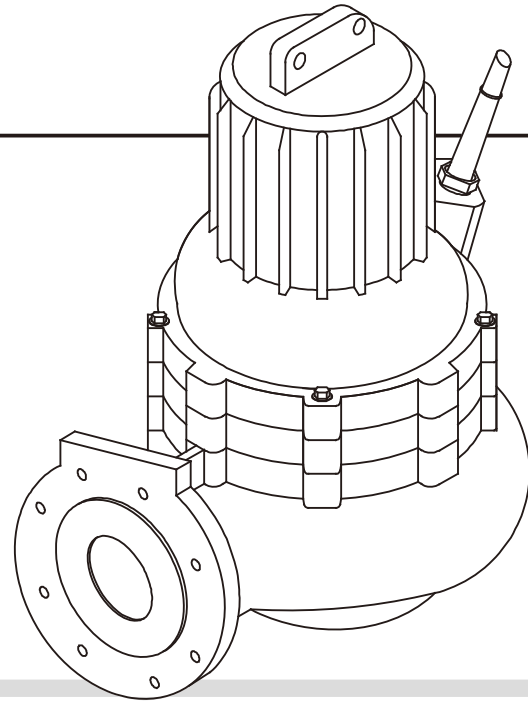


OPERATION INSTRUCTIONS

Submerged Sewage Pump  
**VQN/VQP/VQ/SVQ/SSVQ**

ENG 



Please check the following points before installation.

- The product is meeting with the specifications ordered.
- Defective or damages, if any.
- All related accessories and tools are ready.
- These instructions contain fundamental information and precautionary notes.
- Please read the manual thoroughly prior to installation of unit for proper operation.
- Keep these instructions near location of operation for easy access.
- Any failure or accidents caused by erroneous installation and/or wrong operation. Non-compliance with the instructions will not be warranted.

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## General

The pumps have been developed in accordance with state-of-art technology. They are manufactured with utmost care and subject to continuous quality control. These instructions are intended to facilitate familiarity with the pumps and its designated use. The manual contains important information for reliable, proper and efficient operation. Compliance with the operating instruction is of vital important to ensure reliability and a long service life of the pump and to avoid any risks.

## Safety

These instructions contain fundamental information, which must be complied with during installation, operation and maintenance. Therefore the manual must be read and understood both by the installing personnel and the responsible trained personnel/operators prior to installation and commissioning, and it must always be kept close to the location of the unit for easy access. Marking of Safety sign in the instructions. The safety instructions contained in this manual non-compliance of which might cause hazards to person are specially marked with the common hazard sign, namely,



(Safety Mark)

Non-compliance with Safety instructions. Non-compliance with safety instructions can jeopardize the safety of personnel, the environment and the machine itself. Non-compliance with these safety instructions will also lead to forfeiture of any and all rights to claim for damages.

In particular, non-compliance can, for example, result in; Failure of important machine / unit functions,

- Failure of prescribed maintenance and servicing practices,
- Hazard to persons by electrical, mechanical and chemical effects.

## Safety awareness

It is imperative to comply with the safety instructions contained in this manual, the relevant national and safety regulations and operator's own internal work, operation and safety regulations.

## Safety instructions for maintenance, inspection and installation work

The operator is responsible for ensuring that all maintenance, inspection and installation work be performed by authorized, qualified specialist personnel who are thoroughly familiar with the manual. Working on machine must be carried out only during standstill. The shutdown procedure described in the manual for taking the machine out of service must be adhered to without fail. Pump handling media injurious to health must be decontaminated. Immediately following completion of work, all safety-related and protective devices must be re-installed and/or re-activated.

## Unauthorized modification and manufacture of spare parts

Modification or alterations of the machine are only permitted after consulted with the manufacturer. Original spare parts and accessories authorized by the manufacturer ensure safety. The use of other parts can invalidate any liability of the manufacturer for consequential damage.



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## 1 Precautions before start

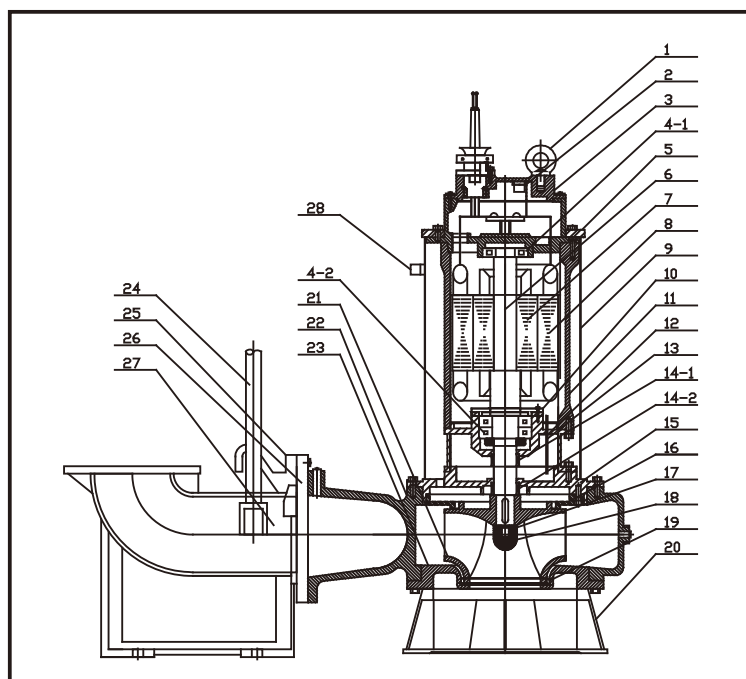
- 1) Before starting the water pump, please use 0~500V megohmmeter to check insulation of stator winding;
- 2) Check if the service power and voltage frequency is consistent with the indication on the nameplate;
- 3) The cable of the water pump is not allowed to connect with any power source without protection device (otherwise it will possibly burn the motor or cause it to lack phase); please refer to the Wiring Method of Submerged pump (See Page 8);
- 4) Check the rotation direction of motor; the correct rotation direction is described as follows, i.e.; looking from the suction direction of impeller, it should turn anticlockwisely; if the rotation direction is wrong, please change the wirings of any two phases;
- 5) Never move the water pump if no power source is disconnected; when the pump works, please keep people away from the water source where the pump is placed, otherwise when the pump leaks electricity or there is no electrical leakage protection device, it will cause electric shock or other accidents;
- 6) Check if the grounding cable is grounded correctly or reliably;
- 7) Check if the water level controller can be operated normally; otherwise it will influence motor service life of submerged pump;
- 8) Close the gate valve of outlet pipe, start the motor; when the drainage valve is closed, keeping the pump running 3 minutes at most; open the gate valve to monitor the current of motor; maintain the electricity within the rated scope; check if the pressure (through the pressure meter) and pump is normal; if not, please remove the possible problems as per the Failure Analysis Table;
- 9) Never start the pump if there is no water;
- 10) Never dip the cable head of the pump into water.

In order to ensure the pump to be used safely, please read carefully the “Installation and Operation Instruction”.

## 2 Assembly and disassembly

### 1. Structural diagram (The structure is different if the power varies).

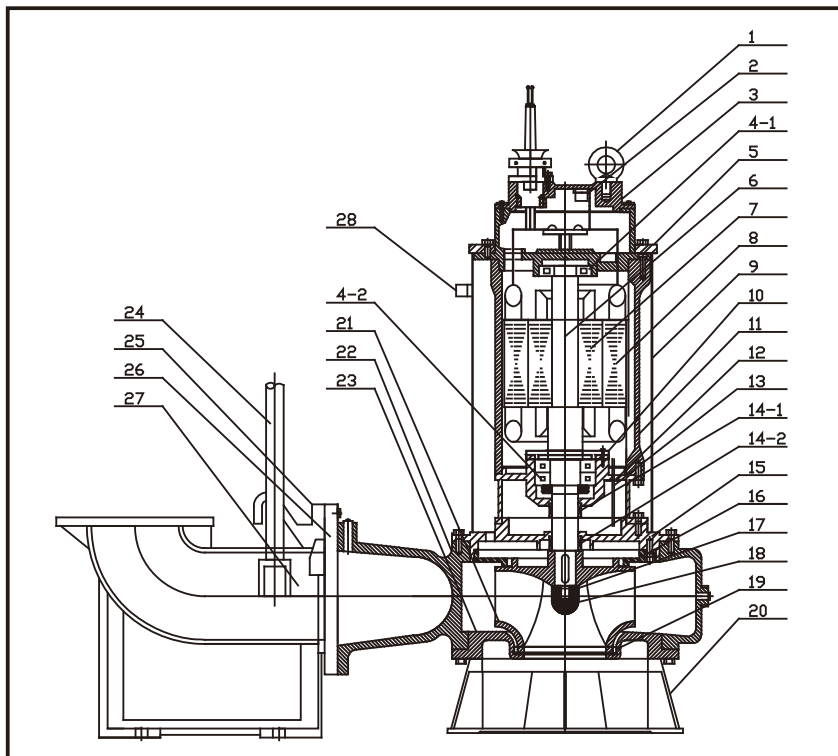
VQ Pump Structure Diagram



## 2 Assembly and disassembly

No.	Name	Material	No.	Name	Material
1	Lifting lug	SUS4520	14-2	Mechanical seal	SIC-WC
2	Overheat protector		15	Mail box	FC200
3	Motor cover	FC200	16	Bottom cover of mail box	FC200
4-1	Bearing		17	Thrust washer	SUS304
4-2	Bearing		18	Impeller nut	FC200
5	Water cooled jacket flange	SS345	19	Seal ring	LBC2
6	Main shaft	SUS4520	20	Bottom base of filter	FC200
7	Rotor		21	Impeller	FC200
8	Stator		22	Pump	FC200
9	Water cooling jacket	SUS304	23	Bottom cover of pump	FC200
10	Bearing cover	FC200	24	Guide pipe	SS34
11	Motor	FC200	25	Mating flange	FC200
12	Intermediate bearing base	FC200	26	Directing plate	FC200
13	Water leakage detector		27	coupling	FC200
14-1	Mechanical seal	CERAMIC-AL2O3	28	Water outlet	SS34

SVQ Structure Diagram



No.	Name	Material	No.	Name	Material
1	Coupling	FC200	13	Shaft	SUS420J2
2	Mating flange	FC200	14	Rotor	
3	Bottom base of filter	FC200	15	Stator	
4	Impeller nut	A2-70	16	Bearing	
5	Wearing ring	FC200	17	Fixing bolt of cable	SS34
6	Impeller	FC200	18	Handle	FC200
7	Pump	FC200	19	Cable	
8	Oil chamber	FC200	20	Motor cover	FC200
9	Mechanical seal	SIC-WC	21	Motor	FC200
10	Intermediate bearing	FC200	22	Guide pipe	SS34
11	Mechanical seal	CARBON-AL2O3	23	Directing plate	FC200
12	Bearing				

**2. The motor protection grade of VQ and SVQ submerged pump is IP68, so there is high requirement on its assembly; We strongly recommend to return the motor for assembly or repair in our company; if repairing in the working site, please stick to the following steps, i.e.:**

Before assembling, please check the components and make airtightness test; inspect if the components have any defects affecting the assembly; afterwards please clean the brush, and then make assembly accordingly.

- 1 ) Use special fixture on the pressure machine to move the rotor of motor into the motor. Note: Never damage the lacquered wire and move it to the correct position;
- 2 ) Use special fixture on the pressure machine to move the main shaft into the rotor. Note: Move the main shaft to the correct position;
- 3 ) Heat the bearing oil to 90°C, and then add the oil into the main shaft;
- 4 ) Put the main shaft that has been installed the bearing and cooled to the room temperature into the bearing stand (for large horse power motor, it needs to compact the bearing cover);
- 5 ) Put the O–ring on the intermediate bearing stand, and then the motor; afterwards lock the bolts;
- 6 ) Put the O–ring on the motor cover that has been placed the wiring and installed the cable sealing device; and then place it on the motor; connect and fix the cable head and stator cable (Please note the cable number); afterwards put the motor cover and lock the nuts;
- 7 ) Put the mechanical stationary seal ring on the intermediate bearing stand; put the rotating seal ring on the bearing, and then install the elastic collar on the shaft;
- 8 ) Put the O–ring on the oil tank cover; put the oil tank cover on the intermediate bearing stand; afterwards lock the bolts;
- 9 ) Put the mechanical stationary seal ring on the oil tank cover and the mechanical rotating seal ring on the main shaft;
- 10 ) Install the key, impeller, retaining washer and impeller nut in turns; and then lock the impeller nut and rip the retaining washer off;

## 2 Assembly and disassembly

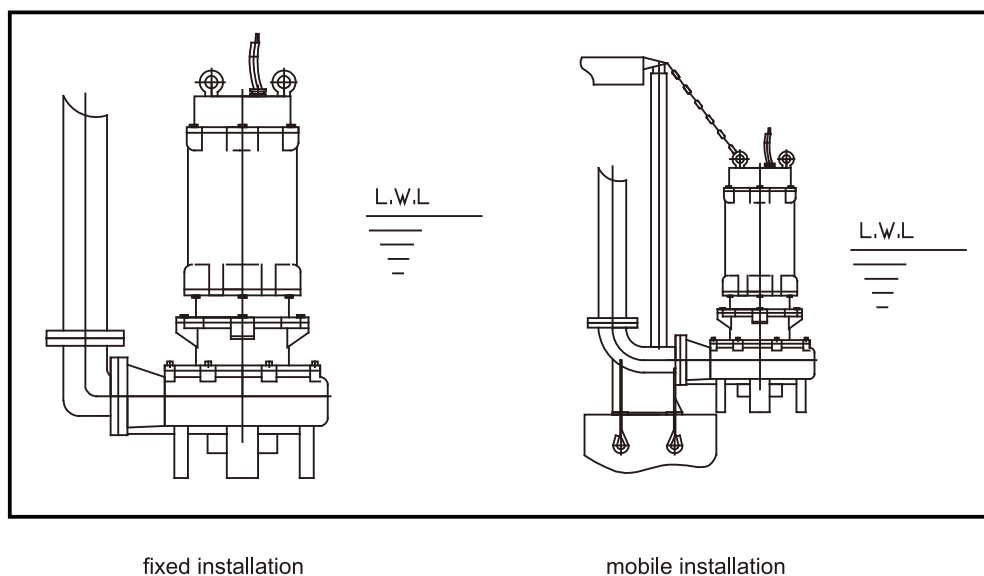
- 11 ) Feed 0.5Mpa compressed air into the assembled part and make airtightness test, ensuring there is no leakage in 5 minutes;
- 12 ) Put the bottom cover of pump that has been installed the seal ring into the pump; and then lock the bolts;
- 13 ) Add sufficient steam-turbine oil into the intermediate bearing stand;
- 14 ) Finally block the oil hole and experimental port well.

In the assembly process said above, some small pieces, such as the key, O-ring and so on, are easy to be missed or installed in wrong sequence, so please take care! The dismantling sequence of pump is contrary to the assembly sequence.

## 3 Installation

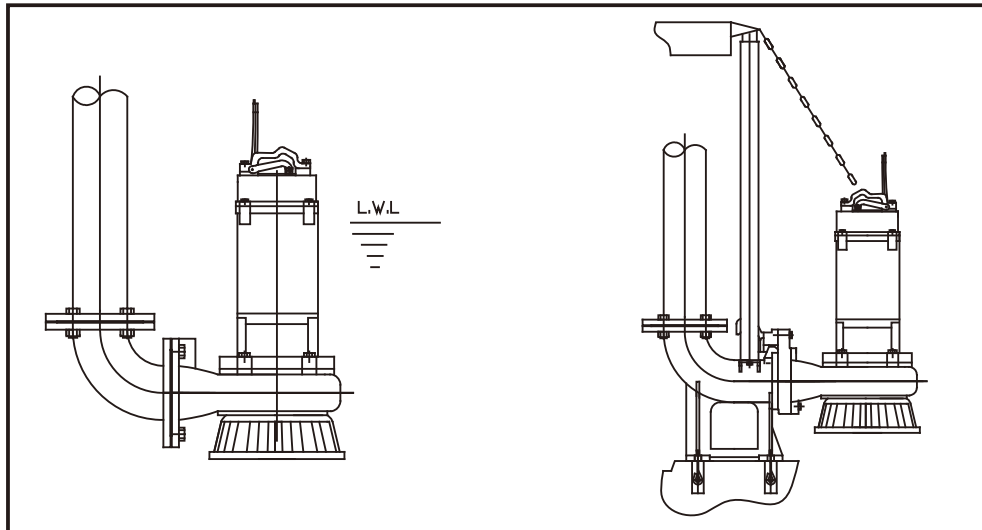
**The installation quality of pump is vital to operation and service life of the pump; therefore it is required to install and calibrate carefully.**

Installation Diagram of VQ Pump



Installation Diagram of SVQ Pump





fixed installation

mobile installation

**1、 Installation base of water pump (The installation of the one without coupling has no requirement on foundation)**

- 1) The foundation should be solid, stable and durable enough;
- 2) At the static process, keep the sedimentation and inclination within the allowable scope, ensuring the water pump to be used normally;
- 3) Keep the net distance from the coupling edge to the foundation over 100mm; make the toweling course and grouting layer placed secondarily thick 25mm at least;
- 4) The type, size and installation position of foundation bolt is required to be determined as per the Installation Diagram. The minimal depth going into the concrete is subject to the actual force; if there is no way to judge the force, it can be subject to the principle that bolt can pull cut, but can not come out;
- 5) The mass of design base and embedding depth of foundation should be subject to the object, i.e.: the working pump will not make the foundation move; normally the foundation of water pump should be 10 times of the mass of the water pump;
- 6) The height of foundation is required to satisfy structural requirement, i.e.: ensuring there is sufficient concrete protection layer at the bottom of embedded bolt; if there is the guaranteed strength at the bottom of pit, the protection layer can be placed thinner a bit;
- 7) In order to prevent crack caused by temperature and shrinkage stress, or uneven settlement or vibration, it is required to add the reinforcing bar in the foundation; the reinforcing bar is preferred to be the one with a size between  $\phi 10$  and  $\phi 16$ mm, with gap around 200~400mm.



## 2. Installation of water pump

### 1. Installation requirements:

- a) Check if the opening is appropriate before installing;
- b) Reserve the cable outlet in advance for wiring work; after installing pump, fix the cables appropriately;
- c) Keep the distance from the pump inlet to the wall of pool over 50cm;
- d) Do not make the pump burden with whole weight of outlet pipe; the outlet pipe must be supported and fixed appropriately;
- e) Before installing pump, it should check if the voltage and frequency is in accord with the indication of nameplate;
- f) Never change cable length; never dip cable head into water;
- g) Fix the cable and chain separately; prevent the cable away from being damaged when lifting the pump;
- h) Install the float switch to control water level and make pump operate automatically; keep the height of pool water higher than the warning level; in order to make pump run steadily, keep the float switch away from the entrance of pool water.

### 2. Installation of pump (See Figure A~D)

#### ***a) To determine the position of fixing frame and retaining plate***

Make a vertical line mark on one wall of the pool at one side of drainage pipe, making the vertical line on the plane of the center of drainage pipe and using the vertical line as the benchmark of the fixing frame and retaining plate;

#### ***b) Install the fixing frame and retaining plate***

Firstly, make the centerline of the fixing frame and the retaining plate coincide with the vertical line, i.e.: the installation benchmark; and then drill holes for expansion screws at the pool wall as per the slot distance; afterwards insert the expansion screws to fix the fixing support; please do not tighten the screws at this moment; for 50, 80, 100 of the caliber off and fixed plate fixation with the fixation; use the expansion screws to fix the retaining plate on the pool wall, and then install the fixing frame onto the retaining plate.

#### ***c) Install the coupling***

Place the coupling at the bottom of pool, hang a vertical line from the fixing frame, making it coincide with the centerline of fixing frame; determine the centerline of the coupling in accordance with the vertical line, making two conical centers on the fixing frame on the same axial line as two conical centers of coupling; adjust the anchor hole of foundation bolt or preserved hole; afterwards place the concrete and make sure the installation position of foundation bolt comply with the Installation Diagram.

### 3. Installation of guide pipe

If the sewage pool is less than 6m, it should determine the length of guide pipes (2 pieces) as per the pool depth and the distance between foundation and two fixing cones; afterwards saw the guide pipe with the given length and then place the pipes into the cone, keeping the guide pipe vertical; if the sewage pool is large than 6m, it should use union coupling to connect the long guide pipe and the short guide pipe, and use the check screws to fasten.



**4. Adjustment of fixing frame, coupling and guide pipe system**

Adjust the fixing frame, coupling, and check the verticality of guide pipe, making its center on the same plane; afterwards fasten all screws in the system, making the system free of space in the vertical direction and horizontal direction.

**5. Installation of drainage pipe**

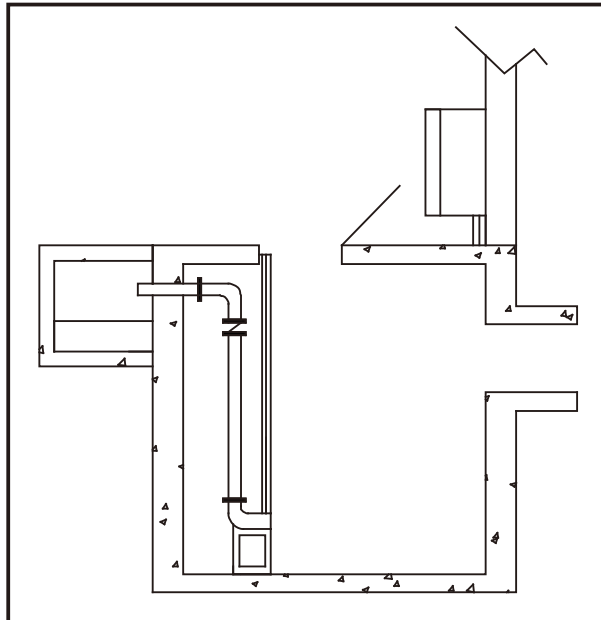
In accordance with the installation diagram, connect the drainage pipe, bending pipe, wall pipe and swing check valves, wedge gate valve; afterwards, use the concrete to infill the wall pipe and pool wall.

**6. Installation of water pump**

Use the shackle to put the chain into the lifting lug hole of water pump and lift the water pump, making the directing plate slide into the guide pipe and the sewage pool; finally make it stick at the inlet edge of coupling; using the self-weight of the water pump, it can obtain the correct job position automatically to ensure the airtightness performance of pump outlet and foundation inlet.

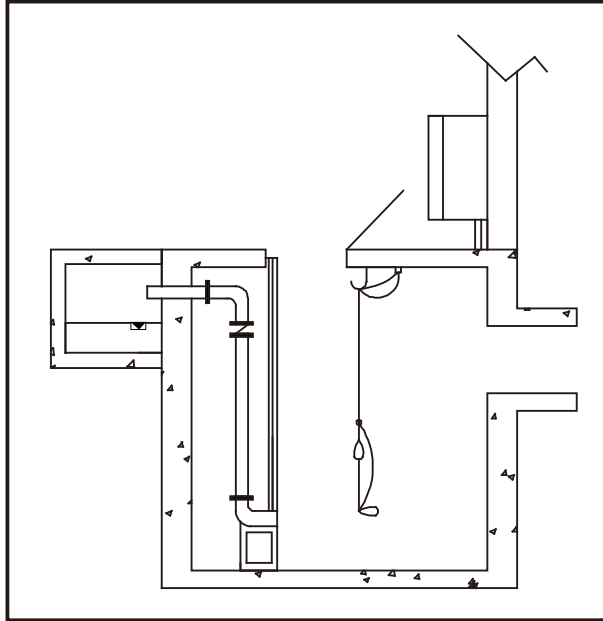
**7. Adjust the control position of float switch**

In accordance with the design requirement or other demands of water pool, user can adjust the float switch to use the inner water level change of water pool to realize the control on functions, such as the start, stop and alarm of the water pump.

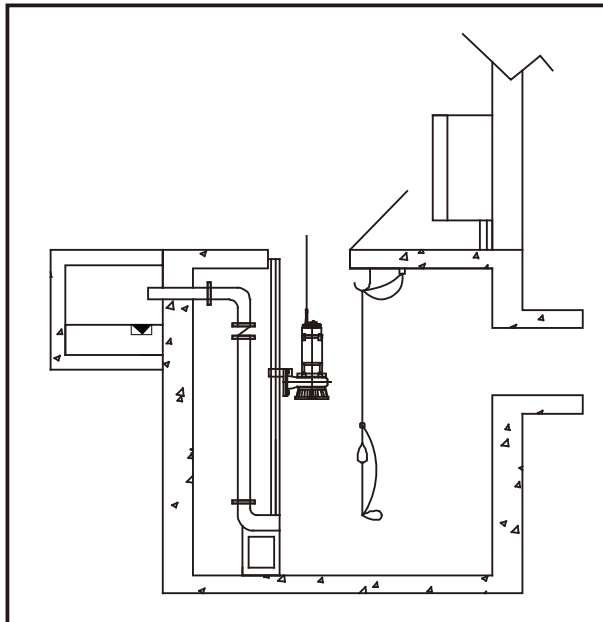


### 3 Installation

A: Fixing the coupling stand, insert the tail end of guide rod into the guide hole of the coupling stand, and then fix device outlet pipe

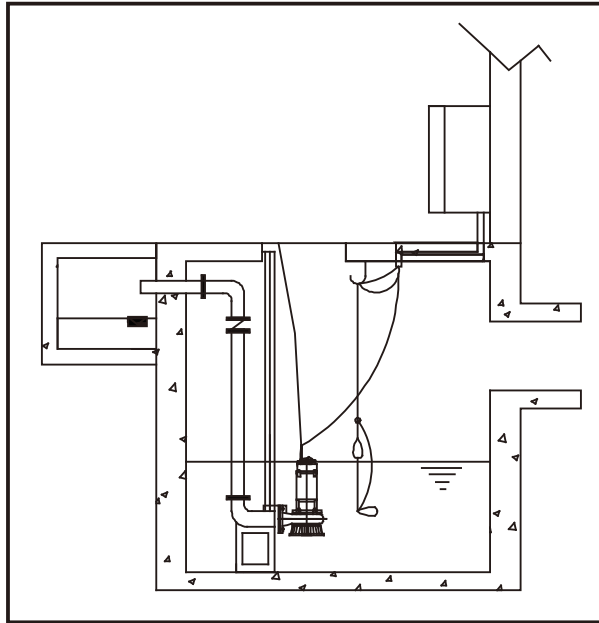


B: Water level control



C: Use the chain to buckle the submerged pump and use the guide rod to release the water pump; making the machine set integrate with the coupling automatically.





D: Switch on the power supply to check if all installation are made correctly; test the pump, if everything is okay, please cover the manhole cover to finish installation.

### 3、 Installation explanations

- 1) The installation height of pump, length, diameter and flow rate of pipe should be same as the calculated value so as to reduce unnecessary loss;
- 2) Install the non-return valve at the exterior of gate valve;
- 3) After installing the pump at the proper position, fix the heavy chain at the well opening to provide convenience when lifting the pump;
- 4) The pump room is required to be designed at the bright, dry and clean place, keeping spare room for dismantling operation and inspection job; when multiple pumps are configured, it must consider the interval, layout and so on;
- 5) In view of flood control, please make the top surface of the installation foundation of power distribution control system higher than the flood level;
- 6) In order to make it easy to repair the pump, please design a lifting frame or lifting device over the well opening;
- 7) It is prohibited to use cable to bear weight of pump; fix the cable on the pool wall to prevent friction caused by water flow, and then protect the cables;
- 8) The water suction pool is required to be available the trash rack; before draining water, please clean the suction pool completely;
- 9) The water level of suction pool is required to be higher than the minimal water level required by the pump; otherwise the motor will not be submerged completely; which will cause the motor to involve a poor radiation and make it burn down;
- 10) It is prohibited to dip the cable head into water; otherwise the water will go into the pump through cable core to deteriorate insulation or cause internal short circuit.

## 4 Start, stop and operation

### 1、 Start

- 1) The hand pump should turn without friction; inching the motor to test if the rotation direction is correct (it should turn clockwise if looking from the impeller end of the pump); the inching duration should be less than 5 seconds so as to prevent the mechanical seal from being damaged;
- 2) Close the valve on the pipe exit
- 3) Switch the power on. When pump works normally, in the gate open out and adjust the pressure to the pressure value indicated by the nameplate (if the outlet pressure is too low, it will make pump work with large flow; if so it will cause super-power).

### 2、 Stop

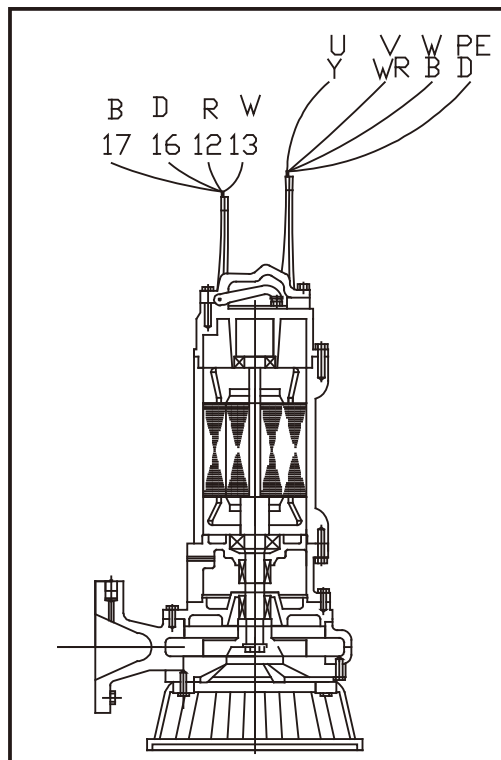
- 1) Close the gate on the outlet pipe and shut the power supply off;
- 2) If environmental temperature is below 0°C, pump should be discharged within the pumping media in order to avoid Frost Crack.
- 3) If long-term to stop using the pumps, it should be cleaned and demolition and oiling, packaging and management.

### 3、 Operation

When the pump works, please observe the reading of instrument; if anything goes wrong, please stop and solve problem immediately.

## 5 Control method of VQ and SVQ

Wiring method of VQ, SVQ submerged pump, See the following figure:



### 1. Wiring method (without control cable)

The power cable for the pump is the 3-phase 4-wire cable; the live wire is in red, black, white (yellow); the grounding wire is in two colors, with joint clamp;

If the phase sequence of the 3 phases in the electric control box is unclear, it should connect the red, black and white wire of the pump with the live wire of V, W and U before installing; the flexible wire is connected with the PE earthing protection cable; afterwards itch the pump to test if it works normally.

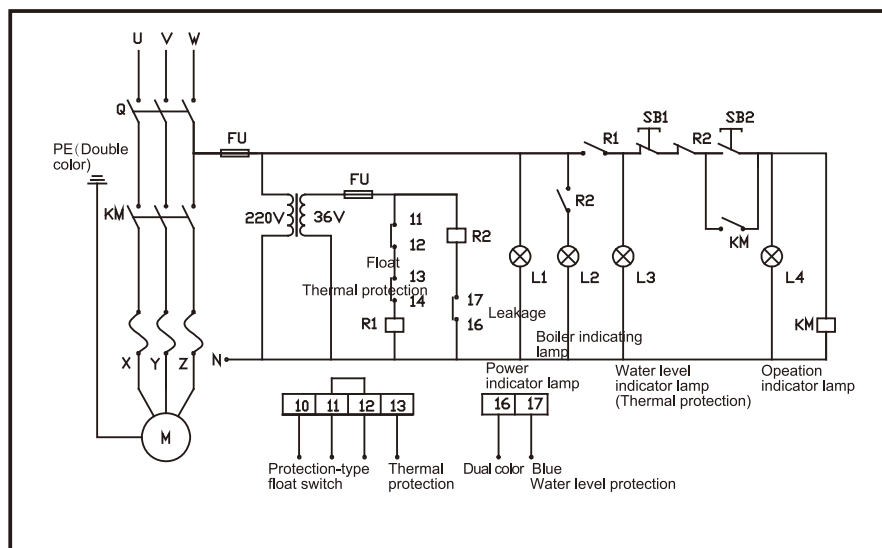
The itching duration is around 5 seconds; the itching test is made when there is no water; therefore the itching test should not be done too long, otherwise it will damage the mechanical seal of pump;

When making itching test, the symbol of positive rotation is the wind that comes out from the pump outlet; therefore it can use palm to feel the wind. If there is no wind to come out, it proves that wiring is connected incorrectly; at this moment, it should change the wiring of any two live wires of the three phases.

Important: Do not connect the earthing wire with the live wire, otherwise it will burn the motor down.

### 2. Wiring method (with control cables)

The control cable is the four-wire cable, with the blue and two-color as the water leakage protection wire and red and white as the thermal protection wiring.



### Application Description

Close the air switch Q, the power indicator lamp (L1) will be on.

When water level goes up to the given height, the float switch will close, and the relay R1 will action; the Normal-open Contact Point will close; at this moment, the water level and the thermal protection (L3) lamp will be on; press the button SB2, the contactor KM will be powered on, and the Normal-open Contact Point KM will close, and motor will run; meanwhile it will be locked by itself; at this moment, the operation lamp (L4) will be on.

When motor leaks water, 16/17 is of short-circuit; R2 Normal-Close Contact Point will be opened, and KM relay will lose electricity and KM contact point will open; at this moment the motor will stop rotating; meanwhile the R2 Normal-Open Contact Point will be closed; the leakage lamp (L2) will be on; thus it will form the water leakage protection.

## 5 Control method of VQ and SVQ

When the internal temperature of motor goes up and exceeds the rated value, the thermal protection contact point 12/13 will be opened, R1 relay will lose electricity, and R1 contact point will open, KM Contactor will lose electricity, KM Contact Point will open, and motor will stop working; thus it will form thermal protection for motor.

Press SB1 button, KM relay will lose electricity and KM Contact Point will open, and the motor will stop working. Note: for the pump with power less than 3KM (inclusive), it will be of the Y connection method; for the pump with other power, it will be of  $\Delta$  connection method. If the power is over 15KM, it should design a piece of control cable (if including additional two power cables, there will be of three cables totally).

## 6 Maintenance and upkeep of water pump

Name	Description	1 year or every 3000 hours	2 years or every 6000 hours
Bearing	Sealing status of grease/oil Check if the surface of the roller and ball bearing is peeled off; if it is deformed, please replace new one.		○
O-ring	Check if the surface is scratched or hardened; If it is deformed, replace the new one;	○	
Lubricating oil	If it is deteriorated or emulsified, change new lubricating oil; If water goes in, check the mechanical seal.	○	
Cable	Check if there is crack; Check if the rubber is hardened.		○
Mechanical seal	degree of wear of the moving or static ring Check if the rubber is hardened.	○	

Note: VQ and SVQ Submerged Pump is required to use full-closed maintenance-free bearing, and no lubricating grease or lubricating oil is needed.

## 7 Failure Reason and Troubleshooting

Status	Reason	Troubleshooting
Can not start	The voltage is not normal; Power cable goes wrong; Wiring problem Electric component does not action The motor goes wrong.	Ensure normal voltage. Check the power cable and ensure power cable in sound condition or replace; Reconnect the cables. Repair the electric parts; Repair motor.



## 7 Failure Reason and Troubleshooting

Status	Reason	Troubleshooting
Water volume or pressure is insufficient	<p>The rotation direction is wrong.</p> <p>The automatic vent valve goes wrong; air goes into the pump.</p> <p>The impeller is damaged;</p> <p>The coupling leaks water.</p> <p>The impeller or filtering net is blocked.</p> <p>The motor power is too low.</p>	<p>If the rotation direction is adverse, change the phase sequence of motor.</p> <p>Change the automatic vent valve.</p> <p>Repair or replace the impeller.</p> <p>Change the seal.</p> <p>Remove the foreign matters.</p> <p>Change large power motor.</p>
Vibration and noise	<p>The impeller turns adversely.</p> <p>The motor bearing is damaged.</p> <p>The rotating shaft displaces.</p> <p>Impeller is damaged.</p> <p>Air goes into pump.</p> <p>The pump is supported unsteadily.</p>	<p>Adjust the phase sequence of motor</p> <p>Repair or change bearing.</p> <p>Repair the rotating shaft.</p> <p>Repair impeller or change impeller.</p> <p>The water level is too high, or reduce the height between the water pump and the liquid level.</p> <p>Consolidate the support.</p>
Can not lift water	<p>The working direction is reverse.</p> <p>The impeller or filtering net is blocked</p> <p>The water level is too low;</p> <p>The automatic venting valve goes wrong; air goes into the pump.</p> <p>The outlet pipe leaks;</p> <p>The outlet pipe is designed unreasonably, i.e.: the resistance is too much;</p> <p>The impeller is damaged.</p> <p>The model is selected wrongly.</p>	<p>Adjust the phase sequence of motor.</p> <p>Remove the foreign matters.</p> <p>Reduce the height between the water pump and the liquid level.</p> <p>Repair or change the automatic vent valve.</p> <p>Check and repair the pipeline.</p> <p>Improve the resistance of outlet pipe.</p> <p>Repair or change the impeller.</p> <p>Use the proper pump with correct model.</p>
Current is overloaded	<p>The motor turns reversely.</p> <p>The water amount is too much.</p> <p>The motor bearing is damaged.</p> <p>The impeller is stuck by foreign matter.</p> <p>The system is under voltage.</p>	<p>Adjust the phase sequence of motor.</p> <p>Adjust the outlet valve or cutting impeller.</p> <p>Change motor bearing</p> <p>Remove the foreign matters.</p> <p>Ensure normal voltage.</p>



