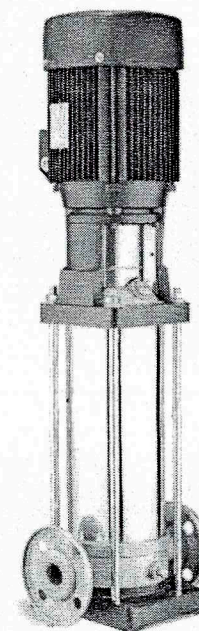




**ENERGY**

**YDL Vertical Multistage Stainless Steel  
Centrifugal Pump**

**User's Manual**



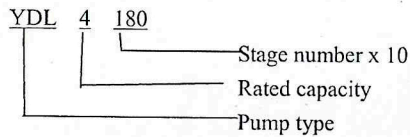
## 1. Features

The YDL Vertical Multistage Centrifugal Pump is made from stainless steel SUS304 or SUS316L and formed using metal sheet stamping and welding technologies. With its double-chamber design and easy-mounting mechanical seal design, the pump is compact, lightweight, low noise, long life and easy to assemble and maintain.

## 2. Applications

The YDL Vertical Multistage Centrifugal Pump can be used for transporting thin, non-explosive, weak corrosive and clean liquids, such as water supply systems, boiler feeding, pure water treatment, food industries, fire fighting, pharmaceuticals and etc.

## 3. Symbols



## 4. Working Conditions

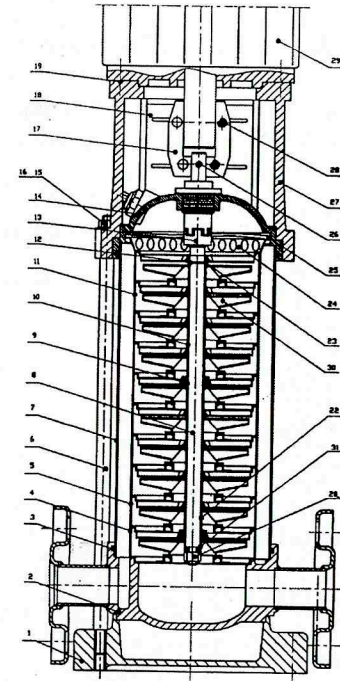
- 4.1. Ambient temperature: +40 °C max.
- 4.2. Liquid temperature: -15~80 °C
- 4.3. Maximum working pressure: 25 bars
- 4.4. Minimum suction pressure: see Appendix 1
- 4.5. Maximum suction pressure: suction pressure plus pressure at shutting discharge valve must not higher than the Maximum Working Pressure.
- 4.6. Minimum capacity

Model	Minimum Capacity When Liquid Temperature at -15~+80 °C
YDL2	2m <sup>3</sup> /h
YDL4	4m <sup>3</sup> /h
YDL8	8m <sup>3</sup> /h
YDL16	16m <sup>3</sup> /h

- 4.7. Electrical data: see motor nameplate.

## 5. Structure

- 5.1. The suction and discharge of the pump locate on a same axis. Three types of connections are available: flange, Victaulic and male threads.
- 5.2. Easy-mounting mechanical seal is used for the pump, which can provide fast and easy maintenance.
- 5.3. IBM14 standard motor is used on the pump, which is connected to the pump shaft using a coupling.
- 5.4. Cross section:



- |                     |                      |
|---------------------|----------------------|
| 1. Base Plate       | 17. Coupling         |
| 2. Bottom Cover     | 18. Coupling Guard   |
| 3. O Ring           | 19. Screw            |
| 4. Diffuser I       | 20. Shaft Nut        |
| 5. Diffuser II      | 21. Spring Washer    |
| 6. Tension Bars     | 22. Shaft Sleeve I   |
| 7. Outer Barrel     | 23. Shaft Sleeve III |
| 8. Splined Shaft    | 24. Diffuser IV      |
| 9. Plain Bearing    | 25. Wire Washer      |
| 10. Shaft Sleeve II | 26. Shaft Pin        |
| 11. Diffuser III    | 27. Bracket          |
| 12. Position Ring   | 28. Hex Screw        |
| 13. Mech. Seal      | 29. Motor            |
| 14. Top Cover       | 30. Impeller         |
| 15. Washer          | 31. Shave Sleeve IV  |
| 16. Nut             |                      |

## 6. Assembling and Dismantling

- 6.1. Before assembling, check all pump parts are all in readiness.
- 6.2. Put the O rings in the grooves of the bottom cover and top cover, then put the bottom cover on the base plate. Apply some silicone oil on the outside surface of one end of the outer barrel, push the end of the barrel into the bottom cover.
- 6.3. Push the position ring in the groove of the splind shaft, assemble all of the shaft sleeves, impellers and diffusers on the splind shaft in order then, put the spring washer on the end of the shaft and tighten up the assembly with the shaft nut.
- 6.4. Put the assembled internal assembly in the outer barrel and then, put on the Diffuser IV.
- 6.5. Put the wire washer in the top cover and put the top cover on the top end of the outer barrel, mount the bracket on the top cover, use the tension bars to fix top cover, bracket, outer barrel and bottom cover together.
- 6.6 Check the shaft extension is in the middle of top cover's hole. Apply some silicone oil on the inner side of mechanical seal's O ring and on the shaft extension.
- 6.7. Put the mechanical seal in the hole of the top cover along the shaft extension, screw the nut of mechanical seal into the hole until it is firmly tightened. (See Figure 2)
- 6.8. Mount the motor onto the bracket with the hex nuts, insert the pin from the hole of the splined shaft, combine the two half couplings on the shaft and make the couplings hold the pin properly.
- 6.9. Use a screw driver to set the coupling to the middle position between it moves to the top and

bottom.

- 6.10. Use the socket hex bolts to fasten the two half couplings. The seams at each side of the coupling should equate to each other. (See Figure 3b)
- 6.11. Fix the mechanical seal to the shaft by screwing the socket hex screws on the mechanical seal, make sure the mechanical seal turns along with the shaft. Do not unscrew other longer slotted screws on the mechanical seal.
- 6.12. Check if the coupling and the shaft turns freely.
- 6.13. Screw on the priming and drain plugs, fix the coupling guards on the bracket using screws. Take the actions in reverse order to dismantle the pump.

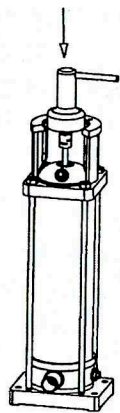


Figure 2

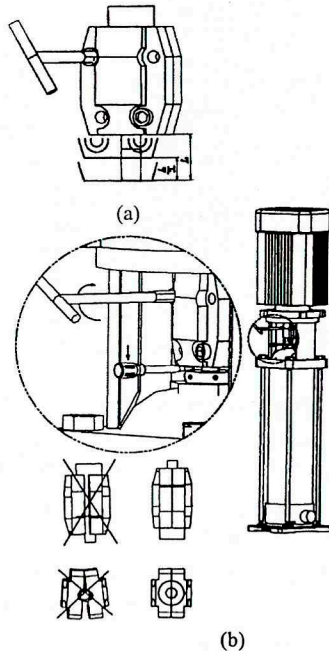


Figure 3

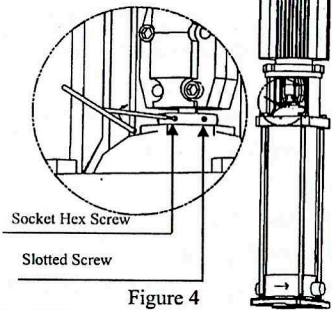


Figure 4

### 7. Installing the Pump

To avoid damage of pump, take the following actions before installing the pump.

- 7.1. Check the pump and the motor are in good conditions before installation.
- 7.2. The arrow sign on the bottom cover indicates the pump's discharge direction.
- 7.3. The pump can be installed vertically or horizontally. To provide the pump with good cooling condition, the pump must be installed in a place where is well ventilated.
- 7.4. To reduce noise and vibration as far as possible, use flexible or soft hoses on the suction and discharge, and install the pump on a vibration proofed base.
- 7.5. Set a valve on the suction and discharge tubes separately to provide convenience to pump

maintenance. Set non-return valves can protect the pump from damage by water hammer.

- 7.6. Prevent air cave to create when installing the pipelines, particularly in the suction pipeline.
- 7.7. When the discharge pipeline stretches downward for a long distance, or when there is a risk of siphonage, or to prevent dirty liquid from flowing back to the pump it is recommend to set a drain valve on the pipe that closes to the discharge port.
- 7.8. Electrical wirings must be done by specialized electricians according to the local electrical regulations. The pump must be earthed effectively.

### 8. Starting, Operating and Stopping the Pump.

- 8.1. Before using a new pump, turn the coupling of pump by hand to check the pump is running freely, evenly and quietly.
- 8.2. Prime the pump and vent air before operating the pump.
  - a. When the water level is above the pump, unscrew the top air escape plug that locates in the middle of the top priming plug and let the water flow in and fill up the pump body to vent the air form the pump body completely, and then screw back the air escape plug until it is firmly tightened. (See Figure 5)
  - b. When the water level is beneath the pump, unscrew the top priming plug and the bottom air escape plug in the middle of the bottom drain plug, prime the pump body and the suction pipe from the priming hole until they are filled up with water, and then screw back the priming plug and the air escape plug until they are firmly tightened.

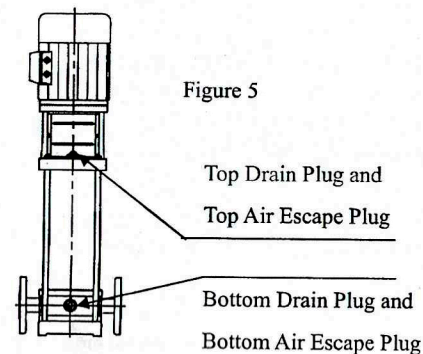


Figure 5

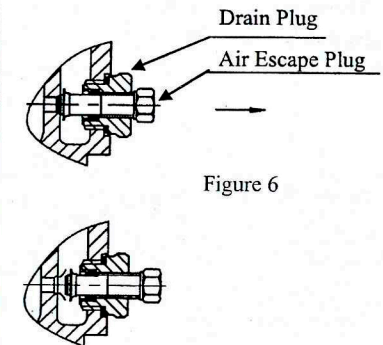


Figure 6

- 8.3. Start up the pump for a second and check the rotation is in the same direction that the arrow pointed on the bracket. (The rotation direction is anticlockwise when viewing from the top of the pump.)
- 8.4. Start up the pump and unscrew the air escape plug until a stream of water flows out evenly from the hole, and then screw back the plug.
- 8.5. After the pump is running normally, open the discharge valve and set the capacity and the pressure to the required values. There would be a risk that the pump gets heat when the capacity is set too low. Therefore, the operating capacity should not be lower than the minimum capacity that required. (See 4.6 Minimum capacity)

- 8.6. Before stopping the pump, shut off the discharge valve, and then turn off the power.
- 8.7. When faults occur during starting, operating and stopping, check the Troubleshooting for solutions.
9. Maintenance
- 9.1. Make sure the power is shut off before maintenance.
- 9.2. Maintenances of the splined shaft and shaft seal are not necessary.
- 9.3. When the pump remains inactive for a long period, before draining pump, remove one of the coupling guards and apply a few drops of silicone oil on the shaft seal to prevent it from being stuck when the pump is put in use again.
- 9.4. When the temperature of the transported liquid is lower than its freezing temperature, make sure the liquid is not frozen inside the pump before starting the pump. During frost season, always drain the pump completely after using the pump.

#### 10. Troubleshooting

Faults	Possible Causes	Remedies
1. Motor doesn't run when switch is on.	+No electricity +Fuse burnt +Thermistor of starter breaks +Connections of starter do not close or windings are broken +Controlling circuit failed +Motor failed	Supply electricity Replace fuse Reset thermistor Repair starter or winding  Check the cause Repair motor
2. Thermistor of starter breaks immediately when power is on.	+One of the fuses burnt +Bad connections of thermistor +Bad or loose plug +Bad motor windings +Pump is blocked +Too low overload current is set	Replace fuse Replace thermistor Repair plug or replace it Repair windings Check and eliminate. Reset current
3. Starter occasionally trips	+Too low overload current is set +Too low voltage at peak load	Reset current Check power supply system
4. Starter is on but pump doesn't run.	+Coupling is not fixed to shaft	Fix the coupling on
5. Capacity is not even.	+Too low suction pressure +Suction pipe is blocked +Air is drawn into pump	Increase suction pressure Clean suction pipe Seal suction
6. Pump runs but no water outs	+Suction pipe is blocked +Foot valve or non-return valve is jammed +Leakage on suction pipe +Motor back runs	Clean suction pipe Clean the valve  Seal suction pipe Correct wiring
7. Pump back runs when power is off.	+Leakage on suction pipe +Foot valve or non-return valve is broken	Seal suction pipe Repair or replace valve
8. Shaft seal leaks	+Shaft seal is broken	Replace shaft seal
9. Noise	+Vapour	Check and seal suction

+Shaft is not fitted properly	Adjust shaft position
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#### Appendix I

When the pump is operated under the following conditions, it is necessary to measure the suction pressure "H"

- High liquid temperature.
- Actual capacity is obviously bigger than rated capacity.
- Suction head is too high.
- Suction pipe is too long.
- Bad suction conditions.

If the pump suction pressure is lower than the steam pressure of the transported liquid, vapour may happen. To avoid this please make sure there is a minimum pressure at the pump suction. The Maximum Suction Head can be calculated using the following formula:

$$H = P_b \times 10.2 - NPSH - H_f - H_v - H_s$$

$P_b$  = Atmosphere pressure, unit: bar

In the closed system,  $P_b$  represents system pressure, unit: bar.

NPSH = Net Positive Suction Head, unit: m (refer to NPSH curves)

$H_f$  = Lose of Suction Pipe, unit: m

$H_v$  = Vapour Pressure, unit: m

$H_s$  = Safety Allowance = minimum 0.5 m head

If "H" is a positive value, the pump can be operated under the Maximum Suction Head. If "H" is a negative value, a Minimum Suction Pressure, positive "H" m head is required.

For example (transported liquid is fresh water)

$P_b = 1$  bar

Pump model: DL2, 50Hz

Flow:  $Q = 2 \text{ m}^3/\text{h}$

NPSH (refer to the curve) = 1.5 m

$H_f = 3$  m

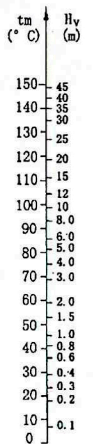
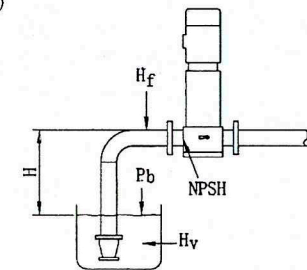
Liquid temperature:  $+80^\circ \text{C}$

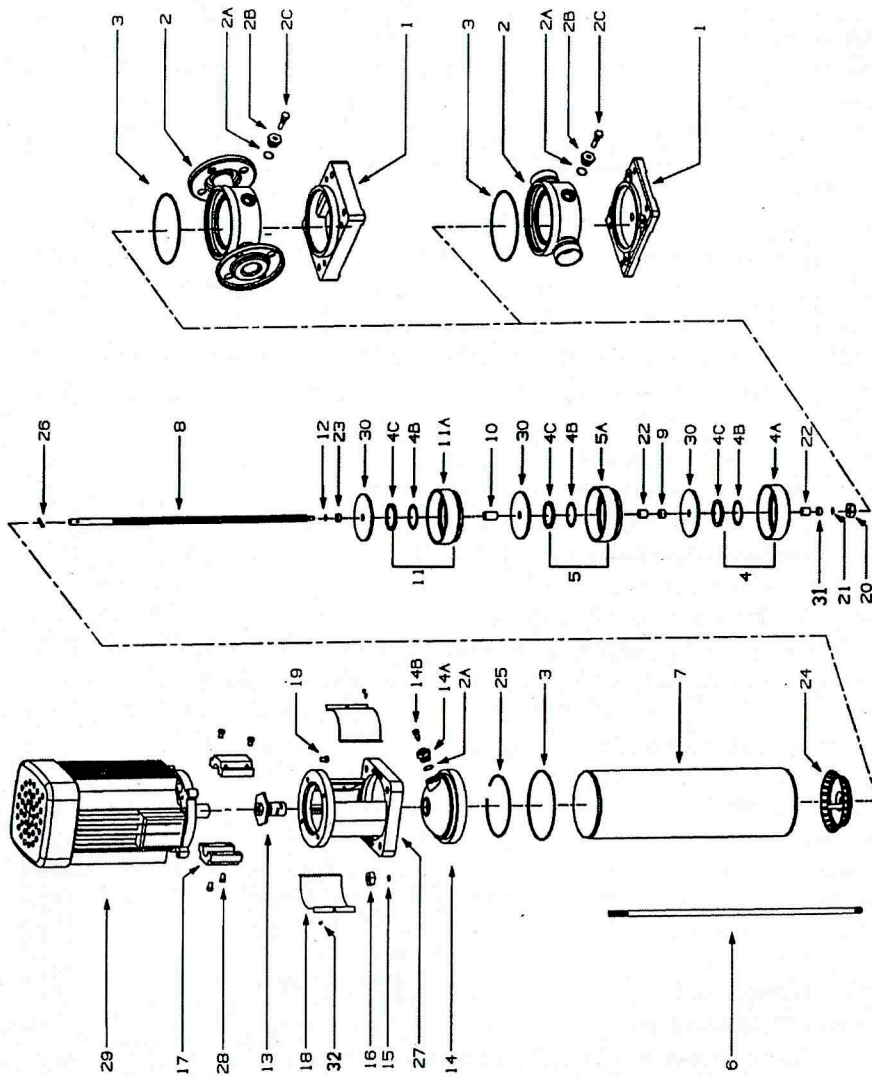
$H_v = 4.8$  m (see Figure 7)

$$H = P_b \times 10.2 - NPSH - H_f - H_v - H_s$$

$$H = 1 \times 10.2 - 1.5 - 3 - 4.8 - 0.5 = 0.4 \text{ m}$$

This represents the pump can be operated at a maximum suction head of 0.4 m.

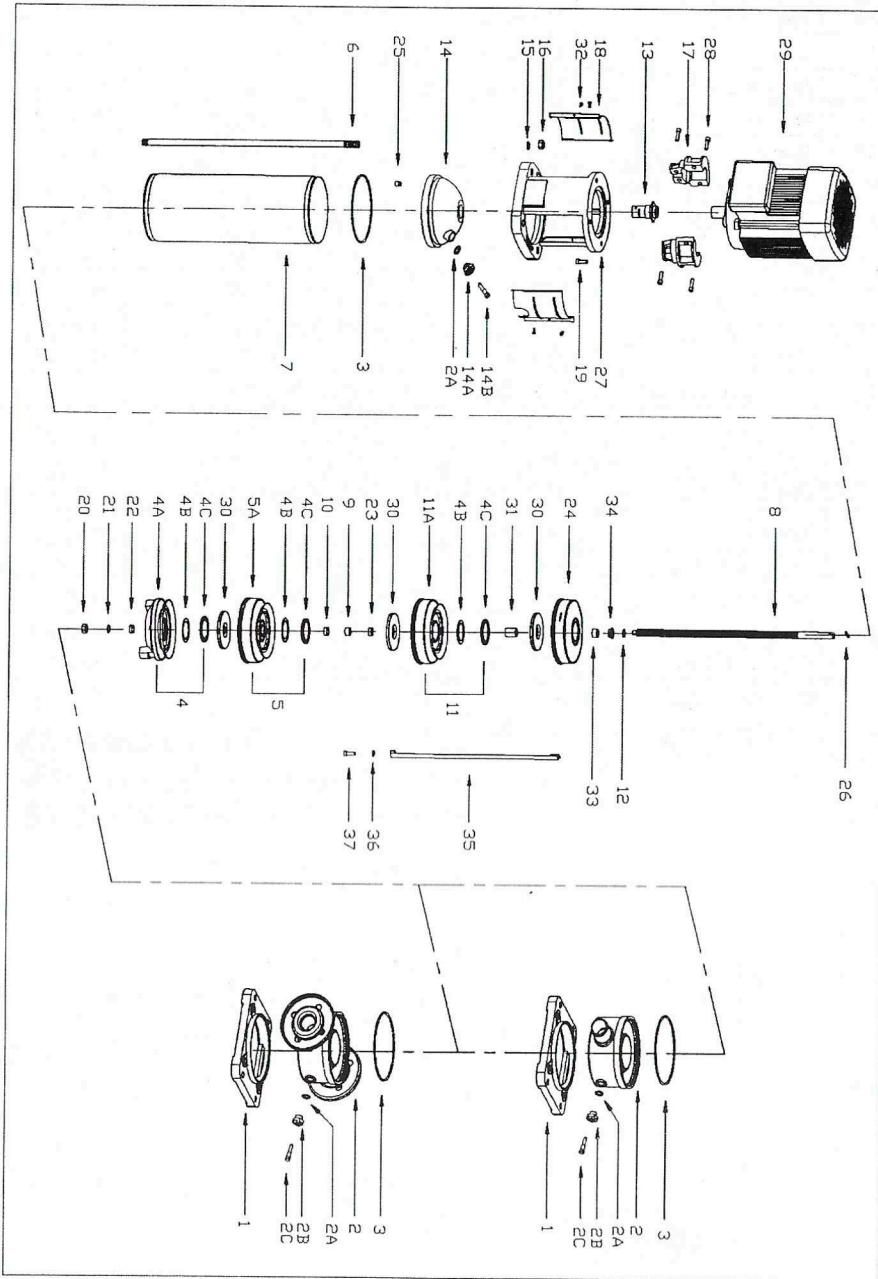




Appendix 2

No.	Part Name	Material	No.	Part Name	Material
1	Base Plate	Cast-iron	14	Top Cover	SUS 304
2	Bottom Cover	SUS 304	14A	Top Drain Plug	SUS 304
2A	O Ring-Drain Plug	NBR	14B	Top Air Escape Plug	SUS 304
2B	Bottom Drain Plug	SUS 304	15	Washers-Bracket	Steel
2C	Bottom Air Escape Plug	SUS 304	16	Nuts-Bracket	Steel
3	O Ring-covers	NBR	17	Coupling	Steel
4	Diffuser I Assembly	Assembly	18	Coupling Guards	SUS 304
4A	Diffuser I	SUS 304	19	Hex Bolts-Bracket	Steel
4B	Ware Ring	Teflon	20	Nuts-Shaft	SUS 304
4C	Ware Ring Plate	SUS 304	21	Spring Washer-Shaft	SUS 304
5	Diffuser II Assembly	Assembly	22	Shaft Sleeve I	SUS 304
5A	Diffuser II	SUS 304	23	Shaft Sleeve III	SUS 304
6	Tension Bars	Steel	24	Diffuser IV Assembly	SUS 304
7	Outer Barrel	SUS 304	25	Wire Washer	SUS 304
8	Splined Shaft	SUS 304	26	Pin	Steel
9	Plain Bearing	WC	27	Bracket	Cast-iron
10	Shaft Sleeve II	SUS 304	28	Hex Bolts-Coupling	Steel
11	Diffuser III Assembly	Assembly	29	Motor	Assembly
11A	Diffuser III	SUS 304	30	Impeller	SUS 304
12	Position Ring	SUS 304	31	Shaft Sleeve IV	SUS 304
13	Mechanical Seal	Assembly			

APPENDIX 3 (YDL8,YDL16)



No.	Part Name	Material	No.	Part Name	Material
1	Base Plate	Cast-iron	15	Washers-Bracket	Steel
2	Bottom Cover	SUS 304	16	Nuts-Bracket	Steel
2A	O Ring-Drain Plug	NBR	17	Coupling	Steel
2B	Bottom Drain Plug	SUS 304	18	Coupling Guards	SUS 304
2C	Bottom Air Escape Plug	SUS 304	19	Hex Bolts-Bracket	Steel
3	O Ring-covers	NBR	20	Nuts-Shaft	SUS 304
4	Diffuser I Assembly	Assembly	21	Spring Washer-Shaft	SUS 304
4A	Diffuser I	SUS 304	22	Shaft Sleeve I	SUS 304
4B	Ware Ring	Teflon	23	Shaft Sleeve III	SUS 304
4C	Ware Ring Guard Plate	SUS 304	24	Diffuser IV Assembly	SUS 304
5	Diffuser II Assembly	Assembly	25	Wire Washer	SUS 304
5A	Diffuser II	SUS 304	26	Pin	Steel
6	Tension Bars	Steel	27	Bracket	Cast-iron
7	Outer Barrel	SUS 304	28	Hex Bolts-Coupling	Steel
8	Splined Shaft	SUS 304	29	Motor	Assembly
9	Plain Bearing	WC	30	Impeller	SUS 304
10	Shaft Sleeve II	SUS 304	31	Shaft Sleeve IV	SUS 304
11	Diffuser III Assembly	Assembly	32	Bolts	Steel
11A	Diffuser III	SUS 304	33	Shaft Sleeve V	SUS 304
12	Position Ring	SUS 304	34	Shaft Sleeve VI	SUS 304
13	Mechanical Seal	Assembly	35	Inner tension bar	SUS 304
14	Back Cover	SUS 304	36	Spring washers	SUS 304
14A	Drain Plug	SUS 304	37	Nuts	SUS 304
14B	Air Escape Plug	SUS 304			