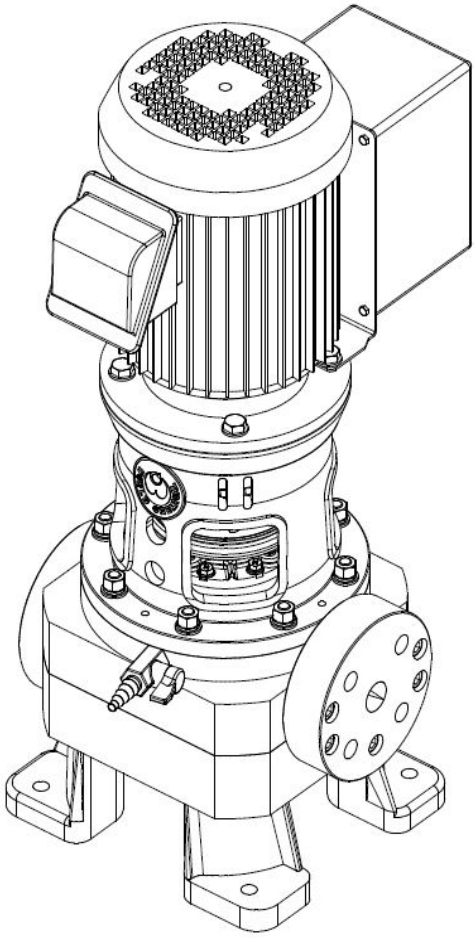
Corrosive-resistant Vertical Linear seal pump

SLURRY Pump

YD-LRN series

INSTRUCTION MANUAL

Version: 241120



World Chemical Co.,Ltd.

Preface

Thank you very much for purchasing our corrosive-resistant vertical pump, “Slurry pump”. Please read this manual thoroughly for using the pump safety and efficiently for a long time.
Store this manual where it can be easily accessed.

Table of contents

Check when receiving the pump

Check the followings when purchasing a pump.

1. The model, total head, capacity, motor performance and voltage specification on the pump and motor nameplates are the same as the order.
2. There are all accessories.
3. There is no damage during transportation.

If you have any questions, ask your supplier.

Safety precaution (To be observed at all times)

The following procedures are intended to protect you from personal injury and/or property damage.

- The following symbols classify the degree of danger and explain the damages that could occur when its contents are ignored or the pump is used improperly.

⚠ **Warning**	Non-compliance can lead to fatal or serious injury.
⚠ **Caution**	Non-compliance can lead to some injury and/or property damage.

- Safety rules to be observed are classified and explained under the following symbols. (The following are examples of picture displays)

⚠	This symbol cautions people to be careful.
⊘	This symbol signifies that this action must not be taken.
❗	This symbol indicates that the action must be taken.

⚠ WARNING

(1) Dangerous liquids and surroundings.
When using the pump for dangerous liquids or in surroundings (only explosion prevention specifications), adhere to facility standards determined by law and conduct daily check to prevent leakage. If operate the pump under abnormal conditions, such as liquid leakage, it may cause serious accidents such as explosion or fire and personal injury. Regarding handing liquid, follow the liquid manufacturer.

(2) Do not use damaged or modified pumps.
Using the damaged or modified pumps may cause fatal accident, electric shock or pump damage. It is not covered by our warranty.

(3) Caution when transporting or lifting the pump.
Always use the hoist belt for pumps that come with them. When pumps do not have hoist belts, lift them with bolt slings while watching the weight balance. It should be performed by qualified personnel with enough strong slings. The lightest pumps' weight is around 16kg (35 lbs.), and do not carry the by hands as much as possible.

(4) Do not operate pumps with power on.
Do not inspect or dismantle pumps or motors with the power on. It may lead to personal injuries such as electric shock or getting caught in the rotor. Operate it with multiple safety devices such as the switch for main power supply, the operation switch, and the hand switch for the pump.

(5) Connecting earth cable.
If using the pump without connecting earth cable to the motor, it may cause electric shock. Connect it by qualified personnel under the electric facility technical standards and interior wiring regulations.

(6) Protect power supply cord.
Over-stretching, pinching and damaging power supply cords or motor lead wires may cause fire or electric shock to damage it. Place the terminal box cover at the original position.

(7) Install Current Leak Circuit Breaker.
The operation without a current leak circuit breaker may cause electric shock. Install it or an over current protection device to prevent electric accidents or pumps damage.

(8) Caution when removing pump.
When removing the pump from piping, make sure to close valves on the suction/discharge piping and check no liquid leakage. Direct contact with liquid may be harmful and wear protective gear when performing operation.

⚠ CAUTION

(1) Unspecified use.
Do not use pumps for purposes other than specification in the spec sheet or the nameplate. Especially, check the motor specification (phase, voltage and frequency). Unspecified use may cause personal injuries, the pump or peripheral equipment damage.

(2) Restrictions of operator.
Transportation, installation, wiring, operation, servicing, and inspection should be performed by qualified personnel who have full knowledge on the handling the pump.

(3) Caution when opening package.
Open the package after checking upside down of the product. When opening a wooden crate, be careful of nails and silvers to get the product out without hurting you.

(4) Ventilation.
Do not place objects around the pump that might obstruct ventilation as the motor heats up. In handling toxic or odorous liquids, have the pump situated in a well-ventilated place to prevent poisoning.

(5) Repairs and returning the pump.
When repairing the damaged pump, contact your supplier. If sending the pump back by express, wash the interior and exterior with fresh water and check it without liquid. Then, wrap with a vinyl bag and pack it.

(6) Plastic (resin) parts.
The pump is made of resin and it may cause fatal accident for strong impact. Do not hit and get on top of the pump. Also attach piping supports not to apply any pipe load to the pump.

(7) Pump starting.
Check the direction of rotation at the starting up of the pump. In this time, open the suction and discharge valves and check no liquid leakage from the pipe connection. After exhausting air and filling the pump with liquid, check the direction of rotation by switching quickly. If the rotation is in reverse, switch two of the three phases in the three-phase power supply to change the direction of rotation. Make sure to power off before wiring it.

(8) Disposing of scrapped pump.
When disposing scrapped pumps, remove adherent liquid and discard it as industrial waste in law.

(9) Outflow protection.
Just in case liquid leaks to break the pump or pipes, take appropriate preventative measures.

Model description

Example:

YD – 40 05 LRN 3 – PP – L D – 5 2

(1) (2) (3) (4) (5) (6) (7) (8) (9)

(1) Discharge bore Diameter
- 25 : 25**LRN3
- 40 : 40**LRN3

(2) Motor output
- 01 : 0.75kW
- 02 : 1.5kW
- 03 : 2.2kW
- 05 : 3.7kW
- 07 : 5.5kW

(3) Pump model
- LRN3 : Slurry pump

(4) Motor type
- 3 : IE3 motor
- 1 : Other than IE3 motor and without motor

(5) Main Material
- PP : Polypropylene (PP)
- PE : PP (Casing, Suction/Discharge flange) +
  : Ultrahigh molecular weight polyethylene (Back casing, Impeller, Impeller nut)
- * Common parts material: Chloroethene (Linear seal flange, Shaft sleeve)

(6) Seal type
- L : Linear seal

(7) O-ring material
- E : EPDM
- D : FPM

(8) Frequency
- 5 : 50Hz
- 6 : 60Hz

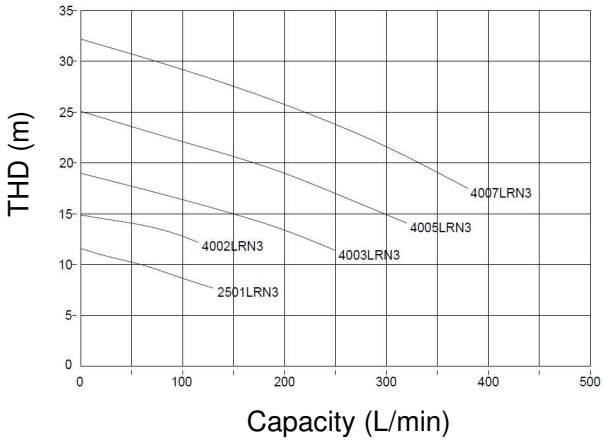
(9) Max. specific gravity
- 2 : 1.2

Performance

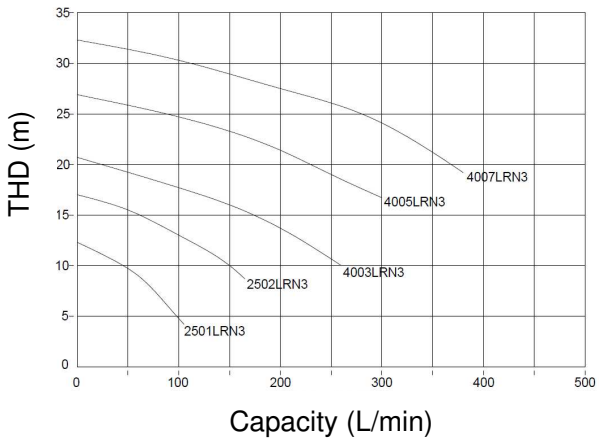
Model		2501LRN3	2502LRN3	4002LRN3	4003LRN3	4005LRN3	4007LRN3
Bore (Suc. x Dis.)		40A x 25A		50A x 40A			
Motor output (kW)		0.75	1.5		2.2	3.7	5.5
Std. performance (m-L/min)	50Hz	10-60	-	13-100	15-150	17-250	25-220
	60Hz	9-60	13-100	-	16-150	19-250	25-280
Weight (kg)		34	40	47	51	63	86
Range of temp. to use		-PP: 0 – 60 degrees, -PE: 0-50 degrees					

*Note that if the operating environment temperature drops below 0 degree, the diaphragm (rubber) becomes harden and the linear seal does not open properly, which may cause malfunction.

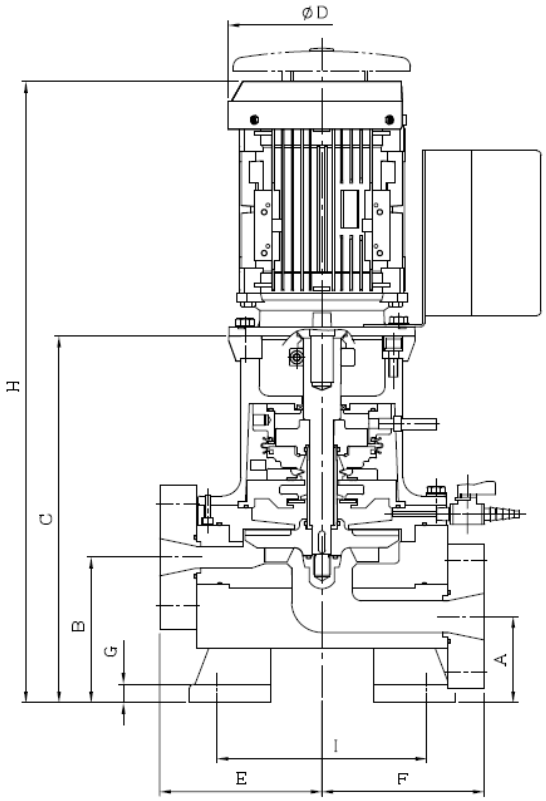
Performance (50Hz)



Performance (60Hz)



Outline dimension



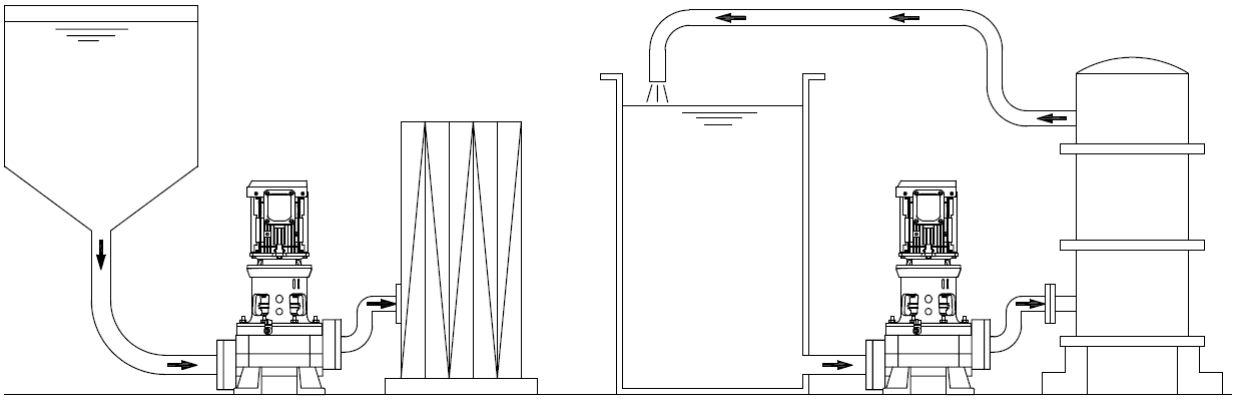
(mm)

Model	A	B	C	D	E	F	G	H	I
YD-2501LRN3	115.5	168	397	Φ172	156	156	20	632.5	215
YD-2502LRN3	115.5	168	397	Φ202	156	156	20	670	215
YD-4002LRN3	92.5	156	388.5	Φ202	174	174	20	661.5	225
YD-4003LRN3	92.5	156	388.5	Φ202	174	174	20	690.5	225
YD-4005LRN3	92.5	156	388.5	Φ243	174	174	20	714.5	225
YD-4007LRN3	92.5	156	388.5	Φ285	174	174	20	809	225

Precaution for installation / piping

Installing the pump and piping properly makes a pump deliver prescribed performance.
Improper piping may lead the pump damage, so install the pump adequately.

【Example to use】

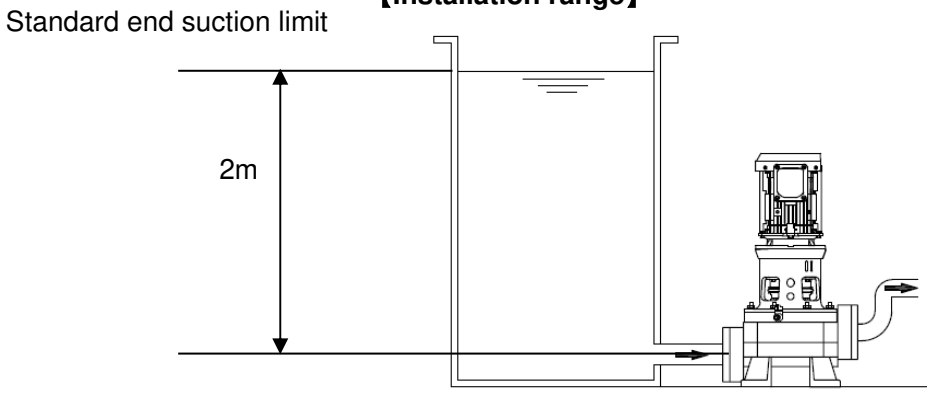


1. Installation place/position

- The installation place is near the tank as much as possible and the liquid level is in the installation range. (End suction method).

Standard end suction limit: The height from the pump base to the liquid level in the tank is 2m or less.
Caution: Consult us if it is 2m and more.

【Installation range】



- Check that the environment meets the pump (motor) performance. Take safety measures not to adversely affect the motor and wiring under the condition such as wet or hot and humid.

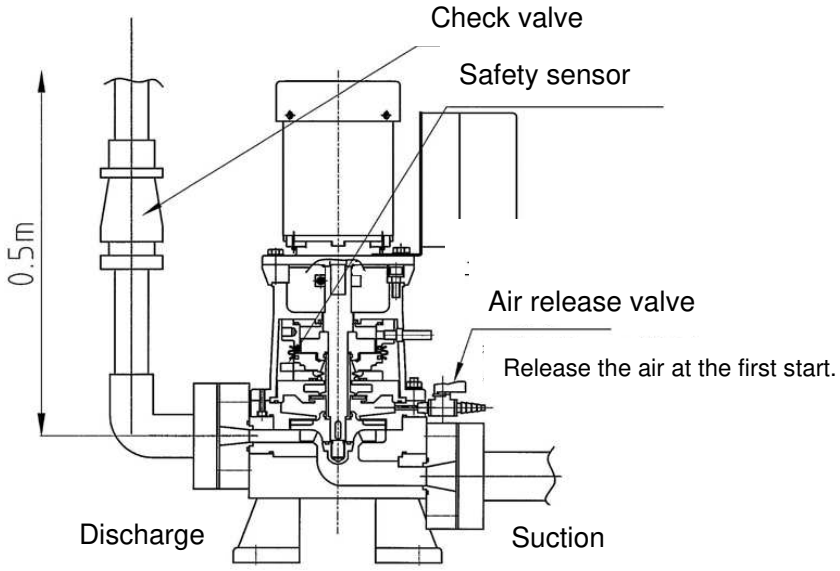
- Install and fix the pump vertically on a level surface where there is no influence of other machine's vibration. Make sufficient space around the pump for maintenance or not to block the motor fan cool. Securely fix the pump stand not to generate vibration.

- Do not install two and more pumps in series.
  Also do not operate two and more pumps connected in parallel at once. If installing spare pumps in parallel, install valves at each pump's suction and discharge side and open only the valve which is at the side of the pump to use when using.

2. Piping instructions

- The suction pipe employs the end suction method, short and less bending.
- Do not allow areas where air is trapped in the suction pipe. It may cause an airlock (dry running).
- When a screen such as a strainer is installed at the suction inlet, periodically clean the screen. If it is clogged, it causes the pump's performance and function failure.
- Be the same the discharge pipe's diameter and the pump's discharge bore diameter. Place a rising pipe of 0.5m and more. If the discharge pipe is horizontally installed without a rising pipe, air in the chamber is hardly released and it causes the pump failure for linear seal malfunction.
- When air remains in the pump chamber due to air suction, dry running or replacement of liquid, using air release valve prevents the pump damage for air remaining. Use the air release valve immediately after deadhead operation or dry running before starting operation.
- It is recommended to install a check valve to prevent the pump damage by "water hammer".
  ※ "Water hammer" may occur when the discharge pipe is long and/or the head is 10m and more.
  ※ When a check valve is installed, make sure to install an air release valve. When replacing liquid in a tank, release the air remaining in the pipe.

【Example of installation】



- Place pipe supports for the suction and discharge pipes to prevent the piping load or thermal stress to the pump.
- Install valves with low pressure loss at the suction/discharge pipes for maintenance.
- If the pipes are long or narrow against the capacity, pipe resistance is increased and the specified performance may not be obtained. Use appropriate pipes under the consideration of the resistance.
- When transferring high-temperature liquid, the suction performance declines due to high saturated vapor pressure. It is recommended to make the suction pipe diameter larger, pipes shorter as much as possible and minimize the bends to prevent cavitation.
- Instructions for tightening pipes
  Use M16 x 45 bolts to connect suction/discharge flanges of the pump and tighten them evenly with a tightening torque of 120kgf·cm (11.8N・m).

3. ⚠ Wiring

Qualified personnel (authorized worker) handle electrical wiring and power source setup. We are not responsible for personal injury and equipment damage caused by improper wiring/power source setup done by unqualified personnel. If necessary, contact your supplier. Be subject the electric codes.

- Use an electromagnetic switch which is suitable for the pump's motor (voltage, capacity, etc.)
- When wiring the pump outside, keep out rainwater or moisture into the switches.
- Place the electromagnetic switch and push button at a reasonable distance from the pump.

■ Operating precautions ⚠

1. Caution

- At the time a pump is controlled by an inverter other than what has a protection device.
  A linear seal is installed in the pump and it seals by rotating the pump bearing (motor). If the rotation (frequency) is low, it causes the linear seal failure. Therefore, even if the frequency is controlled, do not set that **40Hz or lower (rotation speed: 240rpm or less)**. If the pump is operated with the figure or less, the linear seal does not work and it leads to the pump damage.
  Set the acceleration / deceleration time of the inverter at the time of start-up / shutdown to the minimum value (about 0.5 second).
  If the acceleration/deceleration time is long, liquid may leak from the linear seal due to improper operation of the linear seal.
  Caution: The control circuit for the pump with a protection device is not compatible with an inverter. Therefore, connect the inverter to a separate power source that interlocks with on/off operations of the pump (do not connect the pump via the inverter).

- **If the pump is operated with an inverter, the front/rear blade of the impeller balance changes by slower the rotation, liquid leakage may happen during operation. In this case, adjust the rotation speed of the motor until the liquid stops leaking**.
- The operation with closed suction valve makes the inside vacuum state and the pump damage.
- If cavitation (vibration or abnormal noise) occurs, stop the pump immediately.
- Release air because the operation with air entered causes air lock. Increasing liquid temperature by liquid sealed also causes the pump failure.
- The long operation with closed discharge valve makes the inside liquid temperature increase and causes the pump damage. Also, be aware that a rise in internal temperature by liquid sealing causes the pump malfunction.
- Note that the pump operation with the discharge valve closed for a long time makes the temperature of the liquid inside the pump rise and causes damage to the pump.
- When power outage occurs during operation, turn off the power immediately.
- When transferring high-temperature liquid, the pump becomes hot, so provide a contact protection to prevent burns.
- Do not start the pump when cleaning piping with high-pressure air or high-pressure cleaning water.

  It may cause damage to the pump.
- Do not operate the pump while forcibly pumping liquid from the suction port of the piping, such as by

pressurizing from a tank truck, or operate the pump while forcibly drawing liquid from the discharge port of the piping using vacuum. Do not do above as it may cause a pump malfunction.

- **Periodic maintenance may be required when transferring viscous liquid that is likely to stick to the surface or can easily be solidified. Consult us in advance.**
- Operate (start-up/shutdown) the pump 6 times/hour or less. Do not frequently start/stop the pump as it may increase the burden on the pump and motor, and as a result, damage the pump.

2. Preparation for operation

When the pump is operated at the first after installation or long-term suspension, prepare as the described below.

- Pour liquid after cleaning the inside of piping and tanks thoroughly.
- Check that bolts for flange connecting and a pump base for tightness and retighten them if necessary.
- Add priming water into the pump and release the air trapped in the pump and piping.
- After adding priming water into the pump (or after checking that the pump is filled with priming liquid), run the motor momentarily to check the direction of motor's rotation. The rotation direction of the motor is clockwise as viewed from the motor fan (see the arrow on the pump). If it is the wrong direction, stop the pump immediately. Reverse two wires of the three-phase power wires after making sure to turn off the power.
- When operating the pump for the first time after installation or the liquid exchange in a tank, it may evacuate air inside the pump improperly or linear seal word inaccurately. In this case, release air from the air release valve (lab cock) on the casing. Malfunction may cause linear seal damaged and liquid leakage. Release the air only at a trial operation after installation, liquid exchange or re-operating.
- Check the linear seal moves when the motor starts rotating.
  The movable seal of the linear seal goes down once the pump starts operation. If not, the linear seal may be broken. Immediately, stop the operation and check the seal. (Refer to P18.)

3. Operation

- When controlling the rotation speed of the pump, refer to the operating precautions in the previous section.
  - **Release air from the air release valve when operating the pump for the first time or re-operating after the liquid exchange**.
- When all preparations are done, check that the valves are opened / closed.
- Once the pump goes into a continuous run, check if the flow rate and pressure are at appropriate specified points.

4. Shutdown

- Turn off the power and check if the pump stops smoothly. If not, check the inside of the pump.
- In case of long-term suspension of operation, withdraw inside liquid from the pump, wash it and close the suction / discharge valves.

Maintenance / Check

1. Troubleshooting

If a cause of pump failure is unknown, stop the pump immediately and contact us or the nearest distributor.

Problem	Symptom on pump		Cause	Check & Measures
	Discharge valve closed	Discharge valve opened		
Unable to pump.		Pressure/vacuum gauges indicate zero.	● Insufficient priming water.	○ Stop the pump, fill with enough priming water.
	Priming water does not go into the pump.		● Suction strainer is clogged. ● Improper suction piping. ● Decline liquid level in a tank.	○ Clean the strainer. ○ Check the piping. ○ Be appropriate the liquid level.
	At the start, pressure drops when discharge valve is opened.	Pressure/vacuum gauges trembles and drops to zero.	● Air entering through the suction pipe or gasket.	○ Check sealing of suction flange. ○ Check abnormally low liquid level. ○ Correct voltage or not.
	At the restart after suspension, pumping failure occurs.	At the restart after suspension, pumping failure occurs.	● Airlock or air accumulation in the suction pipe.	○ Release air in the pipe. ○ Check pipes / modify air pockets. ○ At the suspension, backflows go into. Improve the piping incline to exhaust air. Clean the strainer.
	Pressure gauge readings remain low.		● Rpm failure. ● Inverse rotation.	○ Check wiring & motor. ○ Switch wiring.
Discharge quantity not enough.		High vacuum gauge reading.	● The strainer is clogged. The suction pipe is obstructed.	○ Clean the clogged strainer. Remove the foreign objects.
	Pressure/vacuum gauges show normal readings.	Vibration	● The impeller is clogged.	○ Remove the foreign objects.
		Pressure/vacuum gauges fluctuate.	● Air entering through the suction pipe or gasket.	○ Inspect the suction pipe joints and retighten if necessary.
			● Foreign objects at the discharge side.	○ Remove foreign objects inside. ○ Remove foreign objects in pipes.
		High pressure gauge reading but vacuum gauge is normal.	● Any resistance in the discharge pipe. Actual head & head loss are too high.	○ Check the actual pump head and pressure loss in the discharge pipe and take appropriate actions.
	Pressure and vacuum gauge readings are low.	Pressure and vacuum gauge readings are low.	● Reverse rotation.	○ Reverse wiring.
Motor heats up.			● Insufficient voltage. ● Overload. ● High ambient temperature.	○ Check the voltage and Hz. ○ Check flow rate, S.G. and viscosity. ○ Well ventilation.
Sudden loss of discharge quantity.		High vacuum gauge reading.	● Strainer is clogged.	○ Remove the foreign objects.
			● Base defect. ● Loose bolts. ● Closed suction pipe or cavitation in the pump. ● Impeller comes into contact with casing. ● Worn motor bearing.	○ Make sure the installation is done appropriately. ○ Tighten the bolts. ○ Conduct cleaning or remove the cause of cavitation. ○ Remove the cause or replace the parts. ○ Replace the bearing or motor.
Liquid leaks from seal during operation.	Liquid increasingly leaks as the valve is closed.		● Liquid level in the tank is too high. ● Discharge pipe clogged by foreign objects. ● Crystal deposits accumulated on the back blade of the impeller.	○ Lower the liquid level in the tank. ○ Remove the foreign objects. ○ Remove the crystal deposits.
Liquid leaks from seal during suspension.			● Linear seal failure.	○ Replace the linear seal with new one.
A little liquid leaks from seal just after suspension.			● Worn cut seal. ● Water hammer.	○ Replace the cut seal with new one. ○ Place a check valve at the discharge pipe.

2. Maintenance

◆ Daily inspection

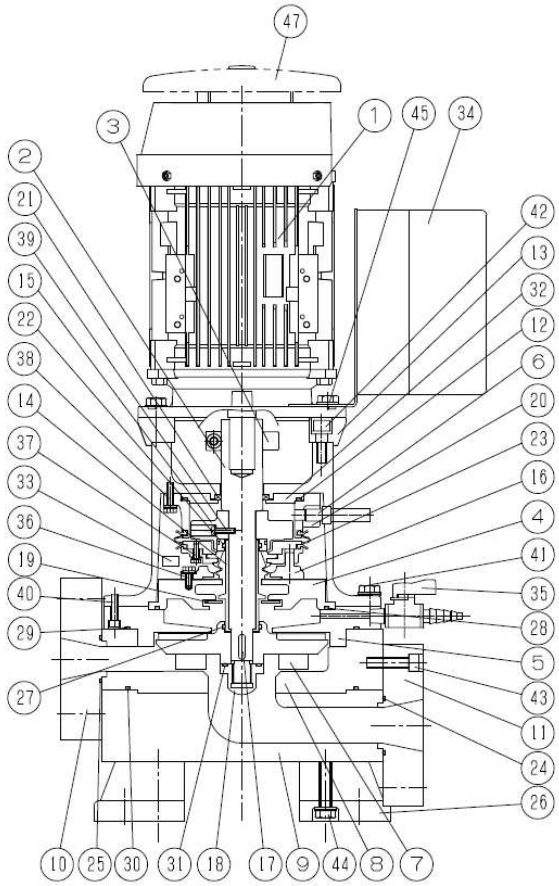
- Check no liquid leakage before the operation. If any, stop the operation and take appropriate measures.
- Check that the pump operates smoothly without generating abnormal sounds or vibration.
- Check the liquid level in the suction tank and the suction pressure.
- Compare the flow rate, discharge pressure and current value during operation with the nameplate to check if the pump is operated within the normal load limits.
  ※ The indicated value of the pressure gauge is proportional to the specific gravity of the liquid.
- If there is a spare pump, keep it ready for use by operating it from time to time.
- Check for fluctuations of discharge pressure, discharge flow rate and motor current/voltage. If they fluctuate greatly, see “Troubleshooting” and take appropriate actions.

◆ Periodic inspection

To ensure smooth operation of the pump, carry out the following periodic inspection procedures. During an overhaul inspection, make sure not to damage the seal parts.

Inspection period	Parts name	What to be checked	Correction
Once a year or 1,000 hours ※ Keep the check record.	Motor	● Sound of bearing (Check for abnormal sounds during operation). ● Vibration. ● Tightness of pump base bolts.	○ Replace the bearing. ○ Contact us or the nearest distributer in the event of anomaly. ○ Retighten the bolts.
	Connecting pipe	● Scratch, flaw or crack. ● Corrosion. ● Deformation. ● Worn/corroded oil seal.	○ Replace the connecting pipe in the event of anomaly. ○ Replace the connecting pipe in the event of anomaly. ○ Remove load on piping if any. ○ Replace the oil seal if it is corroded or worn away greatly.
	Casing	● Scratch, flaw, crack or wear. ● Adhere the foreign objects inside Wet Parts Kit. ● Swelling or corrosion of o-ring.	○ Replace the casing in the event of anomaly. ○ Remove the foreign objects. ○ Replace the o-ring (Replace it with new one whenever a disassembly inspection is conducted).
	Linear seal	● Liquid leaks. ● Wear, corrosion or deterioration of rubber parts.	○ Replace the linear seal in the event of failure such as liquid leaks. ○ Replace the linear seal if it is corroded or worn away greatly.
	Impeller	● Sliding mark on the whole impeller. ● Corrosion. ● Looseness of impeller nut.	○ Replace the impeller in the event of anomaly. ○ Replace the impeller in the event of anomaly. ○ In the event of anomaly, remove the impeller and the nut, check for corrosion on the shaft and refasten the impeller nut. If the shaft is corroded, contact us or the nearest distributor.

Parts structure



[Parts list]

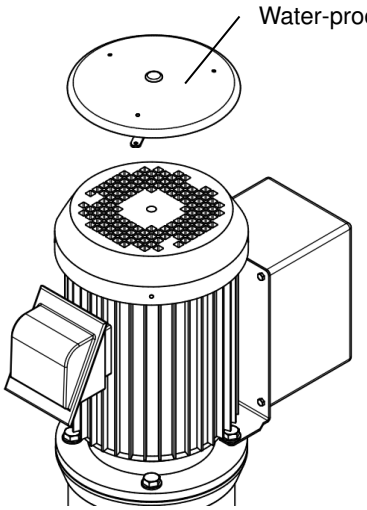
No.	Parts name	Qty	Material	Remarks	No.	Parts name	Qty	Material	Remarks
1	Motor	1			***24***	O-ring for sucion flange	1	EPDM·FPM	25LRN: G-65, 40LRN: AS568-233
2	Pump shaft	1	SUS304		***25***	O-ring for discharge flange	1	EPDM·FPM	25LRN: G-40, 40LRN: G-50
3	Slit collar	1 2	S45C		***26***	Leg	4	PET	
4	Linear seal flange	1	HT.PVC		***27***	O-ring for impeller	1	EPDM·FPM	P-32
5	Back casing	1	PP·UPE		***28***	O-ring for linear seal flange	1	EPDM·FPM	AS568-259
6	Hose joint	1	PP		***29***	O-ring for back casing	1	EPDM·FPM	25LRN: AS568-261, 40LRN: AS568-268 ($\Phi_{3.8}$)
7	Impeller	1	PP·UPE		***30***	O-ring for casing	1	EPDM·FPM	25LRN: AS568-261, 40LRN: AS568-268 ($\Phi_{3.8}$)
8	Casing (discharge side)	1	PP·UPE		***31***	O-ring for impeller nut	1	EPDM·FPM	P-28
9	Casing (suction side)	1	PP		***32***	Oil seal lock	1	PP	
10	Discharge flange	1	PP		***33***	safety sensor	1		
11	Suction flange	1	PP		***34***	Control box	1	PC	For protection device 200V
12	O-ring for oil seal retainer	1	EPDM·FPM	G-105	***35***	Lab cock	1	PVC/EPDM/FKM	
13	Connecting pipe	1	FC	with Motor flange	***36***	Cross-recessed hex. bolt	8	SUS304	M6*15
14	Shaft sleeve	1	HT.PVC		***37***	Cross-recessed hex. bolt	8	SUS304	M5*14
15	Rotating disk	1	CFR PP/Ceramics		***38***	Cross-recessed hex. bolt	4	SUS304	M6*25
16	Movable seal	1	CFR PP/FPM		***39***	Pan head bolt	2	SUS304	M5*20
17	Impeller key	2	Titanium		***40***	Hex. head cap bolt	4	SUS304	M6*20
18	Impeller nut	1	PP·UPE		***41***	Hex. head cap bolt	8	SUS304	25LRN:M110*145 with W, SW, N 40LRN:M10*180,M10*110 with W,SW, N
19	Cut seal	1	FPM		***42***	Hex. head cap bolt	4	SUS304	M10*20
20	Outer phragm base	1	CFR PP		***43***	Hex. head cap bolt	10	SUS304	M10*40
21	Oil seal	1	NBR		***44***	Hex. bolt	4	SUS304	M10*90 with W, SW
22	O-ring for rotating disk	1	FPM	P-32	***45***	Hex. bolt	4	SUS304	0.75-2.2kW: M10*30 with W 3.7-5.5kW: M12*35 with W
23	Outer phragm	1	FPM		***46***	Motor flange	1	PVC	Only 5.5kW
					47	Waterproof cover	1	SPC	Option

※ ③ Use two slit collars for a motor of 5.5kw or more.

Assembly & disassembly procedure

■ Disassembly

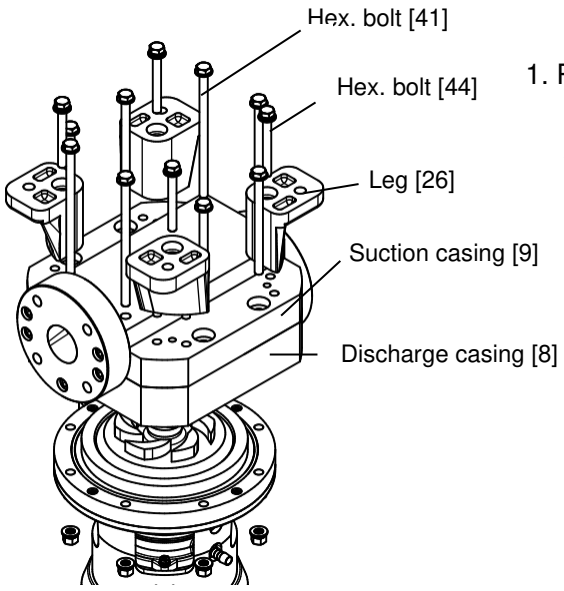
Wash the inside of the detached pump with water thoroughly. Make sure to drain liquid inside the pump. It is easy to disassemble the pump by upending the motor [1].



If the pump with water-proof motor cover is turned upside down, it may be deformed by its own weight. Make sure to remove the cover to prevent the deformation before the pump is turned upside down for the disassembly.

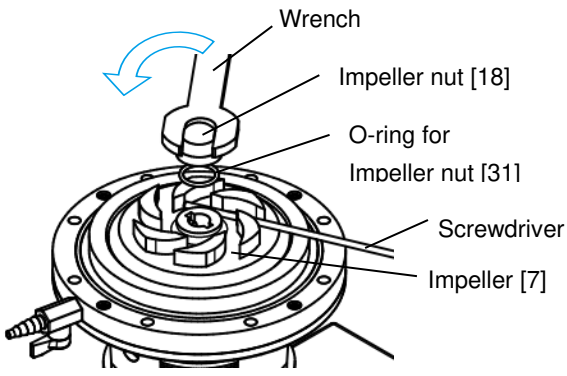
[SUS water-proof motor cover]

It is bolted with the motor fan cover, so if the water-proof motor cover is removed, bolt the fan cover firmly.



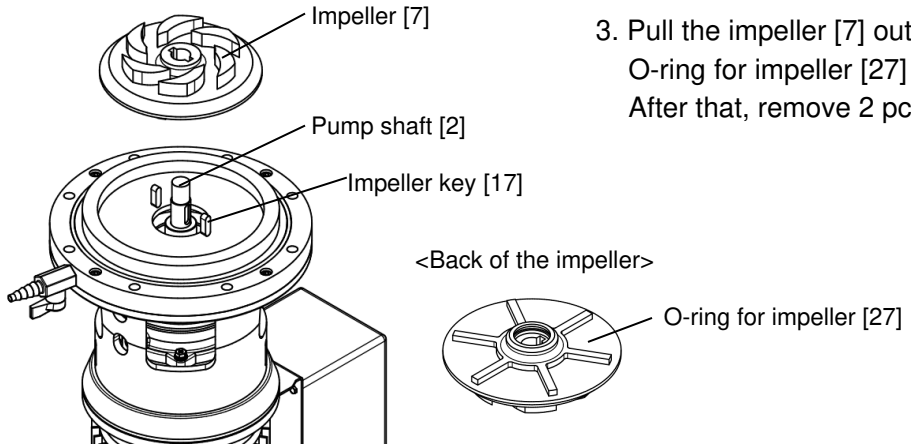
1. Remove 4 pcs of hex. bolt for the leg [44] and separate the leg. After that, remove 8 pcs of hex. bolt [41] for the casing and separate the discharge casing [8] and suction casing [9].

Hex. bolt [41], [44]
Recommended torque: 9.8N・m (100kgf・cm)

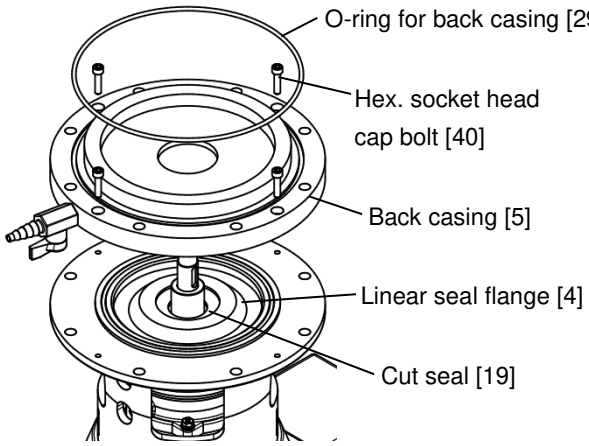


2. Fix the pumping part of the impeller [7] with a screwdriver not to rotate it and turn the impeller nut [18] counterclockwise with a wrench to remove the impeller.
Remove the O-ring for impeller nut [31] together.

Impeller nut [18]
Recommended torque: 7.8N・m (80kgf・cm)

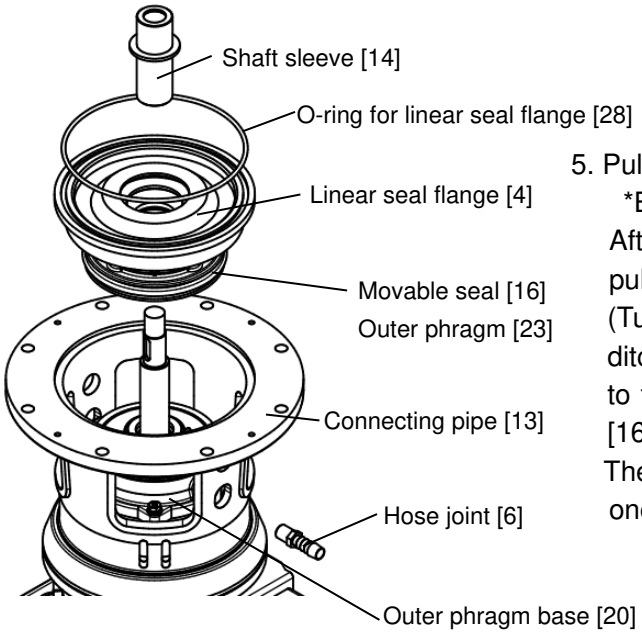


3. Pull the impeller [7] out from the pump shaft [2].
O-ring for impeller [27] is separated with the impeller.
After that, remove 2 pcs of the impeller key [17]

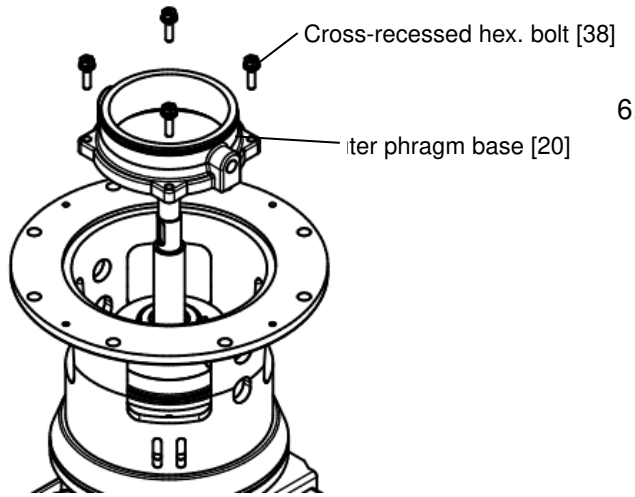


4. Remove 4 pcs of the hex. socket head cap bolt [40] and the back casing [5]. The O-ring for back casing [29] is separated together.
Then, remove the cut seal [19] inserted at the center of the linear seal flange [4].

Hex. socket head cap bolt [40]
Recommended torque: 2.5N・m (25.5kgf・cm)

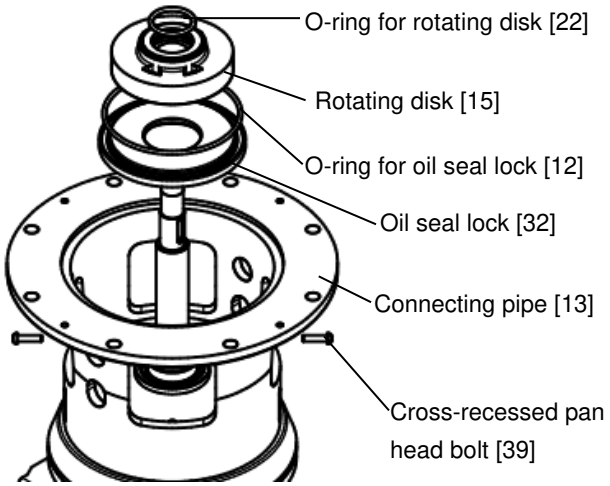


5. Pull the shaft sleeve [14] out from the pump shaft [2].
*Be careful not to lose the spacer ring inserted.
After that, remove the hose joint for overflow [6] and pull the linear seal flange [4].
(Turn the outer phragm [23], which is put on the ditch from the opening for the connecting pipe [13] to the outer phragm base [20], to the movable seal [16].)
The O-ring for linear seal flange [28] is separated at once.

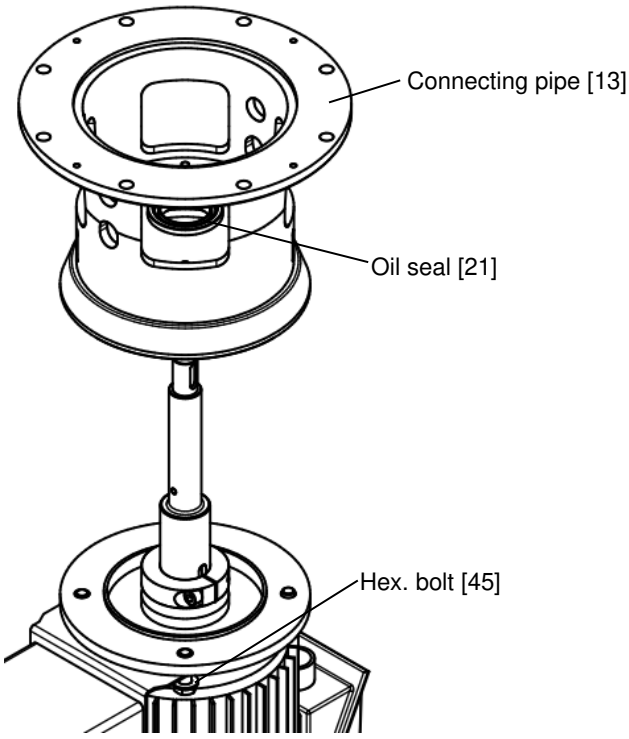


6. Remove 4 pcs of the cross-recessed hex. bolt [38] for the outer phragm base [20].

   Cross-recessed hex. bolt [38]
   Recommended torque: 2.0N・m (20.4kgf・cm)

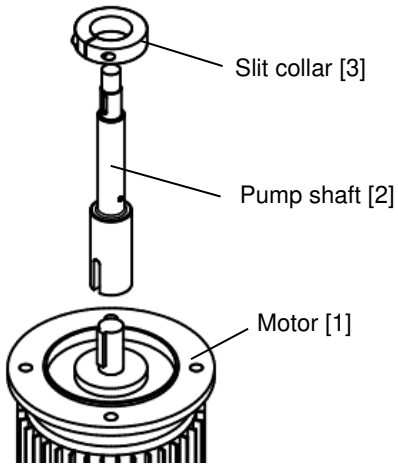


7. Put the plus screwdriver into the opening for the connecting pipe [13] and pull the rotating disk [15] out from the pump shaft [2] after 2 pcs of the cross-recessed pan head bolt [39] for the rotating disk is separated.
   The O-ring [22] is attached at the center of the rotating disk [15].
   Next, remove the oil seal lock [32] and O-ring for oil seal lock [12].



8. Remove 4 pcs of the hex. bolt [45] for the motor flange [46] and the connecting pipe [13].
   The oil seal [21] is attached with the connecting pipe [13].

   Hex. bolt [45]
   Recommended torque: 14.7N・m (150kgf・cm)



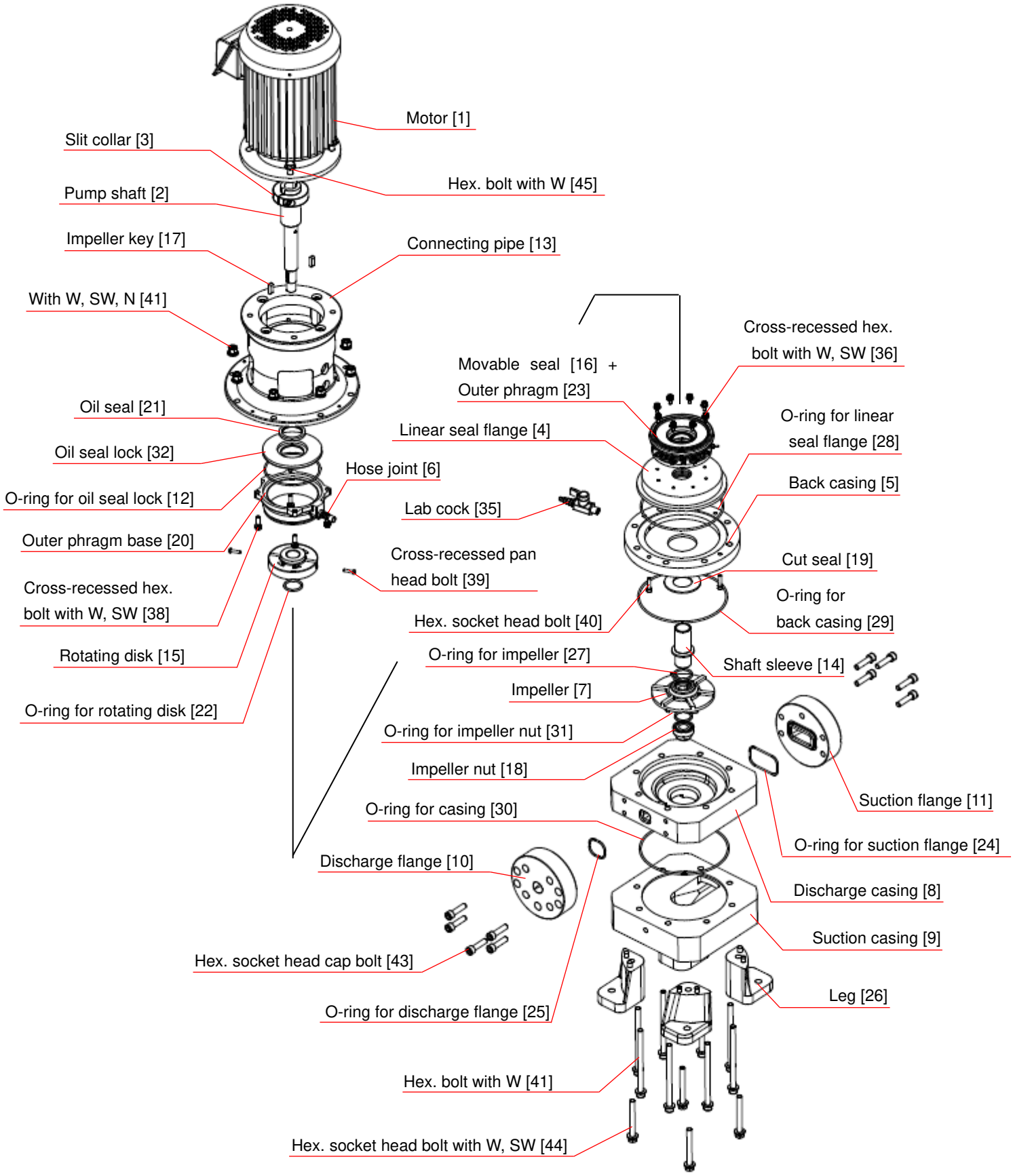
9. Loose the slit collar [3] and pull the pump shaft [2] out from the motor [1].

■ Assembly

Take reverse procedures described above to assemble the pump.

※ When the pump is assembled, replace used O-rings or gaskets to new ones.
When the pump shaft is disassembled, it is necessary to adjust the shaft. (The center runout of the tip is 0.05mm or less.

Exploded view



Linear seal protection device

Overview

This pump can be used under a flooded suction method despite the sealless structure, as it avoids liquid leaks by actions made by the back blade of the impeller during operation and by the linear seal during suspension.

This section describes how the linear seal works during operation or suspension and the linear seal protection device with a limit switch to emergency stop when a malfunction occurs in the linear seal.

- Linear seal

  The linear seal is a shaft seal to prevent liquid leakage when the pump stops.

  The seal does not contact during operation, so there is no abrasion of sealing parts and no contact with liquid to use. It is not affected by slurry.

  When the pump stops, the movable seal goes up and contacts with the rotating disk to keep sealing. When the pump starts, the movable seal goes down and opens. (No contact state)

  This condition keeps during operation. When the pump stops, the movable seal goes up to seal.

Rotating disk (inside this cover)

Movable seal

The movable seal goes down during operation

(Can check through this gap.)

The movable seal goes up at the time of shutdown.

Visually check if the movable seal goes down at the time of the pump start-up.

Do not keep operating the pump if the seal does not go down. Otherwise, the seal may be damaged.

(If the seal does not go down due to airlock, etc., stop the pump, release air from the valve at the head of the casing.)

- **Specifications of the protection device**

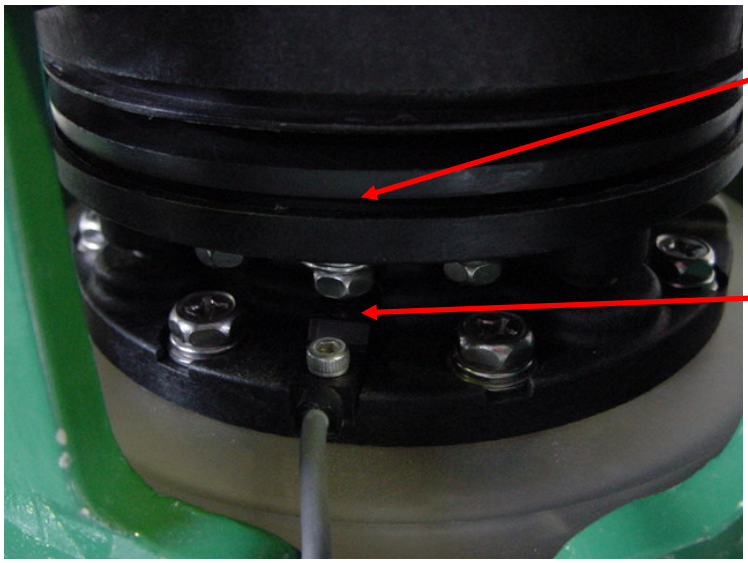
  A protection device is attached to protect the linear seal when a malfunction occurs. Normally, the emergency stop output terminal (dry contact) is closed. When the device detects an abnormality, it opens the output terminal.

  It takes 2 seconds from the pump start-up, because it is necessary to observe the emergency stop output terminal after the 2 seconds.

  If the movable seal does not go down, the output terminal detects and opens. If it keeps to open, when the movable seal goes up without closing it thereafter.

  To cancel the emergency stop signal, turn off the power of the protection device.

◎ If the sensor detects when the linear seal works and the movable seal goes down. The indicator on the device illuminates in red.



- **The connection of the power and signal line**

◎ Supply power to the control box as below.

1. Supply power through the control panel which controls the pump.
2. Supply power at the same time of the pump start-up. (It is also fine to supply power through the motor terminal block.)

* The wire from the motor terminal block to the control panel is connected as standard.

◎ Connect the signal line to the control panel which controls the pump.

◎ Install the function to stop the pump as soon as the emergency stop signal output terminal opens.

<u>Do not operate the pump repeatedly without eliminating the cause of warning, after open the emergency stop signal output terminal. It causes the pump damage.</u>

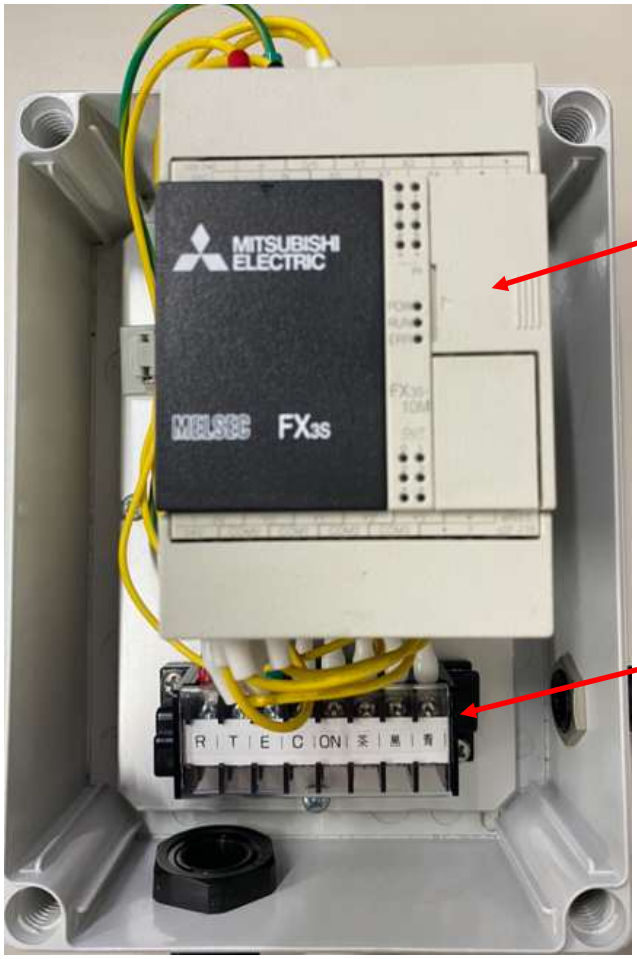
Alignment of the terminal block

R	T	E	C	ON	Blown	Black	Blue

Power	Signal line	Sensor
AC100V – 220V	"Alert output"	<u>already installed</u>
<u>Already wired to the motor</u>	Add in the emergency Stop circuit	

* Caution

Operating the pump is available without using the signal of "Alert output". However, it is recommended to use the function to protect the linear seal.

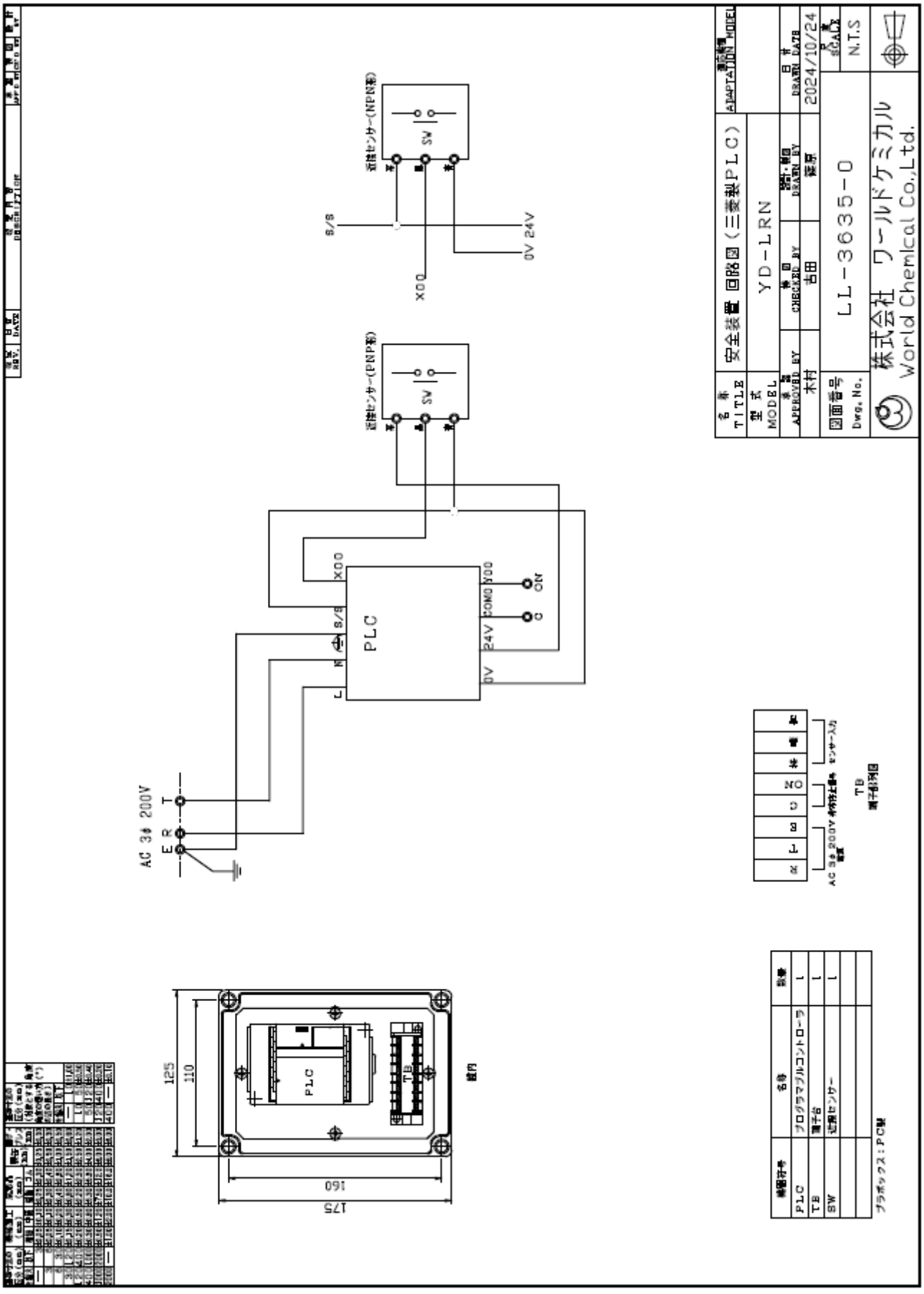


Programmable logic controller(PLC)

Terminal block
Emergency stop signal

The inside of the control box

- Circuit diagram of control panel



Warranty / Repair

1. Warranty period and coverage
   (1) The warranty period is 12 months from dispatched from our factory.
   (2) During warranty period, if the pump breaks down or is damaged at the use under the condition instructed in this manual due to manufacturing defect(s), the failure parts are repaired free of charge.
   (3) Even if the failure occurs within the warranty period, the followings are repaired or replaced for compensation in principle.
      - Breakdown or damage due to different use or safekeeping from the instructions in this manual.
      - Breakdown or damage due to incorrect use or unjust repair or modification.
      - Breakdown or damage as result of pollution, salt damage, gas damage, abnormal voltage or undesigned power (voltage, frequency) as well as fire, earthquake, flood disaster, lightning strike or other natural disaster.
      - Abrasion or degradation of consumable parts like a packing or O-ring.
      - Breakdown or damage during transportation, for relocation or fall after your purchase
   (4) We cannot be responsible for the break down or damage of the customer-specified pump.
   (5) Irregularities or breakdowns due to chemical or hydrodynamic corrosion by liquid are not covered under the warranty. The material chosen at the time of the contract is only a recommendation. We do not guarantee the chemical resistance of the material.
   (6) If the determination of the cause for the breakdown or damage is questionable, it attributes to the negotiation between the customer and us.
   (7) Expenses or other damage incurred as a result of breakdowns at the use under the different condition from the instruction in this manual are not covered under the warranty.

2. Repair

Notice:
For repair, consult the supplier. When returning a pump, thoroughly clean and pack the wet parts kit.

If irregularities are detected during operation, stop the operation immediately for check. (Refer to the section on “troubleshooting”).

   (1) Consult your supplier or us for repair.
   (2) Read this manual again and re-check before requesting repair.
   (3) When visiting to a distance location for repair, the travel expenses are charged.
   (4) Inform the followings when requesting repair.
      - Model name and serial number
      - Use duration and condition
      - Damages parts and condition
      - Liquid (Name, Specific gravity, Temperature, Slurry)

      If liquid leaks during transportation, it is very dangerous, so make sure to clean inside thoroughly. When ordering replaced parts, specify the name in the parts name list (P7, 9, 10). Although, inform the parts’ number and material, too.

Installation record

Model:	
Purchase date:	Serial number:
Start date:	Supplier:

World Chemical Co.,Ltd.

WORLD CHEMICAL CO., LTD. / Japan

Head Office / Overseas department

3F, 1-1-14, Taito. Taito-ku, Tokyo, 110-0016 Japan

TEL 81-3-5818-5130 FAX 81-3-5818-5131 (Head office)

TEL 81-3-5818-5131 FAX 81-3-5818-5131(Overseas epartment)

Osaka Office

3F, 1-19-25, Edobori, Nishi-ku, Osaka-shi, Osaka, 550-0002 Japan

TEL 81-6-6467-8565 FAX 81-6-6467-8566

Nagoya Office

5F, 1-5-27, Nishiki, Naka-ku, Nagoya-shi,
Aichi, 460-0003 Japan

TEL 81-52-253-8426 FAX 81-52-253-8436

Fukuoka Office

5F, 2-17-19,Hakataekimae,Hakata-ku,Fukuoka-shi,Fukuoka,
812-0011 Japan

TEL 81-92-710-6001 FAX 81-92-710-6125

Tsukuba Factory

6127-5, Onogo-machi, Joso-shi, Ibaraki, 300-2521 Japan

TEL 81-297-24-1071 FAX 81-297-24-1075

WORCHEMI TAIWAN CO., LTD. / Taichung, Taiwan

No.915, Zhongshan Rd., Shengang Dist., Taichung City 42955, TAIWAN

TEL 886-4-2562-8358 FAX 886-4-2562-8351

WORLD CHEMICAL USA, INC. / California, U.S.A.

25691 Atlantic Ocean Dr.Unit B-15 Lake Forest, CA 92630, U.S.A.

TEL 1-949-462-0900 FAX 1-888-860-3364

SUZHOU WORLD TECHNOLOGY CO., LTD. / Jiangsu, China

61, Fu Yuan Road, Xiang Cheng Economic District, Suzhou, Jiangsu Province, China

TEL 86-0512-6579-8212 FAX 86-0512-6579-8215