IWAKI PUMPS

IWAKI Vertical Centrifugal Pump

VT Series

Instruction Manual (Asian Edition)

⚠ Read this manual before use of product

Thank you for selecting the Iwaki Vertical Centrifugal Pump VT Series. This instruction manual has been prepared to ensure correct and safe handling of the pump.

Please read this manual carefully and thoroughly prior to operating the pump.

Pay special attention to the "Safety Section," "Warning," and "Caution" messages included in this manual.

This instruction manual should be kept by each end user and at hand of pump operator for quick reference when needed.

Contents

Safety section

For the Safe and Correct Handling of the Pump

- Before use of the pump, read carefully this "Safety Section" to prevent accidents and to avoid the damage or loss of other assets.
- Observe and abide by the instructions described in this "Safety Section". These instructions are very important for protecting pump users or other persons from hazard or from loss of assets.
- Meaning of symbols
  Following two symbols describe the extent of hazards and loss which may brought if the instructions are not observed or if the pump is wrongly used.

 **Warning**	**Nonobservance or misapplication of the contents of the "Warning" could lead to a death or heavy injury of person.**
 **Caution**	**Nonobservance or misapplication of the contents of the "Caution" could lead to a injury of person or damage of assets.**

Following two symbols describe the content to be observed.

	**Prohibited action or procedure is indicated. Inside or near this circle, a concrete activity to be prohibited is depicted.**
	**Action or procedure which must be performed without fail is indicated. Inside this circle, a concrete activity to be performed is depicted.**

Safety section

⚠ Warning

- **Use of protectors:** When disassembling, assembling, and conducting maintenance or when handling a dangerous type of liquid or a liquid of unknown property, be sure to wear safety gloves, a helmet, and protective shoes. In addition, when handling wet-end parts, always wear protective goggles, masks, etc.


Wear protective gear

- **To prevent death or injury from a falling pump,** make sure the rope or chain used for lifting the pump is not accidentally cut or disconnected during installation. Make sure the rope or the chain used to lift the pump has sufficient strength in relation to the pump load. Also, be sure not to stand underneath a lifted or suspended pump.


Caution

- **When fixing the pump with rope or chain,** be sure to use special bolts (or rings) for lifting. Never use any other points for lifting the pump.


Prohibited

- **Always turn off the power supply prior to maintenance works.** Make special provisions so that no other operator mistakenly turns on the power supply while someone is working on the pump. In a noisy or poor visibity environment, display a sign near the power supply switch to notify others that someone is "WORKING" on the pump. Power supply mistakenly turned on during maintenance may lead to personal injury.


Power off

- **Do not hold plastics parts for transferring pump**
  When pump is transferred, do not hold plastics made parts such as casing flanges etc. Otherwise, the parts may be broken and pump may fall, which may result in injury of person.


Caution

- **No remodeling**
  Remodeling of the pump by the user may result in serious personal injury, electric shock, or damage to the pump. Do not attempt remodeling as it is very dangerous.


No Remodeling

- **Cautions when dangerous liquids are transferred.**
  When the pumps are used to transfer the dangerous liquids mentioned as below, the pumps always must be checked and watched so that the liquids can not be leaked. The operation of the pumps leaking the liquids may result in personal injury and/or explosion, fire accidents.
  - Explosive, fire-spreading and inflammable liquids
  - Corrosive and stimulus toxic liquids
  - Liquids detrimental to health

- **Do not damage power cable**
  Do not fold, pull nor pinch by force the power cable or motor lead-wires. Otherwise you may be electrically shocked or fire may happen.


Prohibited

Safety section

⚠ Caution

- **Qualified operators only**
  The pump operator and pump operation supervisor must not allow any operators who have little or no knowledge of the pump to run operate the pump. Pump operators must have a sound knowledge of the pump and its operation.

- **For specified application only**
  The pump is designed and manufactured to the specifications agreed upon by the user and Iwaki. The use of a pump in any application other than those clearly specified may result in injury or damage to the pump. Use the pump strictly in accordance with the pump specifications and application range. If you change any specification, contact Iwaki or your dealer.

- **Spill-out prevention measures**
  Appropriate protective measures should be taken against any spill-out accidents involving the operating liquid as a result of unexpected damage to the pump or the piping. Never discharge hazardous liquid, including, but not limited to, chemical liquid, over the ground or floor on the pump operating site. Follow local rules and regulations in disposing of hazardous substances.

- **Run the pump at the specified power supply voltage on the nameplate only.**
  Otherwise, fire or electric shock may result.

- **If the pump operation is stopped due to a power failure or closure of discharge wire,** turn off the power switch at once. After normal conditions return, turn the switch on again.

- **Do not operate pump with valves closed.**
  Do not run pump with suction and/or discharge valves closed. Otherwise, pump inside temperature increases and pump may be broken down.

- **Keep away from heat or flame.**
  Do not place any open flame or flammable object near the pump.

- **Do not stand on the pump.**
  Do not stand on the pump or use the pump as a step under any circumstances. Otherwise, you may experience a serious injury.

- **Do not touch the pump.**
  When the pump is used to feed a hot liquid, do not touch the pump or the piping with your bare hands during and immediately after operation as their surfaces are dangerously hot.

Safety section

⚠ Caution

- **Arrange grounding**
  Do not operate the pump without connecting the grounding wire. Otherwise, an electrical shock may result. Make sure the grounding wire is connected with the grounding terminal.


Grounding

- **Install an earth leakage breaker**
  The operation of a pump without using an earth leakage breaker may cause an electrical shock. Please install an optional leakage breaker in the system.


Electrical Shock

- **Do not install or store the pump in the following places.**
  - Places where flammable gas, dust or material is used or placed.
  - Places where corrosive gas (chlorine gas or the like) is generated.
  - Places where the ambient temperature is extremely high (40 deg. C or higher) or extremely low, 0 deg. C or lower.
  - Places where the pump is exposed to extreme dust or humidity. (Excluding the outdoor type)
  - Places where vibrations occur.


Prohibited

- **Pump start-up**
  When connecting a power supply to the pump, make sure there is no person around the pump. The pump has no ON/OFF switch. The pump starts operation when the power is supplied by connecting the power supply cable.


Caution

- **Foreign matter**
  Should foreign matter enter the pump, turn off the power at once and remove the obstruction. Using the pump with foreign matter inside may cause damage to the pump or a malfunction.

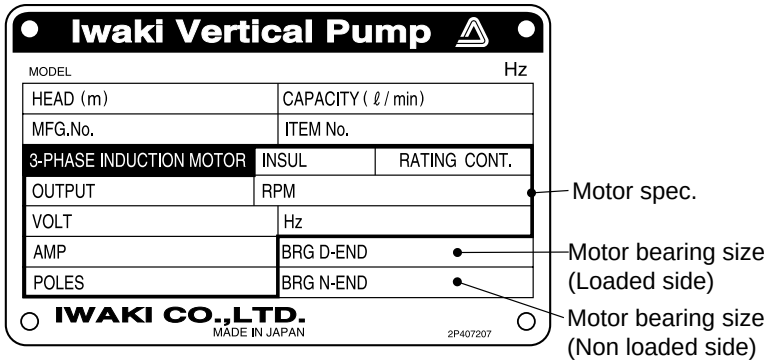

Caution

- **Disposal of used pump**
  Disposal of used or damaged pumps must be done in accordance with local laws and regulations. (Consult a licensed industrial waste products disposing company.)

- **Countermeasure for static electricity**
  When low electric conductivity liquid such as ultra-pure water and fluor inactive liquid (e.g.Fluorinert™) are handled, the static electricity may be generated in pump, which may cause static discharge and break down of pump. Take countermeasure to avoid and remove the static electricity.

OUTLINE OF PRODUCT

1. Unpacking and inspection



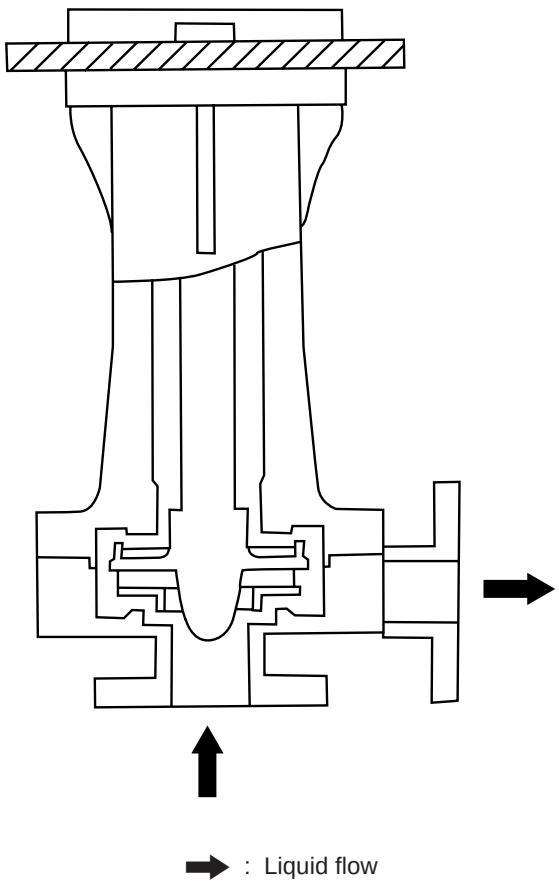
After unpacking, check the following points to confirm that the delivered product and its accompanying parts and elements are exactly what you ordered.

[1] Do the model and frequency indicated on the nameplate conform to your order?

[2] Has the pump unit or any part of it been damaged or have bolts and nuts been loosened during delivery?

If you find anything wrong, please refer to the dealer you placed your order with.

2. Principle of operation



VT Series pumps are seal-less construction vertical centrifugal pumps. Impeller which is directly connected to motor shaft is rotated in pump chamber (front casing) to suck liquid from suction port and discharge it from discharge port.

3. Model identification code

VT – 65 10 PV – 16 – T2 – S
(1) (2) (3) (4) (5) (6) (7)

(1) Series code : VT Series

(2) Pump connection bore (Suction × Discharge)
50 : 65A × 50A
65 : 80A × 65A

(3) Motor output
5 : 3.7 kW
7 : 5.5 kW
10 : 7.5 kW
(Pumps is equipped with totally enclosed fan cooled, three phase, 2-pole motor.)

(4) Material of pump head/O ring
PV : CFRPP/FKM
HV : HT-PVC/FKM

(5) Impeller code
15 : For specific gravity 1.1 (50Hz)
45 : For specific gravity 1.4 (50Hz)
16 : For specific gravity 1.1 (60Hz)
46 : For specific gravity 1.4 (60Hz)

(6) Motor voltage

Standard motor
T2 : 200V(50/60Hz)/400V(50/60Hz)
T3 : 220V(50/60Hz)/380V(50/60Hz)/440V(50/60Hz)

Fuji motor
2 : 200V(50Hz)/200V(60Hz)/220V(60Hz)
3 : 220V(50/60Hz)/380V(50/60Hz)
6 : 380V(50/60Hz)
9 : 400V(50Hz)/400V(60Hz)/415V(50Hz)/440V(60Hz)

(7) Special version code

4. Specification

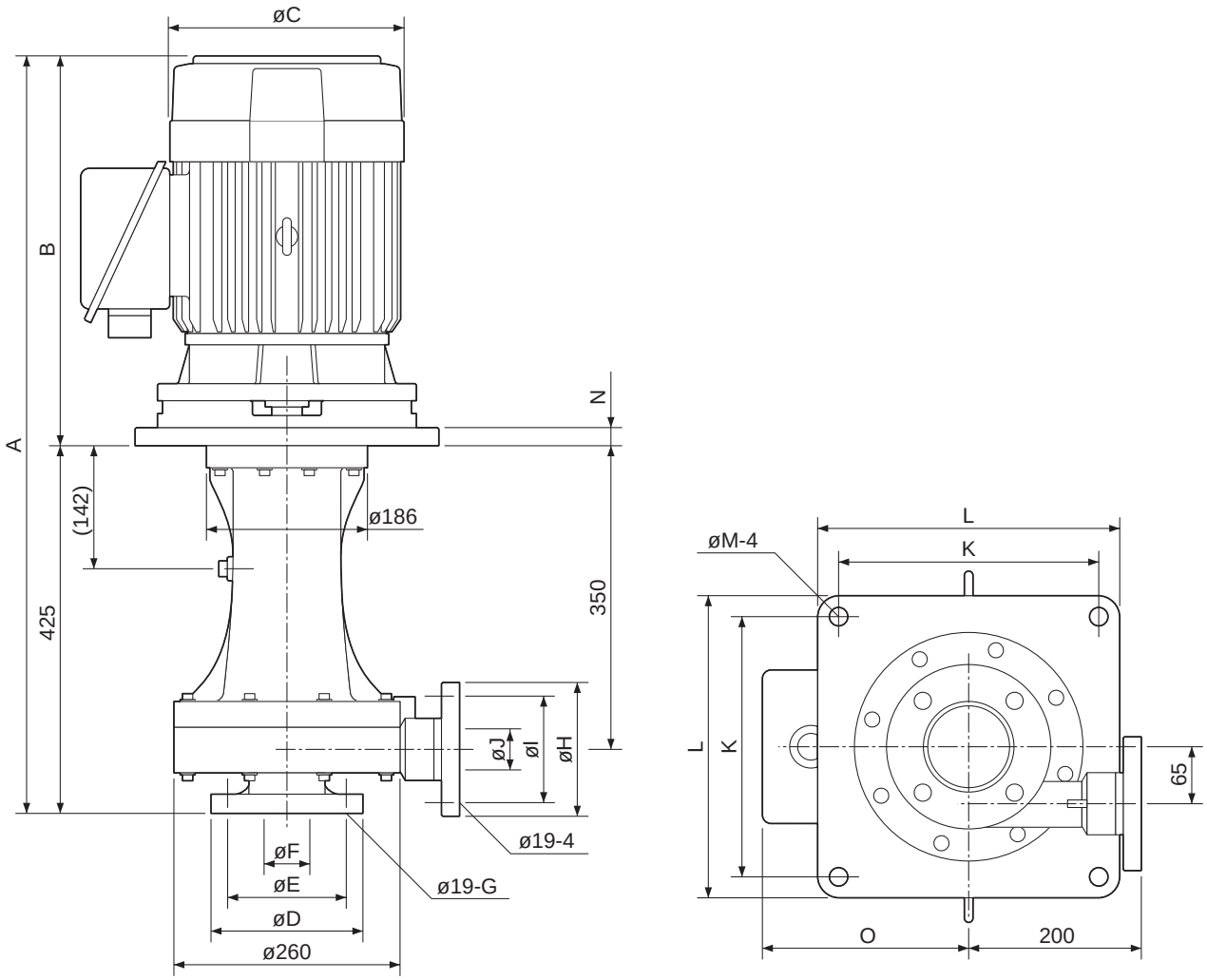
Specific gravity of liquid	Model		Pump bore Suc.×Disch.	Motor output Kw	Min. flow rate L/m in.	Max. head m	Standard H-Q L/min. – m	Max. flow rate L/min.	Mass kg
For 1.1	50Hz	VT-505	65A × 50A	3.7	150	27.5	500 – 18	700	70
		VT-655	80A × 65A	3.7	200	25	550 – 17	900	70
		VT-657	80A × 65A	5.5	200	28.5	600 – 20	1000	95
	60Hz	VT-505	65A × 50A	3.7	150	29.5	500 – 19	800	70
		VT-657	80A × 65A	5.5	200	34	600 – 23	900	95
		VT-6510	80A × 65A	7.5	200	40	700 – 27	1000	100
For 1.4	50Hz	VT-505	65A × 50A	3.7	150	26.5	400 – 16	550	70
		VT-657	80A × 65A	5.5	200	26	600 – 16	900	95
		VT-6510	80A × 65A	7.5	200	29	700 – 18	1000	100
	60Hz	VT-505	65A × 50A	3.7	150	29.5	400 – 19	550	70
		VT-657	80A × 65A	5.5	200	33	600 – 16	700	95
		VT-6510	80A × 65A	7.5	200	30	700 – 21	1000	100

Note 1: Do not use the pump at discharge capacity below min. flow rate shown above. Use the pump within discharge capacity shown by solid line on performance curves.

Note 2: Max. head means the head at pump shut-off (for liquid of S.G. 1.0). Refer to this figure when you study the pressure resistance of pipe and accessories.

Note 3. Mass is the figures complete with motor.

5. Dimension

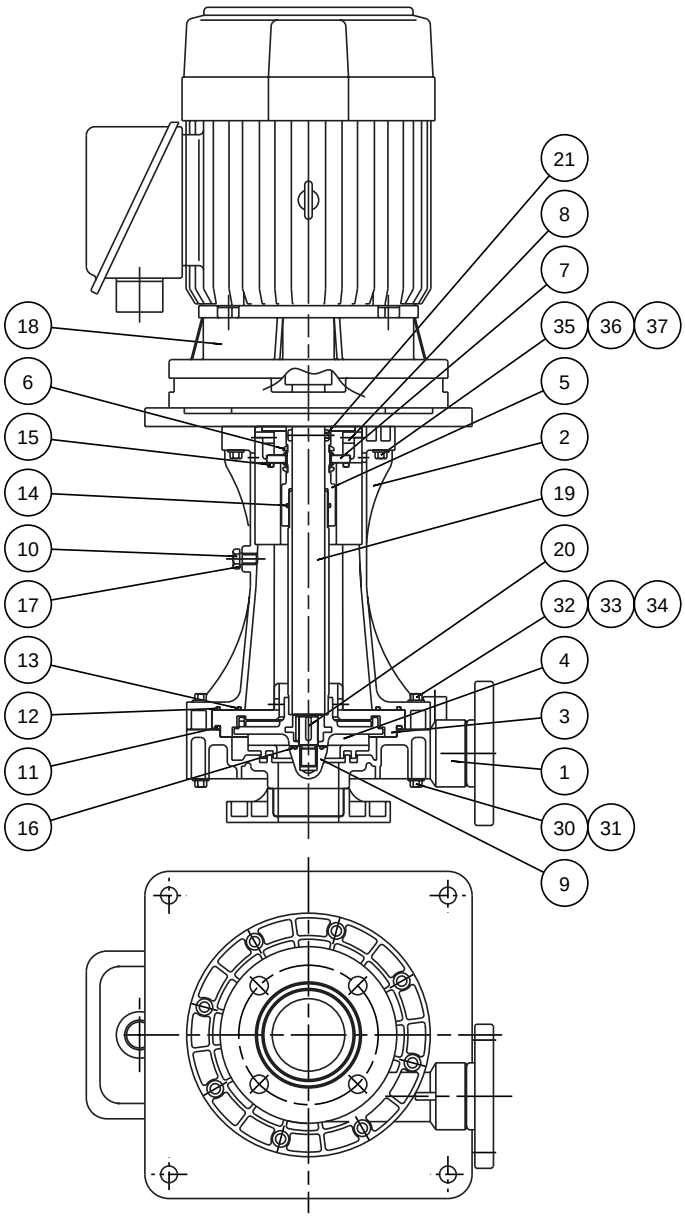


Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
VT-505	803(813)	378(388)	299(235)	177	140	65	4	155	120	50	222	260	15	16	212(187)
VT-655	803(813)	378(388)	299(235)	190	150	78	8	177	140	65	222	260	15	16	212(187)
VT-657, 6510	857(880)	432(455)	337(272)	190	150	78	8	177	140	65	300	352	18	20	249(239)

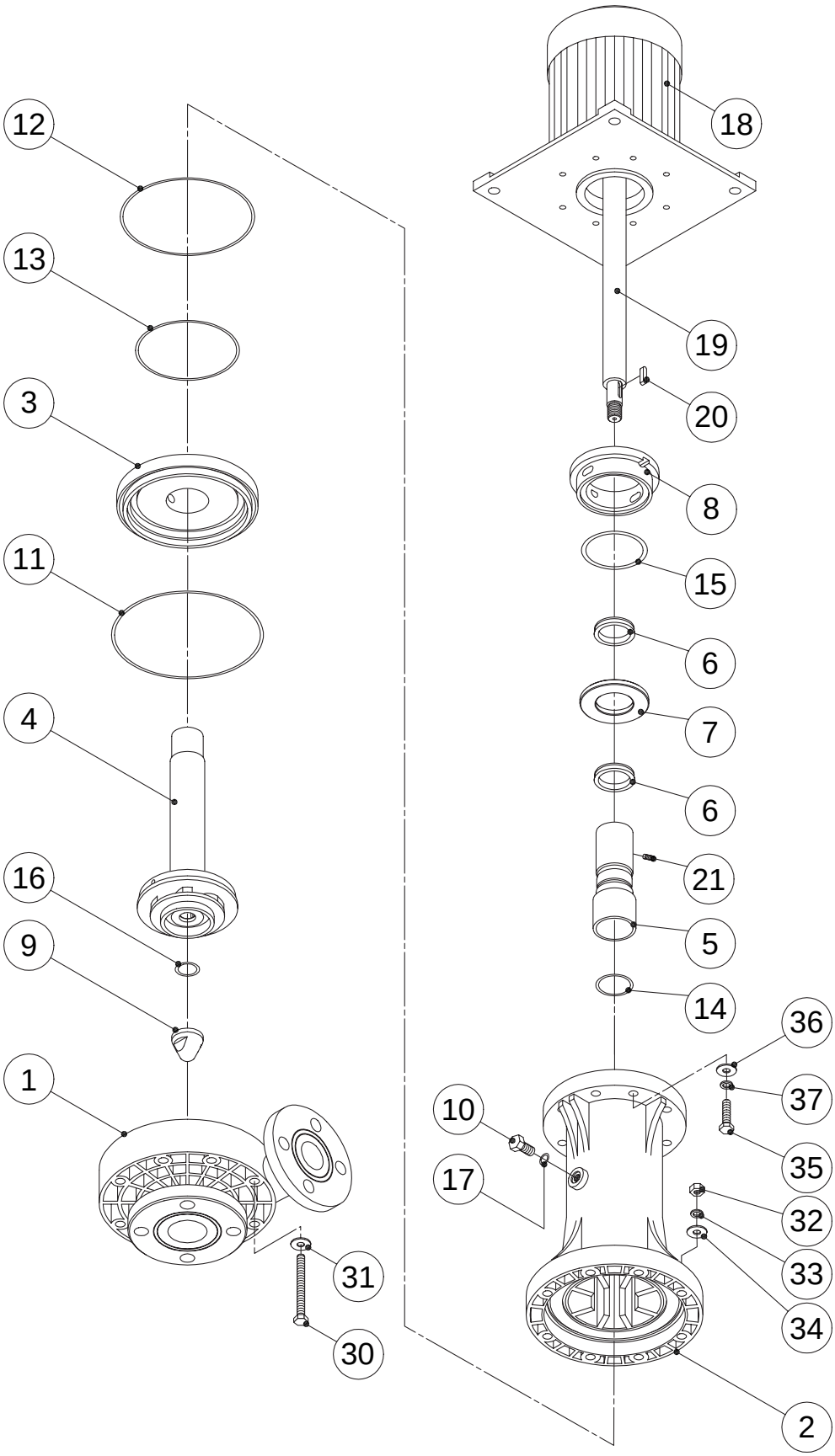
Figures in ( ) are for Fuji Electric motor.

6. Name of parts and construction

VT-50/65



			VT-50/65	
No.	Parts name	Q'ty	Material	Remarks
1	Front casing	1	CFRPP/HT-PVC	
2	Pump body	1	CFRPP/HT-PVC	
3	Rear plate	1	CFRPP/HT-PVC	
4	Impeller	1	CFRPP/HT-PVC	
5	Shaft sleeve	1	GFRPP	
6	Dry seal	2	FKM	
7	Dry seal ring	1	Alumina ceramic	
8	Dry seal cover	1	GFRPP	
9	Impeller nut	1	CFRPP/HT-PVC	
10	Air release bolt	1	CFRPP/HT-PVC	M12 × 25
11	O ring	1	FKM	AS568-367
12	O ring	1	FKM	ID ø 190 × W ø 4
13	O ring	1	FKM	ID ø 145 × W ø 4
14	O ring	1	FKM	JIS B 2401 P42
15	O ring	1	FKM	JIS B 2401 P75
16	O ring	1	FKM	JIS B 2401 P25
17	O ring	1	FKM	JIS B 2401 P12
18	Motor	1		TEFC (Out door)
19	Pump shaft	1	Stainless steel	
20	shaft key	1	Stainless steel	
21	Hex socket set screw	1	Stainless steel	M6 × 10
30	Hex head bolt	8	Stainless steel	M10 × 100
31	Plain washer	8	Stainless steel	M10
32	Hex head nut	8	Stainless steel	M10
33	Spring washer	8	Stainless steel	M10
34	Plain washer	8	Stainless steel	M10
35	Hex head bolt	8	Stainless steel	M10 × 45
36	Plain washer	8	Stainless steel	M10
37	Spring washer	8	Stainless steel	M10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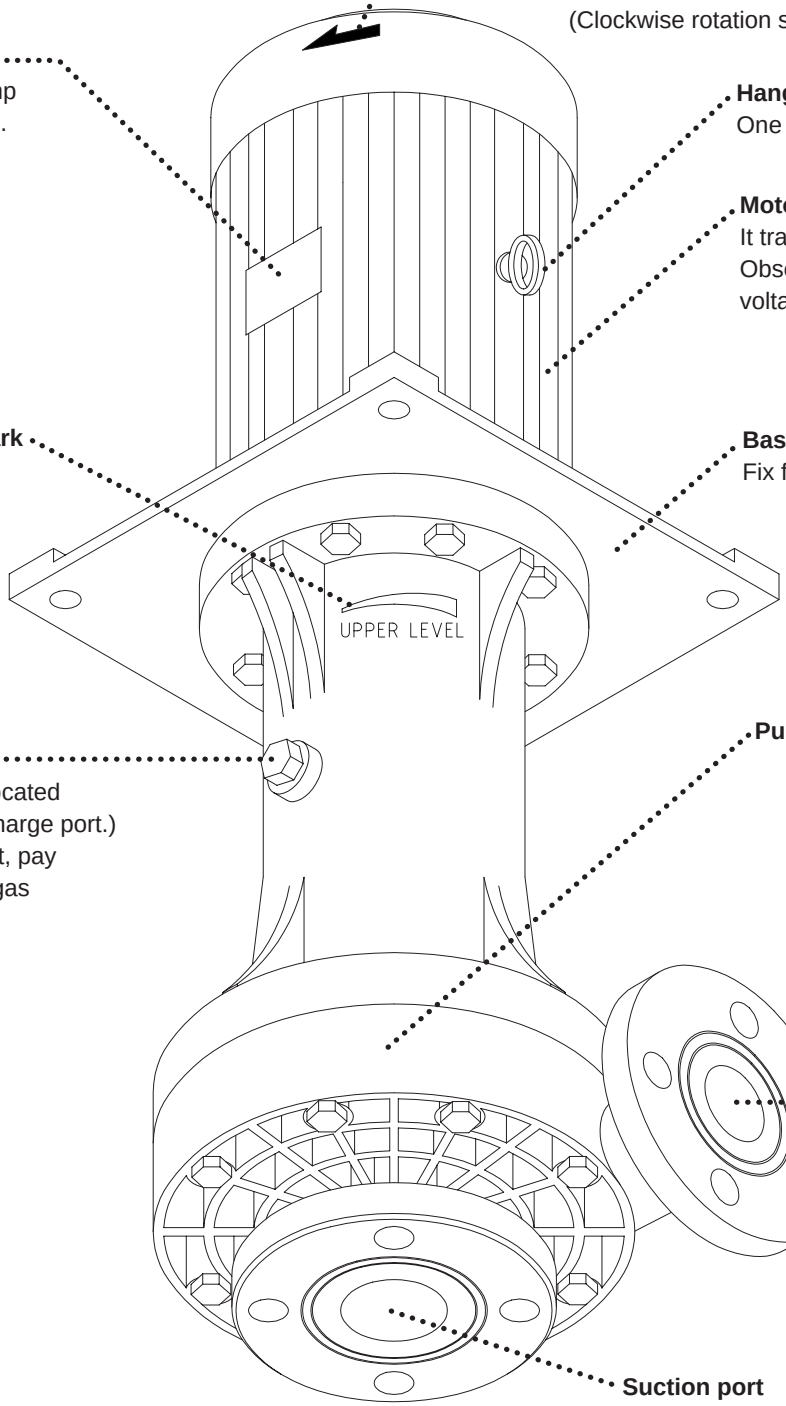
7. Main parts and label



Arrow
It shows direction of rotation of motor. Be sure to rotate motor in the direction of arrow. (Clockwise rotation seen from motor fan)

Nameplate
Specifications of pump and motor are shown.

Hanging bolt
One another at opposite side.

Motor
It transfers power to pump. Observe the power source voltage shown on nameplate.

Max. liquid level mark
Liquid level must be below this mark.

Base flange for mounting
Fix flange to install pump.

Air release bolt
(Actually the bolt is located opposite side to discharge port.) When loosen this bolt, pay attention to liquid or gas spouting out.

Pump body

Discharge port

Suction port

⚠ CAUTION

When cleaning pump, do not to wipe labels or pump body with solvent.

Installation

1. Before use

⚠ Caution

Do not run pump with valve closed or at flow rate below min. permissible flow rate

Do not operate pump with valve closed. If pump continues the operation with valve closed or at discharge capacity below the permissible minimum flow, the liquid temperature in pump increases, which results in deformation of parts and liquid leakage.

Refer to item 4 "Specification" on page 8. Pay special attention to the liquid leakage because it may cause the injury of person.

Keep pump away from fire

To prevent fire and explosions, do not place dangerous or inflammable substances near to pump.

No remodeling

Do not remodel the pump. Otherwise you may be injured or electrically shocked or the pump may be failed.

1.1 Precautions on handling

1) Precautions when pump is started or stopped

a. Pay attention to the liquid level when pump is started or while running. The liquid level exceeding the permissible maximum level may cause liquid leakage thorough motor or liquid getting into the motor. On the contrary, the pump does not discharge liquid normally if the liquid level is below the permissible minimum level. Refer to Example of installation on page 17.

b. Be sure to install a check valve in pump discharge side. If the check valve is not installed, it may happen the liquid leaks from motor or gets into motor because of back flow when pump stops.

c. When pump is started

Before pump is started, be sure to prime it with liquid and close a discharge side valve. After pump is started, gradually open the discharge side valve to come to desired operation point.

d. When you stop pump

Gradually close the discharge side valve and switch off the power for the pump after the valve is fully closed.

Be sure not to keep discharge valve to be closed for more than one minute when pump is started and stopped.

Do not close discharge side valve suddenly by means of solenoid valve or so.

Sudden shut-down of discharge side valve will cause water hammer resulting in pump break down.

2) Do not install or store pump at the following places.

- Place where temperature falls below 0 deg. C.
- Place where exist corrosive gas or explosive gas.
- Place where water is splashed (except the pump equipped with weather-proof motor)
- Place where ambient temperature exceeds 40 deg. C.
- Humid place (Allowable humidity : 35 to 85%RH)
- Place influenced by powder, fire, earthquake and external shock.

3) Prime pump

The pump is not self-priming. Before the pump is started, prime the pump with pumped liquid.

4) Liquids to be transferred

a. Handling of slurry liquid

Slurry liquid can be handled because the pump has no rubbing parts but it may happen that the performance will be reduced due to worn plastic parts after long time operation. If slurry liquid is transferred, install a filter in suction side. In this case pay attention to cavitation phenomenon because of clogged filter or so.

b. Performance influenced by specific gravity and viscosity of liquid

Liquid which is heavier or more viscous than water influences the shaft power, discharge capacity and head. The pump you purchased is made according to the specifications given to us when ordered. If you wish to change the conditions, please contact us.

c. Influence by temperature

Pump performance is not influenced by the change of liquid temperature but the liquid changes its viscosity, vapor pressure and chemical corrosivity according to the change of temperature. Pay attention to the change of characteristics of handled liquid.

Temperature of liquid to be handled : 0 – 75 deg. C (for water)
Permissible ambient temperature : 0 – 40 deg. C
Permissible humidity : 35 – 85% RH

Refer to chemical resistant table for permissible temperature for specific chemical liquids.

5) Intermittent operation

Frequent repeat of pump stop and run may hasten pump damage. Keep the start/stop frequency within six times an hour.

6) Permissible discharge capacity range

Do not use the pump at the flow rate range lower than specified minimum discharge capacity. Use the pump at the range shown by solid line on the standard performance curves.

2. Installation

⚠ Warning

Switch off power

When the works are done, switch off the power. Take care other person not to switch on the power when the works are being done. In a noisy or poor visibility envoronment, display a sign near to the power supply switch to notify that someone is “Working” on the pump.

Do not hold plastics made parts when transferring pump

To transfer the pump, do not hold plastics made parts such as casing, flange or base. Otherwise, plastics parts may be broken and pump may fall resulting in personal injury.

Use lifting bolts

When pump is lifted, be sure to use lifting bolts. Otherwise pump may fall down and may cause pump damage or injury of person.

Electrical works

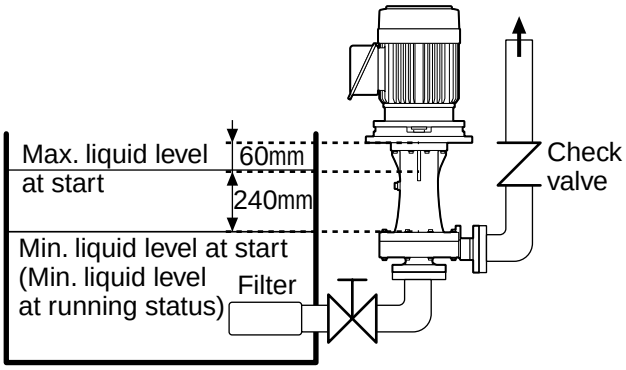
Electrical works should be done by qualified person. Otherwise personal injury or products damage may happen.

2.1 To lift pump

1) Lift the pump with motor upside using two lifting bolts on motor.
2) Use rope or chain which is strong enough to lift the pump/motor.
3) Do not come under the lifted pump to avoid person injury by fell pump.
4) When the pump is taken down, put the pump in horizontal position at flat surface. Do not put it vertically with motor down side.

2.2 Installation

Install the pump correctly referring to the following picture which shows example of standard installation.



Points especially requiring attention to be paid

● When you start the pump, please pay close attention to the liquid level during operation. If the maximum liquid level of proper operation is surpassed, liquid leakage from the motor part or liquid penetration into the motor may occur. Any liquid leakage from the motor part must be especially well monitored since this may lead to personal injury. If the liquid level decreases beneath the minimum liquid level, the pump will not discharge properly (the VT type is not self-priming pump).

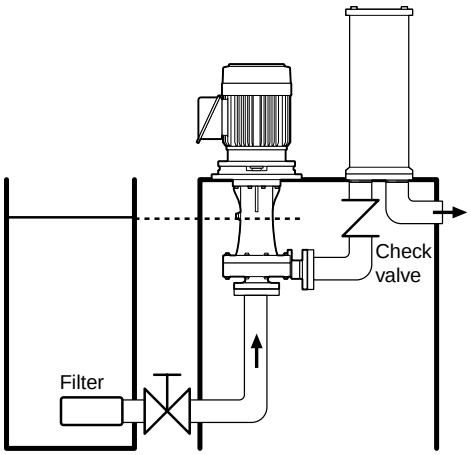
● Please always attach check valve on the discharge side. If check valve fails to be installed, liquid leakage from the motor part or liquid penetration into the motor may occur due to back flow generated by a pump stoppage.

● Take care to avoid discharge valve. Shut-off operation or operation below the minimum flow rate may cause defective discharge due to liquid leakage or air-lock. If this defective discharge condition continues, breakage or liquid leakage may occur due to deformation of a part as a result of liquid temperature rise.

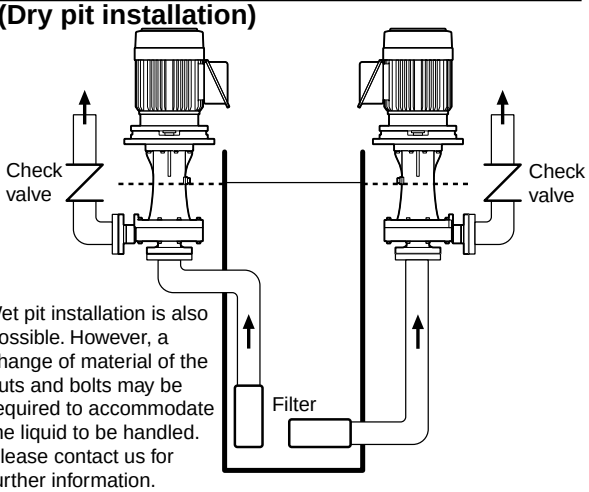
● Using small amounts of slurry will create no damage due to an absence of sliding parts. However, certain performance deterioration may occur due to wear of plastic parts resulting from using the pump in such a way for an extended period. Please install a filter on the suction side where slurry is contained. If you install a filter, please pay attention to whether any cavitation happens due to a clogging filter.

Example of installation

● For filtration

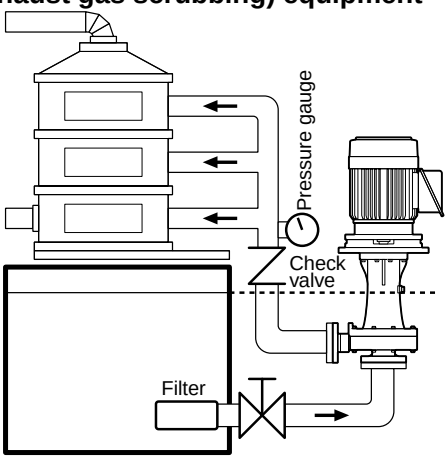


● For chemical solution transportation (Dry pit installation)

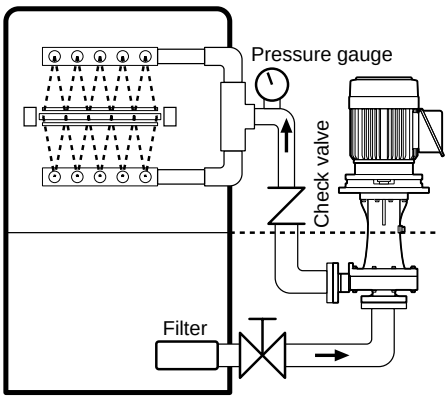


Note: Wet pit installation is also possible. However, a change of material of the nuts and bolts may be required to accommodate the liquid to be handled. Please contact us for further information.

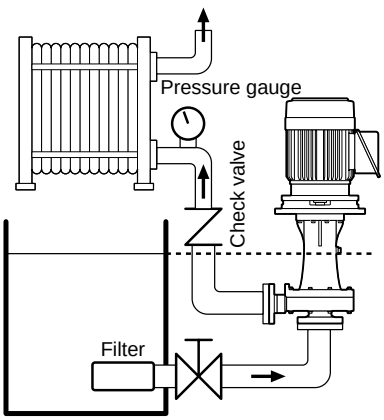
● For circulation of scrubber (Exhaust gas scrubbing) equipment



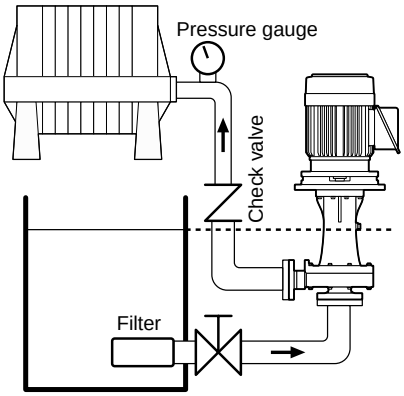
● For spray of etching unit



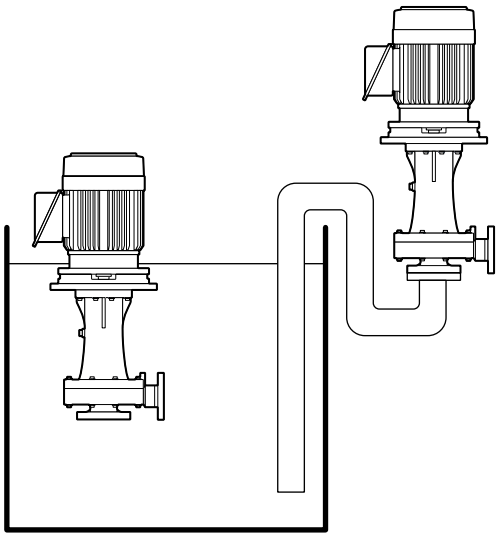
● For circulation of heat exchanger



● For circulation or transportation for reactor tank, mixing tank, filter-press



⚠ Prohibited installation



Do not operate the pump under submerged conditions as shown in below or with double cross formed piping.

1) Installation position

Install pump as close to suction tank as possible. Pay attention to the highest and lowest liquid level which pump accepts.

2) Foundation works

Install pump on the foundation or frame which has enough strength to support the pump. Lack of strength of foundation or frame may cause accident such as fallen pump or damaged piping.

If pump operation is to be subject to vibration (resonation with the piping, for example), provide an expansion joint between the pump and the piping. Otherwise, piping, gauge etc. may be damaged.

3) Indoor and outdoor use

The pump can be operated either indoors or outdoors. However, safety measures should be taken so as not to expose the motor and power distribution unit to flooding or other natural hazards.

4) Installation site

Select an installation site that is flat and free of vibrations caused by nearby machines. Space sufficient for maintenance work should be provided.

3. Piping

3.1 Connection of pipe

Table below shows bolt size and tightening torque to connect pipes to pump flanges.

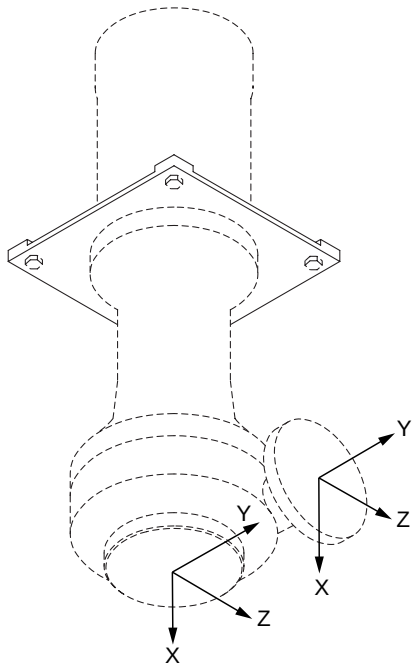
Observe the bolt size and tightening torque. (Figures on the table refer to metal flange and rubber gasket.)

Model	Bolt size	Tightening torque (N·m)
VT-505, 655, 657, 6510	M16	20

3.2 Load of piping and momentum of piping

The permissible stress and moment applicable to pump connection arrangement are as shown below.

The piping should be designed and worked so that stress and moment, higher than those values indicated in the table, should not be applied to the pump.



Permissible pipe load applied to flange

Direction of load	Load kN			
	Discharge flange		Suction flange	
	VT-505	VT-655, 657, 6510	VT-505	VT-655, 657, 6510
Fx	0.10	0.15	0.10	0.15
Fy (Compression/Tensile)	0.15/0.10	0.20/0.10	0.15	0.20
Fz	0.10	0.15	0.15	0.20

Permissible moment applied to flange

Direction of load	Moment kN·m			
	Discharge flange		Suction flange	
	VT-505	VT-655, 657, 6510	VT-505	VT-655, 657, 6510
Mx	0.05	0.10	0.10	0.20
My	0.10	0.20	0.05	0.10
Mz	0.10	0.20	0.10	0.20

3.3 Suction piping

(1) Flooded suction

Flooded suction is recommended. Pay attention to liquid level of suction tank when pump is started, in operation and stopped.

(2) Pipe diameter

Pipe diameter should be larger than pump inlet bore.

(3) Shortest piping

Employ less bends and shortest piping length.

(4) Air pocket in piping

Do not allow any projection in piping where air may be trapped along the suction pipe.

Suction pipe should have an ascending gradient of 1/100 toward the pump.

(5) Different diameter of pipes

If diameter of pump suction port is different from that of suction pipe, use the eccentric reducer pipe. Connect the eccentric reducer pipe so that upper side is level. Residual air may not go out if it is mounted in reverse.

(6) Gate valve in suction side

In case of flooded suction, install gate valve in suction piping. It is needed when the pump is disassembled and inspected.

(7) Piping for flushing

Install pump flushing piping in case that the dangerous liquid will be handled.

(8) In case of suction lift piping (Consult IWAKI if suction lift piping is employed.)

- The end of suction piping should be 1 to 1.5 times of pipe diameter or more away from the bottom of suction tank.
- Install foot valve or check valve in suction piping.

(9) Pipe support

Install the pipe support so that the weight of pipe can not be directly loaded to the pump.

(10) Pipe connection

Pipes must be connected securely so that the air can not be sucked in. If the sealing is not perfect, air is sucked in, which causes pump damage.

3.4 Discharge piping

(1) Pipe diameter

In case the discharge piping is long, the specified performance may not be obtained because of unexpected pipe resistance if the pipe diameter is the same as pump bore. Calculate the pipe resistance in advance to decide proper diameter of pipe.

(2) Gate valve

Install the gate valve in discharge piping to adjust flow rate and to protect motor from over loading. If the check valve is also installed, recommended arrangement is : Pump → Check valve → Gate valve

(3) Pressure gauge

Install a pressure gauge in discharge piping to check the operating conditions such as discharge head etc.

(4) Check valve

Be sure to install a check valve to avoid the liquid leakage from motor or the liquid getting into motor because of flow backwards when pump is stopped.

(5) Air vent

If horizontal discharge piping is longer than 15 to 20 meters, install air vent on the way.

(6) Drain

If the liquid must be drained to protect from freezing, install the drain valve.

(7) Pipe support

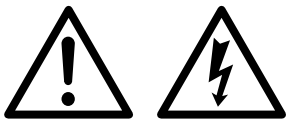
Install the pipe support so that the pipe weight can not be loaded to pump.

(8) Priming piping

Install piping for priming in case of suction lift.

4. Wiring

Electrical connections



ATTENTION

The electrical connection should be carried out by an authorized electrician in accordance with local regulations. Please make sure that the electrical data on the nameplate of the motor correspond to the electricity supply on which it will be used. Motors must be connected to a motor protection switch.

(1) Use an electromagnetic switch that conforms with the specifications (voltage, capacity, etc.) of the pump motor.

(2) If using the pump outdoors, waterproof the wiring to protect the switches from rainwater.

(3) Electromagnetic switches and push buttons should be installed reasonably distant from the pump.

(4) Be sure to use three contacts method star-delta starter to start the pump being equipped with motor if 5.5kW or bigger power.

(5) Do not fold, pull nor pinch by force the power cable or motor lead-wires.

Operation

1. Precautions on operation

⚠ Caution

- Never operate the pump more than 3 minutes with the discharge or suction-side valve closed. Otherwise, the temperature of liquid in the pump will increase abnormally and the pump will be damaged.

- Check the direction of pump rotation. (Clockwise rotation is correct seen from motor fan.) If pump continues to run in reverse rotation, it may be damaged.

- In the event of cavitation, stop the pump within a minute.
  In addition, do not continue pump operation with the air mixed into the suction side.

- The temperature change should not exceed 75 deg. C through starting, stopping, and operating the pump.

- In the event of a service power failure, turn off the power switch immediately.

- Maximum pump surface temperature
  The max. pump surface temperature of each model is shown in the table. Arrange protective measures in accordance with the temperature levels.

Model	Liquid temp (deg. C)	Maximum surface temperature when ambient temperature is at 40 deg. C. (deg. C)
VT-505, 655, 657, 6510	75	70

- Sound generated by pump
  The level of sound generated by each type of pump is shown in the table. Arrange a muffling measures in accordance with the sound level.

Model	VT-505, 655	VT-657, 6510
Sound Level	80 dB	85 dB

2. Operation

2.1 Starting pump

1. Fully close discharge valve and fully open suction valve.
2. Fill liquid into pump
   - In case of flooded suction, confirm if suction valve is fully opened.
   - In case of suction lift, prime to fill liquid into suction piping.
3. Check rotating direction of motor.
   - Start motor momentarily (within a second) to check direction. Direction is shown on "arrow" mark on pump. (Clockwise seen from motor fan side)
   - Also check if motor fan smoothly stops when switched off. If it does not stop smoothly, pump rotating parts may be locked. Check the rotating parts.
4. Air vent operation
   - Before pump full operation, vent the air in the pump.
   - Fully open the valve in air vent piping and repeat one second running for three to five times.
   - After the air vent running, fully close the discharge valve.

   Note 1) In case air vent piping is not equipped, open the discharge valve to repeat momentary run several times.

   Note 2) If air do not go out by the momentary run as said above, release air by loosening air release bolt No. 10. In this case pay attention to liquid or gas spouting out.
5. Starting pump
   - Start pump with discharge valve fully closed. (Maximum one minute)
   - Confirm that discharge pressure rises to shut-down pressure.
   - Gradually open discharge valve to get specified pressure (capacity).

   Note: Pay attention to over-load caused by excessively opened valve.

Precautions on operation

1. Pump may be failed if it continues to run in reverse rotation.
2. Do not run pump more than one minute with discharge valve fully closed.
3. Keep minimum permissible discharge capacity. Otherwise the trouble such as liquid leakage from motor may happen.

Permissible minimum discharge capacity: 150 L/min. for VT-505
200 L/min. for VT,655, 657, 6510

2.2 Stopping pump

1. Slowly close the discharge valve

   Quick closing of valve may cause water hammer and pump damage. Close slowly discharge valve. Stop pump within a minute after the valve is closed.
2. Switch off and stop the pump

   Confirm if pump stops smoothly. If pump stops suddenly and not smoothly, inspection is needed.

Precautions when pump is stopped for a long time.

When the pump is stopped for a long period, anti freezing measure must be taken so that the liquid can not be frozen in the pump or piping. When the pump is stopped because of power failure or so, switch off power and close discharge valve.

If pumped liquid is volatile, it may happen that gas stays in pipe and pump while pump is stopped, which may cause failed pumping when pump is started again. When volatile liquid is pumped, be sure to release air every time when pump is started again. Refer to above item "2.1.4 Air vent operation" on page 25.

Maintenance

1. Troubleshooting

In the case of trouble, turn off the power supply immediately and refer to this table.

Trouble	Phenomenon seen on pump	Cause	Inspection & countermeasure
Liquid can not be sucked in	Pressure, vacuum gauges show zero.	● Lack of priming liquid. ● Dry running ● Bleeding pump is not enough.	○ Stop pump to supply enough priming liquid. ○ Open air release bolt to release air.
	Priming liquid goes down quickly.	● Foreign matters clog foot valve.	○ Clean foot valve.
	Pressure goes down when discharge valve is opened after pump starts.	● Air is sucked in through end of suction pipe or through gasket.	○ Make liquid level of suction tank suitable. ○ Check seals in suction piping.
	Pointers of pressure and vacuum gauges vibrates and go down to zero.	● Air pocket is generated in discharge piping.	○ Check air pocket in discharge piping.
	Pointer of pressure gauge always stays low.	● Too low pump speed. ● Reverse rotation.	○ Check wiring or motor. ○ Exchange wire connection.
Too low discharge capacity.	Pointers of pressure gauge and vacuum gauge are normal but vacuum of vacuum gauge is too high.	● Foreign matters clog filter and liquid path.	○ Remove foreign matters in filter.
	Vacuum is extremely high.	● Air pocket in suction pipe.	○ Check air pocket in suction piping.
		● Impeller inlet is clogged by foreign matters.	○ Disassemble pump and remove foreign matters.
	Pointers of pressure gauge and vacuum gauge vibrate.	● Air is sucked in through suction pipe or gasket. ● Pump discharge side is clogged by foreign matters.	○ Check connected part of suction pipes and tighten. ○ Disassemble pump and remove foreign matters.
	Vacuum gauge shows high but pressure gauge shows normal.	● Air pocket in suction pipe or other resistant factor exists.	○ Check if there is no projected part in suction pipe.
	Pressure is high but vacuum is normal.	● Too high actual head or too large pipe resistance.	○ Check actual head and pipe loss and take countermeasure.
	Both pointers of pressure and vacuum gauges show low values.	● Reverse rotation of motor.	○ Exchange wire connection

Trouble	Phenomenon seen on pump	Cause	Inspection & countermeasure
Motor overheated		● Voltage dropped.	○ Confirm voltage & frequency.
		● Overloaded	○ Check specific gravity & viscosity of liquid.
		● Too high ambient temp.	○ Ventilate.
Discharge capacity drops quickly.	Vacuum gauge pointer shows high. Pressure gauge pointer shows normal.	● Suction pipe is clogged by foreign matters. ● Filter is clogged by foreign matters. ● Worn impeller, casing.	○ Remove foreign matters. ○ Remove foreign matters from filter. ○ Replace parts.
Pump vibrates.		● Insufficient foundation or mounting frame. ● Loosened mounting bolts. ● Insufficient support of pipe. ● Cavitation ● Air is sucked in. ● Worn or broken motor bearing.	○ Re-install the pump. ○ Tighten bolts. ○ Improve support. ○ Remove cause of cavitation. ○ Make liquid level of suction tank suitable height. ○ Replace motor bearing or motor.

2. Maintenance and inspection

⚠ Warning

Wear protectors

Hazardous liquids such as chemical liquids may harm your eyes or skin if you touch them directly or they are splashed. When you do maintenance or inspection works, wear protectors (mask, goggles, gloves etc.).

Turn off power

To avoid electrical shock, switch off the power to stop pump and equipment when works are done.

2.1 Daily inspection

(1) Check to be sure there is no liquid leakage in the pump before operating it. If leakage is found, never try to operate the pump.

(2) Check whether the pump operates smoothly without generating any abnormal noise or vibration.

(3) Check the level of the liquid in the suction tank and the suction pressure.

(4) Compare the discharge pressure and electric current measured during operation with the values indicated on the motor nameplate to confirm if pump is loaded normally.

* Note that the values indicated on the pressure gauge is in proportion to the specific gravity of the liquid. The cock of the pressure gauge or vacuum gauge must be opened only when measurement is carried out. It must be closed upon the completion of each measurement. If the cock remains open during pump operation, the pressure gauge may be broken if abnormal pressure is applied by water hammer action or so.

(5) If a spare pump is prepared, operate it from time to time to keep it ready for use any time.

(6) Check to be sure the discharge pressure, discharge flow rate, and motor power supply voltage do not fluctuate during pump operation. If considerable fluctuation of the respective values occurs, refer to "Troubleshooting" on page 27 for correct measures.

2.2 Periodic inspection

To ensure efficient and smooth operation of the pump, carry out periodic inspections by following the procedures described below. When the pump is disassemble, handle plastics parts, rubber parts and ceramic parts with care not to damage them.

Time to be Inspected	Parts name	Inspection items	Countermeasures
Once every six months (Keep inspection record.)	Front casing	● Dirt on wet-end ● Crack ● Deformation, wear ● Trace front casing touched impeller ● Scratch on sealing surface of O ring	○ Clean ○ Replace if abnormality is found. ○ Consult dealer if reason is unknown.
	Rear plate	● Dirt on wet-end ● Crack ● Deformation, wear ● Trace rear plate touched impeller ● Scratch on sealing surface of O ring	○ Clean ○ Replace if abnormality is found. ○ Consult dealer if reason is unknown.
	Impeller	● Dirt, clogging of impeller inside ● Crack ● Deformation, wear ● Abnormal contact	○ Clean ○ Replace if abnormality is found. ○ Consult dealer if reason is unknown.
	Dry seal	● Dirt ● Wear, break-down ● Hardening, discoloration	○ Clean ○ Replace if abnormality is found. ○ Consult dealer if reason is unknown.
	Dry seal ring	● Dirt ● Scratch, crack	○ Clean ○ Replace if abnormality is found. ○ Consult dealer if reason is unknown.
	Shaft sleeve	● Dirt	○ Clean
	Dry seal holder	● Dirt ● Scratch, crack	○ Clean ○ Replace if abnormality is found. ○ Consult dealer if reason is unknown.
	Pump body	● Dirt on wet-end ● Crack ● Deformation, wear ● Scratch on sealing surface of O ring	○ Clean ○ Replace if abnormality is found. ○ Consult dealer if reason is unknown.
	Motor	● Scratch on pump shaft ● Rust on pump shaft ● Rotation of pump shaft (It should rotate smoothly without vibration .)	○ Consult dealer if abnormality is found.

3. Spare parts

Appropriate spare parts are necessary to ensure long, continuous operation of the pump. It is recommended that consumable parts be kept at hand constantly. When placing an order, supply the following information.

① Name of part and part number (in accordance with the drawings in this instruction manual)
② Pump model number and manufacturing number (as indicated on the pump nameplate)
③ Drawing number if you have the approved drawing

4. Disassembling and assembling

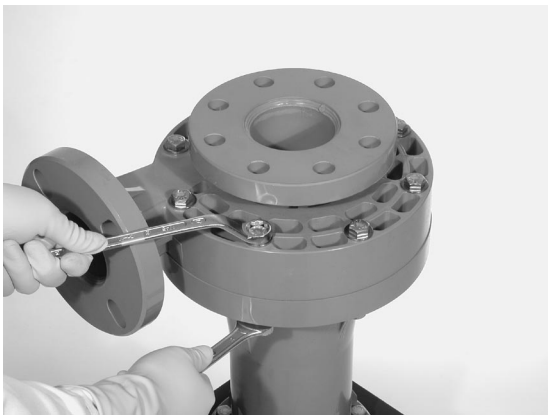
⚠ Warning

Wear protectors
Hazardous liquids such as chemical liquids may harm your eyes or skin if you touch them directly or they are splashed. When you do the works, wear protectors (mask, goggles, gloves etc.).

Turn off power
To avoid electrical shock, switch off the power to stop pump and equipment when works are done.

Precautions when disassembling and assembling pump

* When power wires to motor are removed, mark on each wire so that each wire can be identified and connected correctly not to rotate in reverse when they are connected again.
* Do not disassemble the pump beyond the extent shown on this manual.
* Fully close suction and discharge sides valves before the works are done and clean pump inside.
* Disassembling and assembling works must be done at the place where is enough large to do the works and place where the pump can be put stably.
* You can do the works easily if the pump is put vertically with motor down. Pay attention not to be injured by the pump fallen down.



4.1 Disassembling

Refer to drawing and picture on page 10 and 11.

1. Removal of front casing (1)

   Remove hex. bolt (30) and nut (32) which fix front casing (1) to remove front casing (1) from pump body (2).

   Tool to be used : Two 17mm wrenches

2. Removal of impeller (4)

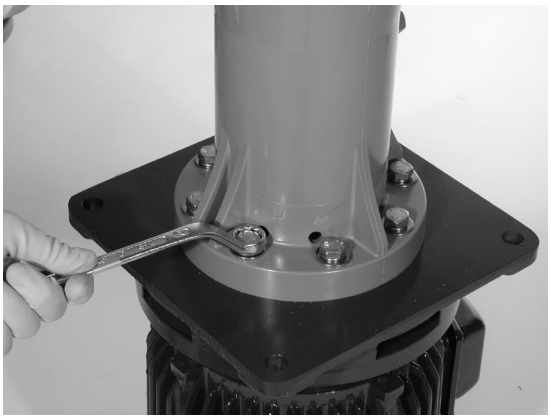
   1) Fix impeller (4) with belt wrench and remove impeller nut (9).

      Tool to be used : Belt wrench, 26mm wrench

   2) Hold periphery of impeller (4) and pull impeller (4) out.

3. Removal of rear plate (3)

   Hold periphery of rear plate (3) and remove the rear plate (3) from pump body (2).



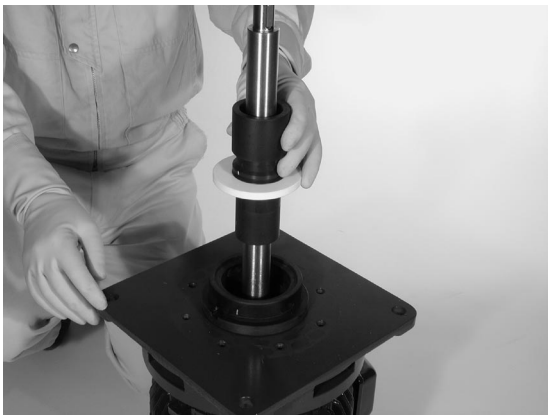
4. Removal of pump body (2)

1) Remove hex. bolt (35) which fix pump body (2).
Tool to be used : 17mm offset wrench

2) Hold flange part of pump body (2) and remove pump body (2) from motor (18).

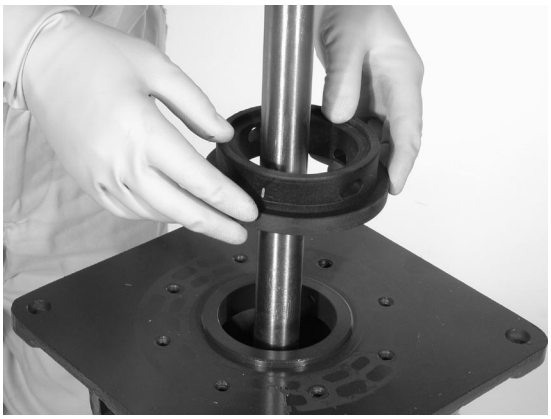
5. Disassembling of dry seal

1) Unscrew hex. socket set screw (21) which fix shaft sleeve (5) to motor shaft (19).
Tool to be used : 3mm hex. wrench



2) Remove shaft sleeve (5) from motor shaft (19).
Dry seal (6) and dry seal ring (7) come out together.

Note: Shaft sleeve (5), dry seal (6) and dry seal ring (7) are unified and can not be separated.



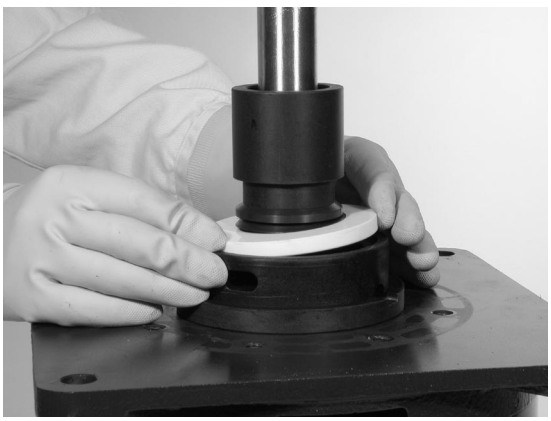
6. Removal of dry seal holder
   Hold periphery of dry seal holder (8) and remove it from motor (18).

4.2 Assembling

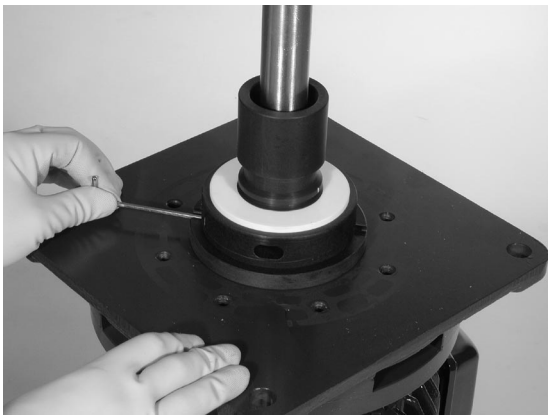
Do the assembling in the reverse manner to disassembling.

1. Mount dry seal holder (8) on motor (18).

2. Insert shaft sleeve (5) (with dry seal (6) and dry seal ring (7)) into pump shaft (19) and push it to the bottom end.
   Pay attention that the dry seal ring (7) must be parallel with dry seal holder (8). Refer to picture.



If the pump is assembled with dry seal ring (7) not parallel to dry seal holder, it may be broken. Refer to picture.

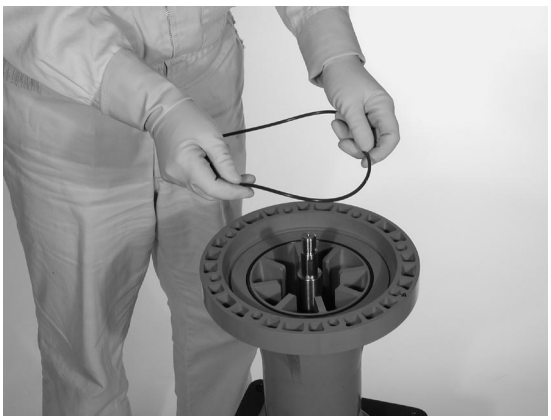


3. Fix shaft sleeve (5) by screwing hex. socket set screw (21) through the U shaped hole of periphery of dry seal holder (8). Shaft sleeve (5) must be fixed at the bottom end of pump shaft (19). Refer to picture.

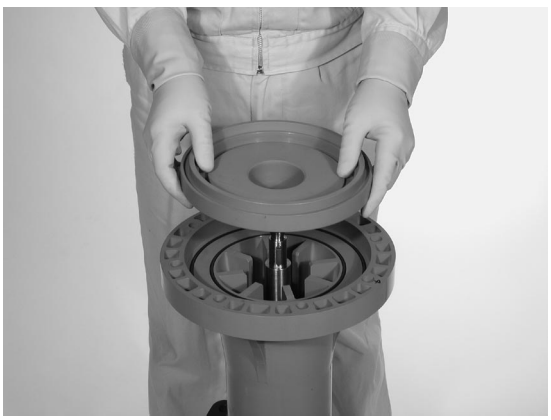
4. Mount O ring (15) on motor mounting side (small flange side) of pump body (2) and mount pump body (2) on motor (18).

   Note: Pay attention for O ring (15) not to be forgotten to be mounted or to fall down.

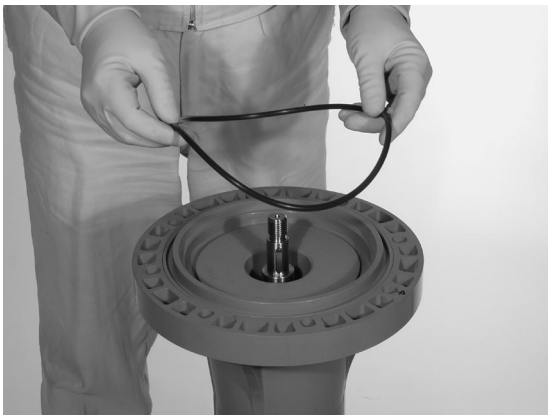
   Mount hex. bolts (35) evenly and diagonally.
   Tightening torque is 14.7 N·m.
   Tool to be used : 17mm offset wrench



5. Put two O rings (12) and (13) on two grooves of large flange side of pump body (2). Refer to picture.



Confirm the O rings (12) and (13) are securely put on grooves and mount rear plate (3) on pump body (2). Refer to picture.

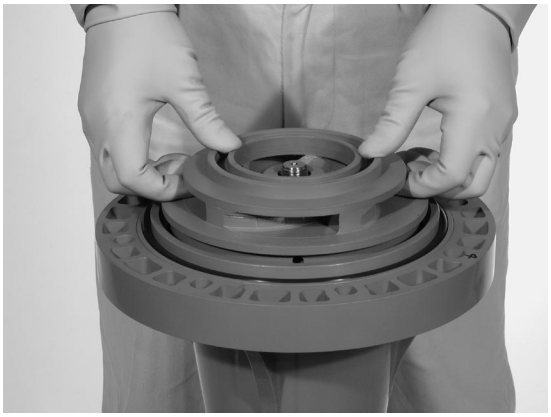


6. Mount O ring (11) on groove of periphery of rear plate (3).

7. Apply fluor resin grease to the end till 30mm of pipe of impeller (4). Refer to picture.

Note: Fluor resin grease is applied so that impeller (4) can easily get into shaft sleeve (5). If fluor grease is not available, neutral soap water can be used in place.

Insert impeller (4) into pump shaft (19). Refer to picture.



Put pump shaft key (20) and key groove of impeller (4) together and push impeller to the bottom end. Refer to picture.

8. Mount O ring (16) on impeller nut (9). Refer to picture.

Hold impeller with belt wrench and screw impelle nut (9) in the threads of pump shaft end. Refer to picture.

Tightening torque of impeller nut (9) is 11.7N·m.

Tool to be used : Belt wrench, 26mm wrench

9. Mount front casing (1) to pump body (2).

Tighten front casing mounting hex. bolt (30) and hex. nut (35) diagonally and evenly.

Tightening torque of bolt is 14.7 N·m.

Normally discharge port of front casing is oriented to opposite side of terminal box of motor.

Tool to be used : Two 17mm wrenches

IWAKI PUMPS

( )Country codes

IWAKI CO.,LTD. 6-6 Kanda-Sudacho 2-chome Chiyoda-ku Tokyo 101-8558 Japan
TEL:(81)3 3254 2935 FAX:3 3252 8892(http://www.iwaki-pumps.co.jp/)

Singapore	: IWAKI Singapore Pte. Ltd.	TEL : (65)763 2744	FAX : 763 2372	Germany	: IWAKI EUROPE GmbH	TEL : (49)2154 9254 0	FAX : 2154 1028
Indonesia	: IWAKI Singapore (Indonesia Branch)	TEL : (62)21 690 6607	FAX : 21 690 6612	Italy	: IWAKI Italia S.R.L.	TEL : (39)02 990 3931	FAX : 02 990 42888
Malaysia	: IWAKIm Sdn. Bhd.	TEL : (60)3 7803 8807	FAX : 3 7803 4800	Denmark	: IWAKI Pumper A/S	TEL : (45)48 24 2345	FAX : 48 24 2346
Taiwan	: IWAKI Pumps Taiwan Co., Ltd.	TEL : (886)2 8227 6900	FAX : 2 8227 6818	Sweden	: IWAKI Sverige AB	TEL : (46)8 511 72900	FAX : 8 511 72922
Thailand	: IWAKI (Thailand) Co.,Ltd.	TEL : (66)2 320 1303	FAX : 2 322 2477	Finland	: IWAKI Suomi Oy	TEL : (358)9 2742714	FAX : 9 2742715
Hong Kong	: IWAKI Pumps Co., Ltd.	TEL : (852)2 607 1168	FAX : 2 607 1000	Norway	: IWAKI Norge AS	TEL : (47)66 81 16 60	FAX : 66 81 16 61
China	: IWAKI Pumps Co., Ltd. (Guangzhou office)	TEL : (86)20 8130 0605	FAX : 20 8130 0601	France	: IWAKI France S.A.	TEL : (33)1 69 63 33 70	FAX : 1 64 49 92 73
China	: IWAKI Pumps Co., Ltd. (Beijing office)	TEL : (86)10 6442 7713	FAX : 10 6442 7712	U.K.	: IWAKI PUMPS (UK) LTD.	TEL : (44)1743 231363	FAX : 1743 366507
China	: IWAKI Pumps (Shanghai) Co., Ltd.	TEL : (86)21 6272 7502	FAX : 21 6272 6929	Switzerland	: IWAKI (Schweiz) AG	TEL : (41)32 3235024	FAX : 32 3226084
Philippines	: IWAKI Chemical Pumps Philippines, Inc.	TEL : (63)2 888 0245	FAX : 2 843 3096	Austria	: IWAKI (Austria) GmbH	TEL : (43)2236 33469	FAX : 2236 33469
Korea	: IWAKI Korea Co.,Ltd.	TEL : (82)2 3474 0523	FAX : 2 3474 0221	Holland	: IWAKI Holland B.V.	TEL : (31)297 241121	FAX : 297 273902
U.S.A.	: IWAKI WALCHEM Corporation	TEL : (1)508 429 1440	FAX : 508 429 1386	Spain	: IWAKI Iberica Pumps, S.A.	TEL : (34)943 630030	FAX : 943 628799
Australia	: IWAKI Pumps Australia Pty. Ltd.	TEL : (61)2 9899 2411	FAX : 2 9899 2421	Belgium	: IWAKI Belgium n.v.	TEL : (32)1430 7007	FAX : 1430 7008

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