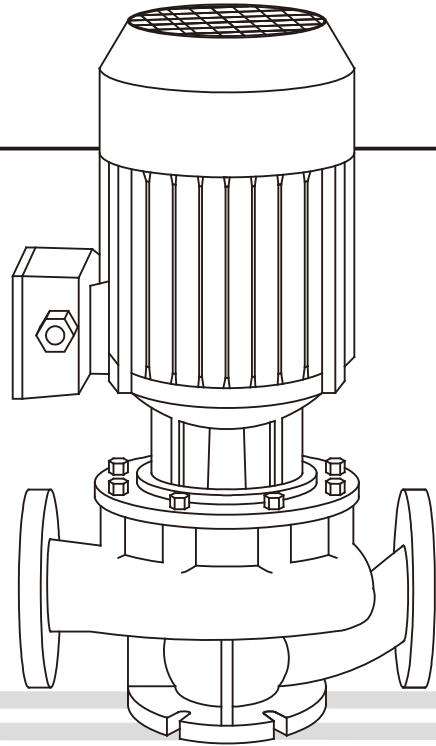


OPERATION INSTRUCTIONS

Vertical Single-stage Inline Pump
FG Series

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.

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.

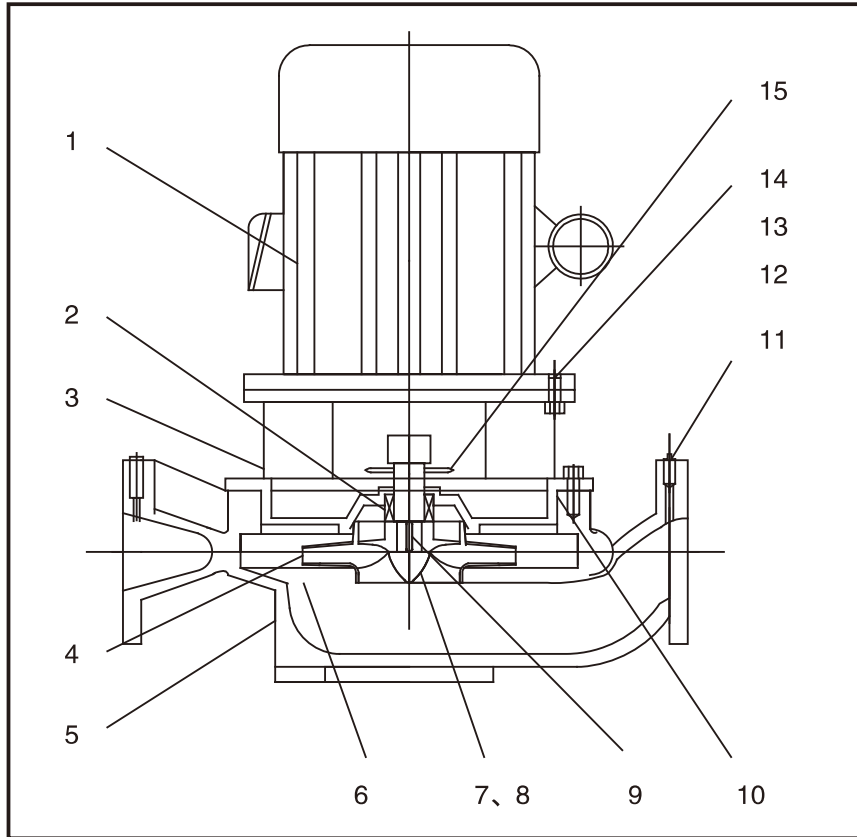


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1. Structural diagram



S/N	Name	Material
1	Motor	
2	Mechanical seal	C/Al2O3
3	Intermediate bearing stand	FC200
4	Impeller	FC200
5	Pump body	FC200
6	Seal ring	LBC6
7	Impeller's nut	FC200
8	Retainer spacer	SS34

S/N	Name	Material
9	Key	S45C
10	O-ring	NBR
11	Thread plug	SS34
12	Screw stud	SS34
13	Nut	S45C
14	Gasket	SS34
15	Water ring	NBR

2 Installation

2. Check firstly if components have any defects before assembling; remove burrs, clean components and then make assembly;

- 1) Put the corresponding nut and thread plug on the corresponding parts in advance;
- 2) Put the O-ring on the intermediate bearing stand in advance;
- 3) Put the seal ring inside the pump body and intermediate bearing stand in advance, and then lock the seal ring by screws;
- 4) Put the intermediate bearing stand on the motor and lock the stud; use MEK to clean the static ring position of mechanical seal; coat machine oil on the seal ring of the static ring of the mechanical seal; afterwards put the static ring of mechanical ring; clean the mechanical real, add the moving ring, and then the key, impeller, washer, impeller's nut in turns; finally lock these parts;
- 5) Put the assembled parts into the pump body and tighten all studs; turn the impeller through the input disc to see if it turns flexibly;
- 6) Calibrate if the outlet port is horizontal on the platform; if not, loosen the nut of motor and the intermediate bearing stand, and adjust accordingly;
- 7) Use the pressure of 2.5 times of work pressure to make static pressure test, holding the pressure for 5 minutes to see if there is sweat; turn the pump when making static pressure test.

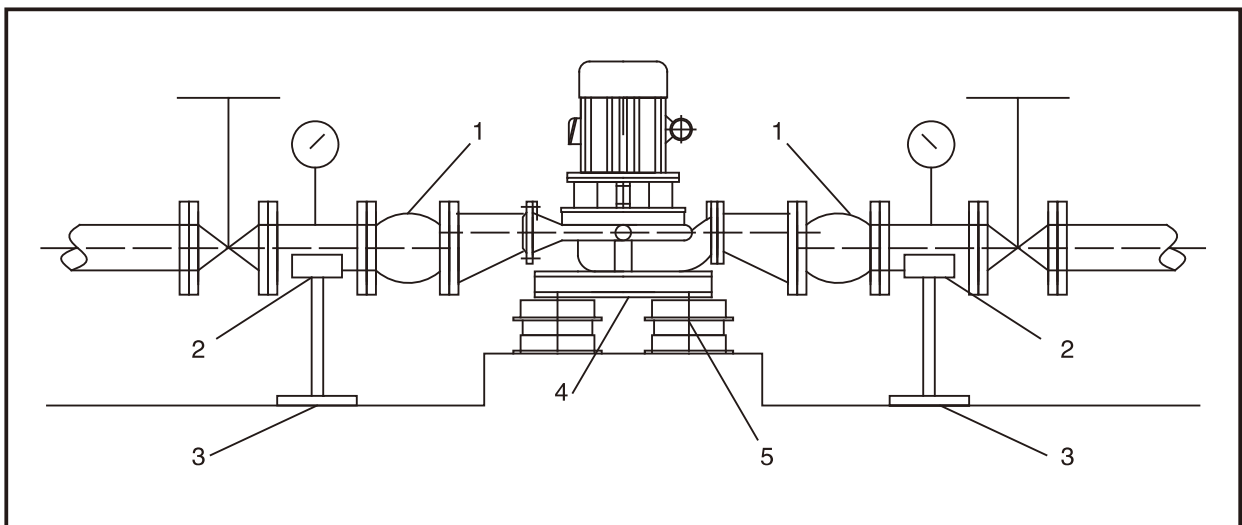
In the process to make assembly said above, it should be noted that some small pieces, such as the key, O-ring and so on are easy to be missed or installed wrongly.

The dismantling sequence of pump is just contrary to its assembly sequence.

2 Installation

The installation quality of pump is important to the operation and service life of pump. Therefore it must make installation and calibration carefully.

The installation diagram for the FG series in-line pump is listed as follows.



Description:

- 1、 XGD type rubber flexible tube;
- 2、 D-type elastic pipeline rack;
- 3、 XJD-400 type rubber vibration isolator;
- 4、 Vibration isolator rack;
- 5、 ZD-type damping spring shock absorber, JG-type rubber-cutting shock absorber or JG-type rubber shock insulator;

1. Installation foundation of water pump

- 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) The vibration of foundation should be kept within the allowable range to ensure the water pump to be used normally and offer normal working condition for operator; in order to reduce the disadvantageous influence on attached device and instrument, please use appropriate shock isolation measures;
- 4) Structural or wall-type foundation should use the reinforced concrete, using 150# and 200# concrete grade; use the reinforced bar as per the internal force through calculation or civil work standard;
- 5) Keep the net distance from the stand edge to the foundation side over 100mm; make the toweling course and grouting layer placed secondarily thick 25mm at least
- 6) 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;
- 7) 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 mass of water pump should be 10 times of the mass of the water pump;
- 8) 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;
- 9) 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 ϕ 10 and ϕ 16mm, with gap around 200~400mm.

2. Installation of water pump

- 1) Clean the foundation surface and check if the foundation accuracy meets the given requirements as per the following table.

2 Installation

Item	Deviation description	Difference (mm)	Item	Deviation description	Difference (mm)
1	Pre-embedded foundation bolt Elevation (top end)	+20, - 0 ±2	5	Pre-embedded foundation bolt hole Central position	±10 ±20 10
	Central distance (measuring respectively at the root and top)			Verticality of hole wall	
2	Exterior dimension of the plane on the foundation	±20	6	Embedded members for pre-embedded foundation bolt Elevation	±5
	Exterior dimension of the plane of the convex platform	-20		Central position	±5
	Dimension of concave pit	+20		Roughness	5
3	Unlevel plain length of foundation (full length)	10	7	Elevation at different planes of foundation	+0, -20
4	Vertical deviation of foundation (full height)	20	8	Coordination position of foundation (longitudinal and transverse line)	±20

- 2) Check if there are impurities inside the pump body before installing.
- 3) Put the water pump set on the foundation, insert a piece of iron cushion between the foundation surface and stand bottom. Adjust the thickness of the iron cushion, make the installed pump reach the design levelness and elevation, increase the stability of water pump and provide convenience for secondary grouting. Put the iron cushion at both sides of foundation bolt only. If placing the iron cushion at one side, it should select and use larger iron cushion as per the diameter of the foundation bolt. The inclined iron cushion is required to use in pairs. The surface of iron cushion must be flat; the quantity of each pair of iron cushion should be 3 or 4 pieces, with the thick iron cushion at the bottom, but the thin one in the middle. The iron cushion of a group must be placed orderly. After adjusting the horizon and orientation of water pump, weld and fix all iron cushions. In the process to adjust the level, it should adjust the foundation bolt simultaneously.
- 4) The preformed hole of the foundation bolt on the foundation should be double calibrated to see if it is correct; afterwards place sufficient grouting into the gap between the stand and foundation to form concrete structure. The size of performed hole of foundation bolt is subject to the diameter of bolt. For the bolt with a diameter of 12~30mm, the performed hole should be of 100mm X 100mm; whereas the hole depth is subject to the length of bolt.
- 5) The mixture ratio of mortar is made as follows, i.e.: mix 400# cement with the sand as per the ratio of 1:2 or 1:3; it should specially pay attention to the shrinkage crack; when the mortar is hardened sufficiently, it can only tighten the nut of foundation bolts.
- 6) When water pump is installed on the shock isolator or vibration isolation material, the vibration isolation material should be placed by taking the gravity of pump set as the center. By using the vibration isolation material, it can prevent the foundation from vibration; but the vibration of water pump becomes intense a bit,
- 7) In order to ensure water pump to use safely, it should make the water pump away from pipeline, valve, frame and other loads; such loads are required to support by rack. It should design a flexible joint or corrugate pipe on the drainage pipe to relieve pipeline vibration and thermal deformation.
- 8) Connect the power cable and contact cable as per the indication of motor nameplate;
- 9) Tighten all connecting bolts (it may loosen in transit or when handling);
- 10) When welding the pipeline, it should shield the motor to prevent welding slag from going into the motor.



3. Installation Description and Precautions

Installation Description:

- 1) The installation height of pump, and the length, diameter, flow and load of pipeline should be calculated to reduce unnecessary loss;
- 2) The check valve should be installed out of the gate valve;
- 3) The pressure meter, vacuum meter should be installed on the straight pipe near to the pump, keeping it between the pump and gate valve;
- 4) In order to prevent air leakage, please try to connect the suction pipe by using flange as much as possible. If air goes into from the suction pipe joint, It will be hard to detect;
- 5) The arrangement of suction pipe is required to have an upward slope from the suction level to the pump (1/50 around) so as to make the pipe away from collecting air;
- 6) Design trash rack inside the suction pool. Besides, the suction pool is required to clean completely before filling with water;
- 7) In view of the decline of water level, it should have sufficient submersion depth at the place where the suction pipe end is in;
- 8) Before installing, it should check if the bottom valve is flexible seriously; meanwhile in order to check and repair, it should consider sound installation method in advance;
- 9) The gate valve installed at the inlet side should be placed horizontally or downwards to prevent air from staying; open all gate valves; it should take all measures to keep air from entering from the seal sleeve;
- 10) For the inlet pipe of parallel pumps, the inlet pressure will become unbalanced of connecting to the header pipe; therefore it should use independent inlet pipe.

Pre-start precautions

1. Clean the pipeline, remove welding slag and foreign matters, prevent impurities from going into pump chamber to damage the mechanical seal and impeller;
2. Inspect if pump installation complies with the requirements; please see "Installation Description" for details;
3. Empty air from the pipeline and pump chamber to prevent dry grinding and damage to mechanical seal;
4. Before start the pump, open the inlet valve firstly, keep the outlet valve full-closed; after starting the pump, open the outlet valve and adjust the pressure to the indicated pressure value on the nameplate; meanwhile monitor the motor current (See the Motor's nameplate).

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 motor fan); the itching duration should be less than 5 seconds so as to prevent the mechanical seal from being damaged;
- 2) Close the gate valve on the drainage pipeline;
- 3) Fill the pump with water or divert water with vacuum pump;
- 4) Turn the pump manually to make the mechanical seal friction pair formed on the surface film;

3 Start, stop and operation

5) Switch the power on. When pump works normally, open the gate valve on the discharge pipeline 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 discharge pipe and shut the power supply off;
- 2) If the ambient temperature is less than 0℃, it should pump all media from the pump out to prevent freezing;
- 3) If the pump is out of use for a long time, it should remove the pump for cleaning, and then pack for safekeeping.

3. Operation

- 1) When the pump works, please observe the reading of instrument, check if bearing heats, mechanical seal leaks, pump vibrates and if the pump produces noise; if anything goes wrong, please stop and solve problem immediately.
- 2) Keep the bearing temperature less than 80℃; don't let the bearing temperature be higher 40℃ than the ambient temperature.

4 Maintenance and upkeep of rolling bearing

1、 Feed of grease

- 1) The mini-motor provided by our company uses the full-closed and maintenance-free bearing, no lubricating grease is needed; for the large motor, there is clear lubrication instruction;
- 2) The pump is required to replenish new lubricating oil if it leaves the manufacturer for delivery for 3 months or the pump is stopped for 3 months for re-start;
- 3) The lubricating grease outlet is the unseen structure; keeping injecting the lubricating grease till the sound of bearing becomes normal; the injection of lubricating grease is preferred to be done whilst the pump works; if injecting the grease when the pump stops, it will cause the lubricating grease to be exchanged insufficiently;
- 4) Before replenishing the lubricating grease, please clean the grease nozzle, and then open all oil-drainage cover; afterwards recover and lock. In the process to inject oil, if the grease comes out, it is okay, which may increase the airtightness effect and prevent dirt and other impurities from going into;
- 5) The lubricating greases with different brands are not allowed to mix for use;
- 6) The injection volume of grease is subject to the one that old grease is squeezed out and new grease comes out rightly; open the oil-drainage cover in advance; after injecting the oil, run the pump for 30 minutes; if everything is okay, it can lock accordingly.
- 7) Bearing temperature

When feeding the grease, the bearing temperature will get rise temporarily; it will recover as normal at the given time; the temperature rise of the exterior of bearing bracket is subject to 40℃(the ambient temperature is 40℃); the maximal temperature could not exceed 80℃.



4 Maintenance and upkeep of rolling bearing

2. Inspection whilst running

When the pump works, please write down the operation log; if there is any problem, please solve as soon as possible.

- 1) Temperature: Please keep focus on the temperature to see if it changes sharply;
- 2) Sound: The bearing may have certain sound in operation; Please do not worry if there is no intense change or special noise.

5 Maintenance and upkeep of mechanical seal

1. The lubricating grease for mechanical seal should be clean, free of solid particles;
2. It is prohibited to let mechanical seal work under the dry grinding condition;
3. Before starting, please turn the pump (motor's radiating rib) firstly, otherwise the sudden startup may damage the mechanical seal;
4. The mechanical seal is free of upkeep at usual time; but when make upkeep on the pump and find the pump leaks water, it should replace the mechanical seal immediately; otherwise it will shorten the service life of motor.

6 Maintenance whilst running

1. The inlet pipe must be filled with liquid; it is prohibited to run the pump under the air corrosion condition;
2. Please check the motor current value regularly, keep the current within the given rated current;
3. When the pump runs for a long time and due to mechanical wear, the pump set will produce much noise and vibration than before; if so it should stop working for inspection; if necessary please replace the easily damaged parts and bearing; the overhaul period of the pump set is one year.

7 Failure reason and troubleshooting

Failure	Reason	Troubleshooting
Can not start	<p>Voltage becomes abnormal</p> <p>Power cable goes wrong</p> <p>Wiring is wrong</p> <p>Electric component does not action</p> <p>Motor goes wrong</p>	<p>Keep voltage normal</p> <p>Check the power cable and ensure the power cable in good condition or replace</p> <p>Re-wire</p> <p>Repair the electric component</p> <p>Repair the motor</p>
Water and water pressure is insufficient	<p>Rotation direction is wrong</p> <p>The automatic vent valve goes wrong, with air inside the pump</p> <p>Impeller is damaged</p> <p>The coupling is poor, and leaking water</p> <p>Impeller or filtering net is blocked</p> <p>Motor power is too low</p>	<p>Confirm if the rotation direction is reverse; change the motor's phase sequence.</p> <p>Change automatic vent valve.</p> <p>Repair or replace impeller</p> <p>Replace seal</p> <p>Remove foreign matters</p> <p>Change large-power motor</p>
Vibration and noise	<p>Impeller's rotation direction is wrong</p> <p>Motor's bearing is damaged</p> <p>Rotating shaft is off the center.</p> <p>Impeller is damaged</p> <p>The pump has air and produces air corrosion.</p> <p>The pump support becomes unstable.</p>	<p>Adjust the wiring phase sequence of motor</p> <p>Repair or replace bearing</p> <p>Inspect rotating shaft</p> <p>Repair or replace impeller</p> <p>Reduce height from water pump to liquid level</p> <p>Enhance management and support</p>
Insufficient flow	<p>Rotation direction is wrong</p> <p>Impeller or filtering net is blocked</p> <p>Water level is too low.</p> <p>Automatic discharge valve goes wrong, with air inside the pump.</p> <p>Outlet pipe leaks</p> <p>Outlet management and design is not reasonable, with large resistance.</p> <p>Impeller is damaged</p> <p>The model is not selected properly.</p>	<p>Adjust the wiring phase sequence of motor</p> <p>Remove foreign matters</p> <p>Reduce height from water pump to liquid level</p> <p>Repair or replace the automatic vent valve</p> <p>Inspect or repair pipeline</p> <p>Improve resistance condition of outlet pipe</p> <p>Repair or replace impeller</p> <p>Use the qualified model</p>
Overload current	<p>Motor turns reversely.</p> <p>Water is too much.</p> <p>Motor's bearing is damaged</p> <p>Impeller is stuck.</p> <p>The system is under the given voltage.</p>	<p>Adjust the wiring phase sequence of motor</p> <p>Adjust outlet valve or cutting impeller</p> <p>Change motor's bearing</p> <p>Remove foreign matters</p> <p>Keep voltage normal</p>



