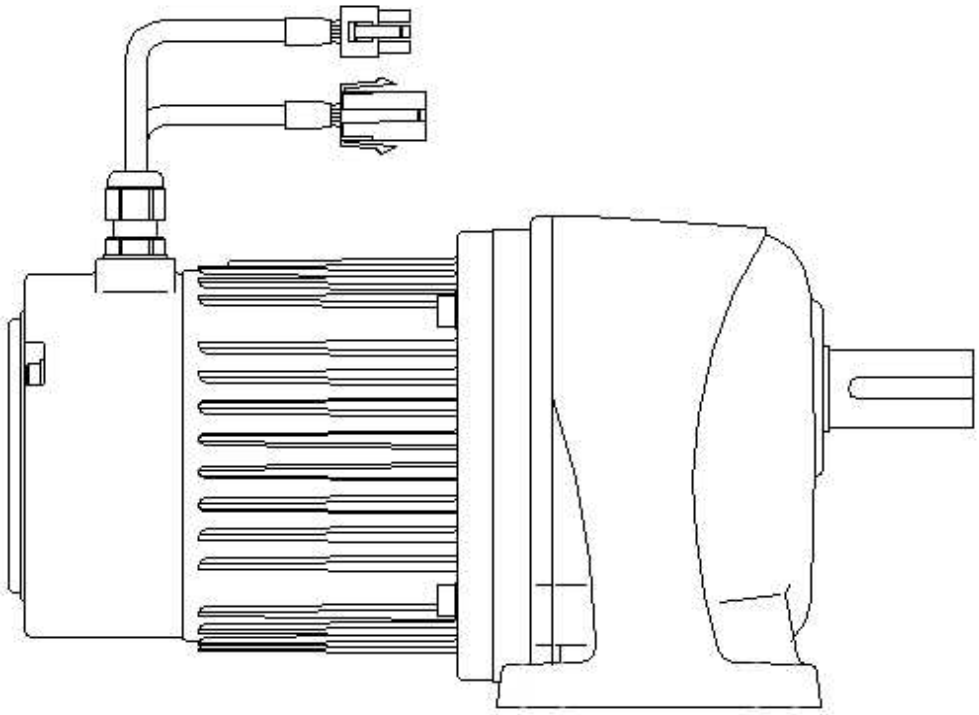
GTR-AR

APQ Type Gearmotor

Instruction Manual



FOREWORD

Thank you for your purchasing of the GTR-AR Series APQ Type.
Please be sure to read this Instruction Manual before using the products, as it provides you with information for proper usage of this motor.

- All information contained in this manual is subject to change without notice due to revision or modification.
- Though we elaborated the contents, please advise us if any error is found in this manual.

For Safe Operation

- The Gearmotor should be operated by a skilled and qualified person. And the contents of this Instruction Manual should be carefully read and understood before operating this product.
- This Instruction Manual should be delivered to a person who actually operates this product.
- This Instruction Manual should carefully be kept in a convenient place for the operator's easy reference.
- In this Manual, injuries and damages anticipated in case of mishandling of the equipment, are classified into two categories, "Danger" and "Caution". The definition of the classification are given below with the corresponding graphic symbols.

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

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

⚠ Danger

(General)

- Do not use the product in explosiveness atmosphere. 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 product 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.
- 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.
- If the product is to be used in a system for human transportation, 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.

(Transportation)

- 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.

(Wiring)

- When connecting the product to the power cable, be sure to follow the Instruction Manual. Failure to observe this warning may cause electric shock, fire and/or malfunction.
- Do not bend, pull or tuck down the power cable or signal cable forcibly. 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 burnout of the motor and/or fire.

(Operation)

- 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.

(Daily Inspection, Maintenance)

- 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.

(Inspection and Maintenance of Brake Part)

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

⚠ Caution

(General)

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

(Check at the unpacking)

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

(Transportation)

- Be careful when transporting products to avoid falling down.

(Installation)

- Do not place any object inflammable near the equipment. Failure to observe this warning may cause fire.
- Do not place any object which may interfere with the ventilation around the product. Failure to observe this warning may result in abnormal overheating caused by the block off of the cool air, which may cause burn injury and/or fire.
- Do not step on a gearmotor or hang to it. Failure to observe this warning may cause physical injury.
- Do not touch the edge of the shaft of gearmotor or key groove in the bore with bare hands. Failure to observe this warning may cause physical injury.
- In equipments like food machines, which must avoid oil or grease, furnish with protective devices like oil pan, in order to protect from the oil leakage caused by failure or life of the manufactured products. Leaking oil may cause defective products.
- Do not apply any strong impact. Failure to observe this warning may cause malfunction.

(Connecting with other equipment)

- 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.
- 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.

(Wiring)

- Do not measure the insulation resistance. Failure to observe this warning may cause malfunction.
- 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.

(Operation)

- The gearmotor becomes rather hot during operation, so do not touch it with bare hands. Failure to observe this warning may cause burn injury.
- When a gearmotor is found abnormal, stop running immediately. Failure to observe this warning may cause electric shock, physical injury or fire.
- Do not supply the commercial power source directly to the motor. Failure to observe this warning may cause burnout of the motor.
- Be sure to secure the motor to the equipment. Failure to observe this warning may cause physical injury by unexpected movement when it starts/stops rotating.

(Daily Inspection, Maintenance)

- Surface of a gearmotor becomes very hot. Therefore, do not touch it with bare hands. Failure to observe this warning may cause burn injury.
- When operation being found abnormal, diagnose the fault according to the instruction manual. Do not operate the machine until the causes of fault are found and proper measures are taken.

(Disassemble and Assemble)

- Be sure to ask our branch office or factory for repairing, disassembling and assembling equipment. Failure to observe this warning may cause physical injury or fire.
- Before servicing, disconnect all power to the motor, confirm the motor is stopped, then wait at least three minutes. Failure to observe this warning may cause electric shock.
- Do not inspect the continuity of the wiring while the power is ON. Failure to observe this warning may cause electric shock.

(Disposal)

- When disposing of the products, treat them as general industrial waste.

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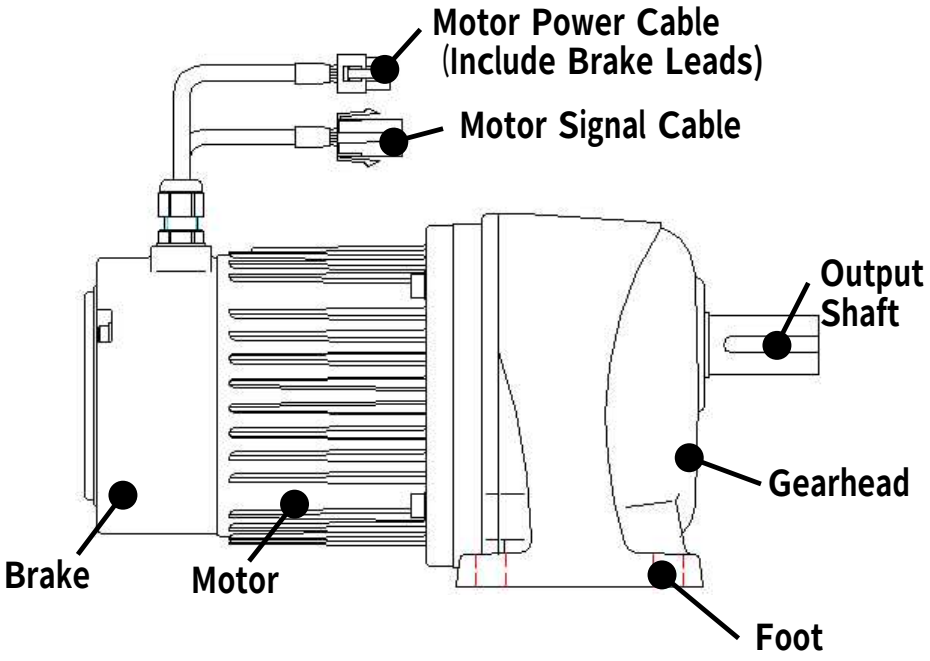
1. Before Operation

1-1. Parts Name and Functions



1-2. Initial Checks

When unpacking a carton, please check up the followings. If you have any problems or questions, please contact the dealer from which the product was supplied or a sales office.

(1) The ordered products and the contents indicated in the nameplate are correct.
(Type, Reduction ratio, Motor capacity, Voltage, Frequency, etc.)
(2) No accidental damage to the product during transportation exist.
(3) Screws or nuts are not loose.
(4) Components
a) Gearmotor
b) Instruction Manual
c) Accessory

2. Installation

2-1. Connection

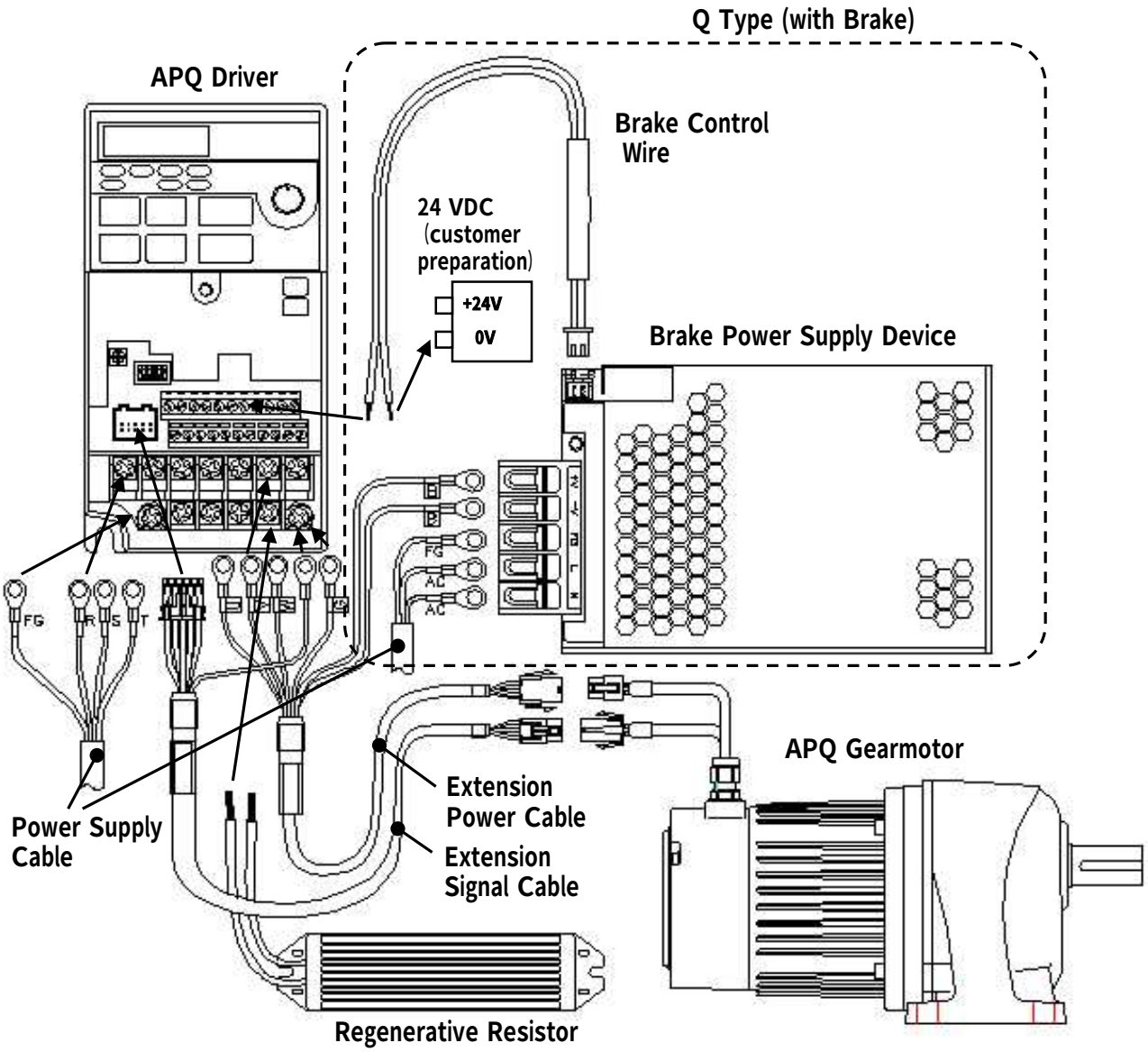
Connect each devices as shown below.
Be sure to insert the correct connector surely.

※ Extension Power Cable and Extension Signal Cable are required to connect Gearmotor and Driver.

※ The cable that comes with the gearmotor extends 200mm.

※ Do not connect or disconnect wiring while the power is on.
It may cause malfunction of the product.

※ When Q type (with brake type) is used, the power supply of 24VDC (10mA or more) is necessary aside from optional brake power supply device.



To ON·OFF the brake, our regular option is not always necessary. It is possible to add DC24V between B and B of the power cable. However, the varistor (82V and 1J or more) or the diode (100V and 1A or more) is necessary between B and B to protect the brake coil and contact point of the relay.

2-2. Installation of Gearmotor

(1) Proper location for installation

Ambient Temperature: 0°C to 40°C
Ambient Humidity: 85% max.
Altitude: Sea level to 1,000m max.
Environment: Well ventilated place free from corrosive gas, explosive gas vapor and/or dust.
Installation Location: Indoors

(2) Direction of Installation

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

(3) Method for Installation

① Attaching the mounting foot and flange
Fix the product with the four bolts on a flat and machined surface free from vibration.
(Roughness of the surface should be less than 0.3mm.)

② Attaching the shaft

- Gearmotor's weight should be supported by the driven shaft.
  (Forces other than turning reactive force should never be imposed to the torque arm.)
- In case start/stop and forward/reverse actions are frequent, tighten up the torque arm with bolts to keep the locking hole not loose.

(4) Tightening Torque

fixing hole (mm)	Bolt Size	Tightening Torque (N·m) {(kgf·m)}
5.5	M5	2.9 { 0.3}
6.5	M6	4.9 { 0.5}
8.5	M8	13 { 1.3}
9	M8	13 { 1.3}
11	M10	25 { 2.6}
13	M12	44 { 4.5}
15	M14	69 { 7.0}
18	M16	108 {11 }
22	M20	294 {30 }

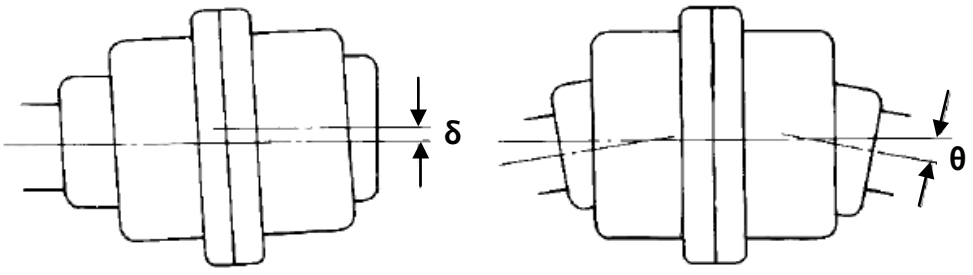
2-3. Connecting with other equipment

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

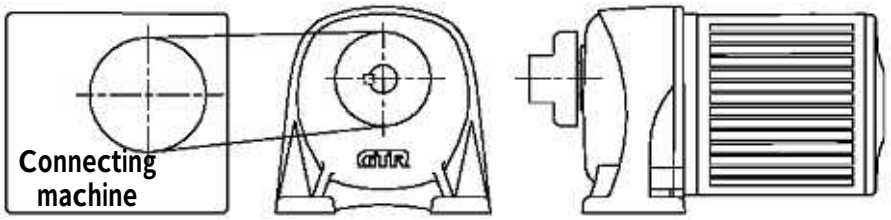


- The displacements δ and θ should be minimized as much as possible.
- The displacements δ and θ differ according to the type of coupling. Therefore, they should be within the allowable value defined by the respective manufacturer. (Reference: In case of chain coupling, δ should be within 2% of the roller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

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

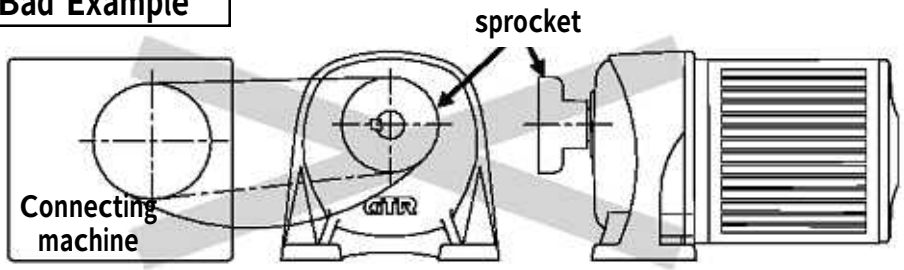
① In any connection, connect the units precisely, so that the center of the shaft of the reducer and that of the other equipment are parallel.
② The tension of the Chains/V-Belts and the coupling of the gear must be perpendicular to the center of the shaft.
③ Tension of the V-Belt: Excessive tensioning 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



- Tensions for belt and chain are correct.
- The positions of pulley and sprocket are also correct.

Bad Example

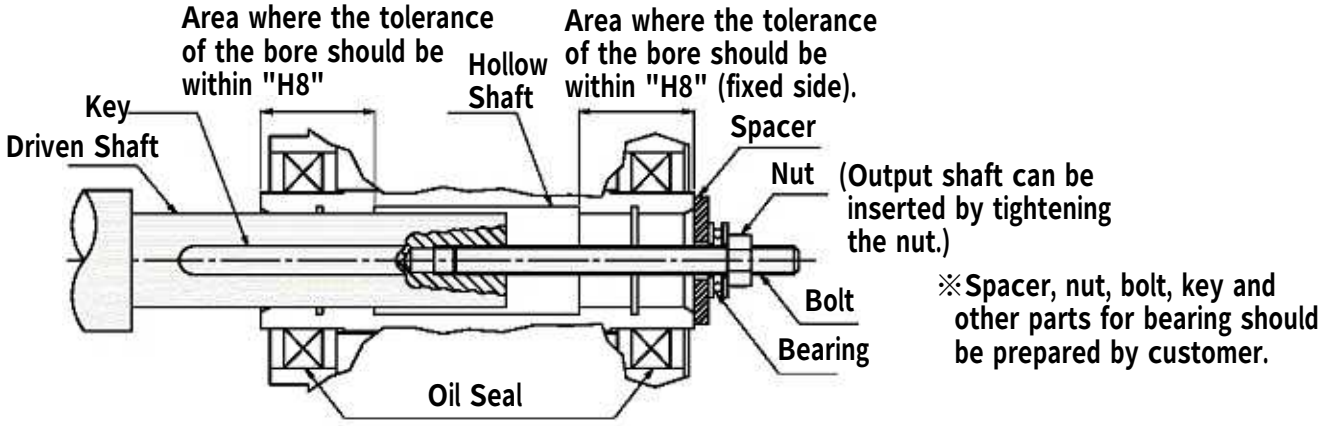


- The chain is too loose.
- The sprocket is positioned in the reverse direction so that the load point moves to the shaft edge.

3 Attaching and Detaching a Driven Shaft to/from AF3S 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.



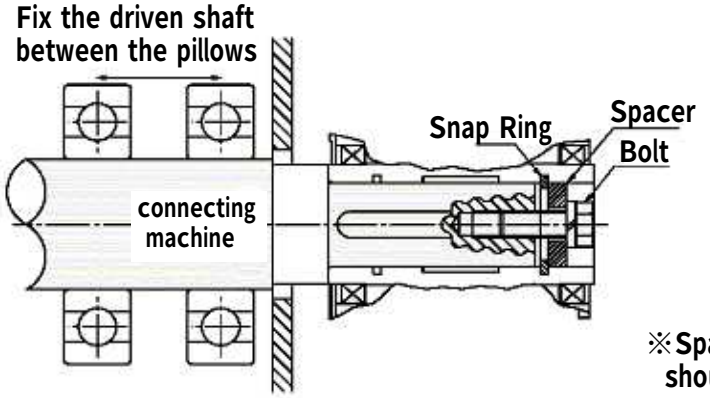
※Spacer, nut, bolt, key and other parts for bearing should be prepared by customer.

Figue-1

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

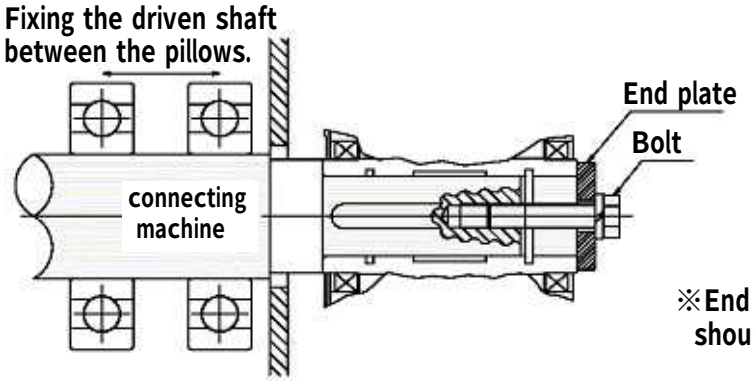
① Driven shaft with a shoulder



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

Figure-2 Fixing by spacer and snap ring

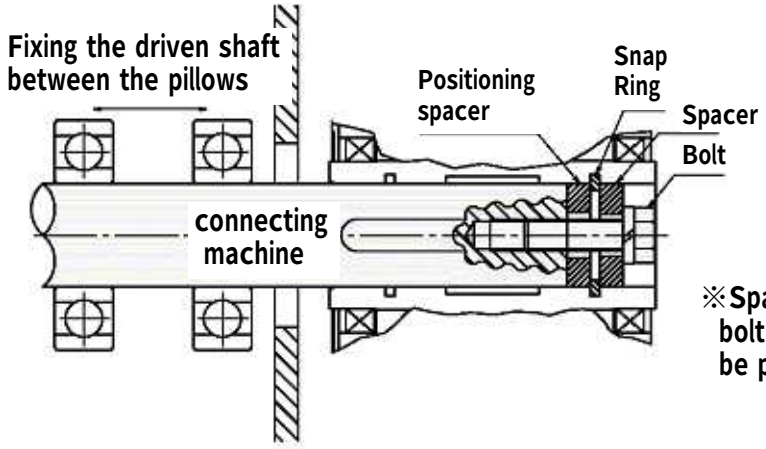
Note) Excessive tightening of the bolt may cause the deformation of the snap ring, which carefully note.



※End plate and bolt parts
should be prepared by customer.

Figure-3 Fixing by End plate

② Driven shaft without a shoulder



※Spacer, positioning spacer,
bolt and snap ring should
be prepared by customer.

Figure-4 Fixing by spacer and snap ring

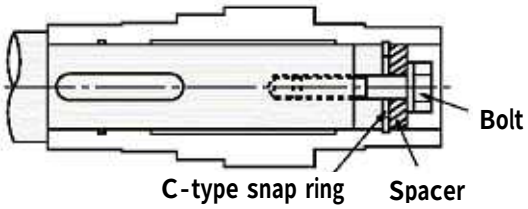
Note) Be sure to have space in the outer diameter of spacer and in the bore of hollow shaft. Excessive tightness of the fitting or inaccuracy of the spacer's diameter may be a cause of scrubbing which may lead to a greater fluctuation between the driven shaft and the hollow shaft. Positioning spacer 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.)

●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 guide line for the strength when designing.

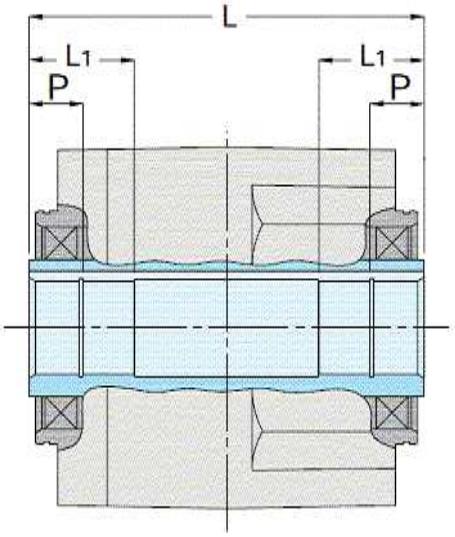
⟨Recommended size for the driven shaft fixing part⟩

	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	M12	Φ44.5	Φ11	5	45



●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.

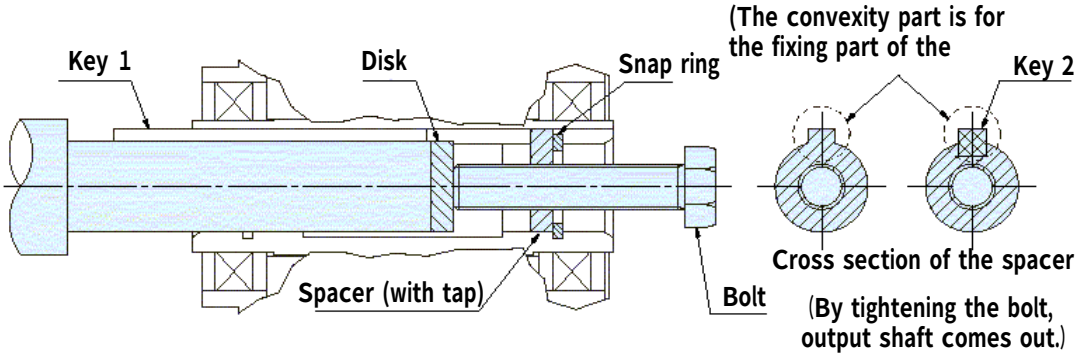


Figure-5

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

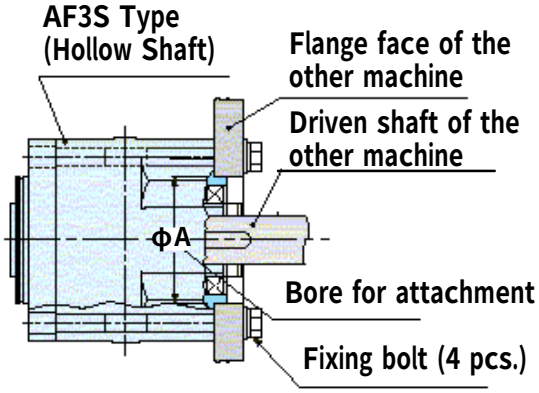
●Attaching Reducer

Merits and demerits of flange mounted and torque arm mounted.

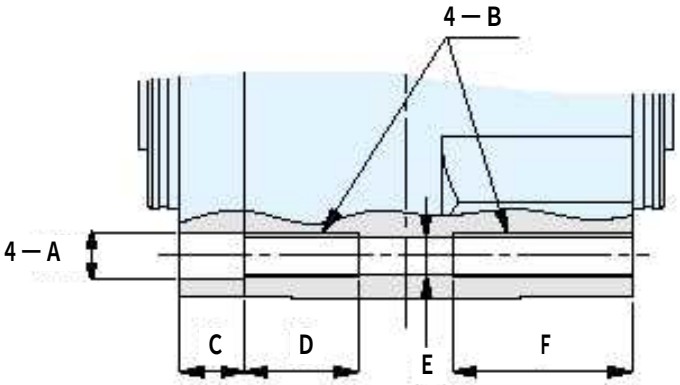
	Merits	Demerits
Flange Mounted	● Direct attachment to the machine is possible.	●Alignment with the connecting machine is needed.
	● Space saving	
Torque Arm Mounted	● Easy alignment with the connecting machine	● Torque arm is needed.
	● Only one fixing point is needed for fixing with other machine	● Space for attaching torque arm is needed.

●AF3S Type Hollow Shaft･Flange Mounted

When the AF3S Type unit is directly coupled with the flange face of the other machine, the alignment should be done precisely to avoid burnout of motor, damage to the bearings, etc. caused by misalignment. In the AF3 Series, there is a bore for the attachment as shown in the diagram on the right. The dimension tolerance of the bore for the attachment ϕA is "h7". The fixing bolts are to be used as shown in the diagram on the right. Fix by 4 bolts.



●Detailed Drawing for the Tapped Hole for Face Mount (Standard Specification)



Frame No.	Reduction Ratio	Capacity	A	B	C	D	E	F
15 (18)	1／10～1／160	0.1kW	ϕ10.5	M10×P1.5	13	25	ϕ8.6	38
25 (22)	1／10～1／ 60	0.2kW	ϕ10.5	M10×P1.5	15	25	ϕ8.6	40
30 (28)	1／10～1／ 60	0.4kW	ϕ10.5	M10×P1.5	16	25	ϕ8.6	41
	1／80～1／240	0.2kW	ϕ12.5	M12×P1.75	16	30	ϕ10.6	46
35 (32)	1／ 5～1／ 60	0.75kW	ϕ12.5	M12×P1.75	18	30	ϕ10.6	48
	1／80～1／240	0.4kW	ϕ16.5	M16×P2	18	40	ϕ14	58
45 (40)	1／80～1／240	0.75kW	ϕ20.5	M20×P2.5	23	50	ϕ17.5	73

※ Values in the parenthesis in the "Frame Number" are that for AF3F.
The necessary holding part of the bolt are recommended to be twice as much as the nominal designation (bolt diameter) of the screw.
(Example: In case of M10, over 20mm is recommended.)

●Fixing a Reducer and a Torque Arm

① Torque arms are subjected to rotation reaction torque, therefore, they must be strong by using materials of enough thickness and bolts to endure the shock load on starting/braking. Choosing our optional torque arms is the most appropriate solution.

② When installing a reducer with a torque arm, be sure to tighten the bolt using helical spring lock washers and plain washers. For proper tightening torque, refer to the table shown on the right.

Bolt Size and Respective Tightening Torque

Bolt Size	Tightening Torque N·m {k f·m}
M8	13 { 1.3}
M10	25 { 2.6}
M12	44 { 4.5}
M14	69 { 7.0}
M16	108 {11 }
M20	294 {30 }

●How to fix the Torque Arm Fixing Part

① In case of Forward/Reverse Operation

Firmly fix the fixing part of the torque arm. Make sure that there is no radial load (suspending load) imposed between the driven shaft and the hollow shaft of the reducer, caused by poor alignment between the hole of fixing part and the connecting machine. (Refer to the Figure-6)

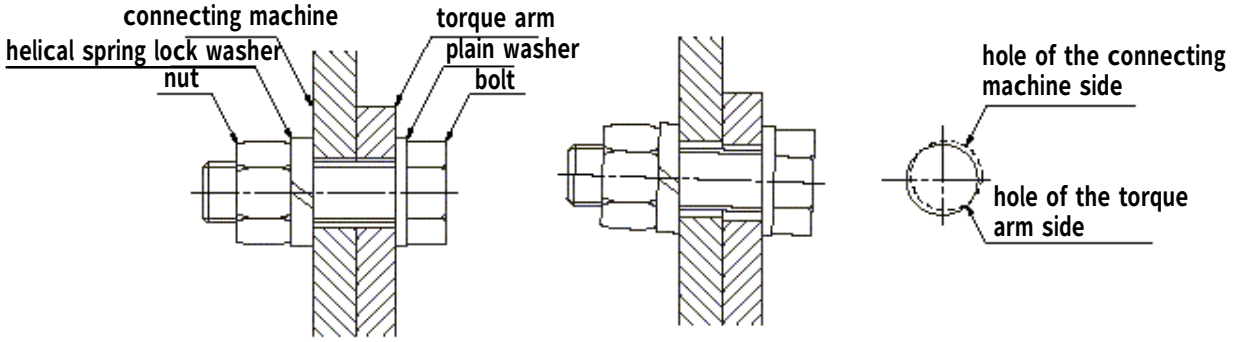


Figure-6 Attaching the fixing part

Bad example

Excess force arisen in the driven shaft and the hollow shaft may cause failure of the machine.

Note) When a backlash in the attaching part arose by forward/reverse operations or by high frequency of starting/stopping, the intense impact given to the torque arm in each starting may cause the failures such as loosening of the tightening bolt.

② In case of One-Direction Operation

If the frequent staring torque like in the forward/reverse operation, is not observed, operation with the released fixing part of torque arm is possible. However, it is necessary to fix the driven shaft and the hollow shaft. (Refer to the Figure 2, 3 and 4) In this case, be sure to secure enough space both for radial direction and for thrust direction in the alignment between the connecting machine and the fixing part.

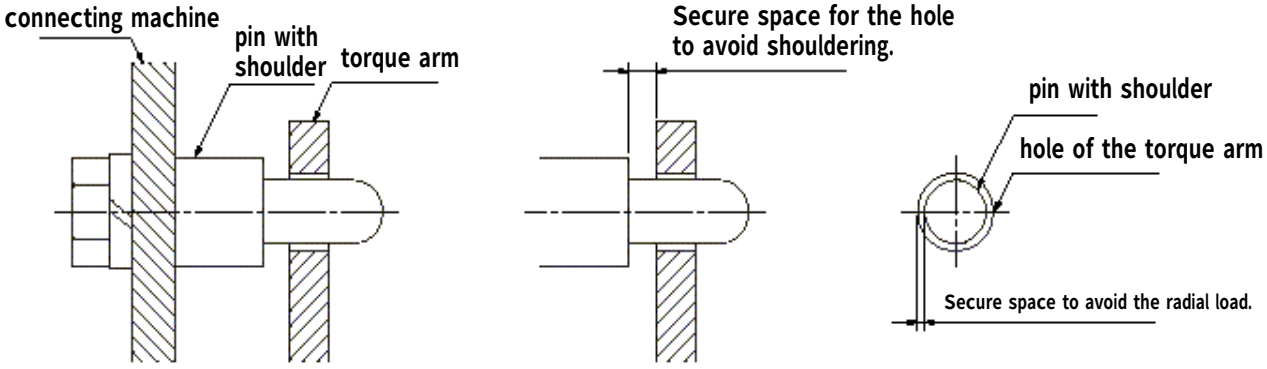


Figure-7 Example of using pin with shoulder

3. Specifications

①Motor Specifications

● The Rated Current described in the following table is a reference value without the gearhead. (motor unit only)

Item \ Capacity (kW)	0.1kW	0.2kW	0.4kW	0.75kW
Motor Type	Blushless DC Motor			
Rated Current (A)	0.6	0.9	2.0	3.8
Ambient Temperature (°C)	0 to 40°C			
Protection	Totally enclosed non-ventilated (IP65)			
Length of Motor Lead Wire (mm)	200			
Maximum Extension Distance (m)	30			

②Brake Specifications

Item \ Capacity (kW)	0.1kW	0.2kW	0.4kW	0.75kW
Brake Type	"Power-off, Brake-on" Type (Spring Close)			
Holding Torque (at motor shaft) (N·m)	0.57	0.95	1.76	3.43
Voltage (±10%) (V)	24			
Current (at 20°C) (A)	0.36	0.58	0.58	1.05
Power (at 20°C) (W)	8.6	13.9	13.9	20.6

4. Maintenance and Lifetime

4-1. Maintenance and Lifetime

● All models use grease lubricant, without needing replacement or replenishment. The gear motor has been designed for an approximate use life of 10,000 hours.

● The life of oil seal may vary according to the condition of use. Therefore replacement may be needed even within 10,000 hours use.

4-2. Method for Brake Gap Adjustment

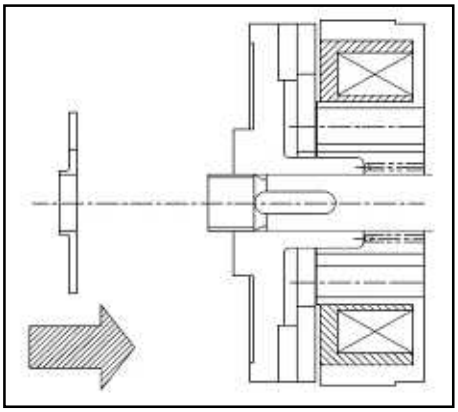
⚠ Danger

1 When adjusting the gap, be sure to disconnect the motor from the power source. Failure to observe this warning may cause physical injury. In the event of the castellated nut removed, be sure to attach it in the right direction. Attaching in the wrong direction may cause damages. For the right attaching direction, refer to the attaching direction of the castellated nut shown right.

2 After inspection and adjustment of the gap, be sure to confirm if the brake functions properly by turning the switch on and off. Failure to observe this warning may cause accident by falling or run out of control.

3 After inspection and adjustment of the gap, do not operate the motor with the brake cover open. Failure to observe this warning may cause wind-in and physical injury.

■Attaching direction of the castellated nut.



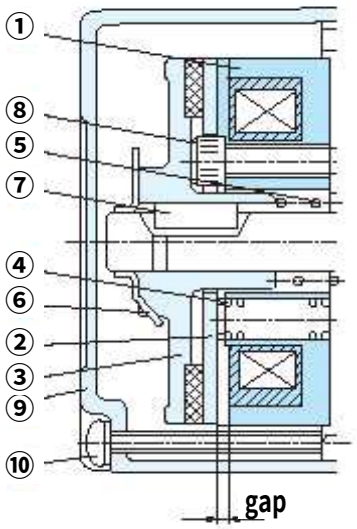
■ Q Type (with Brake)

After operation for an extended period of time, the friction disk of brake becomes abraded and the gap increases. When the gap clearance becomes greater than the limit of gap to inhale, armature inhaling becomes difficult by magnet, making it impossible to release the brake. When using the motor continuously with this condition, the operation with brake-on causes overload and finally ALARM LED on the driver lights up, then the motor will stop. In order to operate this machine safely, it is recommended to check or adjust the brake gap periodically (Every 1 year or every 2 to 3 million cycles).

■Structure of brake

0.1kW, 0.2kW and 0.4kW

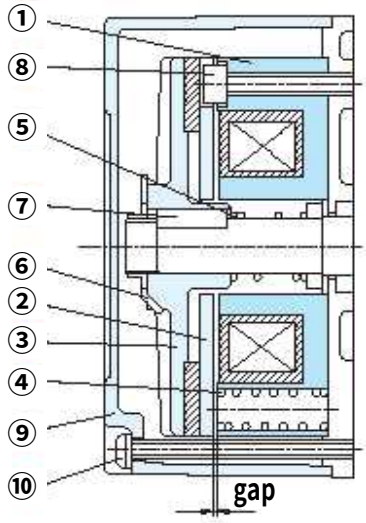
①Field
②Armature
③Outer Disk
④Spring 1
⑤Spring 2
⑥Castellated Nut
⑦Key
⑧Hex Socket Head Cap bolt
⑨Brake Cover
⑩Brake cover setting bolt



※ As a result of using brake for an extended period of time, naturally brake gap grew and finally brake releasing become impossible. To avoid this trouble, be sure to adjust brake gap periodically.
Proper Gap: 0.4mm (±0.1mm)
Gap for Suction Limit: Less than 0.7mm

0.75kW

①Field
②Armature
③Outer Disk
④Spring 1
⑤Spring 2
⑥Castellated Nut
⑦Key
⑧Hex Socket Head Cap bolt
⑨Brake Cover
⑩Brake cover setting bolt



※ As a result of using brake for an extended period of time, naturally brake gap grew and finally brake releasing become impossible. To avoid this trouble, be sure to adjust brake gap periodically.
Proper Gap: 0.2mm (±0.1mm)
Gap for Suction Limit: Less than 0.5mm

5. Troubleshooting

When the defective operation is found, please check the cause and take measures according to the following points.

Trouble	Cause	Troubleshooting
The motor does not run even in the unloaded condition.	Disconnection of motor power cable.	Check the connection.
	Disconnection or poor contact of motor signal cable.	Check the connection.
	Broken gear, shaft or bearing.	Repair at authorized factory.
The motor does not run in the loaded condition.	Motor power cable is too long.	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 frequency.
	Damage to bearings.	Repair at authorized factory.
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	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.
	Life of the friction disk.	Repair at authorized factory.
	Excessive moment of load inertia.	Reduce the load inertia.
Motor does not run. (Rotating speed does not increase.) Overheated motor. Abnormal noise in braking.	Larger brake gap.	Adjust the brake gap.
	Disconnection or short circuit of brake coil.	Repair at authorized factory.
	Poor contact of switch.	Repair or replace the switch.

6. Warranty

1. Warranty Term

The warranty term for the product shall be 18 months after the date of delivery or 12 month from the product starting operation, whether be shorter.

2. Scope of Warranty

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

3. Exception for Warranty

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

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

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

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