# HF
# HX
# HN

# HDROO SERIES

## Light Horizontal Multistage Centrifugal Pump

## Operation Manual

hydroo®

HYDROO Pump Industries SL

# DECLARATION OF CONFORMITY

**Machinery Directive: 98/37/EC, 2006/42/EC**
**Low Voltage Directive: 2006/95/EC**
**Electromagnetic Compatibility Directlve: 2004/108/EC**

**Name of manufacturer or supplier**
HYDROO PUMP INDUSTRIES, S.L.

**Full postal address including country of origin**
C/ La Banyeta Nova, 11 - P.I. La Banyeta, 17843 Palol de Revardit (Girona) - Catalonia - Spain

**Description of product**
HF/HX/HN is a kind of horizontal multistage non-self priming multistage centrifugal pump.

**Name, type or model, batch or serial number**
Name: Light Horizontal Multistage Centrifugal Pump
Model: HDROO SERIES (HF, HX, HN)

**Standards used, including number, title, issue date and other relative documents**
Machinery directive 98/37/EC
Machinery directive 2006/42/EC
- Standard: EN809:1998 + A1:2009

Ecodesign Directive 2009/125/EC
- Commission Regulation 547/2012
- Commission Regulation 640/2009

**Place of Issue**
Palol de Revardit, Spain

**Name of authorlsed representative**
Miquel Coma

**Position of authorlsed representative**
CEO

**Declaration**
I declare that as the authorised representative, the above information in relation to the supply / manufacture of this product, is in conformity with the provisions of the above Dlrectlves. For the most specific risks of this machine, safety and compliance with the essential requirements of the Directive has been based on elements of the above standards.

**Authorized representative**

hydroo
Hydroo Pump Industries, S.L.

Miquel Coma
CEO

# CONTENTS

Read this manual carefully
before install, start the pump.

# I. APPLICATIONS AND CONDITIONS

**HF, HX, HN are non-self-priming light horizontal multistage centrifugal pump (abbr. as pump in the following). They are efficient, low noise, little corrosive tolerance, compact structure, good looking, small volume, light weight, etc.**

**1. Applications**

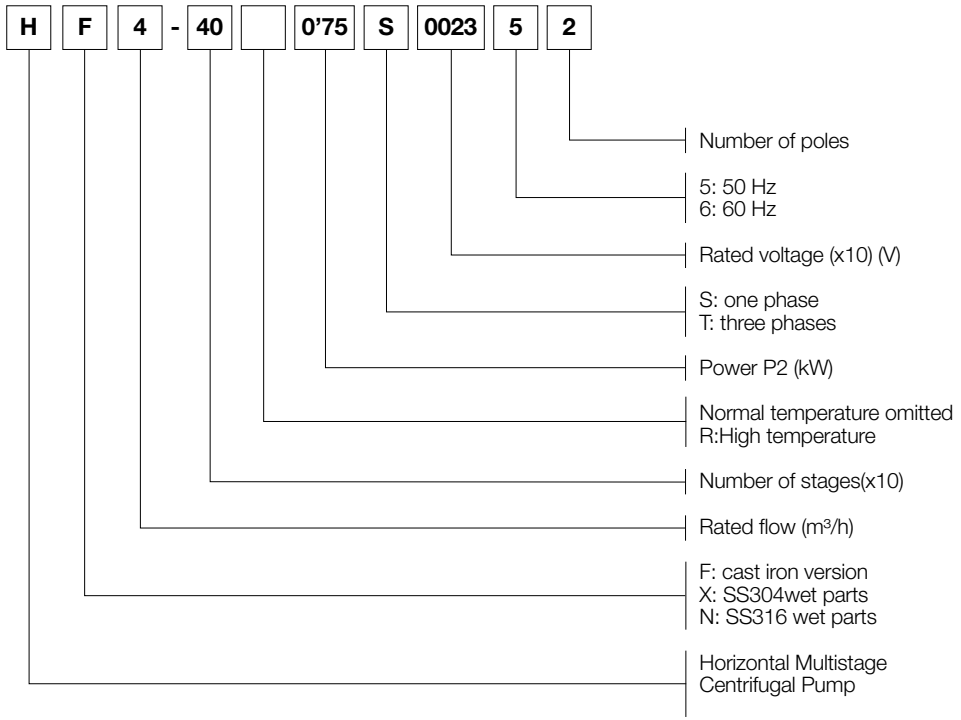
- Pumped liquids: Low viscosity, neutral, non-explosive liquids, not containing so lid particles or fibres. The liquid must not attack the pump materials chemically. (Oil or the liquid mainly consisted of oil can be pumped by special type of pumps);
- Circulation for air condition system;
- Cooling system;
- Water treatment, purification system;
- Industry cleaning system;
- Liquid transferring, circulation, boosting;
- Hot or cold water;
- Feed proportioning system of food, drinking, agriculture, etc.

**2. Operation conditions**

- Liquid temperature: Normal temperature type -15ºC~+70ºC ; Hot water type -15ºC ~+ 110ºC;
- Flow range: 0.5~28 $m^3/h$
- Max pressure: 10 bar
- Liquid pH range: pH5 ~9
- Max ambient temperature: +40ºC
- The Max suction pressure is limited by max operating pressure;
- Min inlet pressure: Refer to HDROO 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

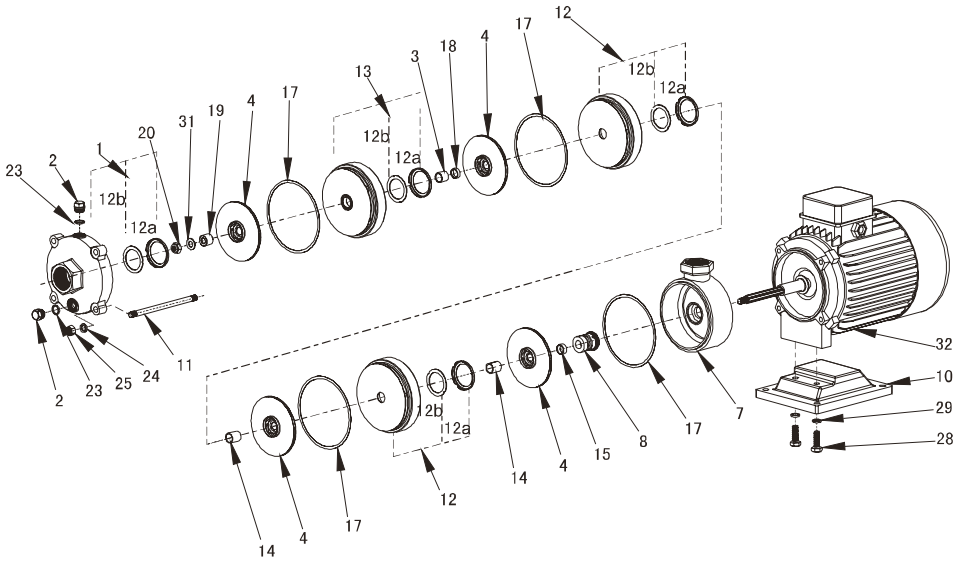


# III. CONSTRUCTION

· Pump is horizontal, multistage, section type. Pump shaft is the extended motor shaft. Axial suction and radical discharge;
· HDROO Series are mainly composed of motor, suction head, discharge head, diffuser, impeller, pump shaft, mechanical seal, etc.
· The key parts of pump---diffuser, impeller, inlet and outlet chamber, pump shaft are made of stainless steel. The suction head and discharge head of HF is made of cast iron.
· Mechanical seal is single face seal. Seal part is made of Silicon Carbide/ Carbide. Other material for Seal part is also available on demand of customers.
· The standard connection type is pipe thread connection, which is conformable with GB7307 standard. See the following pump structure figure.

## HF, HX, HN 2 4-080701

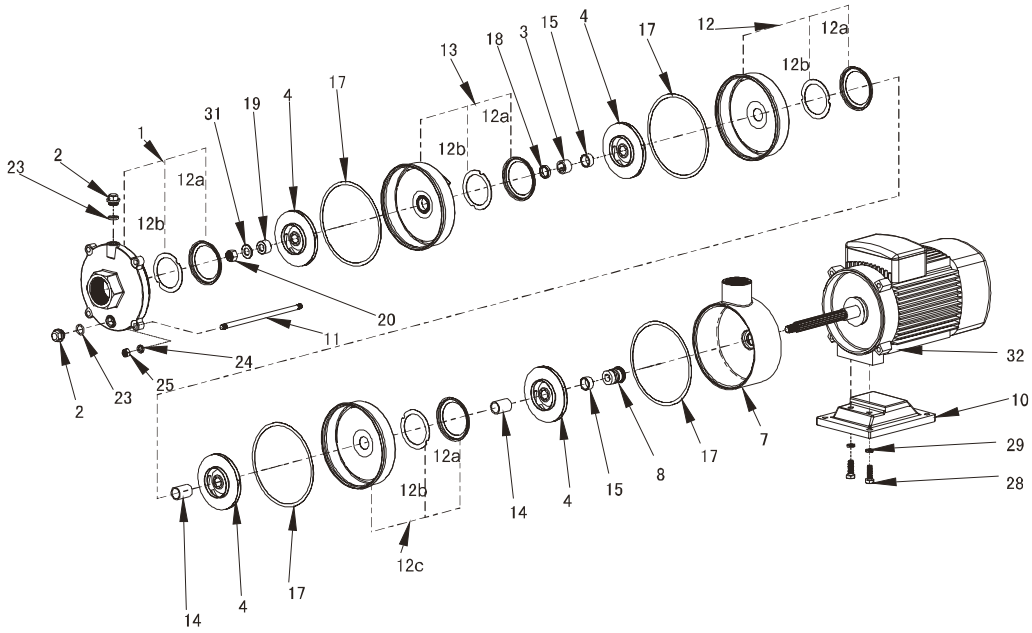
**Fig. 1B HF, HX, HN 2, 4 Pump structure**




1. Suction
2. Plug
3. Bearing (W/O this part in 2-3 stages pump)
4. Impeller
7. Discharge
8. Mechanical Seal
10. Base plate
11. Staybolt
12. Diffuser
12a. Neck ring retainer
12b. Neck ring
13. Support diffuser (W/O this part in 2-3 stages pump)
14. Impeller sleeve
15. Sleeve 1 (W/O this part in HF,HX, HN 2)
17. Seal ring
18. Impeller sleeve(S) (W/O this part in 2-3 stages pump)
19. First impeller cover
20. Nut
23. O ring
24. Spring washer
25. Nut
28. Screw
29. Spring Washer
31. Washer
32. Motor

## HF, HX, HFN 8, 12, 16, 20-080701

**Fig. 1D HF, HX, HN 8, 12, 16, 20 Pump structure**

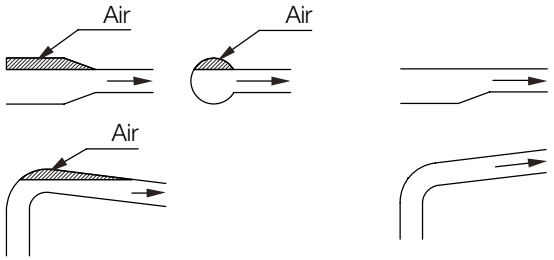



1.- Suction
2.- Plug
3.- Bearing (W/O this part in 1-2 stages pump)
4.- Impeller
7.- Discharge
8.- Mechanical Seal
10.- Base plate
11.- Staybolt
12.- Diffuser (W/O this part in HF, HX, HN 20 1-3 stages pump)
12a.- Neck ring retainer
12b.- Neck ring
12c.- Last diffuser (Only for HF, HX, HN 20)
13.- Support diffuser (W/O this part in 1-2 stages pump)
14.- Impeller sleeve
15.- Impeller sleeve(L) (W/O this part in 1-2 stages pump)
17.- Seal ring
18.- Impeller sleeve(S) (W/O this part in 1-2 stages pump)
19.- First impeller cover
20.- Nut
23.- O ring
24.- Washer
2S.- Nut
28.- Screw
29.- Spring washer
31.- Washer
32.- Motor

# IV. INSTALLATION AND CONNECTION

### 1. Installation

· Pump should be sited in a well ventilated but frost-free position. The distance between pump with 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 to prevent liquid from returning.
· Pump should be fixed in ground or fixed on the brackets on wall. Pump should be safely flxed and stable. Pay attention not to let the weight of pipe system on pump to prevent pump from damage.
· Before pump installation. the inlet pipeline shall be cleaned. If there is impurities in the pipe, it is necessary to install a strainer at 0.5-1mm in front of the pump inlet.
· The air pockets shall be avoided when installing the inlet pipe line. *See Fig. 2*




· It is necessary to flt a pressure meter to observe and control operation of pump.
· When the height of pump position is higher than liquid level, in the suction range of pump, a foot valve should be installed in the inlet pipe end.
And fit a water pouring screw hole in the drainage pipe. It is used for pouring water in before starting pump.

### 2. Electrical connection

· The electrical connections should be carried out by a qualified electrician.
· To make sure the motor is suitable for the power supply, cables ofthe 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

The following table is for suggestion:
3 phase motors:

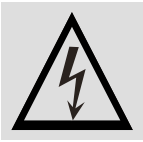
| 380V (50Hz/60Hz) | | | | | | |
|---|---|---|---|---|---|---|
| No. | Power input (Kw) | Cable connection | Input current (A) | Cable spec ($mm^2$) | Circuit breaker (A) | Thermal protector (A) |
| 1 | 0.37 | Y | 1 | 0.75 | 5 | 1.2 |
| 2 | 0.55 | Y | 1.4 | 0.75 | 5 | 1.7 |
| 3 | 0.75 | Y | 1.8 | 0.75 | 5 | 2.2 |
| 4 | 1.1 | Y | 2.6 | 1 | 5 | 3.1 |
| 6 | 1.5 | Y | 3.5 | 1 | 10 | 4.2 |
| 8 | 2.2 | Y | 4.9 | 1.5 | 10 | 5.9 |
| 11 | 3 | △ | 6.3 | 1.5 | 10 | 7.6 |
| 13 | 4 | △ | 8.2 | 2.5 | 20 | 9.8 |
| 15 | 5.5 | △ | 11 | 2.5 | 20 | 13.2 |

Single phase motors:

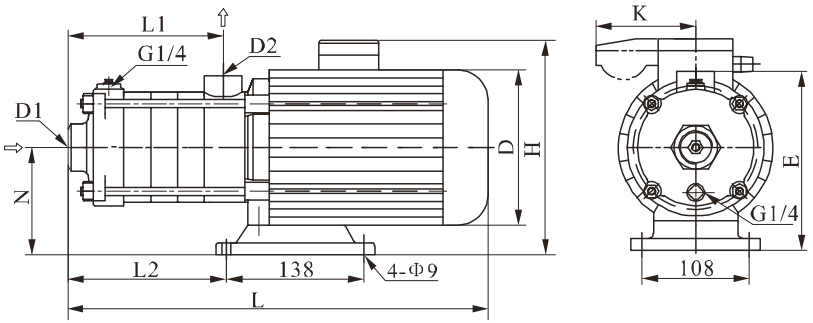
| IE1 MOTOR 230 V 50 Hz | | | | |
|---|---|---|---|---|
| Type | Current (A) | Power (kW) | Speed (rpm) | Efficiency (%) |
| YY-711-2 | 2,37 | 0,37 | 2900 | 0.75 |
| YY-712-2 | 3,88 | 0,55 | | 0.75 |
| YL-801-2 | 5,15 | 0,75 | | 0.75 |
| YL-802-2 | 7,02 | 1,1 | | 1 |
| YL-90S-2 | 9,44 | 1,5 | | 1 |
| YL-90L-2 | 13,67 | 2,2 | | 1.5 |

The acoustic noise emission is around 75 dB (A).

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



### 3. HF, HX, HN dimensions (mm)




| Model | D1 | D2 | N | E | L | L1 | L2 | L3 | d | D | H | | K | M | weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Three phase | Single phase | Single phase | | Kg |
| HF, HX, HN 2-20 | G1 | G1 | 110 | 182 | 305 | 84 | 87 | 138 | 9 | 145 | 215 | 230 | 96 | 108 | 15 |
| HF, HX, HN 2-30 | | | | | 323 | 102 | 105 | | | | | | | | |
| HF, HX, HN 2-40 | | | | | 341 | 120 | 123 | | | | | | | | |
| HF, HX, HN 2-50 | | | | | 359 | 138 | 141 | | | | | | | | |
| HF, HX, HN 2-60 | | | | | 422 | 156 | 159 | | | 170 | 225 | 245 | 100 | | 17 |
| HF, HX, HN 4-20 | G1¼ | G1 | 110 | 182 | 329 | 102 | 105 | 138 | 9 | 145 | 215 | 230 | 96 | 108 | 15 |
| HF, HX, HN 4-30 | | | | | 356 | 129 | 132 | | | | | | | | |
| HF, HX, HN 4-40 | | | | | 416 | 156 | 162 | | | 170 | 225 | 245 | 100 | | 17 |
| HF, HX, HN 4-50 | | | | | 455 | 183 | 188 | | | | | | | | |
| HF, HX, HN 4-60 | | | | | 482 | 210 | 213 | | | | | | | | |
| HF, HX, HN 8-10 | G1½ | G1¼ | 118 | 228 | 395 | 108 | 126 | 138 | 9 | 170 | 230 | 265 | 100 | 108 | 20 |
| HF, HX, HN 8-20 | | | | | 395 | 108 | 126 | | | | | | | | |
| HF, HX, HN 8-30 | | | | | 425 | 138 | 156 | | | | | | | | 25 |
| HF, HX, HN 8-40 | | | | | 490 | 168 | 186 | | | 180 | 240 | 270 | | | 28 |
| HF, HX, HN 8-50 | | | | | 520 | 198 | 216 | | | | | | | | 30 |
| HF, HX, HN 12-10 | G1½ | G1½ | 118 | 268 | 395 | 108 | 126 | 138 | 9 | 170 | 230 | 265 | 100 | 108 | 20 |
| HF, HX, HN 12-20 | | | | | 395 | 108 | 126 | | | | | | | | 21 |
| HF, HX, HN 12-30 | | | | | 460 | 138 | 156 | | | 180 | 240 | 270 | | | 25 |
| HF, HX, HN 12-40 | | | | | 490 | 168 | 186 | | | | | | | | 29 |
| HF, HX, HN 12-50 | | | 126 | 240 | 555 | 198 | 216 | | | 195 | 270 | / | / | | 34 |
| HF, HX, HN 16-10 | G2 | G2 | 117 | 227 | 423 | 126 | 151 | 138 | 9 | 180 | 230 | 265 | 100 | 108 | 18 |
| HF, HX, HN 16-20 | | | 118 | 228 | 455 | 126 | 151 | | | | 240 | 270 | | | 27 |
| HF, HX, HN 16-30 | | | 130 | 240 | 561 | 171 | 196 | | | 195 | 270 | / | / | | 33 |
| HF, HX, HN 16-40 | | | 120 | 230 | 621 | 216 | 340 | 140 | 12 | 220 | 270 | / | / | 190 | 41 |
| HF, HX, HN 20-10 | G2 | G2 | 117 | 227 | 423 | 126 | 151 | 138 | 9 | 180 | 230 | 265 | 100 | 108 | 18 |
| HF, HX, HN 20-20 | | | 118 | 228 | 455 | 126 | 151 | | | | 240 | 270 | | | 27 |
| HF, HX, HN 20-30 | | | 120 | 230 | 576 | 171 | 294 | 140 | 12 | 220 | 270 | / | / | 190 | 41 |
| HF, HX, HN 20-40 | | | | | 621 | 216 | 340 | | | | | | | | 44 |



# V. START-UP, OPERATION AND MAINTENANCE

**Caution: It is prohibited to run without liquid, which will damage mechanical seal and sliding bearing.**

**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.

· Fill water in pump when liquid level is lower than pump. Before installing, pump and pipes must be filled with liquid fully and air vented.

**2. Check the rotary direction**

Switch on the power supply and view the rotary direction by viewing the motor fan. From the motor end, pump shall run counter-clockwise.

**3.Check before pump start-up**

· Check whether the pump is fixed securely.
· Check whether pump is filled with water fully and check whether liquid can flow freely.
· Check whether the voltage of power supply is stable.
· 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.
· 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 allowed 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 started more than 20 times in one hour.
· Suggestion: When pump running, flow should be controlled at the range of 0.5-1.3 times of rated flow.
· There should be no noise when pump running. If there is something wrong, stop pump and check it and repair.

**5. Frost Protecting**

Pump can be used in the system with anti-frozen measures. If the pump is installed in easily frozen environment, suitable antifreeze shall be added to the transferring liquid to prevent pump from being damaged. If antifreeze is not used, pump shall not be used during periods of frost. Pump should be drained when stops using.

**6.The following should be checked regularly for pump**

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

If find faults, check system according to “Fault Finding and Solution chart”.

- Pump shall be cleaned and kept appropriately when it is not used for a long time.
- Pump shall be prevented from being corrupted and damaged in storage.

# VI. ASSEMBLE AND DISASSEMBLE

**HF, HX, HN**

- Fit discharge head on the motor. Fit mechanical seal. The faces of mechanical seal should be lubricated.
- Fit the impellers, diffusers etc. in position according to the drawing. Then fit impeller cover, tighten nuts, fit seal circle on every diffusers.
- Fit suction head, stay bolts, tighten the nuts of stay bolts.
- Rotate the motor fan by hand to ensure that the shaft is not choked. Reverse the process above can 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. | |
| | e) 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. 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.

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Be pumping partners

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