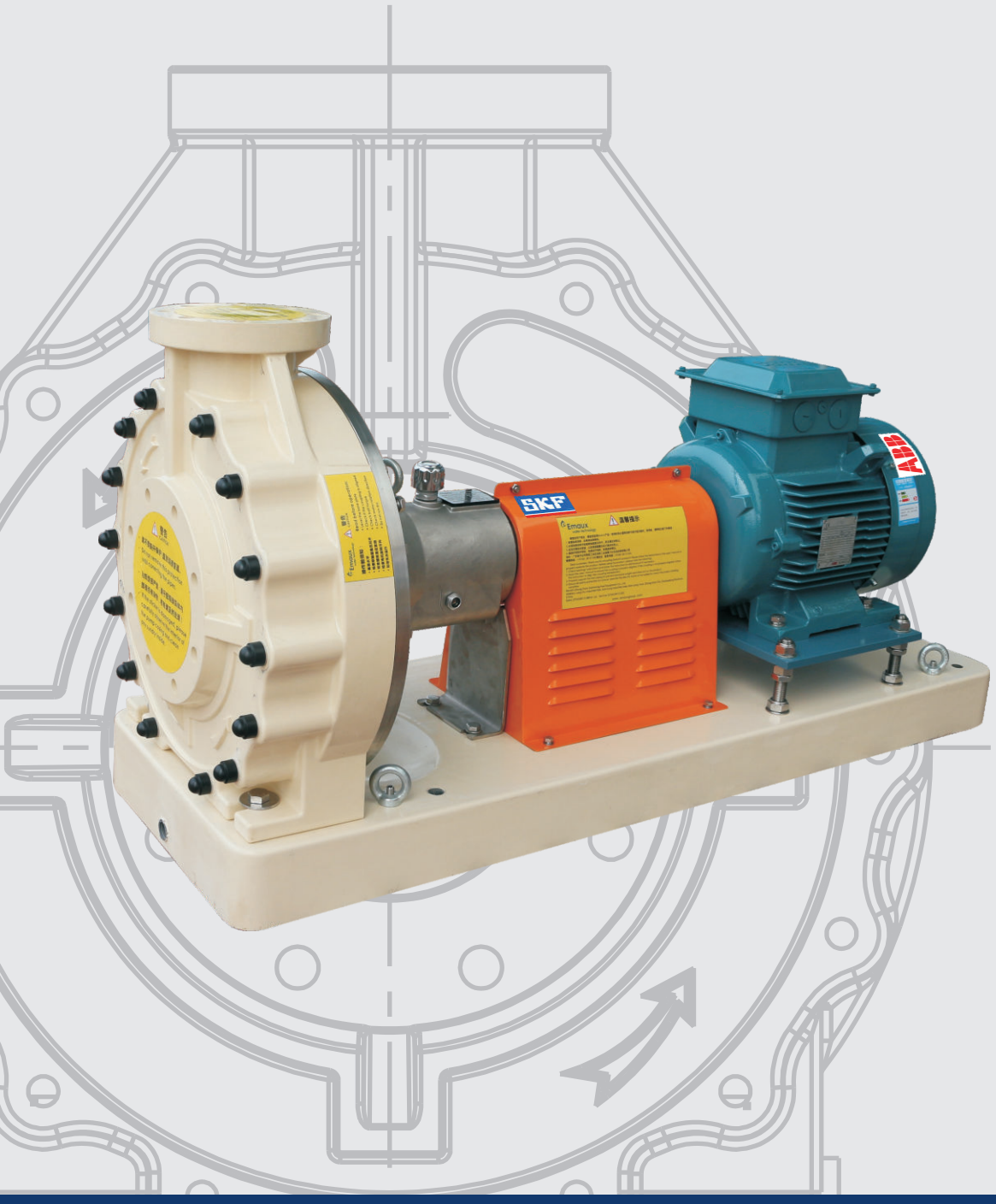
Emaux
water technology



User Manual for SWP Series Corrosion Resistant FRP Pump

EMPU18112776

Contents

1. Introduction

1.1 Quality Guarantee

Manufacturer: The manufacturer guarantees that SWP water pump is manufactured in accordance with standard design drawing and at the same time provides motor, baseboard, connecting parts as well as their protectors, which are all manufactured in accordance with GB standard.

Unified Standards: The standards listed above only ensure that the water pump can work normally in the working environment specified in the specification or service agreement; clients have the responsibility to ensure that the water pump work in proper working environment.

This statement will be invalid if there is any artificial alteration to the machine or if the machine is made to work in improper working environment.

This statement only approves the water pumps being installed and used in accordance with the production processes approved by the manufacturer. The circulation system of the water pump should be done in accordance with standards.

If clients only need water pumps with shaft, they should install the whole water pump in accordance with specifications made by the manufacturer and should ensure that it is in accordance with GB standards before the running of the pump.

1.2 General Information

The purpose of this manual is to ensure that safety use of the equipment. The stability of the water pump is only guaranteed by complying with the guides specified in this manual, and that the same time, unforeseeable risks can only be avoided by doing so.

Clients should use the equipment in accordance with national standards and safety regulations, though it is possible that these standards are not specified in this manual.

This manual should be placed near the water pump or be attached directly on the water pump.

The specification should be read before the water pump being installed, **used and maintained**.

If clients fail to operate in accordance with the guides, **he is possible to get hurt and at the same time the warranty is possible to be invalid**.

The operation guides and information specified in the specification is only valid to the type of water pump attached in this specification. It's not applicable to all water pumps in the same system.

1.3 Rights and Disclaimer

The information provided in this manual is taken as standard. The manufacturer is not responsible for the information missing in this manual. Clients should read the information contained in this manual, and if there is any mistake, they should contact with the manufacturer in time.

1.4 Signs

Each water pump is fitted with a nameplate containing the information required by GB standards. At the same time, it is a convenient way to identify the water pump. When clients ask the manufacturer for spare parts, they should provide relative information on the nameplate or the sequence code of the water pump.

1.5 Warranty

All water pumps manufactured by the company enjoy the quality guarantee made by the company. Defects of manufacturing materials are included in warranty clause. The warranty period is one year starting from the date of production (the date specified on invoice) or six months starting from the date of installation, during which the manufacturer will undertake all the costs of maintenance and changing parts. The manufacturer is only responsible for careless mistakes in the manufacturing process or the products being made by defective materials. The warranty can replace the defective parts, but it should be certain that the damage is caused by faults in manufacturing process, instead of improper operation.

The company will not be responsible for the damage caused by: Running with little water or without water at all;

Improper installation and/or foreign matters in the water pump;

Using on the liquid that is not listed by the manufacturer;

Unstable flow speed;

Comparison of the data of total pump head or temperature with the date on the time of delivery;

Water hammer effects;

Damaged in transportation;

Damages caused by operated by people without qualification; etc.

Warranty clause doesn't include direct or indirect compensation for loss of goods and physical injury caused by the abnormal running of the water pump, or during the time of maintenance (manufacturer or the third party).

If clients do the maintenance by themselves without consulting with the manufacturer, they will be disqualified for warranty.

Using the parts provided by the third party suppliers will be regarded as giving up the warranty.

The warranty clause requires the clients sending back the parts in proper packaging, and they should pay the cost of packaging and transporting after the parts have been repaired or replaced.

All works done under warranty clause don't affect the warranty term of this product.

The warranty clause doesn't include vulnerable parts.

Those who don't obey the content of the manual and take a non cooperative attitude will be deprived of the qualification of warranty.

1.6 Safety

The staff running, **installing**, **testing and maintaining the water pump should have relative qualifications**.

If the staff don't have relative qualifications to do the authorized work, clients should ensure that they get relative training. According to operators' requests, clients can ask the manufacturer in written form for the proper training with reasonable price.

All standard parts have been tested so that the quality of the product and its performance under long time working can be ensured. Using parts supplied by the third party may result in performance degradation of the water pump or causes safety problems. Any damage caused by improper using is excluded from the warranty clause. Any alteration to the water pump or the dismantling of original parts will affect the safety of the running water pump.

This manual contains detailed safety signs, all of which are listed in the following part. Unfamiliar to one or more signs may lead to harm to the operator.

2. Transportation and Storage

2.1 Packaging

The material and structure of the packaging will be determined by the goods' shape, size and weight.

Clients should follow the following steps when receiving the goods:

1) Checking the goods in the package according to the order and shipping list;

2) Checking whether there is any signs of damage of the packaging container during the transportation;

3) Taking out goods from the package carefully.

2.2 Transportation, Loading and Unloading, Raising

During the transportation, goods should be protected carefully; transportation is very important to the normal running of the water pump.

During loading and unloading , the goods' shape, weight and the nature of package should be taken into consideration.

During raising the goods, the most vulnerable parts of the water pump (for example parts made by glass fiber and connecting parts etc.) shouldn't bear additional pressure. The packed water pump should be put down slowly and should ensure that in this process it isn't been knocked. The water pump should be fitted in normal position and there must be enough support to keep it in the position when being packaged. Severe vibrations should be avoided in the process of transportation.

The same standards should be complied with when unloading the goods.

Operating instructions on transportation, loading and unloading the goods and raising the goods:

1) Check the goods'weight, size and the center of gravity before loading and unloading the goods;

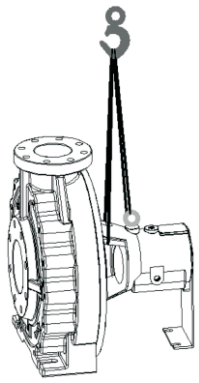
2) If the water pump needs to be moved after it has been installed, please ensure that the water in the water pump has been drained out;

3) Hanging the water pump from the suggested place of hanging;

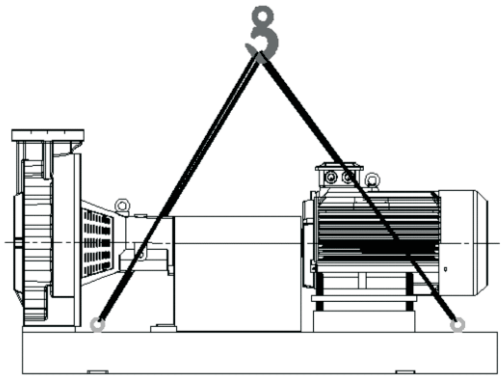
4) The string or sling used to hang the water pump shouldn't form an angle greater than 90 degree;

5) It is prohibited to hang the whole parts by a single hanger;

6) It is prohibited to use the handle of the motor to hang the water pump.



The installation and hanging diagram of the front part of the sea water pump



Hanging diagram of sea water pump

2.3 Testing

1) The receiver should make the overall checking to the goods when they arrive;

2) The manufacturer isn't responsible for any damage to the water pump caused by transportation;

3) If the goods are damaged, clients should contact with corresponding logistics company.

2.4 Storage

Scattered parts of the water pump should be assembled in a short time. If it is need to store the parts for a long time, they should be stored in a dry place far away from vibroseis, radioactive source, flammable or explosive materials, and at the same time, the direct radiation from the sun or from heat source should be avoided. The damages to the parts should be avoided before assembling.

The following rules of storing the parts of water pump should be complied with:

1) The parts of the water pump should be kept in the room in their original package. If the parts of the water pump need to be placed outdoor, their packages should be waterproof and avoid the permeation of dampness.

2) The parts of the water pump should be placed horizontally and should be covered with waterproof material;

3) Putting the parts of the water pump on the crosser to avoid the direct contacting with the earth; keeping far away from pollutants on the earth and at the same time avoiding deformation or bending;

4) It is prohibited to place the heavy on the packed parts;

5) Keeping the parts of the water pump far away from splash material and corrosive material;

6) The storage temperature should be between 5℃ to 35℃ and should be always higher than the freezing point;

7) In the process of storage, the shaft head should be rotated 5 circles per week. When rotating the shaft head, paying attention to the consistence of the rotating direction and the rotating direction when the water pump is running. This measure can effectively prevent the interface from locking under the function of friction force;

8) It is prohibited to move the port at the end of the water pump if the installation of the water pump hasn't been prepared;

9) Cleaning the water pump before installation; preventing external parts from affecting the normal running of the water pump.

3. Installation

⚠ Please read this part carefully before installation. People who do the installation should keep in mind the information in this manual. If the installation is not done according to the instructions, it may bring irreversible harm to the water pump.

3.1 Installation Position of the Water Pump

The water pump should be installed in the best position to ensure that:

1) The water inlet pipe and water outlet pipe can be connected easily;

2) The simplicity of daily inspection can be ensured in the process of running;

3) Being close to the tank.

⚠ When installing the water pump, ensure there is adequate safety distance away from pedestrians, and the safety of operators should be ensured. The choosing of installation position of the water pump should also consider the liquid leakage or damages to the parts under high voltage.

Before installation of the water pump, be sure that the switch is off, and at the same time cutting off the connection with supply circuit so that the harm caused by incorrect operations of any rotated parts can be avoided.

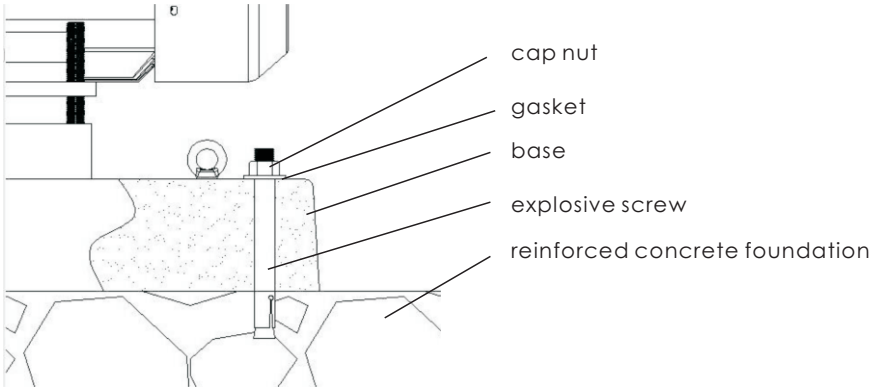
3.2 Supporting Base

The supporting base is made by proper material to ensure that it can support the water pump and perimeter zone solidly. There are also suggested methods of laying foundations in cement. The base should be placed horizontally, tested with an air level, and fixed with standard screws. It is suggested to use metal gasket to avoid the problem of non alignment between the water pump and the pipes, the using of which can make adjustments and ensure the alignment.

3.3 Base and Foundation

The foundation should use proper material to ensure the solidity of the base and its perimeter zone. We highly recommend using reinforced concrete as the materials of the foundation. The surface of the foundations should be kept horizontal to ensure the exact fitness between the assembling unit and the pipes. Explosive screws should be used to fix the base and the foundation.

Note: The area of the foundation should be larger than the area of the base of the water pump



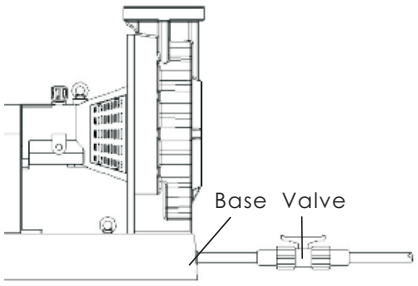
3.4 Draining Pipes on the Base

The manufacturer provides a threaded hole scupper on the base so as to evacuate the liquid leaked on the drip tray. This scupper should be connected with the exterior drainage system.

Note:

1) Draining pipes and their fittings should be connected with screw threads and should use the same kind of material;

2) In the process of running, the valve should always be in the state of open. (The valve may not be installed)



3.5 The Calibration of Water Pump

The calibration of all water pumps are done by the manufacturer. However, in the process of transportation, the calibration may be invalid. Therefore, the calibration should be done again after the installation of the water pump.

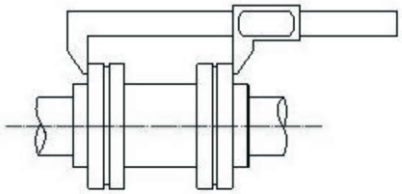
The best way of checking the calibration is using electronic instruments. If electronic instruments are not available, traditional methods (ruler) can be used to achieve the same goal.

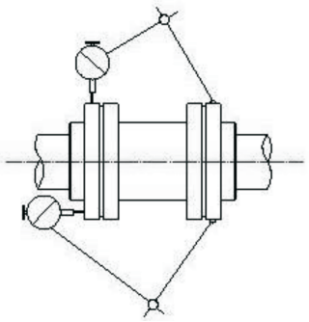
The method of checking the calibration by vernier calipers is as followed:

1) Use vernier caliper to do the measurement;
2) The water pump is in the state of calibration when the distance between the two couplings is the same.

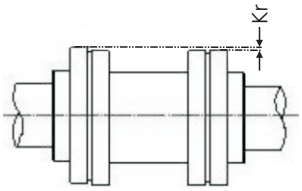
The method of checking the calibration by comparator is as followed:

1) Rotate the part of coupling by hand to ensure that the instrument is fixed on the same point at the side of the coupling.
2) Rotate the coupling 90 degrees and repeat the above mentioned operation.

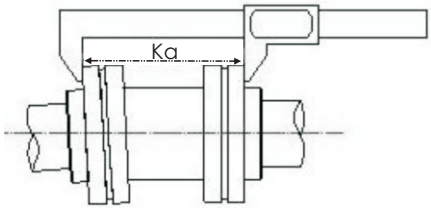




If non alignment is found, please use the adjustment system on the base to align the shaft.



Δ Kr max = 0.5mm



Δ Ka max = 0.5mm

3.6 Pipes

The design of the pipe network has a direct influence on the water pumps' operation. The size of the suction tank as well as the sizes of water inlet pipe and outlet pipe should all be taken into consideration.

3.7 Water Inlet Pipe

The size of the water inlet pipe is very important. **Improper size will result in many problems on the running of the water pump**.

The following rules should be complied with:

1) The water inlet pipe should be a short pipe and should prevent it from bending;
2) The pipes should be supported by racks. The racks should be covered with coating, so that they can be protected against being damaged by liquid or vapor;
3) When the size of water inlet pipe is larger than the water inlet, please use the flexible pipe to connect the water pump;
4) The condition of the water inlet pipe determines the maximum suction height. At the same time, the viscosity of the liquid, the level of fouling and the temperature should be taken into consideration;
5) Elbow pipe, bottleneck, a sudden decrease in diameter or other types of pipes should be avoided. Elbow pipes of large radius should be used;
6) High water level pipe that may form bubbles should be avoided;
7) The valve should be installed to prevent the liquid in the water pump from overflowing. In the process of running, the valve should open fully all the time and only closes when checking the water pump;
8) In the connection of pipes, try to avoid the air from penetrating into the pipes;
9) Install a filter at the end of the water inlet pipe to prevent exterior foreign matters from entering the water pump. The filter should be cleaned promptly so as to prevent the pipe from blocking;
10) Keeping the water inlet pipe and other parts in the suction tank fill with liquid all the time;
11) A minimum distance should be kept between the water inlet pipe and the suction tank. The minimum distance should be more than 0.5 meters so as to prevent the solid particles at the bottom of suction tank from affecting the normal running of the water pump;

12) Put baffle wall in the suction tank so as to prevent penetration or the forming of whirlpool in the suction pipe;

13) Test the lowest water level in the automatic regulating water level box (if it is provided); it is suggested to ensure the fullness of water in the suction tank by connecting a liquid level probe to the electromagnetic valve.

3.8 Water Outlet Pipe

A check valve and a flanged gate valve should be installed on the water outlet pipe, and at the same time, performance and temperature testing instruments should be installed.

The following rules should be complied with:

1) The pipes should be supported by racks. The racks should be covered with coating, so that they can be protected against being damaged by liquid or vapor;

2) The friction loss should be calculated when designing the water outlet pipe, and at the same time, the viscosity of the liquid, the level of fouling and the temperature should be taken into consideration;

3) When the size of water outlet pipe is larger than the water outlet, please use the flexible pipe to connect the water pump;

4) Elbow pipe, bottleneck, a sudden decrease in diameter or other types of pipes should be avoided;

5) It is prohibited to place the elbow pipe directly at the position of water outlet;

6) High water level pipe that may form bubbles should be avoided;

7) Install exhausting pipe between the water pump and the check valve. The end of the exhausting pipe should directly open to the exterior environment;

8) If the liquid may freeze, please empty all liquid in the pump before freezing.

3.9 Fittings

In order to ensure the normal running of the water pump under safety environment, the following fittings should be equipped in water pump system:

Fittings Recommended		
Name of the Fitting	Use	Applicable Location
Racks	Supporting pipes	All pipes
Filter	Decreasing the amount of solid particles	The end of the water inlet pipe
Flexible pipe (reducing pipe)	Avoiding the forming of cavitation	In front of the suction mouth
Flanged gate valve	Parting the water pump from the whole system when doing the maintenance	In water inlet and outlet pipes
Flow regulator	Decreasing whirlpool and turbulence	Water outlet pipe (behind the flange gate valve)
Filter	Decreasing the amount of solid particles	At the position of water inlet pipe
Flexible connector	Protecting the pipes and the water pump	Slightly beyond the position of water inlet and outlet
Check valve	Protecting the water pump against water hammering; preventing the drain-pipe from	In the drain-pipe, between the water pump and the flanged gate valve
Flow regulating valve	Regulating the output of the water pump	Behind the check valve
Valve	Evacuating air when starting the process of self suction	In exhausting pipe

3.10 Controlling Equipment

In order to ensure the normal running of the water pump, the following fittings should be equipped in pipe network:

Fittings Recommendedt		
Name of the equipment	Use	Applicable locations
Minimum water level probe	Verifying that the water level is at a minimum	In suction tank
Vacuum gauge	Verifying the pressure in water suction tube	The distance between vacuum gauge and the suction mouth is twice the diameter
Thermometer	Checking the temperature of liquid	In water inlet pipe
Thermometer	Checking the temperature of liquid	In water outlet pipe
Manometer	Measuring the working pressure	In front of the check valve,and the distance between the manometer and the water outlet should be twice the diameter
Flow meter	Measuring the working flow	Behind the flanged gate valve in water outlet pipe
Workload monitor	Preventing from working without water	Connecting the motor
Switch	Starting and closing the water pump	Controlling board
Emergency switch	Stop the running of water pump in emergency	Controlling board
Dynamometer or ammeter	Monitoring the energy utilization	Controlling board

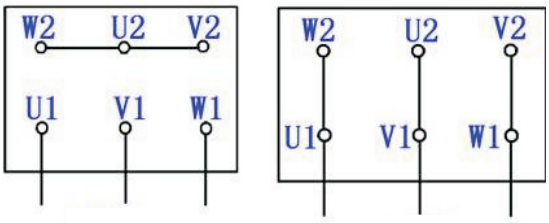
3.11 The Last Examination before Running

1) Check whether the screws have been tightened;
2) Check whether the covers of the mouth of water outlet pipe and drain-pipe have been taken off;
3) Check whether the pipes are parallel to water inlet and outlet of the water pump;
4) Check whether the water inlet and outlet pipes have been screwed correctly;
5) Check whether the motor has been correctly connected under the manufacturer's instructions;
6) Check whether the ground wire has been connected correctly according to local standards;
7) Check the nameplate of the motor so as to ensure that the current source matches with the motor;
8) Check whether the motor is installed under room temperature; avoid environments with vibrations and dusts;
9) Check whether there is enough movable space at the bottom of the motor so as to ensure the ventilation and to help dissipating heat;
10) Install the switch and emergency switch according to local standards;
11) If the power of the motor is equal to or greater than 11kw, soft start should be installed to start the motor.

3.12 Wiring of Different Starting Methods

1) The connecting box on standard single speed motor usually consists of six winding terminals and at least one earth terminal. DOL- or Y/D- starting is allowed;
2) For two-speed motor and special motor, the wiring of power supply should be done according to the instructions on the connection box or the motor;
3) The voltage and wiring instructions are printed on the nameplate of the motor;
4) Direct starting (DOL): Y or D winding connection is probably needed to use. For example, 690VY , 400VD means Y connection of 690V and D connection of 400V;
5) Star/Delta starting (Y/D): When using D connection to start, the voltage of power supply should equal to the rated voltage of the motor.

The two methods showed in the following diagrams can be used for the connection of three-phase motor (Diagram):



Y connection Delta connection

4. Use

The operator of the water pump should be equipped with corresponding tools when doing the operations specified in this chapter. Rubber shoes, acid-proof protective clothes and the helmet with face protective cover can ensure the operator's safety. It's prohibited to put fingers or other parts of the body into orifice and other mouths. Some parts in the water pump rotate at a very high speed. The following operations should be done by experienced operators.

4.1 Rotating Direction

The motor's rotating direction should be checked before starting the water pump. The rotating direction should be marked permanently on the water pump, clockwise from motor to pump body.The following steps should be followed when checking the motor's rotating direction:

1) Turn the switch off;
2) Disconnect the power line;
3) Remove the coupling protective cover;
4) Remove the coupling spacer;
5) Put on the coupling protective cover again;
6) Connect the power line;
7) Turn the switch on to start the motor;
8) Observe the rotating direction to see whether it is the same as the rotating direction on the water pump;
9) If the rotating direction is wrong, exchange the phase of the motor (doing this step after turning the switch off);
10) If the rotating direction is correct, re-install the coupling spacer and then start the motor.

4.2 Initial Testing of the Water Pump

Before starting the water pump, rotate the transmission shaft by hand from the position of coupling to ensure that the shaft rotates normally at the right direction. When doing this, the power line should be disconnected with the supply circuit.

4.3 Initial Testing of the Motor

Check all electronic connections and rotating directions before starting the motor.

4.4 Starting

The following steps should be followed before starting the water pump:

1) Check whether all bearings have been lubricated adequately;
2) Check the rotating direction of the motor;
3) Check whether the water inlet pipe, water outlet pipe and gaskets have been connected correctly and whether all threaded bolts have been tightened;
4) Fully open the valve in the water inlet pipe;
5) Check and clear all solid foreign matters in the water inlet pipe;
6) Make the water pump and the water inlet pipe fill with water;
7) Switch on the power switch of the water pump;
8) Slowly open the valve in the water outlet pipe (starting from 10%);
9) Adjust the working point of the water pump through the valve in water outlet pipe;
10) Check the input value of the water pump and compare it with the values printed on the nameplate, make sure that it doesn't exceed the rating value.

4.5 Working Status

The following points should be paid attention to when the water pump is working:

1) It's prohibited to do any maintenance or checking to the parts of the water pump when it is working;

2) It's prohibited to do any maintenance or checking if the motor hasn't been disconnected with the power supply;

3) Monitor the temperature of the bearings;

4) Prevent people or any object contacting the heating parts of the water pump;

5) Ensure that the water pump doesn't vibrate and the noise range doesn't exceed the rating value;

It's prohibited to run the water pump without water or with little water!

When the water outlet valve has been off, the water pump shouldn't run for more than 1 minute.

The water pump should be closed immediately if water holes form.

4.6 Temperature

The working temperature of the water pump is indicated in data sheet. The working temperature of the water pump may vary by the difference of liquid density.

4.6.1 The Working Temperature of the Bearings

The temperature of the bearings should be measured regularly and be compared with the data provided by the manufacturer. By doing so, any change in the process of working can be found easily, including the loss and the imbalance of rotating parts. Adjustments should be done immediately if the installing environment doesn't comply with the installing standards of the water pump, or a system failure appears.

Group	Temperature range of the bearings (2950-3500rpm)		Group	Temperature range of the bearings (1000-1750rpm)
4X3 6X4	55 – 75		4X3 6X4	55 – 70
8X6	55 – 80		8X6	55 – 75

The maximum working temperature of the bearings shouldn't exceed 110℃

4.7 Flow Range

The manufacturer chooses the type of the water pump, the blade and the motor according to the data of flow and pump heads provided by clients. Clients should check the working condition indicated on the data sheet, especially the data of flow, pump head and pump liquid.

4.8 Noise Value

Generally, the normal working noise of the water pump won't exceed 80db. However, due to the motor's power, working point and the material and structure of pipes, the noise may exceed this value. Estimated noise value is indicated in the following table:

Motor's power(kW)	Noise value (dB)		
	1000RPM	1450RPM	2900RPM
4	62	63	69
5.5	62	65	71
7.5	64	66	72
11	66	68	74
15	67	69	75
18.5	68	70	76

Sound Pressure	Measures to be taken to solve the problem
Less than 70dB	No measures are needed
Greater than 70dB	Providing protective facilities to the staff near the water pump
Greater than 90dB	Warning signs should be put up to warn all staff in the area of the water pump. Anti-noise earphone should be worn. Sound-proof material should be used on the water pump to deafen the noise.

5. Maintenance

The staff should be equipped with proper equipment when doing the maintenance to the water pump. Rubber boots, acid-proof protective clothes and the helmet with protective face mark are all required to ensure the safety of the staff. It's prohibited to put the finger or other body parts into orifice and other mouths. Some parts in the water pump rotate at a very high speed. The following operations should only be done by experienced operators.

5.1 Prophylactic Maintenance

Check all kinds of value of the liquid pumped by the water pump (including temperature, proportion and chemical composition). Check flow and pressure value and compare them with designed value to ensure that there is no variation. Ensure that the controlling assembly works normally and correctly receives signals.

5.2 Daily Checking and Maintenance

Daily monitoring of the running of the water pump can find fault timely and immediately take measures to prevent it from affecting other parts of the water pump. The following checks should be done each time the water pump runs:

1) Check noise value, vibration, temperature and Working Status;
2) Check whether there is leakage of liquid or lubricant oil;
3) Check the volume of lubricant oil;
4) Ensure that the water pump doesn't work without liquid;
5) Check to ensure that there's no seeper in (scupper) on the base (if it is provided). If there's seeper, open the valve to drain the seeper;
6) Ensure that the parts of the water pump have all been tightened by threaded bolts.

5.3 Additional Maintenance

If there are faults or leakage, stop the running immediately through corrector steps. The cause of the problem or the fault should be made clear. If the problem can't be identified, contact with the manufacturer immediately. Without the manufacturer's approval, any operation to the water pumps is prohibited.

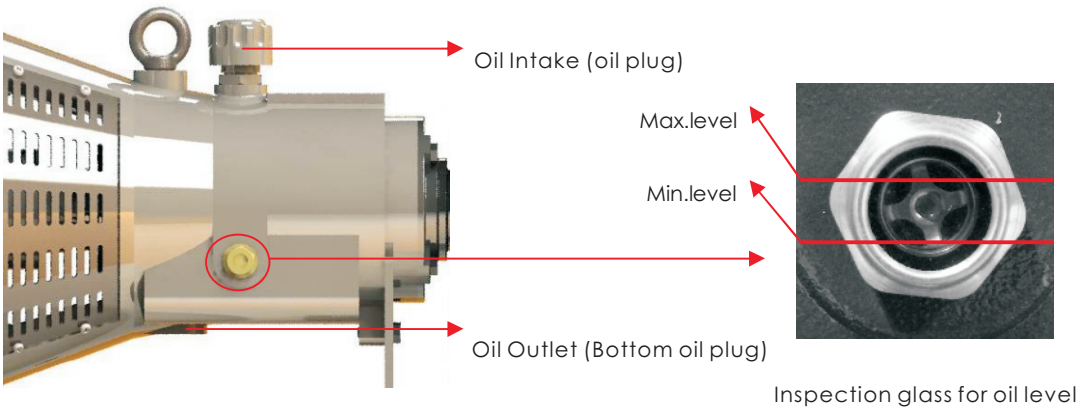
5.4 Volume of Lubricant Oil

It's very important to keep appropriate amount of lubricant oil. Inadequate lubricant oil cannot lubricate the bearings adequately, which will result in premature wear. Too much lubricant oil can overheat the bearing or causes leakage of the lubricant oil. The initial changing of lubricant oil should be done 300 hour later; after that, it should be changed every 4 months.

When measuring the volume of the oil, ensure that the temperature of the oil is close to room temperature and the water pump doesn't run.

The following rules should be complied with when choosing lubricant oil:

1) The lubricant oil should be clean and doesn't contain solid particles;
2) The temperature of the operating environment of water pump should be taken into account;
3) It's prohibited to mix lubricant oil of different brands or different natures. (Lubricant oil: Mobil 600 XP 68 Grade ISO VG 68)



The steps of adding lubricant oil are as followed:

1) Unscrew the oil plug;
2) Pour in needed lubricant oil. Check the volume to ensure that it doesn't exceed the maximum value or lower than the minimum value
3) Tighten the oil plug.

The steps of discharging lubricant oil are as followed:

1) Put oil connection device under the bottom oil plug;
2) Unscrew the bottom oil plug;
3) Wait until all lubricant oil has been discharged; clear excess oil;
4) Tighten bottom oil plug.

5.5 The Crystallization of the Liquid in Water Pump

The problem of crystallization of the liquid in water pump shouldn't be neglected. Clients should know clearly under what temperature and what conditions the liquid in water pump will be crystallized, and inform the manufacturer about it in advance. Failure to provide the relative information to the manufacturer will result in invalidity of warranty clause.

5.6 Draining and Changing of the Liquid in Water Pump

If it is needed to use the water pump on different liquid, clients should submit a written application to the manufacturer. Different proportion or viscosity will affect the life of the water pump or increase the weight per shaft, which will result in decreasing of pressure.

The following steps should be followed when changing the liquid in the water pump:

1) Stop the running of the water pump;
2) Completely empty the liquid in the water pump (if there is a drainage port) and the water inlet pipe;
3) Wash the inside of the water pump with clean water or relative liquid. Pay attention to avoid any harm to the operators caused by chemical reaction;
4) Dispose the liquid used for washing through the right way.

5.7 Idling Running

It's prohibited to run the water pump of this series idly. Idling running can damage the mechanical seal or other parts of the water pump.

The following problems may occur if the water pump runs idly:

1) No liquid or little liquid in the water pump;
2) The missing or breakdown of the instrument in pipes used for testing the water flow;
3) Inadequate maintenance to the filter and the bottom valve;
4) The damage of he flanged gate valve in the water inlet pipe;
5) The forming of cavitation or whirlpool caused by inappropriate size and inappropriate structure in pipes.

5.8 Impurity of the Liquid in Water Pump

The liquid of the water pump should be clear and clean. It's not suggested by the manufacturer to use the water pump on the liquid that may contain small solid particles. If the liquid does contain solids, the content, concentration, size and solidity of them should be informed, so that the most applicable plans can be chosen.

5.9 Suggested Spare Parts

To ensure that there are least amount of spare parts that are ready to use at any time when doing the maintenance to the water pump, clients should consider the working environment of the water pump and the number of working water pump. For detailed information, please contact with the technology department to learn about the interval length of changing parts.

When purchasing spare parts, please provide:

1) Sequence code, name and the type of the water pump (indicated on nameplate) ;

2) Parts location number.

5.10 Repairing of the Water Pump

⚠ **1) Before sending the water pump back to the manufacturer for being repaired, the water in the water pump should be drained out and the water pump should be washed with water or relative liquid.**

2) When washing the water pump, pay attention to avoid harm to the water pump and operators caused by chemical reactions.

3) After washing the water pump, the liquid used for washing should be disposed properly.

5.11 Dismantling of the Water Pump

Warning: Don't try to dismantle or assemble the water pump. The steps of dismantling the water pump should be done by experienced professionals or staff having basic mechanical knowledge and skills. In order to better understand the characteristics of the water pump, basic material knowledge is still needed.

The following steps should be followed before dismantling the water pump:

1) Ensure that the water pump isn't in a state of working;

2) In order to avoid sudden starting of the water pump in the process of maintenance, both the water pump and the motor should be disconnected with power supply;

3) Close water inlet valve and water outlet valve;

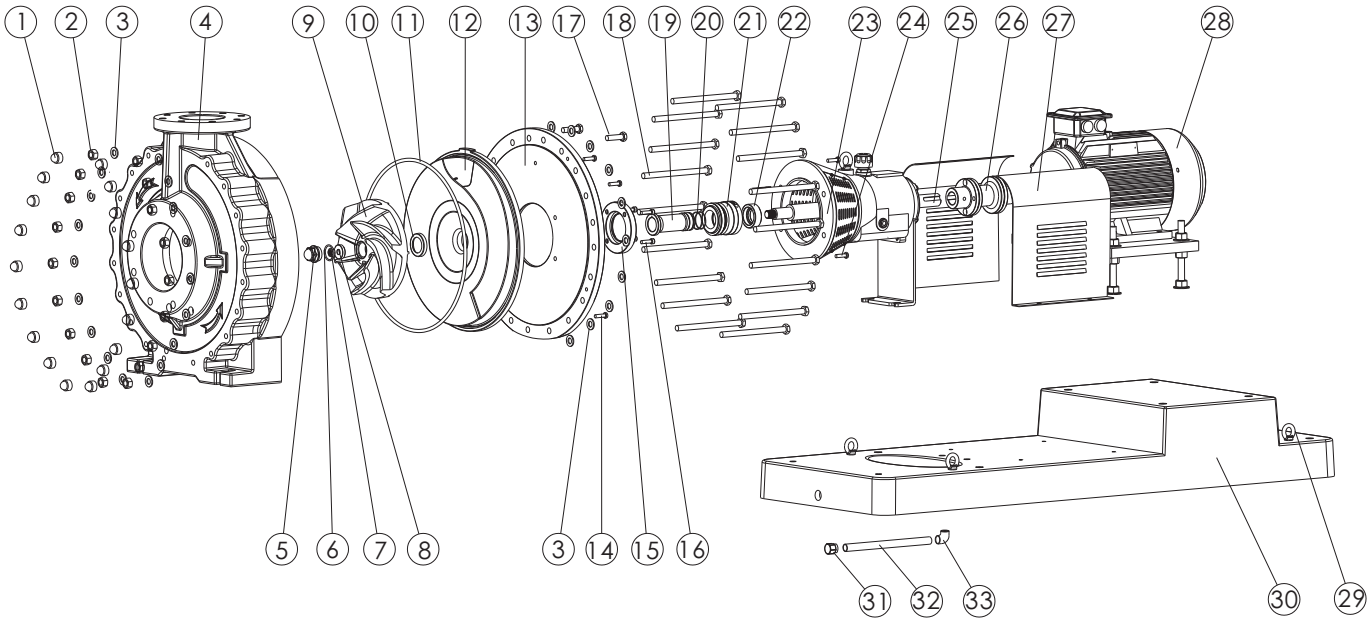
4) Wait the water pump cools until it reaches room temperature;

5) Use water or relative liquid to wash all parts that have contacted with the liquid; the liquid used for washing should be disposed properly;

6) Disconnect the water pump with the system.

6. Description of the Sea Water Pump

6.1 Exploded Diagram of the Water Pump



6.2 Parts List

Key NO.	Part Name	Pump Model	QTY
1	M14 nut cap	4 x 3	12
		6 x 4	14
		8 x 6	18
2	M14 nut	4 x 3	12
		6 x 4	14
		8 x 6	18
3	M14 gasket	4 x 3	24
		6 x 4	28
		8 x 6	38
4	Pump body		1
5	Water leaf nut		1
6	Leaf water ring nut		1
7	Water leaf nut		1
8	Water leaf gasket		1
9	Water leaf		1
10	Water leaf rubber pad		1
11	Flanged rubber ring		1
12	Flange		1
13	Frame flange		1
14	M10 hexagon head bolt	4 x 3, 6 x 4 only 4 bolts of 4×3 and 6×4	5
14A	M8 hexagon head bolt	No bolt of 8×6	1
15	Positioning flange		1
16	M8 hexagon head bolt		4
	M8 spring gasket		4
17	M14 bolts	4×3, 6×4 No bolts of 4×3 and 6×4	2
18	M14 threaded bolt	4×3	12
		6×4	14
		8×6	18
19	Shaft installing sleeve		1
20	The sleeve ring		2
21	Mechanical seal kits		1
22	Locating ring		1
23	Supporting rack		1

Key NO.	Part Name	Pump Model	QTY
24	M12 hexagon head bolt		4
	M12 gasket		4
25	Crankshaft		1
26	Coupling		1
27	Protective cover		1
28	Motor		1
29	Hanging ring	No hanging ring of 4×3	1
30	Base	No top of 4×3 and 6×4	4
31	ø20 gum mouth		1
32	ø20 rubber pipe		1
33	ø20 rubber elbow		1

6.3 Descriptions of Main Parts

6.3.1 The Pump Body

The pump body contains water suction entrance, water inlet and water outlet, they are all on the direction of the shaft; it complies with the requirements of equipment.

6.3.2 The Vain

The vain is of half-open type; the leaf on the back of the vain can effectively reduce the impacts of the axial thrust caused by the flow on the running of the water pump. The size varies according to output of the water pump.

6.3.3 Shaft

The shaft conveys the rotational movements produced by drive unit to the vain. The shaft connects with the drive unit through a flexible connector and gasket. The frame and two bearings bear the shaft at the same time.

6.3.4 Sealing

Sealing parts include mechanical sealing and various rubber rings and rubber gasket.

6.3.5 Bearings

Radial cylindrical ball bearings are used in water pump. These bearings use oil as lubricant. Their temperature should be tested frequently when the water pump is running.

6.3.6 Mechanical Sealing

Mechanical sealing can avoid the leakage of liquid from the water pump. Mechanical sealing of different models and brands all can be used. At the time of booking, the model of mechanical sealing should be determined by the running environment of the water pump and the compatibility of the used liquid.

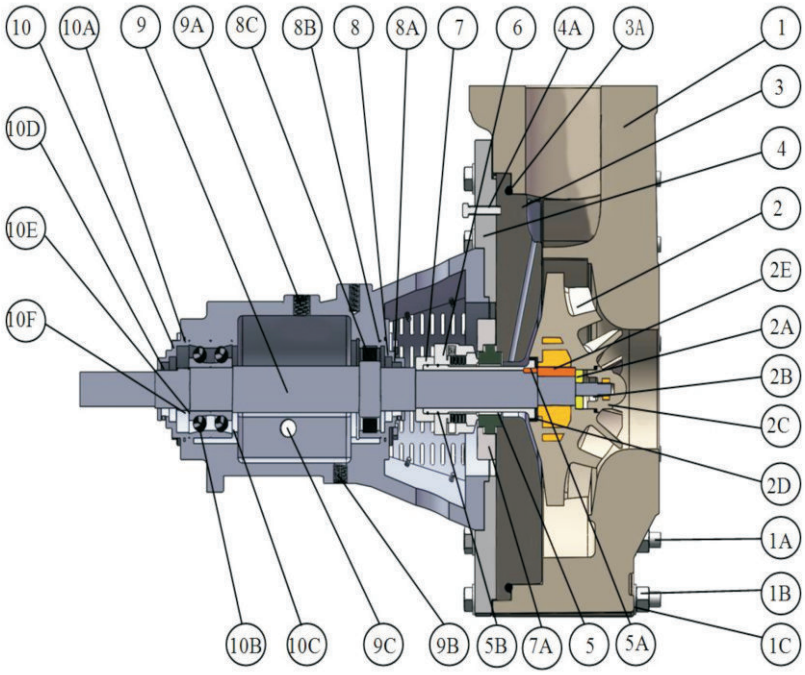
6.3.7 Frame

The frame is integrated structure, and the shaft can be supported by two bearings.The structure of the frame is determined by the model of the water pump.

6.3.8 Base, Coupling, Coupling Protective Cover

The whole base is made of glass fiber and is fitted with coupling protective cover made by stainless steel. The coupling uses elastic connection mode and at the same time is equipped with gasket. If the vision is only pump shaft, couplings with the same characteristics is needed.

6.3.9 Break-out Sections of Main Parts

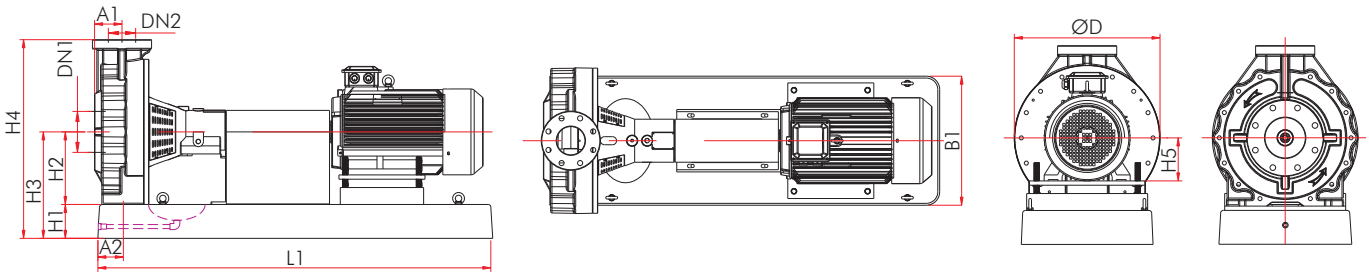


Parts No.	Name	Parts No.	Name	Parts No.	Name	Parts No.	Name
1	Pump body	3	Flange	7A	Retaining flange	10	The rear cover of the supporting rack
1A	M14 bolt	3A	Flanged rubber ring	8	The front cover of the supporting rack	10A	The rubber ring of the rear cover
1B	M14 nut	4	Frame flange	8A	Front oil seal	10B	Rear bearings
1C	M14 gasket	4A	Set screw	8B	The rubber ring of the front cover	10C	Snap ring
2	Water leaf	5	Shaft installing sleeve	8C	Front bearing	10D	Rear oil seal
2A	Water leaf gasket	5A	Key sleeve	9	Crankshaft	10E	Gasket
2B	Water leaf nut	5B	The sleeve ring	9A	Oil inlet	10F	Lock nut
2C	Water leaf screw cap	6	Mechanical sealing	9B	Oil outlet		
2D	Water leaf rubber shim	7	Locating ring	9C	Inspection glass for oil level		

7. The Shape and Size of the Sea Water Pump

7.1 Main Sizes of the Sea Water Pump

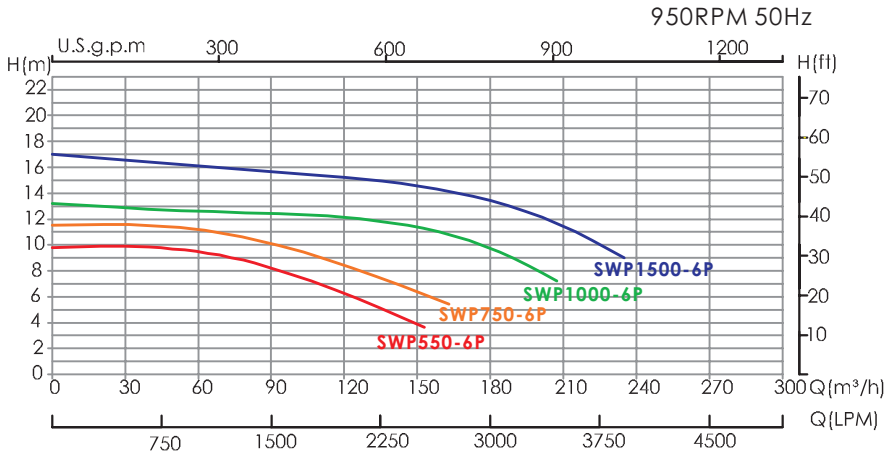
Body	L1	B1	H1	H2	H3	H4	H5	DN1	DN2	ØD	A1	A2
	(mm)							inch(mm)		(mm)		
100×80	1200	420	100	210	310	590	112	4"(100)	3"(80)	458	102	78
100×80	1200	420	100	210	310	590	132	4"(100)	3"(80)	458	102	78
150×100	1450	480	100	254	354	697	132	6"(150)	4"(100)	540	102	78
150×100	1450	480	100	254	354	697	160	6"(150)	4"(100)	540	102	78
200×150	1530	570	100	368	468	874	160	8"(200)	6"(150)	700	152	93
200×150	1530	570	100	368	468	874	180	8"(200)	6"(150)	700	152	93

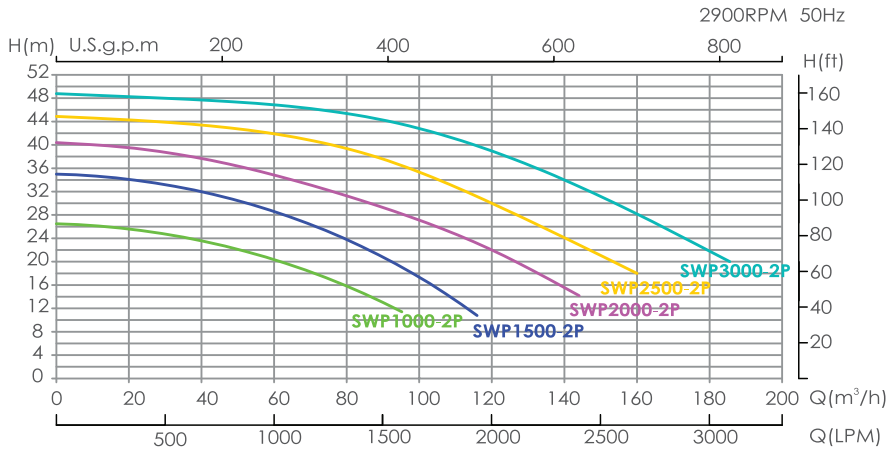


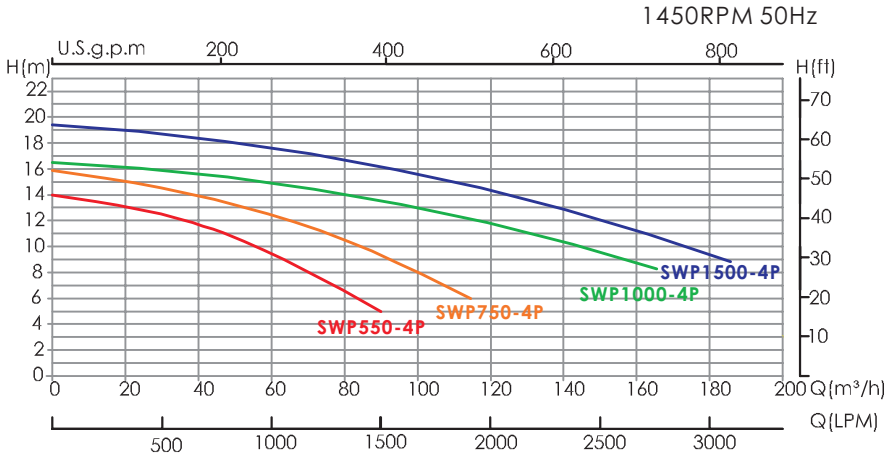
7.2 Technical Data

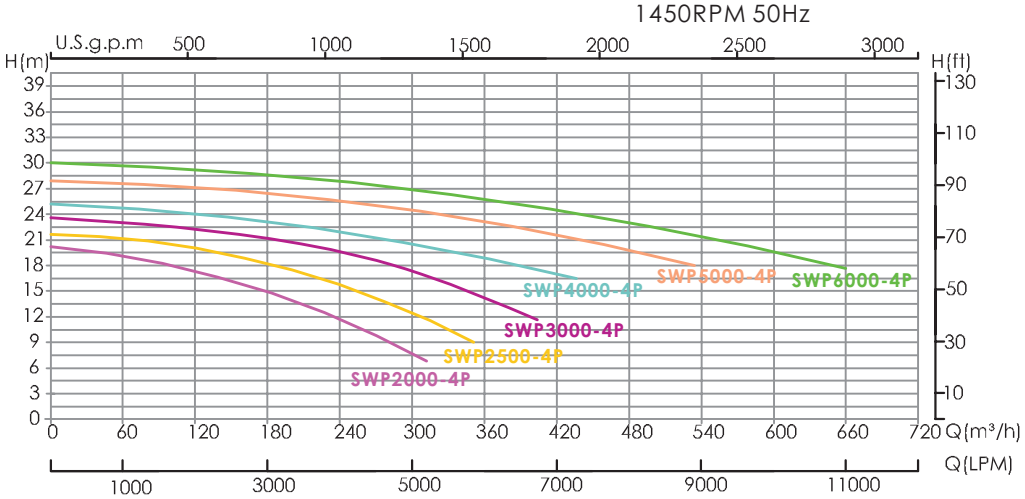
Model	Inlet x Outlet x Impeller Dia (mm)	rpm	Power		Weight(KG)
SWP550-6P	150 X 100 X 250	950	5.5HP	4kW	420
SWP750-6P	150 X 100 X 270	950	7.5HP	5.5kW	435
SWP1000-6P	200 X 150 X 270	950	10HP	7.5kW	643
SWP1500-6P	200 X 150 X 300	950	15HP	11kW	665
SWP550-4P	100 X 80 X 205	1450	5.5HP	4kW	285
SWP750-4P	100 X 80 X 220	1450	7.5HP	5.5kW	300
SWP1000-4P	150 X 100 X 225	1450	10HP	7.5kW	417
SWP1500-4P	150 X 100 X 250	1450	15HP	11kW	480
SWP2000-4P	200 X 150 X 250	1450	20HP	15kW	647
SWP2500-4P	200 X 150 X 265	1450	25HP	18.5kW	677
SWP3000-4P	200 X 150 X 280	1450	30HP	22kW	694
SWP4000-4P	200 X 150 X 295	1450	40HP	30kW	763
SWP5000-4P	200 X 150 X 310	1450	50HP	37kW	796
SWP6000-4P	200 X 150 X 325	1450	60HP	45kW	828
SWP1500-2P	100 X 80 X 170	2900	15HP	11kW	345
SWP2000-2P	100 X 80 X 190	2900	20HP	15kW	358
SWP2500-2P	100 X 80 X 200	2900	25HP	18.5kW	377

7.3 Performance Curve









8. Troubleshooting

8.1 Main Problems and Troubleshooting Methods

Problem	Cause	Troubleshooting method
The water pump doesn't work or the suction speed is low during self-suction	The end of the water inlet pipe or the bottom valve doesn't completely immerse in liquid	Immersing the end of the water inlet pipe or the bottom valve in water according to suggested distance
	The bottom valve is small or hasn't been installed properly	Check or change the bottom valve
	The suction height exceeds the value indicated	Check the suction height to ensure that it doesn't exceed the limit of the water pump or the height of liquid in suction tank isn't too low
	The suction tube is too long or the diameter is too small	Check the diameter of suction tube
	There's air leakage in the suction tube	Check the seal ring and re-screwing the connections between pipes
	The valve in the suction tube is closed or half closed	Fully open the valve of the suction tube
	The proportion, temperature and viscosity of the liquid exceeds the maximum designed value	Check the proportion, temperature and viscosity of the liquid
	The exterior solids block the water leaf or water outlet	Clearing the blockage
	The water leaf damages or the distance between the water leaf and the hull exceeds the maximum suggested value	Decrease the distance between the water leaf and the hull or change the water leaf
	The valve of the water outlet closes	Open the valve of the water outlet
	Motor phase missing	Check the supply power of the motor
	The rotation speed is too low	Check connection lines
	Speed induction failure	Check connection lines
	The frequency of the current source isn't suitable to the water pump	Check the frequency of the current source
nadequate rate of flow or pressure	There's air in pipes	Check the condition of pipes
	There's air or other gas in liquid	Check the condition of liquid
	The exterior solids block the water leaf or water outlet	Clearing the blockage
	The water leaf damages or the distance between the water leaf and the hull exceeds the maximum suggested value	Decrease the distance between the water leaf and the hull or change the water leaf
	The total pumping head of the whole system is larger than the total pumping head of the water pump	Check the loss and the condition of the whole system

Problem	Cause	Troubleshooting method
Inadequate rate of flow or pressure	The viscosity of liquid exceeds the designing value	Check the proportion, temperature and viscosity of the liquid
	The rotating speed is too low	Check connection lines
	Speed induction failure	Check the connection line
	The frequency of the current source isn't suitable to the water pump	Check the frequency of the current source
The water pump vibrates severely	Cativation	Check the whole system to find the cause of cativation
	The working point is not within suggested flow range	Adjust working point according to suggested flow range
	The exterior solids block the water leaf or water outlet	Clearing the blockage
	One or more parts of the water pump damage	Dismantle the water pump and change the damaged parts
	The pump bearings or motor bearings wear	Change the worn-out bearings
	The base hasn't been fixed properly	Screw the base on reinforced cement bottom
	The mounting screws haven't been screwed	Screw bolts
	The elastic parts in the coupling wear	Change elastic parts in the coupling
	The water pump doesn't align correctly	Check the alignment of the water pump
Overheating of the motor	The proportion or viscosity of the liquid pumped exceeds the designing value	Check the value of proportion and viscosity
	The temperature of the working environment is too high	When installing the water pump, pay attention to be far away from other heating matters, and at the same time, cool the water pump appropriately
	The rotating speed is too high	Check connection lines
	Squeezing pressure of the mechanical sealing is too large	Contact with the manufacturer
	There are flaws on the hull or on the motor bearings	Change the water pump or the bearings of the motor
	The pump body and the motor doesn't align correctly	Align the pump body and the motor again
The loss of mechanical sealing is too fast	The liquid in the water pump contains solid particles or abrasive material	Check the content of solid particles contained in liquid to ensure that it doesn't exceed the specified maximum value

Problem	Cause	Troubleshooting method
The loss of mechanical sealing is too fast	The material used for mechanical sealing is incompatible with the liquid of the water pump	Contact with the manufacturer
	The liquid of the water pump forms gas	Contact with the manufacturer
	The working point is not within suggested flow range	Adjust working point according to suggested flow range
	Idling running	Check the installation and running of the water pump
	The pump body and the motor doesn't align correctly	Align the pump body and the motor again
The loss of bearings is too fast	The working point is not within suggested flow range	Adjust working point according to suggested flow range
	There's no lubricant oil in bearing bracket	Adding lubricant oil
	The lubricant oil contains solid particles	Ensure the cleanness of the lubricant oil
	Water or condensate appears on the bearings or on motor	Contact with the manufacturer
	Bearing overloading caused by mechanical defects	Contact with the manufacturer
	Mechanical breakdown or damages of the water pump	Contact with the manufacturer
	The pump body and the motor doesn't align correctly	Align the pump body and the motor again

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