

⚠ Read this manual before operation



**SUBMERSIBLE MIXER
INSTRUCTION MANUAL**



YIXING TEIO INTERNATIONAL TRADE CO.,LTD.

SPECIALIZED IN WATER TREATMENT SOLUTIONS

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1. Overview

QJB Submersible mixer is used for municipal sewage treatment plants and industrial wastewater treatment plants to produce low tangential flow with force, also can be used to create a flow for circulation, nitrification, denitrification and phosphorus removing.

2. Equipment Features

2.1 Characteristics

The submersible mixer has the characteristics as follows:

- (1) Compact structure, light weight, easy operation and maintenance, simple installation.
- (2) Self-cleaning blade, preventing debris from twining or blocking.
- (3) Low energy consumption, high aeration rate preventing sedimentation.
- (4) Two rows of independent mechanical seal, longer service life.
- (5) Class F insulation of motor winding, motor protection grade IP68, imported permanent lubricated maintenance-free bearings, chamber leakage detection, motor winding overheating protection.

2.2 Working Conditions

- (1) The maximum temperature of the medium should not exceed 40°C.
- (2) The pH value of the medium should be between 5 and 9.
- (3) The liquid density should not exceed 1150 kg/m³.
- (4) During long-term operation, the diving depth should not exceed 20m.
- (5) When the pool volume is 1000–3000 m³, the viscosity should not exceed 50 cP, and when the pool volume is 500-700 m³, the viscosity should not exceed 1000 cP.

Attention: The submersible mixer should work underwater and cannot work in flammable and explosive environment or in highly corrosive liquid.

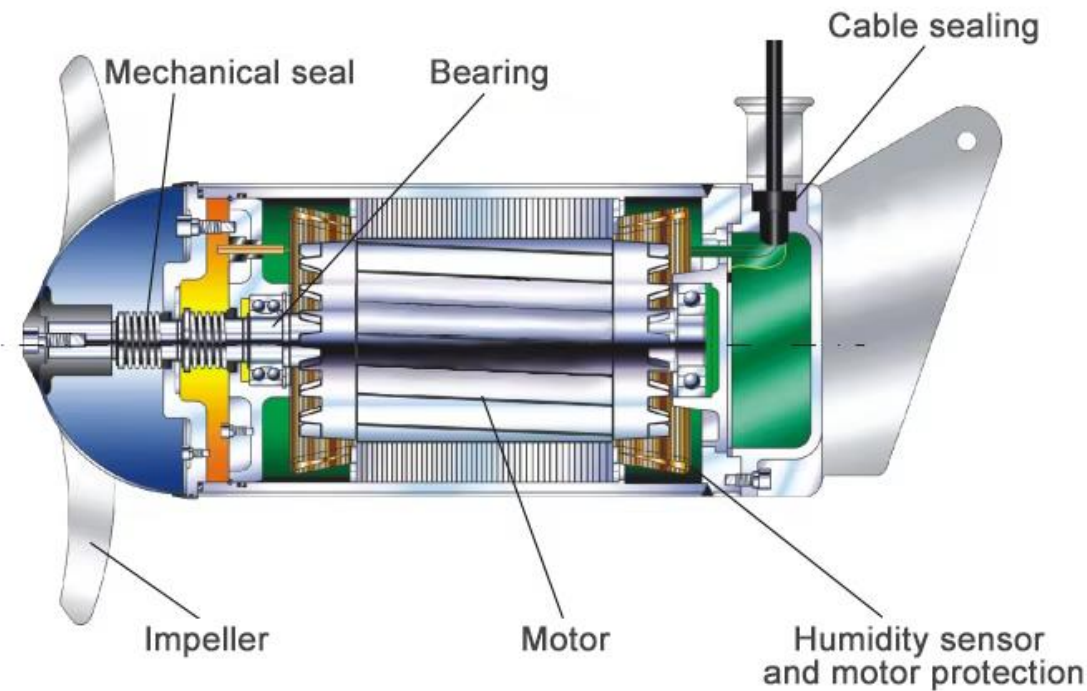
2.3 Scope of Application

- (1) Places where suspended solids need to be stirred evenly, such as aeration tank, anaerobic tank and sludge tank in sewage treatment plant.

(2) Places with high operating safety, such as water containing metal salts, pulp and fiber materials, papermaking, food and chemical industries.

(3) Places where need to make the water flow, such as fish pond, aquatic farm.

3. Equipment Structure



3.1 Cable Entry

Watertight cable is used as the cable entry.

3.2 Junction Box

The junction box is fully enclosed and isolated from the surrounding liquid.

3.3 Motor

The motor is three-phase squirrel cage asynchronous motor, its protection level is IP68, and its insulation level is F (155°C). The motor can run continuously and can be started at least 10 times per hour.

3.4 Stator Cooling

The stator is cooled by the surrounding liquid.

3.5 Monitoring Device

The stator is equipped with tow thermal switches connected in series, which automatically turn off when the temperature reaches 125°C (260°F).

Most of the submersible mixer is equipped with oil chamber leakage protector.

Attention: Some models of submersible mixer are not equipped with thermal switches and oil chamber leakage protector.

3.6 Shaft

The shaft and rotor of the motor are an integral component.

3.7 Sealing

The external seal is O-ring, which seals between the surrounding liquid and main machine. The shaft is sealed with two independent high-quality mechanical seals. The sealing surface is made of corrosion-resistant tungsten carbide or silicon carbide, so as to seal the stator chamber and the oil storage chamber.

3.8 Bearing

The service life of the bearing can be more than 100,000 hours.

3.9 Oil Tank

The oil in the oil tank is used for lubrication and cooling, and used to isolate the penetrating fluid.

3.10 Impeller

The impeller is equipped with three blades, the blades are wide and thin, with smooth surface and backward curved shape. Therefore, the submersible mixer can achieve efficient and unobstructed operation.

3.11 Impeller Diversion Cover

The submersible mixer is available with or without impeller diversion cover. Using the impeller diversion cover can improve efficiency and control the spray action.

Please note: If the impeller diversion cover is not used, the energy consumption will be increased.

3.12 Installation System

The installation system is composed of guide rail system and lifting system. It is used to freely adjust the lifting and the lifting and lowering of the mixer, and to assemble and disassemble the mixer without emptying the pool.

4. Transportation & Storage

- (1) When transporting and storing the submersible mixer, place it horizontally or vertically. Do not flip or turn over the mixer.
- (2) It is not allowed to use the cable of the submersible mixer to lift or hang the mixer. When transporting or hanging the mixer, use a chain with a hook to hook it on the lifting plate.
- (3) When storing the mixer for a long time, moisture and high temperature must be avoided. Turn the impeller by hand from time to time to prevent the sealing rings from sticking together. After long-term storage, the submersible mixer must be inspected before use. Pay special attention to the seals and cable entry.
- (4) After installation, the submersible mixer cannot be immersed in the water for a long time without use. It is recommended to run it for at least 4 hours every half month to check its function and adaptability, or lift it up and store it in a dry place for standby use.

5. Equipment Installation

5.1 Precautions

- (1) Please comply with all health and safety rules and operating regulations.
- (2) In order to avoid accidents, conspicuous warning signs must be placed on-site. The area near the equipment should be separated.
- (3) In order to reduce the risk of electric shock, please refer to the 'Installation Method' and 'Electrical Connection' sections.
- (4) The submersible mixer must be operated underwater. The minimum submersible depth (the distance from the outer edge of the impeller to the water surface) must not be less than 1.1 m, otherwise it is easy to produce water vortex and cavitation. The maximum submersible depth must not be more than 20 m. If the mixer is operated below the minimum submersible depth, a liquid level sensor should be installed.

5.2 Installation System

- (1) When assembling and disassembling the submersible mixer, the lifting system should be used.
- (2) The lifting capacity of the lifting system should be greater than twice the weight of the submersible

mixer.

- (3) During the lifting operation, if the lifting capacity is too large, the submersible mixer will be damaged by collision.

5.3 Installation Method

5.3.1 Precautions

It is necessary to avoid installing the submersible mixer in the following situations:

- (1) There are obstacles in front of the submersible mixer.
- (2) Due to the design problem of the water storage tank, the water flow of the submersible mixer is not smooth.
- (3) When the impeller rolls up vortex flow, use the baffle plate to block the vortex flow, or place the mixer deeper.

5.3.2 Introduction of Installation System

- (1) When installation, ensure that the vertical deviation of the guide rod does not exceed 10 mm, so that the submersible mixer will not get stuck or excessively rub on the guide rod, and can move freely.
- (2) When the pool depth is more than 4 m, a support frame must be added in the middle of the guide rod to increase the stability of the guide rod.
- (3) Cover the wire rope with lubricating grease before use, and perform maintenance in accordance with lifting equipment standards.

5.3.3 Installation Notes

- (1) Before installation, the lifting center of gravity should be identified first. During installation, the gravity center of the lifting frame and submersible mixer should be on a vertical line, so that the submersible mixer can move smoothly and freely when lifted up and down.
- (2) It is not allowed to rotate the submersible mixer in use. Please adjust the angle and rotate the submersible mixer during installation. Please place the submersible mixer on the lower limit plate or directly on the bottom of the pool, so that the wire rope is not stressed.
- (3) Do not excessively bend or tighten the cable when extending it.
- (4) Attention! Do not immerse the end of the cable below the liquid surface. Water may penetrate into

the junction box or motor through the cable, so the head of the cable must be above the liquid surface.

- (5) Attention! During installation, ensure that the cable will not be caught in the impeller.
- (6) Attention! If the submersible mixer is operated without a diversion cover, there must be a limit switch on the guide rod to prevent the impeller from hitting the wall when rotating.
- (7) Finally, fix the cable and ropes of the submersible mixer to the pool side.
- (8) Before lifting the submersible mixer from the pool, make sure that the mixer is stopped.

5.3.4 Electronic Connection

Attention! Before operation, make sure that the mixer is disconnected from the power supply and will not be suddenly powered on.

Before starting the submersible mixer, a qualified electrician should check the mixer to ensure that the following required electrical protection measures are taken:

- (1) Before starting the submersible mixer, a 0-500 V megohmmeter should be used to check the insulation resistance of the motor stator winding to ground. The minimum resistance value must not be less than 1 megohm.
- (2) The power supply voltage must be within the range of $\pm 5\%$ of the rated voltage. The increase of the power supply voltage is not allowed to exceed 10% of the rated voltage. If the power supply is far away from the place where the submersible mixer is used, the cross-sectional area of the cable should be appropriately thickened and the number of joints should be as small as possible. Otherwise, the voltage will drop too much. The joints should be sealed and waterproof.
- (3) In the cable, the one with a \perp mark is the ground wire, which is usually a yellow-green wire. In order to ensure safety, the ground wire must be firmly connected and 50 mm longer than other wires.
- (4) YC or YCW cable is suitable for motor.
- (5) Connect the thermal switches to the starter. Two thermal switches are connected to the stator and are normally closed.
- (6) Check whether the oil leakage protector is installed in the submersible mixer. The protector can detect whether there is water in the oil chamber. If there is 30% water in the oil, the protector will send out an alarm signal. It is recommended to replace the oil within 7 days after sent out the alarm signal. If the sensor continues to alarm after replaced the oil, please stop the mixer for further maintenance.

- (7) In order to prevent water from entering the mixer, it is necessary to check whether the cable inlet sealing sleeve matches the cable outer diameter, and whether the cable sheath is damaged.
- (8) The starting current may exceed 3.5 times the rated current, please make sure to use the suitable fuse or circuit breaker.
- (9) The overload protection (motor protection circuit breaker) should be set to the rated current of the motor on the nameplate.

5.3.5 Impeller Rotation Direction

For submersible mixer with three-phase power supply, the rotation direction should be checked when first started or reinstalled the mixer. If the rotation direction is incorrect, it will reduce efficiency and damage the submersible mixer.

The impeller should rotate correctly (clockwise) in the phase series L1-L2-L3 (R-S-T) (seen from the motor side). Check the corresponding series on the main line with the phase series indicator. If the rotation direction is incorrect, swap the two lines.

6. Equipment Operation

6.1 Operation Before Startup

- (1) Check the oil level.
- (2) Check whether the impeller can be rotated by hand.
- (3) Check whether the cable entry is tightened correctly.
- (4) If there is a monitoring device, check whether it works well.
- (5) Check the rotation direction of the impeller. The impeller should rotate clockwise seen from the motor side.

6.2 Test Run

- (1) The submersible mixer should be fixed to the guide rod before test run.
- (2) Please note that the impeller has a strong impact when starting, so please take special care.
- (3) When the submersible mixer is running, be careful of the rotating impeller.
- (4) It is normal for the current to be 10%-20% higher than the working current within a few seconds of starting. The current in steady state should be lower than the rated current.

- (5) Excessive current consumption may be caused by high viscosity or high concentration of the liquid, or it may be caused by improper commissioning of the submersible mixer. Check whether the submersible mixer is swinging or vibrating.
- (6) Swing or vibration may be caused by excessive stirring in a small pool, unbalanced impeller, or uncoordinated inflow and outflow of liquid.
- (7) Interference between several submersible mixers can also cause swing and vibration.

6.3 Continuous Operation

- (1) During continuous operation, airflow is not allowed to be generated by the impeller.
- (2) Make sure that the submersible mixer operates completely underwater.
- (3) When the submersible is still running or immersed in water, it can continue to be used when the temperature is below 0°C. But it is strictly prohibited to be used when the temperature is above 40°C.
- (4) The submersible mixer is lubricated with grease or lubricating oil. When the seal is worn and the grease or lubricating oil leaks out, please replace the seal to prevent the motor from burning out.
- (5) When the power is not turned off, it is not allowed to move the submersible mixer, and the operator is not allowed to enter the water.

7. Maintenance

7.1 Safety Precautions

Before maintenance, make sure that the submersible mixer is disconnected from the power supply and cannot be started accidentally.

In order to avoid personal injury, check whether the components of the submersible mixer are worn or damaged.

Make sure that the submersible mixer or its components will not roll or fall over, so as to avoid personal injury or property damage.

7.2 Maintenance Cycle

Regular inspection and maintenance can ensure the reliable operation of the submersible mixer. The maintenance schedule is divided into two groups A and B according to the wear and tear.

Group	Worn	Maintenance period	Overhaul period
A	No or slight	Every 8,000 working hours or once a year	Every 50,000 working hours or once five years
B	Serious	Every 4,000 working hours or twice a year	Every 20,000 working hours or once two years

7.3 Inspection Items

7.3.1 Regular Inspection and Maintenance

The following items need to be checked and repaired if necessary.

- (1) Replace all worn components.
- (2) Check all screw joints.
- (3) Check the lubricating oil level and oil condition.
- (4) Check whether there is liquid in the stator chamber.
- (5) Check the cable entry and cable condition.
- (6) Check the function of the starting device.
- (7) Check the rotation direction.
- (8) Check the clearance distance between the lifting device and the guide rod, and the worn condition of them.
- (9) Check electrical insulation.
- (10) Replace all the removed seal rings during inspection.
- (11) Check and clean the surrounding area of the seal rings.

7.3.2 Overhaul

The overhaul should be carried out by authorized maintenance department. The following items need to be checked and repaired if necessary.

- (1) Replace the bearings.
- (2) Replace the bearing seals.

- (3) Replace the lubricating oil.
- (4) Replace the seal rings at the cable entry and relocate the cable entry.
- (5) Replace the cable.

7.3.3 Oil Filling and Changing

The oil chamber of the submersible mixer has been filled with an appropriate amount of lubricating oil before leaving the factory. The oil should be replaced every year.

Caution! The oil chamber may be under pressure. Please cover the oil plug with a cloth to prevent the oil from splashing out.

Oil change should be carried out according to the following steps:

- (1) Place the submersible mixer on two brackets or lift it horizontally with a crane.
- (2) Place the oil chamber screw plug downward and place a container under the screw plug to collect the oil.
- (3) Loosen the screw plug to release the lubricating oil, and then clean the oil chamber with detergent.
- (4) Inject an appropriate amount of lubricating oil (90# gear oil or 20# mechanical oil).
- (5) Keep the submersible mixer in a horizontal position.
- (6) Replace the O-ring of the oil chamber screw plug, and tighten the screw plug.



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