



State High-tech Enterprise

## QY(B)、QYL(B) Stainless Steel Self-suction Gas-liquid Mixing Pump

### Operation Manual



Nanfang Pump Industry Co., Ltd.

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subject to amendments



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Executed Standard Product Code: 《Q/HNB002-2006》  
Before using this product, please read this manual carefully.

Read this manual carefully before install, start the pump  
Standard:Q/HNB002 (self-suction gas-liquid mixing pump)

### I. General

QY(B),QYL(B) pump is a horizontal self-suction gas-liquid mixing pump. QY(B) is connected with special motor directly. QYL(B) is connected with standard motor by coupling. All the flow parts of the pump is made of stainless steel by precise molding technology.

The suction inlet of the pump can suck gas by negative pressure, so it is not needed to use gas compressor or gas jet. The quickly rotating impeller mix the gas and the liquid, so mixer is not needed. Because of the mixing by added pressure in the volute, gas and liquid dissolves with each other completely. The dissolution efficiency arrives to 80~100%, so big added pressure gas tank or expensive reactor tower is not needed to get high concentration solution. One gas-liquid mixing pump can suck, mix, dissolve gas and liquid. And pump the high concentration solution to the application place directly. Therefore, the usage of the pump can improve the making efficiency of gas-liquid solution, simplify making device, save space, decrease first investment cost, save operation and maintenance cost.

### II. Application

The pump is applied to transfer liquid, mix gas and liquid, circulate and boost.

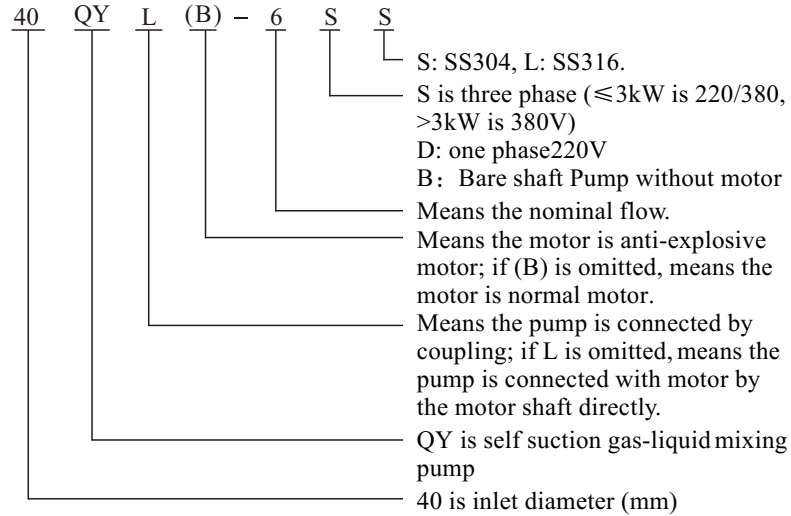
Typical application:

- Gas suspension treating equipment, ozone water making equipment, heavy-oxygen-enriched water making equipment and biological treating equipment.
- Transfer of heating or cooling medium for various temperature adjusting devices.
- Various filters;
- Sucking from underground tank or high pressure transferring low-viscosity liquid such as gasoline, diluents, all kinds of solvent.
- Misting treatment of clear water, pure water, foods, chemical solution and waste solution.
- Strict applications(intermittent running, water hammer, abrupt variation in hydraulic pressure): such as small scale steam boiler., high building water supply, high pressure water injection to high pressure tank and suction from vacuum tank.
- Sampling from river or tank, transferring foaming liquid, transfer liquid in long and horizontal pipeline, where gas pockets likely occur.

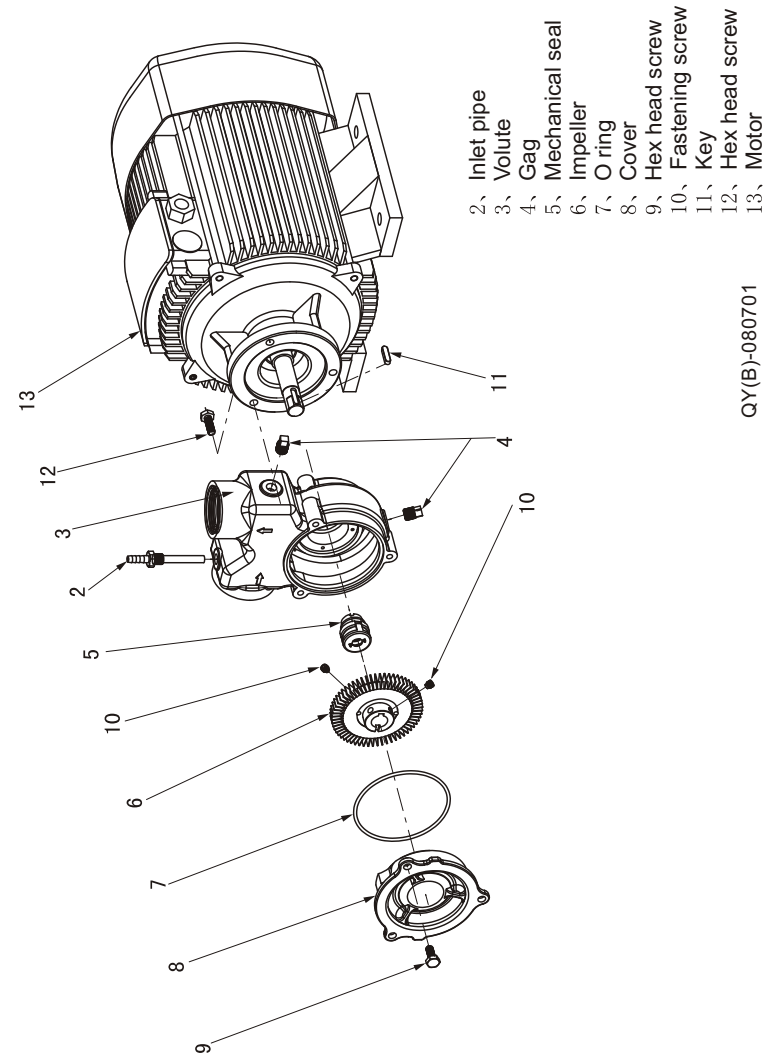
### III. Operation conditions

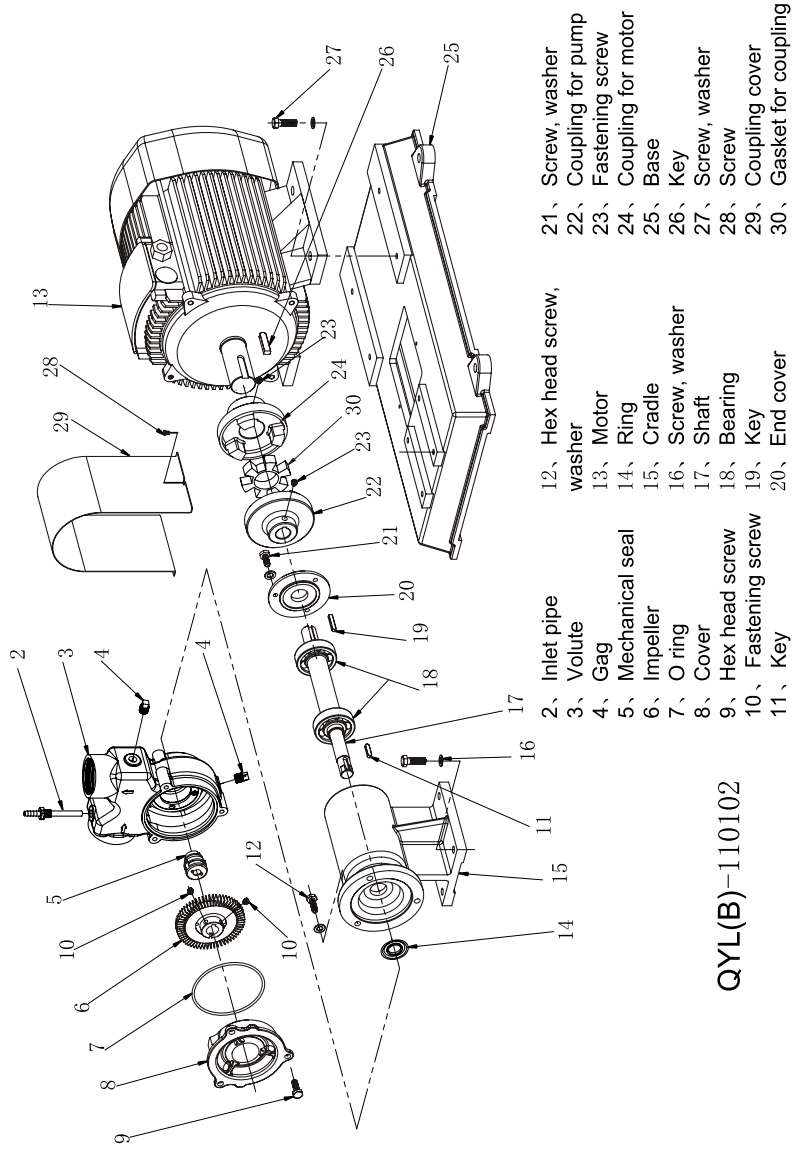
- Thin, clean, low-viscosity liquid;
- PH Value: 3~9
- Liquid temperature: -15°C ~ +120°C
- Ambient temperature: Max +40°C
- Gas liquid volume comparison: 1:9 ( Gas suction quantity is 8%~10%)
- Self-priming height is 9-NPSH(m)

### IV. Definition of Model

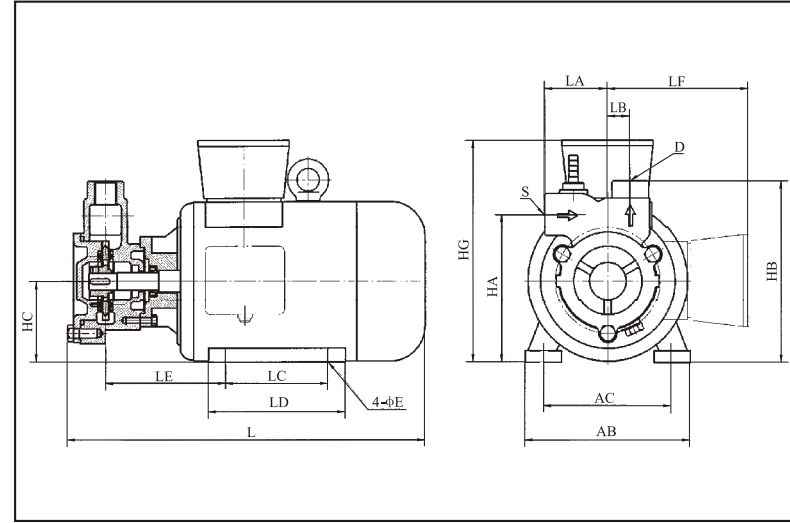


### V. Drawing





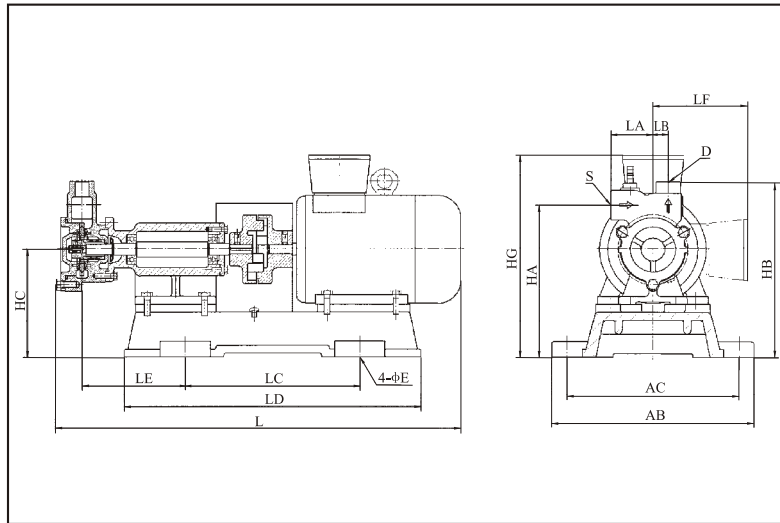
## VI. QY(B) Installation sketch



## QY(B) Installation dimensions

Model	HA	HB	HC	HG	AB	AC	L	LA	LB	LC	LD	LE	LF	S	D	E
20QY-1	128	158	71	195	150	110	320	55	20	90	120	100		G $\frac{3}{4}$	G $\frac{1}{2}$	7
20QYB-1	128	158	71	260	150	110	320	55	20	90	120	100		G $\frac{3}{4}$	G $\frac{1}{2}$	7
25QY-2	150	185	80	214	165	125	327	60	28	100	130	105	145	G1	G $\frac{3}{4}$	10
25QYB-2	150	185	80	340	165	125	327	60	28	100	130	105		G1	G $\frac{3}{4}$	10
40QY-6	185	230	100	270	200	160	444	70	40	140	180	135	180	G1 $\frac{1}{2}$	G1 $\frac{1}{4}$	12
40QYB-6	197	242	112	400	225	190	451	70	40	140	180	142		G1 $\frac{1}{2}$	G1 $\frac{1}{4}$	12
50QY-12	232	290	132	345	280	216	570	77	47	140	200	190	210	G2	G1 $\frac{1}{2}$	12
50QYB-12	232	290	132	470	280	216	570	77	47	140	200	190		G2	G1 $\frac{1}{2}$	12

## VII. QYL(B) Installation sketch



## QYL(B) Installation dimensions

Model	HA	HB	HC	HG	AB	AC	L	LA	LB	LC	LD	LE	LF	S	D	E
20QYL-1	198	228	141	265	265	225	532	55	20	228	388	135		G $\frac{3}{4}$	G $\frac{1}{2}$	φ8.5
20QYLB-1	198	228	141	330	265	225	532	55	20	228	388	135		G $\frac{3}{4}$	G $\frac{1}{2}$	φ8.5
25QYL-2	220	255	150	284	275	235	610	60	28	293	453	85	145	G1	G $\frac{3}{4}$	φ11
25QYLB-2	220	255	150	410	275	235	610	60	28	293	453	85		G1	G $\frac{3}{4}$	φ11
40QYL-6	255	300	170	340	345	305	721	70	40	363	523	152	180	G1 $\frac{1}{2}$	G1 $\frac{1}{4}$	φ11
40QYLB-6	265	312	182	470	345	305	721	70	40	363	523	152		G1 $\frac{1}{2}$	G1 $\frac{1}{4}$	φ11
50QYL-12	302	360	203	415	390	350	816	77	47	450	610	158	210	G2	G1 $\frac{1}{2}$	φ11
50QYLB-12	302	360	203	540	390	350	816	77	47	450	610	158		G2	G1 $\frac{1}{2}$	φ11

## VIII. Usage and operation

### 1、 Operation

1) Before the first operation, fill water to the pump fully, then open the inlet valve and outlet valve completely. After close the gas inlet valve and outlet pressure meter, switch on the power shortly to check the pump rotating direction. If the pump rotating direction is correct, operate the pump. In the following operations, before switch on the pump power, close the gas inlet valve when manual operation.

2) Close inlet valve gradually, when the vacuumeter indicates negative pressure -100mmhg~+0.3kgf/cm<sup>2</sup>, open gas suction valve. Open the check valve of the outlet pressure meter, adjusting outlet pipe controlling valve until arrive to the set outlet pressure.

3) Adjust inlet pipe controlling valve, gas suction valve, outlet pipe controlling valve little by little until liquid flow, gas flow and outlet pressure arrives to preset value. The gas inlet amount is nearly 7~8% of the liquid inlet amount, should not exceed to 10%.

E.g.

When the inlet liquid flow is 30 l/m, the inlet gas flow is 2.4~3.0 l/m;

When the inlet liquid flow is 50 l/m, the inlet gas flow is 4.0~5.0 l/m;

4) When inlet water flow, inlet gas flow, outlet pressure arrives to preset value, it can work normally.

5) When pump stops, close gas suction valve firstly, then stop pump.

### 2、 Important notice

1) With the increment of gas suction, outlet flow and pressure will decrease gradually, when the gas suction amount exceeds the limitation, the flow will stop, that is, pump works but no efficiency.

2) When choose the pump, please refer to the performance curve. The outlet pressure should be set according to the application. For ozone mixing water, the presetting value is 2~3kgf/cm<sup>2</sup>. For gas suspension treating equipment, oxygen adding treatment, it should be 3.5~4 kgf/cm<sup>2</sup>. When the inlet gas is 7~8%, big flow pump should be chosen.

3) The outlet pressure would not exceed 4 kgf/cm<sup>2</sup> to generate a little gas pockets. If pressure exceeds 4 kgf/cm<sup>2</sup>, the diameter of the gas pocket and gas solution amount will not change much, only deduce solution flow or increase pump power cost.

4) Gas inlet amount

The resolved gas is 3% in the water normally (the saturated resolved amount in the normal pressure). The inlet gas being pumped should be big than the saturated resolved amount, it is suggested that the amount should be the 7~8% of the water flow. The max should not exceed 10%. In addition, the gas injected to the pump, the unresolved gas would flow in the pipes as bubble, at the pressure released valve, it can form gas bag which will affect the generation of the little gas bubble. Therefore, it is suggested to install a gas liquid separating tank in front of pressure release valve to vent the redundant gas. The volume of the gas liquid tank should be chosen according to the pump flow. For convenience, the suitable relation of the gas liquid tank and the pump diameter is as follows.

The discharge diameter of the pump	The volume of the gas liquid separating tank
~32 mm	4 kilolitre
40 mm	8 kilolitre
50 mm	29kilolitre

5) In order to ensure the gas suction efficiency, use a gas sucking mouth at the pump sucking point. The gas sucking mouth will guide the gas to the position near impeller, then guide the gas and liquid to the pump flow part by impeller's turning force. The usage of the gas mouth can ensure the gas to suck constantly and dissolved efficiently. It is suggested to fit a one-way check valve at gas mouth to prevent from liquid flowing back. The one-way check valve and electromagnetic valve can avoid solution flowing back normally. If the gas-liquid mixing device is operated manually, the one-way check valve and electromagnetic valve may not be used, but should refer to the operating notice when operating.

6) In order to generate good little gas bubble, the drainage pipe after the pressure release valve should be noted as follows:

A. The diameter of the drainage pipe should be as big as or bigger than the pump outlet diameter.

B. The first part of drainage pipe should be horizontal or face upwards. It must not face down.

C. The little gas bubble release hole should be not smaller than 10mm;

D. The length of the drainage pipe before the outlet valve should be 0.5m ~1m, the pipe after the outlet valve should be as short as possible.

E. The gas flow meter is used to adjust and control the gas suction volume. The material of gas suction mouth and gas flow meter depends on the sucked gas and liquid. For ozone application, the material of them should be stainless steel.

#### 7) Suction pipe

A. Normally, the diameter of the suction pipe should be same as the pump suction diameter or bigger than the pump suction diameter.

B. In the case of suck the gas by negative pressure, the diameter of the suction pipe should be thinner, but should not be too thin.

C. When the liquid level of the water supply tank is lower than the pump central height, fit a footer valve at the lowest position of the suction pipe.

D. Fit a strainer(60 eyes) at the suction pipe to keep of the grain in the liquid.

## IX. Maintenance

Before maintenance, shut off the power supply. Because it is dangerous that the pump would start abruptly when in automatic mode.

1、 Important notice for daily checking.

1)If pressure, voltage, vibration, noise is different from that of normal, it predicates there is something wrong with the pump. Stop the pump and repair it at once. In addition, it is suggested to use spare pump to prevent from sudden case.

2)The max temperature of bearing is 80°C. If the motor shell can be touched by hand, it is normal, or it should be checked after stop.

3)The normal leakage of mechanical seal is 3ml per hour. When running, if leakage is bigger than this and bigger and bigger, stop it at once.

4)In the case of correct installation and pipe work, if there is strong vibration when running, it indicates that pump receives big force from pipe or the base screws are loose. Stop and check at once.

2、 When pump running, please refer to the following.

1)If the pump running exceeds the nominal pressure(head), it will overburden. Therefore, the motor will be burned.

Important notice: Must not close the discharge valve when running.

2)The metal sound will be heard when pump running in high pressure. This is the character of the gas-liquid pump, not the malfunction.

3)Frequent starting or stopping the pump will do harm to pump. The starting frequency should not exceed 6 times per hour.

4)When power cut, must switch off the pump to prevent from pump running suddenly when power is supplied, which will be dangerous.

3、 The storage is as follows when the pump stop working for a long time.

1)In winter, if pump stops, must take anti-frozen steps and drain the water in pump to prevent pump casing from broken.

2)Spare pump should be run periodically, so it is ready for work.

4、 Wearing parts of pump

1)、 The pump parts should be replaced if the following case happened.

Wearing parts	Standard of replacement	Normal replacement period
Mechanical seal	Leakage exceeds required amount.	Once a year
Bearing	There is abnormal noise or grease leaks	Once in two or three years
Gasket or O ring	When routing checking	Once in two or three years

Note: The above normal replacement period is the period of replacement for normal usage.

When ordering spare parts, please advise the pump model indicated in the pump name plate.

## X. Assemble and disassemble

Please follow up the following steps to disassemble and assemble.

1、 Disassemble

1)Disassemble pump cover screws, take apart pump cover;

2)Loose impeller fixing screws, take the impeller from the shaft. If the impeller is difficult to take it out, fit the screws to two screw holes, pull the impeller out;

3)Take apart the key from shaft, wipe off the fixing trail;

4)Take apart the rotating ring of mechanical seal;

5)Loose and take off the screws which are fixing the volute to the pump station flange, take apart the volute. The stationary part of mechanical seal can also be taken apart with the volute. Note that not scratch the face of mechanical seal.

2、 Assemble

Reverse the disassemble steps can assemble a pump. But take note of the following.

1)The spring hook of mechanical seal should be in the mechanical seal fixing groove of the impeller. The rubbing part of mechanical seal should be cleaned by clean and soft cloth. Be careful not scratch the rubbing face;

2)Impeller should be fit between casing and cover. In addition, before disassemble, wipe off the fixing trail. The clearance between impeller and casing is adjusted as follows.

Fit the impeller on the shaft, push it toward to the casing until it touches the casing. Tight the impeller fixing screws a little, then hammer the shaft point slightly, the impeller is moved by reverse force. When the clearance is adjusted correctly, fit the cover, rotate the shaft. If the shaft can rotate smoothly, tighten the impeller fixed screws.

3)Replace O ring, gasket

4)Replace all wore out parts.

5)The screws should be tightened evenly, do not tighten one and then tighten another one.

6)After installation finished, rotate the shaft, it should not be choked or loose or tight.

## XI. Fault finding and solution chart

Fault	Cause	Solution
Motor does not rotate	<ol style="list-style-type: none"> <li>1. Motor is broken</li> <li>2. Impeller is blocked.</li> <li>3. There is grain in the volute</li> </ol>	<ol style="list-style-type: none"> <li>1. Repair motor</li> <li>2. Reassemble or send to CNP for repair</li> <li>3. Disassemble, remove grain</li> </ol>
Not enough flow	<ol style="list-style-type: none"> <li>1. Pipes are blocked.</li> <li>2. There is no leading water in the pump</li> <li>3. The valve is closed or open half</li> <li>4. The suction height is too high for the pump.</li> <li>5. Pump rotates reversely.</li> <li>6. Low rotating speed.</li> <li>7. Liquid temperature is too high, or there is volatile liquid</li> <li>8. Too much energy is cost at the pipe</li> <li>9. Rotating part wears out.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean pump or pipe</li> <li>2. Fill leading water fully.</li> <li>3. Open valve</li> <li>4. Recheck installation height.</li> <li>5. Check rotating sign, re-connect cables.</li> <li>6. Check rotating speed, check if voltage is too low.</li> <li>7. Consult CNP.</li> <li>8. Re-design pipes</li> <li>9. Replace wearing parts.</li> </ol>
At first, pumps water, but no water comes out soon.	<ol style="list-style-type: none"> <li>1. Not enough leading water</li> <li>2. Too much suction head.</li> <li>3. Air is sucked</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill leading water fully.</li> <li>2. Lower the pump installation place.</li> <li>3. Check the suction pipe or check the seal to see if there is gas leakage.</li> </ol>
Water leaks from pump.	<ol style="list-style-type: none"> <li>1. The mechanical seal is not fit well.</li> <li>2. The mechanical seal is broken or wears out.</li> </ol>	<ol style="list-style-type: none"> <li>1. Refit the mechanical seal.</li> <li>2. Replace mechanical seal.</li> </ol>
Too much noise	<ol style="list-style-type: none"> <li>1. The motor bearing wears out.</li> <li>2. The impeller is blocked</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace bearing or motor</li> <li>2. Refit the impeller or send pump to CNP.</li> </ol>

Continued

Fault	Cause	Solution
The motor temperature is too high, smokes out and smells bad	<ol style="list-style-type: none"> <li>1. It is overloaded.</li> <li>2. The voltage is not correct.</li> <li>3. The cables connection is not correct.</li> <li>4. The cables are not contacted well.</li> <li>5. There is grain in the motor which block the fan</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust outlet valve, run the pump at the specified pressure.</li> <li>2. Check the voltage</li> <li>3. Re-connect the cables according to the motor cables connecting drawing.</li> <li>4. Reconnect the cables and tight them.</li> <li>5. Get rid of grain.</li> </ol>

## XII. Important notice

1. The content of this manual is subject to change at all times without further notice;

2. Under the situation of adequate selection of the type and normal operation, the guarantee of repair for the pump is 1 year. Normal abrasion of wearing parts is not within this limit;

3. During the guarantee period, the consumer shall hold all liabilities for the quality problems due to disassembly by himself.