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TDR00 SERIES

In-line
Circulation
Pump

*Installation, Operation
and Maintenance Manual*



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Read this manual carefully before install, start the pump

Standard:Q/HNB007(In-line circulation centrifugal pump)

Contents

I. General	1
II. Shipment and moving	1
III. Operating conditions	1
IV. Notices for installation and operation	2
V. Electrical connection	4
VI. Pump starting	4
VII. Repair and maintenance	5
VIII. Technical data	5
IX. Fault finding chart	7
X. Model definition	9
XI. Structure	9
XII. Important Notice	11

I. General

TDROO in-line circulation centrifugal pump is single stage, single suction centrifugal pump. We use an excellently performed hydraulic model when designing. Flow part of pump is manufactured by precision casting technology. The technology makes flow part smooth with little friction and high efficiency.

The advantage of TDROO series is energy saving, little noise, reliable performance. The structure is compact. It is easy to assemble and dismantle. It can be connected with pipe work directly. It is used for liquid transferring and circulation and boosting.

II. Shipment and Moving

TDROO is packaged by wood. Pump unit and motor is supplied as one part. When installation big pump, connect casing with pipes firstly, then lift motor and pump head including motor, pump head, shaft, impeller onto the casing. When lifting a full pump, note not lift it very high.

III. Operating Conditions

1.Application

TDROO series are applied to cold, hot water transferring and circulation.

- Boiler pumping;
- Water pumping for residential subdistricts;
- Center heat supply system for subdistricts and apartments;
- Water circulating system for refrigeration for center air conditioning system;

• Washing system;

• Warm water home system

• Normal industrial water system.

2.Pumping liquid

The pump liquid should be thin, clean, non-flammable, and non-explosive which should not contain grain and fibre that might damage the pump mechanical seal.

- Pumping water for center heating system of normal industrial water system(Water should comply with relating standard of heat water supply system);

- Liquid for cooling;
- Water for using at home
- Water for industrial use or industrial liquid
- Intenerated water

When pumping liquids with a density and/or viscosity higher than those of water, it will lead to the follows.

- Pressure dropped down greatly;
- Hydraulic performance decreases;
- Power consuming increased

Some time, pump needs to be supplied with bigger power motor in some condition. The original rubber ring is only suitable for water or liquid at PH 4-9.

If the pumping liquid contains of mineral, oil, chemical preparation, or any other liquid different from water, rubber ring should be re-chosen.

IV. Notices for installation and operation

- When pump hot or poison liquid, there should be a guard or a sign to prevent people from touching pump surface by accident.
- The pump should be sited in a well ventilated and ambient temperature should be bigger than 0°C (frost-free position).
- The arrow on the flange indicates the flowing direction. The direction of motor rotation is clockwise from motor end which can be seen from the sign on motor fan cover.
- If motor power is not more than 2.2kW, pump can be installed horizontally or vertically on pipes.
- If motor power is bigger than 2.2kW, pump must be installed vertically on pipes.

Notice:

1. The motor for pump must site higher than pipes.
2. When installation, there should be enough space on top of pump for cleaning and dismantling in order to move motor and clean up parts. The enough space is as follows:
 - It should be 300mm if motor power is less than or equal to 4.0kW.
 - It should be 1000mm if motor power is 5.5kW or bigger than 5.5kW.
 - In the pump room, on very top of the motor, it should be well ventilated by air or by mechanism device.

If the pump is used to pump thick and easy to froze liquid at 0°C which will lead to block the pump, heat device can be used. When the pump stops, if it is so cold that will lead to frozen the flowing liquid, water-cut hole must

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face down and it must be opened.

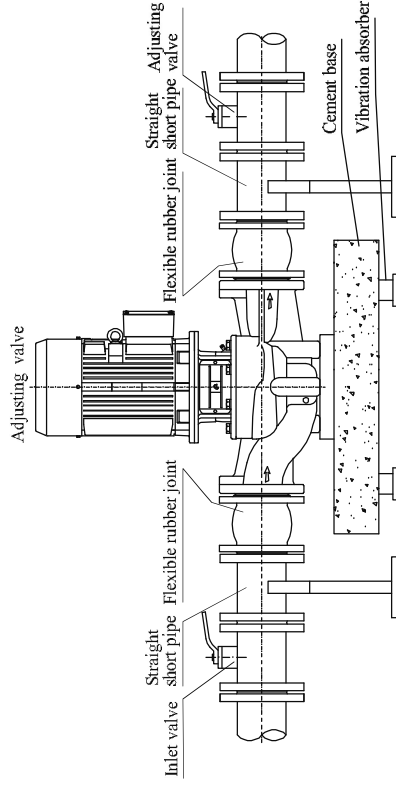
Notice: Technical data must be compiled with chapter VIII.

1. Requirement for pipes.

1) If the pump or pipes will be cleaned or maintained usually, it is required to install valves on the two sides of the pipes to prevent from draining the system.

2) If the pipes on the two sides can support pump and matched motor power is less or equal to 2.2kW, pump can be hung on the pipes.

3) If the matched motor power is bigger than 2.2kW, place some concrete base or vibration resistant device as fig. shows below. The base or vibration resistance device is also workable with the motor less than 3kW.



4) When installing pipes, pump must be supported hardly. In order to prevent pipes from being pressed greatly.

5) The inlet size of pump must be fulfilled with the designed flow and designed pressure for suction.

6) When installing pipes, it must be avoided that grain or deposit to go down to the bottom of the pump.

7) When installing pipes, it must be avoided that there was air in the pipes, especially in suction pipe.

Notice: Pump is not allowed to be started if the valves are closed completely, which will lead to temperature rising or vapor. It will damage flow part or seal of pump. Before starting pump, open inlet valves fully, open outlet valve a little or open little flow bypass, the flow should be 10% of the nominal flow which is indicated in the pump nameplate.

2. Terminal box

Before starting pump, power cables should be checked, check the swit-

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ch if it is switched on or not. Make sure switch will not be switched on by accident before connecting cables. Terminal box can be installed by turning at 90° with motor. To change the place of terminal box can be done as follows.

- 1) Switch off the power.
 - 2) Remove the screws locking motor and pump.
 - 3) Turn motor to the required place.
 - 4) Rescrew the screws locking motor and pump and tighten screws.
 - 5) Refit the safe device and connect power cables.
3. Base

There are two screwed holes in the bottom of pump which is for connecting base. The base size will be decided as required.

4. Frost-free protection

Pump can't be used in the cold days or easy to be frozen days. If it must be used in the above condition, drain pump and pipes when pump stops.

V. Electrical connection

1. The power cable connection of the pump should be complied with local regulations.
2. The electrical connections should be carried out by an authorized electrician.
3. Before changing or turning terminal box or moving or dismantling pump, power supply must be switched off.
4. Pump must be connected with outer main power cables by one-way switch.
5. Power voltage and frequency should comply with operating voltage and frequency indicated in the pump nameplate.
6. Pump should be earthed and electricity leakage precaution should be applied. Electrical device should be connected reliably, to ensure that the motor will not be damaged by lack of phase, unstable voltage or overload.

VI. Pump starting

Do not start the pump until it has been filled with liquid fully and air vented fully.

1. Filling water to pump
- 1) Close the pump valve, release air vent screw on the pump head, unscrew it a little to vent the air fully. Be careful not let the air vent screw aim to people or motor or other objects that will be damaged by the liquid in the pump. And do not take away the air vent screw. Do not aim the air vent screw hole to people or motor or other objects that will be damaged by the liquid in the pump especially pumping hot water or chemical preparation to

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prevent them from hurting.

- 2) Open valve slowly until liquid flow from air vent screw steadily.
 - 3) Tighten air vent screw and open valve fully.
2. Running
- 1) Before pump starting, open inlet valve fully and open outlet valve a little.
 - 2) Checking pump rotating direction, open outlet valve slowly to adjust the flow till required.
 - 3) Note pump running, stop and repair it when there is something wrong.

VII. Repair and maintenance

Before pump starting, make sure switches can be switched on/off to guarantee power can be switched freely.

1. Pump unit

Pump should be checked and maintained periodically. If the pump will not used for a long time, inject some silicone grease for lubricating in shaft and shaft seal to prevent the surface of shaft seal from being choked.

2. Motor

- Motor should be checked regularly. Ensure site well ventilated, keep motor clean.
- If pump is installed in a place full of dust, check and clean up motor regularly.

VIII. Technical data

- Ambient temperature: Max +40°C
- Liquid temperature: -15°C to 110°C
- Performance data refer to pump name plate or pump catalog.
- Working pressure/testing pressure

Testing pressure: The value is got by testing with 20°C clean water without purities.

Inlet pressure: In order to keep pump run correctly, adjust pump inlet pressure correctly. TDROO pressure condition (The net positive suction head-NPSH);

We recommend applying to the NPSH as following table 1,2 listed in order to prevent impeller from being cavitation, make sure pump work well, deduce vibration and noise.

The value listed in the table is the relative pressure in bar which can be read from pressure meter on the side of inlet.

NPSH can be also calculated by the following formula.

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

H Maximum suction head(m)

P_b- Atmosphere pressure(bar)

In a closed system, P_b means system pressure(bar)

NPSH Net positive suction head(m)

It can read out from the point of possible max. flow rate shown on NPSH curve.

H_f - Pipeline loss at the inlet(m)

It is in accordance with pipeline possible max. Flow.

H_v Steam pressure(m)

It depends on liquid temperature and steam pressure value.

H_s Safety margin(m)

Minimum 0.5 deliver head.

If the calculated result H is positive, the pump may run under the maximum suction head H. In case the calculated result H is negative, there should be a minimum pressure that is "H" meter in the inlet, so the pumps can work well. Please refer to the catalogue for the minimum inlet pressure data.

Note: Normally, the above calculation need not to do. H is calculated only in the following conditions:

1. The liquid temperature is comparatively higher.
2. Liquid flow exceeds rated value;
3. Suction head is comparatively big or inlet pipeline is long;
4. System pressure is too low;
5. Bad inlet condition.
6. Environment requirement: Pump should be worked in non-flammable, non-explosive places. The maximum humidity is 95%.

IX. Fault finding chart

Before open, repair, dismantle or move pump, make sure that the electricity power has been switched off and will not be switched on by accident. For parallel connected pumps, spare pump moving slowly is normal.

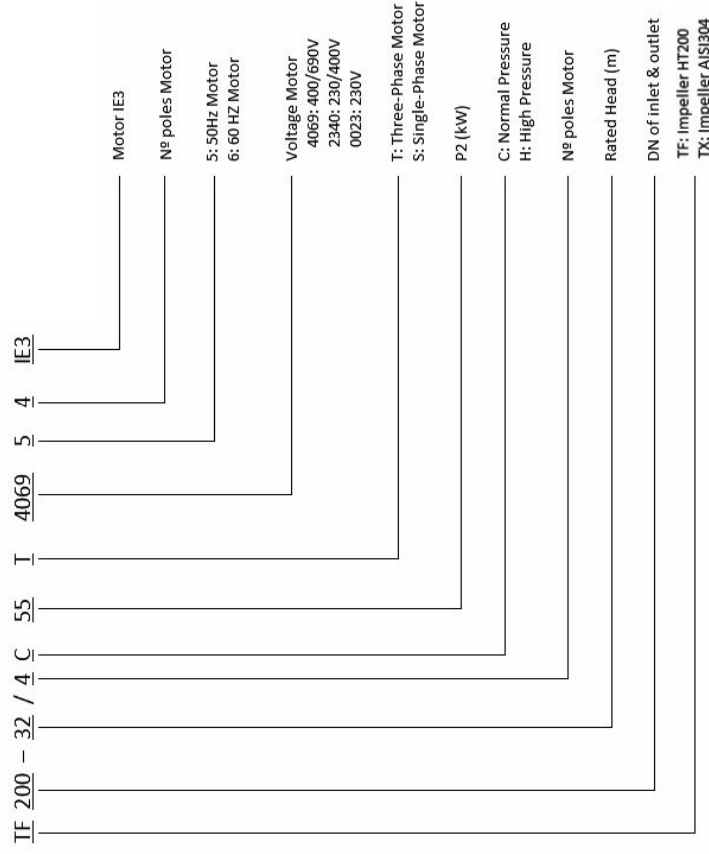
Fault	Cause
1. Motor does not run when started	<ol style="list-style-type: none"> a. Circulation is defective. b. Fuses blown. c. Motor starter trips. d. Contacts of motor starter are disconnected or are not connected well. e. Fuse of control device is blown. f. Something wrong with motor.
2. Motor starter trips when switch on.	<ol style="list-style-type: none"> a. Circulation is defective. b. Motor starter trips. c. Cables connection is loose. d. Twisted cables of motor is defective. e. Pump is blocked. f. Overload setting is too low.
3. Motor start trips occasionally.	<ol style="list-style-type: none"> a. Overload setting is too low. b. Power waves periodically. c. Pressure of outlet subtracts inlet is too low.
4. Motor starter does not trip occasionally but motor does not start.	<ol style="list-style-type: none"> a. Power cable is defective. b. Fuse blow. c. Main cable of motor starter and start coil are defective. d. Control circuit is defective.
5. Water flow is not constant	<ol style="list-style-type: none"> a. Inlet pressure is too low. b. Inlet or inlet pipe are blocked by impurities. c. There is air in the pump.
6. No water pumped.	<ol style="list-style-type: none"> a. Inlet or inlet pipe are blocked by impurities. b. Something wrong with foot valve or non-return valve. c. Suction pipe is leaked. d. There is air in suction pipe or pump. e. Motor rotates reversely.

Continued

Fault	Cause
7. Rotates persistently or rotates suddenly or stop suddenly	<ul style="list-style-type: none"> a. There is high pressure difference in pipes when start or stop. b. Real water flow is bigger than expecting. c. Outlet pipe leaks. d. Installation direction of pump is wrong. e. Pipes, valves, filters are blocked by impurities. f. Control device of pump is defective.
8. Noise	<ul style="list-style-type: none"> a. Pump is running without water. b. Place of pump shaft is not correct, so pump can't run well. c. Motor rotating shaft resonate with device. d. There is impurities in pump
9. There is leakage in shaft seal.	<ul style="list-style-type: none"> a. Place of pump shaft is not correct. b. Shaft seal is not good.
10. Stop periodically for a long time(rotate or stop suddenly)	<ul style="list-style-type: none"> a. There is high pressure in pipes when stops. b. Flow is bigger than estimated. c. Pump parts are blocked or twisted. d. Pipes, valves, strainer are blocked by impurities. e. Outlet pipe leaks.
11. Pump runs reversely when switches off.	<ul style="list-style-type: none"> a. Inlet pipe leaks. b. Foot valve or non-return valve are defective. c. Foot valve or non-return valve are opened or half opened.

X. Model definition

1. Pump model



XI. Structure

- 1) TDROO in-line circulation pump is vertical single stage centrifugal pump Motor extension is connected with pump shaft directly and fixed by bolts axially. Inlet and outlet are below motor and are at the same level.
- 2) Pump working chamber is composed of casing, pump head; Rotating part is composed of impeller, pump shaft, mechanical seal, key and impeller nut.
- 3) Looking from motor end, pump rotates clock-wisely.

XIII. Important Notice

1. Customers will not be advised if this manual is updated.
2. Pump will be guaranteed for one year under normal operation with the correct model. Wearing part is not included.
3. Users shall be responsible for the damage if they disassemble the pumps by themselves in guaranteed period.

