GTR eco

High Efficiency Ipm Gear Motor

IPM Gear Motor

G3 Series (Parallel Shaft)	H2 Series (Right Angle Shaft)	F Series (Hollow Shaft / Solid Shaft)	F3 Series (Hollow Shaft / Solid Shaft)

Instruction Manual

G3 Series

H2 Series

F Series · FS Type

F Series · FF Type

F3 Series · F3S Type

F3 Series · F3F Type

For Safe Operation

- The Gear Motor 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.

Thank you for your purchasing our product.

In this Manual, injuries and damages anticipated in case of mishanding 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

- Do not connect the IPM Motor directly to a commercial power supply. Failure to observe this caution may result in fire.
- Do not operate the motor in explosive atmospheres or corrosive atmospheres. 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.
- When rotating the motor from the output shaft, insulate the terminal. Failure to observe this 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.
- Use the motor and inverter with the specified combination. Failure to observe this warning may cause fire, and/or damage to the equipment.

⚠ Caution

- ●Do not use the 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.
- ●The gearmotor becomes rather hot during operation and soon after the power is OFF. Therefore, do not touch it with bare hands. Failure to observe this warning may cause burn injury.
- ●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 responsible for the product modified or repaired by the user himself.

Table of Contents

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, etc.)
(2) No accident damage to the product during transportation exists.
(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.)

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. When an eyebolt or eyeplate is provided with the gearmotor, be sure to confirm if there is any loosening before using it. After installing gearmotor to the other equipment, do not hoist the entire machine using an eyebolt. Failure to observe this warning may cause physical injury and/or damage to the equipment due to the damage of the eyebolt or falling down of the machine.**
- **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.**
- **In case of wooden box package, it is unstable to lift under the wooden box by using a forklift. Therefore it is recommended to belt over the wooden box for lifting.**

3 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.**
- **Be sure to insulate the terminal when rotating the motor from the output shaft. Failure to observe this warning may cause electric shock.**
- **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.**
- **Vibrations come out from the installation surface of gearmotor or from other source should be minimized to under about 0.5G.**

① Proper location for installation

	IP40, IP44 (Indoor Type)	IP65 (Outdoor Type)
Ambient Temperature	-10°C to 40°C	-10°C to 40°C
Ambient Humidity	85 % max. (Non Condensing)	100 % max. (Non Condensing)
Altitude	Sea level to 1,000 m max.	Sea level to 1,000 m MAX
Environment	Well-ventilated place free from corrosive gas, explosive gas vapor and/or dust.	Well-ventilated place free from corrosive gas, explosive gas vapor and/or dust. Operation in water or in the high-hydrostatic pressure environment is not permitted.
Installation Location	Indoors	Indoors and/or Outdoors

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, tighten up the torque arm with bolts to keep the locking hole not loose.

④ Tightening Torque

Bolt Size	Tightening Torque (N·m) {(kgf·m)}
M 8	13 { 1.3 }
M10	25 { 2.6 }
M12	44 { 4.5 }
M14	69 { 7.0 }
M16	108 {11.0 }
M20	294 {30.0 }

4 Connecting with Other Equipment

⚠ Caution

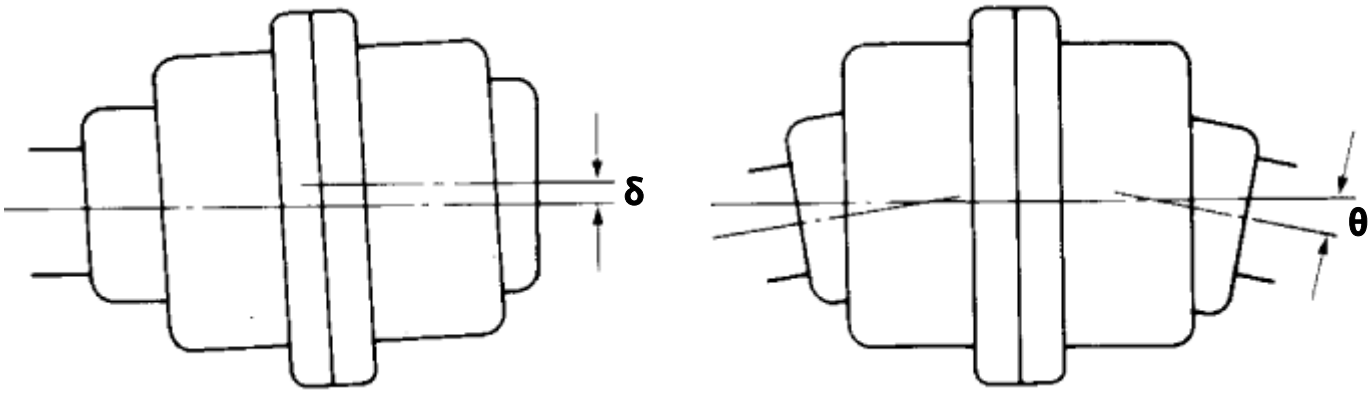
- When connecting the gearmotor with a load, make sure of the alignment of shaft, the tension of the belt and parallelism of pulleys. In direct coupling, be sure to check whether the alignment of shaft is extremely precise. If a belt is to be used, be sure to adjust its tension properly. Also, before 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.

An example of gear coupling



- The displacements δ and θ should be minimized as much as possible.
- The displacements δ and θ differ according to the type of coupling. Therefore, they should be within the allowable value defined by the respective manufacturer.
  (Reference: In case of chain coupling, δ should be within 2% of the roller chain pitch and δ should be within 1 ° .)

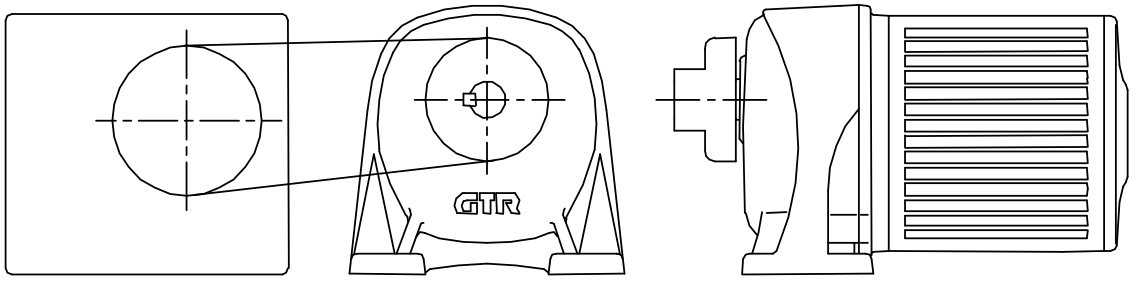
② Attaching Chains, V-Belts, Gears, etc.

(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.

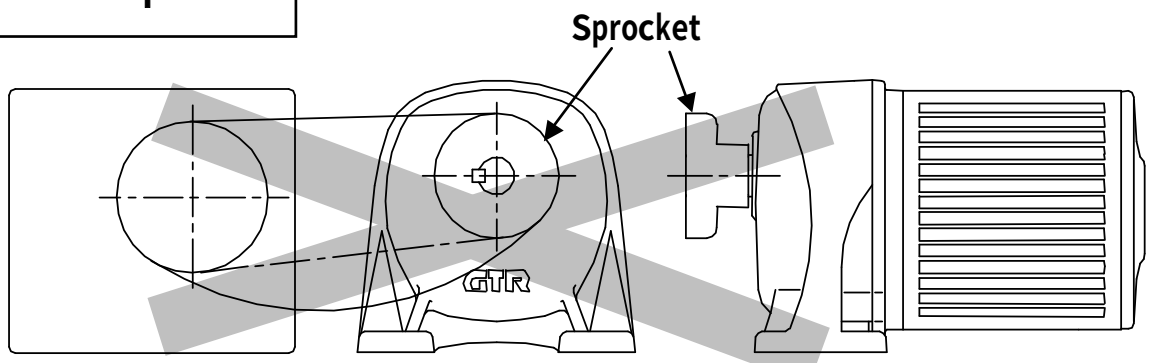
Proper Way of Use



connecting machine

●The tension of V-belt and chain are properly set, also pulley and sprocket are properly positioned.

Bad Example



connecting machine

●The chain is too loose.

●The sprocket is positioned in the reverse direction so that the load point moves to the shaft edge.

③ Attaching and Detaching a Driven Shaft to/from FS/ F3S Type Hollow Shaft

●Attaching a Driven Shaft to the Reducer Hollow Shaft

(1) When attaching, be sure to smear extreme pressure agent(molybdenum disulfide, etc.) on the surface of driven shaft and the bore of the hollow shaft to avoid seizing, and insert the reducer to the driven shaft.

(2) In case impact does not apply in the uniform load, loose fit is recommended for the fit tolerance of driven shaft. In case shock load or heavy radial load is applied to the shaft, the fit should be tighter. The bore of the hollow shaft is machined to conform to "JIS H8" tolerance.

(3) If the fitting is too tight, for smooth insertion, knock on the hollow drive shaft end gently with plastic hammer. In this case be sure not to hit the casing. Smoother insertion can be obtained if you prepare jigs shown in the figure below.

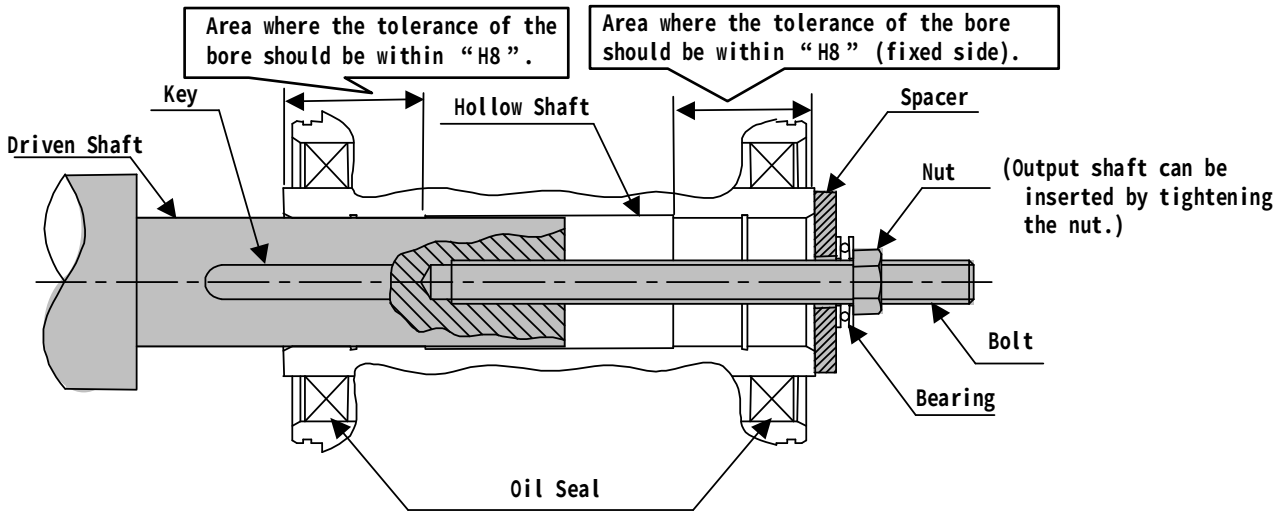


Figure-1

(Spacer, nut, bolt, key and other parts for bearing should be prepared by customer.)

(4) The length of the driven shaft and the fixing key are recommended to be within the area where "H8" tolerance for the fixed side bore is required.

(5) It is recommended to minimize the fluctuation of the driven shaft below 0.05 at the shaft edge. The greater fluctuation may give harmful effect to the reducer.

●Connecting Reducer with Driven Shaft

(1) Driven shaft with a shoulder

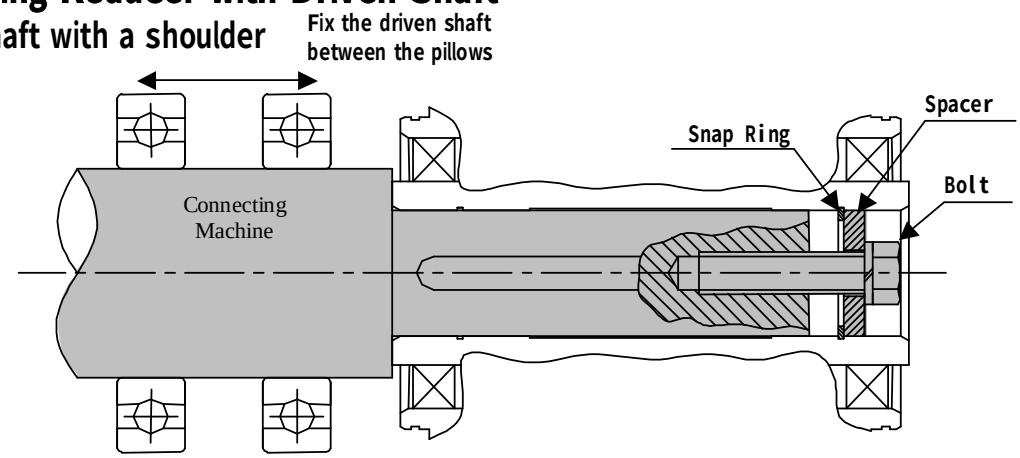


Figure-2 Fixing by spacer and snap ring

(Spacer, bolt and snap ring should be prepared by customer.)

Note) Excessive tightening of the bolt may cause the deformation of the snap ring, which carefully note.

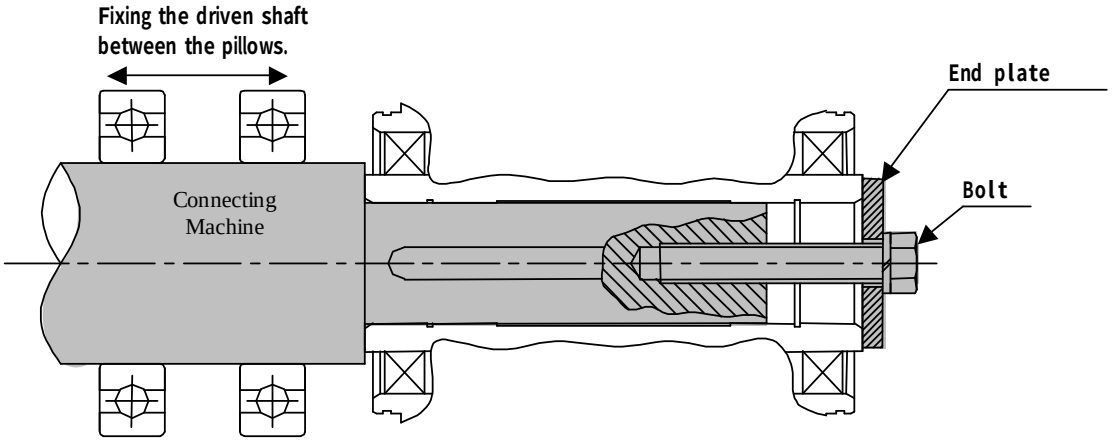


Figure-3 Fixing by End Plate
(End plate and bolt parts should be prepared by customer.)

Note) The plastic cover that is an attachment of F-Series cannot be attached, which please note. Safety measure such as preparing the protective cover should be given by customer in order to avoid wind-in at the output shaft.

(2) Driven shaft without a shoulder

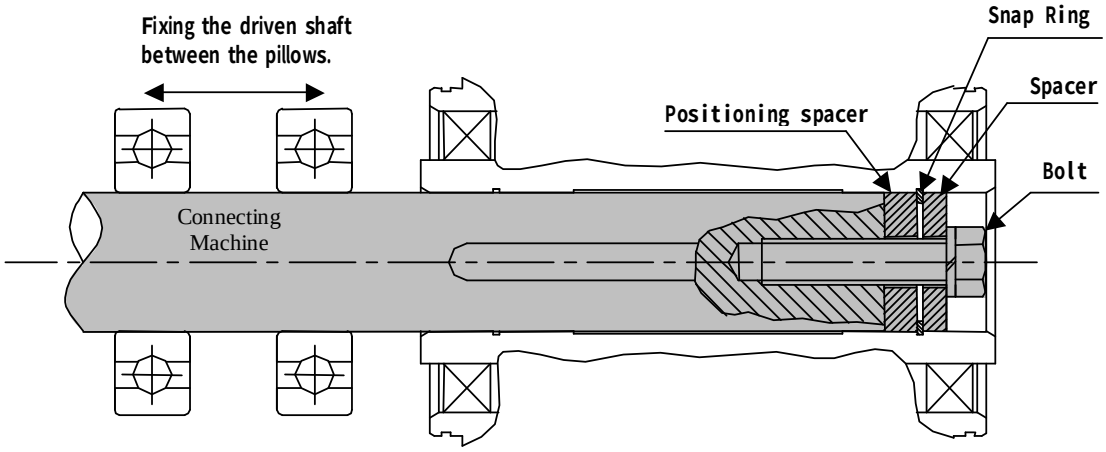


Figure-4 Fixing by spacer and snap ring
(Spacer, positioning spacer, bolt and snap ring should be prepared by customer.)

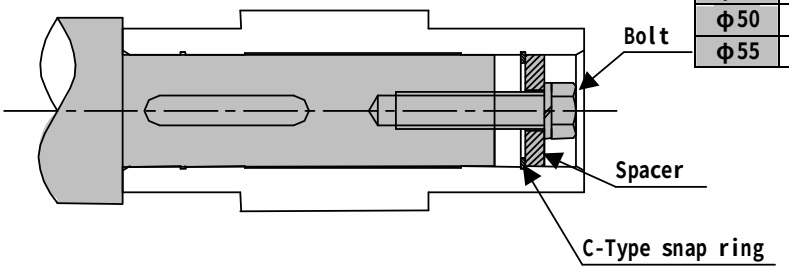
Note) Be sure to have space in the outer diameter of spacer and in the bore of hollow shaft. Excessive tightness of the fitting or inaccuracy of the spacer's diameter may be a cause of scrubbing which may lead to a greater fluctuation between the driven shaft and the hollow shaft. Positioning spacer is used when deciding the position of the reducer. In case the length of the driven shaft is already clarified, positioning spacer is not necessary. By having a positioning spacer, smoother detachment from the hollow shaft can be obtained. (For more details about the detachment from the hollow shaft, refer to Figure-5 on page 10.)

●Recommended size for the driven shaft fixing part

For the attachment of the hollow shaft in general use, we recommend you to refer to the dimensions shown on the right as a guideline for the strength when designing.

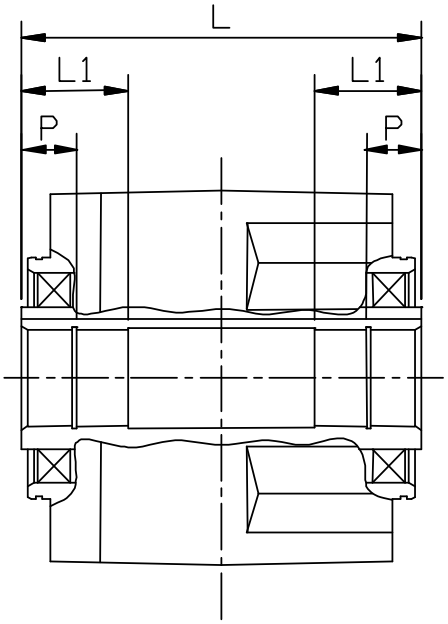
⟨Recommended size for the driven shaft fixing part⟩

	Bolt Size	Spacer Dimension			Nominal Designation for C-Type Snap Ring
		Outer Diameter	Inner Diameter	Width	
φ20	M6	φ19.5	φ7	3	20
φ25	M6	φ24.5	φ7	4	25
φ30	M8	φ29.5	φ9	5	30
φ35	M10	φ34.5	φ11	5	35
φ45	M10	φ44.5	φ11	5	45
φ50	M12	φ49.5	φ13	6	50
φ55	M12	φ54.5	φ13	6	55



●About the length of driven shaft

The driven shaft must be reached to the both side of the L1 part. (As shown on the right figure)
However, be sure to have allowance for the spacer's dimension necessary at the "Detachment from the hollow shaft".



●About the length of key for the driven shaft

The length of the key should be more than 1.5 times of the diameter of hollow shaft. Also, the key inserting position should be the place where more than 1/2 of the total key length can be reached to L1.(Refer to the figure on the right)

●Detaching from the hollow shaft

Make sure to avoid excessive force between the casing and the hollow shaft. Smoother detachment can be obtained by using a jig as shown in the figure below.

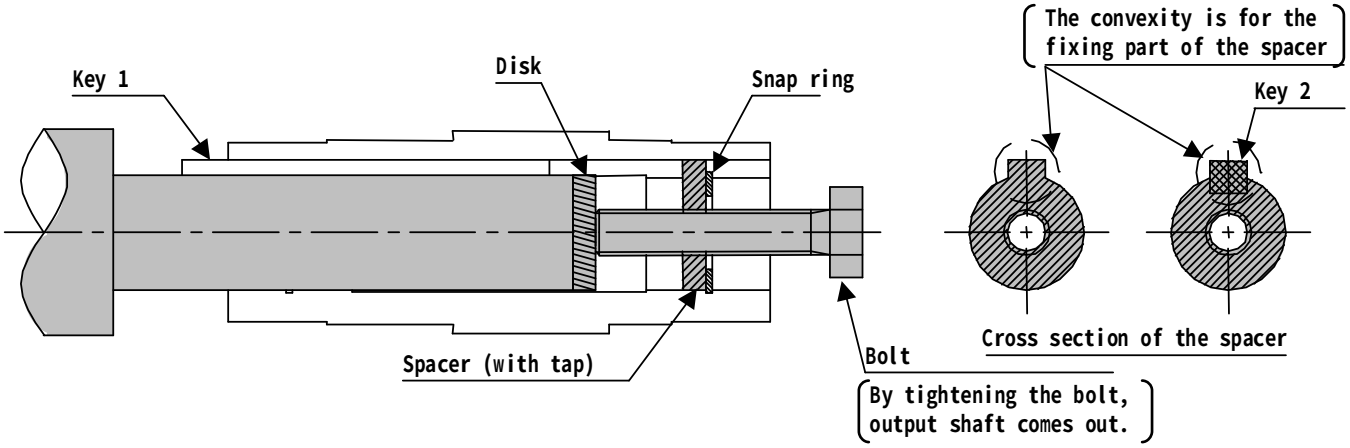


Figure-5

(Spacer, disk, bolt and snap ring should be prepared by customer.)

5 Direction of Rotation

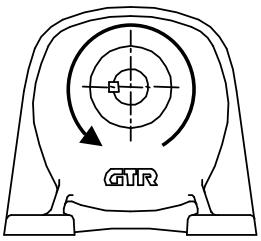
⚠ Caution

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.

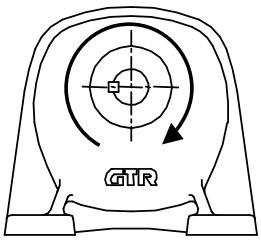
The direction of the output shaft rotation of the IPM gearmotor is as follows at the inverter CW input.

●G3 Series (Viewed from the output shaft side)

0.1kW 1/5～1/50 and 1/300～1/1200
0.2～2.2kW 1/5～1/30 and 1/300～1/1200

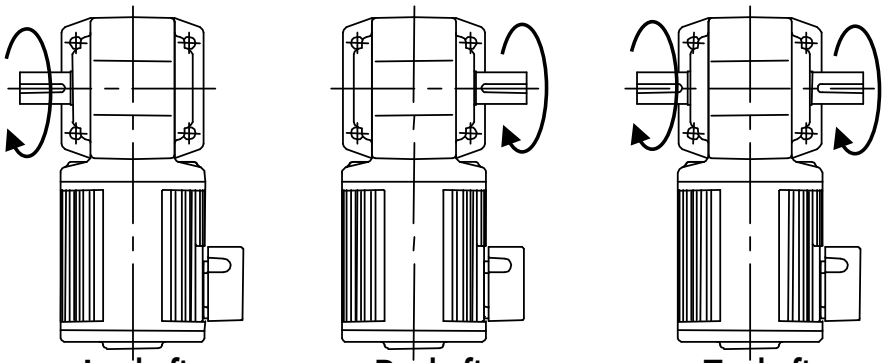


0.1kW 1/60～1/200
0.2～2.2kW 1/40～1/200



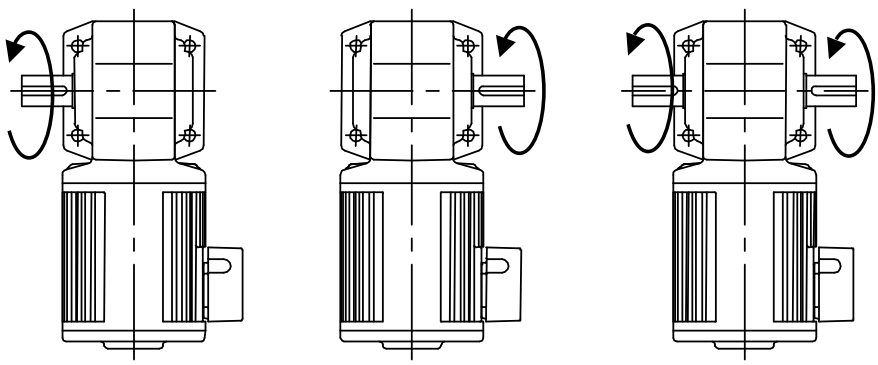
●H2 Series

0.1kW, 0.2kW 1/5～1/60 and 1/600～1/1500
0.4kW, 0.75kW 1/5～1/60 and 1/300～1/1500
1.5kW, 2.2kW 1/5～1/30



L-shaft R-shaft T-shaft

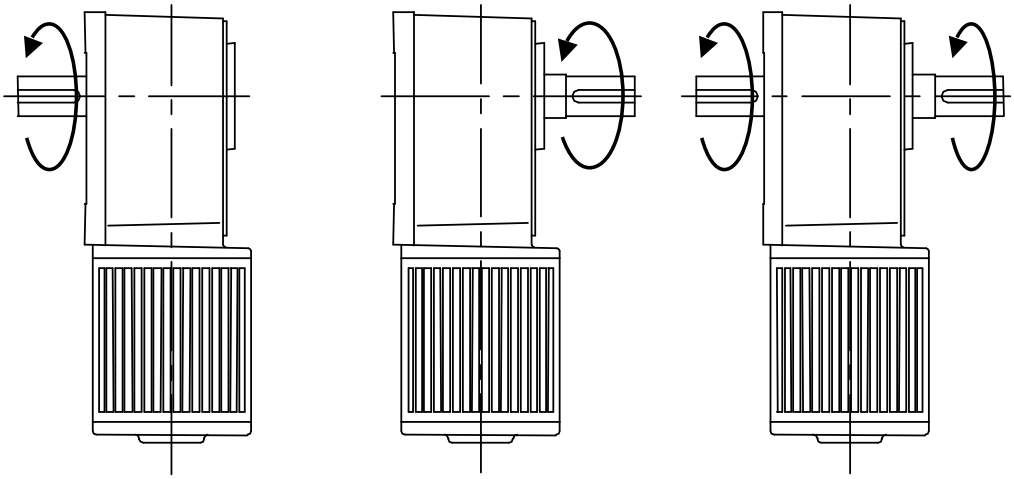
0.1kW, 0.2kW 1/80～1/450
0.4kW, 0.75kW 1/80～1/240
1.5kW, 2.2kW 1/40～1/240



L-shaft R-shaft T-shaft

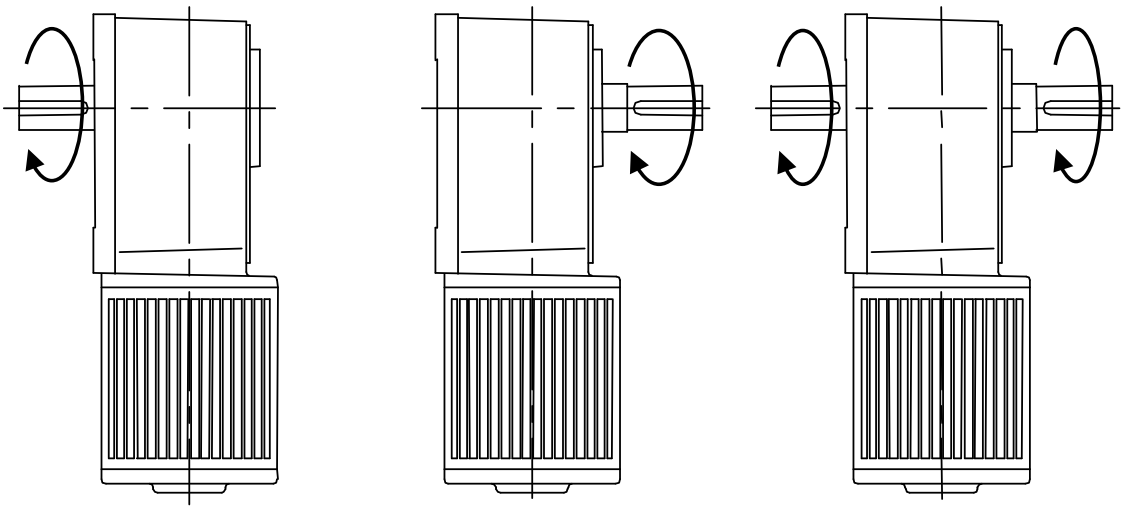
●F Series

0.1～0.75kW 1/5～60 and 1/300～1/1500
1.5kW, 2.2kW 1/5～30



L-shaft R-shaft T-shaft

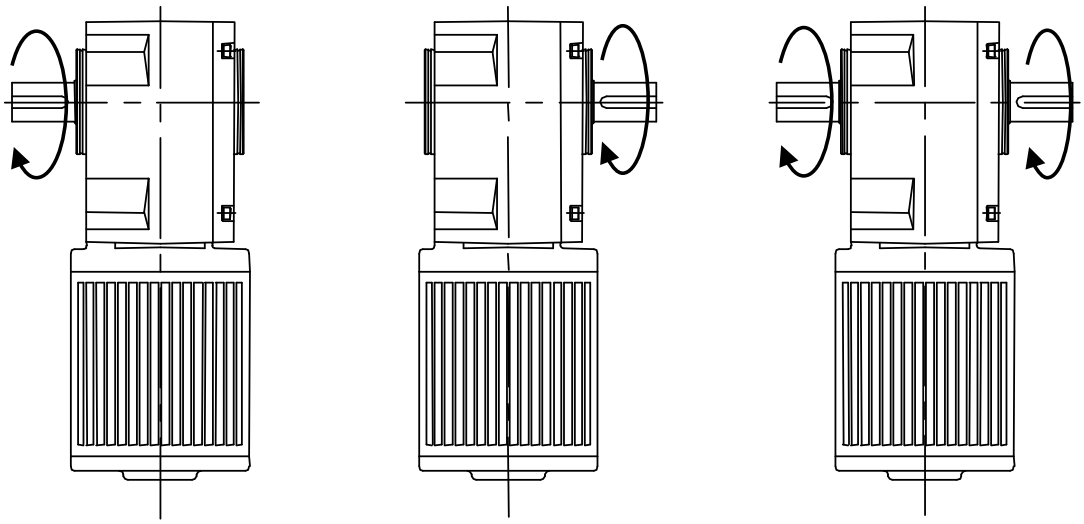
0.1～0.75kW 1/80～1/240
1.5kW, 2.2kW 1/40～1/240



L-shaft R-shaft T-shaft

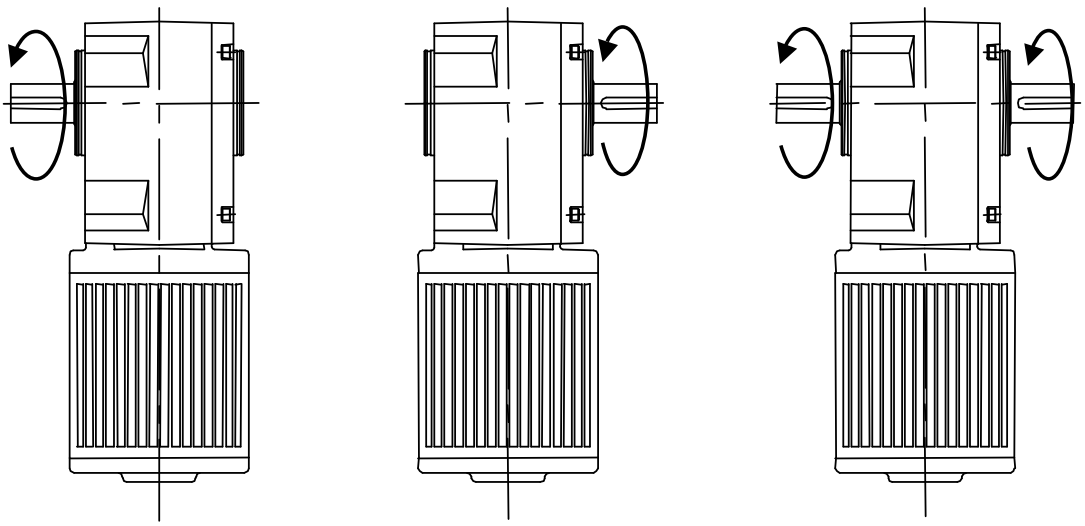
●F3 Series

0.1～2.2kW　1/5～1/60 and 1/300～1/1500



L-shaft　　R-shaft　　T-shaft

0.1～2.2kW　1/80～1/240



L-shaft　　R-shaft　　T-shaft

6 Wiring

⚠ Danger

- ●Be sure to perform an input voltage and a connection to the motor and the inverter surely definitely. Failure to observe this warning may cause damage to the equipment, electric shock and/or fire.
- ●Do not to connect a commercial power supply to the motor directly. Failure to observe this warning may cause fire.
- ●Do not bend, pull or tuck down the power 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.
- ●Do not touch the terminals while the motor is rotated from the output shaft, because high voltage may be generated even if the power supply is OFF. Failure to observe this warning may cause electric shock.
- ●Be sure to use the appropriate power supply specified in the nameplate. Failure to observe this warning may cause burn out of motor or inverter and/or fire.

⚠ Caution

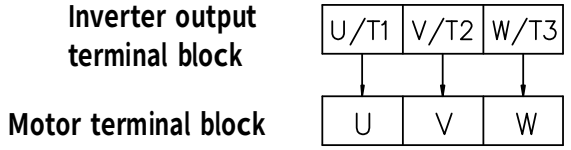
- ●Do not touch terminals when inspecting the insulation resistance. Failure to observe this warning may cause electric shock.
- ●Wiring should be properly made under the specified electrical equipment engineering standard or the safety code. Failure to observe this warning may cause electric shock, fire or physical injury.
- ●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.
- ●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.

(Note) 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.

① Wiring of gearmotor

Connect the gearmotor as shown below. Do not interchange previously installed lead wire on the terminal block.

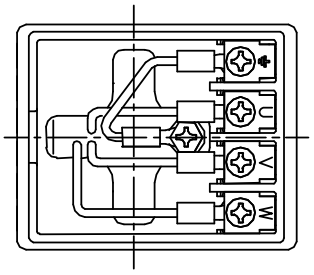
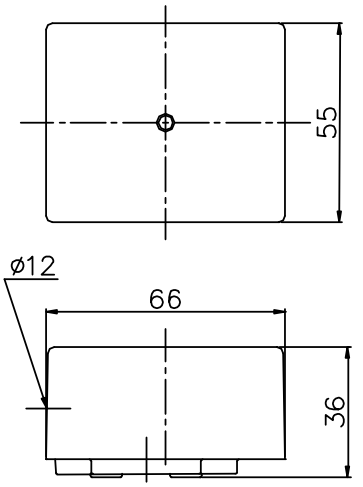
Connecting diagram



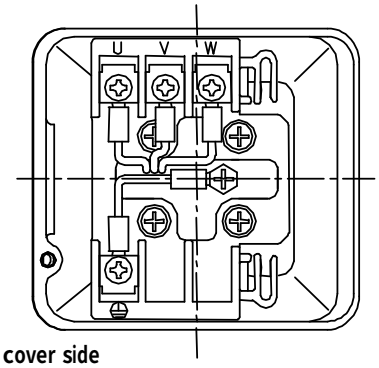
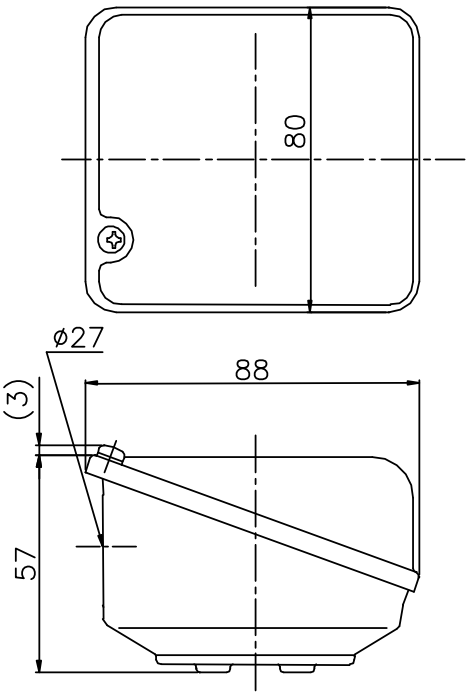
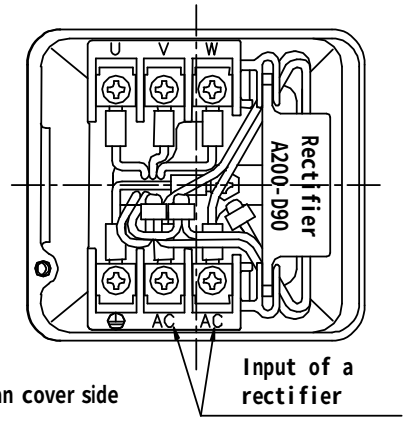
② Detail of terminal box

●The size of terminal clinchers is all M4.

■J-type terminal box(plastic compact)

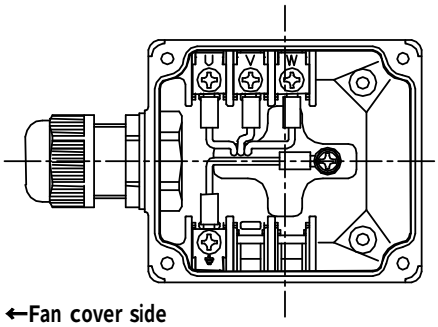
Standard Type	 ←Fan cover side (Note) The brake lead wire appears directly from brake part. (for brakemotor type)	 (Note) If the box cover is attached upside down, the position of opening for power cable changes to bottom side.

■T-type terminal box(Steel)

Standard Type	 ←Fan cover side (Note) The brake lead wire appears directly from brake part. (for brakemotor type)	
AC Switching (built in rectifier)	 ←Fan cover side Input of a rectifier	

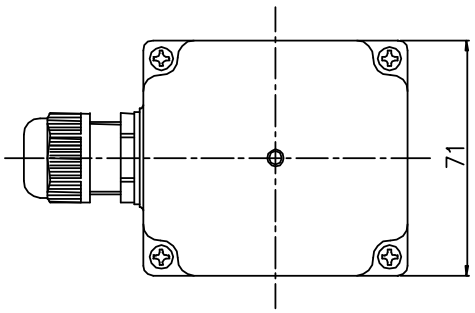
■L-type terminal box(plastic)

Standard Type

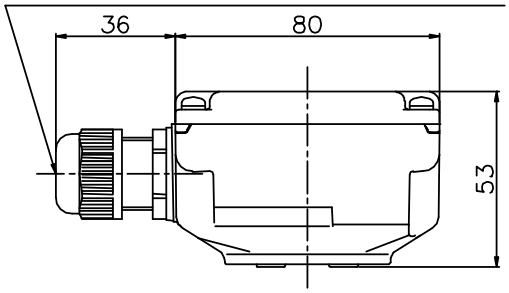


←Fan cover side

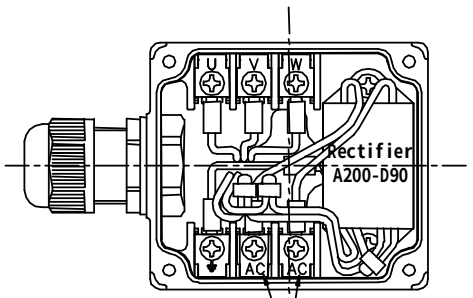
(Note) The brake lead wire appears directly from brake part. (for brakemotor type)



0.1～0.4kW Applicable cable diameter φ7 ～ φ12.5
0.75kW Applicable cable diameter φ8.5 ～ φ14



AC Switching (built in rectifier)

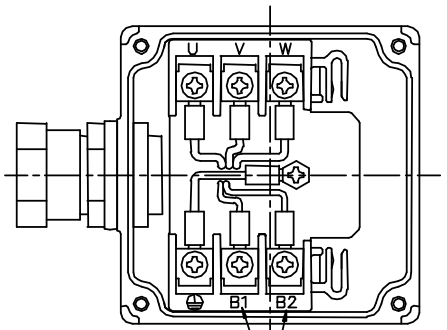


←Fan cover side

Input of a rectifier

■E-type terminal box(aluminum) for IP65 type

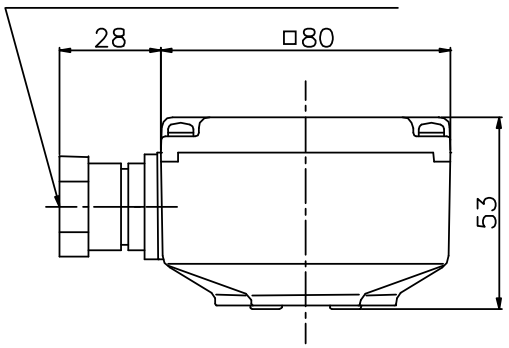
Standard Type



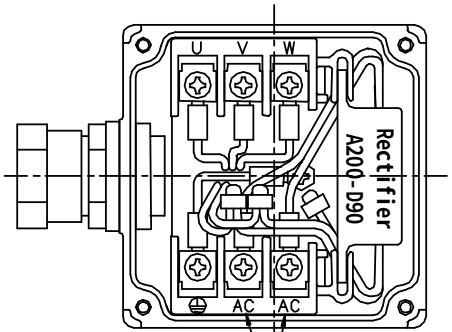
←Fan cover side

Brake lead wire (for Brakemotor type)

Applicable cable diameter φ8 ～ φ12



AC Switching (built in rectifier)



input of a rectifier

←Fan cover side

③ Wiring of Brake

(1) Be sure to bypass the inverter when wiring the brake. Otherwise, malfunction of the brake may be observed due to the voltage drop.

(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.

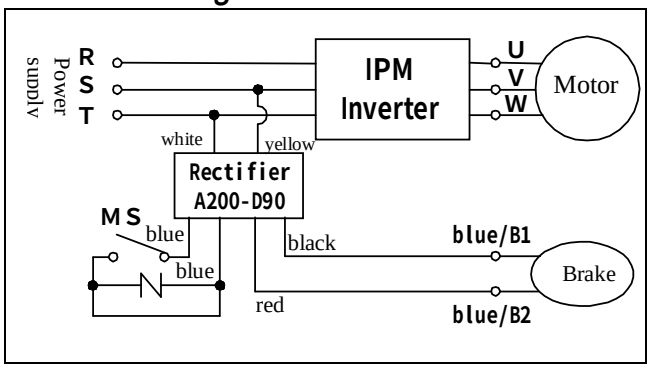
(4) Brake circuit relay is recommended to be the electro-magnetic switch with the capacity of more than the rated current of 6A (AC200V). In case DC Switching wiring is employed, the electro-magnetic switch with the capacity of DC110V, auxiliary contact rated DC13 class is recommended in order to shield the inductive load (DC coil). In case of using noncontact relay, the electro-magnetic switch with the capacity equivalent to the rated voltage of AC240V is recommended. (Half-wave rectification load can be switched.)

*Auxiliary contact rated DC13 is a type of JIS C 8201-5-1
(low pressure switching and controlling device) when applied to a coil load.

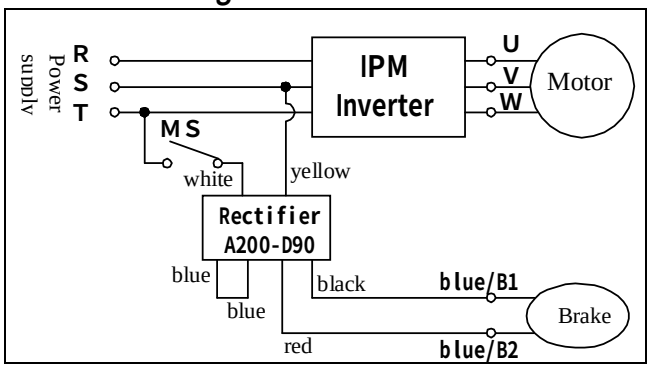
(5) As the rectifier unit contains diodes, improper wiring may cause fatal short-circuiting and breakage of the unit. So, special care should be taken for wiring.

(6) Please refer to an instruction manual of the inverter about timing of operation command and brake ON/OFF.

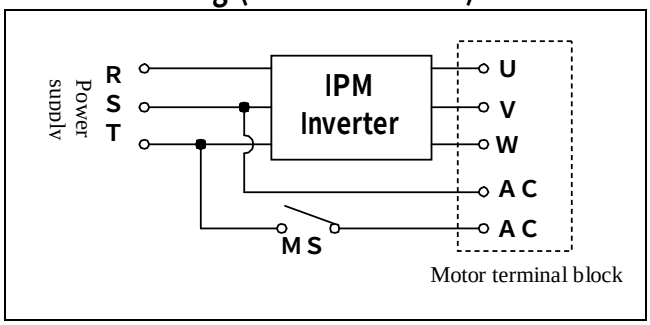
■DC Switching



■AC Switching



■AC Switching (built in rectifier)



MS : Magnet Switch
⊣N⊢ : Protection Device (Option)

7 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.
- ●Do not touch the terminals while the motor is rotated from the output shaft, because high voltage may be generated even if the power supply is OFF. Failure to observe this warning may cause electric shock.

⚠ Caution

- ●The gearmotor becomes rather hot during operation and soon after it stops. Therefore, 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.
- ●Be sure to operate the motor within a permissible range (load torque, load inertia and O.H.L.).

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.

② Check up matters at test running:

(1) Confirm the direction of rotation by operating the motor with unloaded condition.
(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 80°C Under ambient temperature 20 °C. Do not touch the surface with bare hands. Failure to observe this warning may cause burn injury.

8 Specifications

① Motor Specifications

<table>
<tr><td colspan="3">Motor Type</td><td colspan="6">IPM Motor (Interior Permanent Magnet Motor)</td></tr>
<tr><td colspan="3">Motor Capacity Designation</td><td>010</td><td>020</td><td>040</td><td>075</td><td>150</td><td>220</td></tr>
<tr><td colspan="3">Capacity</td><td>0.1kW</td><td>0.2kW</td><td>0.4kW</td><td>0.75kW</td><td>1.5kW</td><td>2.2kW</td></tr>
<tr><td colspan="3">Motor Pole Number (Note.1)</td><td colspan="3">4 pole</td><td colspan="3">6 pole</td></tr>
<tr><td colspan="3">Maximum Torque</td><td colspan="6">150%</td></tr>
<tr><td colspan="3">Rated Current (A) (Note.2)</td><td>0.45</td><td>0.86</td><td>1.74</td><td>3.37</td><td>6.13</td><td>8.20</td></tr>
<tr><td colspan="3">Minimum Rotating Speed(rpm) (Note.3)</td><td colspan="6">0</td></tr>
<tr><td colspan="3">Rated Rotating Speed (rpm)</td><td colspan="3">1800 (60Hz)</td><td colspan="3">1800 (90Hz)</td></tr>
<tr><td colspan="3">Maximum Rotating Speed (rpm) (Note.4)</td><td colspan="3">2500 (83.3Hz)</td><td colspan="3">2500 (125Hz)</td></tr>
<tr><td colspan="3">Speed Control Range at Rated Torque (rpm)</td><td colspan="3">180 ～1800 (1:10)</td><td colspan="3">120 ～1800 (1:15)</td></tr>
<tr><td rowspan="4">Degrees of Protection</td><td rowspan="4">Motor Type</td><td>M</td><td colspan="2">Totally Enclosed (IP40 or IP44) (Note.5)</td><td>Totally Enclosed (IP44)</td><td colspan="2" rowspan="2">Totally Enclosed and Self-circulation (IP44)</td></tr>
<tr><td>B･J</td><td colspan="3">Totally Enclosed and Self-circulation (IP40 or IP44) (Note.5)</td></tr>
<tr><td>G</td><td colspan="4" rowspan="2">Totally Enclosed (IP65)</td><td colspan="2">Totally Enclosed and Self-circulation (IP65)</td></tr>
<tr><td>H</td><td colspan="2"></td></tr>
<tr><td colspan="3">Thermal Class</td><td colspan="6">Class B (for EN standard), Class A (for UL standard)</td></tr>
</table>

Note 1. The motor pole number is depending on a capacity. The relation between rotating speed of motor and frequency is calculated according to the following equation.

$$\text{Rotating Speed (rpm)} = \frac{120 \times \text{Set value of frequency}}{\text{Motor pole number}}$$

2. The Rated Current described in the above is a reference value without the gearhead. (motor unit only)
3. Rotational fluctuation of a motor tends to increase at the operation range less than 100 rpm.
4. The range between 1800rpm and 2500rpm are limited torque range. Be sure to refer to the allowable torque.
5. The IP code (IP40 or IP44) depends on the type of the terminal box. Motor type IP40 and IP44 are not waterproof type. Do not sprinkle water and/or oil on the gearmotor.

① Brake Specifications

(1) The holding brake is only used to hold the load. It cannot be used to stop the gearmotor.
(2) Do not energize the brake continuously while the motor stopped.
(3) Please refer to an instruction manual of the inverter about timing of operation command and brake ON/OFF.
(4) Do not use the brake while the motor enters servolock status. Otherwise, the motor may become overload.

Item \ Motor capacity	0.1kW		0.2kW		0.4kW		0.75kW		1.5kW	2.2kW
Motor Capacity Designation	010		020		040		075		150	220
Motor Type	B·J	H	B·J	H	B·J	H	B·J	H	B·J	B·J
Brake Type	"Power-off, Brake-on" Type (Spring close)									
Holding Torque (N·m) {kgf·m} (Note.1)	0.98 {0.10}		1.96 {0.20}		3.92 {0.40}		7.35 {0.75}		14.7 {1.50}	21.6 {2.20}
DC voltage (average) with rectifier (V)	90									
Power (at75°C) (W)	14	10	14	10	16	12	24	16	37	37
Current (at75°C) (A)	0.15	0.11	0.15	0.11	0.18	0.13	0.27	0.17	0.41	0.41

(Note.1) Holding torque is a reference value. It does not ensure safety.

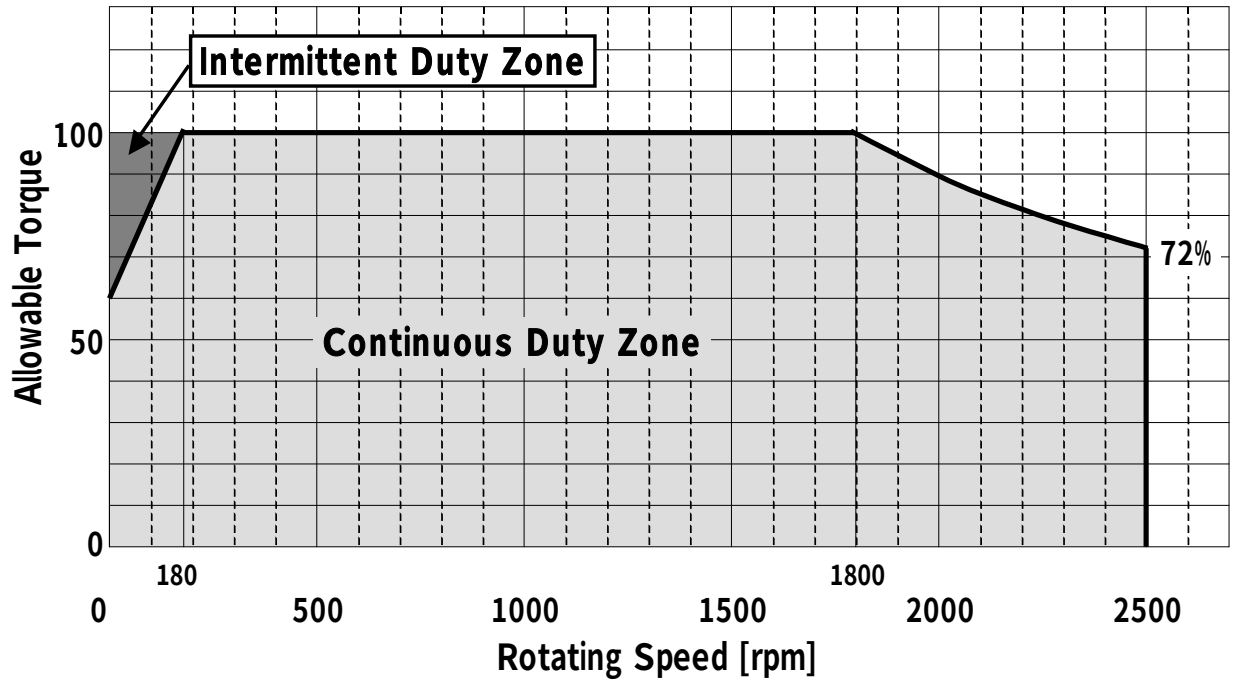
③ Operating Range

(1) Allowable torques described in the product catalog are continuous value at 1800 rpm. For more than 1800rpm, use the derating rate according to the following diagrams.

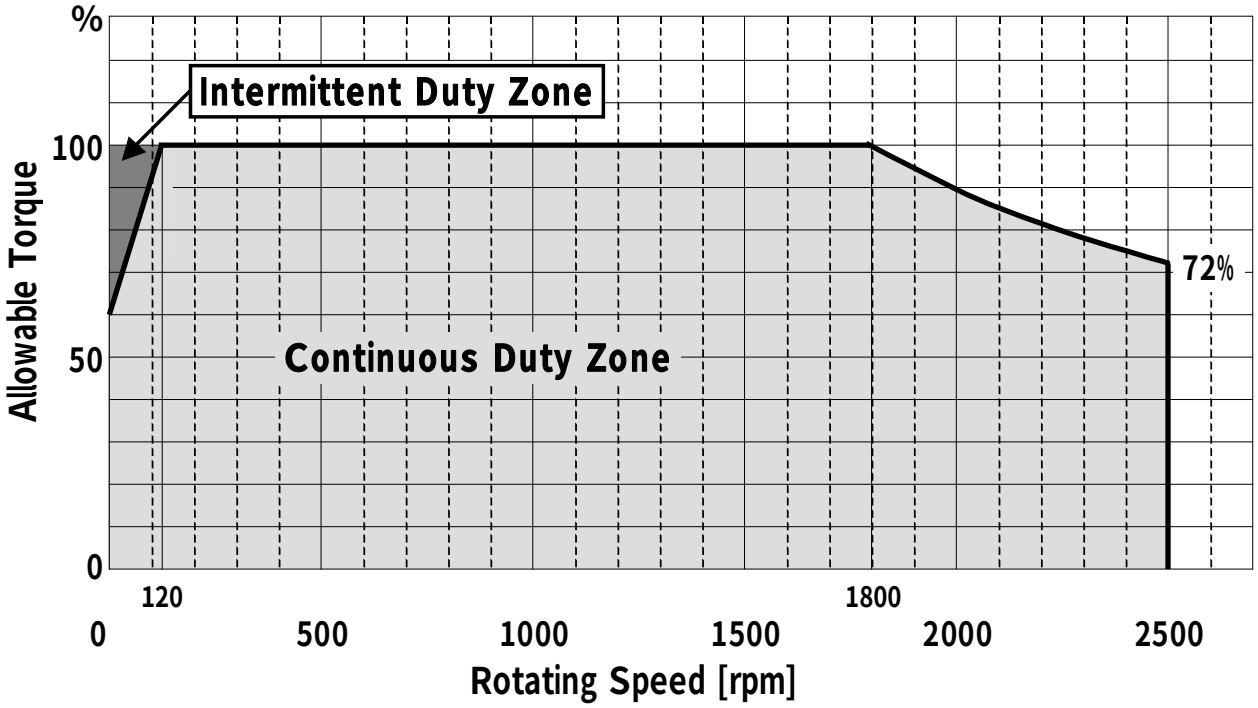
(2) The allowable O.H.L. can also be obtained by the derating rate shown below.

(3) As for the allowable inertia moment I { allowable GD^2 }, incase of using of over 1800 rpm, it can be obtained by multiplying $(1800/\text{input rpm})^2$ to the allowable inertia moment in the product catalog.

●0.1kW, 0.2kW, 0.4kW



●0.75kW, 1.5kW, 2.2kW



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 operate the equipment with the safe guard off for inspection. Failure to observe this warning may cause wind-in and physical injury.
- ●Do not operate the equipment while releasing brake by manual releasing lever. Failure to observe this warning may cause accident by falling down of the equipment or by running out of control.
- ●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.
- ●The gearmotor becomes rather hot during operation and soon after the power is OFF. 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.
- ●Do not disassemble the motor. Failure to observe this warning may cause injury and/or damage to the equipment.

[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 nameplate.
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 80 °C max.
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 1MΩ when insulation resistor shows 500V.

When any abnormality is found during the daily inspection, take proper measures according to the "10 Troubleshooting"of this Instruction Manual.

③ Warning Label

Warning label is attached on the gearmotors. If the label peeled off or became hard to read, contact the nearest sales office of nissei corporation.

④ Grease, Oil seal and O-Ring

(1) All series is 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

Trouble	Cause	Troubleshooting
The motor does not run even in the unloaded condition.	Disconnection of wire	Check the wiring
	Poor contact of switch	Repair or replace the relay.
	Disconnection of stator coil.	Repair at authorized factory.
	Broken gear, shaft and bearing	Repair at authorized factory.
The motor does not run in the loaded condition.	Voltage drop	Check the length and diameter of power cable.
	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 load.
	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.
Brake does not work	Wrong wiring	Check the wiring
	Damaged switch	Replace or repair the switch
Brake function is not enough.	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.	Remove foreign substances or oil or repair at authorized factory.
Motor does not run. (Rotating speed does not increase.) Overheated motor. Overload alarm 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.
	Poor contact of switch.	Replace or repair the switch

11 Disposal

⚠ Caution
Gearmotors and lubricant should be disposed as general industrial waste.

12 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

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. (Please refer to “explanation about the storage (Page.27)” for the explanation about the storage.)
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.

13 Storage

●Storage Location

(1) Avoid storage outdoors or in places with humidity, dust, sudden temperature changes or corrosive gas.
(2) Do not storage on the ground directly.
(3) Avoid a place with vibration. Otherwise, fretting corrosion may damage the bearing.

● During Storage Period

(1) Rotate the gearmotor every 6 months for rust prevention of bearing.
(2) Check the insulation resistance of the motor is more than 1MΩ by using the insulation resistance tester of 500V every 6 months.
(3) Rustproof the output shaft every 6 months.

●Use After Storage

(1) Before using the gearmotor, check the insulation resistance of the motor is more than 1MΩ by using the insulation resistance tester of 500V.
(2) After starting the gearmotor, verify that there is no abnormal noise, vibration or heat rise.
(3) If supplied as a Brakemotor, check that the brake operates properly. If any anomaly is observed, contact our nearest sales office.

If you have any questions or concerns about our product, please contact the dealer or distributor from whom purchased, or contact the nearest sales office or plant of Nissei Corporation.

NISSEI CORPORATION

Sales, Overseas Division
1-1 Inoue, Izumi-cho, Anjo-shi, Aichi, 444-1297 JAPAN
TEL: +81-566-92-5312 FAX: +81-566-92-7002

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