Shinhoo®

Mega PUMPS

Installation and Operation Manual

CONTENTS.

CONTENTS.

Warning
This document must be carefully reviewed before proceeding with the installation of the equipment. The equipment must be installed and operated in accordance with the requirements of this document and local codes and regulations.

1. Safety instructions

Warning
This equipment must be operated by personnel with the necessary knowledge and experience.
Persons who are physically, mentally, visually or hearing impaired shall notThe equipment must be authorized for operation.
Children are not allowed access to this equipment.

General information about document

The Data Sheet, Installation and Operating Instructions contain fundamental information that must be observed during installation, operation and maintenance. It is therefore essential that the relevant operating personnel or the user familiarizes themselves with them before installation and commissioning. This document must be permanently available at the place of use of the equipment.
In addition to the general safety instructions in section 1. Safety Notes, but also the special safety notes i n the other sections.

Meaning of symbols and inscriptions on the product

Instructions placed directly on the equipment, e.g:

- arrow indicating the direction of rotation,
- designation of the pressure connection for pumped medium supply, must be compulsorily observed and preserved so that they can be read at any time

Qualification and training of service personnel

Personnel who carry out operation, maintenance and inspection work as well as installation of the equipment must have the appropriate qualifications for the job. The scope of matters for which the personnel a r e responsible and which they must supervise, as well as their area of competence, must be precisely defined by the user.

Dangerous consequences of non-observance of the safety instructions

Failure to observe the safety instructions may result in:

- dangerous consequences for human health and life;
- endangering the environment ;
- voiding all warranty claims for damages; failure of critical equipment functions;

- ineffectiveness of prescribed maintenance and repair methods;
- a dangerous situation for the health and life of personnel due to electrical or mechanical factors.

Performing work in compliance with safety techniques

The safety instructions in this document, the existing national safety regulations as well as any internal work, operating and safety regulations applicable to the user must be observed during the work.
Safety instructions

Safety instructions for the consumer or service personnel

- It is forbidden to dismantle the existing protective guards for moving parts and components when the equipment is located in operation.
- The possibility of electrical hazards must be excluded (for more details see, for example, the regulations of the PUE and the local power supply companies).

Safety instructions for maintenance, inspection and installation work

The user must ensure that all maintenance, inspection and installation work is carried out by qualified personnel who are authorized to carry out such work and have been sufficiently familiarized with it through a detailed study of the installation and operating instructions.
All work must always be carried out with the equipment switched off.
The shutdown procedure described in the installation and operating instructions must be strictly adhered to.
Immediately after completion of work, all safety and protection devices that have been removed must be reinstalled or switched on again.

Self-conversion
and manufacture of spare parts and components

Conversion or modification of the devices may only be carried out in agreement with the manufacturer.Original spare parts and components as well as components authorized by the manufacturer are designed to ensure reliable operation.
The use of assemblies and parts from other manufacturers may cause the manufacturer to deny liability for any resulting consequences.

Unacceptable operating modes

The operational reliability of the supplied equipment is guaranteed only if it is used according to with functional purpose according to section 6. Scope. Maximum permissible values specified in
in the technical data must be compulsorily observed in all cases.

2. Transportation and storage

The equipment should be transported in covered wagons, closed cars, by air, river or sea transport.
Conditions of transportation of the equipment in terms of mechanical factors impact should correspond to group "C" according to GOST 23216. During transportation, the packed equipment must be securely fastened to the means oftransportation to prevent unintentional movement.Storage conditions of the equipment must comply with group "C" of GOST 15150. Ambient temperature during transportation:
-40 to +70 °C. The maximum designated storage period is 2 (two) years. No preservation is required during the entire storage period.

3. Meaning of symbols and inscriptions in the document

Warning
Failure to observe these instructions can have dangerous consequences for human health.

Warning
Failure to follow these instructions can result in electric shock and have life- and health-threatening consequences.

Warning
Contact with hot surfaces of the equipment can cause burns and serious bodily injury.

Attention ***Safety instructions which, if not followed, may cause equipment failure or damage to the equipment***

Guideline ***Recommendations or instructions to facilitate work and ensure safe operation of the equipment.***

4. General information about product

This document applies to the pumps of the Mega series. Circulation pumps of the complete Mega series are equipped with an integrated control system,to ensure that the pump capacity is matched with the actual requirements of the system.In many systems, this results in significant energy savings, reduced noise from thermostatic control valves and other similar fittings, and improved system controllability. The required head can be set on thecontrol panel.

Design

Mega pumps have a hermetically sealed rotor, i.e. pump and motor form a single unit without mechanical shaft seal. The bearings are lubricated by the pumped liquid.

Standard type designation

Example	Mega	40-8	F 220

Typical range

Nominal suction diameter and pressure connections (DN), [mm]

Maximum head [m]

Flange configuration (if no marks, then threaded)

Port-to-port length, [mm]

Mega nameplate

Pos.	Name
1	Brand
2	Frequency
3	Voltage
4	Insulation class
5	Protection class
6	Maximum fluid temperature
7	Energy efficiency Index
8	Certification
9	Type
10	Serial number
11	Rotation direction
12	Power
13	Current
14	Maximum pressure

Check valve

If a check valve is installed in the piping system (Fig. Fig. 1), it must be ensured that the set minimum discharge pressure of the pump is higher than the closing pressure of the valve. This is particularly important for the proportional pressure control mode (reduced head in case of minimum flow).

Fig. 1 Check valve

Operation with closed shut-off valves

Mega pumps can operate harmlessly for several days with closed shut-off valves and at any speed.
It is recommended to set the control mode to minimum speed to reduce energy consumption. There is no minimum flow requirement.

Attention

The pump inlet and outlet valves must not be closed at the same time to prevent pressure build-up.
The pumped liquid and ambient temperatures must not exceed the specified values.

5. Packing and moving

Packaging

for Upon receipt of the equipment, inspect the packaging and the equipment itself for any damage that may have occurred during transportation. Before disposing of the packaging, carefully check for any documents or small parts that may have been left behind. If the equipment received does not match your order, contact to the equipment supplier.
If the equipment is damaged in transit, contact the shipping company immediately and notify the equipment supplier.The supplier reserves the right to thoroughly inspect possible damage. For information on disposing of packaging, see section.
19. Information on the disposal of packaging.

Product inspection

Check that the voltage and frequency of the product are the same with on - site voltage and frequency. See section
Mega nameplate.

Scope of supply

Fig. 2 External view of the Mega pump

The box contains the following components:
- Mega Pump;
- Technical Documentation;
- Plug;
- Threaded pipe connections complete with gaskets (for pumps with threaded connection);

Moving
Warning
Local code restrictions for manual lifting and loading and unloading operations must be observed.
Guideline ***Do not lift the equipment by the supply cable***

6.Area of application

The Mega pump is designed for pumping liquids in the following systems:
- of the heating system;
- air conditioning and refrigeration systems.

In addition, the pump can be used in the following systems:
•systems that utilize geothermal energy;
•solar heating systems.

Pumped fluids

The pump is designed for pumping clean, non-viscous, explosion- proof, solids-free or long-fiber-free liquids that are chemically neutral to the pump materials.In heating systems, water must meet the requirements of local water quality standards for heating systems.

Glycol

The pump can be used for pumping ethylene glycol and water solutions up to a concentration of 50%.
The use of solutions with a concentration greater than 40% reduces the fluid's heat capacity and heat transfer efficiency. Pump operation is controlled by the restriction function power, which provides overload protection.When pumping glycol solutions, the maximum characteristic andpumping performance is degraded, which depends on the concentration of the solution/glycol as well as on the temperature of the liquid.
To prevent the glycolsolution from changing parameters, it is necessary to control thetemperature of the fluid above the operating temperature; it is alsonecessary to reduce the operating time at high temperatures.
The system must be cleaned and flushed before adding glycol solution to the system.
The condition of the glycol solution must be monitored regularly to prevent corrosion or lime scale formation.If additional dilution of ethylene glycol is required, follow the instructions in the glycol supplier's manual.

Warning
Do not use pumps to pump flammable liquids such as diesel fuel and gasoline.

Warning
Do not use pumps to pump flammable liquids such as diesel fuel and gasoline.

Guideline

Adding additives with density and/or kinematic viscosity、higher than water to the coolant reduces pump performance.

7.Principle of action

The operating principle of the Mega series pumps is based on increasing the pressure of the liquid moving from the inlet to the outlet.
The pressure increase is achieved by transferring mechanical energy from the motor shaft coupled to the pump shaft directly to the liquid by means of a rotating impeller. The liquid flows from the inlet to the center of the impeller and further along its vanes. Under the action of centrifugal forces, the velocity of the liquid increases, hence the kinetic energy increases, which is converted into pressure. The spiral chamber (volute) is designed to collect the fluid from the impeller and direct it to the outlet.

8.Installation of the mechanical part

Location installation

The pumps are intended for indoor installation. The pumps must be installed in dry conditions, without danger of getting wet, e.g. from the ambient air.equipment.
It is not recommended to install in places such as:

- Indoor swimming pools, as the pump will be exposed to the pool environment.
- Locations with direct and prolonged exposure to the marine atmosphere.
- Rooms containing hydrochloric acid vapor (HCl) in the air, e.g. as a result of leakage from open tanks or when containers are frequently ventilated.

The use of Mega pumps is not prohibited in the respective application areas, but direct installation in rooms is not recommended with the described environment.
The following requirements must be observed to ensure adequate cooling of the motor and electronics:
- The pump must be installed in such a way that it is adequately cooled.
- The ambient temperature must not exceed 40 °C.

Application in cooling systems

When used in cooling applications, condensate may appear on the surface of the pumps. In some cases it may be necessary to install condensate collection and drainage devices.

Mounting pump

The Mega series includes pumps with flange and threaded connection. These installation and operating instructions apply to all versions, however, a general description of pumps with flanges is provided. In case of differences, the description for the version with threaded connection will be presented separately.
The pump must be installed in such a way as to avoid misalignment and pulling in the piping, which could damage the pump.
The pump can be mounted without additional supports directly on the piping, provided that the piping can support its weight. The piping must be fixed in such a way that there is no tension or pressure from the piping on the pump casing.
Procedure for installing the pump:
1. The arrows on the pump casing show the direction of fluid flow through the pump.The direction of fluid flow can be horizontal or vertical depending on the position of the control unit.
2. Close the shut-off valves and make sure that the system is not pressurized during pump installation.

3.Install the pump with gaskets on the piping.
4.Version with flange:
Install bolts, washers and nuts. Size the bolts according to the system pressure.
Threaded version:
Tighten the connection nuts.

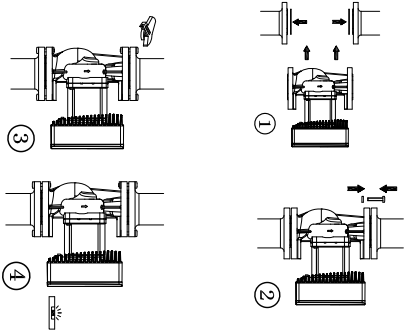


Fig. 3 Mounting the pump

Mounting position

The pump should always be installed with the motor shaft horizontal. Avoid positioning the pump on a piping system with the flow direction downward. This position limits flow control and makes it difficult to bleed the pump.

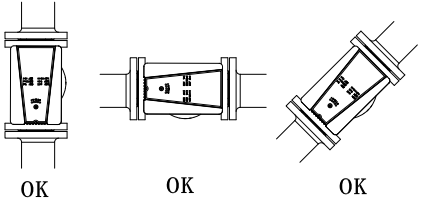


Fig. 4 Permissible positioning of the pump shaft

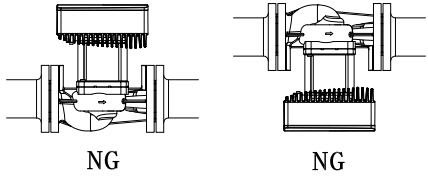


Fig. 5 Unacceptable positioning of the pump shaft

Changing the position of the control unit

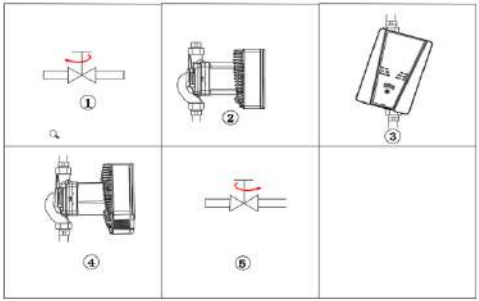


Fig. 6 Procedure for changing the position of the control unit

Changing the position of the control unit

Change the position of the electronic control unit (the electronic control unit can be rotated in 45° increments).

1. Close the pump inlet and outlet gate valves;
2. Remove the four bolts securing the stator to the volute. While doing so, hold the stator from falling without removing it from the pump.
3. Without removing the stator from the v o l u t e , rotate on the shaft axis so that the cable glands point downward;
4. Align the mounting bolt holes; Install the mounting bolts in the holes and tighten them crosswise;
5. Carefully open the gate valves, first on the suction line, then on the pressure line.
   Do not cover the electronic unit with insulating materials to ensure sufficient cooling.

Thermal insulation

When carrying out thermal insulation measures it is forbidden to apply thermal insulation to the pump head.

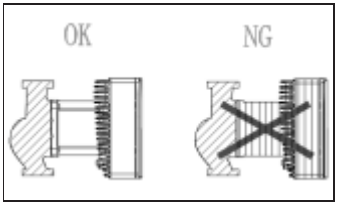


Fig. 7 Thermal insulation of the Mega pump

Warning Provision must be made measures to protect personnel from injury and prevent equipment damage from fluid leaking out when the stator is unscrewed.

9.Connecting electrical equipment

Make electrical connections and install protection in accordance with local codes and regulations. Make sure that the operating voltage and current frequency correspond to the rated values on the rating plate.

Warning
Before installing the unit and carrying out any kind of work on the pump, disconnect the power supply and secure it against accidental activation.

Warning
The pump must be connected to an external switch, minimum contact gap: 3 mm on all poles.
Earthing or grounding must be used as protection against electric shock in case of indirect contact. Versions with plug connection:
In case of insulation damage, the short-circuit current can be a pulsating direct current. When installing the pump, observe local codes and regulations regarding the selection of residual current devices (RCDs/ RCDTs).

- The pump must be connected to an external mains switch.
- External protection of the pump motor is not required.

Guideline

The number of starts and stops of the pump by applying and disconnecting the supply voltage must not exceed four times in one hour.

1x230 V, 50 Hz, protective earth (PE).
The voltage tolerances assume some fluctuations in the mains voltage.
Do not use voltage tolerances to connect pumps to mains voltages other than those indicated on the rating plate.
Do not connect the pump to a voltage regulator or UPS with non- sinusoidal output voltage.

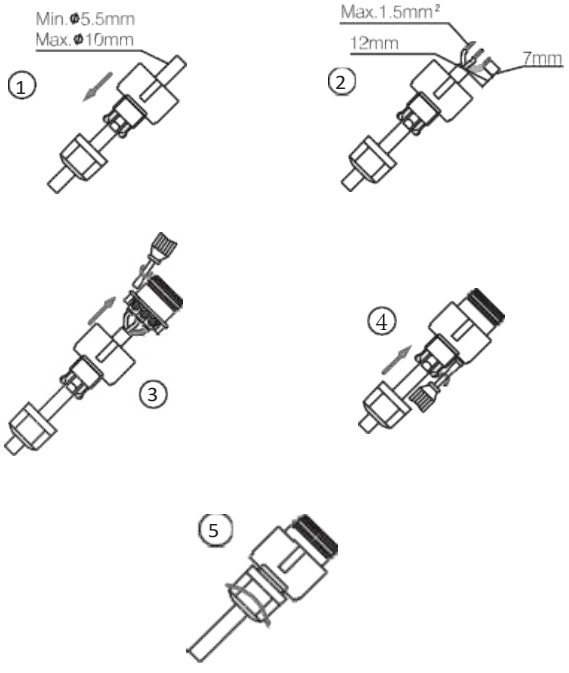


Fig. 8 Electrical connection

10.Commissioning

All products are subjected to acceptance testing at the factory. No additional testing is required at the installation site.
Before commissioning, the system must be flushed, filled with operating liquid and vented. The pump inlet must be pressurized to the required pressure.
The pump removes the accumulated air inside by itself, at the same time it is necessary to remove the air at the highest point of the system in which the pump is used.

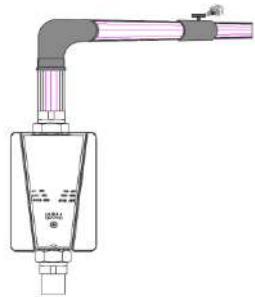


Fig. 9 Connecting the signal cable

11.Operation

Refer to section 15 for operating conditions. Technical data.

Control panel

Warning
To avoid burns, only the control panel should be touched.

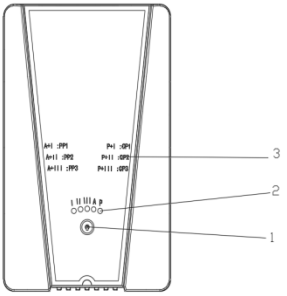


Fig. 9 Control panel elements

The pump control panel consists of the following elements:

Pos.	Description
1	button
2	indicator light
3	work mode

Selecting the control mode

The control mode is selected by pressing the button on the control panel, see Fig. Fig.10, pos. 4. 4. The selected control mode is displayed by means of light fields on the control panel.

Brief description of control modes

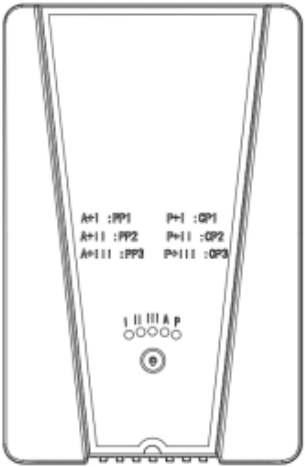


Fig. 11 Light areas on the control panel

Lighting Area	clarification	icon
AUTO	auto-adaptation	
PP1	Proportional pressure low speed	
PP2	Proportional pressure medium speed	
PP3	Proportional Pressure High Speed	
CP1	Constant pressure low speed	
CP2	Constant pressure medium speed	
CP3	Constant pressure high speed	
CS1	Constant speed low speed	
CS2	Constant velocity medium speed	
CS3	Constant speed high speed	
P	PWM control	

Factory setting of the control mode: AUTO (self-regulating mode).

Attention

2.1 Performance curve

The proportional pressure control mode adjusts the pump capacity to the required flow rate in the system, but within the limits of the selected operating characteristic curve - PP1-3.

Depending on the pump unit size, between 1 and 3 proportional pressure control mode curves are available.
The selection of the appropriate control mode for proportional pressure change depends on the system parameters and the desired flow rate. See Control Mode Selection Guidelines.

Control mode with constant pressure value (CP1-3)

The constant pressure control mode adjusts the pump capacity to the required flow rate in the system, but within the limits of the.

selected operating characteristic curve - CP1, CP2, CP3
Depending on the pump unit size, between 1 and 3 constant pressure control curves are available.
Selecting the appropriate constant pressure control mode depends on system parameters and desired flow rate. See Control Mode Selection Guidelines.

Fixed speed control mode (CP1-3)

In this control mode, the pump operates at a fixed speed regardless of the required flow rate in the system. The pump operates within the selected operating characteristic curve - CP1-3.
Depending on the pump unit size, between 1 and 3 fixed speeds are available.
Selecting the appropriate control mode for fixed speed depends on the system parameters and the desired flow rate. See section Guidelines.

PWM control mode

The incoming PWM signal is used to transmit the PWM signal the signal cable is included in the kit. The connection is made to the appropriate connector located in the control unit (see Fig.Fig.15) depending on the pump size.

Action Sequence:

1.Disconnect the pump from the mains.

2.Insert the signal cable plug into the connector or connect an external signal cable to the pump signal cable leads.

3.Connect the signal cable to the external controller.

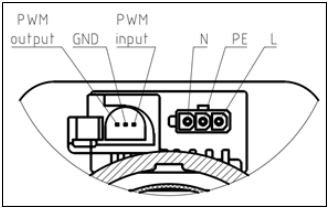


Fig. 15 PWM signal connection diagram

Pump operation by PWM signal

The Mega series pumps can be controlled by a PWM signal from an external controller, e.g. boiler controller, smart home controller, etc. The pump itself also sends the PWM output signal to possible dispatching and monitoring devices that allow monitoring the status of the pump (operation or stoppage, power consumption).
The characteristics of the PWM input signal for pump control and the output signal from the pump are given in the table:

Parameter	**Symbol**	**Significanc**
Frequency range of the PWM control signal	fvx	100-
PWM control signal voltage range (high level)	Uin.n	4000 Hz
PWM control signal voltage (low level)	Uin.n	4-24 V
Current strength of the PWM control signal (high level)	Ivx	≤0.7V
Fill factor of the PWM control signal	d	≤10 mA
Frequency of the PWM output signal from the pump	fвыхвых	75 Hz±5%
Fill factor of the PWM output signal from the pump	d	0-100 %

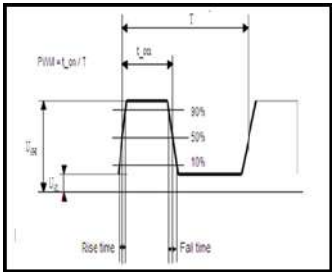


Fig. 16 PWM signal characteristics

The input PWM signal is .

After the pump is connected to a PWM signal source, the pump shaft speed varies depending on the value of the fill factor d.
The dependencies are shown in Figure Fig.17 and in the table:

PWM1 Input Signal (%)	Pump Status
0	the pump switches to non-PWM mode (normal mode), and the default system will have no PWM signal input.
≤5	the pump runs at the highest velocity
＞5～≤85	the pump curve will drop from the highest to the lowest
＞85～≤88	the pump runs at the lowest velocity
＞88～＜93	if the velocity variance point of input signal fluctuates, then it will block the start and stop of the pump according to the principle of magnetic hysteresis
≥93～≤100	stand-by, the pump stops
Recognition accuracy	±1 (Example: When the PWM input signal is 20%, the actual duty cycle is in the range of 19%-21%)

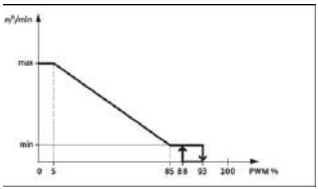


Fig. 17 Speed dependence on the filling factor

The PWM output is signal.

The fill factor values of the pump PWM output signal and the pump states corresponding to these values are shown in Figure Fig.18

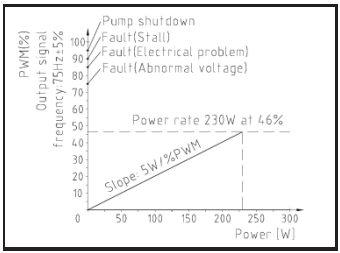
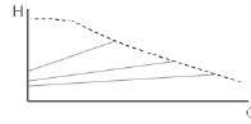
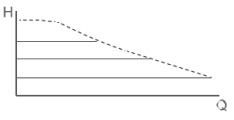


Fig. 18 Dependence of the filling factor on the pump condition

Recommendations for selecting the control mode

Application in hydraulic systems	Select this control method:
In systems with relatively high pressure losses in distribution pipes and in air conditioning and refrigeration systems. •Two-pipe heating systems with thermostatic control valves and: –with long-distance distribution pipelines; –with heavily throttled balancing valves; –with differential pressure regulators; –with significant pressure losses in individual system elements that determine the total water flow rate (e.g. heating boiler, heat exchanger and primary circuit distribution piping). •Primary circuit pumps in systems with significant pressure drop in the primary circuit. •Air conditioning systems –with heat exchangers (fan coils); –with chilled ceilings; –with cooling surfaces.	Proportional pressure change control mode 

In systems with relatively low pressure losses in distribution pipelines. •Two-pipe heating systems with thermostatic control valves: –designed for natural circulation; –with negligible pressure losses in individual system elements that determine the total water flow (e.g. heating boiler, heat exchanger and distribution piping to the primary circuit); –with a large temperature difference between the supply and return pipes (e.g. district heating). •Underfloor heating systems with thermostatic control valves. •Single-pipe heating systems with thermostatic control valves or pipeline balancing valves. •Primary circuit pumps in systems with low pressure losses in the primary circuit.	Control mode with constant pressure value 

The pump can also switch to an operating mode according to the maximum or minimum characteristic, i.e. a mode similar to that of an unregulated pump: • Maximum characteristic operation should be selected at times when maximum flow is required. For example, when the pump is running on a vertical pipe with downward flow direction. • The minimum characteristic operating mode should be selected during periods when minimum flow is required.	Control mode at fixed speed 

The equipment is immune to electromagnetic interference corresponding to the conditions of use according to the section

6. Scope of application and is intended for use in low power,commercial and industrial areas in conditions where the level of electromagnetic field strength/ electromagnetic radiation does not exceed the maximum permissible level.

12.Technical maintenance

Maintenance of the pump should include: checking every 3 months the integrity of the electrical cable and the electrical block. It is also necessary to check the integrity of the inlet and outlet connections of the pump at the same regular intervals. In case of periodic operation of the system, after prolonged downtime, before starting the system, it is necessary to flush the pump of deposits and make sure that the shaft rotates freely.

13.Withdrawal from operation

In order to take the pumps out of service, the mains switch must be set to the "Disconnected" position.

All electrical lines upstream of the mains s w i t c h are permanently energized. Therefore, the mains switch must be locked out to prevent accidental or unauthorized activation of the equipment.

Attention

14.Protection against low temperatures

If the pump is not operated during cold weather, the necessary measures should be taken to prevent damage from exposure to low temperatures.

Attention

Adding additives with density and/or kinematic viscosity higher than water to the coolant reduces pump performance.

Guideline

– The pump is running and won't stop.
–For the dual pump system (main - standby), a changeover operation with a switching interval of 24 hours is mandatory in order to avoid clogging or sludge deposits. in the pump.

Guideline

15.Technical data

Dimensions and weight
See Shinhoo catalog. Circulation pumps with wet rotor.

Power supply voltage
1x230 V, 50 Hz.

Motor protection
External protection of the pump motor is not required.

Degree of protection
IP 44.

Insulation class
H.

Leakage current
The line filter of the pump generates an earth leakage current Ioutput < 3.5 mA during operation.

Relative humidity
95% maximum.

Ambient temperature range
-30 to +70 °C..
During transportation: -30 to +70 °C.

Temperature class
TF110.

Liquid temperature
-20 to +110 °C.

Sound pressure level
The sound pressure level depends on the power input and does not exceed 40 dB (A). The measurement uncertainty characteristic (parameter K) is 3 dB.

Maximum system pressure

The sum of the pump inlet pressure and the pressure at closed shut-off valves must be less than the maximum allowable system pressure.

Attention

The maximum permissible system pressure is stated on the nameplate of the pump: PN 10: 10 bar / 1.0 MPa

The pump must not be used with system pressures higher than those indicated on the rating plate under normal operating conditions.

Attention

Minimum inlet pressure

To prevent cavitation noise and bearing damage during operation, a minimum pressure must be maintained at the suction connection of the pump. The table below shows the minimum inlet pressure values.

The relative minimum pressures are specified for pumps installed up to 300 m above sea level. For pumps installed above 300 m above sea level, the required relative inlet pressure must be increased by 0.01 bar or 0.001 MPa for every 100 m of altitude. The Mega pump may only be used up to an altitude of 2000 m above sea level.

Guideline

	Pumped liquid temperature	*Pump inlet pressure*
Inlet pressure	≤ + 75 °C	0.005 MPa
	≤ + 95 °C	0.01 MPa
	≤ +110 °C	0.15 MPa

16.Detecting and eliminating faults

Pump malfunctions are indicated by flashing of the speed indicator:

Fault indication	***Fault Description***
All indicator lights flash once at the same time	Over-voltage protection
All indicator lights flash 2 times simultaneously	Under-voltage protection
All indicator lights flash 3 times simultaneously	Overcurrent protection
All indicator lights flash 4 times simultaneously	Out-of-phase protection
All indicator lights flash 5 times simultaneously	Blocking protection
All indicator lights flash 6 times simultaneously	light load protection
All indicator lights flash 7 times simultaneously	Over-temperature protection
/	Overheating

Guideline

The pump must be completely de-energized before correcting the fault. The pump can only be connected to the mains after the fault has been rectified.

Critical failures can result:

- incorrect electrical connection;
- improper storage of equipment;
- damage or malfunction of the electrical/hydraulic/mechanical system;
- damage, blockage or malfunction of critical parts of the equipment;
- violation of rules and conditions of operation, maintenance, installation, control inspections.

To prevent erroneous actions, personnel must be thoroughly familiarized with this installation and operating manual.

In the event of an accident, failure or incident, immediately stop operation of the equipment and contact a service center.

17.Disposal of product

The main criterion for the limit state of a product is:
1.Failure of one or more component parts that cannot be repaired or replaced;
2.Increased repair and maintenance costs resulting in uneconomic operation.
This product, as well as assemblies and parts, must be assembled and disposed of in accordance with local environmental regulations.

18.Manufacturer. Service life

ANHUI SHINHOO CANNED MOTOR PUMP CO., LTD
Address:No.1 Yanglin Road, Hi-tech Development Zone, Hefei, Anhui, P.R. China(230088}
Terms and conditions of equipment sales are determined by the terms and conditions of the contracts.
The service life of the equipment is 10 years. After the expiration of the designated service life, the operation of the equipment can b e continued after a decision on the possibility of extending this indicator. Operation of the equipment for purposes other than the requirements of this document is not allowed. Work to extend the service life of the equipment must be carried out in accordance with the requirements of the legislation without reducing the safety requirements for life and health of people, environmental protection.
The warranty period for Shinhoo equipment terminates after the expiration of 24 months following the month of manufacture of the equipment.

Technical changes are possible.

19.Information on recycling packaging

<table>
<tr><th colspan="4">General information on the labeling of
any type of packaging used by Grundfos</th></tr>
<tr><td colspan="4"> 
The packaging is not intended to come into contact with foodstuffs</td></tr>
<tr><th colspan="2">Packing material</th><th>Name of packaging / packaging aids</th><th>Letter designation of the material from which the packaging/ packaging aids are made</th></tr>
<tr><td colspan="2">Paper and cardboard (corrugated cardboard, paper, other cardboard)</td><td>Boxes/boxes, liners, gaskets, liners, liners, grates, retainers, packing material</td><td> 
PAP</td></tr>
<tr><td colspan="2">Wood and wood-based materials (wood, cork)</td><td>Boxes (board, plywood, fiberboard), pallets, laths, removable sides, strips, laths, clamps</td><td> 
FOR</td></tr>
<tr><td>Plastic</td><td>(low-density polyethylene)</td><td>Pouches, bags, foils, pouches, bubble wrap, retainers</td><td> 
LDPE</td></tr>
</table>

Packing material		Name of packaging / packaging aids	Letter designation of the material from which the packaging/ packaging aids are made
Plastic	(high-density polyethylene)	Sealing gaskets (made of film materials), including air gaskets. bubble wrap, clamps, stuffing material	 HDPE
	(polystyrene)	Sealing gaskets made of foamed plastics	 PS
Combination packaging (paper and cardboard/ plastic)		Skin type packaging	 C/PAP

Please pay attention to the marking of the packaging itself and/or the packaging aids (if applied by the packaging manufacturer).
If necessary, in order to save resources and environmental performance, the manufacturer may reuse the packaging and/or packaging aids.
The packaging, packaging aids and the materials from which they are made are subject to change at the manufacturer 『s discretion. Please contact the manufacturer of the finished product listed in section 18 for the latest information. Manufacturer. Service life of this Data Sheet, Installation Manual and operation.
Please specify the article number when inquiring equipment.

Shinhoo®

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