Shinhoo®

Mega

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 not operate 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 instructions*, but also the special safety notes in 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 are 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 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 supplied equipment is guaranteed only when it is used according to section.

6.Scope. Maximum permissible values specified 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 of transportation to prevent unintentional movement.

Storage conditions of the equipment must comply with group "C" of GOST 15150.

Ambient temperature during transportation:
-30 to +70 °C. The maximum designated storage period is 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 may 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 product information

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 the control panel.

Design

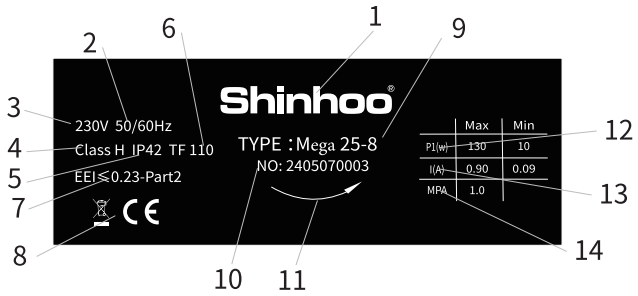
Mega pumps have a hermetically sealed rotor, i.e. pump and motor form a single unit without mechanical shaft seal. The bearings are lubricated by the pumped liquid.

Type designation

Example **Mega 40 -10 F 220**

Model name
Nominal flange diameter [mm]
Maximum head [m]
Flanged version
(without designation - threaded version)
Mounting length [mm]

Mega nameplate



No.	Name
1	Brand
2	Frequency
3	Voltage
4	Insulation class
5	Protection class
6	Maximum fluid temperature

No.	Name
7	Energy efficiency Index
8	Certification
9	Model
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 (*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).

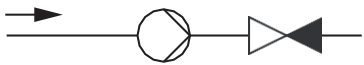


Fig. 1 piping system

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. Packaging and moving

Packaging

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 documents;
- Plug;
- Threaded pipe connections complete with gaskets (for pumps with threaded connection);
- Pumps with flanged connections are delivered without mating flanges.

Moving

Warning
Local code restrictions for manual lifting and loading and unloading operations must be observed.

Attention

Do not lift the equipment by the supply cable.

6. Application

The Mega pump is designed for pumping liquids in the following systems:

- 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 and pumping performance is degraded, which depends on the concentration of the solution/glycol as well as on the temperature of the liquid.

To prevent the glycol solution from changing parameters, it is necessary to control the temperature of the fluid above the operating temperature; it is also necessary 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 the pump to pump corrosive liquids such as acids and seawater.

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

Place of 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.

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.

Pump installation

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.

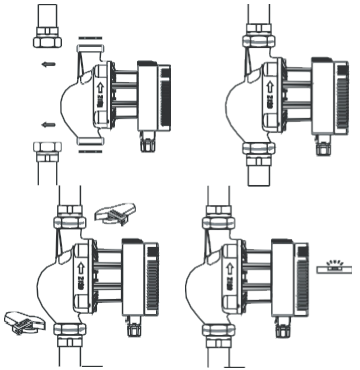


Fig. 3 Mounting the pump

Installation direction

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.

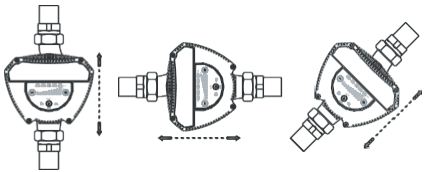


Fig. 4 Permissible positioning of the pump shaft

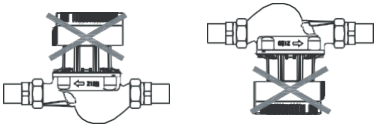


Fig. 5 Unacceptable positioning of the pump shaft

Changing the position of the control unit

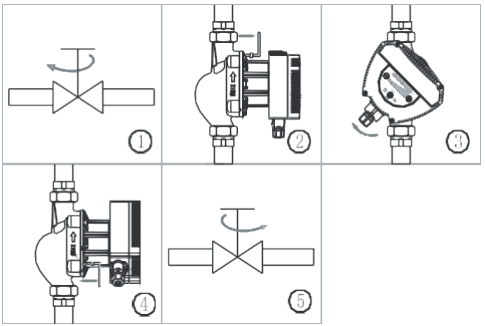


Fig. 6 Procedure for changing the position of the control unit

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 volute, 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.

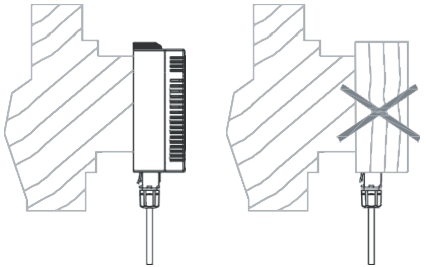


Fig. 7 Thermal insulation of the Mega pump

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. Connection of 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 inone hour.

Power supply voltage

1x230 V, 50/60Hz, 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.

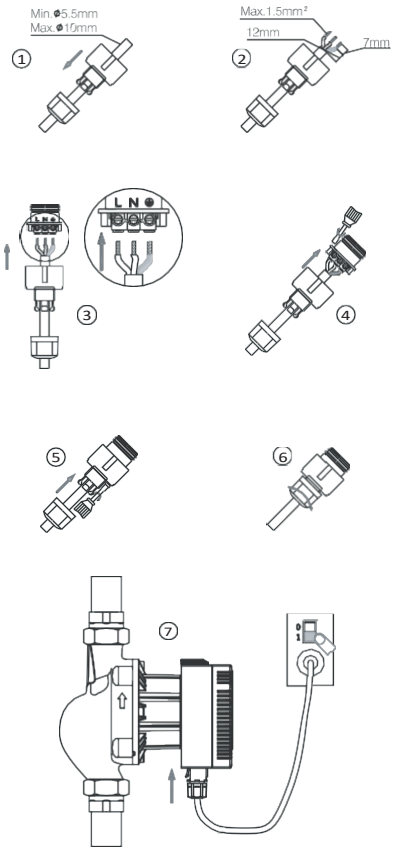


Fig. 8 Electrical connection

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.

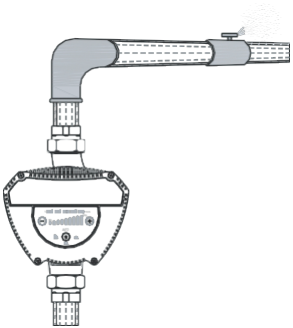


Fig. 9 Venting the system

11. Operation

Refer to section *15. Technical data.* for operating conditions.

Control panel

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

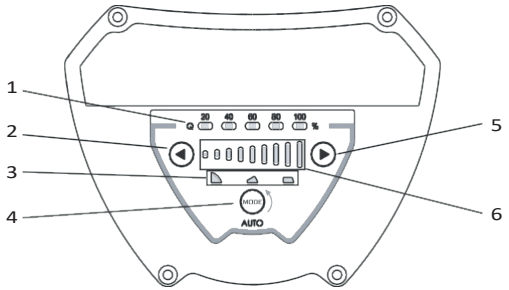


Fig. 10 Control panel elements

The pump control panel consists of the following elements:

Pos.	Description
1	Current flow rate in % of Max.
2	Speed reduction key
3	Operation mode indication
4	Control mode selection key
5	Speed increase key
6	Display of the current operating speed

Selecting the control mode

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

Brief description of control modes

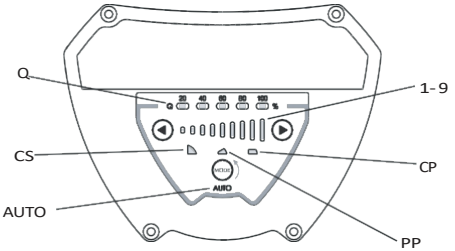


Fig. 11 Light areas on the control panel

Gear Level	Clarification
CS：Constant speed mode (Max)	When the electric pump is in constant speed mode, the electric pump runs at a constant speed, the constant speed indicator is on, and the indicator light of gear 1~9 is displayed according to the set gear. The traffic indicator is displayed in real time based on the traffic volume.
AUTO mode	When the electric pump is in AUTO mode, the electric pump will automatically make the necessary adjustments according to the actual system characteristics, and the AUTO indicator will light up. The traffic indicator is displayed in real time based on the traffic volume.
PP：Proportional mode	When the electric pump is in proportional mode, the lift of the electric pump increases proportionally with the increase of the flow rate. The ratio indicator light is on, and the corresponding gear indicator light is displayed according to the set gear. The traffic indicator is displayed in real time based on the traffic volume.

Gear Level	Clarification
CP：Constant pressure mode	When the electric pump is in constant pressure mode, the head of the electric pump remains unchanged with the increase of the flow rate. The constant pressure gear indicator lights up, and the corresponding gear indicator is displayed according to the set gear. The traffic indicator is displayed in real time based on the traffic volume.
PWM control mode	When the electric pump is in PWM control mode, the indicator light showing the flow is all on.
0-10V signal control	When the electric pump is controlled by 0-10V analog signal, the gear indicator light is all on, the mode light is not on, and the flow indicator light is on according to the power.
Gear manual single cycle press switch constant speed, ratio, constant pressure, AUTO mode (press switch time 200-300 milliseconds), 0-10V signal control, PWM signal control.	

Gear switching scheme:

Number of key presses	Gear	Indicator light display
0	AUTO	AUTO gear indicator on
1	CS	Constant speed gear indicator light on + gear 1-9 lights all on
2	PP	Proportional gear indicator light on + gear 1-9 lights all on
3	CP	Constant pressure gear indicator light on + gear 1-9 lights all on
4	PWM	Indicator light showing flow rate is fully illuminated, mode light is not illuminated
5	0-10V	Gear indicator light is fully illuminated, mode light is not illuminated
6	AUTO	AUTO gear indicator on

Guideline

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

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 *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.

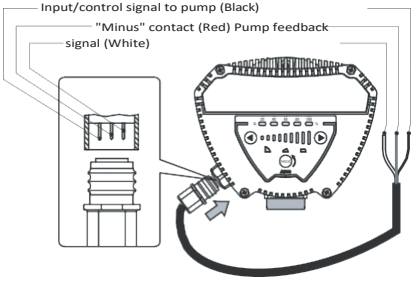


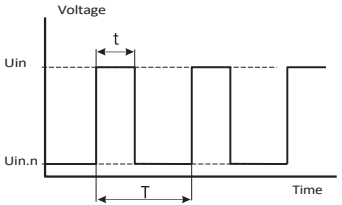
Fig. 12 PWM signal connection diagram

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



T - signal period t - pulse time
d=t/Tx100% - fill factor

Fig. 13 PWM signal characteristics

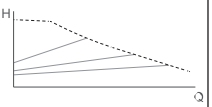
The input PWM signal.

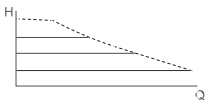
After the pump is connected to a PWM signal source, the pump shaft speed varies depending on the value of the fill factor d.

The dependencies are shown in *Fig. 17* and in the table:

Fill factor value	**Pump operation description**
d = 0 (no PWM signal)	The pump will automatically return to the operating mode it was in prior to connection to the PWM signal source
0<d≤10%	Pump running at maximum speed
10<d≤84%	The speed changes from maximum to minimum
84<d≤91%	Pump runs at minimum speed
91<d<95%	Hysteresis area (minimum speed/stop)
95≤d<100%	Pump stopped
d = 100%	The pump will automatically return to the operating mode it was in prior to connection to the PWM signal source

Recommendations for selecting the control mode

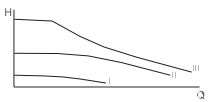
Application in hydraulic systems	**Select this control method:**
In systems with relatively high pressure losses in distribution pipes and in air conditioning and refrigeration systems. • Two-pipe heating systems with thermostatic control valves and: – with long-distance distribution pipelines; – with 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* 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. 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 stop the pump, the power switch must be set to the "disconnected" position.

Attention

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

14. Protection against low temperatures

Attention

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

Guideline

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

Guideline

When the ambient temperature is below 0 °C, the following conditions must be met:

- ***Pumped liquid temperature +5 °C.***
- ***The pumped liquid contains glycol.***
- ***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.***

15. Technical data

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

Power supply voltage
1x230 V, 50/60Hz.

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

Degree of protection
IP 42.

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
0 to +40 °C.
During transportation: -30 to +70 °C.

Temperature class
TF110.

Liquid temperature
2 to +110 °C.

Sound pressure level
The sound pressure level depends on the power input and does not exceed 45 dB (A). The measurement uncertainty characteristic (parameter K) is 3 dB.

Warranty
The product is covered by a warranty period of 5 years from the date of shipment or installation. Please refer to the manufacturer's warranty terms for details.

Maximum system pressure

Attention

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

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

Attention

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

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.

Guideline

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.

	Pumped liquid temperature	Pump inlet pressure
Inlet pressure	≤ + 85 °C	0.005 MPa
	≤ + 90 °C	0.028 MPa
	≤ +110 °C	0.100 MPa

16. Faults detection and elimination

Pump malfunctions are indicated by flashing of the speed indicator:

Fault indication	Fault Description
Speed indicator 1 flashes	Increased voltage
Speed 2 indicator blinks	Reduced voltage
Speed 3 indicator flashes	Current overload
Speed 4 indicator blinks	Phase loss
Speed 5 indicator blinks	Impeller blocked
Speed 6 indicator blinks	Pumps running without liquid
Speed 7 indicator blinks	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.

Shinhoo®

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