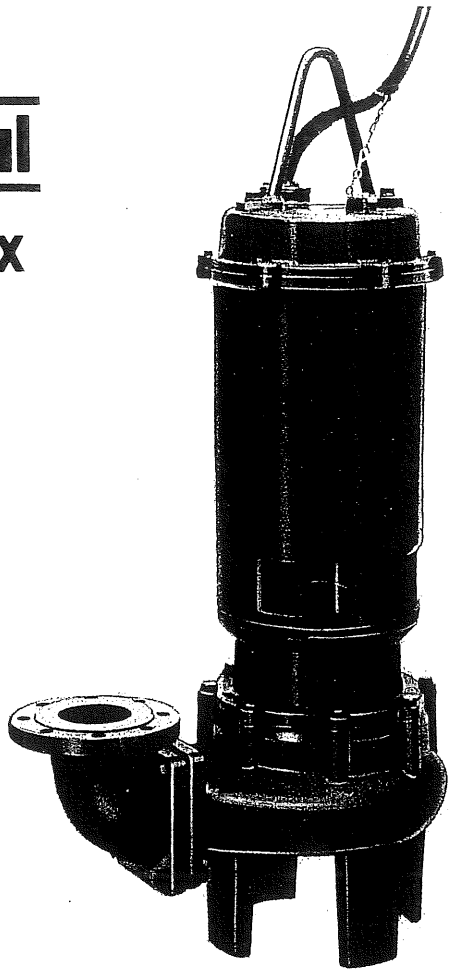
CF3209U-H901 Rev.1

Instruction Manual

EBARA Submersible Vortex Sewage Pumps

MODEL DV



Introduction

Check the following points upon receipt of your pump:

(1) Is the pump exactly what you ordered? Check the nameplate. **It is especially important that you check whether the pump is to be used with 50 or 60 Hz.**

(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.

Specifications

Check the nameplate for your pump's head (HEAD), discharge volume (CAPACITY), speed (SPEED), motor voltage and current. Other specifications are noted in the chart below.

Item		Standard specifications
Liquids handled	Type	Sewage, drainage water
	Temperature	0 ~ 50°C (less than 7.5 kW) 0 ~ 40°C (more than 11 kW)
	Max. solid matter size	Diameter: less than 100% of piping diameter Fiber length: less than 500% of piping diameter
Shaft seal lubrication oil		No. 32 Turbine oil (ISO VG-32)
Shaft seal lubrication oil		No. 32 Turbine oil (ISOVG 32)
Maximum water depth		8m
Installation		Upright (floor model)

Installation

1. Check the following before beginning installation.

Insulation resistance measurement:
With the motor and cable (excluding the power supply cable) immersed in water, use a megger to measure the insulation resistance between the ground and each phase of the motor, and again between each phase of the motor. The megger should indicate an insulation resistance of not less than 20mega ohms. While making the measurement, keep the power supply cable off the ground.
We recommend that an auxiliary pump be kept on hand in case of emergency.

2. Installation

(1) Under no circumstances should the cable be pulled while the pump is being transported or installed.
Attach a chain or rope to the grip and install the pump.

(2) This pump must not be installed on its side or operated in a dry condition. Ensure that it is installed upright on a secure base.

(3) Install the pump at a location in the tank where there is the least turbulence.

(4) If there is a flow of liquid inside the tank, support the piping where appropriate. (See **Fig. 1**)

(5) Install piping so that air will not be entrapped.
If piping must be installed in such a way that air pockets are unavoidable, install an air release valve wherever such air pockets are most likely to develop.

(6) Do not permit end of discharge piping to be submerged, as backflow will result when the pump is shut down.

(7) Do not operate the pump continuously for a long time with the water at the lowest operating level, since this will cause the motor protector or the thermal detector inside the motor to be activated.
As shown in **Fig. 2**, install an automatic operation unit and set the water level so that the pump is not operated in a dry condition.

(8) Refer to the mounting/demounting device instruction manual for details on the installation of pumps so equipped.

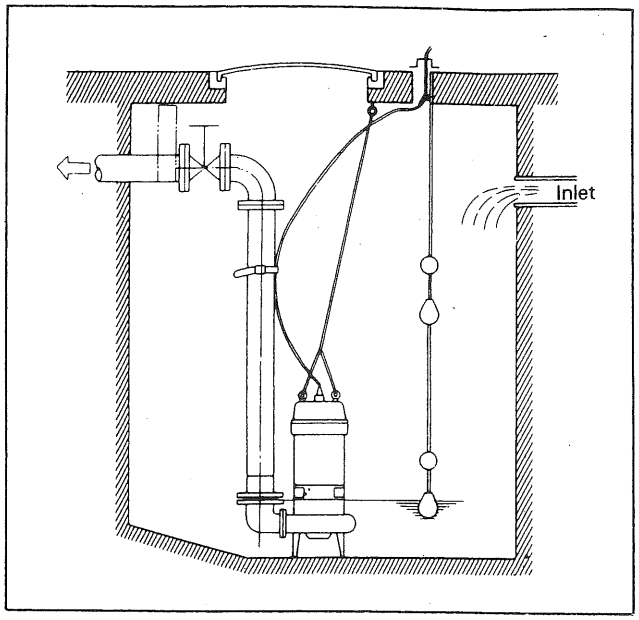
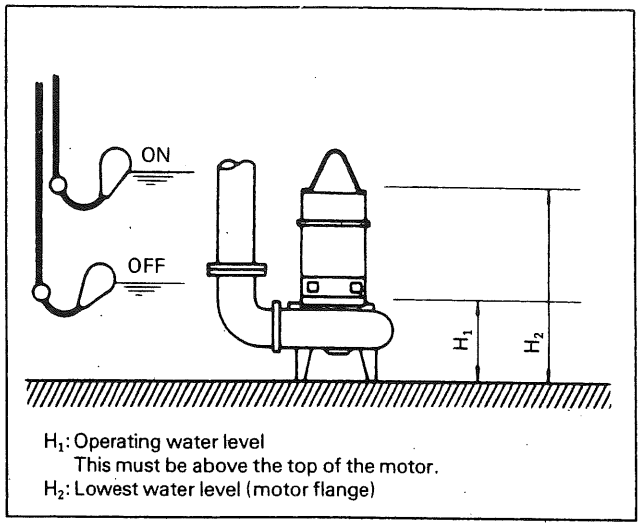


Fig. 1



H_1: Operating water level
This must be above the top of the motor.
H_2: Lowest water level (motor flange)

Fig. 2

3. Electrical wiring

(1) Wiring
   a) Wire as indicated for the appropriate start system as shown in **Fig. 3.**
   b) Loose connections will stop the pump. Make sure all electrical connections are secure.

(2) Cable
   a) Never let the end of the cable contact water.
   b) If the cable is extended, do not immerse the splice in water.
   c) Fasten the cable to the discharge piping with tape or vinyl strips.
   d) Install the cable so that it will not overheat. Overheating is caused by coiling the cable and exposing it to direct sunlight.

(3) Grounding
   As shown in **Fig. 4** ground the green wire (label E).
   Under no circumstances should the green wire be connected to the power supply.

(4) Use short circuit breakers to prevent danger of electrical shock.

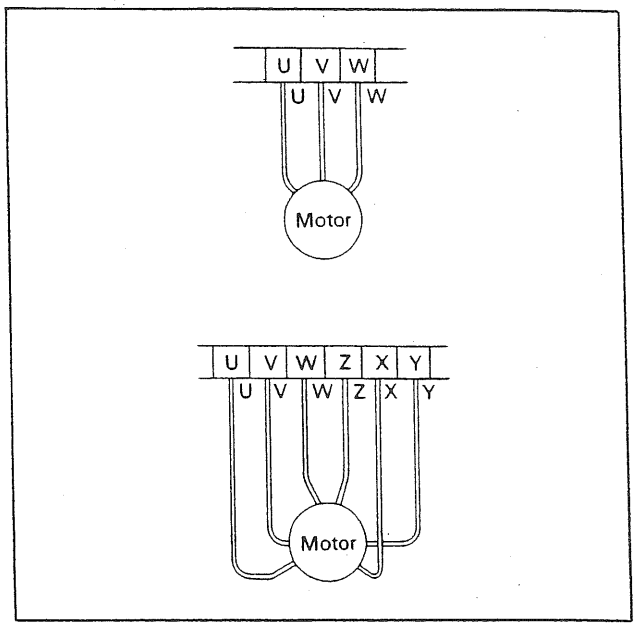


Fig. 3

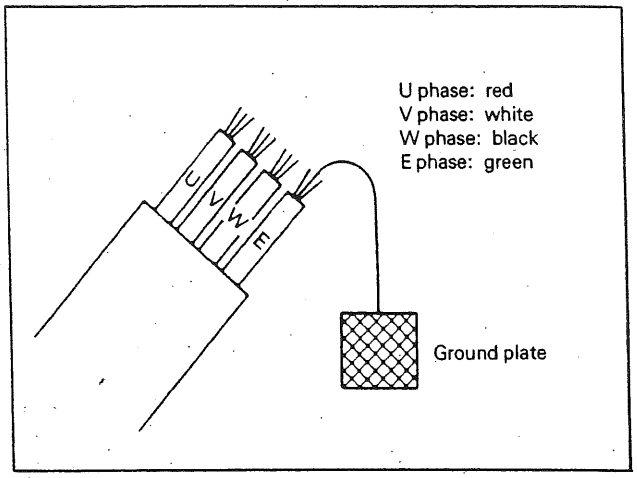


Fig.4

Operation

1. Before starting the pump

(1) After completing installation, measure the insulation resistance again as described in **Installation.**

(2) Check water level.
If the pump is operated continuously for an extended period of time in a dry condition or at the lowest water level, the motor protector (less than 7.5kW) or the thermal detector (more than 11kW) will be activated. Constant repetition of this action will shorten pump service life. Do not start the pump again in such a situation until after the motor has completely cooled.

2. Test operation

(1) Turn the operating switch on and off a couple of times to check for normal pump start.

(2) There is no problem if voltage fluctuates within ±10% of standard rating, but if it should drop below that value, the pump will not start. (Be particularly careful when electrical wiring has been extended with a cable of same size.)

(3) Check direction of motor rotation as follows.

a) If there is a shut-off valve on the discharge side of the pump.
Open the shut-off valve slightly (so that air is released and a small amount of water escapes) and turn on switch. If the motor produces the higher shutoff pressure direction of rotation is correct. If the rotation is reversed, there will be a sudden rise in current as the shut-off valve is gradually opened. **(Fig. 5)**
In case of reverse rotation, reverse two of the three wires. **(Fig. 6)**

b) If there is no shut-off valve on the discharge side of the pump.
If discharge volume is low or unusual sounds are heard when the pump is operating, rotation is reversed. Reverse two of the three wires.

3. Operation

Pump operation can be commenced after test operation has been successfully completed.

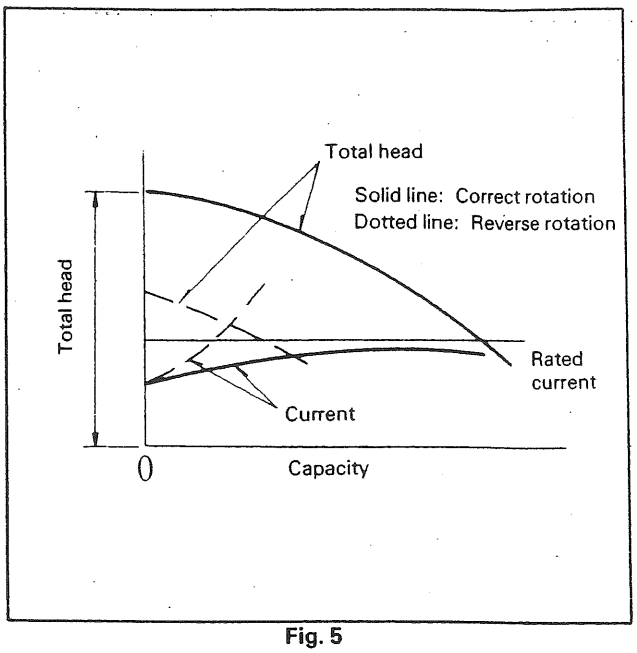


Fig. 5

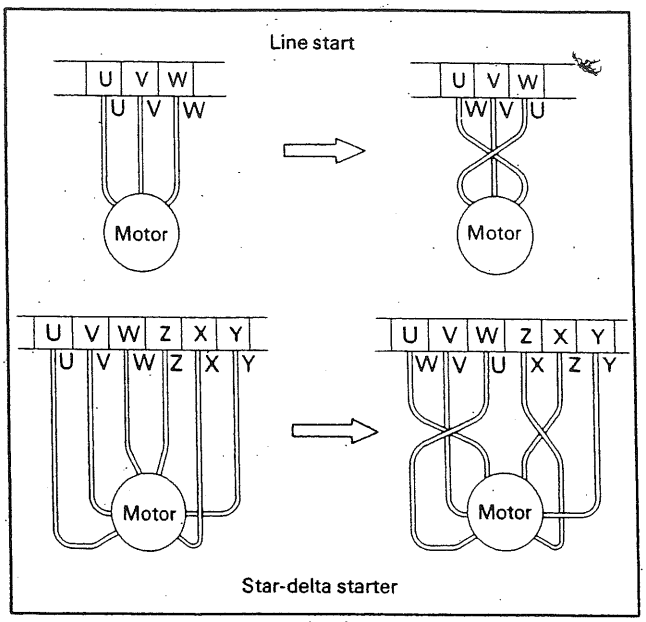


Fig. 6

Maintenance

Check pressure, output, voltage, current and other specifications. Unusual readings may indicate trouble. Refer to **Troubleshooting** and correct as soon as possible.

1. Daily inspections

(1) Check current and ammeter fluctuation daily. If ammeter fluctuation is great, even though within the limits of pump rating, foreign matter may be clogging the pump.
If the quantity of liquid discharged falls suddenly, foreign matter may be blocking the suction inlet.

2. Regular inspections

(1) Monthly inspections
Measure the insulation resistance. The value should be more than 1M ohm. If resistance starts to fall rapidly even with an initial indication of over 1M ohm, this may be an indication of trouble and repair work is required.

(2) Annual inspections
The service life of the mechanical seal can be prolonged by replacing the oil in the mechanical seal chamber once a year. Water mixed with the oil or a cloudy texture are indications of a defective mechanical seal requiring replacement. When replacing the oil, lay the pump on its side with filler plug on top as shown in **Fig. 7**.

For over 5.5kW motors, inject turbine oil No. 32 (ISO VG-32) until it overflows.
For less than 3.7kW motors inject the amount specified in **Table 1**.

(3) Inspections at 3-5 year intervals
Conduct an overhaul of the pump. These intervals will preclude the possibility of future trouble.

3. Precautions when operation is suspended

(1) If operation is to be suspended for a prolonged period of time with the pump immersed in water, measure the insulation resistance of the motor occasionally. If resistance is normal, operate pump to prevent rust from developing on moving parts. Follow the instructions under **Operation** when pump operation is to be resumed.

(2) For dry storage, clean out pump and store in a dry place. Follow the instructions under **Installation** and **Operation** when pump operation is to be resumed.

kW	Oil
0.75	650c.c.
1.5	920c.c.
2.2	1230c.c.
3.7	1380c.c.

Table 1

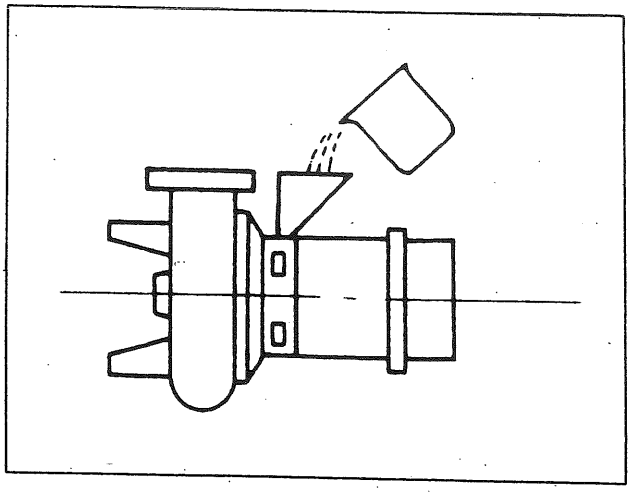


Fig. 7

4. Parts that will need to be replaced

Replace the appropriate part when the following conditions are apparent.

Part \ Motor output	0.4kW	0.75kW	1.5kW	2.2kW	3.7kW	5.5kW	7.5kW	11kW	15~22kW
Mechanical seal	20φ		25φ	30φ		40φ	40φ	40φ	45φ
Oil filler plug gasket	Inner diameter × outer diameter × thickness = 10φ × 18φ × 0.8t or 13φ × 23φ × 0.8t								
Lubricating oil (turbine oil # 32)	650cc		920cc	1230cc	1380cc	2500cc	2500cc	3500cc	6200cc
O-ring	G130		3φ x 150φ	3φ x 170φ		3φ x 180φ	3φ x 180φ	3φ x 180φ	3φ x 220φ
Oil seal							VC 68907		VC 751007

Table 2

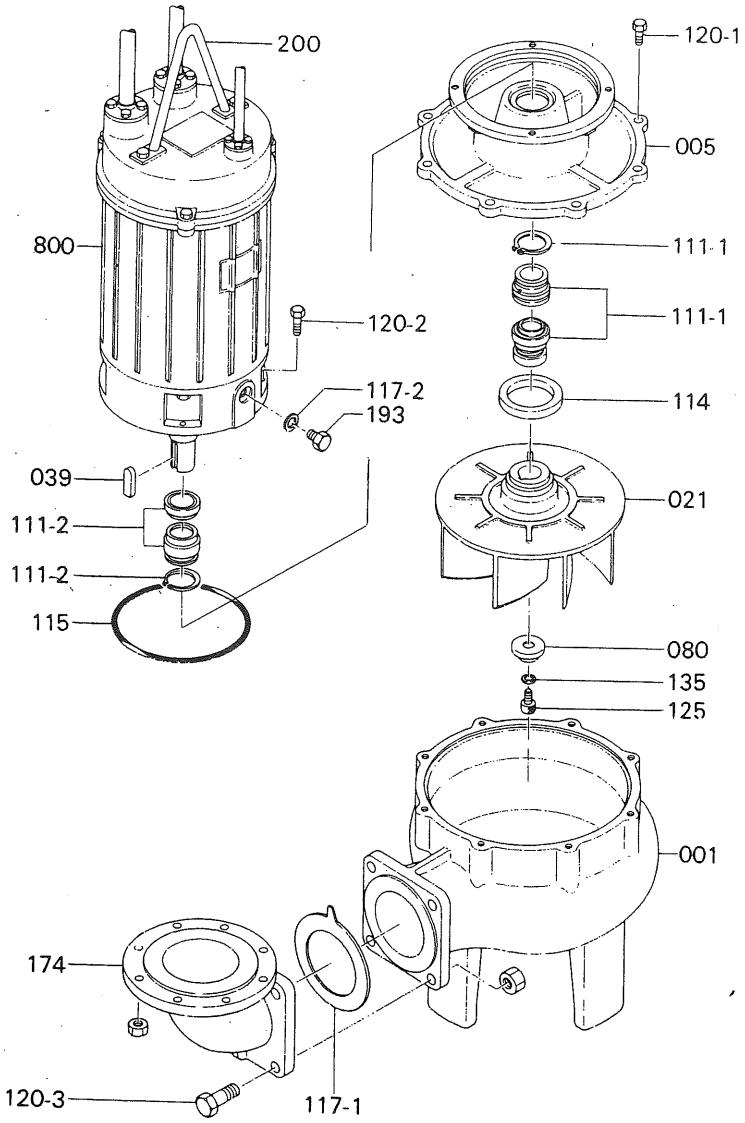
Above replacement schedule is based on normal operating conditions.
(replacement frequency may vary significantly depending on conditions.)

Troubleshooting

Trouble	Cause	Remedy
Does not start. Starts, but immediately stops.	(1) Power failure (2) Large discrepacy between power source and voltage (3) Significant drop in voltage (4) Motor phase malfunction (5) Electric circuit connection faulty (6) Faulty connection of control circuit (7) Fuse blown (8) Faulty magnetic switch (9) Water is not at level indicated by Float (10) Float is not at appropriate level (11) Defective float (12) Short circuit breaker is functioning (13) Foreign matter clogging pump (14) Motor burned out (15) Motor bearing broken	(1)~(3) Contact electric power company and devise counter-measures (4) Inspect connections and magnetic switch (5) Inspect electric circuit (6) Correct wiring (7) Check and replace with correct type of fuse (8) Replace with correct type of switch (9) Raise water level (10) Move float to appropriate start level (11) Repair or replace (12) Repair short circuit (13) Remove foreign matter (14) Repair or replace (15) Repair or replace
Operates, but stops after a while.	(1) Prolonged dry operation has activated motor protector and caused pump to stop (2) High liquid temperature has activated motor protector and caused pump to stop	(1) Raise stop water level (2) Lower liquid temperature
Does not pump. Inadequate volume.	(1) Reverse rotation (2) Significant drop in voltage (3) Operating a 60Hz pump on 50Hz (4) High discharge head (5) Large piping loss (6) Low operating water level causes air suction (7) Discharge piping leak (8) Discharge piping clog (9) Foreign matter in suction inlet (10) Foreign matter clogging strainer. (11) Foreign matter clogging pump (12) Worn impeller	(1) Correct rotation (see Operation 2, (3)) (2) Contact electric power company and devise counter-measures (3) Check nameplate (4) Recalculate and adjust (5) Recalculate and adjust (6) Raise water level or lower pump (7) Inspect, repair (8) Remove foreign matter (9) Remove foreign matter (10) Remove foreign matter. (11) Disassemble and remove foreign matter (12) Replace impeller
Over current	(1) Unbalanced current and voltage (2) Significant voltage drop (3) Motor phase malfunction (4) Operating 50Hz pump on 60Hz (5) Reverse rotation (6) Low head. Excessive volume of water (7) Foreign matter clogging pump (8) Motor bearing is worn or damaged	(1) Contact electric power company and devise counter-measures (2) Contact electric power company and devise counter-measures (3) Inspect connections and magnetic switch (4) Check nameplate (5) Correct rotation (see Operation 2. (3)) (6) Replace pump with low head pump (7) Disassemble and remove foreign matter (8) Replace bearing
Pump vibrates; excessive operating noise.	(1) Cutoff valve closed too far (2) Piping resonates (3) Reverse rotation	(1) Open cutoff (valve) (2) Improve piping (3) Correct rotation

Construction

1. Sectional drawing



PART NO.	PART NAME	NO. FOR 1 UNIT
001	CASING	1
005	INTERMEDIATE CASING	1
021	IMPELLER	1
039	KEY	1
080	BUSHING	1
111-1	MECHANICAL SEAL	1 SET
111-2	MECHANICAL SEAL	1 SET
114	OIL SEAL	1
115	"O" RING	1
117-1	GASKET	1
117-2	GASKET	1
120-1	BOLT	4
120-2	BOLT	4/8
125	BOLT	1
135	WASHER	1
174	DISCHARGE PIPE	1
193	OIL PLUG	1
801	ROTOR	1
802	STATOR	1
811	SUBMERSIBLE CABLE	1
814	MOTOR FRAME	1
816	MOTOR COVER	1
817	MOTOR COVER	1
830	SHAFT	1
848	MOTOR PROTECTOR	1
848-1	BALL BEARING	1
849-2	BALL BEARING	1

2 Standard accessories

Captyre cable . . . . . 10 m
Companion flange. . . . . 1 set

Disassembly and Assembly

1. Disassembly

When disassembling pump, have a piece of acrdboard or wooden board ready to place the different parts on 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 not 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) Loosen casing bolts and remove casing.
(2) Loosen bolt at end of pump shaft and lift impeller off shaft.
(3) Remove pump shaft key and mechanical seal.
(The mechanical seal cannot be removed at this point with a motor of less than 3,7kW.)
(4) Loosen inner casing bolts and remove inner casing.
Note 1: Drain the lubricant oil into a container.
(5) Remove the mechanical seal from the main shaft.
(The mechanical seal and the motor can be removed at this point with motors of less than 3.7kW.)
Note 2: Be careful not to cut your fingers on the shaft key groove when pulling out the mechanical seal.
Note 3. Be careful not to scratch or bend the pump shaft during disassembly.

2. Assembly

Re-assemble in reverse order of disassembly.

Be careful of the following points.

(1) During re-assembly, rotate the impeller by hand and check for smooth rotation.
(2) Replace the O-ring.
(3) Replace all parts that are damaged.
(4) Tighten bolts evenly.

Please obtain "O" rings, gland packings and other parts from pump dealer. The table of dimensions is given in **"Maintenance"**.

All specifications subject to change without notice.
In this catalog, the particulars in [ ] are in accordance with the International System of Units (SI) and given for reference only.

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