the equipment may result.
- When using the equipment in conjunction with an explosion proof motor, a technician with electrical expertise should supervise the transport, installation, plumbing, wiring, operation, maintenance and inspection of the equipment so as to avoid a potentially nazardous sitnation that may result in electrical shock, fire, explosion, personal injury and/or damage to the equipment.
- When the unit is to be used in a system for human, transport a secondary safety device should be installed to minimize chances of accidents that may result in personal injury, death, or damage to the equipment.
- When the unit is to be used for an elevator, install a safety device on the elevator side to prevent it from falling; otherwise, personal injury, death, or damage to the equipment may result.

How to Refer to the Maintenance Manual

● This maintenance manual is common for gearmotors and gearmotors with brake (Brake motors). The symbols shown below appear in the upper right corner of each page to indicate the classification. Read the applicable pages. On COMMON pages, these symbols identify distinctions.

Specifications	Common specifications	Gearmotor	
		Without Brake	With Brake (Brakemotors)
Symbol	COMMON		

CONTENTS

1. Inspection Upon Delivery

⚠ CAUTION

- Unpack the unit after verifying that it is positioned right side up; otherwise, injury may result.
- Verify that the unit received is in fact the one you ordered. Installing the wrong unit may result in personal injury or equipment damage.
- Do not remove the rating plate.

Verify the items listed below upon receiving the gearmotor or reducer. If a nonconformity or problem is found, contact our nearest agent, distributor, or sales office.

(1) Does the information on the rating plate conform to what you ordered ?
(2) Was there any part broken during transport ?
(3) Are all bolts and nuts tightened firmly ?

1 – 1) How to Refer to the Rating Plate

Gearmotor

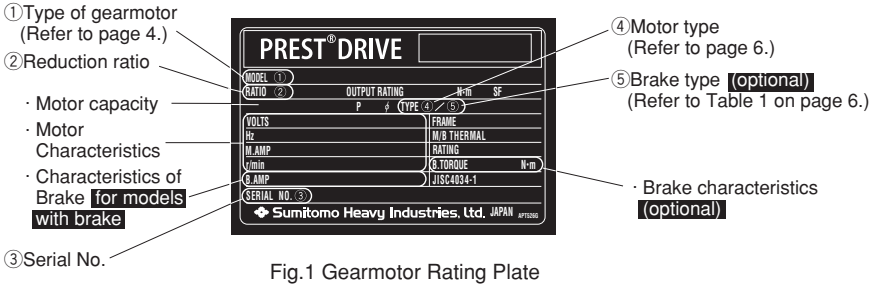


Fig.1 Gearmotor Rating Plate

COMMON

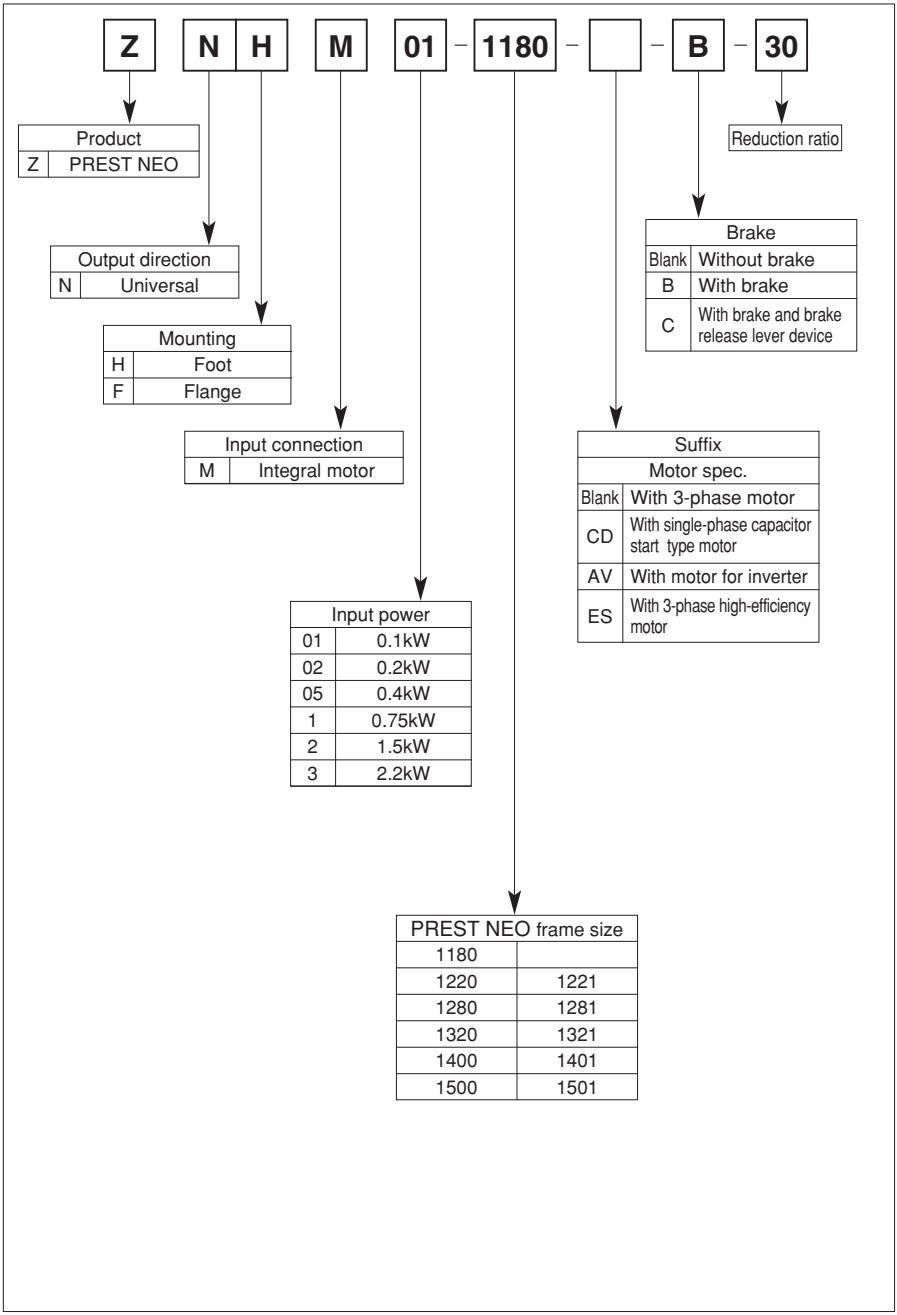
· When making an inquiry, advise us of ① the gearmotor or reducer type, ② reduction ratio, and ③ serial No.

1 – 2) Lubrication Method

All models gearmotor, PREST NEO, are grease-lubricated. They are grease-packed when shipped from our factory and arrive ready to operate.

1 – 3) Nomenclature of Gearmotor

Respective codes and PREST NEO nomenclature are shown below. Please verify that the type of gearmotor or reducer you received conforms to what you ordered.



1 – 4) Spec cord of Gearmotor

Respective codes and motor nomenclature are shown below. Please verify that the gearmotor type you received conforms to what you ordered.

Notes : Because the spec cord is displayed when the customer directs it, it mighe not be writen in the rating plate and statemen of delivery.

J	2	N	Q	L	A
①	②	③	④	⑤	⑥

1st digit International standard

J	JIS (Japan)
U	UL
N	NEMA
E	CE Marking
C	CCC
A	CSA
9	Others

3st digit Location

N	Indoor type
A	Outdoor type
B	Light dust proof type
E	Increased safety eG3
F	Increased safety eG3(Outdoor)
9	Others

5st digit Position of terminal box(Viewed from output side)

L	Left	R	Right
T	Top	B	Bottom

1st digit	Motor Type	2st digit 1	2	4	D	9
J (JIS)	Three phase motor	—	200/220 50/60	400/440 50/60	—	Other voltage
	Single phase motor	100 50/60	200 50/60	—	100/200 50/60	

4st digit Terminal box type

A	Made of Aluminum
B	Made of Aluminum,with terminal plate
P	Made of Plastic
S	Made of Steel
Q	Made of Plastic, with terminal plate
T	Made of Steel, with terminal plate
X	Without terminal box

1st digit	Motor Type	2st digit B
U (UR)	Three phase motor	230/460 60

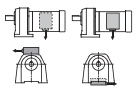
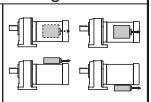
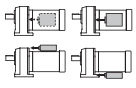
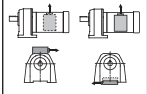
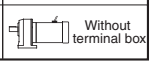
1st digit	Motor Type	2st digit B
A (CSA)	Three phase motor	230/460 60

1st digit	Motor Type	2st digit B
N (NEMA)	Three phase motor	230/460 60

1st digit	Motor Type	2st digit C
C (CCC)	Three phase motor	220/380 50

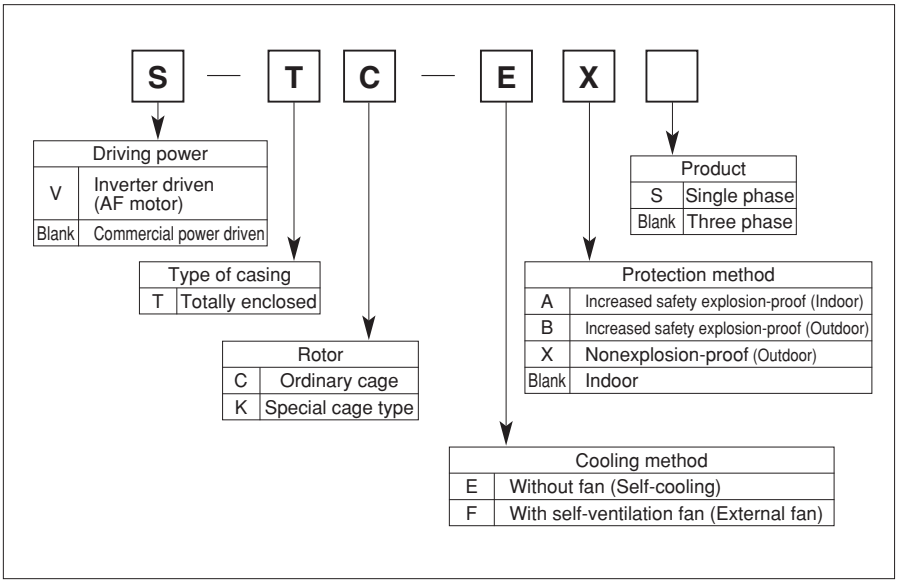
1st digit	Motor Type	2st digit 8
E (CE)	Three phase motor	230/400 50

6st digit Direction of with drawing lead wire

A		B	
C		D	
		X	 Without terminal box

1 – 5) Type of Motor

Respective codes and motor nomenclature are shown below. Please verify that the gearmotor type you received conforms to what you ordered.



1 – 6) Brake Type

The types of brake and the relationship between the motor capacity and brake delay time are as follows:

Table 1 Brake Type

	Motor capacity	Brake delay time (sec)	
	3-phase motor	Normal braking action	Fast braking action
FB-01A1	0.1kW	0.15 – 0.2	0.015 – 0.02
FB-02A1	0.2kW	0.15 – 0.2	0.015 – 0.02
FB-05A1	0.4kW	0.1 – 0.15	0.01 – 0.015
FB-1D	0.75kW	0.2 – 0.3	0.01 – 0.02
FB-2D	1.5kW	0.2 – 0.3	0.01 – 0.02
FB-3D	2.2kW	0.3 – 0.4	0.01 – 0.02

2. Storage

When storing gearmotors or reducers for any extended period of time, consider the following important points:

2 – 1) Storage Location

Store the unit in a clean, dry place indoors.

· Avoid storage outdoors or in places with humidity, dust, sudden temperature changes or corrosive gas.

2 – 2) Storage Period

(1) Storage period should be less than 1 year.
(2) When the storage period exceeds 1 year, special rust prevention is necessary. Contact the factory for details.
(3) Export models need export rust prevention. Contact the factory for details.

2 – 3) Use After Storage

(1) Oil seals will deteriorate when exposed to high temperatures and UV rays. Inspect the oil seals before operation. Replace the oil seals after long-term storage if there is any sign of deterioration.
(2) After starting the gearmotor or reducer, verify that there is no abnormal sound, vibration or heat built-up. If supplied as a brakemotor verify that the brake operates properly. If any anomaly is observed, contact our nearest agent, distributor or sales office.

3. Transport

DANGER

● Do not stand directly under a unit suspended by a crane or other lifting mechanism; otherwise, injury or death may result.

CAUTION

● Exercise ample care so as not to drop the gearmotor or reducer. When a hanging bolt or hole is provided, be sure to use it. After mounting a gearmotor unit to the equipment, do not hoist the entire machine using the hanging bolt or hole; otherwise, personal injury or damage to the equipment and/or lifting device may result.
● Before hoisting, refer to the rating plate, crate, outline drawing, catalog, etc. for the weight of the gearmotor. Never hoist a unit that exceeds the rating of the crane or other mechanism being used to lift it; otherwise, personal injury or damage to the equipment and/or lifting device may result.

4. Installation

DANGER

- Do not use a standard unit in an explosive atmosphere (which is likely to be filled with explosive gas or steam). Under such conditions, an explosion-proof motor should be used; otherwise, electric shock, personal injury, fire, explosion, or damage to the equipment may result.

CAUTION

- Do not use the gearmotor for purposes other than those shown on the rating plate or in the manufacturing specifications; otherwise, electric shock, personal injury, or damage to the equipment may result.
- Do not place flammable objects around the gearmotor; otherwise, fire may result.
- Do not place any object around the gearmotor; that will hinder ventilation; otherwise, excessive heat may build-up and cause burns or even fire.
- Do not step on or hang from the gearmotor; otherwise injury may result.
- Do not touch the shaft end of the gearmotor, inside keyways, or the edge of the motor cooling fan with bare hands; otherwise, injury may result.
- When the unit is used in food processing applications vulnerable to oil contamination, install an oil pan or other such device to cope with oil leakage due to failure or breakdown; otherwise, oil leakage may damage products.

4 – 1) Installation Location

Ambient temperature: –10˚C to + 40˚C

Ambient humidity: 85% max.

Altitude: 1000 m max.

Ambient atmosphere: There should be no corrosive gas, explosive gas, or steam. The location should be well ventilated without dust.

Installation location: Indoors, with minimal dust and no water contact.

· Units made to special specifications are necessary for installation under conditions other than the above.
· Units made according to the outdoor, explosion-proof or other specifications can be used under the specified conditions without any problem.
· Install units where inspection, maintenance, and other such operations can be easily carried out.
· Install units on a sufficiently rigid base.

4 – 2) Installation Angle

There is no restriction on the installation angle.
(For outdoor type gearmotors, standard installation angle is horizontal in the axial direction. Contact us for other axial directions.)

5. Coupling with Other Machines

⚠ CAUTION

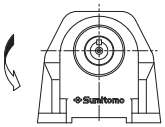
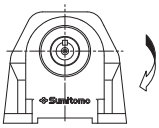
- Confirm the rotation direction before coupling the unit with the driven machine. Incorrect rotation direction may cause personal injury or damage to the equipment.
- When operating the gearmotor or reducer alone (uncoupled), remove the key that is temporarily attached to the output shaft; otherwise, personal injury may result.
- Cover the rotating parts; otherwise, personal injury may result.
- When coupling the gearmotor or reducer with a load, check that the centering, the belt tension and parallelism of the pulleys are within the specified limits. When the unit is directly coupled with another machine, check that the direct coupling accuracy is within the specified limits. When a belt is used for coupling the unit with another machine, check the belt tension. Correctly tighten bolts on the pulley and coupling before operation; otherwise, personal injury may result because of misalignment.

5 – 1) Confirming Rotation Direction

Gearmotor  

Figure 2 shows the rotation direction of the output shaft when wires are connected as shown in Fig. 10 – 14 on page 15 – 19.

Fig. 2 Rotation direction of slow speed shaft

When the motor wiring conforms to Fig. 10 – 14, the motor shaft turns clockwise viewed from the load side. Rotation direction of output shaft is in the direction of the arrow in the diagrams below.		
Frame size	Reduction ratio	
1180#	3, 5, 10, 15, 20, 25, 30, 40, 50	–
1220#	3, 5, 10, 15, 20, 25, 30	60, 80, 100, 120, 160, 200
1221#	30	40, 50, 60, 80, 100
1280#	3, 5, 10, 15, 20, 25, 30	100, 120, 160, 200
1281#	30	40, 50, 60, 80, 100
1320#	3, 5, 10, 15, 20, 25, 30	100, 120, 160, 200
1321#	30	40, 50, 60, 80, 100
1400#	3, 5, 10, 15, 20, 25, 30	100, 120, 160, 200
1401#	30	40, 50, 60, 80, 100
1500#	–	100, 120, 160, 200
1501#	30	40, 50, 60, 80, 100
Rotation direction of slow speed shaft. (Viewed from load side)	 the same direction as rotation of the motor shaft	 the opposite direction as rotation of the motor shaft

· Change the positions of R and T shown in Fig. 10, 12 – 14 to reverse the rotation of three-phase motors.

· Change the positions of Z_1 and Z_2 shown in Fig. 11 to reverse the rotation of single-phase motors.

5 – 2) Coupling Installation

· When installing a coupling, do not impact or apply excessive thrust load to the shaft; otherwise, the bearing may be damaged.
· Thermal shrinking or end cap screws are recommended for mounting (Fig. 3).

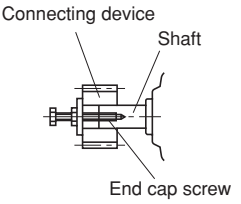


Fig. 3

(1) When using a Coupling
The accuracy of the dimensions (A, B, and X) shown in Fig. 4 should be within the toleronce shown in Table 2.

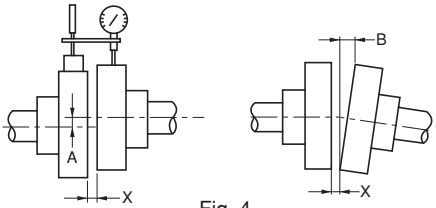
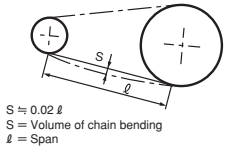


Fig. 4

Table 2 Centering accuracy of flexible coupling

A Dimension Tolerance	0.1mm or manufacturer's specification
B Dimension Tolerance	0.1mm or manufacturer's specification
X dimension	manufacturer's specification

Fig. 5 Chain Tension



(2) When using a Chain Sprocket and Gear
· The chain tension angle should be perpendicular to the shaft.
· When using a chain, attention volume of bending. If the volume of chain bending is large, it has bad influence on the driven machine or gearmotor that heavy shock occurs.
Therefore make the volume of bending around 2% of the span of sprocket. (Fig. 5)
· It is no problem that the chain shaft is arranged at any layout. However, adjust the upper part to the tension side at the horizontal layout. Avoid vertical arrangement of sprockets. Arrange them that large one is as below as possible when it is unavoidable, at any direction of rotation.

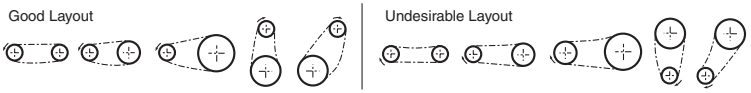


Fig. 6 Layout of chain

· Select sprockets and gears whose pitch diameter are three times the shaft diameter or greater.
· Install sprocket and gears so that their point of load application will be closer to the gearmotor or reducer side with respect to the length of the shaft. (Fig. 7)

(3) When using a V-belt
· Excessive V-belt tension will damage the shaft and bearing. Refer to the V-belt catalog for proper tension.
· The parallelism and eccentricity (β) between two pulleys should be within 20'. (Fig. 8)
· Use a matched set with the same circumferential length when more than one belt is to be installed.

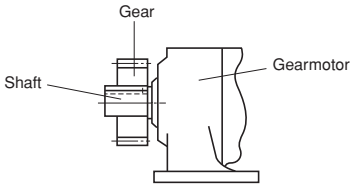


Fig. 7

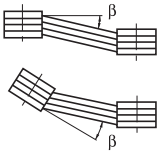


Fig. 8

6. Wiring

❍ Wiring for SUMITOMO standard 3-phase motor is shown below. Refer to the respective instruction manual when using another manufacturer's motor.

⚠ DANGER

- Do not handle the unit when cables are live. Be sure to turn off the power; otherwise, electric shock may result.
- Connect a power cable to the unit according to the connection diagram shown inside the terminal box or in the maintenance manual; otherwise, electric shock or fire may result.
- Do not forcibly curve, pull, or clamp the power cable and lead wires; otherwise, electric shock or fire may result.
- Correctly ground the grounding bolt; otherwise, electric shock may result.
- The lead-in condition of an explosion-proof type motor shall conform to the facility's electrical codes extension regulations, and explosion-proofing guide, as well as the maintenance manual; otherwise, explosion, electric shock, personal injury, fire or damage to the equipment may result.

⚠ CAUTION

- When wiring, follow the facility's electrical codes and extension regulations; otherwise, burning, electric shock, injury, or fire may result.
- The motor is not equipped with a protective device. However, it is compulsory to install an overload protector according to facility electrical codes. It is recommended to install other protective devices (earth leakage breaker, etc.), in addition to an overload protector, in order to prevent burning, electric shock, personal injury, and fire.
- Do not pull cable strongly from the terminal plate. The terminal plate may be broken.
- Check screws of the terminal plate have not loosen.
- Never touch the terminals when measuring insulation resistance; otherwise, electric shock may result.
- When measuring the insulation resistance of an explosion-proof type motor, confirm that there is no gas, steam, or other explosive substance in the vicinity, in order to prevent possible explosion or ignition.
- When using a 400V-class inverter to drive the motor, mount a suppresser filter or reactor on the inverter side, or provide reinforced insulation on the motor side; otherwise, dielectric breakdown may cause fire or damage to the equipment.
- For brake motors, install a rectifier in a place where the temperature is 60˚C or below; if the ambient temperature exceeds 60˚C, be sure to use a cover for protection.
- For brake motors, do not electrify a brake coil continuously when a motor is stopping; otherwise, a brake coil may burn and fire may result.

· Long cables cause voltage to drop. Select cables with appropriate diameter so that the voltage drop will be less than 2%.
· After wiring outdoor and explosion-proof type motors, check that terminal box mounting bolts are not loose, and correctly attach the terminal box cover.

6 – 1) Attaching/Detaching The Terminal Box Cover

(1) Detaching

As shown in Fig. 9, hold both sides of the terminal box and pull it towards you. The cover will detach.

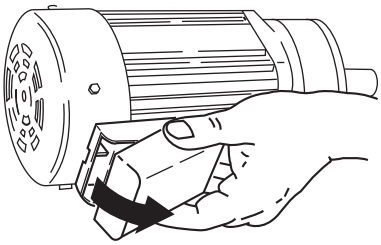


Fig. 9

(2) Attaching

Press the terminal box cover to the terminal box case until it snaps into place.

6 – 2) Measuring Insulation Resistance

When measuring the insulation resistance, disconnect the motor from the control panel. Check the motor separately.

Measure the insulation resistance before wiring. The insulation resistance (R) varies according to the motor output, voltage, type of insulation, coil temperature, humidity, dirt, period of operation, test electrification time, etc. Usually, the insulation resistance exceeds the values shown in Table 3.

Table 3 Insulation resistance

Megohmmeter voltage	Insulation resistance (R)
500V	1MΩ or more

Reference: The following equations are shown in JEC – 2100.

$$R \geqq \frac{\text{Rated voltage (V)}}{\text{Rated output (kW)} + 1000} \quad (M\Omega)$$

$$R \geqq \frac{\text{Rated voltage (V)} + \text{Speed (rpm)}/3}{\text{Rated output (kW)} + 2000} + 0.5\ (M\Omega)$$

A drop in insulation resistance may be attributed to poor insulation. In that case, do not turn on the power. Contact our nearest agent, distributor, or sales office.

6 – 3) Protection Coordination

(1) Use a molded case circuit breaker for protection against short circuit.
(2) Use an overload protection device that protects the unit against asurge of electric current exceeding that shown on the rating plate.
(3) For an explosion-proof type motor, use an overload protector that can protect the unit within the allowable binding hour by means of the locked rotor current shown on the rating plate.

6 – 4) Single-Phase Motor Condenser Specification

Table 4-a 0.1, 0.2kW Capacitor start type Single Phase Motor Condenser Specification

Motor voltage	Motor capacity(W)	For starting	
		Condenser capacity(μF)	Condenser Voltage Resistance (V)
100V, 200V	0.1	100	125
	0.2	200	125

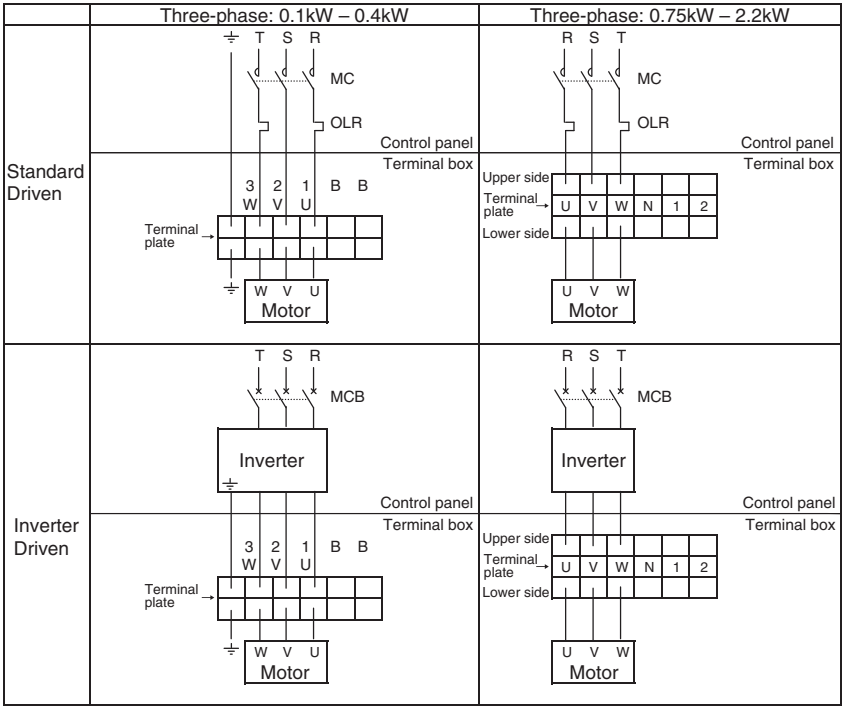
Table 4-b 0.4kW Capacitor start and run type Signle Phase Motor Condenser Specification

Motor voltage	Motor capacity (W)	For starting		For operation	
		Condenser capacity(μF)	Condenser Voltage Resistance (V)	Condenser capacity(μF)	Condenser Voltage Resistance (V)
100V/200V	0.4	200	125	40	230

6 – 5) Three-Phase Motor and Single-Phase Motor (without brake) Connection

Fig. 10 shows the three-phase motor (without brake) connection and the standard specifications for terminal codes.

Fig. 10 Three-phase motor connection and terminal code



· Change the positions of R and T to reverse the rotation of three-phase standard motors.

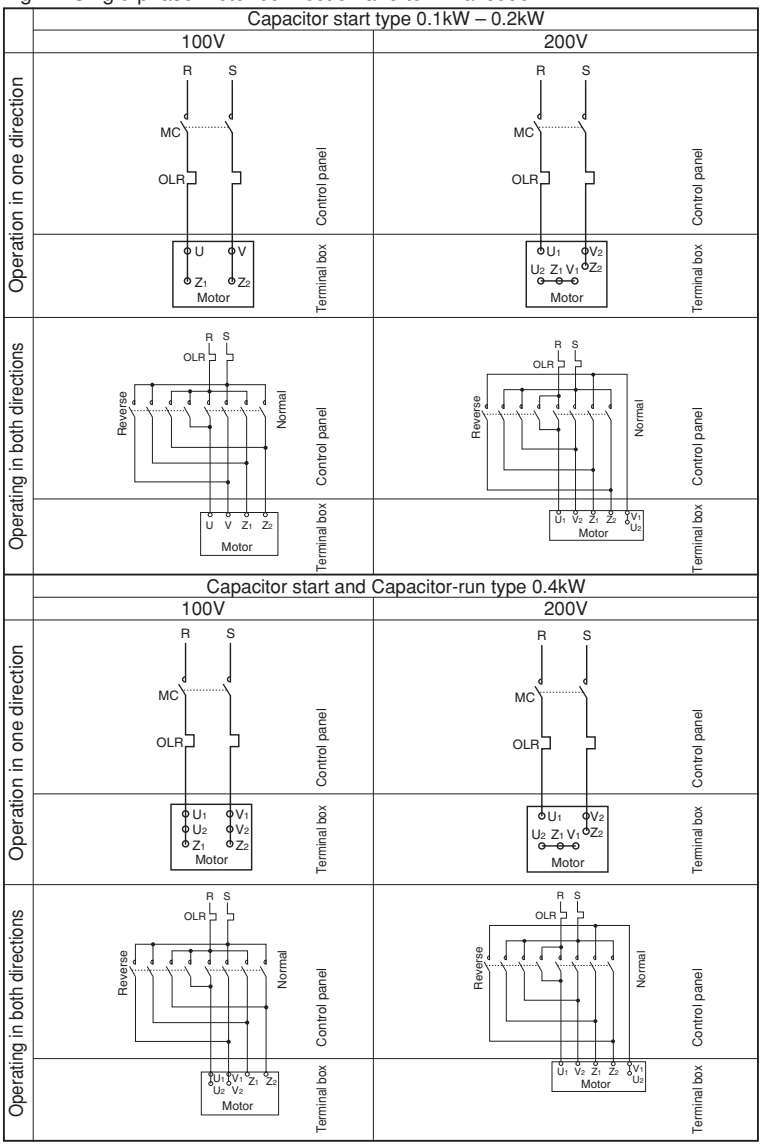
· Change the positions of R and T to reverse the rotation of three-phase standard motors.

· The terminal plate is two row structure as shown in the above figure.
Connect wiring from power sorce for motor to upper side shown in figure above.

MC: Electromagnetic contactor
OLR: Overload relay or thermal relay
MCB: Molded case circuit breaker
— These should be furnished by the customer

Fig. 11 shows the single-phase motor (without brake) connection and the standard specifications for terminal codes.

Fig. 11 Single-phase motor connection and terminal code.



Note: When operating in the reversed direction, exchange X and Y in the above diagrams.

Note : Change the positions of Z1 and Z2 after stopping the motor in order to reverse the rotation it.

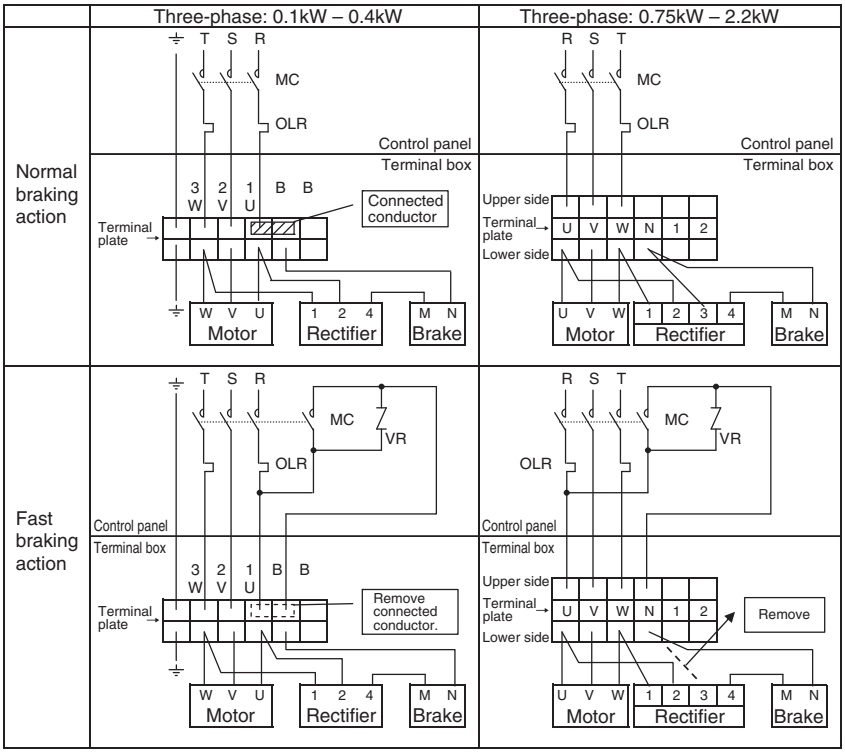
MC: Electromagnetic contactor
OLR: Overload relay or thermal relay
SW: Rotation shifting switch
— These should be furnished by the customer

C: Condenser — Accessory

6 – 6) Three-Phase Motor · Single-Phase Motor With Brake

Fig. 12 shows the three-phase motor with brake connection and the standard specifications for terminal code.

Fig. 12 Three-phase motor with brake connection and terminal code



· Change the positions of R and T to reverse the rotation of three-phase standard motors.

· Change the positions of R and T to reverse the rotation of three-phase standard motors.

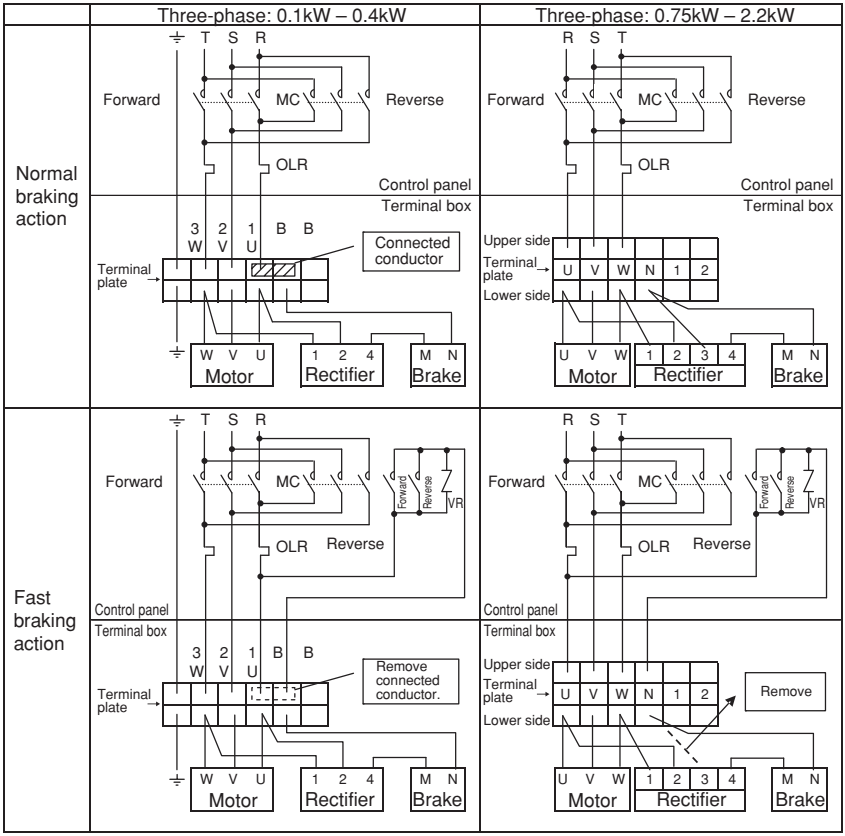
· The terminal plate is two row structure as shown in the above figure.
Connect wiring from power sorce for motor to upper side shown in figure above.

MC: Electromagnetic contactor
OLR: Overload relay or thermal relay
VR: Varistor (protector element)

These should be furnished by the customer

Fig. 13 shows the three-phase motor with brake connection and the standard specifications for terminal code.

Fig. 13 Three-phase motor with brake connection and terminal code.
(For operating in both directions)



· Change the positions of R and T to reverse the rotation of three-phase standard motors.

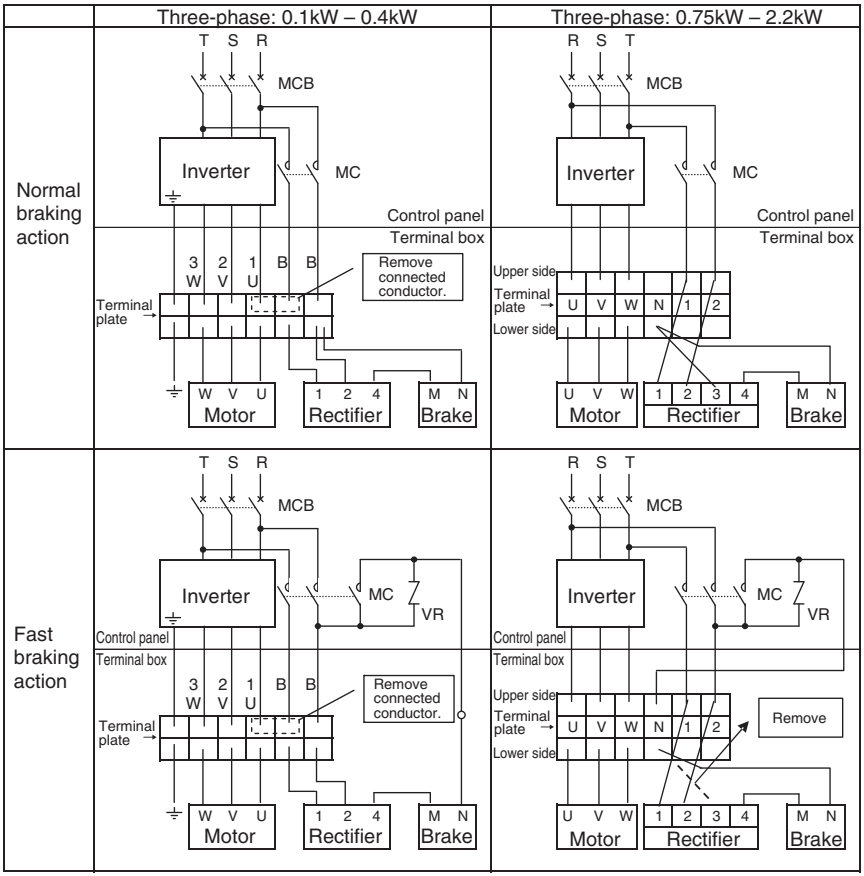
· Change the positions of R and T to reverse the rotation of three-phase standard motors.

· The terminal plate is two row structure as shown in the above figure.
Connect wiring from power sorce for motor to upper side shown in figure above.

MC: Electromagnetic contactor
OLR: Overload relay or thermal relay
VR: Varistor (protector element)
— These should be furnished by the customer

Fig. 14 shows the three-phase motor with brake connection and the standard specifications for terminal code.

Fig. 14 Three-phase motor with brake connection and terminal code. (For inverter driven)



· Change wiring at "1" and "2" on the rectifier.

· Change wiring at "1" and "2" on the rectifier.

· The terminal plate is two row structure as shown in the above figure.
Connect wiring from power sorce for motor to upper side shown in figure above.

MCB: Molded case circuit breaker
MC: Electromagnetic contactor
VR: Varistor (protector element)

These should be furnished by the customer

Table 5 Varistor (VR) Capacity

Motor power			AC100V – 230V	AC380V – 460V
Rated voltage of varistor			AC260V – AC300V	AC510V
Varistor voltage			430V – 470V	820V
Rated power of varistor	Brake type	FB-01A1, 02A1, 05A1	0.2Watt or more	0.4Watt or more
		FB-1D	0.4Watt or more	0.6Watt or more
		FB-2D, 3D	0.6Watt or more	1.5Watt or more

· The brake delay time of the normal braking action is different from that of the fast braking action. Table 1 on page 6 shows the delay time. Use a circuit that meets your requirements.
· DC braking capacity (for DC coil loading) exceeding 5 times the braking current shown on the name plate is recommended for the fast braking action.

· Use fast braking action for lifting devices or for better stopping accuracy.
· Use fast braking action when a leading capacitor is used.

· Pay attention to the following items when driving an inverter.

· For the inverter-driven motor with a brake, use the primary-side power supply for braking as shown in Fig.14, and synchronize the braking operation with the ON/OFF operation of the unit.
· For the inverter-driven motor with a brake, interlocking with the inverter is necessary to engage/release the MC. Refer to the inverter maintenance manual or guide.
· During the low speed running, the mechanical life might be in danger of being shortened by reducing the cooling ability. When it happens, please reduce the time that brake's power is on.

7. Operation

⚠ DANGER

- Do not approach or touch rotating parts (output shaft, etc.) during operation; loose clothing may become caught in these rotating parts and cause serious injury or death.
- When the power supply is interrupted, be sure to turn off the power switch. Unexpected resumption of power may cause electric shock, personal injury, or damage to the equipment.
- Do not operate the unit with the terminal box cover removed. Return the terminal box cover to the original position after maintenance in order to electric shock.
- Do not open the terminal box cover when power is supplied to an explosion-proof type motor prevent otherwise, explosion, ignition, electric shock, personal injury, fire, or damage to the equipment may result.
- For motors equipped with brakes, do not operate with brakes released by the manual loosening bolt, otherwise the motor may fall or go out of control.

⚠ CAUTION

- Do not put fingers or foreign objects into the opening of the gearmotor or reducer, otherwise electric shock, personal injury, fire, or damage to the equipment may result.
- The gearmotor or reducer becomes very hot during operation. Do not touch or come in contact with the unit; otherwise, burns may result.
- If any abnormality occurs during operation, stop operation immediately; otherwise, electric shock, personal injury, or fire may result.
- Do not operate the unit in excess of the rating; otherwise, personal injury or damage to the equipment may result.
- Do not touch the charging portion of the starting capacitor of a single-phase motor until the capacitor has discharged completely, otherwise electric shock may result.

After the unit is installed and properly wired, check the following before operating.

(1) Is the wiring correct ?
(2) Is the unit properly coupled with the driven ?
(3) Are foundation bolts tightened firmly ?
(4) Is the direction of rotation as required ?

After confirming these items, conduct initial break-in without a load; then gradually apply a load. Check the items shown in Table 6 on page 18.

Table 6 Items to check during initial start-up and break-in period

Is abnormal sound or vibration generated ?	(1) Is the housing deformed because the installation surface is not flat ? (2) Is insufficient rigidity of the installation base generating excessive noise ? (3) Is the shaft center aligned with the driven machine ? (4) Is the vibration of the driven machine transmitted to the gearmotor or reducer ?
Is the surface temperature of the gearmotor or reducer abnormally high ?	(1) Is the voltage rise or drop substantial ? (2) Is the ambient temperature too high ? (3) Does the current flowing to the gearmotor exceed the rated current shown on the rating plate ?

If any abnormality is found, stop operation and contact our nearest agent, distributor, or sales office.

8. Daily Inspection and Maintenance

⚠ DANGER

- Do not handle the unit when cables are live. Be sure to turn off the power; otherwise, electric shock may result.
- Do not approach or touch any rotating parts (output shaft, etc.) during maintenance or inspection of the unit; loose clothing may become caught in these rotating parts and cause serious injury or death.
- Customers shall not disassemble or modify explosion-proof type motors; otherwise, explosion, ignition, electric shock, or damage to the equipment may result.
- The lead-in condition of an explosion-proof type motor shall conform to the facilities electrical codes, extension regulations and explosion-proofing guide, as well as the maintenance manual; otherwise, explosion, ignition, electric shock, or damage to the equipment may result.

⚠ CAUTION

- Do not put fingers or foreign objects into the opening of the gearmotor or reducer; otherwise, electric shock, personal injury, fire, or damage to the equipment may result.
- The gearmotor or reducer becomes very hot during operation. Touching the unit with bare hands may result in serious burns.
- Do not touch the terminal when measuring insulation resistance; otherwise, electric shock may result.
- Promptly identify and correct, according to instructions in this manual, any abnormalities observed during operation. Do not operate until abnormality is corrected.
- Do not use damaged gearmotors or reducers; otherwise, personal injury, fire, or damage to the equipment may result.
- We can not assume any responsibility for damage or injury resulting from an unauthorized modification by a customer.
- Dispose gearmotor or reducer, lubricant as general industrial waste.
- When measuring the insulation resistance of an explosion-proof type motor, confirm that there is no gas, steam, or other explosive substance around the unit in order to prevent, explosion or ignition.

· The gear section is filled with long-life grease that allows it to operate for extended periods without replenishment. However, overhaul the gear section every 20,000 hours or 3 to 5 years to ensure long service life.
· Overhauling the gearmotor or reducer reguires specific skills. Be sure to use a workshop specified by Sumitomo for overhaul.

To ensure proper and continued optimum operation, use Table 7 to perform daily inspections.

Table 7 Daily Inspection

Inspection item	Details of inspection
Electric current 	Is the current below the rated current shown on the rating plate ?
Noise	Is there abnormal sound ? Is there sudden change in sound ?
Vibration	Is there excessive vibration ? Does vibration change suddenly ?
Surface temperature	Is the surface temperature abnormally high ? Does the surface temperature rise suddenly ? (The temperature rise during operation differs according to the model. When the difference between the temperature of the gear surface and the ambient temperature is approx. 40˚C degrees, there will be no problem if there is no fluctuation.)
Grease leakage	Does oil or grease leak from the gear section ?
Foundation bolt	Are foundation bolts loose ?
Chain and V-belt	Are chain and V-belt loose ?
Brake 	Is the brake lining abraded ? (After operation for an extended period of time, the brake lining becomes abraded. Check the brake gap occasionally, following instructions in section 9, Brake Inspection / Maintenance (page 24 – 28).)

When any abnormality is found during the daily inspection, take corrective measures according to Section 10, Troubleshooting (pages 29 and 30.) If the abnormality connot be eliminated, contact our nearest agent, distributor, or sales office.

9. Brake Maintenance

❍ section discusses the operation and maintenance of the sumitomo brake. (When using another manufacturer's brake, please refer to their maintenance manual.)

⚠ DANGER

- Do not handle the unit when cables are live. Be sure to turn off the power; otherwise, electric shock may result.
- When the motor is used for lifting, do not release the brake while a load is lifted, otherwise the load may fall, leading to an accident.
- Do not operate the motor with the brake released by the manual loosening bolt, otherwise the motor may fall or go out of control.
- Turn on and off the power to check the braking operation before starting the motor, otherwise the motor may fall or go out of control.
- Do not allow water or grease to collect on the brake, otherwise the motor may fall or go out of control due to a drop in the brake torque.
- In the initial operation or right after exchange of the brake lining, specified braking torque might not be outputted. When this happens, under the least loading, turn the power switch on and off to rub the friction sides together.

⚠ CAUTION

- After inspection and/or adjustment of the gap, do not operate the motor without replacing the fan cover; otherwise loose clothing may become caught in rotating parts and cause serious injury.
- Replacing the brake lining reguires specific skills. Be sure to use a workshop specified by sumitomo for brake replacement.
- Because of the brake structure, rubbing noise of the lining might be made, which has no problems with the performance.

· The mechanical life of the FB brake is 2,000,000 times, but periodically check the brake gap G. After use for an extended period of time, the brake lining will be abraded, making it impossible to release the brake. When the brake is used for more than 2,000,000 times, the motor may fall or go out of control because of the abrasion or breakage of mechanical parts.

9 – 1) Construction and Operation

Figs. 15 – 16 show the construction of the brake. A spring is used for braking operation (nonexcitation operation type).

0.1kW – 0.4kW

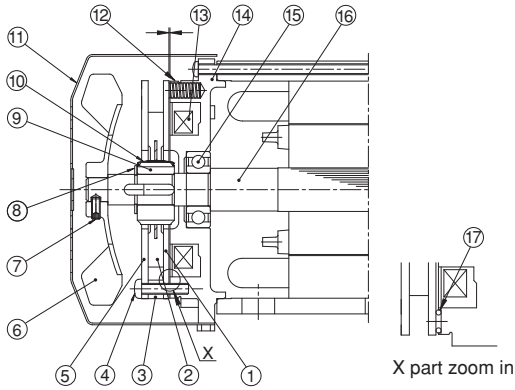


Fig. 15 FB-01A1, 02A1, 05A1

No.	Part name
1	Armature core
2	Brake lining
3	Spacer
4	Assembling bolt
5	Fixed plate
6	Fan
7	Fan setting belt
8	Shaft retaining C-ring
9	Boss
10	Leaf spring
11	Cover
12	Spring
13	Electromagnetic coil
14	Stationary core
15	Ball bearing
16	Motor shaft
17	Shock absorber

0.75kW – 2.2kW

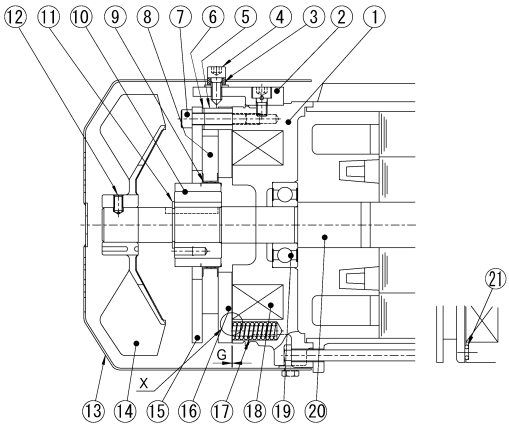


Fig. 16 FB-1D, 2D, 3D

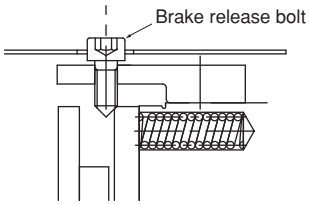
No.	Part name
1	Stationary core
2	Release fitting
3	Manual release prevention spacer
4	Brake release bolt
5	Spacer
6	Gap adjusting shim
7	Assembling bolt
8	Brake lining
9	Leaf spring
10	Boss
11	Shaft retaining C-ring
12	Fan setting bolt
13	Cover
14	Fan
15	Fixed plate
16	Armature core
17	Spring
18	Electromagnetic coil
19	Ball bearing
20	Motor shaft
21	Shock absorber

9 – 2) Manual Release Operation of Brake

To manually release the brake without turning on the power, operate the brake release device as follows:
FB-1D – 3D (FB-01A1 – 05A1 are options.)

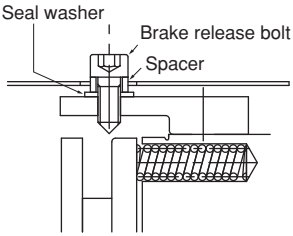
(1) Remove the brake release bolts arranged diagonal to each other, and remove the spacer. Then screw in the bolts with a hexagon wrench, and the brake will be released. Be careful not to turn the brake release bolts excessively. (Check to see if the brake is released, while turning the brake release bolts.) (See Fig. 17.)

(2) To return to the original state after releasing the bolts, re-install the spacer, which was removed in step (1), to the original position for safety. (See Fig. 18.)



During releasing

Fig. 17



During operation

Fig. 18

Do not operate while the brake is released manually. Make sure to check the brake motion by turning the switch on and off before actual operation.

9 – 3) Gap Inspection

Brake gap expands after extended use, due to brake lining wear. Exceeding the limit value of brake gap may cause abnormal operation, such as brake release taking longer or brake release not functioning correctly. Periodically check the gap G as follows:

(1) Remove the cover.

(2) Insert the feeler gauge between the stationary and armature cores to measure the gap. When the gap is near the limit shown in Table 7, adjustment is necessary. Measure three points along the circumference. (The minimum thickness of the gap adjusting shim for FB-1D – 3D is 0.2 – 0.25 mm.)

Note: FB-01 – 05A1 and FB-1D – 3D includes shock absorber between core and armature core to lower brake noise. Locations of shock absorber are equally distributed four locations with focus on places below.

FB-01A1 – 05A1: Near the attachment bolt

FB-1D – 2D: Near the through bolt*1

FB-3D has 4 shock absorbers placed equidistance to each other, based on the location of release bolt.

Be careful not to damage shock absorbers such as with tools and measuring instruments, such as gap gauge, at the time of inspection. Damage or loss of shock absorbers may result in larger brake noise or malfunction.

*1. Through bolt: Bolt to fix core and motor frame.

Table 8 Brake Gap

Type of brake	Gap G (mm)	
	Specification	Limit
FB-01A1 FB-02A1 FB-05A1	0.2 – 0.35	0.5
FB-1D	0.3 – 0.4	0.6
FB-2D	0.3 – 0.4	0.6
FB-3D	0.3 – 0.4	0.7

9 – 4) Gap Adjustment

Follow the steps below to adjust the gap when the gap measurement is becoming closer to the limit indicated in Table 8. Exceeding the gap limit may cause malfunction.

FB – 01A1, 02A1, 05A1 (Refer to Fig. 15 on page 25.)

(1) Remove cover ⑪.

(2) Slightly loosen assembly bolt ④, and turn fixed plate ⑤ counterclockwise to the maximum. Then tighten the assembly bolt. After tightening, measure the gap G, and confirm that it is between the specification and limit. (After this operation, the gap will decrease by approx. 0.3mm.)

(3) After adjusting the gap, check the brake's performance by turning the system power on and off a few times.

(4) Install cover ⑪.

FB – 1D, 2D, 3D (Refer to Fig. 16 on page 25)

(1) Remove cover ⑬.

(2) Remove fan set bolt ⑫, and remove fan ⑭.

(3) Loosen assembly bolt ⑦, and remove spacer ⑤, gap adjusting shim ⑥, assembly bolt ⑦, and fixed plate ⑮ together as a set. Be careful not to remove assembly bolt ⑦ alone; otherwise, gap adjusting shim ⑥ will drop.

Note: Be careful not to lose the shock absorber ㉑.

(4) Gap adjusting shim ⑥ is approx. 0.2 mm thick. Reduce the number of shims according to the amount of abrasion, and reassemble spacer ⑤, gap adjusting shim ⑥, assembly bolt ⑦, and fixed plate ⑮ together as a set.

(5) Check the gap G, and if it is substantially different from the specification, readjust the shim.

(6) After adjusting the gap, check the brakes performance by turning the system power on and off a few times.

(7) Install fan ⑭, fan set bolt ⑫, and cover ⑬. Apply locking agent to fan setting bolt at this point.

9 – 5) Brake Lining Replacement

Replace the brake lining with a new one when it reaches the limit thickness on Table 9 (when reaching limit brake gap after readjusting the gap of FB-01A, 02A1, and 05A1).

Table 9 Brake Lining Dimension

Brake Nomenclature	Brake Lining	Initial Thickness to (mm)	Thickness Limit to (mm)
FB-01A1 FB-02A1 FB-05A1		7.0	
FB-1D		7.0	6.0
FB-2D		8.8	7.8
FB-3D		9.0	8.0

10. Troubleshooting

If any abnormality is found in the gearmotor or reducer, refer to Table 10 below and take appropriate measures as soon as possible. If the abnormality cannot be eliminated, contact our nearest agent, dealer or sales office.

Table 10 Troubleshooting

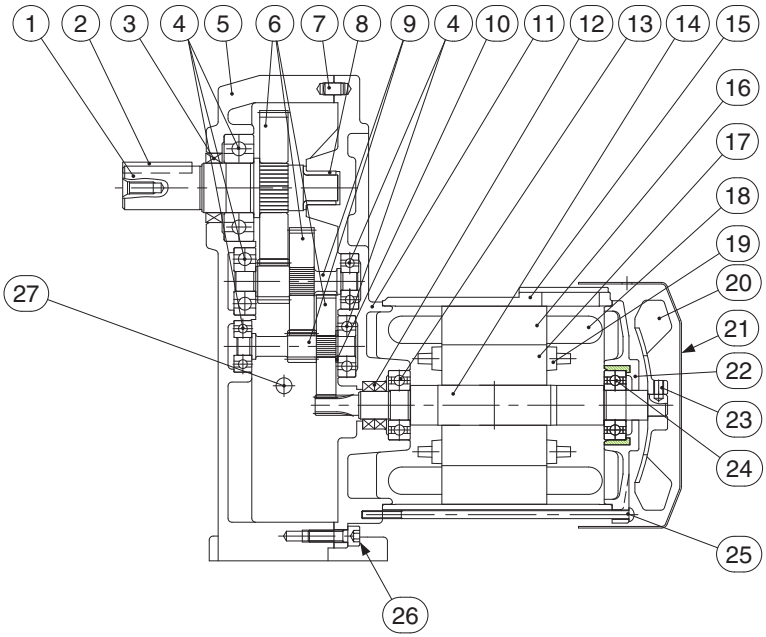
Type of Trouble			Cause	Remedy
 The motor does not run in the unloaded condition.			Power failure	Contact the power supply company.
			Defective electric circuit	Check the defective portion of electric circuit.
			Fusing	Replace the fuse.
			Safety device at work	Eliminate a cause of incorrect safety device actuation.
			Locking of the load	Check and investigate the load and the safety device.
			Poor contact of swich	Adjust the contact.
			Disconnection of motor stator wiring	Replace the gearmotor
			Broken bearing	Replace the gearmotor
			Three-phase motor acting as single-phase motor (3-phase motor)	Check the power sorce using a voltmeter. Repair or replace the motor, transformer coils, contactors and fuses.
			Brake: Rust on friction surface	Cleaning of brake (lining) at special workshop
			Brake: Poor gap adjustment	Fine adjustment of brake gap. (Page 27)
The motor works but the output shaft does not work.			Defective gear drives due to overloading etc.	
The output shaft rotates without loading, but	When loaded	Switch is overheated.	Insufficient switch capacity	Replace the switch with one having the specified capacity.
			Overloading	Reduce the load to the specified level.
		Fuse is cut.	Insufficient fuse capacity	Replace the fuse with one having a specified capacity.
			Overloading	Reduce the load to the specified level.
		Rotating speed does not increase and overheated.	Voltage drop	Consult with the power supply company.
			Overloading	Reduce the load to the specified level.
			Short circuit of motor stator winding	Repair the stator at a specialized workshop.
		Motor stops.	The key is not set on the shaft	Set the key.
			Burned bearing	
			Defective adjustment of the safety device	Adjust the safety device.
	The motor rotates reversely.		Wrong connection	Connect correctly.
	Disconnected fuse.		Short-circuit of the lead wire	
			Poor connection of the motor with the starter	Connect firmly.
Excessive rise in temperature			Overloading	Reduce the load to a specified level.
			Increased or decreased voltage	Consult with the power supply company.
			Ambient temperature is too high.	Improve the ventilation method.
			Failure due to overloading to shaft and gear	Check the selection and replace the gearmotor

Table 10 Troubleshooting

Type of Trouble		Cause	Remedy
Grease leakage	Grease leakage from the output section	Damaged oil seal.	Replace the oil seal.
	Grease leakage from the casing seam	Slacked bolts.	Tighten the bolts.
Abnormal noise or excessive vibration		Damaged gear.	Replace the gearmotor
		Distortion of the housing due to rough bed surface.	Flatten the bed surface or adjust the bed with the liner.
		Resonance resulting from insufficient rigidity of the bed.	Improve rigidity of the bed by reinforcement.
		Misalignment of connecting shafts.	Realign or use flexible coupling.
		Vibration transferred from the connected machine.	Detect vibration sources by running the gearmotor independently.
Abnormal noise in the motor		Foreign substances inside the motor.	Eliminate the foreign substances.
		Damaged bearing.	
		Improper brake gap adjustment.	Adjust the brake gap. (Refer to page 27)
		Worn brake lining.	Replace the brake lining. (Refer to page 28)
		Burned magnetic coil in the brake assembly.	
		Failure of the rectifier (brake motor)	Replace the rectifier.
		Disengagement or failure of leaf spring in the brake boss.	Replace the leaf spring.
Ineffective braking function	Brake does not work.	Releasing bolt not returned to the original position.	Return the bolt to the original position and readjust the gap.
	The brake slips. Braking response is slow.	A fast braking circuit is not working.	Shift to the fast braking action (Refer to page 17 – 19)
		Foreign substances or oil are adhered to the brake lining.	Remove foreign substances and clean the lining surface with a dry cloth.
		Worn brake lining.	Adjust the brake gap. Replace the brake lining.
		Uneven brake gap.	Adjust the brake gap.
		Overloading.	Reduce the load or apply a larger brake frame.
		Insufficient recovery of the releasing bolt.	Reset the releasing bolt to the original position and readjust the gap.
Inverter tripping	Shut-off due to overcurrent	Sudden acceleration / deceleration	Make the acceleration / deceleration time longer.
		Sudden change in load	Decrease the load.
	Grounding overcurrent	Grounding on the output side	Make correction to eliminate grounding
	DC overcurrent	Short-circuiting on the output side	Make correction to eliminate short-circuiting. Check cables.
	Shut-off due to regenerative overvoltage	Sudden deceleration	Make the deceleration time longer. Reduce the braking frequency.
	Thermal relay operation	Overloading	Decrease the load to the specified value.

11. Construction Drawings

11 – 1 Gearmotor Construction



Part No.	Part name	Part No.	Part name	Part No.	Part name	Part No.	Part name
1	Output shaft	8	Plain bearing	15	Motor frame	22	Bracket
2	Key	9	Pinion gear	16	Stationary core	23	Fan setting bolt
3	Oil seal	10	Distance	17	Roter core	24	Bearing
4	Bearing	11	Motor flange bracket	18	Stator windings	25	Bolt
5	Horizontal casing	12	Oil seal	19	Roter conductor short circuit ring	26	Bolt
6	Gear	13	Bearing	20	Fan	27	Plug Note 1)
7	Horizontal pin	14	Motor shaft	21	Fan cover (opposite drive end)		

Note 1) Frame size 1180, 1220, 1221 do not have the plug.

12. Warranty

The scope of our warranty for our products is limited to the range of our manufacture.
Warranty (period and contents)

Warranty Period	The warranty period for the Products shall be 18 months after the commencement of delivery or 18 months after the shipment of the Products from the seller's works or 12 months from the Products coming into operation, whether comes first.
Warranty Condition	In the event that any problem or damage to the Product arises during the "Warranty Period" from defects in the Product whenever the Product is properly installed and combined with the Buyer's equipment or machines, maintained as specified in the maintenance manual, and properly operated under the conditions described in the catalog or as otherwise agree upon in writing between the Seller and the Buyer or its customers; the Seller will provide, at its sole discretion, appropriate repair or replacement of the Product, without charge, at a designted facility, except as stipulated in the "Warranty Exclusions" described below. However, if the Product is installed or integrated into the Buyer's equipment or machines, the Seller shall not reimburse the cost of: removal or re-installation of the Product or other incidental costs related thereto, any lost opportunity, any profit loss or other incidental or consequential losses or damages incurred by the Buyer or its customers.
Warranty Exclusions	Not withstanding the above warranty, the warranty as set forth herein shall not apply to any problem or damage to the Product that is caused by: 1. installation, connection, combination or integration of the Product in or to the other equipment or machine that is rendered by any person or entity other than the Seller; 2. insufficient maintenance or improper operation by the Buyer or its customers, such that the Product is not maintained in accordance with the maintenance manual provided or designated by the Seller; 3. improper use or operation of the Product by the Buyer or its customers that is not informed to the Seller, including, without limitation, the Buyer's or its customers' operation of the Product not in conformity with the specifications, or use of lubricating oil in the Product that is not recommended by the Seller; 4. any problem or damage to any equipment or machine to which the Product is installed, connected or combined, or on any specifications particular to the Buyer or its customers; 5. any changes, modifications, improvements or alterations to the Product or those functions that are rendered on the Product by any person or entity other than the Seller; 6. any parts in the Product that are supplied or designated by the Buyer or its customers; 7. earthquake, fire, flood, sea-breeze, gas, thunder, acts of God or any other reasons beyond the control of the Seller; 8. normal wear and tear, or deterioration of the Product's parts, such as bearings, oil-seals; 9. any other troubles, problems or damage to the Product that are not attributable to the Seller.

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