



Installation personnel must provide copies of this manual to the customer's pump operation, maintenance and inspection personnel. Keep this manual in a safe place where it can be consulted at any time.

Be sure to issue the customer's pump operation, maintenance, and inspection personnel with copies of this manual.



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## 1 Warnings








Warnings in this manual provide information needed for safe operation of the pump, and instructions for preventing danger or injury to you or other people. So that you will know the degree and imminence of danger that warnings signify, they are divided into two grades, WARNING and CAUTION, according to the seriousness of what will happen if their instructions are not heeded. Both grades of warning contain important safety information; carry out all the instructions that they give, without fail.

















Warning grade	Meaning
 <b>Warning</b>	Potentially hazardous situation. Failure to follow the instructions could result in death or serious injury.
 <b>Caution</b>	Failure to follow the instructions given could result in minor injury or damage to the pump.










<b>Note</b>	Used to emphasize important information.
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Meanings of symbols accompanying WARNINGS and CAUTIONS.	
	Indicates prohibition (that something must NOT be done). Precisely what must not be done is indicated by pictures or words either inside the circle of the symbol or close to it.
	Indicates an imperative (that something MUST be done). Precisely what must be done is indicated by pictures or words close to the symbol.




## 2 Safety Cautions

 <b>Warning</b>	Turn OFF the power switch when to stop long-term the pump. It may cause electric shock or electrical leakage and fire.	
	Turn OFF the power switch before inspecting or repairing the pump. Not doing so could result in the pump starting up suddenly in auto operation, exposing personnel to danger.	
	Do NOT operate the pump for more than 1 minute with the discharge valve closed. Doing so will increase the inner pressure of the pump, damaging the casing or plugs.	
	Install and ground an earth cable. Electric shock could occur during accidents or electric leakage.	
	Perform wiring work correctly as specified by electrical facility technical standards and extension codes. Incorrect wiring could result in electric shock and fires.	
	Turn OFF the power switch when a power failure. Otherwise, the pump may start-up suddenly when the power supply is resumed, exposing personnel to danger.	

	Install the pump in the locked pump room or equipment room. When it is placed outside, please arrange the fence and cover to avoid easy touch by the third person. If the rotating or high-temperature part is touched, unimaginable injury may happen.	
	Please arrange specific short circuit breaker for this pump. It is suggested to install the wiring breaker with electric leakage alarm output. Otherwise, it may cause electric shock and fire.	
	Close the suction and discharge valves, drain the casing drain, and ensure that the pump pressure is not abnormal or negative when disassembly and inspections. The pump may undergo abnormal rotation while the work is incomplete, resulting in damage to the casing.	
	Do NOT touch the rotating parts such as the spindle, shaft couplings, V-pulleys, etc. while the pump is running. Since these parts rotate at high speed, doing so could result causing injury.	
	Disassembly and repair of the pump should only be performed by specialist maintenance technicians. Otherwise, error by personnel could result in electric shock, fire or operating abnormally and causing injury.	
	Do not pour water on the motor. Otherwise, it may cause electric shock, electric leakage, fire and others.	
	Please use the anchor bolts to firmly fix the pump. In case of pump toppling, there will be injury danger. In addition, it may lead to pipe damage danger due to pump vibration.	
	Install the coupling guard after the couplings are aligned. In addition, during pump operation; don't be close to the rotating parts to prevent damage.	
	Please confirm that there are no loose wire connections on the motor, the primary side and secondary side of control panel, the electrical equipment in the control panel; and remove the dust. If bad connection or dust adsorbed on the terminal part due to lose wire connection, it may lead to heating and danger of fire accident.	
	Do NOT install the pump and motor near dangerous and flammable articles. Otherwise, it may cause fire due to ignition.	
 <b>Warning</b>	Do NOT touch the charge part under turning power switch on. Otherwise, there is the danger of electric shock.	
	Do NOT burn plastic components. In case of burning, it may generate harmful gases.	
	Do NOT install the pump outdoors or in locations exposed to water unless the motor is designed for outdoor use. Otherwise, it may cause electric leakage, electric shock and fire due to deteriorated insulation or other reasons.	
	Do NOT install non-genuine parts or modify the pump. Otherwise, there is a danger of electric shock and fire, as well as malfunction and breakage of the pump, which may result in bodily injury. Also, the normal functioning of the pump may be impaired.	
	NEVER use or work with the pump while it is lifted or suspended off the floor or ground. Otherwise, it may fall and cause bodily injury.	

	When handling and installing the pump, give consideration to its mass and shape and be sure to work safely. There is a risk of the pump falling down and causing bodily injury.	
	When handling chemicals, consult material safety data sheets (MSDSs) and other data to study the handling method, protective equipment to be used, precautions for disposal and so on, wear appropriate protective equipment and carry out work in a safe manner while observing other precaution instructions. Otherwise, there is a risk of burns, fire, and environmental impact.	
	The handling and installation of the pump must be performed by technical experts and in accordance with applicable laws and regulations (for example, Electrical Equipment Technical Standards, Interior Wiring Code and Building Standards Act). Otherwise, there is a risk of violation of laws and regulations, as well as a danger of an accident involving fire, bodily injury and other damage.	
	Install the pump in a well-ventilated place free of dust, corrosive or explosive gas, salt, moisture, vapor and condensation, away from rain, wind and direct sunlight, in consideration of the machine's service life. In an adverse environment, deteriorated insulation in the electric motor drive or control panel may lead to electric leakage, electric shock and fire.	
	When the pump is out of use for prolonged periods such as the wintertime, water inside the pump could freeze, causing damage to it. Accordingly, in such situations, either drain all water from the pump or provide thermal insulation to prevent the water from freezing.	
 <b>Warning</b>	Do NOT use, to the extent that was out of specification, such as handling liquid, the installation location and power supply. Causing the pump failure or injury or electric shock or electrical leakage and fire.	
 <b>Caution</b>	To prevent an accident if the pump stops running or an abnormality occurs, immediately turn off the power switch. Contact the shop from where you ordered the pump, or EBAS to perform an inspection and maintenance on the pump.	
	Do NOT operate the pump with 50Hz specifications at 60Hz. Doing so will overload the pump, causing the motor to burn.	
	Make sure that any one of three terminals of the three-phase motor is not loose or disconnected. Running the motor with only two terminals connected could a phase interruption, burning out the motor.	
	Do NOT touch the motor. The motor's surfaces will be hot, and you could get burned if you touch them.	
	Do NOT cover the motor with a blanket or cloth. Doing so could over heat the motor, setting a fire.	

	Make sure that the floor surface where the pump is installed has been waterproofed and treated for waste water. If it has not, severe damage could be caused should leakage occur.	!
	In facilities with living matter (fish farms, fish preserves, aquariums, etc.), always prepare a spare pump, as oxygen deprivation may result deaths due to pump failure.	!
	Please be sure to prepare the spare pump when you use this pump for important equipment (computer cooling equipment, freezer cooling equipment, etc.) Otherwise, the water supply may be cut off by failure of a pump, and the equipment may stop.	!
	Please prepare the spare pump to prevent currently used stop. Otherwise, the water supply may be cut off and equipment may stop.	!
	Since the coolant, rubber mold release and foreign objects may be mixed in the medium during production, please arrange proper filter at the outlet side according to different devices and proposes, and conduct adequate cleaning, and use the product after confirming no foreign objects.	!
	Please regularly confirm the action of protective relay. In case of an accident, it cannot act normally, and there may be electric shock and fault.	!
	If the pump is to be out of use for a long time, please implement the test run according to the "Installation" and "Operation" item. Otherwise, It may cause unsmooth pump operation, motor burning or idle operation.	!
	Avoid the pump operation without priming and permitting air to enter the handled liquid. Otherwise, the pump, bearing, shaft seal damage or pumping could not disabled. In addition, it may cause scald with pump overheating.	⊘
 <b>Caution</b>	Do NOT touch the pump when the handled liquid exceeds 40 °C. The pump temperature is high; touching the pump causes scald.	⊘
	Do NOT approach the inlet for suction pipe of the pump. Otherwise, it may cause the injury of hands and feet by pump operation.	⊘
	When the water in the pipe is drained off, don't turn power switch on. Otherwise, it may scald by operating without priming, pump damage and overheating.	⊘
	Operate the pump within the range of specification. If the pump is used under quantity changes, avoid the operation under less than the minimum quantity (equivalent to that of pump inlet diameter [mm]. For example, for 50mm, 50L/min). Otherwise, pump is air locked, and/or it may cause pump damage due to pressure and temperature of pump rising.	⊘
	Upon stopping operation, please drain off the water in the pump and pipe. Otherwise, it may flow of bacteria due to corrupted lagging water.	!
	Please regularly replace the consumable parts. If they are used under aging or wearing, water leakage, sticking, damage or others, major trouble may happen. Please entrust the distributor, EBAS to conduct regular repair or replacement of parts and components.	!

	The product cannot be used for food processing or food transfer applications because it may cause development of bacteria and contamination by foreign matter.	
	Ensure that all connection screws in electrically conductive parts are securely fastened. Otherwise, there is a risk of heat generation, malfunction and burnout.	
	When chemical waste is generated during the disassembly or cleaning of the pump, consult material safety data sheets (MSDSs) to study the method of disposal, and dispose of it in accordance with laws and local regulations, for example by employing a contractor specialized in chemical waste disposal.	

### 3 Delivery checks



When your pump is delivered, check the following immediately.

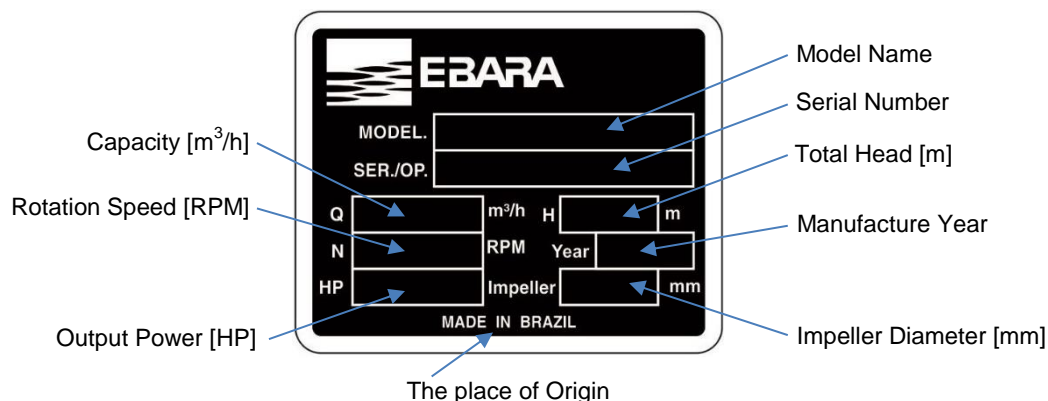
#### 1. The pump and accessories

- (1) Check that the pump is as ordered, by referring to the nameplate (**Fig.1**)
- (2) Confirm that no damage has occurred during transportation.  
Check all nuts and bolts to confirm that they are not loose.
- (3) Confirm that all accessories have been delivered. (Refer to chapter **9** "Structure")

#### 2. Nameplate

The basic specifications of the pump are listed on the nameplate. Read the data on the nameplate to check that this pump was the product that you ordered and be aware of the differences between 50 Hz and 60 Hz devices.

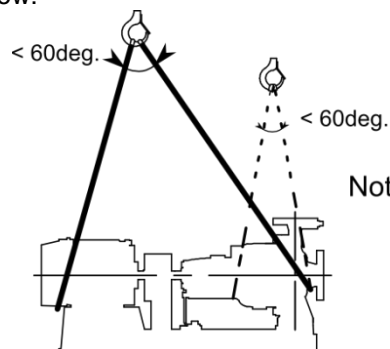
 <b>Caution</b>	<b>Be aware of the differences between 50 Hz and 60 Hz devices.</b>	
	<ul style="list-style-type: none"> <li>Pumps with 50 Hz specifications will overload when operated at 60 Hz, causing the motor to burn.</li> <li>Pumps with 60 Hz specifications will poorly perform when operated at 50 Hz.</li> </ul>	



**Fig.1 Data on pump nameplate (Standard English type)**

### 3. Lifting and carrying in/out

To carrying the pump/ pump set (with motor and common base) suspend it from the lifting tackles as shown below:



Note: Always notice that there are no people around it during operation.

Do not use the eye bolts for lifting.

**Fig.2 Lifting and carrying in/out the pump (dashed line) or pump set (solid line)**

## 4 Specifications

GS/GSD pump is a hydraulic part of device that moves liquid by physical or mechanical action and is of end suction own bearings. GS pump complies with EN733 dimensions.

Application: Agriculture, Fire-Fighting, Building, Water supply etc.

Check on the nameplate the total head, capacity, the pump speed as well as the nominal voltage and current of motor. Other specifications are on **Table 1**.

**Table 1 Standard specifications**

Pum p M odel		GS	GSD
Pole		2 Poles / 4 Poles	
L iqu id	Tem perature	0°C to 80°C	
	D ensity	To be discused each tim e	
	V iscos ity		
M ax. O perating Pressure		Up to 16Bar (1.6M Pa)	
Structure	Im peller	C losed	
	ShaftSeal	M echanicalSeal / G land Packing	M echanicalSeal
	Bearing	Shield BallBearing (Grease Lubrication)	—
F lange Standard		ANSIB16.1 (OptionalEN PN16)	
M aterial	Casing	Cast Iron	
	Im peller	Cast Iron	
	Shaft	Stainless Steel	
	Casing Ring	Bronze	
	ShaftSleeve	Stainless Steel	
	O-Ring	NBR / EPDM (Option)	
W eight		P lease refer to Catalogue	
D rive		E lectric M otor* <sup>1</sup> / Engine	E lectric M otor* <sup>1</sup>
Accessories	Bare Shaft	—	
	W ith M otor	Base	
		Coupling	—
		Coupling Guard	—
Location* <sup>2</sup>		Indoor / Outdoor	

- \*1 Voltage fluctuation: Within  $\pm 10\%$  of rated voltage. Frequency fluctuation:  $\pm 5\%$  of rated frequency. Simultaneous fluctuation of voltage and frequency: Sum of both absolute values shall be 5% or less.
- \*2 Ambient temperature: 0 to 40 °C (32 to 104 °F) 、 humidity: 85% or less (no condensation), altitude: up to 1000m. Do not install at the circumstance which has corrosive gas, explosive gas or steam.

<b><u>Note</u></b>	<p>Refer to the Standard specifications if you have purchased a standard model. We also offer pumps with optional features according to customer demand.</p> <p>Be careful not to exceed the given specifications in the use of your pump.</p>
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## 5 Installation

### 1. Location

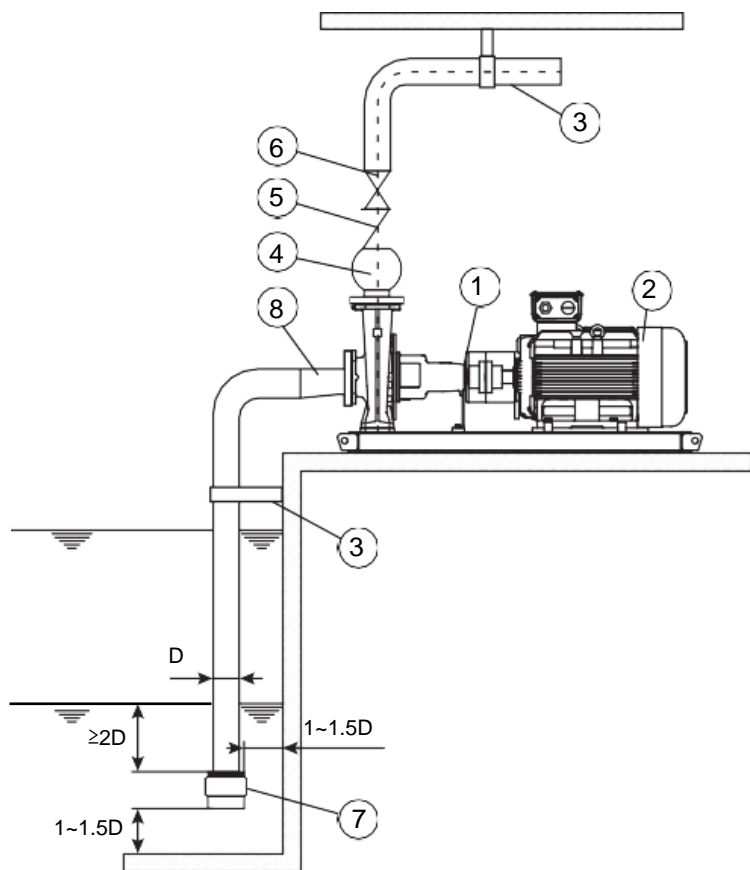
- (1) There should be ample space around the pump and securing a large working space for maintenance and inspection.
- (2) Provide an enclosure around the pump or take some other effective measures to prevent unauthorized personnel from coming near it.
- (3) Install the pump in a location where it is near a water source, suction height (the height from the suction surface to the centre of the pump) is low, and the length of the suction piping is short.
- (4) Suction pipe should be as short as possible (check the suction total head at data sheet). In certain cases, such as with hot water, suction head must be lower. To minimize suction pipe loss, excessive use of elbows and valves should be avoided.
- (5) Select an airy location with little dust and moisture. Ambient temperature should not exceed 40°C.
- (6) Since water leaks can occur from the mechanical seals and gaskets in the pump, take precautions to prevent water from leaking onto the floor or lower levels.

<b><u>Note</u></b>	After installation, have unneeded packaging disposed of by a specialist disposal company.
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## 2. Pipes

The installation must be done according to the arrangement shown in the Figure:



1	Pump
2	Motor
3	Pipe Support
4	Flexible Joint
5	Check valve
6	Gate valve
7	Foot valve
8	Eccentric reduction

**Fig.2 Installation view**

1. Make sure that the suction and delivery ducts do not transmit any stresses to the pump, by installing sufficiently strong supports. If this is not done, the pump could become misaligned and even break.
2. Fit any check valves (between the pump and the delivery valve) in the following cases:
  - In very long pipes.
  - If the head is high.
  - If the operation is automatic.
  - When you fill a tank under pressure.
  - When the operation is in parallel.
3. Mount air relief valves, if required, in those parts of the installation where it is impossible to avoid the formation of air bubbles. However, they must not be fitted at points where the pressure is less than atmospheric pressure, since the valve would suck in air rather than expel it.
4. To reduce the effect of a water hammer, mount a check valve with spring.
5. Suction systems:
  - The bottom end of the suction pipe must remain submerged and at a depth of at least twice the diameter of the pipe ( $2D$ ) and at a distance from the bottom of 1 time to 1 and a half times the diameter ( $1 \sim 1.5 D$ ).
  - Fit a bottom valve with a filter at the beginning of the suction pipe to prevent the entry of any foreign bodies.

- The suction pipe will be installed with an upward gradient towards the pump (of more than 1%) to avoid the formation of air bubbles. The pipes and other accessories must be connected in such a way so as not to create any air intake between the different elements.
- Make sure that the suction pipe is as short and straight as possible and try to avoid any unnecessary curves or additional length. Do not install any shut-off valve in this section.

6. In systems where suction is operational:

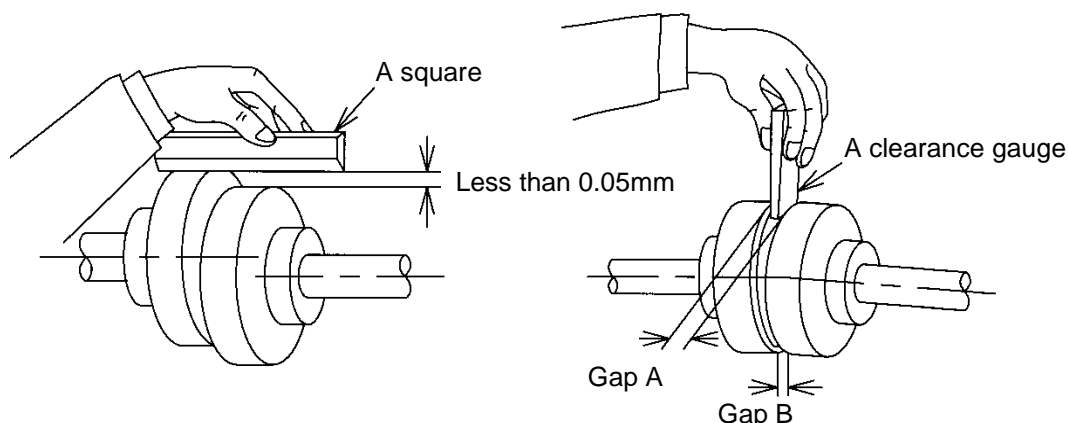
- The installation of a shut-off valve is recommended in the suction pipe to facilitate dismantling and overhauls.
- Install the suction pipe with an upward gradient towards the pump to avoid the formation of air bubbles.

### 3. Alignment

If a simple elastic coupling is used, adjust by placing tapered liners under earth the bed, and center so that the shaft coupling is within the range indicated in **Fig.3**.

To center a pump which has been purchased without a driver and which is to be directly driven, insert liners under the driver, and center so that the shaft coupling is within the range indicated in **Fig.3**.







The coupling guard must be removed to make centering adjustments. Be sure to replace before beginning operation.



**Fig.3 Misalignment of the couplings**

The difference between Gap A and Gap B should be smaller than 0.1 mm.

#### 4. Electrical connection

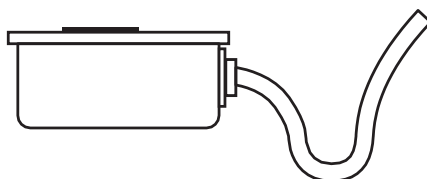
 <b>Warning</b>	Perform wiring work correctly as specified by electrical facility technical standards and extension codes. Incorrect wiring could result in electric shock and fires.	
	Install and ground an earth cable. Electric shock could occur during accidents or electric leakage.	
 <b>Caution</b>	Make sure that any one of three terminals of the three-phase motor are not lose or disconnected. Running the motor with only two terminals connected could a phase interruption, burning out the motor.	
	The motor manual must be read and completely understood by the specialist personnel/ operators responsible prior to installation and operation of the motor.	

Check that the motor is cooled properly, by leaving the air inlets and outlets unobstructed. Our recommendation is to install the equipment in a ventilated place away from any heat source.

The condensate drainage outlets must be in the lower part of the motor. The drainage caps can be removed if this does not jeopardize the protection of the motor.

All electrical connections of the equipment must be carried out by qualified personnel with the power supply switched off.

- Use power supply cables that are adequately sized to carry the maximum current absorbed by the motor, in addition to the margin set by local requirements; this will avoid any overheating and/or voltage drops (voltage drops must be less than 4% during the start-up phase).
- Make sure the cables reach the terminal box with a curve that prevents water from getting in and running over them. **(Fig.4)**
- The contact surfaces of the connections must be clean and protected against rust. Do not place any washers or nuts between the terminals on the motor and those providing access to the mains.
- Check the airtight sealing of the cable gland so as to ensure the degree of protection indicated on the nameplate.
- Avoid any mechanical stress being transferred to the motor terminals.
- Comply with the current and frequency limits indicated on the nameplate of the motor.
- It is advisable to install a switch in order to prevent any accidents involving electrical discharges, and also a protection against power surges for motors with the aim of avoiding any damage due to overheating.
- Terminal voltage in motors bearing may be within  $\pm 10\%$  of the rated voltage, exceeding this range will be lead to breakdown.



**Fig.4 Curve of the Cable**








<b>Note</b>	The correct direction of rotation is clockwise when looking from the motor side.
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## 5. Electrical maintenance

Any work on the motor must be carried out with the appliance switched off and after disconnecting the mains power supply.

- Check on a regular basis that the requirements regarding installation and electrical connections are complied with.
- Comply with the lubrication schedule for the bearings and the type of grease (if it is specified on the motor nameplate). Nevertheless, we recommend that bearings are replaced after three years.

### 6 Operation

 <b>Warning</b>	Do not operate the pump for more than 1 minute with the discharge valve closed. Doing so will increase the inner pressure of the pump, damaging the casing or plugs.	
	Do not touch the rotating parts such as the shaft, etc. while the pump is running. Since these parts rotate at high speed, doing so could result in injury.	
 <b>Caution</b>	If the pumped liquid is hot water, keep your hands off the pump. The pump's surfaces will be hot, and you could get burned if you touch them.	
	Do not touch the motor. The motor's surfaces will be hot, and you could get burned if you touch them.	
	Do not cover the motor with a blanket or cloth. Doing so could over heat the motor, setting a fire.	



### 1. Preparation for operation

<b>Note</b>	After piping or Water filling, check the centering of pump again please.
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- (1) Do pipe flashing before operation. Without pipe flashing, there might be some abnormal wear occurring on mechanical seal or other rotating parts.
- (2) Try to turn the shaft, to check that it rotates easily. If it turns stiffly or irregularly, inspect internal rusts, etc.
- (3) Prime the pump. Operating the pump without priming it will cause damage. Open the suction valve, discharge valve, and air vent valve, and fill the pump to the discharge nozzle with water from the pipe line.
- (4) When priming, rotate the pump manually to completely remove air from inside the impeller.
- (5) Tightening nuts of gland bolts to the extent to which hand-cranked becomes heavy. Make sure that there is no uneven tightening happening when tightening nuts of gland bolts. Do adjustment of gland packing according to “**Adjustment of gland packing**” (P.15).

<b>Note</b>	Do not make the water leakage value of gland packing to 0 mL/min. (Refer to P.15 - Table 2)
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## 2. Operation · Stopping

 <b>Warning</b>	If there is a power failure, turn the power switch off. Otherwise, the pump may start-up suddenly when the power supply is resumed, exposing personnel to danger.	
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<b><u>Note</u></b>	The correct direction of rotation is clockwise when looking from the motor side.
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- (1) Close the discharge valve and air vent valve after priming is completed. If a suction valve is equipped, open it to full turn
- (2) Turn the power briefly on and off again a couple of times, and check that operation is normal. Also check the direction of rotation.
- (3) Once the prescribed speed is reached, gradually open the discharge valve to start cycle operation.
- (4) Check for abnormal pressure, current, vibration, or noise. Keep the cocks of the pressure gauge and compound gauge closed, except when taking measurements. These gauges may be damaged if their cocks are left open.
- (5) After closing the gate valve on the discharge side, turn off the power to shut down the motor.
- (6) If there is no check valve on the discharge side, when shutting down operation, gradually close the discharge valve, and then shut down the motor.
- (7) Before the pump is started up for the second time and before all subsequent start-ups, conduct the daily inspection specified in 7 Maintenance.

<b><u>Note</u></b>	Run the pump at a discharge capacity that is suitable for the equipment. (Capacity that is too large or small will cause noise and vibration, and waste power.)
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### 3. Adjustment of gland packing · · · For gland packing type

For gland packing specification, make sure the water leakage is moderate according to **Table 2**. Prevent over tightening and uneven tightening gland packing from happening. If the water leakage could not be adjusted, there might be a deterioration occurring at shaft seal parts. Therefore, it is necessary to exchange gland packing or both gland packing and shaft, and then adjusting the water leakage value.

(1) The tightening of gland packing

- (a) Tightening nuts of gland bolts to the extent to which hand-cranked becomes heavy.
- (b) Make sure that there is no uneven tightening happening when tightening nuts of gland bolts.

(2) Adjustment of gland packing during operation of pump

- (a) During initial operation of pump, the water leakage value is more than normal operation (**Table 2**). To take 10 to 30 minutes' running-in of pump and making sure that you are aware of the fever, abnormal noise.
- (b) During normal operation of pump, do not make the water leakage value to 0 mL/min.
- (c) After running-in of pump, adjusting the water leakage value is moderate according to **Table 2**.
- (d) Checking table of the water leakage value (as a standard) .

**Table 2 The water leakage value (as a standard)**

Inner diameter of gland packing (mm)	Initial operation (mL/min)	Normal operation (mL/min)
33	70	33
43	86	43
53	106	53
60	120	60
70	140	70
80	160	80

You can also check inner diameter of gland packing from **Table 5**. (For example, inner diameter of gland packing of model 32-125 is 33 mm: Refer to **Table 5**.)



- (e) When the water leakage value is huge, tightening gland packing to adjust the water leakage value to normal value. However, if you tighten gland packing in a short time, pump might be prone to fever. Therefore, you should tighten gland packing gradually at 10 to 30 minute intervals.

### 4. Replacement of gland packing · · · For gland packing specification

Do replacement of gland packing under the situations below.

- (1) The disassembling of pump happens, such as a periodical inspection
- (2) There is no more space for tightening of gland packing.
- (3) The water leakage value could not be adjusted.
- (4) When a significant damage or dents (0.7mm or more for one side) occurs to the shaft surface, shaft should be exchanged for new.
- (5) Replace gland packing with new packing, shifting joints from 90 to 120 degrees until last joint is on the bottom.

## 5. Cautions for operation

 <b>Warning</b>	If the pump is operated for long periods with the discharge valve closed, the water temperature inside the pump will rise, causing an accident. Do not operate the pump with the discharge valve closed for longer than 1 minute.	
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- (1) The frequent starting up and stopping of the pump will cause damages. It is recommended to limit the starting up of the pump as follows:

**Table 3 The value of starting frequency**

Motor output	10 HP (7.5 kW) or less	15 HP to 30 HP (11 kW to 22 kW)	40 HP (30 kW) or more
Number of starts per hour	6 times or less	4 times or less	3 times or less

- (2) If there is a power failure, turn the power switch off. Otherwise, the pump may start-up suddenly when the power supply is resumed.

## 7 Maintenance

 <b>Warning</b>	Disassembly and repair of the pump should only be performed by specialist maintenance technicians. Otherwise, error by personnel could result in electric shock, and the pump catching fire or operating abnormally and causing injury.	
	Always turn the power switch OFF before inspecting or repairing the pump. Not doing so could result in the pump starting up suddenly in auto operation, exposing personnel to danger.	
 <b>Caution</b>	If the pumped liquid is hot water, keep your hands off the pump. The pump's surfaces will be hot, and you could get burned if you touch them.	
	Do not touch the motor. The motor's surfaces will be hot, and you could get burned if you touch them.	
	To prevent an accident if the pump stops running or an abnormality occurs, immediately turn off the power switch. Contact the shop from where you ordered the pump, or EBAS to perform an inspection and maintenance on the pump.	
	When the pump is out of use for prolonged periods such as the wintertime, water inside the pump could freeze, causing damage to the pump. Accordingly, in such situations, either drain all water from the pump or provide thermal insulation to prevent the water from freezing.	

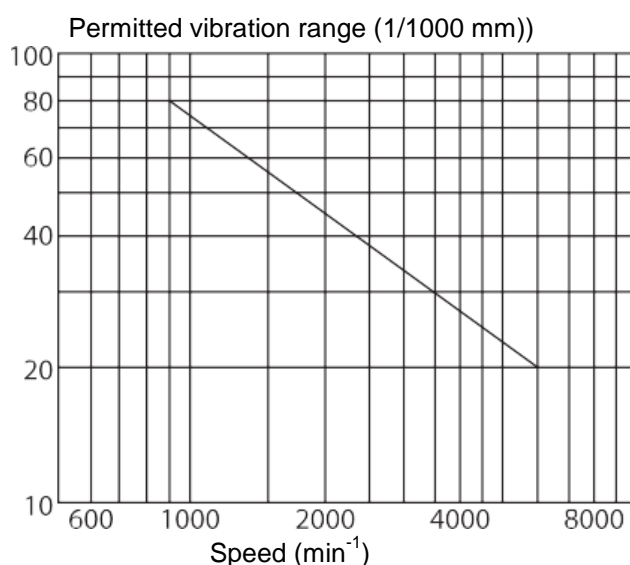
## 1. Daily inspection

- (1) If pressure, current, capacity, vibration, or noisy differ markedly from normal, trouble of some kind is probably going to occur, and you should take prompt corrective action. Refer to 8

Troubleshooting for diagnosis and corrective action. You are advised to post a Daily Operation Condition Check Sheet.

<b><u>Note</u></b>	Standard performance curves can be obtained from EBAS sales office or dealers.
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- (2) For standard specification, allowable operating temperature of bearing is no more than Room temperature + 40°C, and no more than 80°C.
- (3) There should be almost no leakage if the mechanical seal is normal. If there is a large amount of leakage, replace the mechanical seal.
- (4) Normally, there should be almost no leakage for a mechanical seal. However, at the beginning of operating of pump, a little water leakage from a mechanical seal is recognized. As the pump is operating for a while, the water leakage would be decremented, otherwise you should stop the pump and check it. During daily inspection, losing the bolts of the protector. Do not remove the bolt of the protector. It may cause bolts to be lost.
- (5) For gland packing specification, make sure the water leakage value is moderate according to **Table 2**. and preventing over tightening and uneven tightening gland packing. If the water leakage value could not be adjusted, there might be a deterioration occurring at shaft seal parts. Therefore, it is necessary to exchange gland packing or both gland packing and shaft, and then adjusting the water leakage.
- (6) Standard value of vibrations for when the pump is installed correctly, and piping work has been performed correctly are shown in **Fig.5**. Wrong piping work can often cause excessive vibrations.



**Fig.5 Vibration standard**

- (7) Make sure that mounting bolts and terminal screws of electrical wiring are fasten firmly.
- (8) Measure the insulation resistance of motor once a month. It is okay when the insulation resistance value is equal to or greater than the 5MΩ. However, when the insulation resistance value drops suddenly, no matter the insulation resistance value is more than the 5MΩ or not, the repair of motor is required



## 2. Prolonged stoppage and storage

- (1) If you have installed a spare pump, run it from time to time and keep it ready for operation anytime.
- (2) When the pump is out of use for three months or more, the gland packing unit might be rust-eaten. Please take the old gland packing unit out, remove moisture from the stuffing box, and install new gland packing unit into the stuffing box. Also, to prevent the finished surfaces of bearing and shaft and coupling and so on being rust-eaten, doing something like painting the anti-rust oil please.
- (3) When the pump is out of use for prolonged periods in the wintertime or in cold climates, the water inside the pump could freeze, causing damage to the pump. Accordingly, in such situations, provide thermal insulation to prevent the water from freezing.
- (4) When the pump is out of use for three months or more, please shut off the power.

## 3. Replaceable parts

Replace the parts according to the conditions shown in **Table 4**.

**Table 4 Inspection list**

Replaceable part	Replacement condition	Average replacement frequency
Mechanical seal	When there is leakage.	Annually
Gland packing	When no longer able to control leakage.	Annually
Shield ball bearing	When there is an abnormally loud sound or grease flow.	Once every 2 to 3 years
O-ring	Whenever disassembling for inspection.	—

The above average replacement frequency is for normal operating conditions.

- (2) The replaceable parts for each model as:

Mechanical seal, Gland packing, Shield ball bearing and O-ring.

**Table 5 Model list for replaceable parts**

			Nom inal D IA . / O -R ing m m							
Bearing Num ber (Q ty:2)	M echanical SealNom inal D IA . m m	Grand Packing InnerD IA. M m [GP Type] (Q ty:4)	Nom inal D IA .	125	160	200	250	315	400	500
			O -R ing (Q ty:1)	3.53x183.74		3.53x234.54	3.53x278.99	3.53x355.19	5.33x456.06	5.33x532.26
6306ZZ	28	33 [5/16"]	32-125.1		32-160.1	32-200.1	32-250			
			32-125		32-160	32-200	40-250			
			40-125		40-160	40-200	50-250			
			50-125		50-160	50-200				
			65-125		65-160	65-200				
			80-160							
6308ZZ	38	43 [3/8"]	100-160		80-200	65-250	40-315			
					100-200	80-250	50-315			
					125-200	100-250	65-315			
					150-200	125-250	80-315		100-315	
6310ZZ	48	53 [3/8"]					100-250L	80-315L	80-400	
							125-250L	100-315L	100-400	
							150-250	125-315	125-400	
								150-315	150-400	
6312ZZ	55	60 [1/2"]	150-400L							125-500
6314ZZ	65	70 [1/2"]	200-400							150-500
6316ZZ	75	80 [9/16"]	200-500							

\*Mechanical Seal dimensions depend on EN 12756 (DIN 24960)

\*O-Ring dimensions depend on AS568

## 8 Troubleshooting

Although the equipment usually functions according to the user's requirements, in some cases its operation may not come up to expectations due to problems with the system or the power supply. The following table may be useful in finding possible solutions in the event of failures or malfunctions:

### 1. Pump

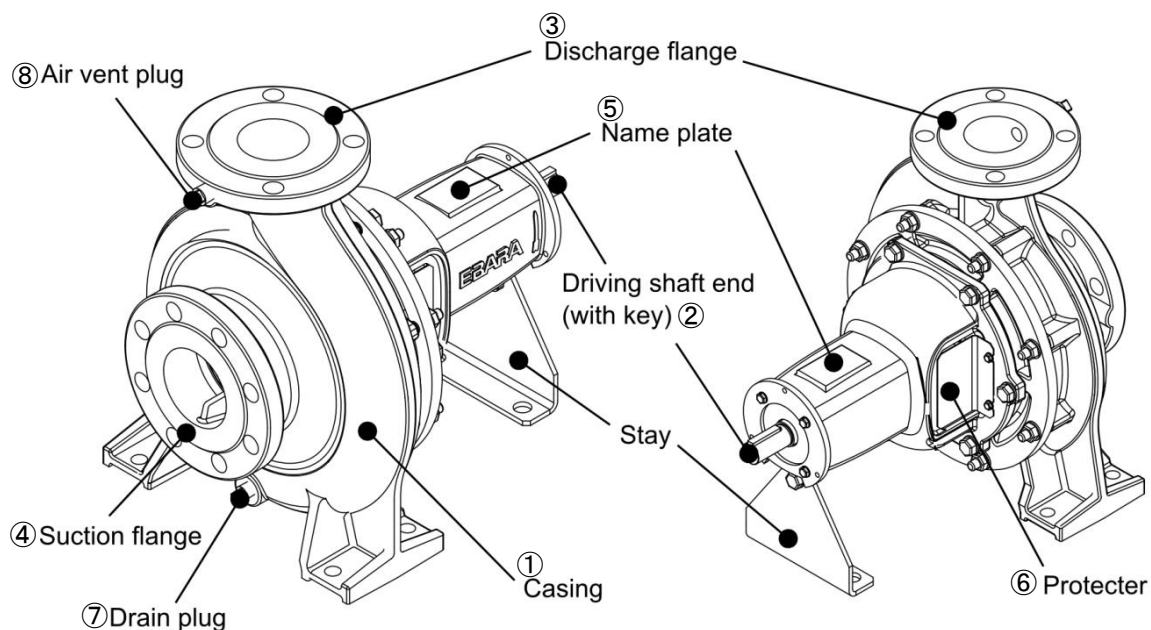
Fault	Causes	Measures to be taken
The motor will not start	<ul style="list-style-type: none"> <li>- The control panel is not working correctly.</li> <li>- Motor failure.</li> <li>- Faults in the power supply.</li> <li>- Friction on rotation shaft.</li> <li>- Pump clogged.</li> </ul>	<ul style="list-style-type: none"> <li>- Check all conditions.</li> <li>- Repair the motor.</li> <li>- Check and repair.</li> <li>- Rotate it by hand. Reassemble.</li> <li>- Repair in specialist workshop.</li> <li>- Remove foreign bodies.</li> </ul>
There is no priming	<ul style="list-style-type: none"> <li>- Foreign bodies in the foot valve.</li> <li>- Malfunction in the bottom valve.</li> <li>- Water leakage from the suction pipe.</li> <li>- Air entering the suction pipe or seal.</li> </ul>	<ul style="list-style-type: none"> <li>- Remove foreign bodies.</li> <li>- Replace the valve.</li> <li>- Check the suction pipe.</li> <li>- Check the suction pipe and mechanical seal.</li> </ul>
The pump has no flow rate	<ul style="list-style-type: none"> <li>- The pump does not turn.</li> <li>- The delivery valve is closed or half-closed.</li> <li>- The suction head is too high for the pump.</li> </ul>	<ul style="list-style-type: none"> <li>- Check that the impeller is free.</li> <li>- Open the valve.</li> <li>- Check the project.</li> </ul>
Low flow rate	<ul style="list-style-type: none"> <li>- The direction of rotation is not correct.</li> <li>- Low rotation speed.</li> <li>- Low voltage.</li> <li>- Blocking in the bottom valve or in the filter.</li> <li>- Impeller is blocked.</li> <li>- Pipe clogged.</li> <li>- Air entering the system.</li> <li>- Leakage in the delivery pipe.</li> <li>- Impeller worn.</li> <li>- Significant head losses in the system.</li> <li>- Liquid temperature very high. The liquid is volatile.</li> <li>- Cavitation.</li> </ul>	<ul style="list-style-type: none"> <li>- Correct the electrical connections.</li> <li>- Measure the RPM with a tachometer.</li> <li>- Check the power supply.</li> <li>- Remove foreign bodies.</li> <li>- Check and repair the suction pipe and shaft seal.</li> <li>- Check and repair.</li> <li>- Check the impeller.</li> <li>- Review the project.</li> <li>- Review the project.</li> <li>- Seek expert advice.</li> </ul>
Water comes out initially and then stops abruptly	<ul style="list-style-type: none"> <li>- The pump has not been primed.</li> <li>- Air entering the system.</li> <li>- Air bubbles in the suction pipes.</li> <li>- The suction head is too high for the pump.</li> </ul>	<ul style="list-style-type: none"> <li>- Prime the pump correctly.</li> <li>- Check and repair the suction pipe and shaft seal.</li> <li>- Vent the pipes.</li> <li>- Review the project.</li> </ul>

Power surge	<ul style="list-style-type: none"> <li>- The voltage is low or the imbalance between the phases is high.</li> <li>- The head is too low, or the flow rate is too high</li> <li>- 50 Hz pump is being used at 60 Hz.</li> <li>- Foreign bodies inside the pump.</li> <li>- The mechanical seal was not fitted correctly.</li> <li>- Bearings damaged.</li> <li>- Friction in the rotation areas. The shaft is bent.</li> <li>- The direction of rotation is not correct.</li> <li>- The density and/or viscosity level of the liquid is high.</li> </ul>	<ul style="list-style-type: none"> <li>- Check the power supply.</li> <li>- Partially shut off the delivery valve.</li> <li>- Check the nameplate details.</li> <li>- Remove foreign bodies.</li> <li>- Fit it correctly.</li> <li>- Replace the bearings.</li> <li>- Repair in specialist workshop.</li> <li>- Check and correct the connection.</li> <li>- Review the project.</li> </ul>
The bearings are overheating	<ul style="list-style-type: none"> <li>- Bearings damaged.</li> <li>- In operation for a long time with the valve closed or half-closed.</li> </ul>	<ul style="list-style-type: none"> <li>- Replace the bearings.</li> <li>- Avoid such a situation; Open the valve or stop the pump.</li> </ul>
Excessive operating vibration and noise.	<ul style="list-style-type: none"> <li>- Fault in installation.</li> <li>- Bearings damaged.</li> <li>- Flow rate too high.</li> <li>- Flow rate too low.</li> <li>- Impeller is blocked.</li> <li>- The direction of rotation is not correct.</li> <li>- Friction in the rotation areas. The shaft is bent.</li> <li>- Cavitation.</li> <li>- Vibrations in the piping.</li> </ul>	<ul style="list-style-type: none"> <li>- Check installation.</li> <li>- Replace the bearings.</li> <li>- Reduce the aperture of the delivery valve.</li> <li>- Increase the aperture of the delivery valve.</li> <li>- Remove foreign bodies.</li> <li>- Check and correct the connection.</li> <li>- Repair in specialist workshop.</li> <li>- Seek expert advice.</li> <li>- Replace the piping or fit an inverter.</li> </ul>
Excessive water leakage from the shaft seal.	<ul style="list-style-type: none"> <li>- Defective fitting of the mechanical seal.</li> <li>- The mechanical seal is damaged.</li> <li>- Overpressure in delivery.</li> <li>- The shaft is bent.</li> </ul>	<ul style="list-style-type: none"> <li>- Fit it correctly.</li> <li>- Replace the mechanical seal.</li> <li>- Review the project.</li> <li>- Repair in specialist workshop.</li> </ul>

## 2. Motor

Fault	Causes	Measures to be taken
It does not work	<ul style="list-style-type: none"> <li>- The winding is broken or has been cut.</li> <li>- Stator short-circuited.</li> <li>- The bearings are blocked.</li> <li>- The voltage is low.</li> <li>- Lack of phases in the power supply.</li> </ul>	<ul style="list-style-type: none"> <li>- Repair in specialist workshop.</li> <li>- Repair in specialist workshop.</li> <li>- Repair the bearings.</li> <li>- Change the nominal voltage.</li> <li>- Check the power supply.</li> </ul>
Abnormal noise or excessive vibrations.	<ul style="list-style-type: none"> <li>- Operation without a phase</li> <li>- Power surges.</li> <li>- Friction between the rotor and stator.</li> <li>- Obstructions in the cooling fan.</li> <li>- Fault in installing the motor.</li> <li>- Poor Star/Delta commutation.</li> </ul>	<ul style="list-style-type: none"> <li>- Check the power supply.</li> <li>- Correct the power surges.</li> <li>- Align and/or replace the bearing.</li> <li>- Remove foreign bodies.</li> <li>- Connect the pump correctly.</li> <li>- Correct the cabling.</li> </ul>
Motor overheating. Appearance of smoke and/or bad smell	<ul style="list-style-type: none"> <li>- High power surges.</li> <li>- Fan is blocked.</li> <li>- Wrong voltage.</li> <li>- The bearings are blocked.</li> <li>- Stator short-circuited.</li> <li>- Stator earthed.</li> </ul>	<ul style="list-style-type: none"> <li>- Correct the power surges.</li> <li>- Release the fan.</li> <li>- Change the motor for one with the appropriate voltage.</li> <li>- Repair the bearings.</li> <li>- Repair in specialist workshop.</li> <li>- Repair in specialist workshop.</li> </ul>
Low rotation speed	<ul style="list-style-type: none"> <li>- Low voltage.</li> <li>- Poor Star/Delta commutation.</li> <li>- Overloading.</li> <li>- Defective electrical connection.</li> </ul>	<ul style="list-style-type: none"> <li>- Change the nominal voltage.</li> <li>- Correct the cabling.</li> <li>- Reduce the current.</li> <li>- Correct the electrical connections.</li> </ul>

## 1. External view and residual risks



No.	Name	No.	Name
1	Casing	5	Name plate
2	Driving shaft end (with key)	6	Protector
3	Discharge flange	7	Drain plug
4	Suction flange	8	Air vent plug

**Fig.6 External view**

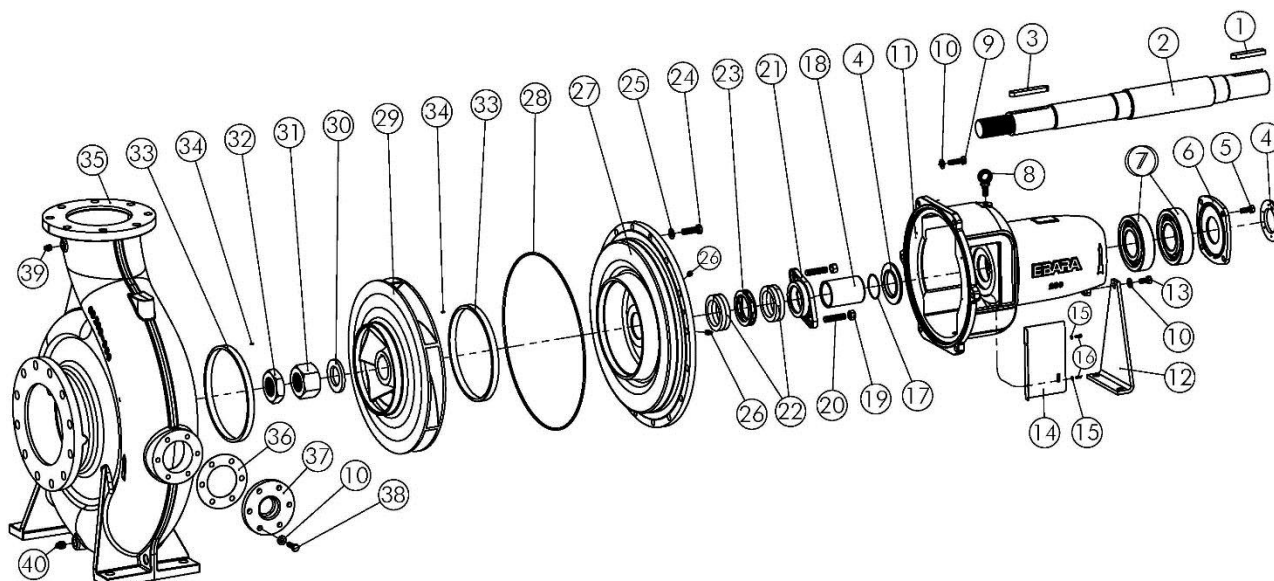
**Table 6 Residual risks**

Operation	Risk	Measures to be taken
Maintenance	<ul style="list-style-type: none"> <li>- Burns</li> <li>- Damage caused due to it being empty or due to pressure</li> <li>- Damage caused by entrapment</li> </ul>	<ul style="list-style-type: none"> <li>- Wait until the temperature goes down</li> <li>- Check the temperature before touching</li> <li>- Stop the pump and proceed very carefully</li> <li>- Stop the pump and proceed very carefully</li> <li>- Always fit protection guards</li> <li>- Keep your distance from rotating parts</li> </ul>
Transport and lifting	- Impacts and falls	- Proceed with care

## 2. Exploded view

### Model GS

This figure shows a Model GS (GS200-500) for example. Depending on the model, your pump may vary slightly.



No.	Description	Qty.
1	Key form AB	1
2	Shaft	1
3	Key form AA	1
4	Deflector	2
5	Bolt	4
6	Bearing Cover	1
7	Bearing	2
8	Eyebolt	1
9	Bolt	6
10	Washer	13
11	Bearing Casing	1
12	Stay	1
13	Bolt	1
14	Protector	2
15	Washer	4
16	Bolt	4

No.	Description	Qty.
17	Gasket	1
18	Shaft Sleeve	1
19	Nut	2
20	Gland Bolt	2
21	Gland	1
22	Gland Packing	4
23	Lantern Ring	1
24	Bolt	16
25	Washer	16
26	Plug	2
27	Casing Cover	1
28	O-Ring	1
29	Impeller	1
30	Washer	1
31	Hex Nut	1
32	Hex Jam Nut	1

No.	Description	Qty.
33	Casing Ring	2
34	Spring Pin	2
35	Casing	1
36	Handhole Gasket	1
37	Handhole Cover	1
38	Bolt	6
39	Plug 3/8" BSP	1
40	Plug 1/2" BSP	1

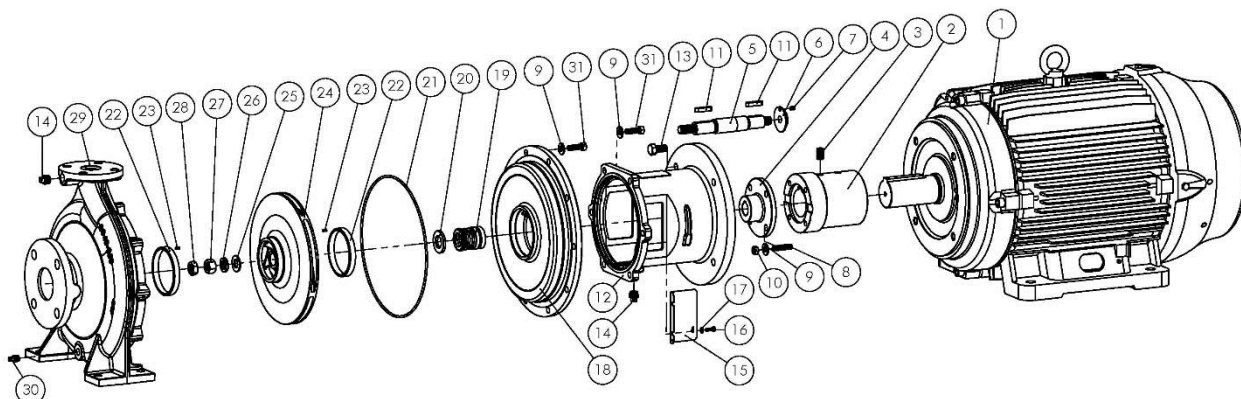
**Fig.7 Exploded view [Example of GS200-500]**

### **Note**

Cross-section drawings indicating the materials of the components can be obtained from EBAS sales offices or dealers.

### Model GSD

This figure shows a Model GSD (GSD40-250[2P-50HP]) for example. Depending on the model, your pump may vary slightly.



No.	Descrição (Description)	QTY
1	Motor eixo standard (Standard shaft motor)	1
2	Bucha do Motor (Motor bushing)	1
3	Parafuso Allen (Set screw)	2
4	Bucha da Bomba (Pump bushing)	1
5	Eixo (Shaft)	1
6	Porca sextavada (Hex nut)	1
7	Parafuso Allen (Set screw)	1
8	Prisoneiro (Stud bolt)	4
9	Arruela Lisa (Washer)	18
10	Porca sextavada (Hex nut)	4
11	Chaveta (Key)	2
12	Intermediário (Bracket)	1
13	Parafuso sextavado (bolt)	4
14	Bujão 3/8" BSP (Plug)	2
15	Protetor (Protector)	2
16	Parafuso Sextavado (Bolt)	4

No.	Descrição (Description)	QTY
17	Arruela lisa (Washer)	4
18	Tampa de Pressão Selo (Casing Cover)	1
19	Selo Mecânico (Mechanical Seal)	1
20	Anel Distanciador do Rotor (Spacer Ring)	1
21	Anel ORing (ORing)	1
22	Anel de desgaste (Casing ring)	2
23	Pino Elástico (Spring Pin)	2
24	Rotor (Impeller)	1
25	Arruela Lisa (Plane Washer)	1
26	Arruela Elástica (Spring Washer)	1
27	Porca Hexagonal (Hex Nut Normal Type)	1
28	Porca Hexagonal(Fino) (Hex Jam Nut Thin)	1
29	Carcaça (Casing)	1
30	Bujão 1/4" BSP (Plug)	1
31	Parafuso Sextavado (Bolt)	16

**Fig.8 Exploded view [Example of GSD40-250]**

#### Note

Cross-section drawings indicating the materials of the components can be obtained from EBAS sales offices or dealers.

### 3. Accessories

Standard accessories (with motor)

Common base (GS/GSD).....1

Coupling (GS).....1 set

Coupling guard (GS) .....1 set



## 10 Disassembly and Assembly

- ※ Disassembly/assembly and repair of the pump should only be performed by specialist maintenance technicians. Otherwise, error by personnel can result in serious physical injury and/or equipment damage.
- ※ Always disconnect and lock out power to the driver before you perform any installation or maintenance tasks. Failure to disconnect and lock out driver power will result in serious physical injury.
- ※ The unit and the components can be heavy. Use proper lifting method.
- ※ Allow all system and pump components to cool before you handle them to prevent physical injury.
- ※ The pump can handle hazardous and toxic fluids. Identify the contents of the pump and observe proper decontamination procedures to eliminate the possible exposure to any hazardous or toxic fluids. Wear the proper personal protective equipment. You must handle and dispose of pumped fluid in compliance with the applicable environmental regulations.
- ※ Avoid injury. Some components can have sharp edges. Wear appropriate gloves while handling these parts.
- ※ Make sure that all replacement parts are available before you start to assemble/disassemble the pump.
- ※ Make sure that all appropriate tools are available before you start to disassemble/assemble the pump.

### 1. Disassembly

#### Model GS

##### STEP.1

Drain all water from Casing (35).

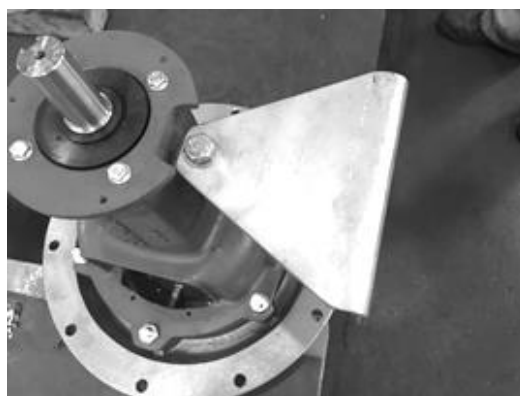
##### STEP.2

Remove the Protectors (14) from the Bearing Casing (11).



##### STEP.3

Remove the Stay (12) from the Bearing Casing (11).



#### STEP.4

Remove the Casing Cover (27) from Casing (35).



#### STEP.5

Remove the O-Ring (28) from the Casing Cover (27).



#### STEP.6

Remove the Washer (30) and the Hex Nut (31/32) for impeller from the Shaft (2).



#### STEP.7

Remove the Impeller (29) from the Shaft (2) through the key.



#### STEP.8

Remove the Key (3) of impeller side from the Shaft (2).

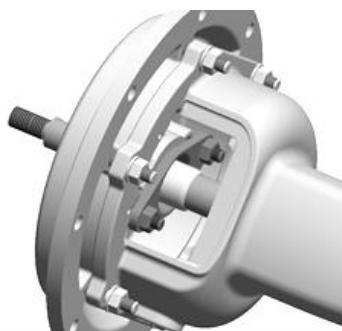


\*Refer to the following STEP.9 to 13 for **Gland Packing specification** and refer to the following STEP.14 to 16 for **Mechanical Seal specifications**.

#### **[Gland Packing specification]**

#### STEP.9

Loosen the Nuts (19).



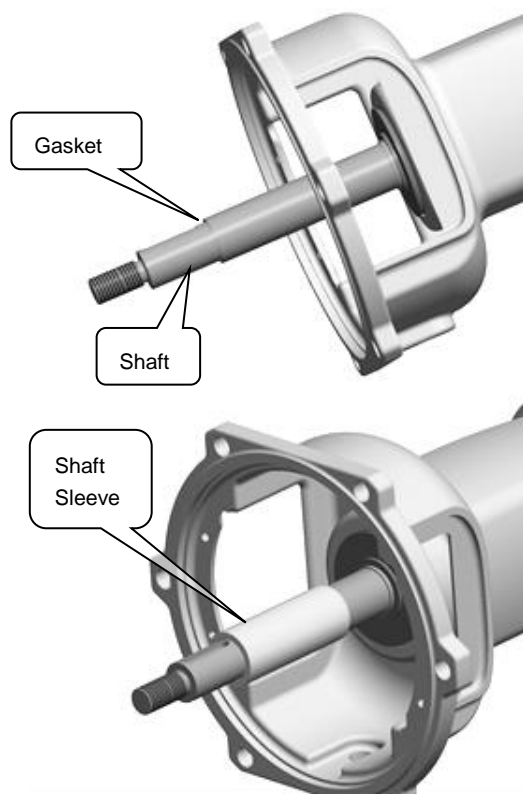
#### STEP.10

Remove the Casing Cover (27) from the Bearing Casing (11).



#### STEP.11

Remove the Gasket (17) and Shaft Sleeve (18) from Shaft (2).



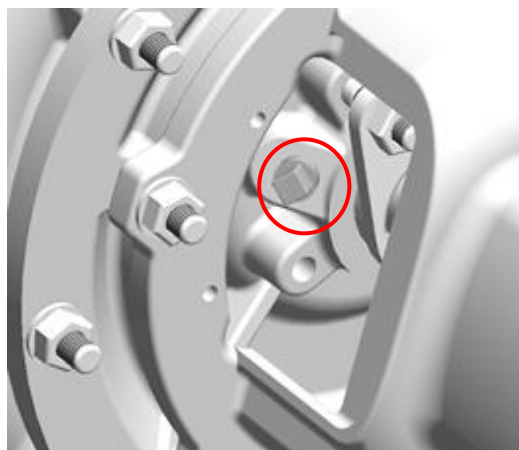
#### STEP.12

Remove the Gland (21), the Gland Bolts (20) and the Nuts. Then remove the Gland Packings (22) and the Lantern Ring (23) from the Casing Cover (27).



#### STEP.13

Remove 2 Plugs (26) from Casing Cover (27).



Proceed to STEP.17 next.

#### **[Mechanical Seal specification]**

#### STEP.14

Remove the Mechanical Seal from the Shaft (2).



#### STEP.15

Remove the Casing Cover (27) from the Bearing Casing (11).



#### STEP.16

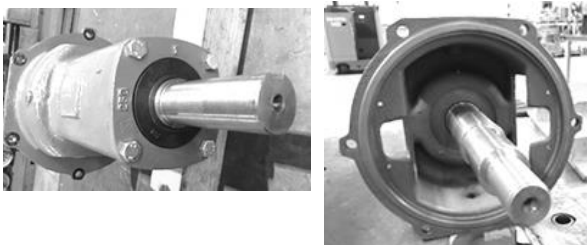
Remove the Mechanical Seal from Casing Cover (27).



Proceed to STEP.17 next.

#### STEP.17

Remove Deflectors (4) from Bearing Cover (6) and Bearing Casing (11).



#### STEP.18

Remove the Bearing Cover (6) from the Bearing Casing (11).



#### STEP.19

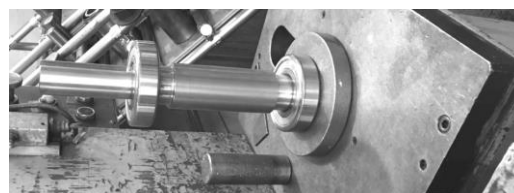
Remove the Shaft (2) from the Bearing Casing (11).



#### STEP.20

Remove 2 Bearings (7) from the Shaft (2).

\*First, remove 1 bearing from the shaft. Then, remove another bearing from the shaft at the other side.





## **Model GSD**

### **STEP.1**

Drain all water from Casing(29).

### **STEP.2**

Remove Protectors(15) from Bracket(12).

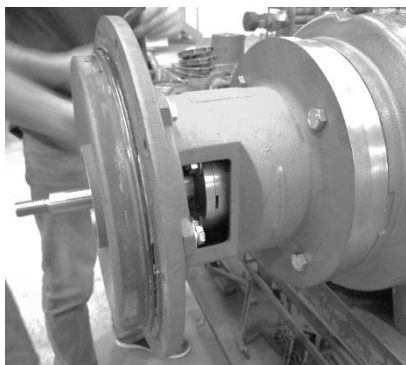


### **STEP.3**

Refer to “1.Disassembly Model GS(From STEP.4 to STEP.8 and STEP.14)”

### **STEP.4**

Remove Casing Cover(18) from Bracket(12).



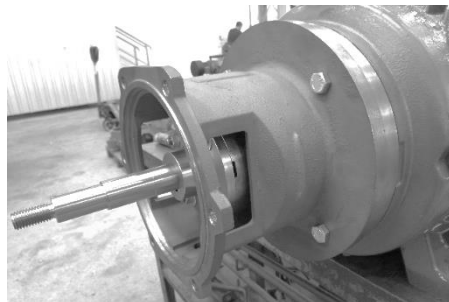
### **STEP.5**

Remove Mechanical Seal(19) from Casing Cover(18).



### **STEP.6**

Remove Bracket(12) from Motor(1).



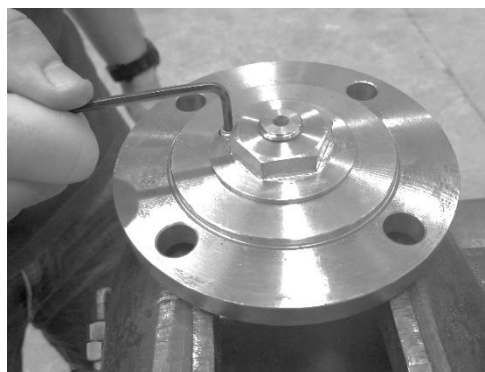
### **STEP.7**

Remove Pump Bushing(4) from Motor Bushing(2).



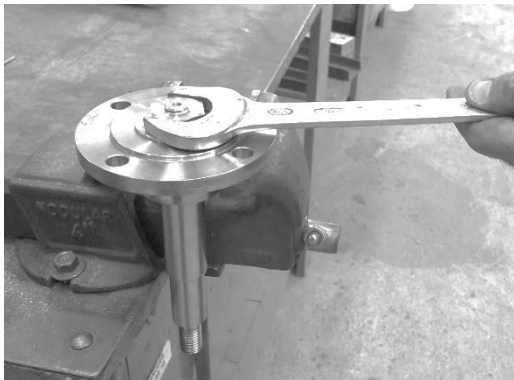
### **STEP.8**

Remove Set Screw(7) from Nut(6) and Pump Bushing(4).



STEP.9

Remove Nut(6) from Shaft(5).



STEP.10

Remove Pump Bushing(4) from Shaft(5).



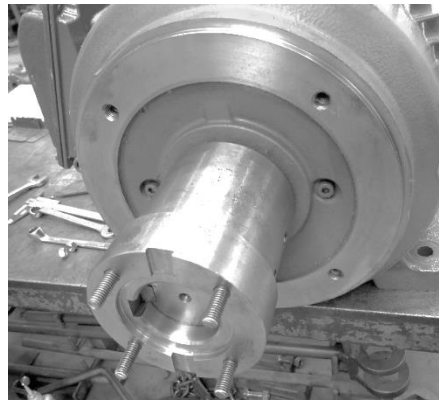
STEP.11

Remove Key(11) from Shaft(5).



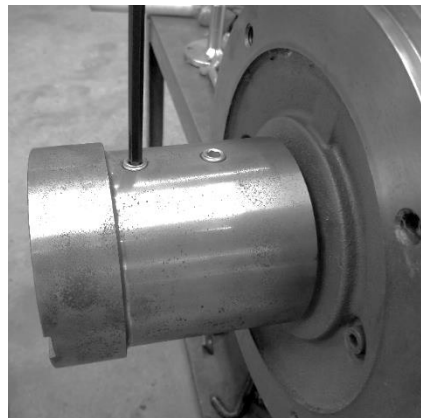
STEP.12

Remove Stud Bolt(8) from Motor Bushing(2).



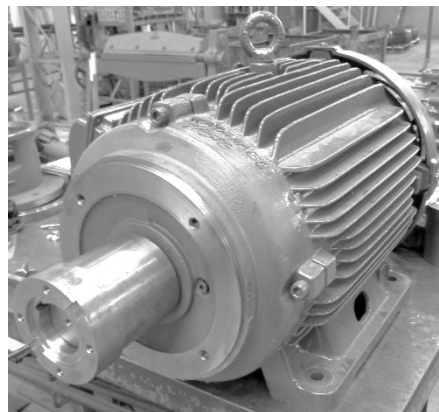
STEP.13

Remove Set Screw(3) from Motor Bushing(2).



STEP.14

Heat the Motor Bushing (2) with a burner and pull out with a pulley removing tool.



## 2. Assembly

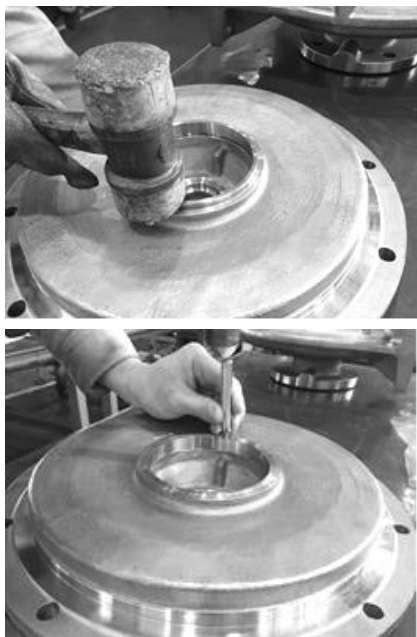
Tighten torques for hexagon bolts and nuts;

1/4": 4.5 Nm, 5/16": 11 Nm, 3/8": 22 Nm, 1/2": 38 Nm, 5/8": 93 Nm, 13/16": 181 Nm, 15/16": 313 Nm.

### Model GS

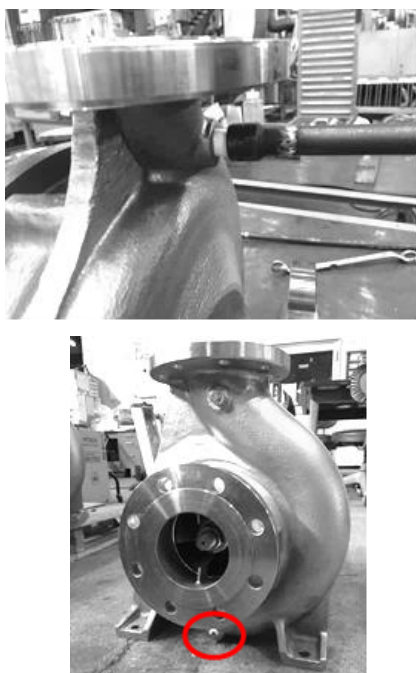
#### STEP.1

Assemble the Casing Ring (33) and Spring Pin (34) to the Casing Cover (27) and Casing (35).



#### STEP.2

Assemble the Plugs (39/40) to Casing (35).



#### STEP.3

Assemble 2 Bearings (7) to the Shaft (2).

\*First, install 1 bearing into the shaft from one side. Then, insert another bearing into the shaft from the other side.



#### STEP.4

Insert the Shaft (2) into the Bearing Casing (11). Position is referred in this photo.



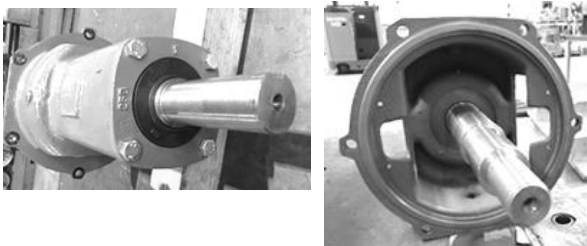
#### STEP.5

Assemble the Bearing Cover (6) to the Bearing Casing (11).



#### STEP.6

Assemble Deflectors (4) to Bearing Cover (6) and Bearing Casing (11).

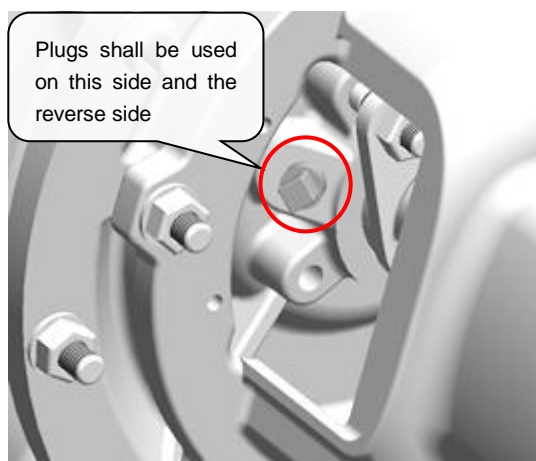


\*Refer to the following STEP.7 to 11 for **Gland Packing specification** and refer to the following STEP.12 to 14 for **Mechanical Seal specifications**.

#### [Gland Packing specification]

#### STEP.7

Assemble 2 Plugs (26) to Casing Cover (27).



#### STEP.8

Insert the Gland Packings (22) and the Lantern Ring (23) into the Casing Cover (27). Then assemble the Gland (21), the Gland Bolts (20) and the Nuts (19) by hand to fix the above-mentioned parts.

#### NOTE

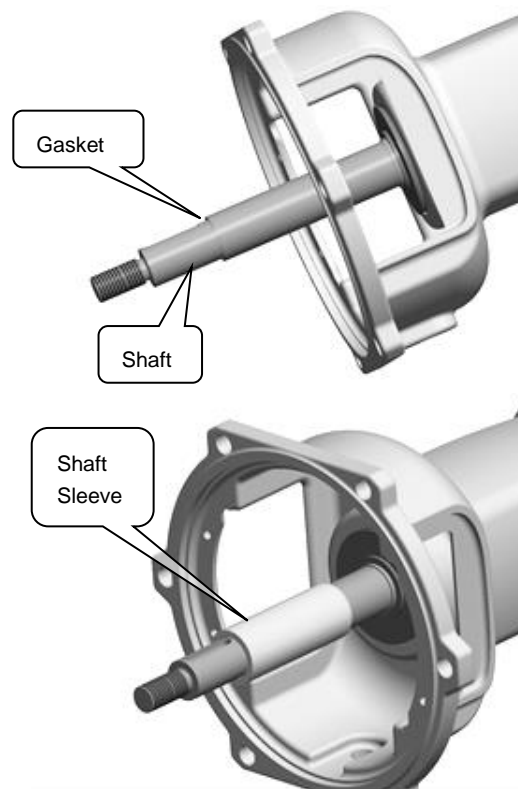
The cutting line for the gland packing nearest to bearing shall be facing under direction. The other gland packings shall be located the direction of cutting line every 90 degrees.

The notches in the lantern ring shall be



#### STEP.9

Insert the Gasket (17) and Shaft Sleeve (18) into Shaft (2).





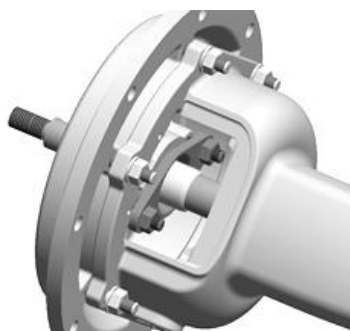
#### STEP.10

Assemble the Casing Cover (27) to the Bearing Casing (11).



#### STEP.11

Tighten the Nuts (19).



Proceed to STEP.15 next.

#### **[Mechanical Seal specification]**

#### STEP.12

Assemble the Mechanical Seal to Casing Cover (27).

#### NOTE

Before insert the mechanical seal, wipe the sliding surface with acetone.

Be careful not to get debris, dust or fingerprints on the mechanical seal's sliding surface.



#### STEP.13

Assemble the Casing Cover (27) to the Bearing Casing (11).



#### STEP.14

Assemble the Mechanical Seal to the Shaft (2).



Proceed to STEP.15 next.

#### STEP.15

Assemble the Key (3) of impeller side to the Shaft (2).



#### STEP.16

Assemble the Impeller (29) to the Shaft (2) through the key.



#### STEP.17

Assemble the Washer (30) and the Hex Nut (31/32) for impeller to the Shaft (2).



#### STEP.18

Assemble the O-Ring (28) to the Casing Cover (27).

To prevent the O-ring from dropping out, Vaseline can be applied to the O-ring.



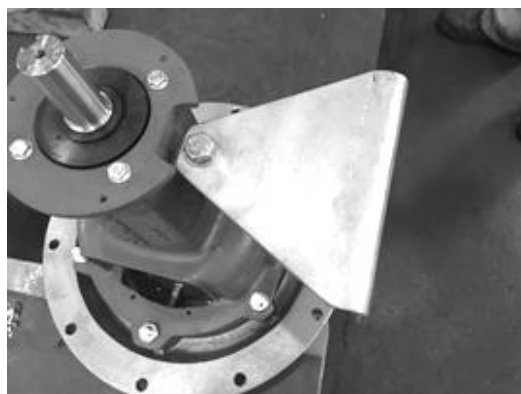
#### STEP.19

Assemble the Casing Cover (27) to Casing (35).



#### STEP.20

Assemble the Stay (12) to the Bearing Casing (11).



#### STEP.21

Assemble the Protectors (14) to the Bearing Casing (11).



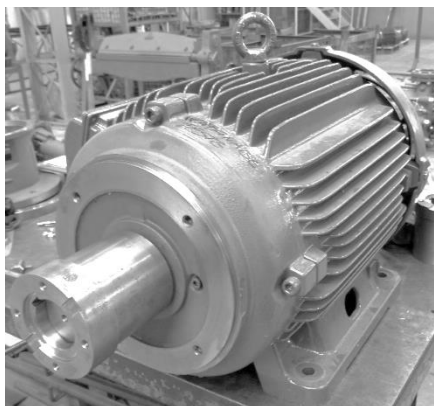
## **Model GSD**

### **STEP.1**

Refer to “2.Assembly Model GS(STEP.1 and STEP.2)”

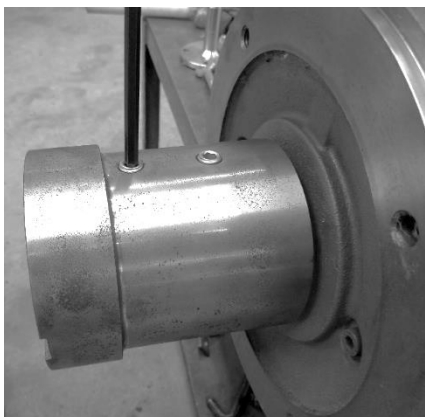
### **STEP.2**

Heat the Motor Bushing (2) up to 100°C. Assemble the Motor Bushing (2) to motor shaft (1).



### **STEP.3**

After cooling, assemble set screw (3) to motor bushing(2).



### **STEP.4**

Assemble stud bolt(8) to motor bushing(2).



### **STEP.5**

Assemble key(11) to motor side of shaft(5).



### **STEP.6**

Assemble pump bushing(4) to motor side of shaft(5).



### **STEP.7**

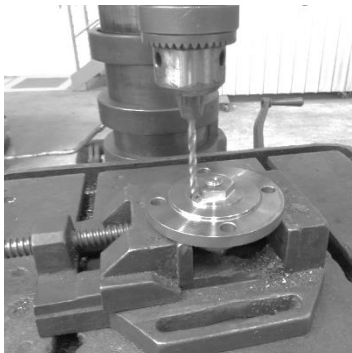
Assemble nut(6) to motor side of shaft(5).





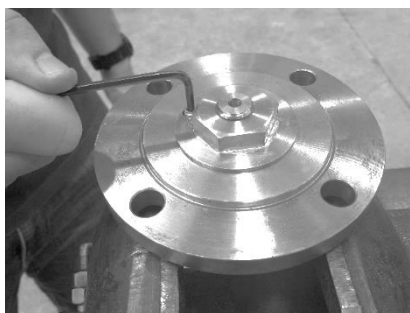
#### STEP.8

Make drill hole (size:  $\phi 5.2\text{mm} \times 8\text{mm}$ ) and tap hole (size:  $1/4''\text{UNC} \times 5\text{mm}$ ) in pump bushing(4) aligning with hole of flange of nut(6) in order to assemble set screw(7).



#### STEP.9

Assemble set screw(7) to nut(6)/pump bushing(4).



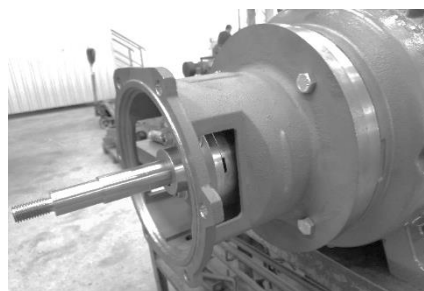
#### STEP.10

Assemble pump bushing(4) to motor bushing(2).



#### STEP.11

Assemble bracket(12) to motor(1).



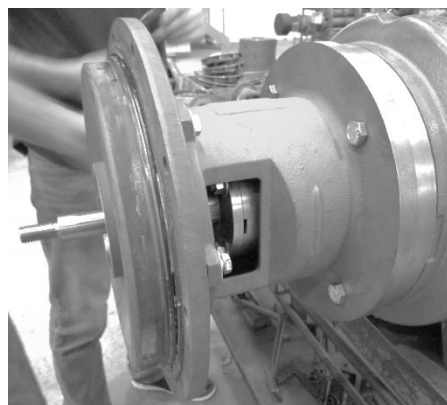
#### STEP.12

Insert fixing ring of mechanical seal (19) into casing cover(18).



#### STEP.13

Assemble casing cover(18) to bracket(12).

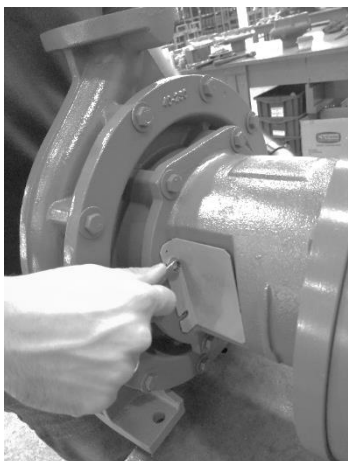


#### STEP.14

Refer to “2.Assembly Model GS(From STEP.14 to STEP.19)”

#### STEP.15

Assemble protector(15) to bracket(12).



If you have any enquiries, please feel free to contact us.

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