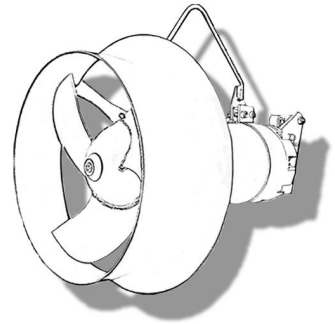




QJB Type Submersible Mixer Operation Manual



WARNING



1. Please refer to the Operation Manual before installation.
2. Power must be switched off when moving maintenance submersible mixer.

Preface

Thank you for choosing “Beite” product. This product manual is only applicable to the QJB400-2.5 submersible mixer manufactured by our company. This product is manufactured in accordance with Urban Construction Industry Standards of the People's Republic of China (CJ/T109- 2007).

Please read the product manual carefully before installation and use. We are not responsible for any liability for personal injury, equipment damage and other financial losses caused by behaviors violating the descriptions in the manual. If you have further questions, please contact us and we will provide in time and warm services.

This manual mainly describes the structural characteristics, working principles, installation and debugging, use and maintenance, failure analysis and troubleshooting, transportation and storage, etc. of QJB400-2.5 submersible mixer.

This manual is applicable to QJB400-2.5 submersible mixer series products and the use of similar customized products of other specifications can refer to this manual.

In case the external view or other illustrations of the product in the manual are different from the actual product, the use of product shall be subject to the actual product.

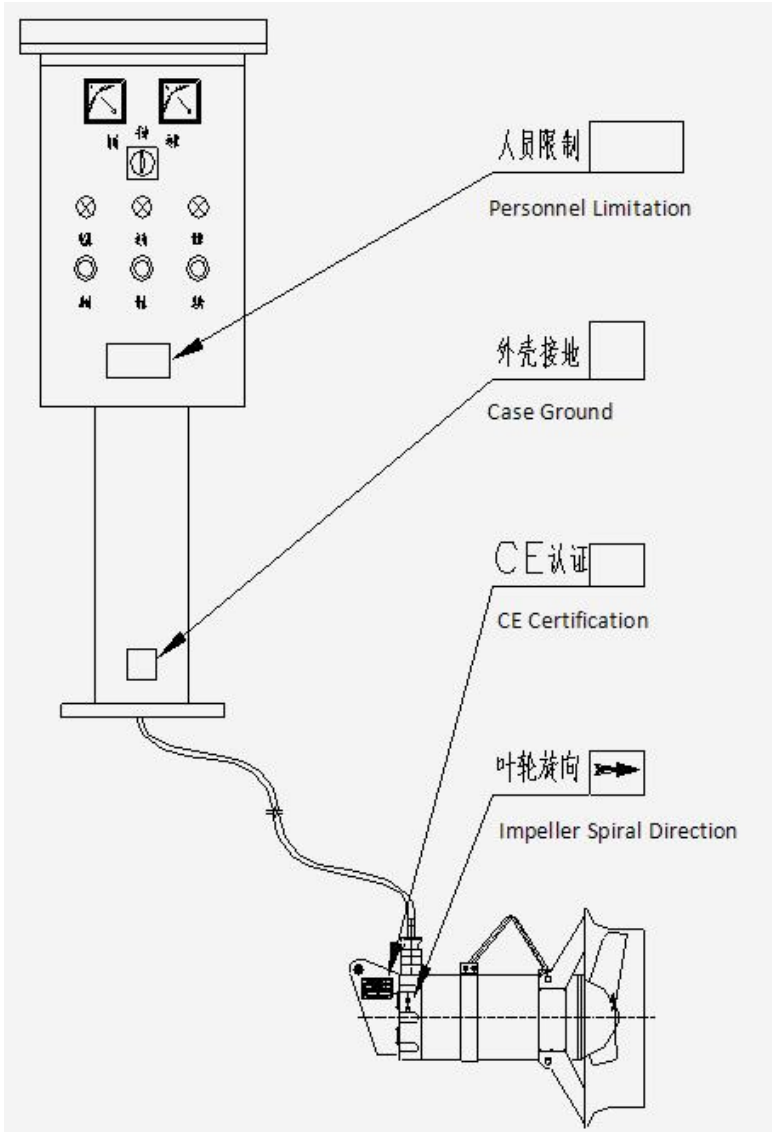
The company’s product technologies will be continuously innovated, and the product manual will be changed accordingly. There will be no further notice for future change.





0 Keynotes

0.1 Please be noticed that notes on safety precautions and warnings as shown in Table 0.1 will appear in different places of this manual.

Table 0.1 Notes on Safety Precautions and Warnings

Figure 1 Location Drawing on Equipment Safety Precautions and Warnings



	Electric shock hazard: Electric shock may cause death or serious injury.
	Hazard warning: Dangerous, may cause hurt.
	May cause equipment failure or unexpected stop
	Operation remind and useful information

0.2 It's a premise condition of ensuring your personal and financial safety, equipment quality and normal operation to abide by this manual.

0.3 This manual provides important information on correct installation, use and maintenance of QJB400-2.5 submersible mixer, so please properly keep it where the equipment is installed.

1 Safety Instructions

The following safety instructions involves in the transport and storage, installation and debugging, use and maintenance of QJB400-2.5 submersible mixer, and it may cause personal injury or property (equipment/raw materials/products) losses in case of ignoring these safety instructions.

Meanwhile, please pay attention to the supplemental safety instructions of this manual in each chapter.

1.0 Overview

There are live parts and moving parts when the equipment is in operation; and there are live parts when the equipment is stopped.

Non-qualified personnel shall not carry out the following operations:

- transport
- storage
- installation/Assembly
- use
- maintenance

Before carrying out the foresaid operations, please carefully read the following information:

- attached drawings of this manual
- other documents provided with the equipment
- label plates of the equipment
- special regulations and requirements related to the equipment
- national/local regulations on safety and accident preventions

The following situations may cause serious personal injury or material damage:

- improper carrying
- improper installation
- improper use or operation
- dismantling necessary safety prevention device unauthorizedly

1.1 Transport and storage

- Confirm the product prevention in the transport process; please confirm if the packing case is complete after receiving the goods and if there is any damage, please notify the carrier and our company immediately, which is a premise condition of claiming for the transport process of the product.

- Please strictly abide by the descriptions related to moving of product; otherwise it may cause personal injury or equipment damage.
- Please abide by the regulations on “long-term storage” in case of storing the equipment for a long period of time, and enough lubrication oil or grease shall be added at designated places and anti-rust measures shall be taken. Pay attention to protection of electric control box for long-term storage electric control box.

1.2 Installation and debugging

- Please carefully read the descriptions on equipment installation in the manual.
- The installation and debugging of this equipment shall be carried out by qualified personnel of the company or agent of the company and before the foresaid personnel arriving the site, do not dismantle the packing case, which is one of the premise conditions of claiming for related product.
- Stop the equipment and check immediately if there is any abnormal phenomena (vibration, sharp noise, out of range temperature rise) in the debugging process, until the causes are found out and eliminated.

1.3 Use and maintenance

- There are live parts and high-speed rotating parts during the use of the equipment. Please strictly abide by the regulations in this manual to avoid injury caused by electric shock, equipment damage or falling in the process of use.
- Stop the equipment and check immediately if there is any abnormal phenomenon (vibration, sharp noise, out of range temperature rise) in the debugging process, and contact our company immediately when necessary.
- The equipment maintenance or troubleshooting process may involve the movement of live parts, rotating parts or equipment parts, and please strictly abide by the regulations of the manual to avoid injuries caused by electric shock or impact of the equipment.

2 Equipment Overview

2.0 Overview

As one of the key equipments in water treatment process, OJB series submersible mixer can realize the process requirements of homogenizing and homogenizing of solid, liquid and gas in the biological process. The submersible mixer is composed of impellers, submersible motor, terminal box, fairwater cone, electric control cabinet and etc. The working principle of the host equipment is as following: the impeller operating below the liquid level rotates in high speed with the driving of the submersible motor, and the impeller drives the flowage of the water, and the suspended water will not deposit in water with certain flowage, instead it will be fully mixed.

2.1 Product feature

2.1.1 Structural feature: the submersible mixer is of directly link pattern. It has such advantages as compact structure, low energy consumption, easy to repair and maintain and etc. The impeller is formed through precision cast or punching press, the shape of which is simple and beautiful and besides, it has anti-wind function. Dual mechanical seal and tungsten carbide are adopted. All the fasteners are made of stainless materials. The insulation grade of equipment winding is F grade and the prevention grade is IP68. The adoption of imported bearing makes the operation of the host equipment more reliable and stable.

2.1.2 Control method: The electric control box of the submersible mixer is equipped with local and remote control buttons, so both local control and remote control in the central control room through remote interfaces are available.

2.1.3 Lifting method:

Anchor type carrying handle is adopted to avoid earlier broken caused by swinging of lifting metal chain or steel wire rope in the water.

2.1.5 High quality low carbon austenitic stainless steel is adopted as the main materials for manufacturing the equipment, which can satisfy the need of underwater anti-corrosion.

2.2 Main purpose or applicable fields of the product

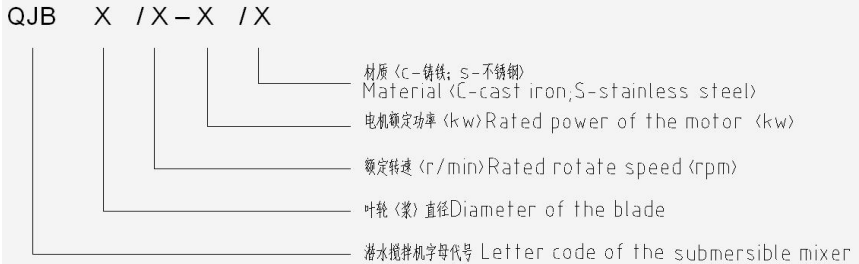
The product is applicable to several process phases for municipal and industrial sewage treatment, and has the functions of causing water flowage, mixing of solid, liquid and gas, homogenizing, optimization of heat transfer, cleaning of sewage tank, removal of suspended materials, deposition prevention and etc.

It can be also used in other industries and fields, such as chemical industry, medical and other

situations with the same functions as the above physical and biochemical functions.

2.3 Product specification models and meanings

The submersible mixer of the company is a collection of the series of products, and there are many specifications according to the diameter of impeller and watt level. The meaning of the product models are as following:



2.4 Applicable environment and working conditions

2.4.1 Working environment

The mixer is long-term continuously operating equipment, which can be controlled remotely and related personnel will only stay on site temporarily during installation and debugging and lifting or maintenance.

- a) Ambient temperature: The air temperature for normal operation is between 5°C - 40°C;
- b) Humidity: When the ambient temperature is 40°C, the relative humidity in the working environment shall not exceed 50%, and the lower the temperature is, the higher of the humidity is allowed (for instance, if the environmental temperature is 20°C, the relative humidity in the work environment shall not exceed 90%.
- c) Atmospheric pressure: 86kPa - 106kPa。

2.4.2 Working conditions

- a) Power conditions
- b) The highest medium temperature shall not exceed 40°C;
- c) The ph value of the medium shall be between 5 - 9;
- d) The liquid density shall not exceed 1150kg/m³;
- e) For long-term underwater operation, the submersible depth shall not exceed 20m;
- f) If the volume of the tank is between 1000 to 3000m³, the viscosity can reach 50cp; and if the volume of the tank is between 500-700m³, the viscosity can reach 1000cp.

The above working conditions are standard design conditions and design exceeding the above requirements can be taken as non-standard design.

2.5 Environmental influence

2.5.1 The underwater operation noise of the whole equipment is less than 78dB(A), conforming to the requirements of GMP on the equipment;

2.5.2 When changing the lubricating oil, the discharge of small amount of waste oil or cleaning soiling solution shall abide by related regulations of the state and local governments;

The equipment will be scrapped after years of use, and the disposal of scrapped materials shall abide by the local laws and regulations. The residual value of some parts in the equipment can be recovered, for instance:

- carbon steel, such as case and bearing can be taken as waste iron;
- stainless steel parts such as impeller, case and connection box can be taken as waste stainless steel;
- wire core of the motor can be taken as waste copper.

3 Structural Features and Working Principles

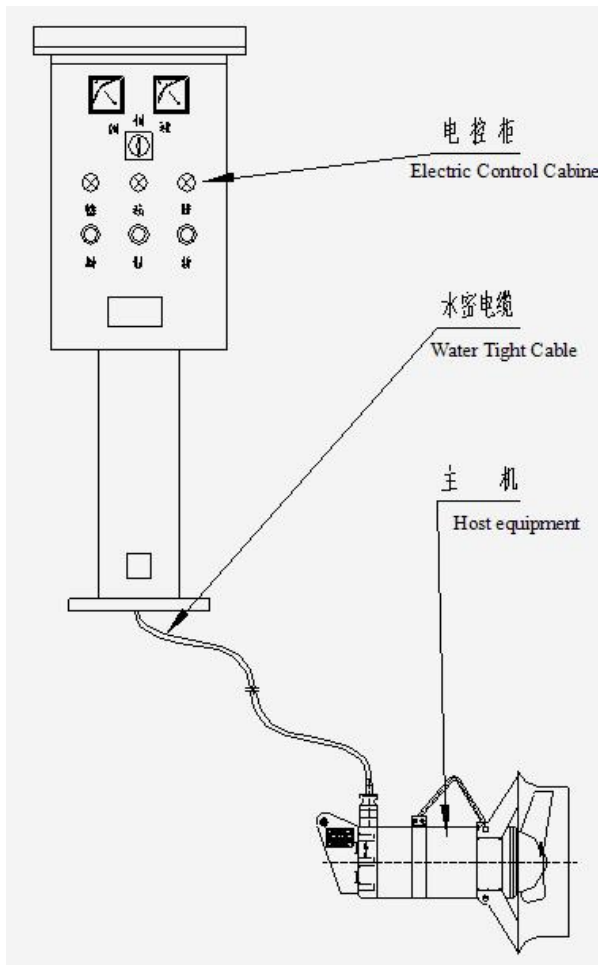


The figures used here is for reference only and they are supplementary to the list of parts; please subject to equipment on site.

3.0 Overview

QJB400-2.5 submersible mixer is mainly composed of the host equipment and electric control cabinet.

Figure II General Assembly Drawing

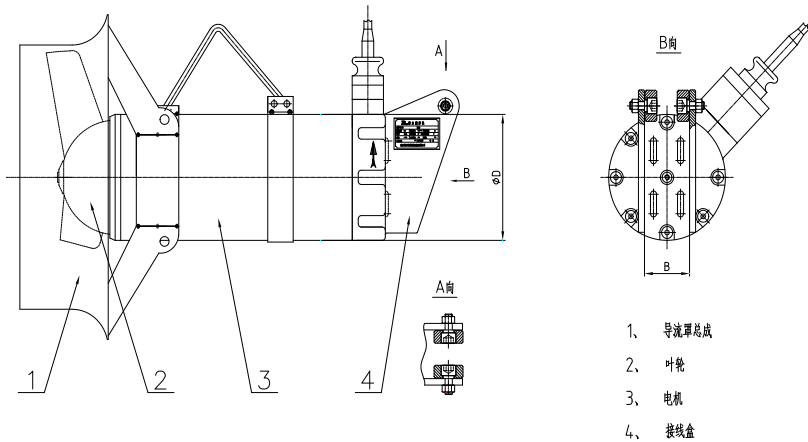


The host equipment is installed underwater and operating continuously, and the electric control cabinet is placed nearby the tank for the convenience of operation.

3.1 Host equipment

The host equipment is composed of impeller, submersible motor, connection box and fairwater cone, and the host equipment is installed on a frame with guide rail on it and will be operated underwater for a long period of time.

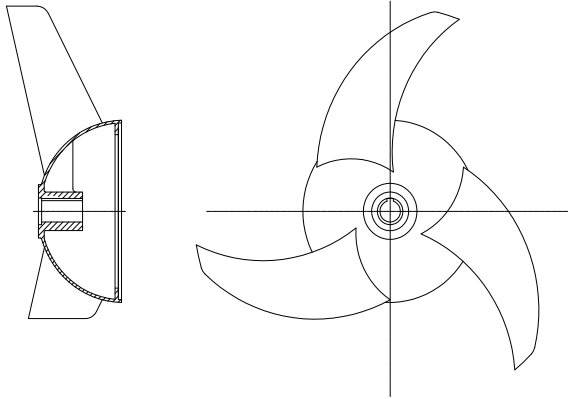
Figure III Host Equipment




3.1.1 Impeller

The impeller, as the main power parts, is welded with three pieces of stainless steel blades and a precision cast stainless steel wheel hub. During installation and debugging, the impeller shall be started and run before being putting into water or the tank is filled with water, and the rotating direction shall conform to the direction of arrows marked on the connection box (as shown in figure 3), otherwise it may cause the impeller disconnecting with the host equipment and falls down. In such case, exchange the positions of any of two lines of three-phase line on the controller, then the trouble can be disposed.

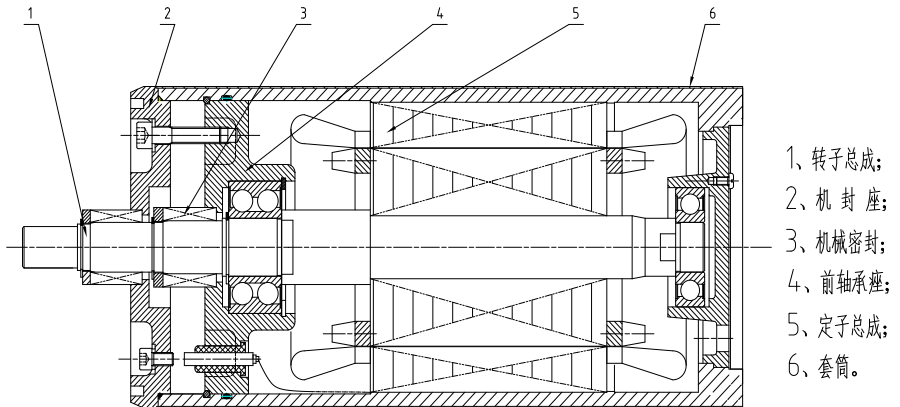
Figure IV Impeller



 接线错误造成叶轮旋转反向有可能造成人身伤害或设备损坏!
Remove the subassemblies will result in injury or damage.

3.1.2 Submersible Motor

Figure V Submersible Motor



1. Rotator assembly; 2. Mechanical seal seat; 3. Mechanical seal; 4. Front bearing seat; 5. Stator assembly; 6. Sleeve

Three-phase squirrel-cage asynchronous motor is adopted as the motor of the submersible mixer, and its protection degree is IP68, the insulation degree is F grade (155°C) or H grade (180°C). The submersible motor can operate continuously and startup over 10 times per hour.

Under rated power, the rated voltage deviation of the motor is $\leq \pm 5\%$. If the motor is not overheat and has been running continuously with load, the permitted rated voltage deviation is $\pm 10\%$.

Cooling

The motor is cooled by the surrounding liquid.

Monitoring device

The stator is equipped with two groups of thermostiches, and F grade insulation thermostich will be disconnected automatically when the temperature is 135°C. Please refer to related regulations of electricity connection and startup devices for details.

The equipment is equipped with oil chamber leakage protector.

Axle

The axle and rotator of the motor will be provided as a whole part. The motor and impeller of the mixer are connected with the same axle.

Mechanical Seal

O type sealing ring is adopted for the plane and radial sealing and mechanical seal is adopted for horizontal sealing. Two independent high quality mechanical seals are adopted for shaft seal and anti-corrosion tungsten carbide or silicon carbide is adopted for mechanical seal, and the mechanical sealing seal the stator bore and the accumulator and the accumulator and the surrounding liquid. The normal service life of the mechanical seal is 8000 hours.

Bearing

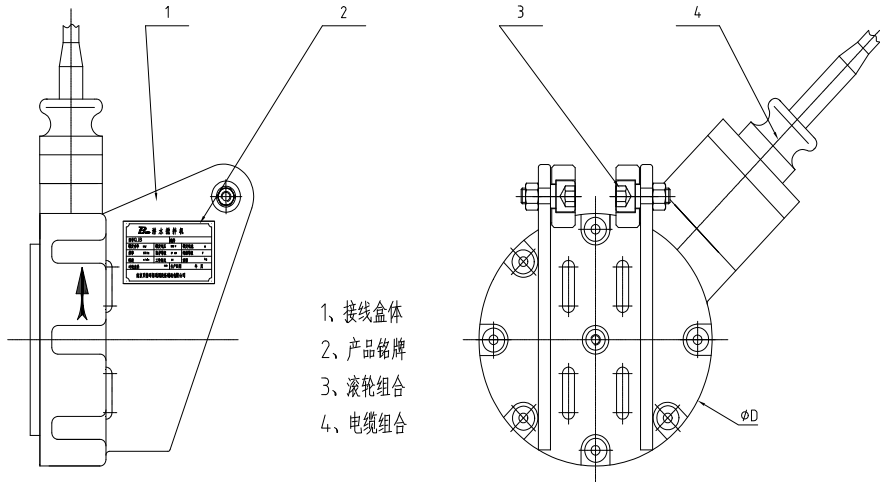
The bearing is composed of front and back bearings, and the service life of the imported axle adopted can reach over 100,000 hours.

Oil Chamber

The oil chamber is adopted to store the oil for lubricating, cooling the bearing and mechanical seal as well as isolating the penetrant.

3.1.3 Connection box

Figure VI Connection Box



1. Connection box case; 2. Product label plate; 3. Roller combination; 4. Cable Combination

As shown in Figure VI, the connection box is composed of connection box case, product label plate, roller combination and cables.

After connecting the connection box case with the submersible motor, isolate the inner chamber with the outside. And the combination of the slide rail and the roller at the tail is convenient to match with the guide rail; the arrow mark at the surface of the tail points out the rotating direction of the impeller.

The sealed cable combination will not allow liquid and gas entering into it, and will connect the electricity and output the signals; however, strong dragging during transport, installation and operation or water penetration caused by damaged cable sheath will cause the motor being burnt out or stop due to startup of protection.



Damage of cable will cause failure of equipment!

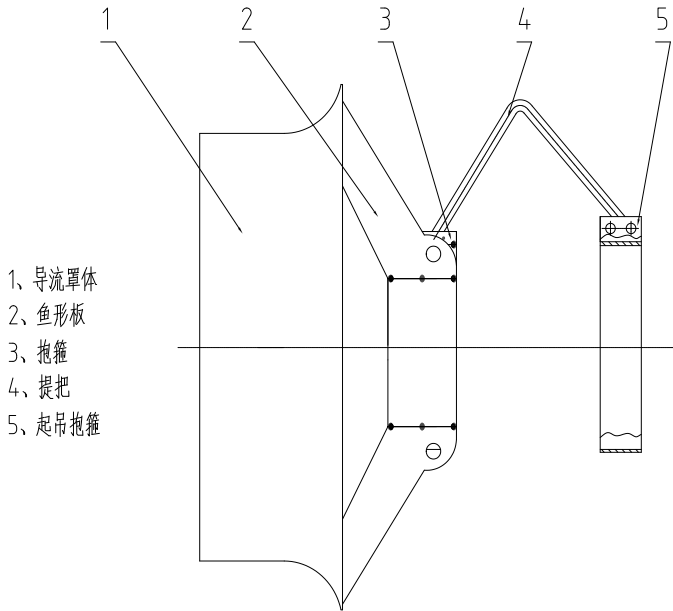
3.1.4 Fairwater cone assembly

The fairwater cone assembly is composed of fairwater cone body, fish-shaped plate, hold hoop, carrying handle, lifting hold hoop and etc. (As shown in Figure V).

A fairwater cone is optional for the submersible mixer. By using of the fairwater cone, the work efficiency can be improved and water flow direction can be controlled. For liquid with fiber, a

fairwater cone may not be provided. The lifting lug of the carrying handle is where the center of gravity is located, and is convenient for hanging by anchor hook.

Figure VII Fairwater Cone Assembly



- 1、导流罩体
- 2、鱼形板
- 3、抱箍
- 4、提把
- 5、起吊抱箍

1. Fairwater cone body, 2. Fish-shaped plate, 3. Hold hoop, 4. Carrying handle, 5. Lifting hold hoop

3.2 Electric control cabinet

The electric control cabinet is independent from the host equipment system. It is of non-explosion-proof and single type structure and installed nearby the tank of the main engine, which is convenient for the electric appliance operation and maintenance personnel.



(1) Maintenance for the electric control system must be performed by qualified personnel.

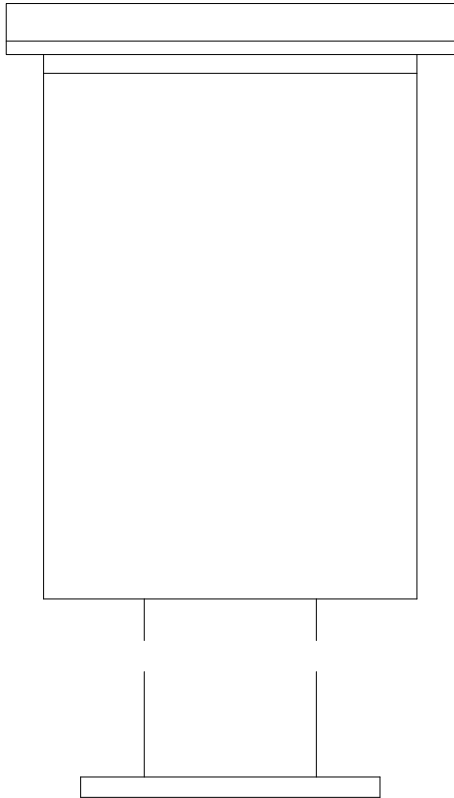
(2) The electric control cabinet shall be locked in normal times and the keys shall be kept by qualified personnel.

The repair and maintenance of the control system shall be carried out by qualified personnel.



The electric control cabinet shall be locked in normal times and the keys shall be kept by qualified personnel.

Figure VIII Outside View of Electric Control Cabinet

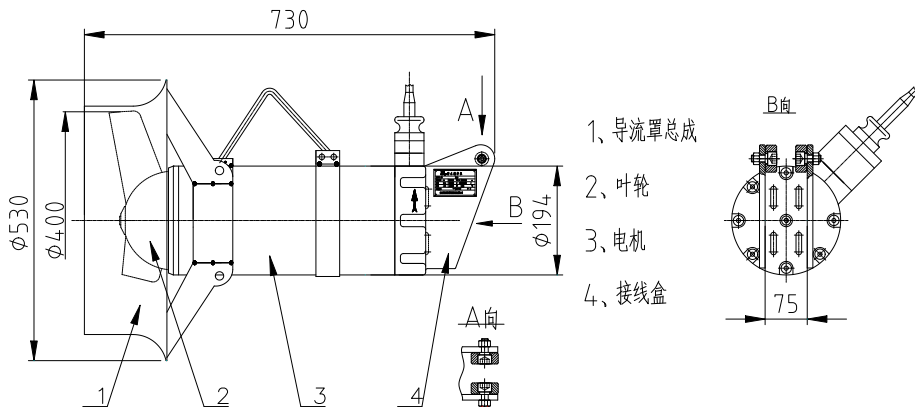


1. 自动-Auto;
2. 手动-Manual;
3. 远控-Remote control;
4. 电源-Power;
5. 运行-Operation;
6. 故障-Failure;
7. 启动-Startup;
8. 停止-Stop;
9. 急停-Emergency stop

4 Outline Dimension and Main Technical Parameters

4.1 Outline and Dimension

Figure IX Outline and Dimension Drawing of Host Machine



1. Fairwater cone assembly; 2. Impeller; 3. Motor; 4. Connection box

4.2 Main technical parameters (Table 4.1)

Table 4.1 Main technical parameters

Model	Motor Power kW	Rated Current A	Diameter of Impeller mm	Thrusting Force N	Weight kg
QJB400-2.5	2.5	7	400	800	82

5 Installation and Debugging



The equipment shall be installed by qualified personnel!

Parts with ground symbols shall be correctly grounded and grounding continuity test shall be carried out, the reading of which shall not be larger than 4Ω , otherwise it must be corrected;

Make sure the lifting equipment is proper before installation, and valid test certificates shall be provided for these tests;

Please do not use twisting cable, damaged cable or knotted cable to carry out the lifting operation;

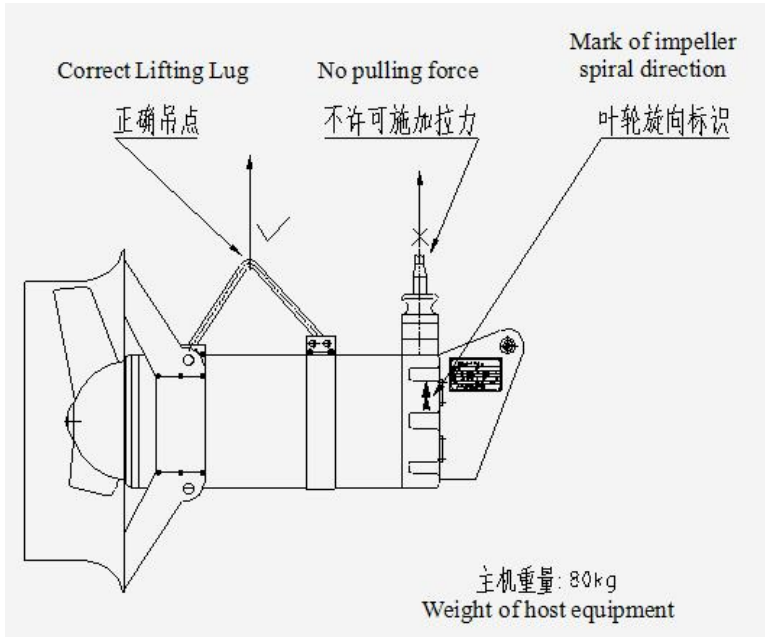
Use of incomplete and unmatched tools is forbidden.

Installation in dangerous places not allowed by the national electricity regulations is not allowed.

5.1 Equipment installation

- a) After dismantling the package, adopt proper lifting and carrying equipment to remove the host equipment to proper installation place;
- b) Lift the host equipment to a mounting bracket that can be coupled automatically, but imposing pull force to the cable is not allowed (as shown in Figure X).
- c) Connecting the power;
- d) Carry out installation inspection to correct improper problems.

Figure X Lifting and Carrying Drawing



5.2 Installation Precautions

- 5.2.1 The installation and debugging of this equipment shall be carried out by qualified personnel of the company or agent of the company and before the foresaid personnel arriving at the site, do not dismantle the packing case, which is one of the premise conditions of claiming for related product.
- 5.2.2 The environment of the installation site, namely the equipment operation site, shall conform to the regulations specified in 2.4.1.
- 5.2.3 Before installation, confirm if the on-site public service facilities (medium, electricity and etc.) are provided in accordance with the technical requirements of the equipment (as shown in Table 4.1) as well as the requirements specified in 2.4.2.
- 5.2.4 Before installation of the submersible mixer, find out the lifting center of gravity, and during the operation make sure the centers of gravity of the lifting support and the submersible mixer is in a vertical line, so that the submersible mixer can move smoothly and freely during up and down lifting.
- 5.2.5 Do not rotate the angel of the submersible mixer horizontally during use, and please adjust the horizontal angle during installation; place the submersible mixer is on the lower limit bracket, and then dismantle the anchor hook.

5.2.6 Preventing over bending or tightening when extending the cable.

5.2.7 Attention! Do not immerse the end of the cable below the liquid surface, since water may enter the connection box or motor through the cable, so the end of the cable must be above the liquid surface.

5.2.8 Attention! The system I submersible mixer will rotate without a fairwater cone, so a limit function shall provided for the guide rob to prevent the mixer hitting the wall.

5.2.9 Fix the cable of the mixer and the cable rope at the side of the tank and the cable shall not have friction with any underwater structures.



The installation shall make sure the cable will not be involved in the impeller in the following debugging and operation !

Before lifting the mixer from the tank, make sure the mixer has been stopped.

5.2.10 For the movement during the installation process please refer to Chapter 9 “Movement and Storage”.

5.3 Debugging



Under debugging status, all protection measures shall be completely shielded and unqualified personnel shall not carry out debugging operation !

5.3.1 Inspection before debugging

Table 5.1 Items to be inspected before debugging (adjustment)

Inspection Item	Requirements	Method
System grounding	Earthing and protective earthing resistance is not larger than 4Ω	Inspect with ohm gauge
Installation connection	Fixed and reliable	Sensitive test
Cable appearance	Without damage, crack or galling	Visual observation

Connecting the power	380V/50Hz	Carry out by qualified personnel
Insulation resistance to earth of the motor stator winding	The resistance value shall not be lower than 50MΩ	0 - 500v megohmmeter
Fuse and breaker	The ampere value must consider that the startup current of the motor is 5 times of the rated current	By qualified person
Equipment operation region	There are no sundries or irrelated personnel influencing the work.	

5.3.2 No-load (dry tank) startup test

Start the on-site control button to observe the correctness of rotating direction of the impeller and the reliability of the coupling connection between the host equipment and the mounting bracket; in this process, the personnel in charge of startup shall not leave the control cabinet, if the impeller rotates reversely, turn off the equipment immediately and exchange either of the three-phase lines on the controller (as shown in 3.1.1).

Turn off the equipment immediately if the host equipment vibrates; in case the fuse is burnt out or the breaker is broken, then analyze the causes of the problems (since there is no water in the tank to cool the equipment, the test shall be completed in several minutes, otherwise the over-heat protection will stop the equipment or damage the motor).



Since there is no water in the tank to cool the equipment, the test in a dry tank shall be completed in several minutes; otherwise the over-heat protection will stop the equipment or damage the motor.

5.3.3 Inject water after dry tank startup test.

5.3.4 Debugging of electric system

a) The debugging of electric system shall be carried out in a tank filled with water, the test mainly repeatedly startup all the buttons and the effectiveness of remote-control (when remote control function is provided).

b) Inspect the conformity of the rated current (in case the rated current exceeds 10%, over-loading protection shall be launched). This debugging shall not be less than 30 minutes.

6 Equipment Use Operations

6.1 Inspection and preparation before startup of equipment

(Please refer to Table 6.1)

Table 6.1 Inspection and Preparation before Startup of Equipment

Item	Requirements	Method
Check the power voltage	$\pm 10\%$ of the rated voltage value	Indication of voltage meter on the surface of the cabinet; measure with hand vice
Rated current value	As per the nameplate	Clamp ammeter
Rotating direction of impeller (If the equipment is reinstalled due to inspection)	Identical with the direction of the mark on the connection box	Visual observation
Cable (If the equipment is reinstalled or exposed to the sunshine over 1 year.	If it is damaged or cracked	Visual observation
Depth of the impeller immersing into the water	As per Table 6.2	Measure with tapeline

Table 6.2 Inspection and Preparation before Startup of Equipment

Model	QJB400-2.5
The minimum distance from the upper edge of the fairwater cone to the water surface mm	800

6.2 Startup of equipment and operating procedure and method

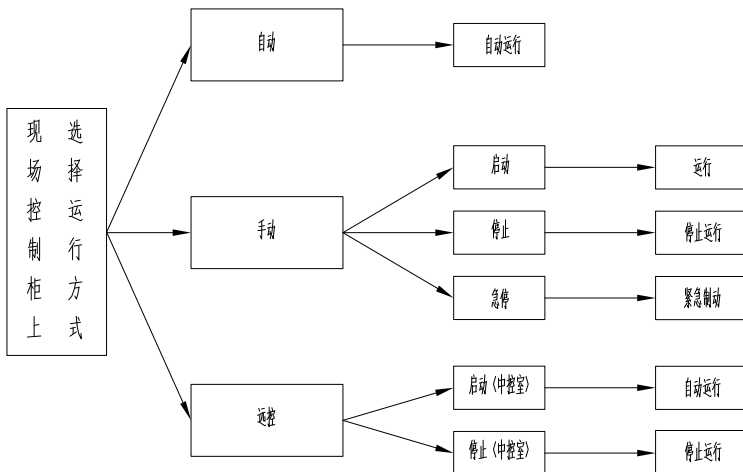


When the operation starts, the equipment shall be fixed on the mounting bracket!
Please be careful since the impulse of the impeller is larger during operation.

6.2.1 Select auto, manual or remote control on the surface of the electric control cabinet

6.2.2 Startup the equipment (Please refer to Figure XI)

Figure XI Total Flow Chart of the Control System



select operation method from the on-site operation cabinet

自动-Auto; 手动-Manual; 远程-remote; 自动运行-Auto operation; 启动-Startup; 停止-Stop; 急停: emergency stop; 中控室- Central control room; 自动运行-Automatic operation; 停止运行-Stop operation; 紧急制动-Emergency stop

6.2.3 In the startup process, pay attention to the current impulse during startup. It is normal that the current in the first few seconds is larger than the normal current. After starting up, the current during normal work shall be within the scope of rated current.

The current during operation is larger may be caused by the strong viscosity or high concentration of the liquid, or improper debugging of the submersible mixer.

Over fierce mixing in tanks with small volume or the asymmetry of flow out and flow in of

water caused by in the air the air flow turn up by the imbalance of the impeller or the air turned up due to the impeller's submerging in the water is lower may all cause swinging or vibration.

Several submersible mixers installed too close will also cause swing or vibration.

6.2.4 When the submersible mixer is still in use or immersed into the water, use of the submersible mixer can be continued when the temperature is below 30°C, however it is forbidden when the temperature exceeds 40°C (50°C for H grade insulation water temperature) .

6.2.5 The submersible mixer uses grease or lubricating oil as lubricant, the grease or lubricating oil will release due to wearing of sealing. In this case, send the submersible mixer to the maintenance department of the company or a designated maintenance point to change the seal to avoid burning out the motor.

6.2.6 When the equipment needs stopping, use the buttons on the on-site control cabinet or remotely shutdown the equipment from the central control room.

6.2.7 Do not move the submersible mixer or have person entering into the operation water area. Please consult with the technical department of our company for other operations on the submersible mixer.

6.3 Operation after shutdown

6.3.1 When the equipment is going to be stopped for over two weeks, lifting the host equipment outside of the water and put it aside the tank; when the equipment is going to be stopped for over 1 month, clean the surface of the host equipment and put it aside the tank; and when the equipment is going to be stopped for over 3 months, clean the outside surface of the host equipment and transport it to the warehouse.

6.3.2 When the equipment is stopped for a long period of time, sludge (such as oxidation ditch and sludge tank) will deposit at the bottom of the tank, and when the host equipment is dropped down and started again, the equipment may be stopped due to overloading, so do not use the mixer until the sludge nearby the host equipment is disposed by dilution.

7 Failure Analysis and Troubleshooting

7.1. Failure Inspection

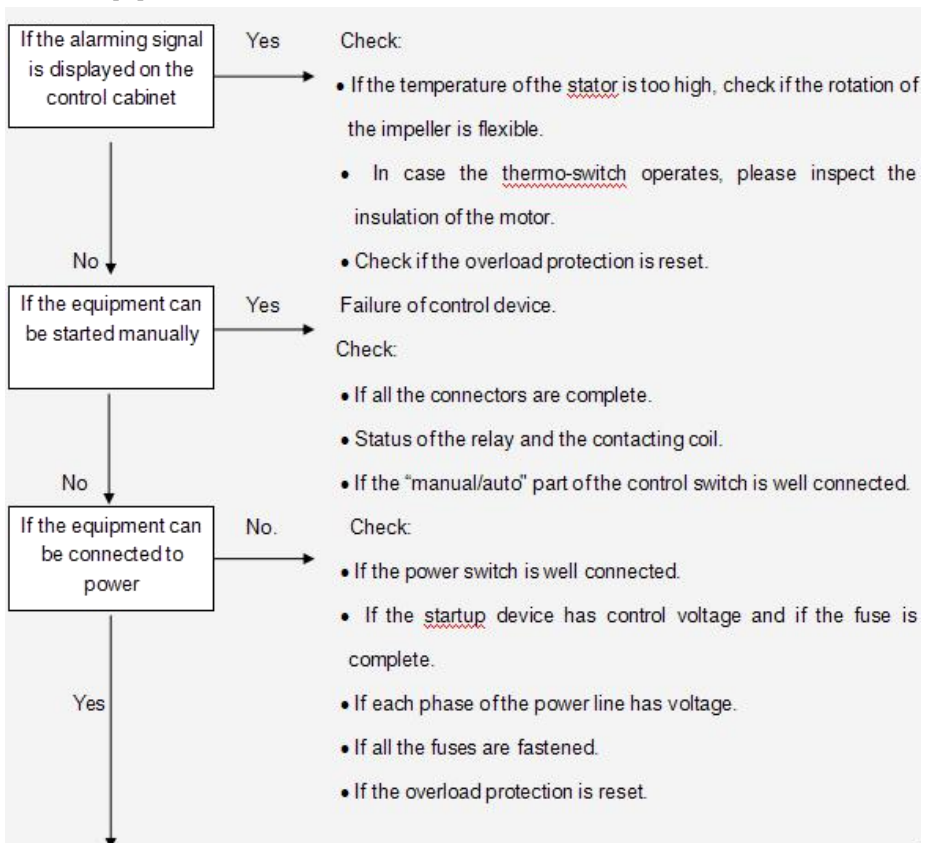
In case the mixer is failed during operation, do not continue the operation if the causes of failure can not be confirmed, and do not dismantle the mixer randomly, please contact a qualified maintenance mechanism or contact the after sales services department of our company.

In order to check the failure of the electric equipment, a multimeter or clip-on ammeter and mixer wiring diagram is required.

Except for failure inspection which requires inspection with power on, all the other inspections shall be carried out when the power is off or the power is disconnected.

The electric operation shall be completed by a qualified electrician. Please abide by related local safety regulations and safety precautions.

7.1.1 The equipment can not be started



If the impeller is being
wound or deformed

Yes

No

- If the cable of the motor is damaged.
- Clean the impeller.
- Change the impeller before reuse.
- Deliver to the qualified maintenance mechanism or contact with the after-sales department of our company.