



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

EBARA End Suction Volute Pumps

Model GS

Instruction Manual



Manufactured by P.T. EBARA INDONESIA

CAUTION

Thank you for choosing the EBARA Model GS End suction volute Pump. EBARA takes every caution in manufacturing the product for safe use by the customer. However, handling this pump in an inappropriate manner may reduce its functional capacity and result in an accident.

This operation manual explains the proper procedures concerning the installation, operation, and maintenance of the product. This manual should be read before conducting operation and maintenance and inspections on this pump.

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.

To installation personnel:



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
 Warning	Potentially hazardous situation. Failure to follow the instructions could result in death or serious injury.
 Caution	Failure to follow the instructions given could result in minor injury or damage to the pump.


















Note	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

 Warning	<p>Turn OFF the power switch when to stop long-term the pump. It may cause electric shock or electrical leakage and fire.</p>	
	<p>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.</p>	
	<p>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.</p>	
	<p>Install and ground an earth cable. Electric shock could occur during accidents or electric leakage.</p>	
	<p>Perform wiring work correctly as specified by electrical facility technical standards and extension codes. Incorrect wiring could result in electric shock and fires.</p>	
	<p>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.</p>	
	<p>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.</p>	
	<p>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.</p>	
	<p>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.</p>	
	<p>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.</p>	
	<p>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.</p>	
	<p>Do not pour water on the motor. Otherwise, it may cause electric shock, electric leakage, fire and trouble.</p>	
	<p>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.</p>	
	<p>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.</p>	
	<p>Please confirm that there are no loose wire connections on the motor, the primary side and secondary side of control panel, and power machine in the control panel; and remove the dust. If bad connection or dust adsorbed on the terminal part due to loose wire connection, it may lead to heating and danger of fire accident.</p>	
<p>Do NOT install the pump and motor near dangerous and flammable articles. Otherwise, it may cause fire due to ignition.</p>		

 Warning	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 the pump. Accordingly, in such situations, either drain all water from the pump or provide thermal insulation to prevent the water from freezing.	

 Warning	<p>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.</p>	
 Caution	<p>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 EBARA to perform an inspection and maintenance on the pump.</p>	
<p>Do NOT operate the pump with 50Hz specifications at 60Hz. Doing so will overload the pump, causing the motor to burn.</p>		
<p>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 cause a phase interruption, burning out the motor.</p>		
<p>Do NOT touch the motor. The motor's surfaces will be hot, and you could get burned if you touch them.</p>		
<p>Do NOT cover the motor with a blanket or cloth. Doing so could over heat the motor, setting a fire.</p>		
<p>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.</p>		
<p>In facilities with living matter (fish farms, fish preserves, aquariums, etc.), always prepare a spare pump, as oxygen deprivation may result due to pump failure.</p>		
<p>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.</p>		
<p>Please prepare the spare pump to prevent currently used stop. Otherwise, the water supply may be cut off and equipment may stop.</p>		
<p>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 purposes, and conduct adequate cleaning, and use the product after confirming no foreign objects.</p>		
<p>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.</p>		
<p>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.</p>		
<p>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 be disabled. In addition, it may cause scald with pump overheating.</p>		
<p>Do NOT touch the pump when the handled liquid exceeds 40 °C. The pump temperature is high; touching the pump causes scald.</p>		

 Caution	<p>Do NOT approach the inlet for suction pipe of the pump. Otherwise, it may cause the injury of hands and feet by pump operation.</p>	
	<p>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.</p>	
	<p>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.</p>	
	<p>Upon stopping operation, please drain off the water in the pump and pipe. Otherwise, it may flow of bacteria due to corrupted lagging water.</p>	
	<p>Please regularly replace the consumable parts. If they are used under aging or wearing, the water leakage, sticking, damage or other major trouble may happen. Please entrust the distributor, EBARA to conduct regular repair or replacement of parts and components.</p>	
	<p>The product cannot be used for food processing or food transfer applications because it may cause development of bacteria and contamination by foreign matter.</p>	
	<p>Ensure that all connection screws in electrically conductive parts are securely fastened. Otherwise, there is a risk of heat generation, malfunction and burnout.</p>	
	<p>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.</p>	

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** "Construction")

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.

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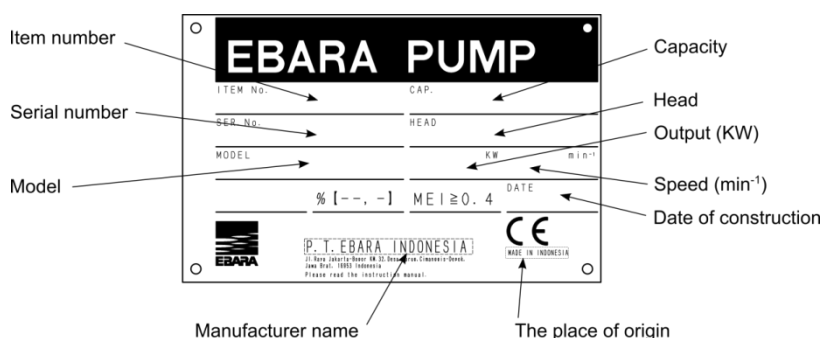
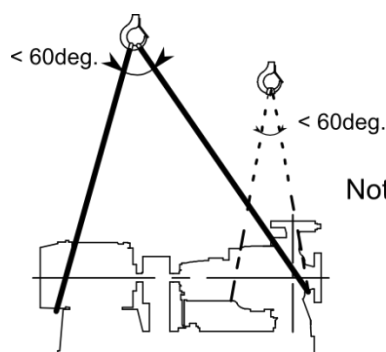


Fig.1 Data on pump nameplate

3. Lifting and carrying in/out

To carrying the pump/ pump set (with motor and common base) suspend it from the lifting tacks 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 pump are hydraulic part of device that moves liquid by physical or mechanical action and is of end suction own bearings. GS pump are comply with EN733 dimensions.

Apprication: Building, Water supply, General industry 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

• Casing Material : Cast Iron

Description		Standard	Optional
		2 poles / 4 poles	2 poles / 4 poles
Liquid	Temperature	-10°C to 120°C	-10°C to 140°C
	Density	To be discussed each time	—
	Viscosity		
Max. Operating Pressure		Up to 16bar (1.6MPa) for standard flange DIN-PN16	Up to 14bar (1.4Mpa) for standard flange JIS10K
Construction	Impeller	Closed	—
	Shaft seal	Mechanical Seal	Gland Packing
	Flushing	N/A	Self, External
	Bearing	Shield ball bearing (Grease lubrication)	—
Flange Standard		EN1092-2	JIS B 2239
Material	Casing	Casting iron	—
	Impeller	Cast iron or Ductile cast irons	Bronze, 304 Stainless steel
	Shaft	Cr.steel ^{*1}	Duplex stainless steel ^{*1}
	Case wear ring	Bronze	Cast iron
	Shaft sleeve	N/A	304 Stainless steel ^{*2}
	O-ring	EPDM	FKM

• Casing Material : Ductile Cast Irons (Larger than bore size 100X80)

Description		Standard	Optional
		2 poles / 4 poles	2 poles / 4 poles
Liquid	Temperature	-10°C to 120°C	-10°C to 140°C
	Density	To be discussed each time	—
	Viscosity		
Max. Operating Pressure		Up to 25bar (2.5MPa) for standard flange DIN-PN25	Up to 25bar (2.5MPa) for standard flange JIS20K
Construction	Impeller	Closed	—
	Shaft seal	Mechanical Seal	—
	Flushing	N/A	—
	Bearing	Shield ball bearing (Grease lubrication)	—
Flange Standard		EN1092-2	JIS B 2239
Material	Casing	Ductile cast irons	—
	Impeller	Cast iron or Ductile cast irons	Bronze, 304 Stainless steel
	Shaft	Cr.steel ^{*1}	Duplex stainless steel ^{*1}
	Case wear ring	Bronze	Cast iron
	Shaft sleeve	N/A	304 Stainless steel ^{*2}
	O-ring	EPDM	FKM

Description	Standard	Optional
	2 poles / 4 poles	2 poles / 4 poles
Weignt	Please refer to your "Pump data sheet"	
Noise levels	Please contact your dealer or EBARA for each model	
Drive	Motor ^{*3}	Electric
Accessories	Bare shaft	-
	With motor	Common Base
		Coupling
		Coupling guard
Location ^{*4}	Indoor	Outdoor

*1 Liquid side.

*2 Gland packing type.

*3 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. However, each value for motor characteristic, temperature rise and etc. do not accord with rated value.

*4 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.

<u>Note</u>	<p>Refer to the Standard specifications if you have purchased a standard model.</p> <p>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) This pump should be installed indoors (except for option : pump of outdoor+motor of outdoor).
- (2) There should be ample space around the pump, and securing a large working space for maintenance and inspection.
- (3) Provide an enclosure around the pump, or take some other effective measures to prevent unauthorized personnel from coming near it.
- (4) Install the pump in a location where it is near a water source, suction height (the height from the suction surface to the center of the pump) is low, and the length of the suction piping is short.
- (5) 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.
- (6) Select an airy location with little dust and moisture. Ambient temperature should not exceed 40°C.
- (7) 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.

Note

After installation, have unneeded packaging disposed of by a specialist disposal company.

2. Piping

- (1) The pump should be installed to piping by **Fig. 2**.

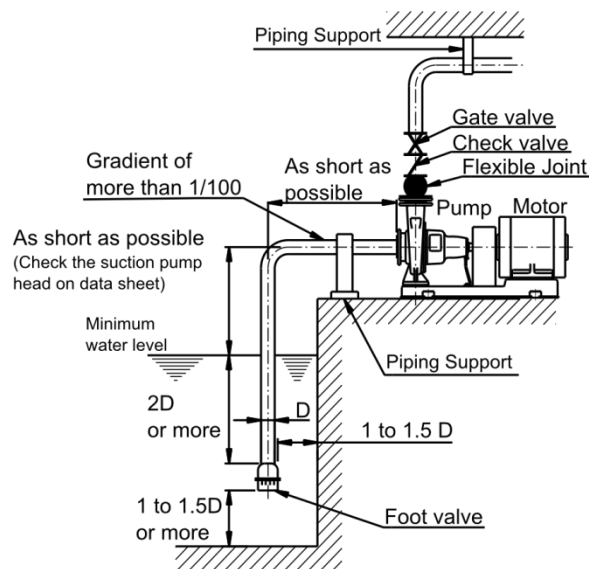


Fig.2 Installation view

- (2) Install the piping so that the pump casing is not affected by the suction or/and discharge piping.
- (3) In the following circumstances, a check valve must be installed: a) if the pipes are long, b) if the actual pump head is high, c) if the pump is to be used in automatic operation, d) when water is supplied to the pressure tank, and e) if two or more pumps are used in parallel. The check valve should be installed between the pump and the discharge side gate valve.

- (4) If the accumulation of air in the top of the pump is unavoidable, provide air vent valves in the trouble areas. However, do not install air vent valves in locations such as suction piping where there is negative pressure, or else air will be sucked.
- (5) Do not install the pump in the convex areas of the piping.
(During operation, air or hot water inside the piping in the pump allows steam to build up and cause dry operation.)
- (6) If thermal insulation is added to the piping, do not apply it to the motor. Also, if it is installed near the boiler, prevent the heat from the boiler to the pump.
- (7) When piping for hot water circulation is used in closed cycle, install an expansion tank or safety valve on the piping.
- (8) If there is a possibility of water hammer occurring, install a quick close check valve, and so on.
- (9) For negative suction application:
 - (a) Make the end of the suction piping is 2 times deeper than the diameter of the piping and 1 to 1.5 times apart from the bottom.
 - (b) Install a foot valve with a strainer on the end of the suction piping to prevent foreign matter from being sucked in.
 - (c) Install the suction piping so that there is an upward gradient toward the pump of at least 1/100 to prevent air from becoming trapped inside. Also, install joints carefully to prevent air from being sucked in.
 - (d) Make the suction piping as short as possible, with as few bents as possible, and do not install a gate valve.
- (10) For flooding or positive suction application:
Install a gate valve on the suction piping to make disassembly and inspection convenient.

3. Centering

Though the pump and driver have been centered in the factory, the common bed may be distorted when the foundation bolts are inserted during installation. 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.

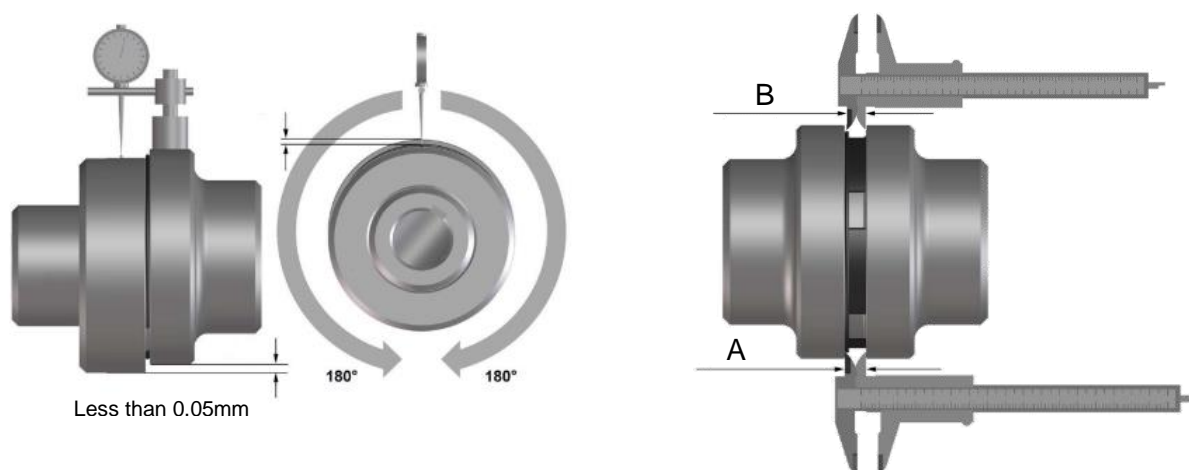








Fig.3 Misalignment of the couplings

Gap A and B between coupling should be set as follow **Table 2**. The difference between A and B to be smaller than 0.1 mm.

Table 2 Coupling gap for standard couplings

Outside dia. (mm)	A (mm)	B (mm)	A - B (mm)
67	2.0 to 3.0		< 0.1
82	2.0 to 4.0		
97			
112	2.5 to 4.5		
128			
148			
168			
194			
214	3.0 to 5.0		
240			
265			








4. Electrical connection

 Warning	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.	
 Caution	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.	
	The motor manual must be read and completely understood by the specialist personnel/ operators responsible prior to installation and operation of the motor.	

- (1) All interconnecting wiring for controls and grounding should be in strict accordance with local requirements such as the USA National Electrical Code and UK IEE wiring regulations. Wiring of motor and control, overload protection and grounding should follow the instructions of connection diagrams attached to the motor.
- (2) Check the following points before turning on operation switch:
 - (a) Installation of appropriate fuses.
 - (b) Correct wiring.
 - (c) Correct grounding.
- (3) Terminal voltage in motors bearing may be within $\pm 10\%$ of the rated voltage, exceeding this range will be lead to breakdown.
- (4) Overloading the motor beyond the prescribed limit will reduce its efficiency, is not economical and will eventually lead to motor malfunction. We recommend that a protective motor relay be installed to prevent burnout caused by overloading.

<u>Note</u>	The correct direction of rotation is clockwise when looking from the motor side.
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6 Operation

 Warning	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.	
 Caution	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

Note	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 or from priming hole (**Priming hole is only available on pump discharge nozzle diameter 100 mm and up**)
- (4) When priming, rotate the pump manually to completely remove air from inside the impeller.
- (5) Tightening nuts of Blots for gland to the Extent to which hand-cranked becomes heavy. Make sure that there is no uneven tightening happening when tightening nuts of Blots for gland. Do adjustment of gland packing according to “**Adjustment of gland packing**” (P.16).

Note	Do not make the water leakage value of gland packing to 0 mL/min.
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2. Operation · Stopping

 Warning	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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Note	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 startups, conduct the daily inspection specified in 7 Maintenance (P.18 to 21).

Note	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 also 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 3**. 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 Blots for gland to the Extent to which hand-cranked becomes heavy.
 - (b) Make sure that there is no uneven tightening happening when tightening nuts of Blots for gland.
- (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 3**). 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 3**.
 - (d) Checking table of The water leakage value (as a standard) .

Table 3 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 3. (For example, model 32-125 uses " 33X49X8 "gland packing, therefore inner diameter of gland packing of model 32-125 is 33 mm which is the same as the first number of gland packing's name)



- (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

 Warning	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 4 The value of starting frequency

Motor output	7.5 kW or less	11 kW to 22 kW	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

 Warning	<p>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.</p>	
	<p>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.</p>	
 Caution	<p>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.</p>	
	<p>Do not touch the motor. The motor's surfaces will be hot, and you could get burned if you touch them.</p>	
	<p>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 EBARA to perform an inspection and maintenance on the pump.</p>	
	<p>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.</p>	

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.

Note	Standard performance curves can be obtained from EBARA sales office or dealers.
-------------	---

- (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, loosening 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 3**. 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.4**. Wrong piping work can often cause excessive vibrations.

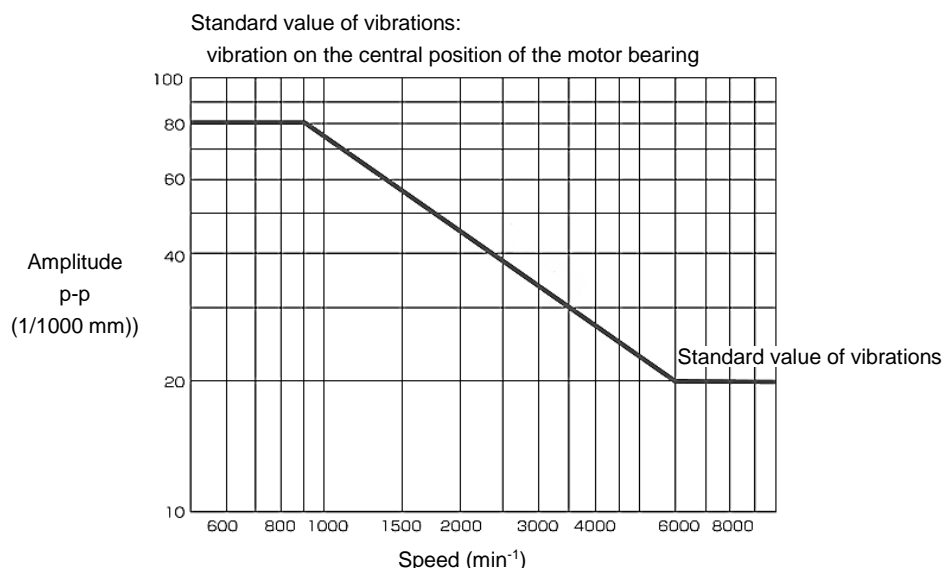


Fig.4 Vibration standard

- (7) Make sure that mounting bolts and terminal screws of electrical wiring are fastened 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 5**.

Table 5 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
Rubber used in Coupling bolts	When rubber is no longer effective when rubber shows sign of wear when wear is uneven.	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 6 Model list for replaceable parts

Bearing Number (qty. 2)	Mechanical Seal Nominal D.A. mm	[Option] Gland Packing Size (qty. 4)	Nominal D.A.	Nominal D.A. / O-ring mm						
				125	160	200	250	315	400	500
			O-ring (qty. 1)	3.53X183.74		3.53X234.54	3.53X278.99	3.53X355.19	5.33X456.06	5.33X532.26
6306ZZ	28	33X49X8		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	43X63X10		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	53X73X10				100-250L	80-315L	80-400		
						125-250L	100-315L	100-400		
						150-250	125-315	125-400		
						150-315	150-400			
6312ZZ	55	60X85X12.5						150-400L	125-500	
6314ZZ	65	70X95X12.5						200-400	150-500	
6316ZZ	75	80X109X14.5							200-500	

*Mechanical seal dimensions depend on EN 12756 (DN 24960). Design type NU.

*O-ring dimensions depend on AS 568.

1. Pump

Trouble	Cause	Remedy
Motor won't turn.	<ul style="list-style-type: none"> Start-up conditions of the control panel are not met. The motor is damaged. Power supply abnormality. Rotating parts in contact. Rust. Burning. Foreign material caught in the contacting surfaces. 	<ul style="list-style-type: none"> Check the conditions. Repair the motor. Inspect and repair. Manually rotate. Re-assemble. Have repaired by a specialist workshop. Remove the foreign material.
Priming not possible.	<ul style="list-style-type: none"> Foreign material caught in the foot valve. Foot valve seat surface is worn. Leakage from the suction piping. Air sucked into suction piping/shaft seal. 	<ul style="list-style-type: none"> Remove the foreign material. Replace the foot valve seat. Inspect suction piping. Inspect suction piping/shaft seal.
Pump operates, but no water is discharged. Water is not discharged at the rated capacity.	<ul style="list-style-type: none"> Pump not primed. Gate valve is closed or half open. Actual pump head is larger than the total pump head. Suction head is too high for the pump. Reverse rotation direction. 60 Hz pump in a 50 Hz region. Voltage is too low. Foot valve or strainer is clogged. Impeller is clogged. Piping is clogged. Air is being sucked in. Leakage from discharge piping. Impeller is corroded Impeller is worn. Case wear ring is worn. Large loss in the piping. High fluid temperature or volatile fluid. Cavitation. 	<ul style="list-style-type: none"> Prime the pump. Open the gate valve. Review the plan. Review the plan. Check the rotation arrow, and correct the wiring. Check the nameplate. Check the power supply. Remove the foreign material. Remove the foreign material. Remove the foreign material. Inspect, repair suction piping and shaft seal. Inspect, repair. Check the fluid, change material. Replace the impeller. Replace the case wear ring. Review the plan. Review the plan. Consult with a specialist.
Water is discharged, but stops.	<ul style="list-style-type: none"> Not primed sufficiently. Air is being sucked in. Air is trapped inside the suction piping. Suction head is too high for the pump. 	<ul style="list-style-type: none"> Sufficiently prime the pump. Inspect, repair suction piping and shaft seal. Refit the piping. Review the plan.
Overload (over current) occurs.	<ul style="list-style-type: none"> Voltage has dropped or phase imbalance is large. Head is low. Too much water flow. 50Hz pump in a 60Hz region. Foreign material in the pump. Improper setting of the mechanical seal. Bearing is damaged. Rotating parts in contact. Shaft is bent. Fluid specific gravity, viscosity is too great. 	<ul style="list-style-type: none"> Check the power supply. Throttle the discharge valve. Check the nameplate. Remove the foreign material. Reassemble the mechanical seal correctly. Replace the bearing. Have repaired by a specialist workshop. Review the plan.
Bearing heats up.	<ul style="list-style-type: none"> Bearing is damaged. Pump is operated for prolonged period at shut-off pressure. 	<ul style="list-style-type: none"> Replace the bearing. Stop shut-off pressure operation.
More leakage from the shaft seal.	<ul style="list-style-type: none"> Poor assembly of mechanical seal. Poor assembly of gland packing. Mechanical seal is damaged Gland packing is damaged Shaft and shaft sleeve is worn. Suction pressure is too high. Shaft is bent. 	<ul style="list-style-type: none"> Install correctly. Install correctly. Replace mechanical seal Replace gland packing Replace the shaft. Reexamine the design. Have repaired by a specialist workshop.
Shaft seal heats up.	<ul style="list-style-type: none"> Sealing water is not flushed (sealing hole is clogged). 	<ul style="list-style-type: none"> Disassemble and inspect.

2. Motor

Trouble	Cause	Remedy
Motor won't start-up.	<ul style="list-style-type: none"> • Coil disconnection. • Coil short. • Tight bearings. • Voltage is low. • Power supply phase interruption. 	<ul style="list-style-type: none"> • Have repaired by a specialist workshop. • Have repaired by a specialist workshop. • Repair bearings. • Use the rated voltage. • Remove the cause of the phase interruption.
Abnormal noise/excessive vibration.	<ul style="list-style-type: none"> • Phase interruption. • Voltage has dropped or phase imbalance is large. • Overload. • Poor air gap. • Contact between stator and rotor. • Foreign material in cooling fan. • Poor motor installation. 	<ul style="list-style-type: none"> • Remove the cause of the phase interruption. • Check the power supply. • Close the pump discharge valve. • Replace the bearings. • Re-centering. Replace the bearings. • Remove the foreign material. • Connect completely with the base.
Temperature rises large. Smoke and odor emitted.	<ul style="list-style-type: none"> • Overload. • Voltage has dropped or phase imbalance is large. • Airway is blocked. • Incorrect frequency. • Incorrect voltage. • Tight bearings. • Coil short circuit. • Coil grounding. • Poor switching between $\lambda - \Delta$. 	<ul style="list-style-type: none"> • Throttle pump discharge valve. • Check the power supply. • Remove the blockage. • Replace with a pump of correct frequency. • Replace with a motor of correct voltage. • Replace the bearings. • Have repaired by a specialist workshop. • Have repaired by a specialist workshop. • Correct switching between $\lambda - \Delta$.
Damage and large temperature rise in bearings.	<ul style="list-style-type: none"> • Looseness in bearing bracket. • Shaft is bent. • Insufficient cooling. • Damage/corrosion to bearings. 	<ul style="list-style-type: none"> • Tighten the bracket bolts. • Have repaired by a specialist workshop. • Remove the cause of insufficient cooling. • Replace bearings.
Speed does not increase.	<ul style="list-style-type: none"> • Voltage is low. • Poor switching between $\lambda - \Delta$. • Overload. • Poor contact. 	<ul style="list-style-type: none"> • Set to the rated voltage. • Correct switching between $\lambda - \Delta$. • Decrease load. • Connect correctly. Tighten.

1. External view and residual risks

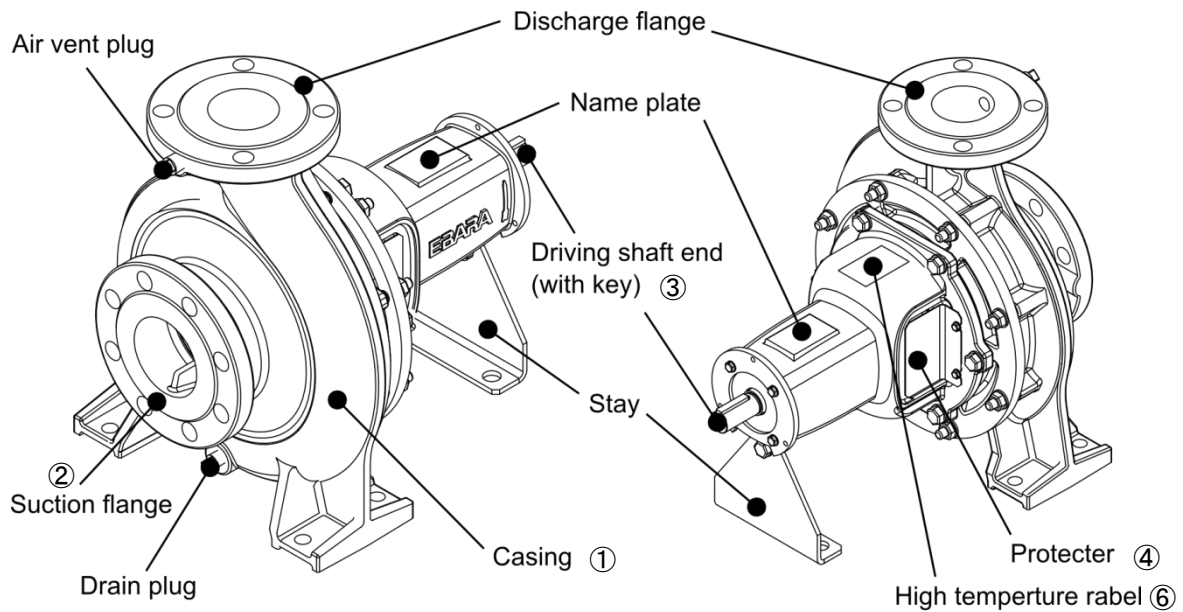


Fig.5 External view

Table 7 Residual risks

No.	Stage	Operation	Caution Levels	Contents of risks	Protective measure
①	Operating	Maintenance	Caution	Burns	Cooling by stop Do not touch the pump
②	Operating	Maintenance	Warning	Injuries caused by suction	Turn off the pump
③	Operating	Maintenance	Warning	Injuries caused by entanglement	Turn off the pump Mount the Coupling guards Do not go near rotating shaft
④	Operating	Maintenance	Warning	Injuries caused by entanglement	Turn off the pump Mount the Protector Do not go near rotating shaft
⑤	Carrying in/out and Lifting	Delivery and Instration	Warning	Overturning and falling	Careful operation

Note: No.⑤ is the residual risk that portion is not specified on the device.

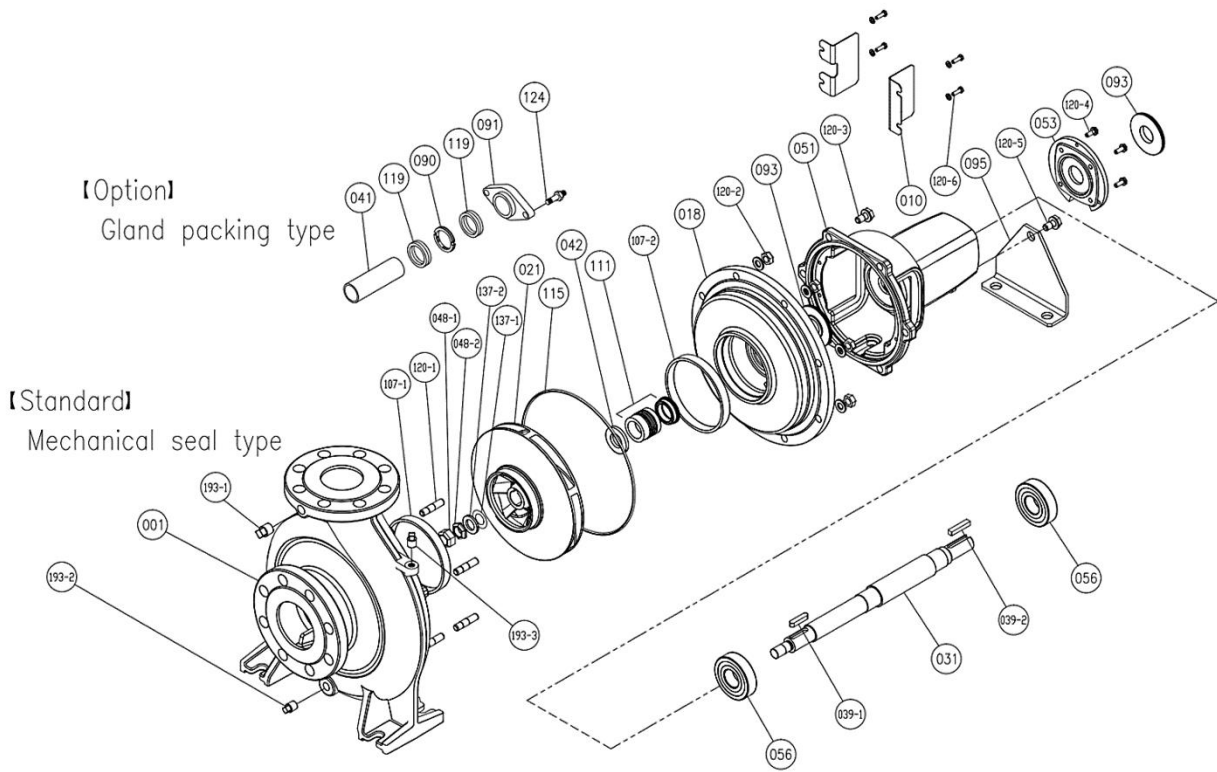
High temperature label(No.⑥) as shown below:



Fig.6 High temperature label

2. Exploded view

This figure shows a GS model for example. Depending on the model, your pump may vary slightly.



Note: No.193-3 (plug for priming hole) only available on pump discharge nozzle diameter 100 mm and up.

Mechanical seal type 【Standard】

No.	Name	Q'ty
001	Casing	1
010	Protector	2
018	Casing Cover	1
021	Impeller	1
031	Shaft	1
039-1	Key	1
039-2	Key	1
042	Spacer	1
048-1	Impeller nut (A)	1
048-2	Impeller nut (B)	1
051	Bearing housing	1
053	Bearing cover	1
056	Ball bearing	2

No.	Name	Q'ty
093	Deflector	2
095	Stay	1
107-1	Case wear ring	1
107-2	Case wear ring	0 or 1
111	Mechanical seal	1 set
115	O-ring	1
120-1	Bolt or stud bolt	6 or 8 or 10 or 12 or 16
120-2	Nut with washer	6 or 8 or 10 or 12 or 16
120-3	Bolt	0 or 6
120-4	Bolt	4
120-5	Bolt	1
120-6	Bolt with washer	4
137-1	Plain washer	1

No.	Name	Q'ty
137-2	Spring lock washer	1
193-1	Plug	1
193-2	Plug	1
193-3	Plug	1

Gland packing type 【Optional】

No.	Name	Q'ty
041	Shaft sleeve	1
090	Lantern ring	1
119	Gland packing	4
124	Gland bolt	2

Fig.7 Exploded view

Note

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

3. Accessories

Standard accessories (with motor)

- Common base.....1 set
- Coupling.....1 set
- Coupling guard1 set

1. Disassembly

When disassembling pump, have a piece of cardboard or plywood ready to place the parts as you work. Do not pile parts on top of each other. They should be laid out neatly in rows the O-ring and gasket can't be used again once they are removed. Have replacement parts ready.

Disassemble in the following order, referring to the sectional view.

Be sure to cut off power source before beginning disassembly.

- (1) Drain all water from casing.
- (2) Remove the motor from the common base. Inspect shaft coupling rubber and replace if excessively worn.
- (3) Remove the casing cover bolts, and remove casing cover (011) and bearing casing (052) from casing (001). You will now be able to inspect the inside of the pump. Check for wear and other abnormal signs. Replace case wear ring (107) when wear approaches 1 mm.
- (4) Remove impeller nut (048) and impeller washer (137), and remove impeller (021) from casing. If the impeller is rusted and will not come loose, tap its end lightly with a wooden hammer to release.
- (5) Remove the impeller key (039-1) from the main shaft (031), the casing cover from the shaft bearing frame, and the deflector from the main shaft.
- (6) Mechanical seal type: at this point in disassembly, the fixed portion of the mechanical seal (111) is attached to the casing cover (011) and the rotating portion to the main shaft (031). The fixed portion of the mechanical seal can be removed by pushing it out of the shaft hole in the casing cover with a screw driver or similar tool.
Gland packing type: remove the packing gland (091) from the casing cover (011) and take out the packing (119) and lantern ring (085). (Some models do not have a lantern ring bushing).
- (7) Remove the shaft bearing cover from the shaft bearing frame and take out the main shaft. Inspect condition of the shaft bearing and replace if it does not rotate smoothly.





Note	If disassembly of the motor is necessary, consult the specialized manufacturer.
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2. Assembly

Assembly should be performed reverse to disassembly. Be careful of the following when assembling the pump.

- (1) Mechanical seal type: wipe contacting part of mechanical seal (111) with alcohol and a dry cloth.
Gland packing type : replace gland packing with new packing, shifting joints from 90 ° to 120° until last joint is on the bottom.
 - (2) Replace the O-rings (115) with new ones.
 - (3) Replace all worn and/or damaged parts.
 - (4) Tighten the bolts and nuts gradually and in order.
Tighten torques for hexagon bolts and nuts;
M6: 4.5 Nm, M8: 11 Nm, M10: 22 Nm, M12: 38 Nm, M16: 93 Nm, M20: 181 Nm, M24: 313 Nm.
- ※ Please obtain O-rings, shaft seals and other parts from pump dealer. The table of dimensions is given in "maintenance".

3. Disposal

 Warning	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.	
 Caution	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.	
<u>Note</u>	After installation, have unneeded packaging disposed of by a specialist disposal company.	



When the pump will be permanently stopped and dismantled, the various materials composing it should be properly disposed of. It is important to make sure that no residual polluting liquids and lubrication (grease or oil) are trapped within the pump. The materials used in pump construction are:

- Steel, stainless steel and cast iron.
- Rubber and plastic.
- Bronze and brass.
- Grease or oil (lubrication).
- Electronic waste.

The disposal of polluting liquids and materials should follow current environmental regulations. Environment protection is an increasingly pressing problem.

Read the instructions carefully before using the appliance for the first time. It is recommended that you do not use this product for any purpose other than that for which it was intended; there is danger of electric shock if used improperly.

11 Limited warranty

 Caution	Any person must be aware that operating pumps are potentially hazardous if pumps are handled without carefulness. To keep you from involving hazards, you ALWAYS shall follow the instructions in this manual when pumps are operated, inspected and maintained.	
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We P.T.Ebara Indonesia state that this warranty is valid for the pump set completed with driven motor. As stipulated below, repair work is covered by this warranty. However, the scope of warranty are as follow:

- (1) Unless otherwise specified in the contact the warranty period is for one (1) year after date of delivery.
- (2) During the warranty period with proper pump operation, if tribule occurs due to defects in design, manufacture or material, damaged parts will be repaired/ replace free of charge based on investigation result decided by P.T.Ebara Indonesia.
- (3) Repairs of the following damages and replacement of consumable parts to be used up (such as bearing, coupling rubber, packing, lubrication oil and grease, etc.) shall be subject to charge:
 - (a) Damages that occur due to mishandling or improper storage of the pump.
 - (b) Damages that occur due to fire, war, natural calamity or acts of God.
 - (c) Damages that occur when parts other than those stipulated by EBARA are used.
 - (d) Damages that occur due to miss-construction of base plate or fondation and miss-alignment of coupling done by customer/ distributor.
 - (e) Damages that occur due to driven motor which not supplied by P.T.Ebara Indonesia.
 - (f) Damages that occur due to miss-installation of electricity at driven motor.
 - (g) Damages that occur due to repair or reconstruction work made by any agents other than EBARA.

Note	Repair or servicing of the pump should be requested to your dealer or to P.T.Ebara Indonesia. Should you notice anything abnormal in the pump's operation, stop the pump immediately and inspect for malfunction (See 8 Troubleshooting). If a trouble occurs, to order repairs or servicing, please contact your dealer or P.T.Ebara Indonesia, stating the data on the nameplate and details of the trouble. If you have any enquiries about the pump, please contact your dealer or P.T.Ebara Indonesia.
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If you have any enquiries, please feel free to contact us.

P.T. Ebara Indonesia

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EC DECLARATION OF CONFORMITY

We, the undersigned,

Manufacturer	P.T. Ebara Indonesia
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Phone number	+62 21 8740852
Facsimile number	+62 21 8740033

under our sole responsibility, declare that the following products,

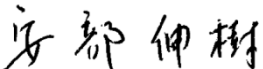
Equipment	End Suction Volute Pumps
Model No.	<p>GS series</p> <p>GS <u>aaa - bbb</u></p> <p>① ② ③</p> <p>① Pump series name: GS</p> <p>② Discharge flange size: 32, 40, 50, 65, 80, 100, 125, 150, 200</p> <p>③ Impeller size: 125, 125.1, 160, 160.1, 200, 200.1, 250, 315, 400, 500</p>

complies with the provisions of following Directives as completed equipment under evaluation of conformity based on the following harmonized standards.

Machinery Directive, 2006/42/EC	<p>EN ISO 12100:2010</p> <p>EN ISO 13857:2008</p> <p>EN 809:1998/A1:2009</p>
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Year of affixing CE marking	2016
Place and date of declaration	Jawa Barat, INDONESIA; 3 November 2016
Signature, name and title of person empowered to draw up the declaration	<p style="text-align: center;"></p> <p>Nobuki Abe Director/President P.T.EBARA INDONESIA</p>

