



VSCT
VERTICAL MULTISTAGE
CENTRIFUGAL PUMP

Operation Manual

ЭНКО



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Read this manual carefully before install, start the pump

I. Applications and conditions

The pumps are non-self-priming vertical multistage centrifugal pumps. The features are high efficient, low noise, a little corrosive liquid resistance, compact structure, good appearance, small volume, light weight, easy to service, good seal performance, etc.

1.Applications

• Pumped liquids: Low viscosity, neutral, non-explosive liquids, not containing solid particles or fibres. The liquid must not attack the pump materials chemically.

- Boiler water supply and condensing system;
- Water treatment, filtration system;
- Food and beverage industries;
- Pressure boosting in high-rise buildings;
- Farmland irrigation, nursery irrigation and golf court irrigation;
- Industry cleaning system;
- Liquid conveying, circulation and boosting;
- Hot and cool water;

2.Operation conditions

• Medium temperature: Normal temperature type $-15^{\circ}\text{C} \sim +70^{\circ}\text{C}$;
Hot water type $-15^{\circ}\text{C} \sim +105^{\circ}\text{C}$;

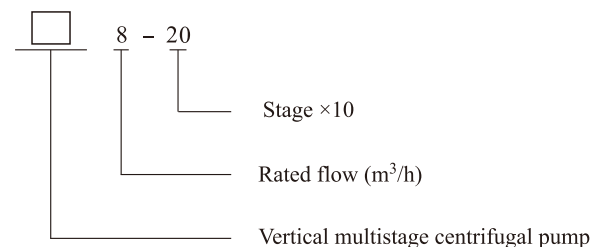
- Flow: $0.4 \sim 180\text{m}^3/\text{h}$
- Medium pH range: pH 5-9;
- Maximum ambient temperature: $+40^{\circ}\text{C}$;
- Maximum altitude: 1000 m;
- Minimum inlet pressure: Refer to the catalogue;

Caution:When pumping liquids with a density and/or viscosity higher than that of water, use motors with correspondingly higher outputs, if required.

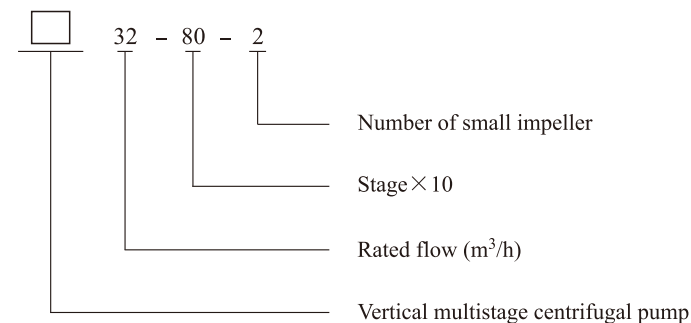


II. Definition of model

1.Rated Flow(m^3/h): 1,2,3,4,5,8,10,12,15,16,20



2.Rated Flow(m^3/h): 32,45,64,90,100,130,160





III. Structure

• The pump is mainly composed of motor, pump head, diffuser, impeller, cylinder, inlet & outlet chamber, pump shaft, mechanical seal and so on. Refer to Fig1-1, 1-2, 1-3, 1-4.

• Key parts of the pump, diffuser, impeller, cylinder, shaft, are all made of stainless steel.

• Mechanical seal is a single face seal. Seal part is cemented carbides/carbon. Support part of support diffuser is made of tungsten carbide.

• Normally, pipes are connected by round flanges. Different types of connections are also available on demand of customer.

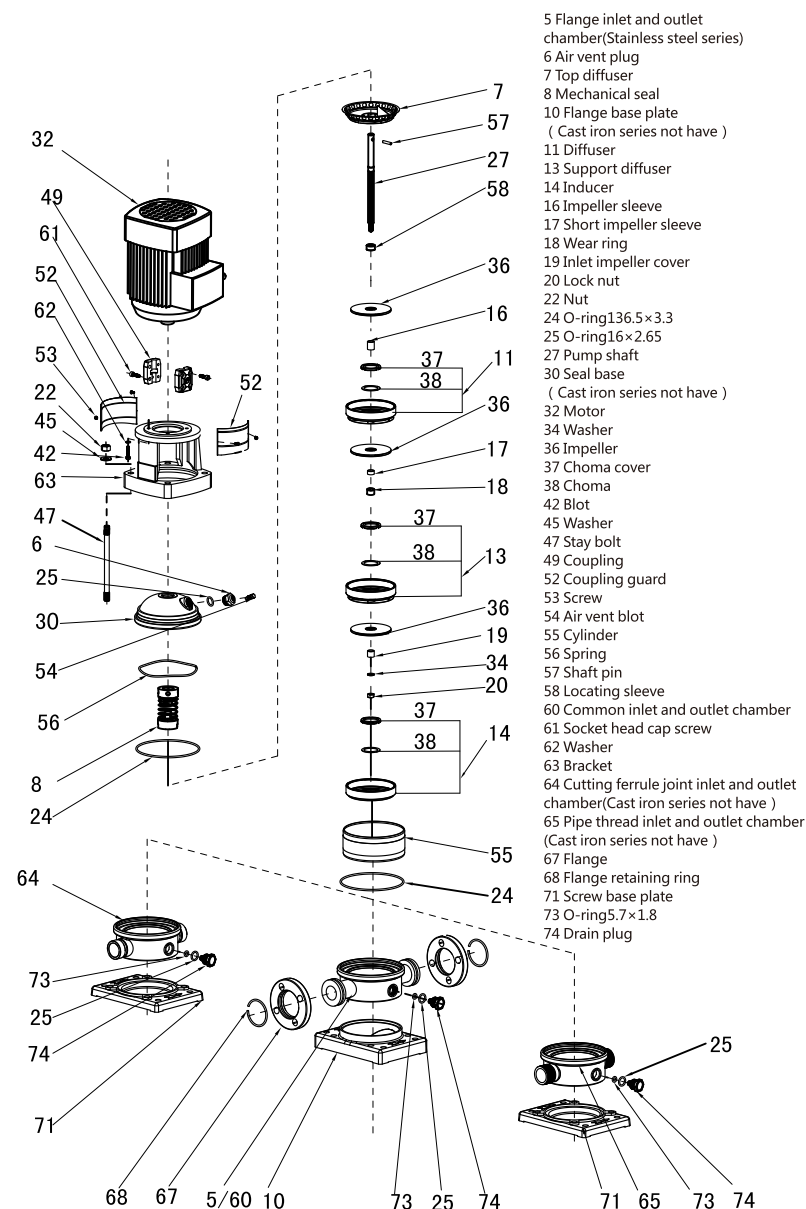


Fig 1-1 1/2/3/4/5

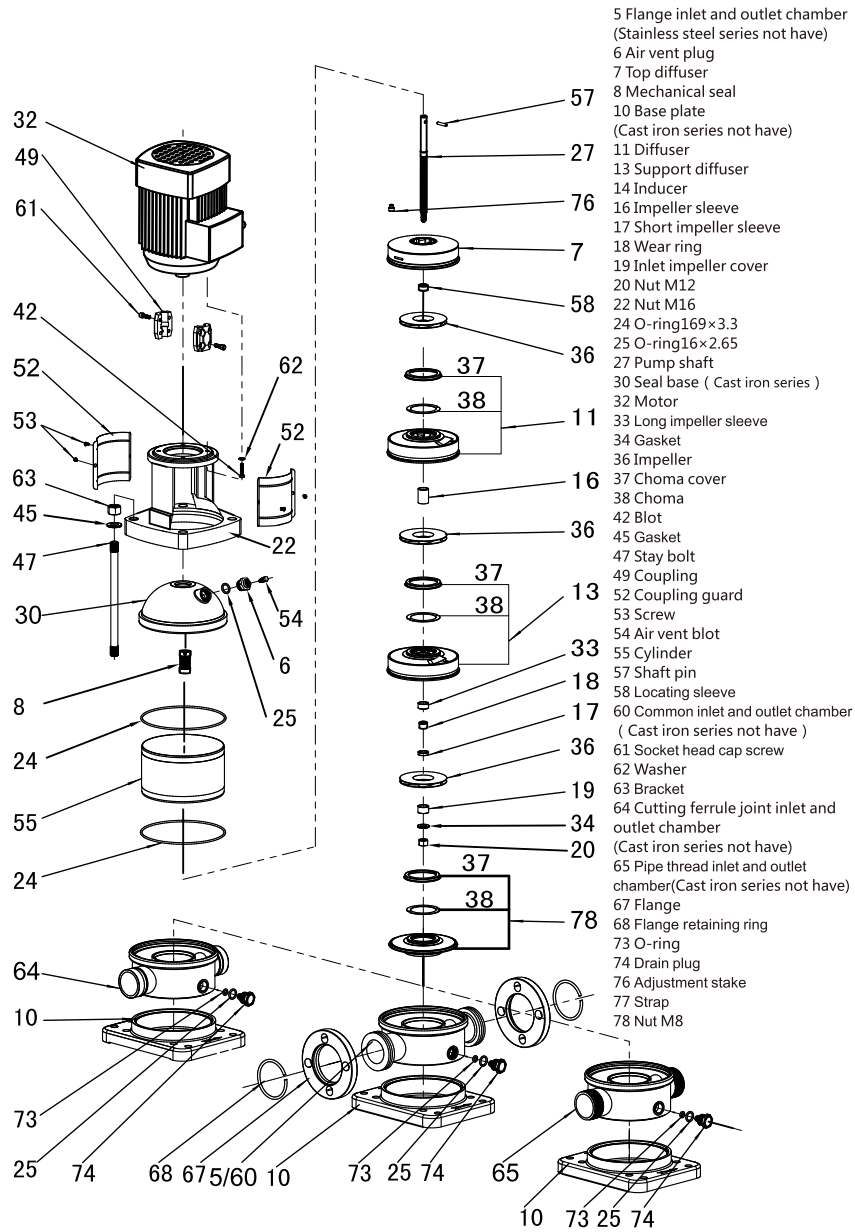


Fig 1-2 8/10/12/15/16/20

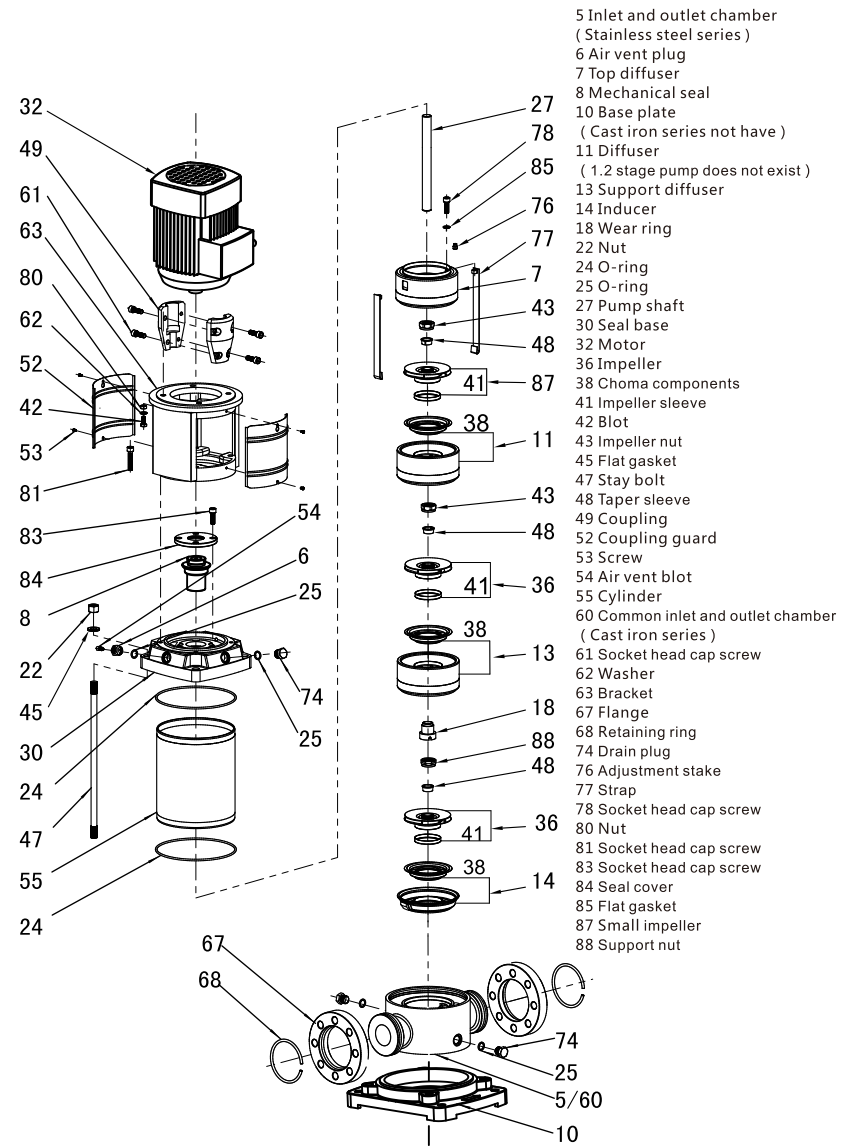


Fig 1-3 32/45/64/90

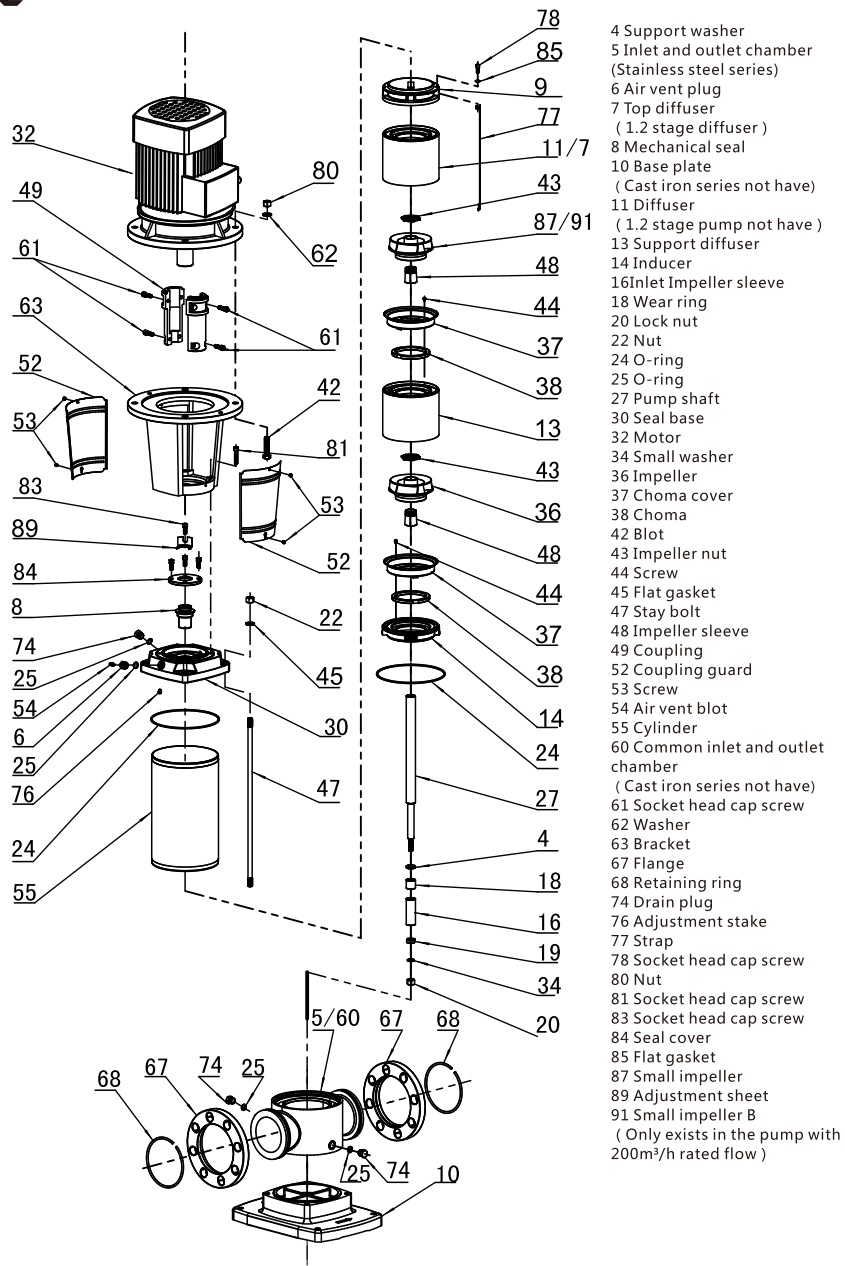


Fig 1-4 100,130,160



IV. Installation and connection

1. Handling

When lifting the entire pump with motor, follow these instructions:

- Pump with motor sizes 0.37-7.5kW:
Lift the pump in the motor flange by means of straps or the like.
- Pump with motor sizes 11-75kW:
Lift the pump by means of the motor eyebolts.

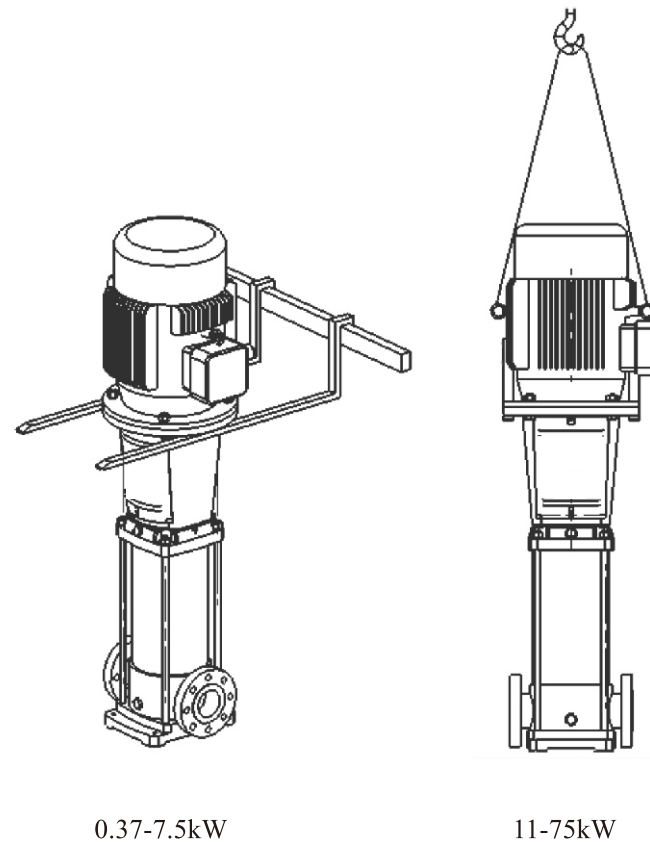


Fig 2



The pump should be sited in a well ventilated and frost-free position. The distance between pump-motor and other objects should be at least 150mm, in order to cool the motor by fan with enough air.

- To reduce the head loss of inlet as least as possible, the inlet pipe shall be as short as possible.

- Ensure the check valve is installed in pipe line system before the pump installation. If pump is used for boiler water supply, a check valve must be installed in the piping between pump and boiler.

- Pump shall be installed in cement base or other similar base with suitable height. It can also be installed in fixed grounds or fixed brackets on wall. Pay attention not to let the weight of pipe system on pump to prevent pump from damage.

Caution: When installation, motor is not allowed to be hung upside down.

- Arrow on the inlet and outlet chamber shows the direction of flow of liquid through the pump. Check whether the liquid can flow easily before starting pump.

- Before pump installation, the inlet pipe line shall be cleaned. If there is impurities in the pipe, it is necessary to install a strainer at 0.5-1m in front of the pump inlet (particularly recommended for pump with flow less than 8m³/h).

The air locks shall be avoided when installing the inlet pipe line. see Fig. 3

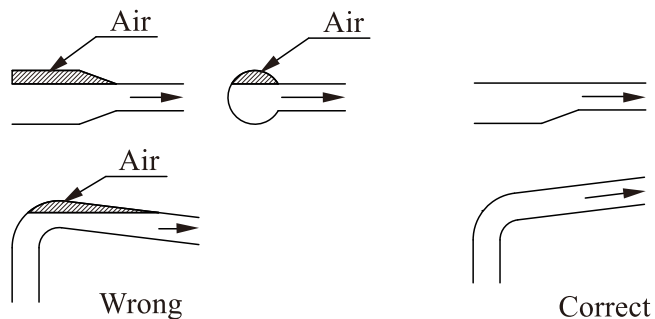


Figure 3



- If the outlet globe valve might be closed(or the flow is decreased to be zero), a bypass shall be installed in outlet pipeline to ensure adequate lubricating and cooling water to pass the pump.

2. Electrical connection

- The electrical connections should be carried out by an authorized electrician.

- To make sure the motor is suitable for the power supply, cables of the motor must be connected to power supply according to the Fig. on the terminal box and the motor nameplate.

- Motor shall be connected with a fast and effective motor starter, to ensure that the motor will not be damaged by lack of phase, unstable voltage or overload. The motor shall be earthed reliably.

Caution: Before take apart the terminal box cover or dismantle pump, make sure that the power supply is switched off.

Warning - Electrical connection and safety devices

- The pump units should be connected to the power supply by the appropriately rated power cables according to the motor ratings.

- The pump units should always be equipped with safety devices as required in the standards (EN 809 and/or EN 60204-1) as well as by the national rules of the country where the pump is used.

- Despite the rules of any country, the power supply to the pump unit must be equipped with at least following electrical safety devices with appropriate ratings:

- Emergency switch
- Circuit breaker (as a supply disconnecting (isolating) device as well as an overcurrent protective device)
- Motor overload protection

- Before open the terminal box, please shut off the power supply to prevent from power shock.

- Before open the coupling guards, please stop pump firstly to prevent from hurts.

- When installing the pump, please fix the foundation bolts vertically to prevent from pump falls to hurt people.

- Please fill grease to the pump when it req.

For motor power is less than 5.5kW, it is free of filling grease. For motor power is equal or bigger than 5.5kW, please fill grease every 5000 running hours.



V. Start-up, operation and maintenance

Caution: Read the label on the cylinder carefully before start-up.

1. Do not start the pump until it has been filled with water or liquid fully.

- Fill water in pump in inverse pouring system.

Close the pump outlet valve, release air vent screw on the pump head, and open the inlet valve slowly until stable water flows from the air vent screw. Then fasten the screw. Open the check valve completely in the inlet pipeline.

• In open system, fill water in pump when liquid surface is lower than pump.

Notice: A check valve shall be installed in the inlet pipe.

Close the pump outlet valve, release air vent screw and fill the liquid in pump through the air vent screw hole until the pump and inlet pipe line are filled with water fully. Fasten the air vent screw again.

Caution: Do not start the pump until it has been filled with liquid fully and air vented. Be careful the direction of the air vent screw hole. Make sure the flowing water will not hurt persons or pump or its parts. Especially, prevent from hurting for the hot water application.

2. Check the rotary direction

Switch on the power supply and view the rotary direction by viewing the motor fan. Arrow on the pump head indicates the correct direction of rotation. That is, from the motor end, pump shall run counter-clockwise.

3. Check before pump start-up

- Check whether the foundation bolt is fasten.
- Check whether pump is filled with water fully.
- Check whether the voltage of power supply is correct.
- Check whether it turns correctly.
- To make sure all pipe lines are connected tightly and can supply water normally.

• The valves in the inlet pipe line are completely opened and the outlet valve shall be opened slowly after the pump is started up.

- Check the operation pressure if pressure meter is installed.
- Check all the controls for normal operation. If the pump is controlled by pressure switch, check and adjust the starting pressure and stopping pressure. Check the full load current to make sure it not surpasses the max. Current.

4. Frequency of pump starts

Pump should not be started too frequently. It is suggested pump shall not be started more than 100 times per hour if the motor power is less or equal to 4kW. When motor power is big than 4kW, pump shall not be sta-



rted more than 20 times in one hour. If pump starts and stops too frequently, control device shall be checked and adjusted to make pump not start and stop too frequently. Also, it is necessary to check the installation.

5. Suggestion: When pump running, flow should be controlled at the range of 0.5-1.3 times of rated flow.

6. Pump which is installed according to this installation manual will work effectively and require a little maintenance.

• Mechanical seal will be adjusted automatically, the moving part and stationary part is lubricated and cooled by the transferring liquid. When replace the mechanical seal, the user needn't to disassemble the motor for power bigger than 7.5kW.

- The bearing in pump is lubricated by the transferring liquid.

7. Frost Protecting

Pump can be used in the system with anti-frozen measures to water. If the pump is installed in easily frozen place, suitable antifreeze shall be added to the transferring liquid to prevent pump from being damaged. If antifreeze is not used, pump shall be stopped when it is frozen. Pumps which are not being used should be drained.

8. The following should be checked regularly for pump.

- Pump working and operating pressure
- Possible leakage
- Possible motor overheat
- Cleaning/replacement of all strainers
- The switch off time of motor when overload
- Frequency of starts and stops.
- All control operation

If malfunction is found, check system according to “Fault finding and solution chart”

9. Pump shall be cleaned and kept appropriately when it is not used for a long time.

10. Pump shall be prevented from being corrupted and damaged in storage.



VI. Assemble and disassemble

1. Rated flow 1,2,3,4,5 m³/h

- Put the circlip cover on the shaft, and then fit the sleeve, impeller, impeller sleeve, diffuser, support diffuser. Continue the assemble order till the last impeller is fitted. Then fit the impeller cover, washer, screw the nut. Pay attention to the position of the support diffuser, for less stages pump, the last one is support diffuser. For more stages pump, support diffuser should be increased accordingly, the distance of each support diffuser should be even, and put on the support sleeve and bearing with support diffuser.

- Put the inducer on the inlet & outlet chamber, and then fit the finished parts as above on the inducer.

- Fit the O-ring on the inlet & outlet chamber, put on the cylinder and the top diffuser.

- Put the pump head installed with O-ring, lining and corrugated spring on the cylinder. Screw the four nuts of the stay bolts on the base plate. Do not tighten one nut completely at one time, but tighten them symmetrically in turn.

- Fit the mechanical seal and tighten it, then install motor and coupling, screw the bolts in coupling (but not tightly), press the coupling and shaft down to the direction of the base plate. Then lift it about 1mm in reverse direction, tighten the screws. Note that the space between the two couplings should be equal.

- Tighten fixing bolts in mechanical seal, rotate the coupling to ensure that the shaft can rotate freely and not be choked.

Reverse the process above can disassemble a pump.

2. Rated flow 8,10,12,15,16,20 m³/h

- Put the circlip cover on the shaft, and then fit the sleeve, impeller, impeller sleeve, diffuser, support diffuser, bearing, support sleeve. Continue the assemble order till the last impeller is fitted, and then install the impeller cover, washer, tighten the nuts.

- Put the inlet & outlet chamber on the base plate, then put the O-ring, clamp plate, inducer on inlet & outlet chamber, then put the finished parts on the inducer, and put the top diffuser on the top, tighten nuts of straps. At last, put on the cylinder.

- Put the pump head installed with O-ring, lining and adjusting rubber on the cylinder, then tighten the four stay bolts symmetrically in turn.

- Fit the mechanical seal and tighten it, then install motor and coupling, screw the bolts in coupling (but not tightly), press the coupling and shaft down to the direction of the base plate. Then lift it about 1mm in reverse di-



rection, tighten the screws. Note that the space between the two couplings should be equal.

- Tighten fixing bolts in mechanical seal, rotate the coupling to ensure that the shaft can rotate freely and not be choked.

Reverse the process above can disassemble a pump.

3. Rated flow 32,45,64,90 m³/h

- Put the inlet & outlet chamber on the base plate, fit flanges on inlet & outlet chamber at two sides, and fit the inducer.

- Put the first impeller on the shaft, tighten the nuts and put the impeller on the neck ring base of inducer, then put on the diffuser, impeller, support diffuser, until the top diffuser, then fix all the diffuser with the straps.

- shaft parts: fit the bottom sleeve, cover, washer on the shaft, tighten the bolts, fit bottom bearing on the inlet & outlet chamber, fit washer. Then put the shaft parts on the inlet & outlet chamber, fit on O-ring, lubricate the O ring and then put on the cylinder.

- Fit stay bolts on the base plate, then fit the O-ring, adjusting rubber, air vent gag on the pump head, and put the pump head on the stay bolts, then put on the washer and tighten all the nuts.

- Fit the mechanical seal on the pump head, then fit the seal cover, tighten the bolts, and the bolts in the seal. Lift the shaft and insert the adjusting slice.

- Fit the bracket and motor on the pump head.

Finally fit the coupling, tighten the bolts, and take out the adjusting slice. Rotate the coupling to ensure that the shaft can rotate freely and not be choked. Reverse the above process to disassemble a pump.

4. Rated flow 100,130,160m³/h

- Put the inlet & outlet chamber on the base plate, fit flanges on inlet & outlet chamber at two sides, and fit the inducer.

- Fit washer, shaft sleeve, inlet impeller sleeve, cover, washer, fasten the nut.

- Fit impeller shaft sleeve, impeller, fasten impeller nut.

- Put the shaft parts on the inducer, fit support diffuser, impeller sleeve, impeller, fasten impeller nut, then, fit diffuser, impeller, etc. till the last diffuser.

- Fit the top diffuser, use straps to fasten all diffusers. Fit O-ring on the inlet and outlet chamber, lubricate them and put on cylinder.

- Fit stay bolts on the base plate, fit O-ring on the pump head, adjusting rubber, air vent screw, etc. Then put pump head on the stay bolts, fit washer, fasten nut.



• Fit the mechanical seal on the pump head, then fit the seal cover, tighten the bolts, and tighten the bolts in the seal. Lift the shaft and insert the adjusting slice.

• Fit the bracket and motor on the pump head. Finally fit the coupling, tighten the bolts, and take out the adjusting slice. Rotate the coupling to ensure that the shaft can rotate freely and not be choked and loose. Reverse the above process to disassemble a pump.



VII. Fault finding and solution chart

Caution: Before removing the terminal box cover and before any removal/dismantling of the pump, make sure that the power supply has been switched off.

Fault	Cause	Solution	Remarks
Motor does not run when started	a) Power supply failure.	a) Check power supply.	
	b) Fuses are blown.	b) Replace fuses.	
	c) Motor is overloaded.	c) Check system.	
	d) Main contacts of starter are not connected well or the coil is defective.	d) Replace motor starter.	
	e) Control circuit is defective.	e) Check control circuit.	
	f) Motor is defective.	f) Repair.	
Overload device of motor starter trips out immediately when power supply is switched on.	a) Fuses are blown.	a) Replace fuses.	In the case of d) and e), users shall not disassemble the pump by themselves.
	b) Contacts of overload device are faulty.	b) Check motor starter.	
	c) Cable connection is loose or faulty.	c) Check cables and power supply	
	d) Motor winding is defective.	d) Replace motor	
	e) Pump mechanically blocked.	e) Check and repair pump	
Overload device trips out occasionally.	a) The setting of overload is too low.	a) Reset overload setting	
	b) Periodic power supply faults.	b) Check power supply	
	c) Low voltage at peak times.	c) Add regulator.	
Motor starter has not tripped out but the pump does not run.	a) Contacts of starter are not contacted well or the coil is faulty.	a) Change motor starter	
	b) Control circuit are defective	b) Check control circuit	



Continued

Fault	Cause	Solution	Remarks
Pumped water does not flow constantly	a) Suction pipe is too small.	a) Enlarge inlet pipeline	
	b) There is not sufficient water in pump water inlet.	b) Improve system and increase coming water	
	c) Liquid level is low.	c) Try to lift liquid level.	
	d) Pump inlet pressure is too low compared with water temperature, pipeline loss and flow.	d) Improve system and try to increase the inlet pressure.	
	e) Suction pipe is partly blocked by impurities.	e) Check and clear impurities.	
Pump runs but gives no water.	a) Suction pipe is blocked by impurities.	a) Check and clean suction pipe.	
	b) Foot valve or check valve is closed.	b) Check and repair foot valve or check valve.	
	c) Leakage in suction pipe.	c) Check and repair suction pipe.	
	d) There is air in suction pipe or pump.	d) Refill liquid, release air.	
Pump runs backwards when switched off.	a) Leakage in suction pipe.	a) Check suction pipe	
	b) Foot valve or check valve is defective.	b) Check and repair foot valve or check valve.	
	c) Foot valve is blocked in opened or partly opened position.	c) Check and repair foot valve.	
	d) There is air in suction pipe.	d) Check and repair suction pipe and release air.	



Continued

Fault	Cause	Solution	Remarks
Abnormal vibration or noise from pump	a) Leakage in suction pipe.	a) Check and repair suction pipe.	In the case of e), users shall not disassemble the pump by themselves.
	b) Suction pipe is too small or suction pipe is partly blocked by impurities.	b) Enlarge or check suction pipe.	
	c) There is air in suction pipe or pump.	c) Refill liquid to the pump and vent air.	
	d) The comparison of the delivery head of device with delivery head of pump is very low.	d) Improve system or choose another pump model.	
	e) Pump mechanically blocked.	e) Check and repair pump.	

VIII. Important notice

1. Pump will be guaranteed for one year under normal operation with the correct model. Wearing part is not included.

2. Users shall be responsible for the damage if they disassemble the pumps by themselves in guaranteed period.

Dear customer, we wish you enjoy using our high performance and reliable product ,thank you.