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

IM0013-E

EBARA VERTICAL IN-LINE CENTRIFUGAL PUMP

Model LPDC

Instruction Manual

⚠ CAUTION

Thank you for choosing the EBARA VERCICAL IN-LINE CENTRIFUGAL Pumps. 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.

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.

CONTENTS

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	Potential 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.

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 Delivery Checks

When your pump is delivered, check the following immediately.

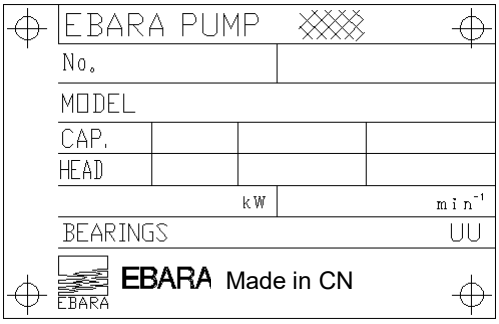
1. Pump and accessories

(1) Confirm that no damage has occurred during transportation.
Check all nuts and bolts to confirm that they are not loose.

(2) Confirm that all accessories have been delivered (Refer to chapter 8 "Construction").

2. Nameplate

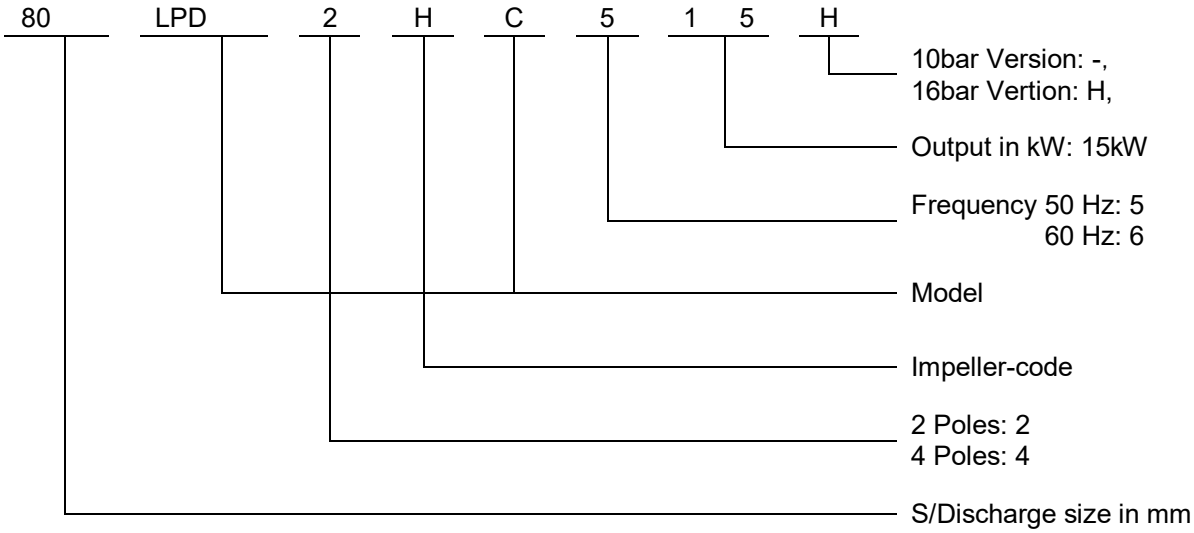
The basic specifications of the pump are listed on the nameplate. Read the data on the nameplate to check that this pump was the product that you ordered.



Graph 1 content on pump nameplate

①. Producing No ②.pump type ③.flow rate ④.head ⑤.motor's regulated output power⑥.rotating speed ⑦.bearing type

Model Code



3 Specifications

For the head, capacity, speed, motor voltage/current and other major specifications of your pump, see the nameplate. The standard specifications are given in the tables below.
This manual uses the International System of Units (SI) for pressure indication, and values in { } are for reference.

Check the following points upon receipt of your pump:
(1) The pump exactly what you ordered? Check the nameplate.
(2) Has any damage occurred during shipment? Are any bolts or nuts loose?
(3) Have all necessary accessories been supplied? (For a list of standard accessories see construction)

We recommend that you keep a spare pump on hand in case of emergencies. Keep this instruction manual in a safe place for future reference.

■ Pump Technical Data

Description		Standard	Option
Liquid handled	Type of Liquid	Fresh Water (pH:5.8~8.6)	
	Temperature	0~80^{0}C	
Max. Working pressure		10 bar / 16 bar	
Location		Indoor / Outdoor	
Covering Range	Suction Dia.	50 to 250 mm	
	Flow rate	0.4 to 18 m^3/min	
	Power	0.37 to 160 kW	
Construction	Pump Type	Inline	
	Casing split	Vertical back pull out	
	Impeller	Enclosed	
	Shaft seal	Mechanical Seal	
Material	Casing	Cast Iron	Ductile cast iron
	Impeller	Bronze	Stainless steel
	Shaft	Stainless steel	
	Mech. Seal	Ceramic/Carbon	
	Motor Casing	Cast Iron	Aluminum
Flanges	Suction	DIN PN10 / PN16	
	Discharge	DIN PN10 / PN16	
Motor	Type	Flange Mounted type	
	No. of pole	2/4	
	Synchr. Speed	3000/1500 min"^{1}	3600/1800 min"^{1}
	Insulation class	F	
	Protection	IP 55	
	Volt/ Phase/ Hz	380V-415V / 3 Ph. / 50 Hz	380V-460V / 3 Ph. / 60 Hz

4 Installation

⚠ Warning	Before insulation resistance measurement, always disconnect the power first. All electric work should be performed by a qualified electrician and all national and local electrical codes must be observed.	⃠

1. Installation location

(1)This pump should be installed indoors. If it is to be used outdoors, some type of roof or covering will be required to protect the pump from the weather.

(2) Install where inspection and maintenance can be easily performed.

(3) Provide suitable enclosure to prevent entry of unauthorized persons.

(4) Install pump as close to water source as possible. Suction height (height from surface of liquid to center of pump) should be as low as possible, and suction piping should be short.

(5) Suction head should be less than 6 meters in certain cases, such as with hot water, suction head must be lower. To minimize suction piping loss, excessive use of elbows and valves should be avoided.

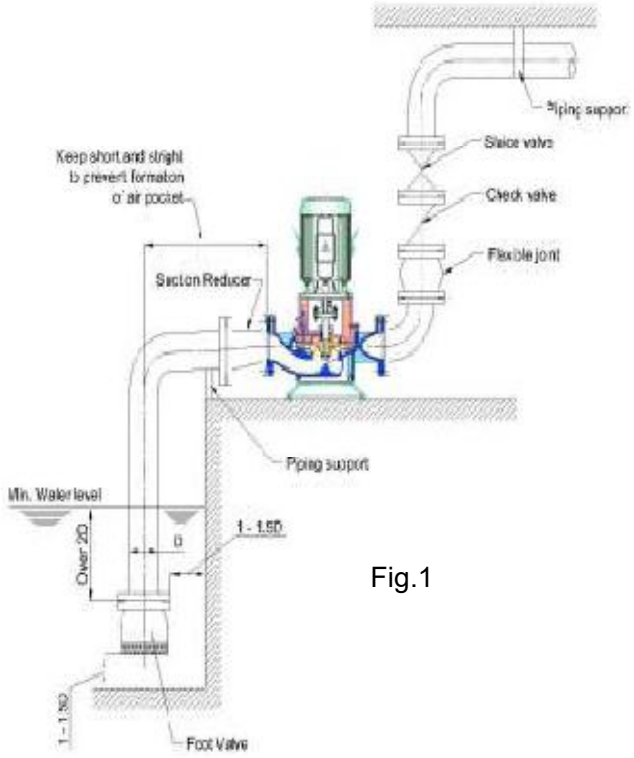


Fig.1

(6) For the influx system, we recommend that you install a cutoff valve on the suction piping to facilitate disassembly and inspection.

2. Piping

(1) Use adequate support for suction and discharge piping.

(2) A check valve must be installed between the pump and the discharge valve in the following cases.

When suction piping is long; when actual head is high; when pump is automatic; when water is being pumped to pressure tank; and when two or more pumps are in parallel operation.

(3) Install an air-release valve in piping to prevent the unavoidable formation of air pockets due to construction. Note, however, that an air-release valve must not be installed where pressure may drop below atmospheric pressure since the valve may suck in air instead of expelling it.

(4) To reduce effects of water hammer, install such a device as a quick-closing check valve.

(5) Suction system:

1. The end of the suction piping should be submerged to a depth of at least twice the diameter (D) of the piping, and should be at a distance between 1 to 1.5 times the diameters of the piping from the bottom of the pit.

2 Install a foot valve at the end of the suction piping to block the entrance of foreign matter.
3 Suction piping should be inclined upward (over 1/100) in relation to the pump to prevent formation of air pockets. Pipe joints must be tight so that there will be no possibility of air suction.
4 Keep suction piping as short and straight as possible. Do not attach a sluice valve.
5 Suction pipe sizes and suction reducer sizes should be as indicated in Table 1. Install the suction reducer as shown in Fig. 1 to prevent the formation of air pockets. The suction reducer is available as a separate special accessory and repair.

Model	Foot valve and Suction pipe size	Suction reducer size
50 LPDC	50	No need to use
65 LPDC	65	No need to use
80 LPDC	100	100x80
100 LPDC	125	125x100
125 LPDC	150	150x125
150 LPDC	200	200x150
200 LPDC	300	300x200
250 LPDC	350	350x250

Table 1

4. Electric wiring

⚠ Warning	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 the danger of fire accident.	❗
	Please implement the grounding works. If it operates without firm installation of grounding wire, the danger of electric shock may appear upon fault and electric leakage.	❗
	To use and install the pump shall be implemented by specialized technician. Otherwise, it may cause fire, injury and other accidents.	❗
	Specialized technician shall correctly implement the wiring works. Please confirm whether the wiring terminals are loose. The wrong wiring works may cause fire, injury and other accidents.	❗
⚠ Caution	Please confirm whether the connection of motor terminals is loose or dropped. In case of loose or drop connection, burn motor may be caused due to missed-phase operation.	❗

(1) Perform wiring in accordance with the instructions in Fig. 2, a connection diagram on the inner lid of the motor terminal box, or an instruction manual for the motor.

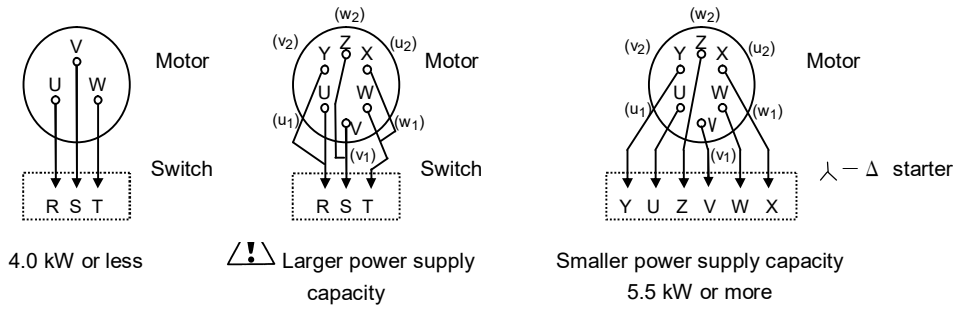


Fig. 2 Wiring connection

(2) Check the following before turning on a switch.

(a) An appropriate fuse is used.

(b) Wiring is correctly completed.

(c) Grounding is completed without fail.

5 Operation

1. Cautions before Starting Operation

(1) Turn the pump by hand and check for smooth rotation. If pump rotation is difficult or uneven, it may be caused by internal rust etc. Locate cause and eliminate.

(3) Before starting, the pump casing must be full of liquid, manual priming may be required if the system does not automatically fill the pump casing with fluid. Open the air vent plug or valve mounted on the pump so as to exhaust air or other gas completely and confirm that pump casing is fully primed.

(4) Rotate the pump by hand when priming to exhaust internal air or other gas from pump casing.

2. Start, Operation and Stop

(1) Ensure that suction valve is fully open and the discharge valve is fully closed.

(2) Turn the start switch off and on once or twice to ensure the pump is operating normally. If there are no malfunctions, the pump may be placed in continuous operation since pump shut-off operation causes rapid liquid temperature rise inside pump, with resultant damage, shut-off operation should be confined to short periods.

(3) Gradually open discharge valve and set to prescribed operation point.

(4) Check that pressure, current, vibration and noise are at normal levels. Both the pressure gauge and compound gauge cocks should be kept closed except at specified times. Leaving them open may lead to malfunction.

(5) Re-check pump and driver 30 to 60 minutes after start.

(6) During stop operation, gradually close the discharge valve before turning off the prime mover.

3. Shut-down and Emergency Shut-down

(1) When the pump stops due to power failure, turn of the switch and closed discharge valve.(This prevents sudden start of pump when power is restored).

(2) Power emergency shut-down, switch off electric power and close discharge valve.

4. Standby Pump

For standby pump operation, fully open the suction and half open for discharge valve. Fill the pump with the liquid so that suction pressure is applied. Stop reverse pressure with check valve only and start the pump as is when restarting.

6 Maintenance

In order to maintain best operating conditions for the pump, the following maintenance and checks should be provided. Pressure gauge and compound gauge cocks should be closed except when taking readings. This will prevent instrument damage.

(1) Supply and replacement of bearing lubricant refer to the motor manufacturer's instruction manual for re-lubrication.

(2) Temperature on the bearing casing should not exceed room temperature plus 40^0C or maximum temperature 80 ^{0}C. If this temperature is exceeded, stop operation immediately and check.

(3) Do not start the pump frequently otherwise the pump may be damage.

(4) Pressure, current, vibration, noises etc. which differ greatly from normal values are a symptom of trouble. Take counter measure immediately.

For this purposed, it is recommended that records be kept.

Check the following items:

- Suction and discharge pressures
- Current value and deviation
- Bearing temperature (max. 80 ^{0}C on bearing casing)
- Vibration (on bearings and pump casing)
- Noises

(5) Turn off the switch without fail before checking pump.

(6) Turn the pump shaft by hand once every week if the pump is stopped for long time.

(7) To prevent freeze and subsequent damage to pump during cold weather operation, drain pump or provide insulation.

(8) Replaceable part under the following condition.

1. Replace parts under the following conditions:

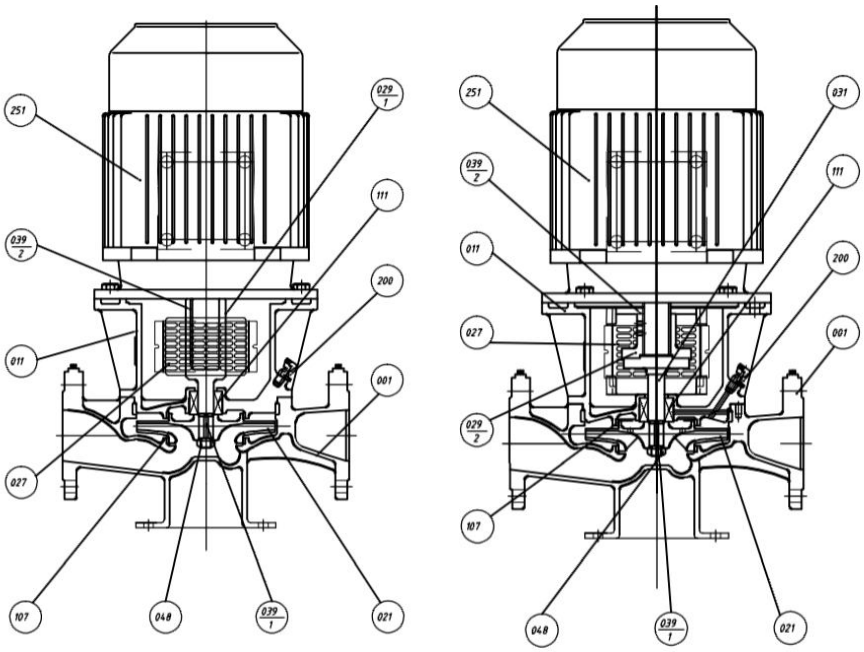
Part	Reason for change	Change frequency
Mechanical Seal	When there is leakage	Annually
O-ring	Each disassembly	-

The above change frequency indicates standard values when the pump is operated normally.

2. The replaceable parts are as follows:

LPDC Model	Mechanical Seal	O-Ring
50LPDHC	0250/2100	3.1×225
65LPDHC	0250/2100	3.1×225
65LPDHC	0250/2100	3.1×225
80LPDHC	0250/2100	3.1×225
65LPDJC	0250/2100	3.1×275
80LPDGC	0250/2100	3.1×185
80LPDJC	0350/2100	3.1×275
100LPDGC	0250/2100	3.1×185
100LPDJC	0350/2100	3.1×275
100LPDHC	0350/2100	3.1×225
100LPDHC	0350/2100	3.1×225
100LPDGC	0350/2100	3.1×195
125LPDJC	0450/2100	3.1×275
80LPD4KC	0350/2100	3.1×335
125LPD4KC	0350/2100	3.1×335
125LPD4LC	0450/2100	3.1×415
150LPD4HC	0350/2100	3.1×225
150LPD4JC	0350/2100	3.1×275
150LPD4KC	0450/2100	3.1×335
150LPD4LC	0450/2100	3.1×425
200LPD4HC	0350/2100	3.1×225
200LPD4JC	0450/2100	3.1×275
200LPD4KC	0550/2100	3.1×335
200LPD4LC	0550/2100	450x415x0.8
250LPD4LC	0650/2100	480x440x0.8

Pump sectional view



Part No.	Part Name	10bar	16bar	Qty/Unity
		Material		
251	Electric motor			1
200	Air vent valve	Brass		1
111	Mechanical seal	Ceramic/Carbon/NBR		1
107	Liner ring	Bronze		2
048	Impeller Nut	Brass		1
039-2	Key	Carbon steel		1
039-1	Key	Stainless steel		1
031	Shaft	Stainless steel		1
029-2	Coupling（*3）	HT200		1
029-1	Extension of shaft（*3）	Stainless steel		1
027	Connection frame protection cover	Stainless steel		2
023	Base（*2）	Carbon steel		1
021	Impeller	Bronze (SS available as option)		1
011	Frame	Cast Iron		1
001	Case	Cast Iron	Ductile Cast Iron/Cast Iron（*1）	1

* 1) For 16 bar model, diameter below 100mm are made of Ductile Cast Iron, while diameter 100mm and above are made of Cast Iron.
2) Pump with diameter below 125mm use stamping base (see type A), while 125mm and above use channel steel base plate (see type B).
3) For pump diameter below 200mm, the shaft coupling between motor and pump use extended shaft; for 200 LPDC and 250 LPDC use rigidity direct coupling.

8 Disassembly and assembly

1. Disassembly

Prior to disassembly prepare cardboard or plywood sheet upon which to place disassembled parts on top each other, since casing O-ring cannot be re-used after disassembly, prepare replacement in advance. Observe the following procedure for disassembly. Before disassembly,
it is necessary to turn off all power, close discharge and suction valves, (close valves in minimum flow piping) and open casing drains to completely drain pump.

Be sure cut off power source before beginning disassembly.

(1) Drain all liquid from casing

(2) Remove all bolts of casing bracket to casing and lift off the casing bracket with jack bolt and remove the casing bracket and motor by lifting the entire unit of casing bracket and motor. Inspect the inside of the pump and check for wear and other abnormal signs.

(3) Remove the impeller nut (right hand thread) and impeller washer and remove impeller from shaft. If the impeller is rusted and will not come loose, tap its end lightly with a wooden hammer to release.

(4) Remove the impeller key from the main shaft and remove mechanical seal, at this point the fixed ortion of the mechanical seal is attached to the casing bracket and the rotating portion is attached to the main shaft. The fixed portion of the mechanical seal can be removed by pushing it out of the shaft hole in the casing bracket with a screw driver or similar tool.

(5) Remove all bolts of electric motor mounting from the casing and remove casing bracket.

(6) Take out the entire stub shaft from motor by losing the set screw on the stub shaft.Inspect condition of the shaft and replace there are some rubs and scratches on the shaft.

2. Assembly

Re-assemble in reverse order of disassembly.

Re-assemble of following points.

(1) Wipe contacting part of mechanical seal with a dry cloth.

(2) Replace O-ring with a new one.

(3) Replace all parts that are excessively worn or damaged.

(4) Tighten all bolts evenly.

Please obtain O-rings and mechanical seal from pump dealer.

9 Troubleshooting

Trouble	Causes	Countermeasures
Prime mover does not rotate or rotates with hum	• Defective prime mover	• Repair or replace
	• Defective power supply	• Check and repair
	• Contacts, rust or seizure of rotating parts.	• Manually rotate pump, disassemble clean, reassemble
	• Foreign matter in motor	• Remove and clean or repair in specialist shop.
Pump is operating but there is no water discharge. Does not obtain specified discharge volume	• Incomplete, no prime.	• Prime.
	• Sluice valve closed, half open.	• Open sluice Valve.
	• Actual head is higher than total head pump.	• Re-check plan.
	• Excessive suction head.	• Re-check plan.
Specified displacement not obtained	• Reverse rotation direction.	• Correct connections, referring to arrow indications.
	• Low rotation speed.	• Check with tachometer
	• No. of poles of motor differs.	• Check nameplate.
	• Low voltage.	• Check power supply.
	• Foot valve or strainer clog.	• Remove foreign matter.
	• Impeller clog.	• Remove foreign matter.
Specified displacement not obtained	• Pipe clog.	• Remove foreign matter.
	• Air lock in suction pipe.	• Remove air.
	• Discharge pipe leak.	• Check and repair.
	• Impeller corrosion.	• Check liquid quality and repair.
	• Excessive impeller wear.	• Replace.
	• Excessive liner ring wear.	• Replace.
	• Excessive pipe loss.	• Recheck plan.
	• Excessive liquid temperature.	• Recheck plan.
	• Cavitations.	• Contact specialist.
	• Actual head higher than total pump head.	• Recheck plan.
	• Excessive suction head.	• Recheck plan.
Water pumped, but soon stops.	• Insufficient prime.	• Prime.
	• Air suction.	• Check and repair suction pipe and shaft seal.
	• Air lock suction height.	• Re-connect piping.
	• Excessive suction head.	• Re-check plan.
	• Excessive rotation.	• Check with tachometer.
Overload.	• No. of poles of motor differs.	• Check nameplate.
	• Voltage drop and considerable unbalance between phases.	• Contact company.
	• Low head or excessive water flow.	• Reduce opening of discharge valve.
	• Centering misalignment.	• Center again.
	• Foreign matter in pump	• Remove foreign matter.
	• Liner ring wear.	• Replace.
	• Bearing damage.	• Replace.
	• Contact of rotating parts or bent shaft.	• Repair in specialist shop.
Bearing over heat.	• Insufficient lube oil.	• Replenish.
	• Excessive lube oil.	• Reduce oil supply.
	• Improper lube oil.	• Replace bearing unit.
	• Deteriorated lube oil.	• Replace bearing unit.
	• Contaminated lube oil.	• Replace bearing unit.
	• Centering misalignment.	• Center again.
	• Bearing damage.	• Replace bearing unit.
	• Excessive time cut-off operation.	• Stop cut-off operation.
	• Inadequate foundation.	• Repair foundation.
Pump vibrates. Excessive operating noises.	• Installation and centering failure.	• Check installation and centering condition.
	• Bearing damage.	• Replace bearing.
	• Excessive water flow.	• Reduce discharge valve opening.
	• Discharge volume too small.	• Operate pump with specified flow.

	• Impeller clog.	• Remove foreign matter.
	• Reverse rotation.	• Correct, referring to arrow.
	• Rotary part touches or bent shaft.	• Repair in specialist.
	• Cavitation.	• Contact specialist.
	• Vibrating piping.	• Modify piping.
Water leak from shaft seal	• Mechanical seal assemble failure.	• Mount mechanical seal correctly.
	• Mechanical seal damage.	• Replace.
	• Shaft and mechanical seal damage.	• Replace.
	• Bent shaft.	• Repair in specialist shop.

10 Limited Warranty

EBARA MACHINERY (CHINA) CO. Ltd. liability under this Warranty is limited to bearing the costs of parts necessary for repair, **EBARA MACHINERY (CHINA) CO. Ltd.** liability shall not extend to any other costs beyond these.

(1) This warranty period is either eighteen (18) months from the date of shipment or twelve (12) months from the commencement of actual use of the product, whichever period expires earlier.

(2) During the said period, **EBARA MACHINERY (CHINA) CO. Ltd.** will repair the pump free of charge provided that: the trouble is due to shortcoming in design, workmanship, etc., that can be attributed **EBARA MACHINERY (CHINA) CO. Ltd.**, and that the pump was being operated correctly and in a normal manner when the trouble occurred. **EBARA MACHINERY (CHINA) CO. Ltd.** takes full responsibility to repair the pump including parts necessary for replacement, however, **EBARA MACHINERY (CHINA) CO. Ltd.** do not take any other damages caused by the trouble.

(3) Fees will be charged for repair in the following circumstances:

(a) if the trouble occurs after the Warranty has expired.

(b) If the trouble is caused by miss-operation, and/or caused during storage.

(c) if the trouble is caused by fire, flood, earthquake or other circumstances beyond **EBARA MACHINERY (CHINA) CO. Ltd.** control.

(d) If the trouble is caused by use of parts other than those recommended by **EBARA MACHINERY (CHINA) CO. Ltd.**.

(e) If the trouble is caused by repair or remodeling of the pump carried out by a party of **EBARA MACHINERY (CHINA) CO. Ltd.**.

* “Consumable parts” refer to bearings, bearing sleeves, O-rings and other parts that will eventually require replacement.

(4) **EBARA MACHINERY (CHINA) CO. Ltd.** liability shall be limited to the warranty coverage described above, and **EBARA MACHINERY (CHINA) CO. Ltd.** shall not be liable for any other cost and damage not covered by the Warranty.

(5) The warranty period for repair parts continues for five (5) years after manufacturing of the parts is discontinued.

(6) The warranty is effective only inside of China.

11 Repair and Service

Repair or servicing of the pump should be requested to your dealer or to **EBARA MACHINERY (CHINA) CO. Ltd.**

Should you notice anything abnormal in the pump's operation, stop the pump immediately and inspect for malfunction (See 9 Troubleshooting).

If a trouble occurs, to order repairs or servicing, please contact your dealer or **EBARA MACHINERY (CHINA) CO. Ltd.**, stating the data on the nameplate and details of the trouble.

If you have any enquiries about the pump, please contact your dealer or **EBARA MACHINERY (CHINA) CO. Ltd.**.

MEMO :

All specifications are subject to change without notice

IM0013-E

EBARA MACHINERY (CHINA) CO.,LTD.

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