Shinhoo

Circulation Pump

Master SD/D
Mega
Mega S
Mega S Pro

Instant
Instant Pro
Instant 15-12E
Aquamaster

AHM
F-AHM

PRODUCT CATALOGUE

1. Circulation pumps overview

2. Master SD/D circulation pump

3. Mega circulation pump

4. Mega S circulation pump

5. Mega S Pro circulation pump

6. Instant circulation pump

7. Instant 15-12E circulation pump

8. Aquamaster booster pump

9. AHM Series Horizontal Multistage Centrifugal Pump

10. F-AHM Series Horizontal Multistage Centrifugal Pump

1. Circulation pumps overview

Application	Pump type									
										
	Master SD/D	Mega	Mega S	Mega S Pro	Instant	Instant Pro	Instant 15-12E	Aquamaster	AHM	F-AHM
Radiator systems	●	●	●	●					●	●
Underfloor heating systems	●	●	●	●						
Domestic hot water circulation	●	●	●	●	●	●	●		●	●
Solar-heating systems	●	●	●	●					●	●
Air-condtioning and cooing system	●		●	●					●	●
Boosting of hot or cold water supply	●	●	●	●	●	●	●	●	●	●

Conditions to measure performance

Instructions below are valid for performance curves given in this section below.

- Degassed water was used as pumped liquid when measuring performance.
- Performance of the pumps is measured with water temperature of +20 ° C.
- All the values are approximate and do not guarantee that the pumps actually have the same performance. If it is necessary to calculate a minimum curve, an individual research is required.
- The given performance range is valid for kinematic viscosity of 1mm^2/s (1 cSt).
- Transformation of hydrostatic head H[m] into pressure p [kPa] is performed for water with density ρ = 1,000 kg/m^3. For pumped liquids with other densities, outlet pressure should be proportional to density.

How to select a pump: a brıef instruction

Prior to selecting a pump, ensure that the following parameters comply with the operating conditions:

- quality and temperature of pumped liquid;
- environmental conditions;
- minimum inlet pressure;
- maximum operating pressure.

See section «Operating conditions»

Pump size

Pump sizes are selected according to the following parameters:

- required maximum flow in a hydraulic system (Q);
- maximum pressure losses in a hydraulic system (H).

In order to find a duty point, study the description of a certain pump size.

Put the required maximum flow (Q) on the X axis, maximum pressure losses (H) — on the Y axis. See Fig. 1.

Note: for more energy effective operation, selecting an excessive pump size is not recommended.

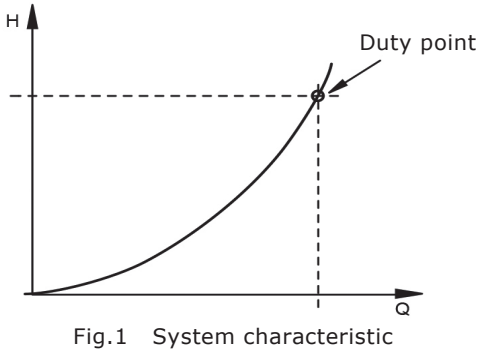


Fig.1 System characteristic

Master SD/D circulation pump

Fig.2 Master SD Master D

Note:Only the Master SD model features a display function.

Type key

Example	Master SD	25	-4	180

Product type
Master SD/D

Nominal diameter of inlet and outlet ports (DN), [mm]

Maximum head [m]

Port-to-port length [mm]

Application

Master SD/D pumps are designed for circulation of water or liquids with glycol in heating systems, underfloor heating systems, air conditioning and cooling systems. Cooling systems include systems in which the temperature of pumped liquid is lower than ambient temperature.

Master SD/D pumps automatically adjust the pressure in the system according to an actual system requirement.
An automatic pump operating mode can be used in all the circuits of a heating system: one- or two- pipe radiator circuits, underfloor heating circuits and feed boiler circuits.

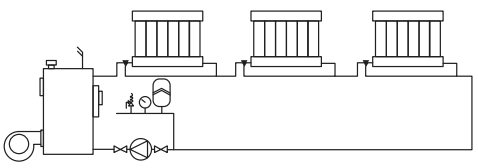


Fig.3 One-pipe heating system

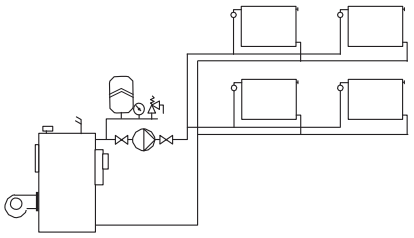


Fig.4 Two-pipe heating system

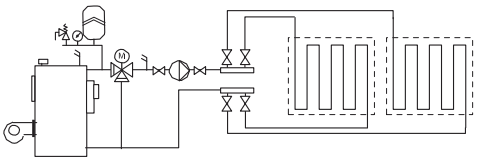


Fig.5 Underfloor heating system

Below you can find the table with the data to select a pump for a certain heating system.

House area [m²]	Flow in the heating system at Δt = 15 °C [m³/h]	Flow in the underfloor heating system at Δt = 5 °C [m³/h]	Pump type
60-80	0.5	1.5	XX-4
80-120	0.7	2	XX-6
120-150	0.9	2.5	XX-7
180-200	1.1	3.2	XX-8

The recommendations are for information only.

Operating conditions

Master SD/D circulation pumps can be used with the following liquid types:

- pure, non-viscous, non-corrosive, non- flammable, and non-explosive liquids without solids or fibers;
- cooling liquids without mineral oils;
- softened water.

Kinematic water viscosity = 1 mm²/s (1 cSt) at 20 °C.
When a circulator pump is used to pump a more viscous liquid, performance of the hydraulic system decreases.
Exclude additives that can negatively effect pump operation.
The pump should be selected according to pumped liquid viscosity.

Technical data

Supply voltage	AC 220V-240V,50/60Hz,PE
Motor protection	Additional external protection is not required
Protection class	IP44
Insulation class	H
Relative air humidity	Max. 95 %
Ambient temperature	From -30 to 70 °C
Sound pressure	≤ 42 dB(A)
Temperature class	TF110
System pressure	Maximum 1.0 MPa (10 bar)
Liquid temperature	-20 ... 110 °C

Inlet pressure

To avoid cavitation noise and pump bearings damage, the following minimal pressure should be set up for an inlet port:

Liquid temperature	≤75 °C	95 °C	110 °C
Inlet pressure	0.005MPa	0.05MPa	0.108MPa
	0.05 bar	0.5 bar	1.08 bar

Electric control instructions

Necessity in the heating intensity of each room constantly changes and depends significantly on solar activity, time of the day, and individual features of the rooms heated.
These are the reasons why a non-adjustable pump can not adapt to changing conditions and works inefficiently.
Possible consequences when using non-adjustable pumps:

- excessive pressure in the system;
- noise in thermostatic heads;
- manual control of the heating system;
- excessive electricity consumption

Adjustable pumps equipped with a frequency converter and integrated software can process an actual system enquiry and automatically adjust to changing conditions.

Operation principles of non-adjustable and adjustable pumps are compared in the following graphs:

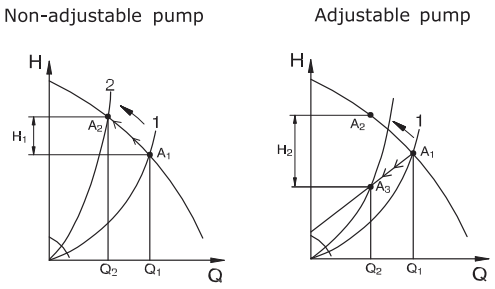


Fig.6 Changing of the duty point position of an adjustable and non-adjustable pump

If the system adopts a non-adjustable pump, then when thermostatic valve tap is closed, pressure difference on it increases due to the pump head rise in a low performance area. This increased pressure difference on the valve tap leads to local increase in water speed that, therefore, causes an unpleasant cavitation noise. If the system involves a Master SD/D pump, the head before the valve tap will drop as the supply of the pump decreases. It means that the reason for noise appearance will be eliminated and the supply of heat transfer medium will comply with the real requirement of the system. Also, as the head decreases, a Master SD/D pump decreases energy consumption.

Fault Protection Instructions

Master SD	
Fault Descriptions	**Fault code**
Over-voltage protection	All indicator lights flash once simultaneously The display panel shows E1
Under-voltage protection	All indicator lights flash twice simultaneously The display panel shows E2
Over-current protection	All indicator lights flash 3 times simultaneously The display panel shows E3
Phase loss protection	All indicator lights flash 4 times simultaneously The display panel shows E4
Locked rotor protection	All indicator lights flash 5 times simultaneously The display panel shows E5
Under-load protection	All indicator lights flash 6 times simultaneously The display panel shows E6
Over-temperature protection	All indicator lights flash 7 times simultaneously The display panel shows E7
Over-heating protection	When the IPM surface temperature > 125±10%℃, the pump is in shutdown state

Master D	
Fault Descriptions	**Fault light**
Over-voltage protection	Gear I indicator light flashes
Under-voltage protection	Gear II indicator light flashes
Over-current protection	Gear III indicator light flashes
Phase loss protection	Gear PWM indicator light flashes
Locked rotor protection	Gear I, II indicator light flash simultaneously
Light-load protection	Gear AUTO indicator light flashes
Over-temperature protection	Gear I, PWM indicator light flash simultaneously
Overheat protection	Gear I, AUTO indicator light flash simultaneously

Construction

Master SD/D pump is a wet-rotor canned pump, the whole unit consisting of the pump and the motor without the shaft seal. The rotor is immersed in the liquid transported by the pump and the bearing is lubricated by the liquid.

Construction advantages of Master SD/D pumps:

- An energy-efficient brand new permanent-magnet motor and increased starting torque.
- A ceramic shaft and bearings with the same temperature extension coefficient provide increased reliability of the equipment.
- A thrust bearing is made of carbon that extends the service life of the pump.
- A rotor can and thrust bearing are made of stainless steel to resist corrosion.
- The pump housing is made of cast iron with protective anti-rust coating.
- Simplified pump connection to power supply with a plug.

This design adopts a four-pole synchronous permanent-magnet motor and frequency converter. Easy access to the terminal box and cable tension compensator are included. The motor complies with the Low Voltage Directive (EN 60335-2-51). The motor is protected from short circuits.

The motor is protected by electronics of the control unit and does not require any external protection. The pump in connected to power supply via a plug supplied with it.

Material specification

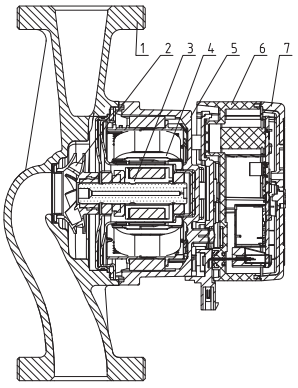


Fig.7 Sectional drawing

No.	Name	Material
1	Pump housing	Cast iron / Stainless steel/ Composite / Plastic
2	Impeller	Composite
3	Assembled rotor	Stainless steel
4	Stator can	Stainless steel
5	Motor housing	Aluminum alloy
6	Terminal box base	Composite
7	Terminal box cover	Aluminum alloy + composite

Electrical connection

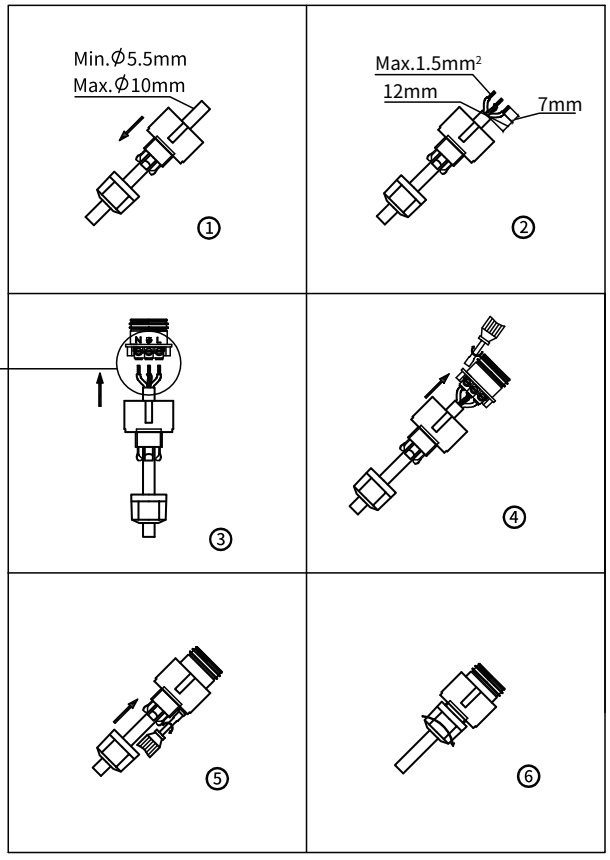
Power supply connection should be performed in compliance with local regulations and rules.
The pump should be connected to an external on/off switch.
The pump should be appropriately earthed.
External protection of the pump motor is not required.

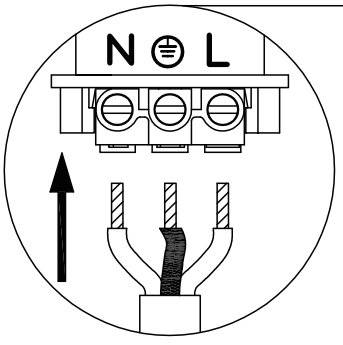
Note: the pump should not be started and stopped more than four times within an hour when supply voltage is turned on and off.
The pump is connected to power supply according to *Fig.8*

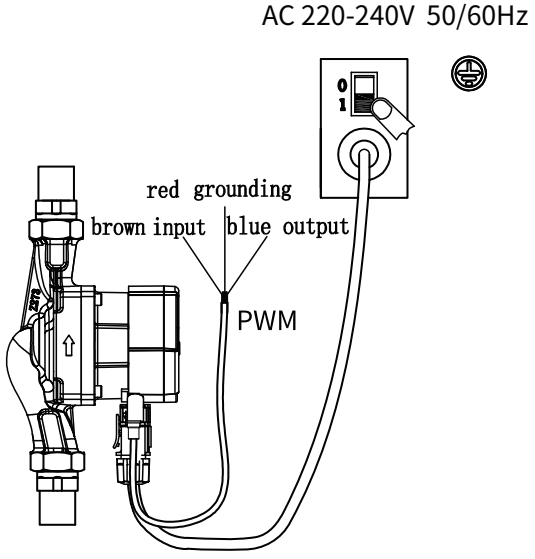
Cables
All the cables should be connected in accordance with the local regulations.

Additional protection
The earth leakage circuit breaker should be marked with the first or both symbols given below:

Marking	Description
	High-sensitivity ELCB, type A, according to IEC 60775
	High-sensitivity ELCB, type B, according to IEC 60775





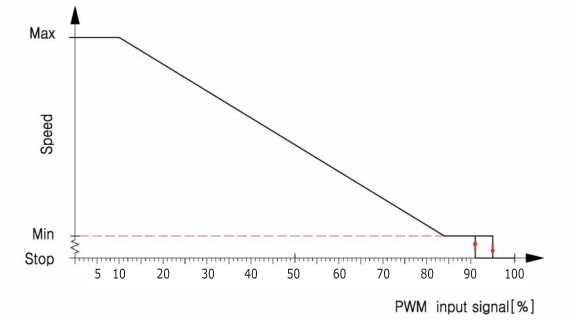


Note:Ensure correct wiring

Fig.8 Electrical connection

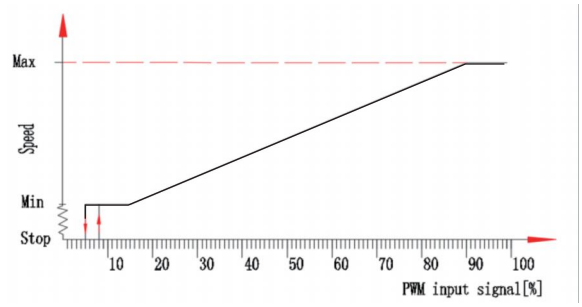
PWM 1 signal input

Under fixed frequency, different duty cycles correspond to different motor given speed signals.Inverse proportional control mode is adopted. The specific control logic is as follows:



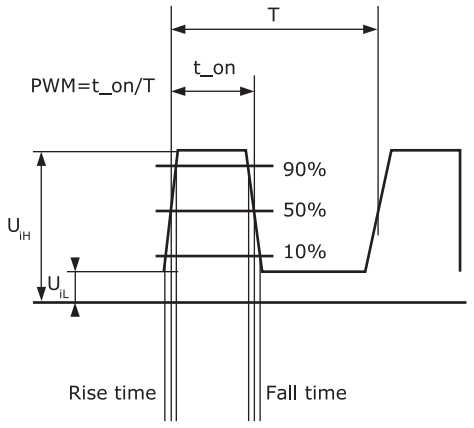
PWM1 Input Signal (%)	Pump Status
≤10	The pump runs at a Max.speed
>10/≤84	Variable speed from Max.to Min.speed
>84/≤91	The pump runs at the lowest speed
>91/<95	If the speed variance point of input signal fluctuates, then it will block the start and stop of the pump according to the principle of magnetic hysteresis
≥95/≤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%)

PWM 2 signal input



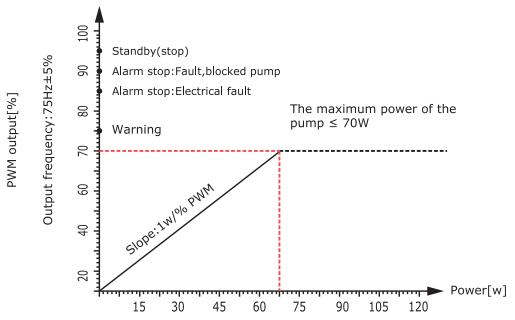
PWM2 Input Signal (%)	Pump Status
≤5	Gear display: 5 lights are fully on, indicating that it is in PWM2 mode Pump status: standby, the pump stops running (the signal line is not connected to the PWM signal, and the pump also stops running)
>5/ <8	If the input signal fluctuates near the speed change point, the pump is prevented from starting and stopping according to the hysteresis principle
≥8/ ≤15	The pump operates at min. speed
>15/ ≤90	Varible speed from min. to max.speed
>90/ ≤100	The pump runs at Max.speed
Recognition accuracy	±1 (Example: When the PWM input signal is 20%, the actual duty cycle is in the range of 19%-21%)

PWM input signal	parameter
Current isolation in pump	Yes
Frequency input	100 ~ 4000 Hz
Input voltage high level	4.0 ~ 24 V
Input voltage low level	≤ 0.7V
Input current high level	Max 10 mA@100Ohms
Input PWM duty cycle	0~ 100 %
Signal polarity	Fixed changeless
Rise time/Fall time	≤ T/1000



PWM feedback(PWM1 & PWM2)

Frequency range: 75±5%Hz.
Corresponding relationship between output signal and circulating pump and operating status.



PWM output signal (%)	State	Potential causes
95	Standby	The pump stops
90	Alarm shutdown	fault (pump stuck locked rotor protection)
85	Alarm shutdown	electrical fault (lightoad protection, phase loss protection,over current protection, over temperature protection,etc.)
75	Warning	Warning (overvolt age protection and undervoltage protection)
0-70	0-70W(slope 1 W/% PWM)	
Recognition accuracy:±1(Example: When the PWM input signal is 20%, the actual duty cycle is in the range of 19% ~ 21%)		

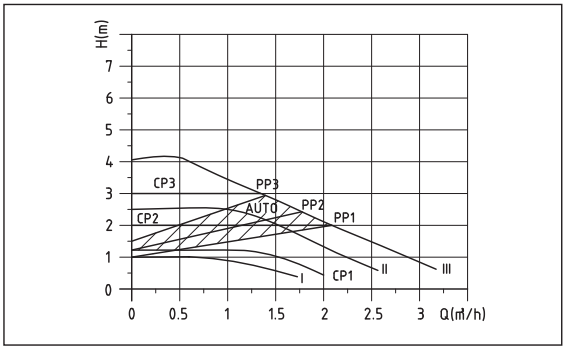
Product range

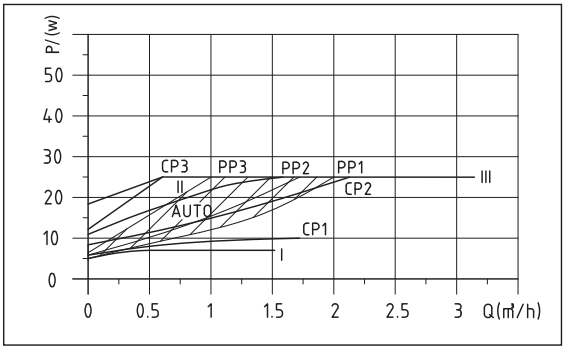
Pump model	Connection size	Port-to-port length mm	Rated power (W)	Rated current (A)	Voltage (V)
Master SD/D 20-4	G 1"	130/180	25	0.25	220-240
Master SD/D 20-5			33	0.3	
Master SD/D 20-6			39	0.35	
Master SD/D 20-7			52	0.45	
Master SD/D 20-8			70	0.55	
Master SD/D 25-4	G 1 1/2"		25	0.25	
Master SD/D 25-5			33	0.3	
Master SD/D 25-6			39	0.35	
Master SD/D 25-7			52	0.45	
Master SD/D 25-8			70	0.55	
Master SD/D 32-4	G 2"		25	0.25	
Master SD/D 32-5			33	0.3	
Master SD/D 32-6			39	0.35	
Master SD/D 32-7			52	0.45	
Master SD/D 32-8			70	0.55	

Performance curves

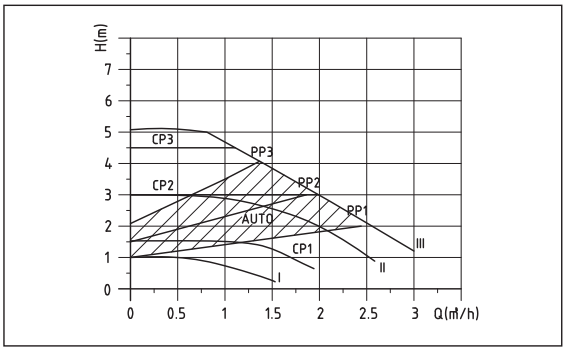
Mode	Clarification
AUTO	Auto-adaptation
PP1	Proportional pressure low speed
PP2	Proportional pressure medium speed
PP3	Proportional Pressure High Speed
CP1	Constant pressure low speed
CP2	Constant pressure medium speed
CP3	Constant pressure high speed
CS1(I)	Constant speed low speed
CS2(II)	Constant speed medium speed
CS3(III)	Constant speed high speed

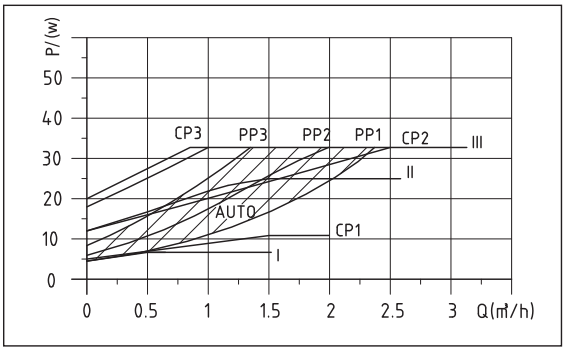
Master SD/D 20/25/32-4 130/180



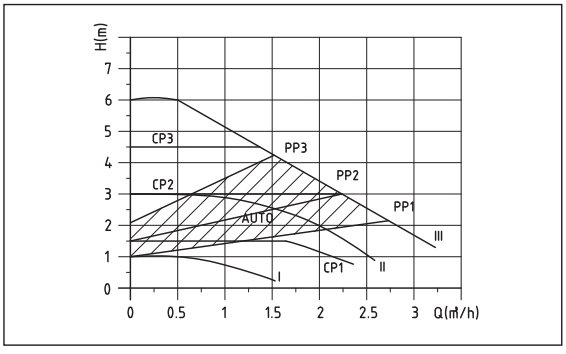


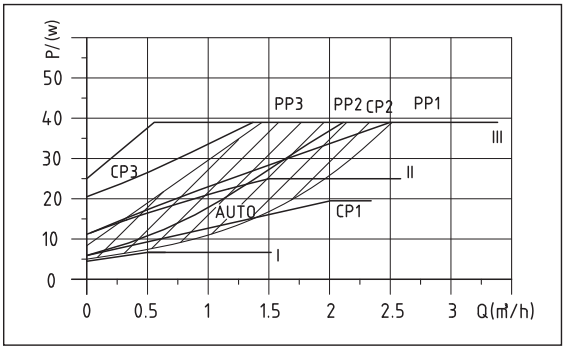
Master SD/D 20/25/32-5 130/180



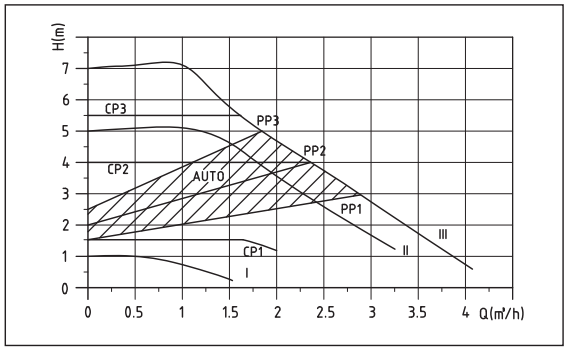


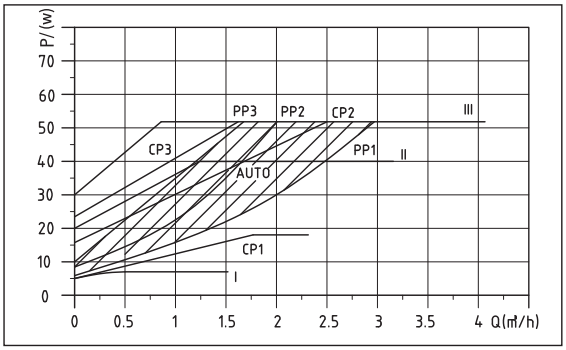
Master SD/D 20/25/32-6 130/180



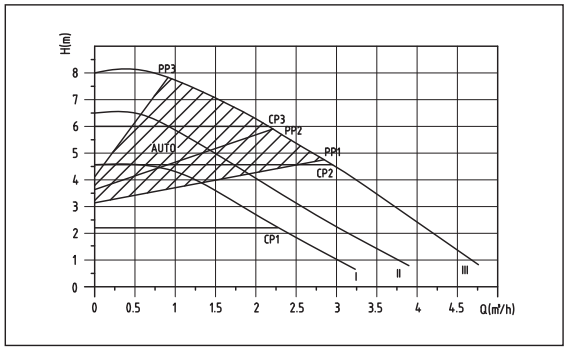


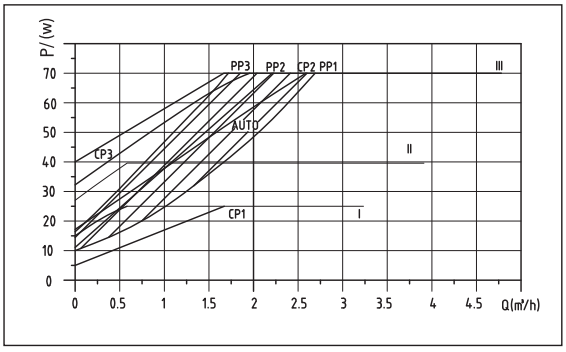
Master SD/D 20/25/32-7 130/180





Master SD/D 20/25/32-8 130/180





Dimensions

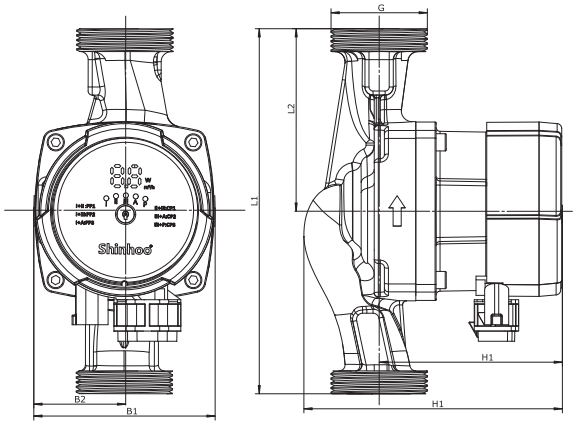
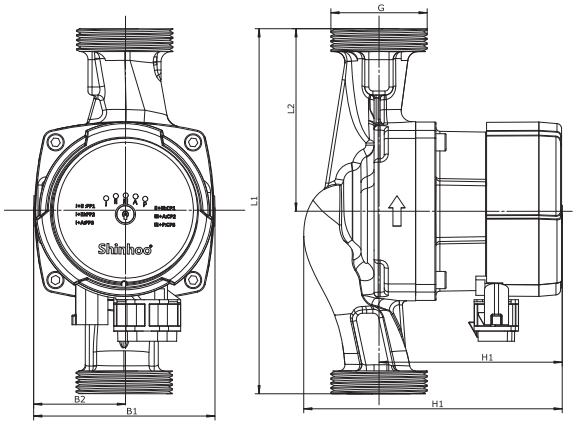


Fig.9 Master SD pump



Master D pump

Pump model	Size [mm]						
	B1	B2	L1	L2	H1	H2	G
Master SD/D 20-X	90	45	130	65	135	90	1”
Master SD/D 25-X	90	45	130	65	135	90	1 /1/2”
Master SD/D 25-X	90	45	180	90	135	90	1 /1/2”
Master SD/D 32-X	90	45	180	90	135	90	2”

Mega circulation pump

Fig.10 Mega

Type key

Example	Mega	40	-10	F	180

Product type
Mega

Nominal diameter of inlet and outlet ports (DN),[mm]

Maximum head [m]

Flange configuration (if no marks, then threaded)

Port-to-port length [mm]

Application

Control modes

The pump has 19 control modes with an automatically changed speed, nine modes with a constant speed and the mode controlled by an external controller with a PWM signal and 0-10v control. The description of the modes is given below.

An operating mode should be adjusted according to the system type (see *Fig. 13*). Initial settings — AUTO (self-adjusting mode). Recommended settings of the pump are given in the table below.

You can select the control mode by pushing the button on the operating panel. (*Fig. 17*). The selected control mode will be visible due to light fields.

Positon	System type	Pecommended	Options
A	Underfloor heating system	AUTO	CP (1-9)
B	Two-pipe heating systems	AUTO	PP (1-9)
C	One-pipe heating systems	PP1	PP (1-9)

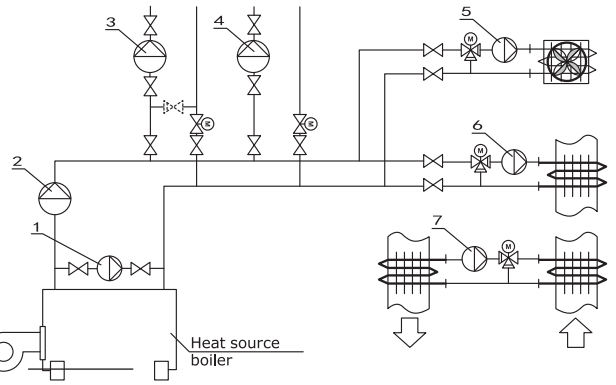


Fig. 11 Functional drawing of heating system

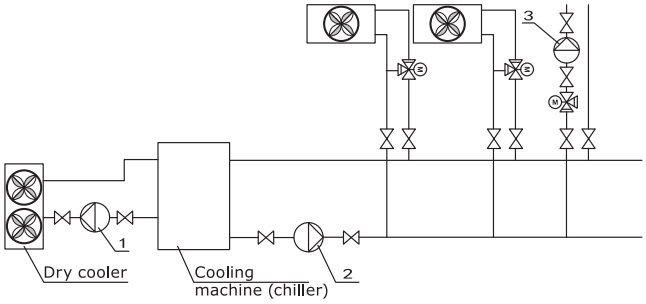


Fig.12 Functional drawing of air conditioning system

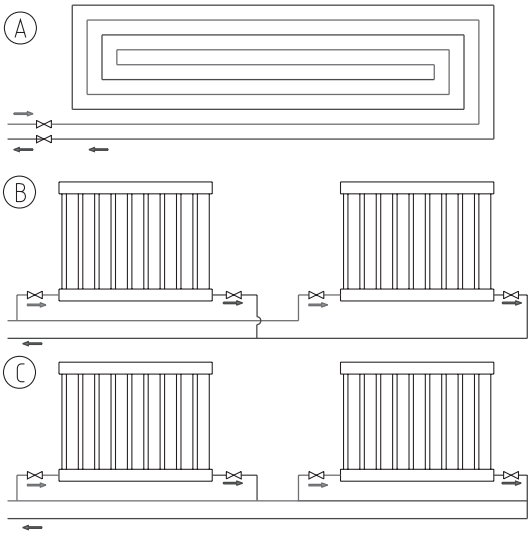


Fig.13 Operating mode adjustment

Operating conditions

General instructions

Water in heating system	Water quality according to local standard
Water with glycol	Maximum viscosity = 10–50 cSt ~ solution of water 50 % / glycol 50 % at -10 °C

Operation range

Parameter	MEGA
Maximum flow	10 m^3/h
Maximum head	10 m

Liquid temperature

from 2 to 110 °C.

Environmental conditions

Ambient temperature when operated	from 0 to 40 °C
Ambient temperature when stored or transported	from -30 to 70 °C
Relative air humidity	Max. 95 %

Maximum operating pressure

1.0MPa (10bar)

Minimum inlet pressure

In order to avoid cavitation noise and bearings damage during pump operation, the following minimum relative pressure should be maintained at its inlet port.

	Liquid temperature	Inlet pressure of the pump
Inlet pressure	≤ 85 °C	0.005 MPa (0.05bar)
	≤ 90 °C	0.028 MPa (0.28bar)
	≤ 110 °C	0.100 MPa (1bar)

Note: the sum of actual inlet pressure and pump pressure should always be lower than a maximum allowable operating pressure in the system when the valve is closed.

Relative minimum pressure is given for the pumps installed at 300 m above the sea level. For the pumps installed higher than 300 m above the sea level, the required relative inlet pressure should be increased by 0.001 MPa or 0.01 bar per each 100 m of height. MEGA pumps are allowed only at a height up to 2,000 m above the sea level.

Sound pressure

Sound pressure depends on the power consumed and does not exceed 42 dB (A).

Pumped liquids

The pump is designed to pump pure and non-corrosive liquids without solids or fibers that can have a mechanical or chemical impact on the pump.

Water used in heating systems should meet the quality requirements of system water for heating units.

The pumps must not be used for inflammable or explosive liquids such as diesel fuel or petrol.

The pumps must not be used for corrosive liquids such as acids or sea water.

If the pump is not operated during a cold season, take the necessary measures to avoid low temperature damages.

Using additives in a heat transfer medium with the density and/or kinetic viscosity higher than the water ones decreases the performance of the pump. Never use the additives that can negatively affect the pump operation.

In order to learn whether the pump can be used with a certain liquid, take into account several factors. The most important are lime content, pH, temperature, and the content of solvents and oils.

The pump can be used for glycol and water mixtures at the level up to 50 %.

Pumping of glycol mixtures decreases hydraulic performance of the pump.

Proportional pressure (PP1-9)

Proportional-pressure mode adjusts the pump performance to the actual heat demand in the system, but the pump performance follows the selected performance curve — PP1-9.

See *Fig. 14*.

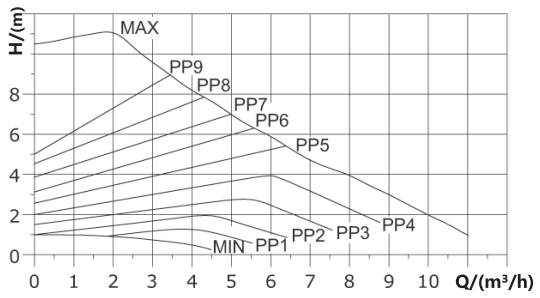


Fig.14 Proportional-pressure curve settings

Depending on the pump sizes, there are 1–9 curves of the control mode of proportional pressure available.

The selection of the proportional pressure mode depends on the system parameters and required flow.

Constant pressure (CP1-9)

Constant pressure mode adjusts the pump performance with regard to the required flow in the system but within the selected performance curve — CP1-9. See *Fig. 15* with CP1-9 modes.

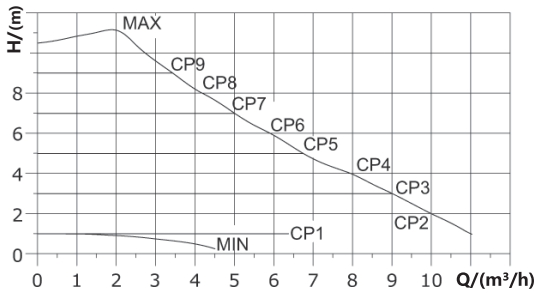


Fig.15 Constant-pressure curve settings

Depending on the pump sizes, there are 1–9 constant pressure mode curves available.

The selection of the constant pressure mode depends on the system parameters and required flow.

Constant curve (CS1-9)

At constant curve, the pump runs at a constant curve independently of the actual flow demand in the system. The pump performance ollows the selected performance curve — CS1-9. See *Fig. 16.*

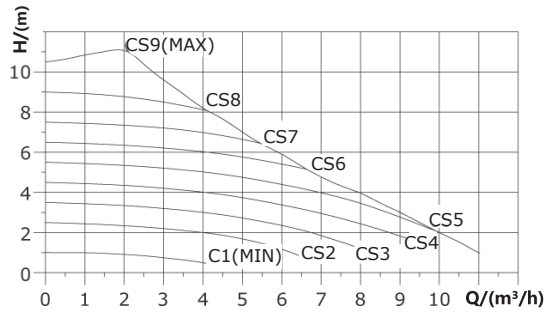


Fig.16 Constant-curve settings

Depending on the pump sizes, there are 1–9 fixed speeds available.

The selection of a suitable operating mode at a constant curve mode depends on the system parameters and required flow.

Brief description of control modes

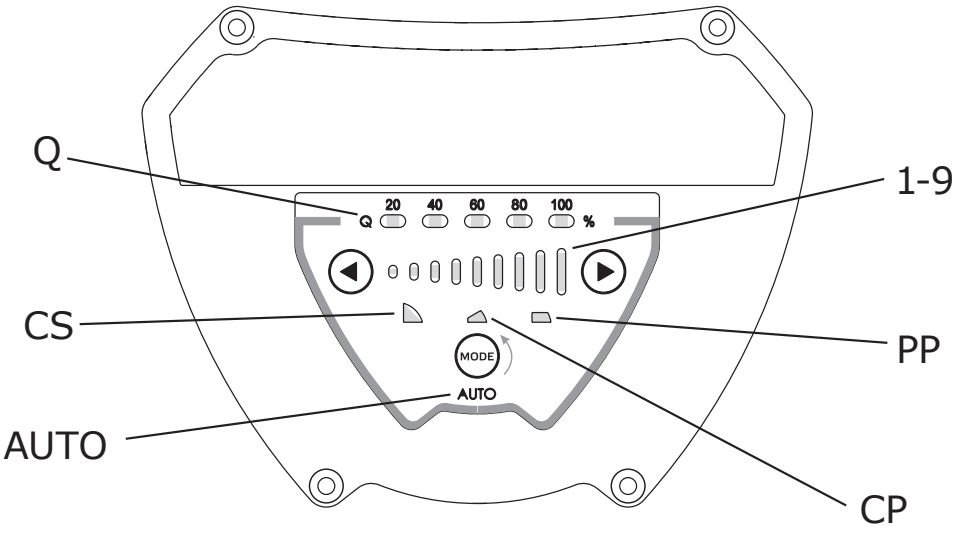


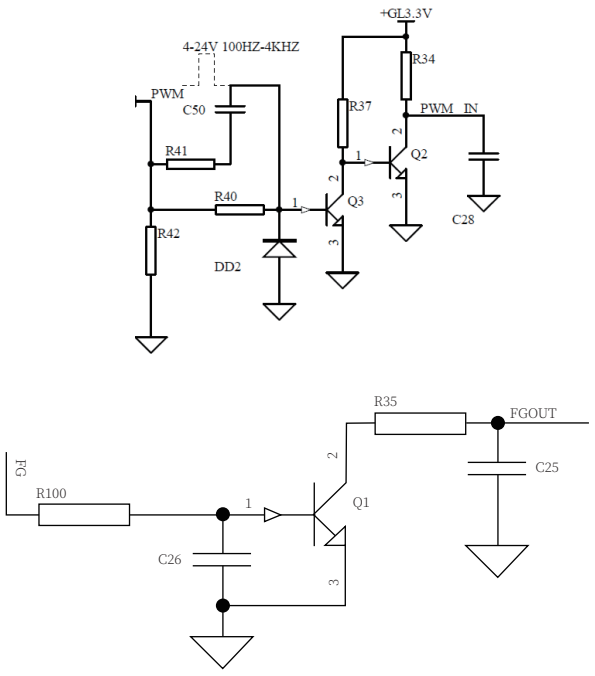
Fig.17 Pump control modes

Setting	Pump performance curve	Description
PP 1-7 for xx-8 model	Proportional pressure curves	The pump duty point will be shifted up or down along one of the seven propotional pressure curves depending on the required system flow. The head (pressure) drops when the required flow in the system is reduced and rises when it is increased.
PP 1-9 for xx-10 model	Proportional pressure curves	The pump duty point will be shifted up or down along one of the nine propotional pressure curves depending on the required system flow. The head (pressure) drops when the required flow in the system is reduced and rises when it is increased.
CP1-7 for xx-8 models	Constant-pressure curves	The pump duty point will be shifted farther or closer along one of the seven constant-pressure control mode curves depending on the required system flow. The head (pressure) remains constant regardless of the required flow in the system.
CP 1-9 for xx-10 models	Constant-pressure curves	The pump duty point will be shifted farther or closer along one of the nine constant-pressure control mode curves depending on the required system flow. The head (pressure) remains constant regardless of the required flow in the system.
CS1-7 for xx-8 models	Constant curves	The pump runs according to one of the seven constant performance curves, i.e. with constant speed.
CS1-9 for xx-10 models	Constant curves	The pump runs according to one of the nine constant performance curves, i.e. with constant speed.
Auto mode	Auto performance range	The pump duty point will be shifted up or down along one of the selected automatic curves depending on the required system flow. The head (pressure) drops when the required flow in the system is reduced and rises when it is increased. The pump automatics selects the curve independently; manual adjustment is not required.

Signal connection

PWM input(white), Fault feedback (red), 0~10V (green), ground cable (black)
PWM output signal:pump feedback signal, PWM frequency is 75Hz±5%。

Interface circuit of PWM input signal



Electric control instructions

PWM signal control mode

In order to transfer a PWM signal, use the supplied signal cable with a plug. The plug is connected to an appropriate connector of a control unit (see *Fig. 18*).

Procedure:

1. Disconnect the pump from the power supply.
2. Place the plug of a signal cable into a connector.
3. Connect the signal cable to an external controller.

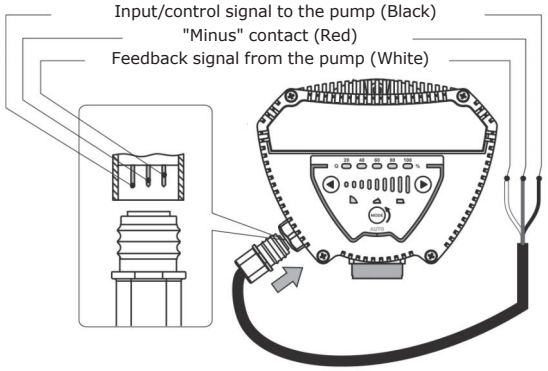


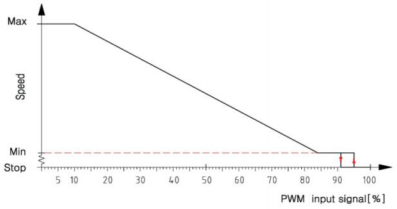
Fig.18 Drawing of PWM signal connection

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 pressure 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

PWM signal input

Under fixed frequency, different duty cycles correspond to different motor given speed signals.Inverse proportional control mode is adopted. The specific control logic is as follows:



PWM input	pump status
0	Stall display: flow indicator is fully illuminated
≤10	The pump operates at maximum speed
＞10～≤84	Pump linearity from highest to lowest
＞84～≤91	The pump operates at the lowest speed
＞91～≤95	If the input signal fluctuates near the speed change point, the hysteresis principle prevents the pump from starting and stopping.
＞95～＜100	Standby, the pump stops running
Accuracy: ±1（Example: When the PWM input signal is 20%, the actual duty cycle is in the range of 19% ～21% ）	

PWM input signal	parameter
Current isolation in pump	Yes
Frequency input	100 – 4000 Hz
Input voltage high level	4.0 – 24 V
Input voltage low level	≤ 0.7V
Input current high level	Max3.5mA@4700Ohms Max10 mA@100Ohms
Input PWM duty cycle	0 – 100 %
Signal polarity	Fixed
Rise time	≤ T/1000

Construction

Mega pump is a wet-rotor canned pump, the whole unit consisting of the pump and the motor without the shaft seal. The rotor is immersed in the liquid transported by the pump and the bearing is lubricated by the liquid.

Motor and frequency converter

Mega pumps are equipped with permanent-magnet motor. This motor type is characterized by an increased efficiency in comparison with traditionally used asynchronous squirrel-cage motors.

Motor speed is set up by a built-in frequency converter.

Pump connections

Threaded pipe and flange connections.

Surface treatment

A pump housing and its head part have cataphoretic coating for better corrosion resistance.

Cataphoretic coating application includes the following steps:

- alkali cleaning;
- zinc phosphate pre-treatment;
- cathodic electrodeposition (cataphoresis);
- varnish-and-paint film drying at 200–250 °C.

Installation

Mega pumps are designed for indoor installation.

The shaft of the pump should be installed horizontally.

The pump can be installed both on horizontal and vertical pipelines.

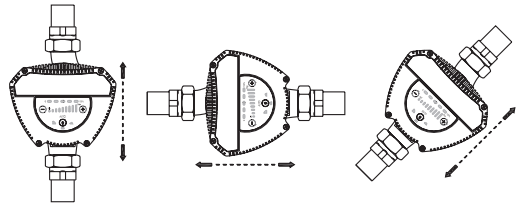


Fig.19 Acceptable position of the pump shaft

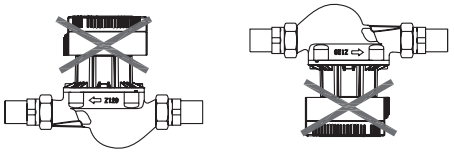


Fig.20 Unacceptable position of the pump shaft

The arrow on the pump housing shows the direction of a liquid flow.

The control unit should be in a horizontal position.

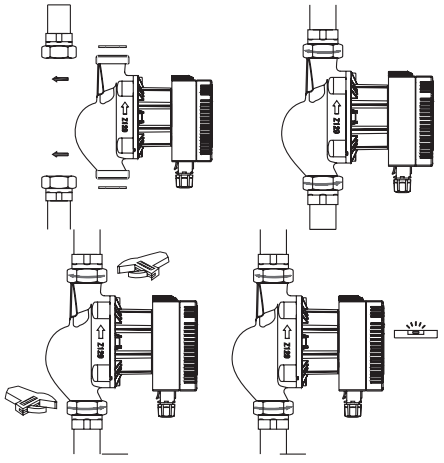


Fig.21 Pump installation

In order to provide sufficient cooling of the motor and electronic equipment, fulfil the following requirement:

- Ambient temperature should not be higher than 40 °C.

Electrical data

Pump type	Mega
Protection	IP 44
Insulation class	H
Supply voltage	AC 220-240V,50/60Hz,PE
Signal input	PWM 0–10 V
Electromagnetic compatibility	EN61000-6-1 and EN61000-6-3

Electrical connection

Power supply connection should be performed in compliance with local regulations and rules.

- The pump should be connected to an external on/off switch.
- The pump should be appropriately earthed.
- External protection of the pump motor is not required.

Note: the pump should not be started and stopped more than four times within an hour when supply voltage is turned on and off.

The pump is connected to power supply according to *Fig.22*.

Cables

All the cables should be connected in accordance with the local regulations.

Additional protection

The earth leakage circuit breaker should be marked with the first or both symbols given below:

Marking	Description
	High-sensitivity ELCB, type A, according to IEC 60775
	High-sensitivity ELCB, type B, according to IEC 60775

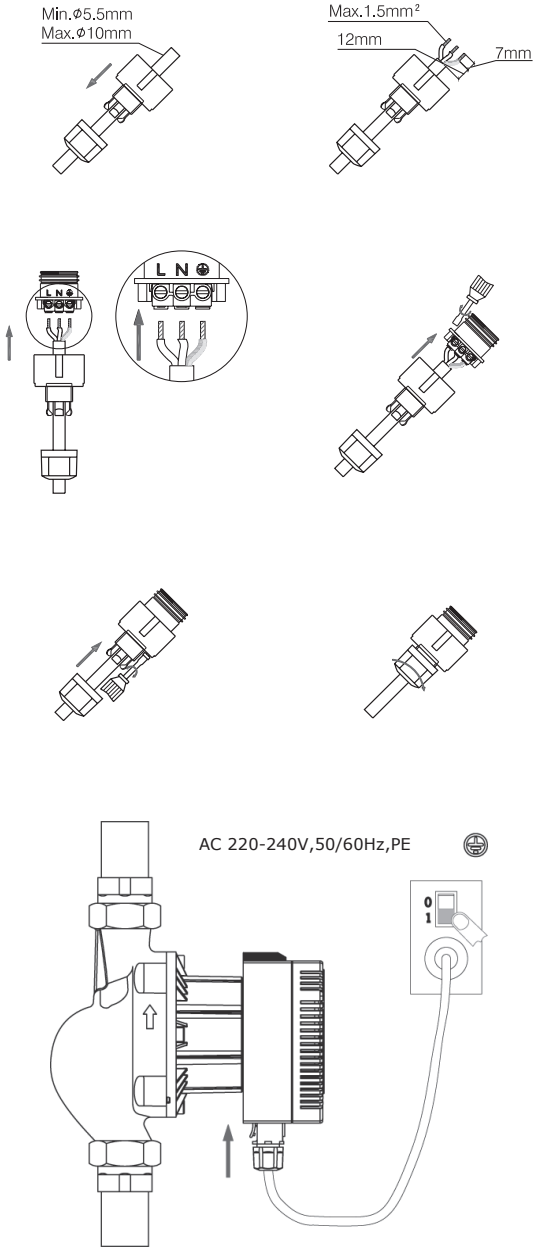
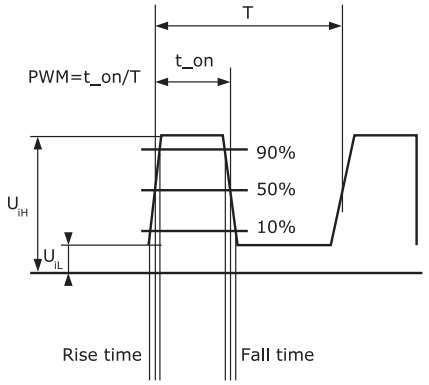
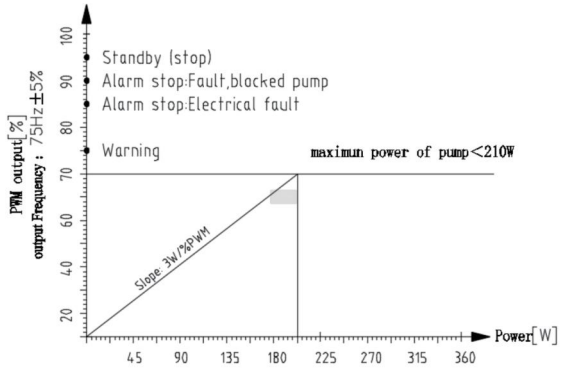


Fig.22 Electrical connection



PWM feedback

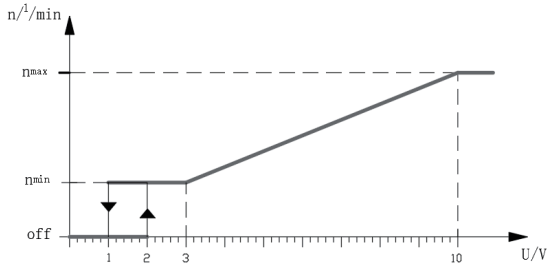
Frequency range: 75±5%Hz.
Corresponding relationship between output signal and circulation pump and operating status.



PWM Output signal (%)	Pump condition	Description
0-70	0-185w (Slope:3w/%PWM)	
75	Alarm stop	Pumps in over-voltage, under-voltage protection state, pumps shut down
85	Alarm stop	The pump is in the protection state of phased eficien-cy,over-current, over-tempera-ture,etc., and the pump stops
90	Alarm stop	The pump stops when the pump is in the lock protection state
95	Standy stop	/

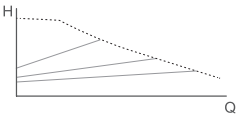
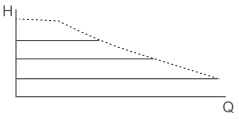
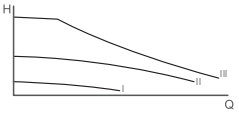
0-10V Control logic

0 to 10V analog control signal Description: When the key is switched to this mode, the gear indicator is fully illuminated, in this mode, input different analog voltages, the pump is in a different operating state.



Input signal	Pump condition
U≤1V	Pump shutdown
1V<U<3V	The pump runs at the lowest speed (when the analog voltage signal changes from large to small, when the voltage value is < 1V, the pump stops; > 1V, the pump runs at the lowest speed. When the voltage signal changes from small to large, when the voltage < 2V, the pump stops; > 2V, run at the lowest speed.)
3V≤U≤10V	Pump at minimum and maximum speed (linear)

Recommendations on the control mode selection

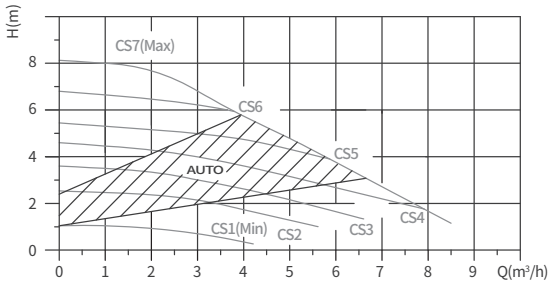
Application in hydraulic systems	Control method:
In systems with relatively large pressure losses in the distribution pipes and in air conditioning and cooling systems. • Two-pipe heating systems with thermostatic valves and: – with very long distribution pipes; – with strongly throttled pipe balancing valves; – with differential-pressure regulators; – with large pressure losses in those parts of the system through which the total quantity of water flows (for example, boiler, heat exchanger and distribution pipe up to the primary circulation). • Primary circulation pumps in systems with large pressure losses in the primary circulation. • Air conditioning systems – with heat exchangers (fan coils); – with cooling ceilings; – with cooling surfaces.	Proportional pressure 
In systems with relatively small pressure losses in the distribution pipes. • Two-pipe heating systems with thermostatic valves: – dimensioned for natural circulation; – with small pressure losses in those parts of the system through which the total quantity of water flows (for example, boiler, heat exchanger and distribution pipe up to the primary circulation); – with high differential temperature between flow pipe and return pipe (for example, central heating). • Underfloor heating systems with thermostatic valves. • One-pipe heating systems with thermostatic valves or pipe balancing valves. • Primary circulation pumps in systems with small pressure losses in the primary circulation.	Constant pressure 
The pump can also be set to operate according to the maximum or minimum curve, i.e. to the mode similar to the operation of a non-adjustable pump: • The maximum curve mode can be used in periods in which a maximum flow is required. • The minimum curve mode can be used in periods in which a minimum flow is required.	Constant speed 

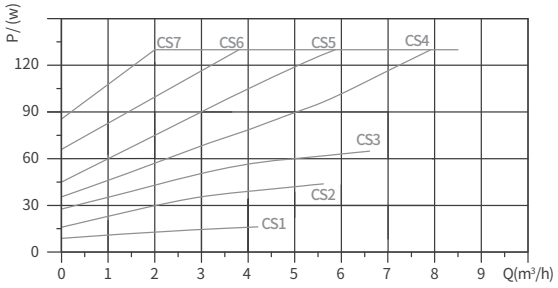
Product range

Pump model	Connection size	Port-to-port length, mm	Rated power min/ max, (W)	Rated current min/ max, (A)	Voltage (V)
Mega 25-8	G 1 1/2"	180	10–130	0.09/0.9	220-240
Mega 25-10		180	10–185	0.09/1.25	
Mega 32-8	G 2”	180	10–130	0.09/0.9	
Mega 32-10		180	10–185	0.09/1.25	
Mega 40-8F	DN40	220	10–130	0.09/0.9	
Mega 40-10F	DN40	220	10–185	0.09/1.25	

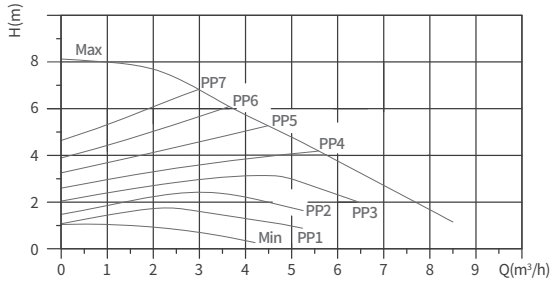
Performance curves and technical data

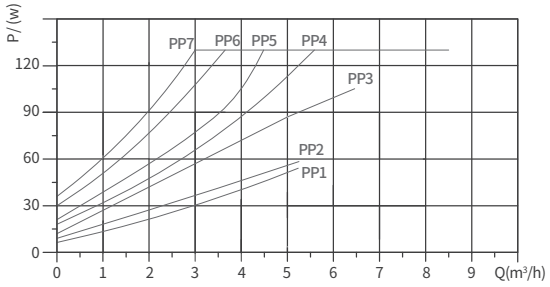
Mega XX-8 Constant-speed curve



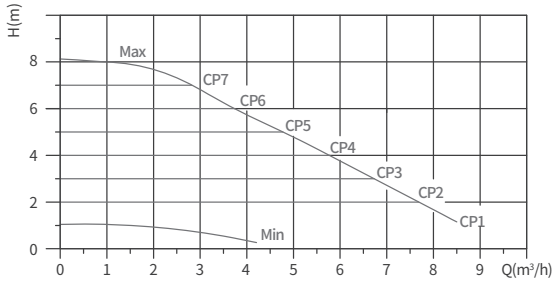


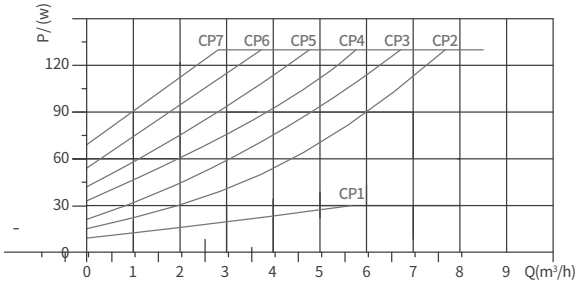
Proportional pressure curve



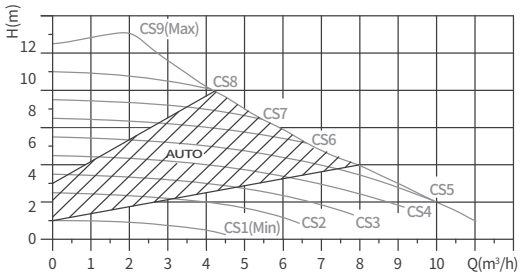


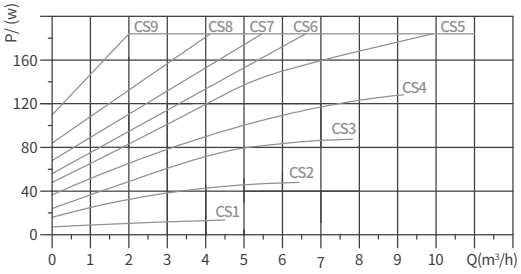
Constant pressure curve



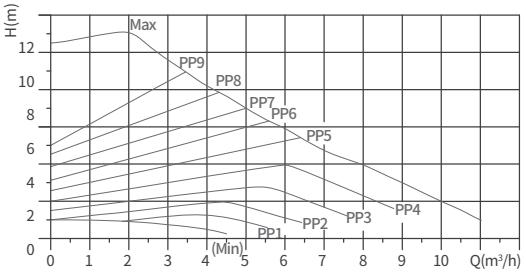


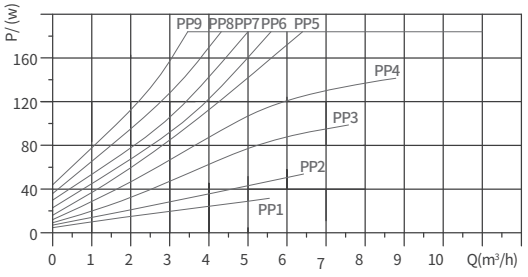
Mega XX-10 Constant-speed curve



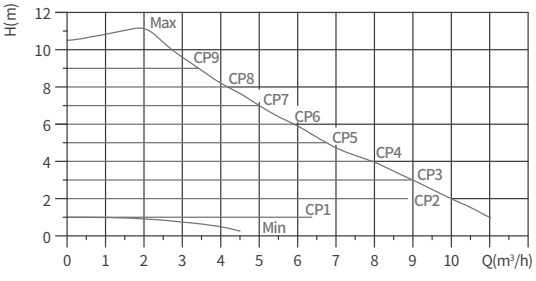


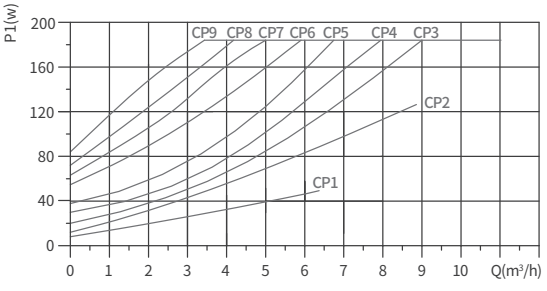
Proportional pressure curve



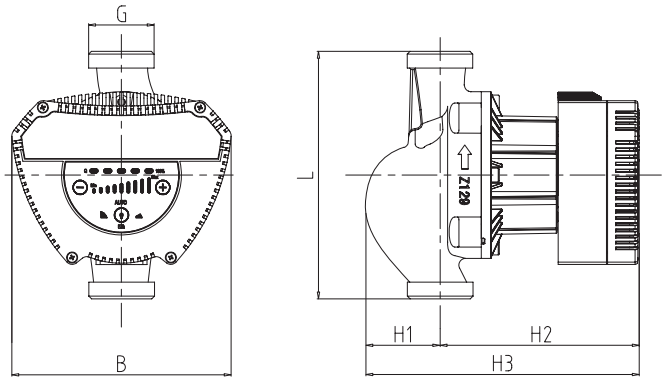


Constant pressure curve

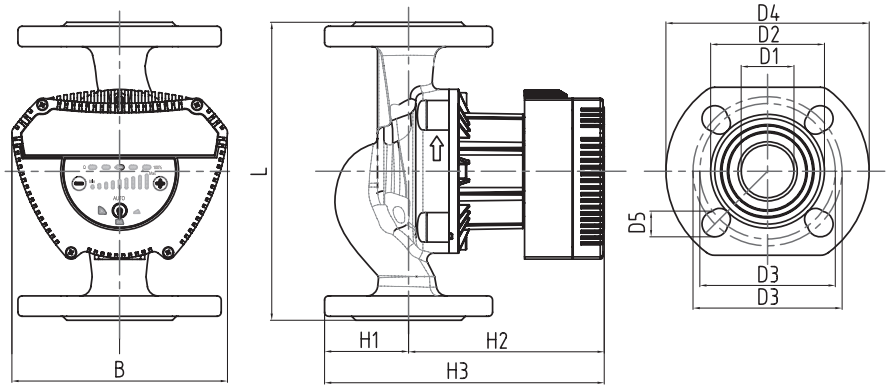




Dimensions



Pump model	Size [mm]					
	L	B	H1	H2	H3	G [inch]
Mega 25-8	180	160	55	144	199	G 1 1/2
Mega 25-10						
Mega 32-8						G 2
Mega 32-10						



Pump model	Pump dimensions [mm]					Flange dimensions [mm]				
	L	B	H1	H2	H3	D1	D2	D3	D4	D5
Mega 40-10F	220	160	62	144	206	40	84	100/110	150	19
Mega 40-10F										

Mega S circulation pump

Fig.23 Mega S

Application

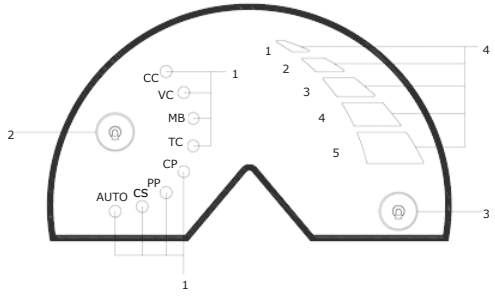
- Heating systems:
  - main pump,
  - secondary circuit lines,
  - heating surfaces.
- Ground source heat systems;
- Solar energy systems.

Mega S circulation pumps are highly effective both in new systems and as a replacement to the ones being in use. The pump is ideal for systems with an automatic pressure adjustment. These pump series allow avoiding the use of expensive bypass valves and similar components.

Type key

Example	Mega S	50	-18	F	280
Product type Mega S					
Nominal diameter of inlet and outlet ports (DN),[mm]					
Maximum head [m]					
Flange configuration (if no marks, then threaded)					
Port-to-port length [mm]					

Operating panel

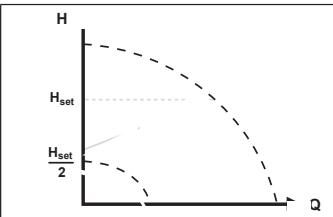
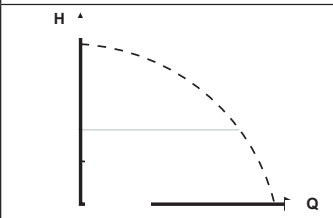
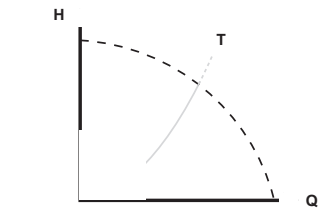
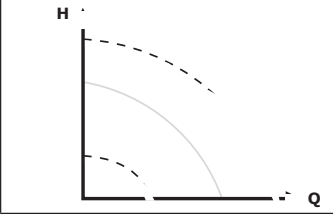


No.	Description
1	Light indicators of operating mode
2	Control mode switch
3	Speed switch
4	Speed & Temperature setting light indicator

Number of mode switch presses	Setting	Description
0 (pre-installed by default)	AUTO Mode	The pump duty point will be shifted up or down along one of the selected automatic curves depending on the required system flow. The head (pressure) drops when the required flow in the system is reduced and rises when it is increased. The pump automatics selects the curve independently; manual adjustment is not required.
1	CS 1-3	The pump works using one of the three constant curves, i.e. with constant rotation speed.
2	PP 1-3	The pump duty point will be shifted up or down along one of the three curves of the control mode of proportional pressure alteration depending on the required system flow. The head (pressure) drops when the required flow in the system is reduced and rises when it is increased.
3	CP 1-3	A duty point of the pump will be shifted farther or closer along one of the 3 constant-pressure control mode curves depending on the required system flow. The head (pressure) remains constant regardless of the required flow in the system.
4	TC1-10	When the pump switches to TC mode, the default setting is TC3. Press button 3 once to switch to TC4; press it twice to switch to TC5; press it 3 times to switch to TC6; press it 4 times to switch to TC7; press it 5 times to switch to TC8; press it 6 times to switch to TC9; press it 7 times to switch to TC10; press it 8 times to switch to TC1; press it 9 times to switch to TC2; press it 10 times to switch to TC3. This cycle repeats.
5	MB	Data transfer module via Modbus.
6	VC	The pump adjusts its rotation speed according to the range of an analog input signal level 0-10V.
7	CC	The pump adjusts its rotation speed according to the range of an analog input signal level 4-20 mA.

Electric control instructions

Brief description of control modes

Proportional pressure • Used in the systems with relatively significant pressure losses in distribution pipes. • The head of the pump will increase proportionally to the flow in the system in order to compensate high pressure losses in distribution pipes.	
Constant pressure • It is advisable to use this control mode in systems with relatively low pressure losses. • The pump maintains constant head that does not depend on the flow in the system.	
Constant temperature In systems with a fixed curve, you should adjust the pump according to a constant temperature in the return pipe.	
Constant speed • The pump can be switched to operating mode when rotation speed is fixed, i.e. the mode similar to the operation of a non-adjustable pump. • Required rotational frequency can be adjusted in % of maximum rotation speed in the range from minimum to 100 %.	

Operating modes

Normal

The pump works in accordance with a selected control mode.

Note: a control mode and set value can be selected even if the pump does not work in a Normal mode.

Stop

The pump stops.

Minimum curve

The minimum-curve operating mode should be selected when you need minimum flow.
A minimum curve can be corrected by determining the pump operation range.

Maximum curve

The operating mode according to a maximum curve should be selected when the maximum flow is required.

Operating modes can be set directly with integrated digital codes. A maximum curve can be corrected by determining the pump operation range.

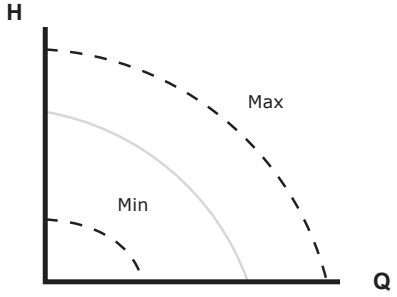


Fig.24 Maximum and minimum curves

Control modes

Default settings

The pumps are supplied with factory settings in an AUTO mode that suits most systems.

The value is set by the manufacturer.

AUTO

We recommend an AUTO control mode for most heating systems, in particular, the ones with relatively significant pressure losses in distribution pipes as well as in case of replacement where the duty point is unknown for the proportional pressure mode.

This control mode is designed specially for heating systems. Application in air conditioning and cooling systems is not recommended.

Features and main advantages

- The pump makes automatic adjustment according to an actual system characteristic.
- Provides minimum energy consumption and low noise.
- Decreases operation expenses and increases comfort.

Proportional pressure

Proportional pressure adjustment suits the systems with relatively large pressure losses in distribution pipes and air conditioning and cooling systems:

- Two-pipe heating systems with thermostatic valves and:

– with very long distribution pipes;
– with strongly throttled pipe balancing valves;
– with differential-pressure regulators;
– with large pressure losses in those parts of the system through which the total quantity of water flows (for example, boiler, heat exchanger and distribution pipe up to the first branching).

- Primary circulation pumps in systems with large pressure losses in the primary circulation.
- Air conditioning systems:
  – with heat exchangers (fan coils);
  – with cooling ceilings;
  – with cooling surfaces.

Features and main advantages

- The pump head increases proportionally to the system flow.
- It compensates significant pressure losses in distribution pipes.

Specifications

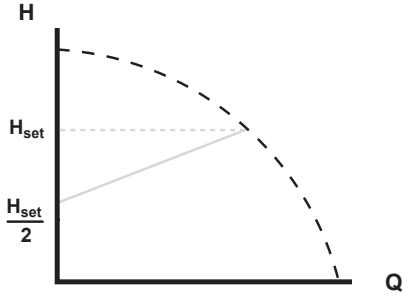


Fig.25 Proportional pressure adjustment

When the valve is closed, the head is equal to a half of a set value H_{set}.

Constant pressure

Constant pressure adjustment suits the systems with relatively small pressure losses in distribution pipes:

- Two-pipe heating systems with thermostatic valves:
  – in natural circulation systems;

– with small pressure losses in those parts of the system through which the total quantity of water flows (for example, boiler, heat exchanger and distribution pipe up to the first branching);
– redesigned to a more significant temperature difference between flow pipe and return pipe (for example, for central heating).

- Underfloor heating systems with thermostatic valves.
- One-pipe heating systems with thermostatic or balancing valves.
- Primary circulation pumps in systems with small pressure losses in the primary circulation.

Features and main advantages

- The pump maintains constant flow that does not depend on flow in the system.

Specifications

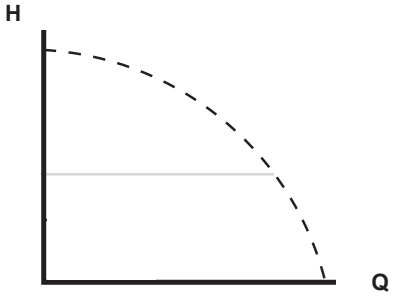


Fig.26 Adjustment based on constant pressure

Constant temperature

This control mode is suitable for the systems with a fixed curve in which it is recommended to adjust the pump in accordance with a constant temperature in the return pipe.

The pump has a factory setting to work in a heating system with a controller gain coefficient Kp=1. If the pump is installed in a cooling system, the gain coefficient is necessary to be changed for a negative value, for example, -1. It can be completed with an operating panel.

Features and main advantages

- Constant temperature is maintained.

Specifications

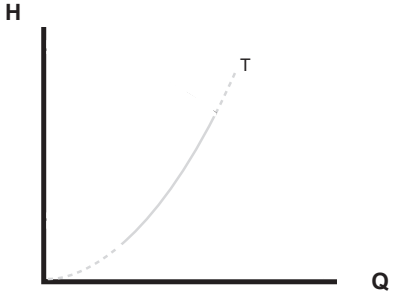


Fig.27 Constant temperature adjustment

The mode of reverse control for cooling systems is available in the pumps starting from model B.

Temperature sensor

If the pump is installed in the flow pipe, it is required to install an external temperature sensor in the return pipe of the system.

See *Fig.28.* The sensor should be installed as close as possible to the consumer device (radiator, heat exchanger, etc.).

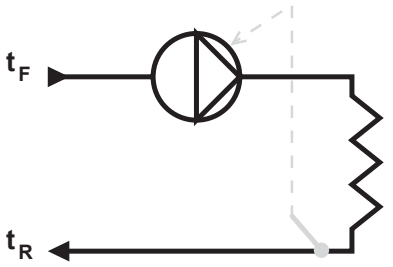


Fig.28 Pump with an external sensor

If the pump is installed in the return pipe of the system, you can use a built-in temperature sensor. In this case, the pump should be installed as close as possible to the consumer device (radiator, heat exchanger, etc.).

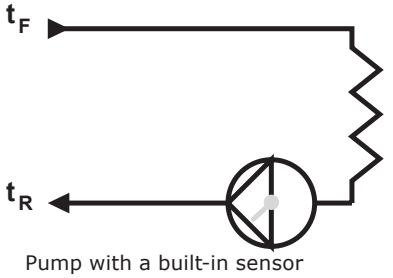


Fig.29 Pump with a built-in sensor

Temperature sensor

Built-in and external sensors are required to measure temperature difference in the flow and return pipes. If the pump is installed in the flow pipe, it is required to install an external temperature sensor in the return pipe.
The sensor should be installed as close as possible to the consumer device (radiator, heat exchanger, etc.).

Constant curve

Constant curve adjustment is applicable to the surface where constant flow and constant head are required, i.e.:

- heating surfaces;
- cooling surfaces;
- heating systems with 3-way valves;
- air conditioning systems with 3-way valves;
- pumps of the air conditioning system.

Features and main advantages

- If an external controller is used, the pump can be switched from one constant curve to another depending on an external signal value.
- The pump can be adjusted according to a maximum or minimum curve depending on your requirements.

Specifications

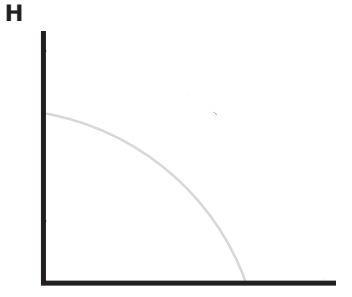


Fig.31 Operation mode according to a constant curve

The pump can be switched to operation mode when rotation speed is fixed, i.e. the mode similar to the operation of a non-adjustable pump. See *Fig. 31*

You can set a required rotation speed in % of the maximum frequency dependent on the pump model. The control range depends on the minimum rotation speed, power limitation and pump pressure.

Note: if rotation speed of the pump is set in the range between the minimum and maximum values, then the pump works according to its maximum curve; power and pressure are limited. It means that maximum performance can be reached at rotation speed less than 100 %.

The pump can also be switched to the operating mode according to a maximum or minimum curve, i.e. to the mode similar to the operation of a non-adjustable pump:

- The operating mode according to a maximum curve should be selected when the maximum flow is required.
- The minimum-curve operating mode should be selected when you need minimum flow. For example, this operating mode can be used for manual switch to a night mode.

These modes can be selected via digital inputs.

4-20mA analog signal control

When the pump is in 4-20mA control mode, the pump adjusts the pump's operation according to the current range of the input analog signal.

Modbus communication control

When the electric pump is in Modbus control mode, the electric pump adjusts the running status of the pump according to the data collected by the communication.

10-Gear temperature control

When the pump is in temperature control mode, the pump can change its operating status at any time according to different temperature settings.

Operating conditions

General recommendations

Water in heating systems	Water quality according to local standards
Water with glycol	Maximum viscosity = 10–50 cSt ~ solution of water 50 % / glycol 50 % at -10 °C

Liquid temperature

Continuous pumping: from -10 to +110 °C.

Installation area

The pump is designed for indoor installation. The pump should be installed in dry conditions without the threat of soaking from nearby equipment, for example.

As the pump includes the stainless steel elements, installation is not recommended in the areas as follows:

- Indoor pools as the pump will be exposed to the pool environment.
- Areas with direct and long-term exposure to sea environment.
- Rooms where there are hydrochloric acid (HCl) fumes in the air, for example, as a result of leakage from tanks or frequent container opening and ventilation.

Cooling systems

In cooling system there can be condensation on the surface of the pump. In some cases tray installation is required.

Environmental conditions

Environmental conditions	
Ambient temperature when operated	from 0 to +40 °C
Ambient temperature when stored or transported	from -20 °C to +70 °C
Relative humidity	Max. 95 %

If ambient temperature is below 0 °C, the following conditions should be fulfilled:

- Liquid temperature: +5 °C.
- The pumped liquid contains glycol.
- The pump works and does not stop.

Minimum operating pressure

1.0MPa (10bar)

Test pressure

The pumps can withstand test pressure in accordance with EN 60335-2-51.

1.2MPa (12bar)

In a normal operating mode, it is prohibited to use the pump at the pressure that exceeds the values written on a pump nameplate.

The test was conducted with the use of warm water at 20 °C with anti-rust additives.

Minimum inlet pressure

In order to avoid cavitation noise and bearings damage during pump operation, the following minimum relative pressure should be maintained at its inlet port.

Mega S	Liquid temperature		
	75 °C	95 °C	110 °C
	Inlet pressure		
Mega S 40-12F-250	0.09MPa(0.9bar)	0.14MPa(1.4bar)	0.20MPa(2bar)
Mega S 40-15F-250	0.09MPa(0.9bar)	0.14MPa(1.4bar)	0.20MPa(2bar)
Mega S 40-20F-250	0.09MPa(0.9bar)	0.14MPa(1.4bar)	0.20MPa(2bar)
Mega S 50-10F-280	0.07MPa(0.7bar)	0.12MPa(1.2bar)	0.17MPa(1.7bar)
Mega S 50-12F-280	0.07MPa(0.7bar)	0.12MPa(1.2bar)	0.17MPa(1.7bar)
Mega S 50-15F-280	0.07MPa(0.7bar)	0.12MPa(1.2bar)	0.17MPa(1.7bar)
Mega S 50-18F-280	0.07MPa(0.7bar)	0.12MPa(1.2bar)	0.17MPa(1.7bar)
Mega S 65-8F-340	0.07MPa(0.7bar)	0.12MPa(1.2bar)	0.17MPa(1.7bar)
Mega S 65-10F-340	0.07MPa(0.7bar)	0.12MPa(1.2bar)	0.17MPa(1.7bar)
Mega S 65-12F-340	0.07MPa(0.7bar)	0.12MPa(1.2bar)	0.17MPa(1.7bar)
Mega S 80-6F-340	0.08MPa(0.8bar)	0.13MPa(1.3bar)	0.19MPa(1.9bar)
Mega S 80-8F-360	0.08MPa(0.8bar)	0.13MPa(1.3bar)	0.19MPa(1.9bar)

Note: the sum of actual inlet pressure and pump pressure when the valve is closed should always be lower than the maximum allowable operating pressure in the system.

Relative minimum inlet pressure is given for the pumps installed at 300 m above the sea level. For the pumps installed higher than 300 m above the sea level, the required relative inlet pressure should be increased by 0.1 bar or 0.01 MPa per each 100 m of height. Mega s pumps are allowed to be used only at a height up to 1000 m above the sea level.

Closed valve gate operation

Mega S pumps can work for several days with any rotation speed when the valve gate is closed without damaging the pump. However, it is recommended to work with the least possible frequency to reduce energy losses. There are no minimum flow requirements.

Note: it is prohibited to close valve gates simultaneously at the inlet and outlet of the pump; during operation one of them should be open to avoid pressure increase.

The temperature of a heat transfer medium and ambient temperature should not exceed the limits

Pumped liquids

The pump is designed for pure, non-viscous and non-explosive liquids without solids or fibers that can have a mechanical or chemical impact on the pump.

Water used in heating systems should meet the quality requirements of system water for heating.

Mega S pumps can be used to pump glycol and water solutions at the level of up to 50 %.

Ethylene glycol WS example: maximum viscosity = 10–50 cSt ~ solution of water 50 % / glycol 50 % at -10 °C.

Pumping glycol mixtures decreases the maximum curve and performance of the pump that depends on the concentration of water/glycol in the mixture and liquid temperature.

In order to avoid the change in the parameters of glycol solution, you should monitor liquid temperatures that exceed the operation ones and reduce operation time at high temperatures.

Before adding glycol solution in the system, cleaning and purging is required.

In order to avoid corrosion or lime deposits, you should regularly monitor the state of glycol solution. If additional dilution of glycol is required, it is necessary to follow the instructions in the manual sent by the supplier of glycol.

Construction

Electric data

Pump type	Mega S
Enclosure class	IPX4D (EN 60529).
Insulation class	H.
Supply voltage	AC 220V-240V, 50/60Hz , PE
Signal input	0–10 V.
	4–20 mA.
	Modbus RTU
Leakage current	I (leakage) < 3.5 mA. Leakage current is measured in accordance with EN 60335-1.
EMC	Standards applied: EN61000-3-2, EN61000-6-3, EN61800-3-3, EN55014-1 and EN55014-2
Cos φ	The pumps connected via terminals are equipped with an integrated active PFC module (power coefficient control) providing the values of cos φ from 0.98 to 0.99 , i.e. very close to 1. In configurations with a plug connection there is no PFC, therefore the power coefficient equals from 0.50 to 0.99.

Sound pressure

Sound pressure depends on the power consumed. Maximum sound pressure — 50/42 dB(A).

Installation

Mechanical installation

Mega S pumps are designed for indoor installation. Install the pump so that the motor shaft is in a horizontal position.

The pump can be installed both on horizontal and vertical pipelines.

Fig.32 Installation options

The arrow on the pump housing shows the direction of liquid flow.

The control unit should be in a horizontal position.

The pump should be installed so that not to be exposed to the weight of the pipeline.

The pump can be installed when suspended directly on the pipeline on condition that the pipeline has an appropriate load bearing capacity.

In order to provide sufficient cooling of the motor and electronic equipment, fulfil the following requirements:

- The pump should be installed so that it can be cooled sufficiently.
- Ambient temperature should not be higher than +40 °C.

Electrical connection

Electric equipment should be connected and protection should be installed according to local regulations and rules. People who have pacemakers should take precautions during installation and maintenance of motors with magnetic components.

- The pump should be connected to an external on/off switch.
- The pump should be appropriately earthed.
- External protection of the pump motor is not required.
- The pump is equipped with thermal protection from slowly growing overloads and blocking.
- When turned on from power supply, the pump starts approx. in 5 seconds.

Note: the pump should not be started and stopped more than 4 times within an hour when supply voltage is turned on and off.

The pump is equipped with a digital input that can be used for external control of start and stop of the pump; turning power on and off is not necessary.

The pump should be connected to power supply in accordance with wirings given in the operation manual.

Cables

In order to connect an external switch, digital input, signal transfer from sensors and set values signal transfer, you should use screened cables.

- All the cables should be resistant to temperatures up to +70 °C.
- All the cables should be connected according to EN 60204-1 and EN 50174-2.

Additional protection

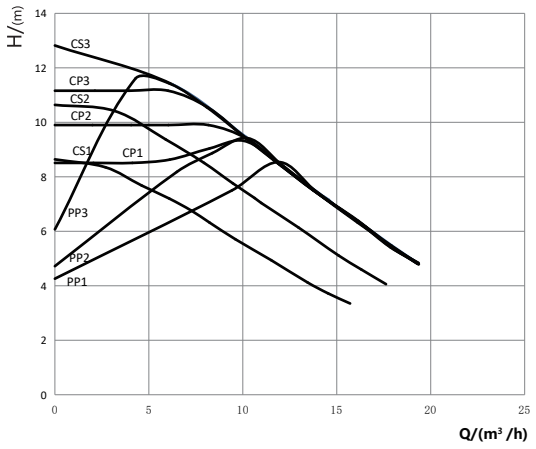
While installing the pump, follow local regulation and rules on residual current devices.

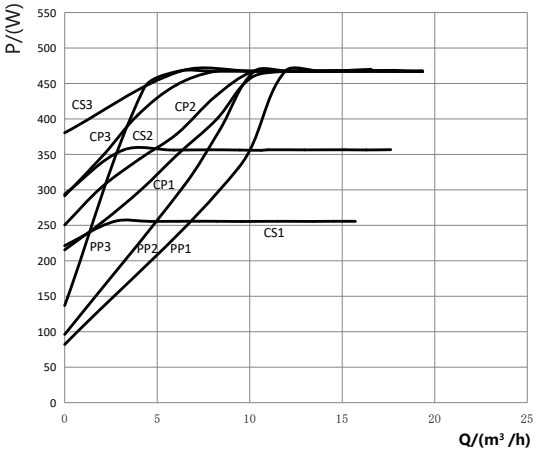
Product range

Pump model	Connection size	Port-to-port length, mm	Rated power min/ max, (W)	Rated current min/ max, (A)	Voltage (V)
Mega S 40-12F-250	DN 40	250	35-460	0.28/2.1	220-240
Mega S 40-15F-250	DN 40	250	35-680	0.28/3.1	
Mega S 40-20F-250	DN 40	250	35-750	0.28/3.4	
Mega S 50-10F-280	DN 50	280	35-480	0.28/2.2	
Mega S 50-12F-280	DN 50	280	35-600	0.28/2.6	
Mega S 50-15F-280	DN 50	280	35-680	0.28/3.0	
Mega S 50-18F-280	DN 50	280	35–750	0.28/3.4	
Mega S 65-8F-340	DN 65	340	35-570	0.28/2.6	
Mega S 65-10F-340	DN 65	340	35-700	0.28/3.1	
Mega S 65-12F-340	DN 65	340	35–750	0.28/3.4	
Mega S 80-6F-360	DN 80	360	35–580	0.28/2.7	
Mega S 80-8F-360	DN 80	360	35–750	0.28/3.4	

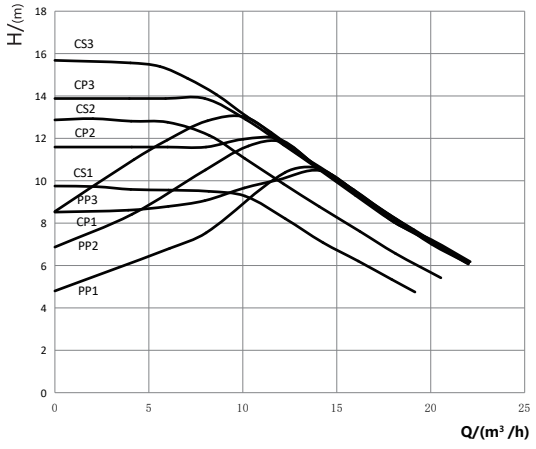
Performance curves and technical data

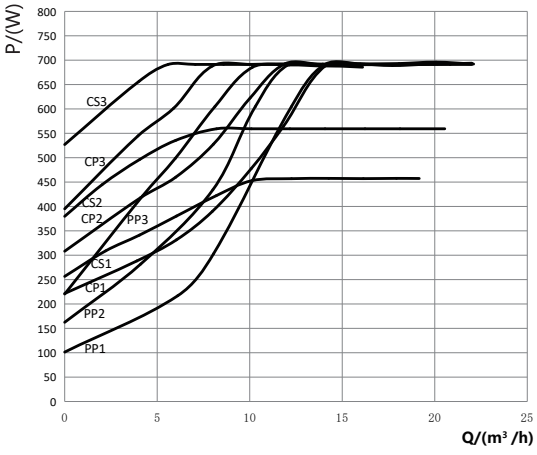
Mega S 40-12F-250



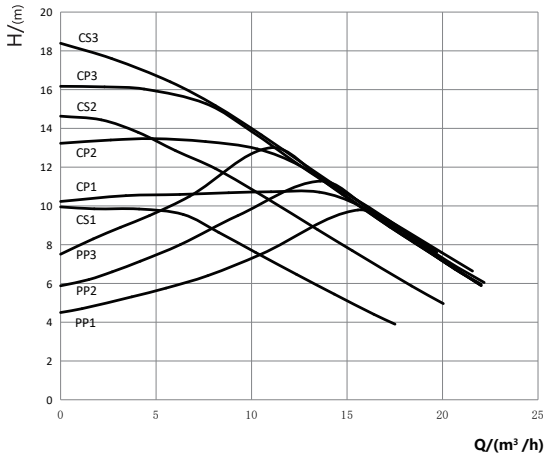


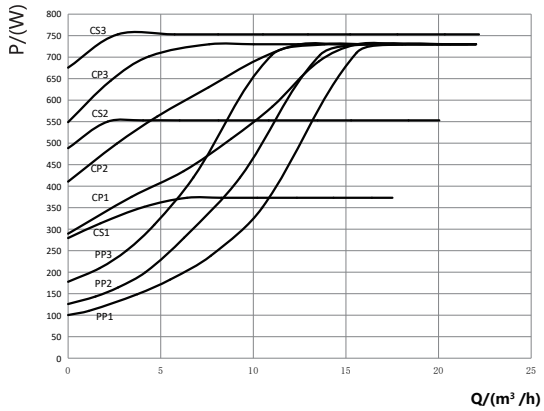
Mega S 40-15F-250



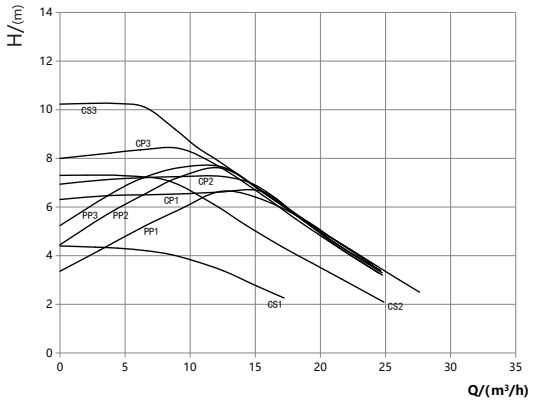


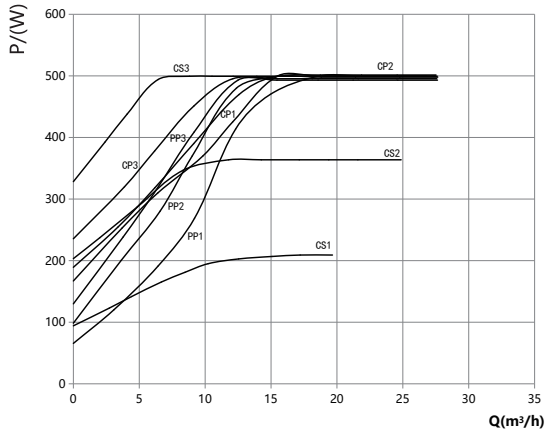
Mega S 40-20F-250



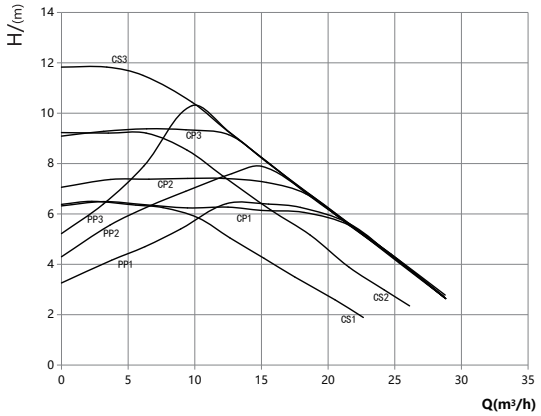


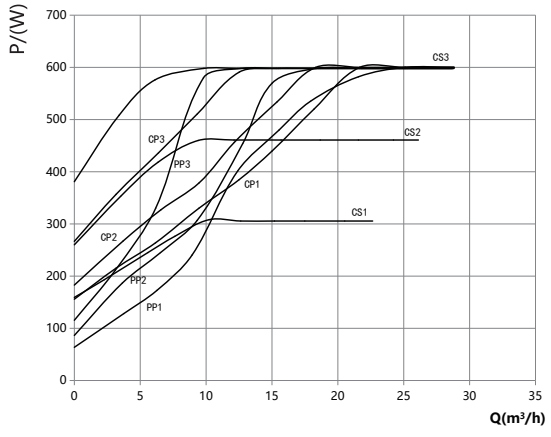
Mega S 50-10F-280



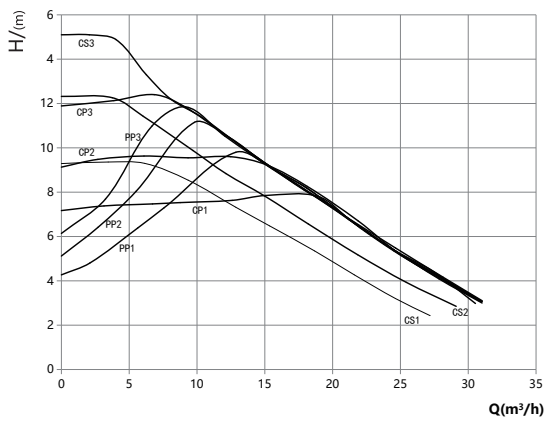


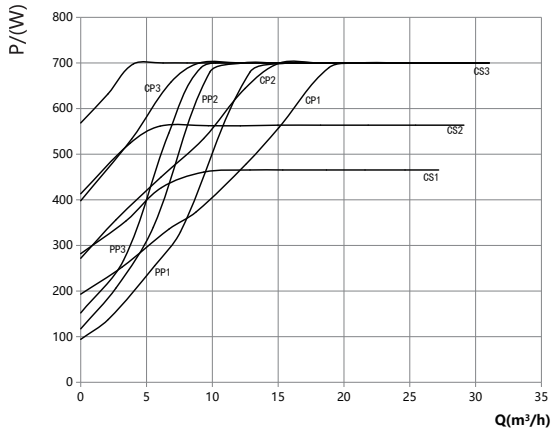
Mega S 50-12F-280



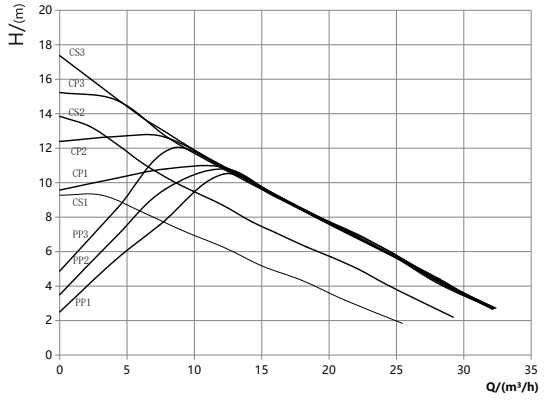


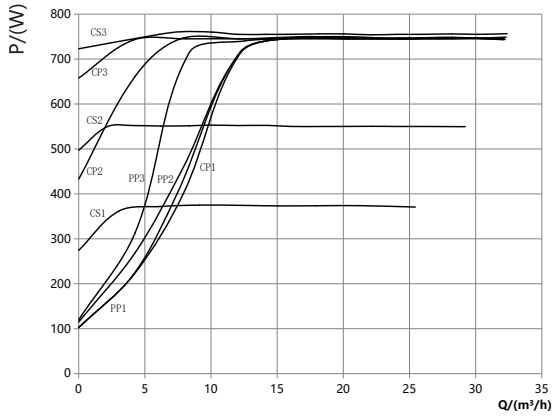
Mega S 50-15F-280



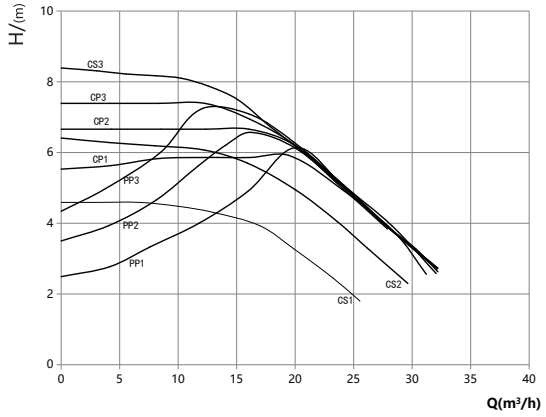


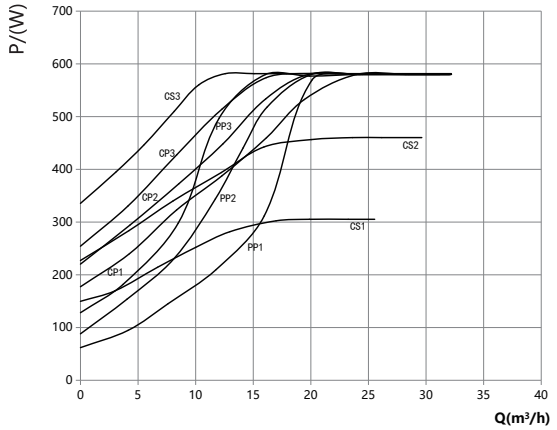
Mega S 50-18F-280



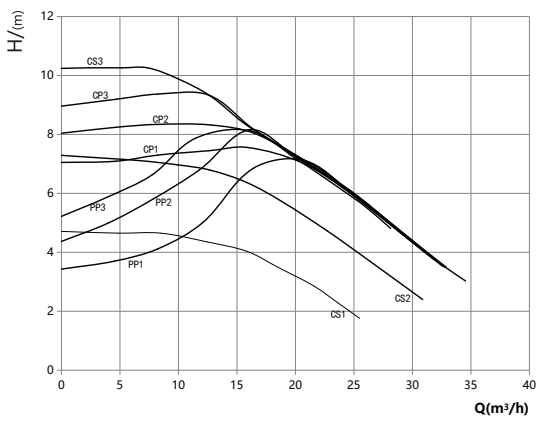


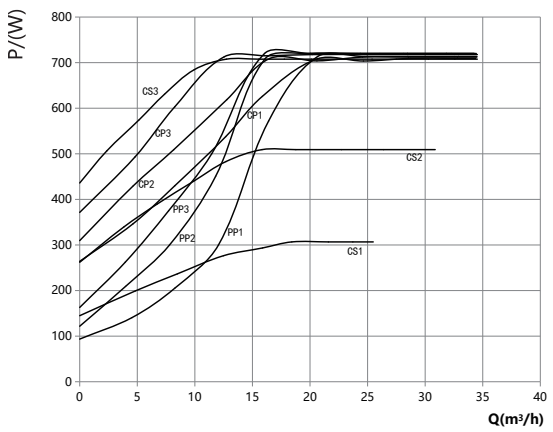
Mega S 65-8F-340



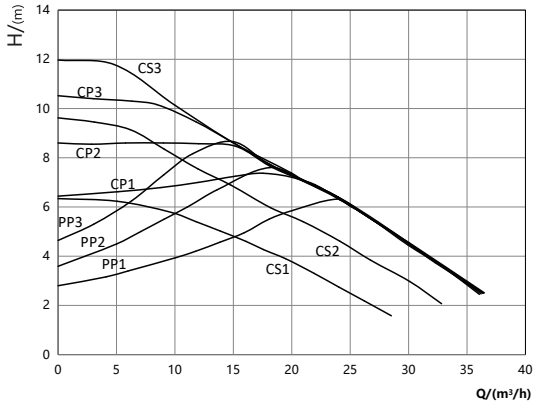


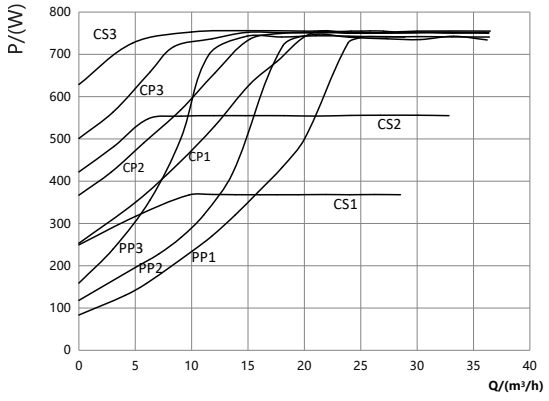
Mega S 65-10F-340



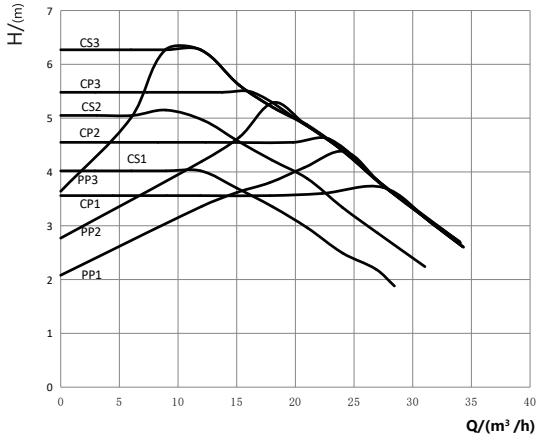


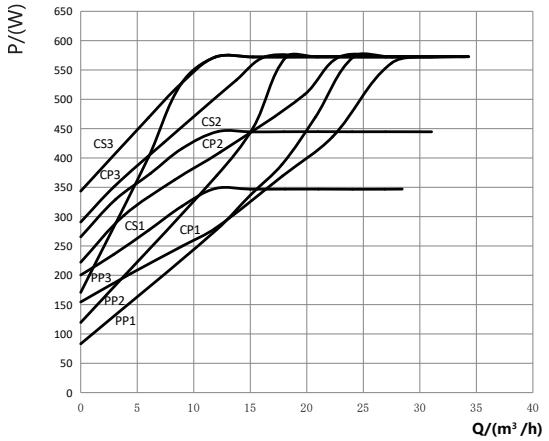
Mega S 65-12F-340



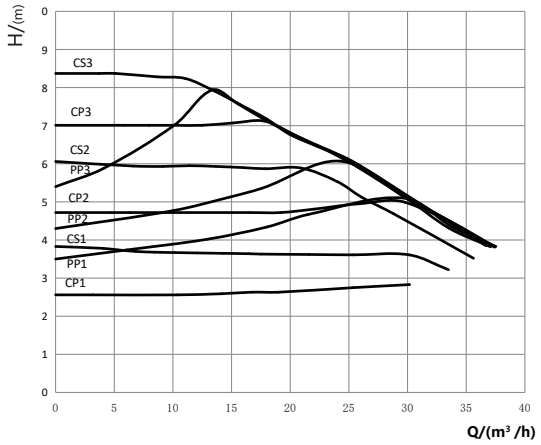


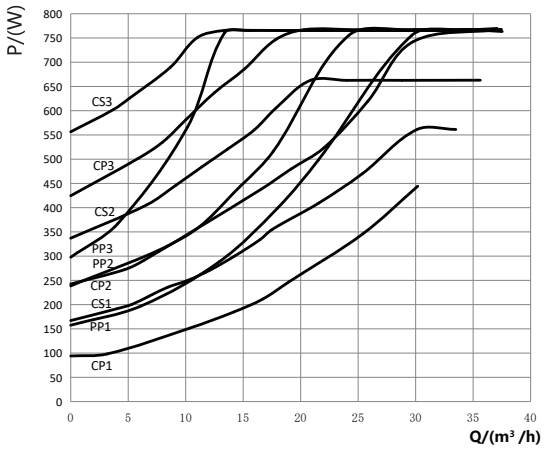
Mega S 80-6F-360



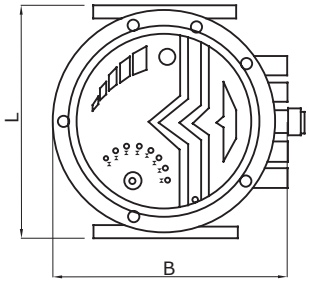


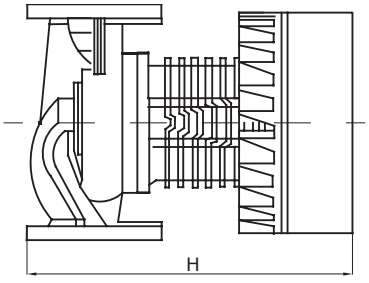
Mega S 80-8F-360

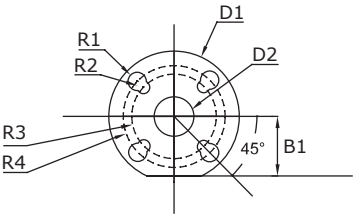




Dimensions







Pump models	Pump dimensions [mm]			Flange dimensions [mm]						
	L	B	H	B1	D1	D2	R1	R2	R3	R4
Mega S 40-12F-250	250	266	377	65	150	40	9.5	7	50	55
Mega S 40-15F-250	250	266	377	65	150	40	9.5	7	50	55
Mega S 40-20F-250	250	266	377	65	150	40	9.5	7	50	55
Mega S 50-10F-280	280	266	380	73.1	165	50	9.5	7	55	62.5
Mega S 50-12F-280	280	266	380	73.1	165	50	9.5	7	55	62.5
Mega S 50-15F-280	280	266	380	73.1	165	50	9.5	7	55	62.5
Mega S 50-18F-280	280	266	380	73.1	165	50	9.5	7	55	62.5
Mega S 65-8F-340	340	266	380	73.5	185	65	9.5	7	65	72.5
Mega S 65-10F-340	340	266	380	73.5	185	65	9.5	7	65	72.5
Mega S 65-12F-340	340	266	380	73.5	185	65	9.5	7	65	72.5
Mega S 80-6F-360	360	266	390	92	200	80	9.5	9.5	75	80
Mega S 80-8F-360	360	266	390	92	200	80	9.5	9.5	75	80

Mega S Pro circulation pump

Fig.33 Mega S Pro

Type key

Example	Mega S	32 - 12	F	Pro

Product type
Mega S

Nominal diameter of inletand outlet ports (DN),[mm]

Maximum head [m]

Flange configuration (if no marks, then threaded)

Upgraded ver

Model example: Mega S 32-12F Pro refers to the high flow high efficiency circulation canned pump,the diameter of inlet/outlet ports is DN32, the maximum head is 12 meters, pump housing is cast iron, connection is flange.

Application

Heating systems, domestic hot water circulation systems, air-conditioner and cooling systems, ground source heat systems and solar energy systems.

Operating conditions

Medium Requirement

Medium used: Clean water or water + ethylene glycol (≤50%) mixture	Medium water temperature: -10℃ to 110℃
Medium pH value: 6.5–8.5	Medium hardness: 25°dH
Solid impurity content in medium: Solid impurities ≤0.1 mm in diameter and length, with a volume ratio ≤0.1%	

Environment Requirement

Using method: keep the axle level	Altitude: ＜1000m
Operating Ambient Temperature: 0℃ to 40℃ (No freezing in pipelines or pump)	Operating Ambient Humidity ≤ 95%

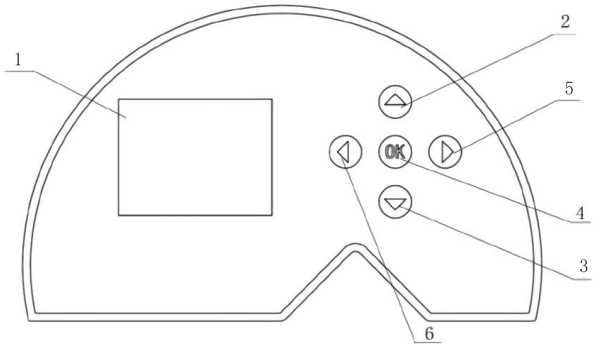
Storage environment requirement

Storage ambient temperature: -30℃ to 70℃ (No freezing in pipelines or pumps)	Storage ambient humidity ≤95%

Comparison table of water temperature and inlet pressure

Liquid temperature	<50℃	95℃	110℃
Inlet pressure	0.1bar	0.5bar	0.85bar
	1m head	5m head	8.5m head

Operating panel



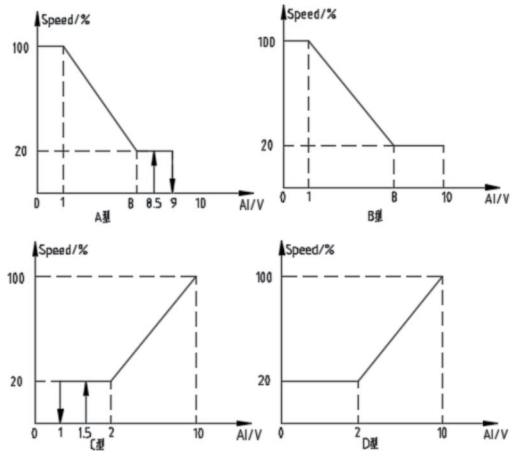
Area number	Function name	Instructions
1	Display Screen	Display corresponding content based on user operations and pump operating status
2	Up & Add Function Key	Implement display of cursor up movement or selected parameter increase
3	Down & Subtract Function Key	Implement display of cursor down movement or selected parameter decrease
4	OK Key	Select, available for selecting cursor, conforming modes and other operations
5	Right Arrow	Implement display of cursor right movement
6	Left Arrow	Implement display of cursor left movement

Electric control instructions

Control modes of products

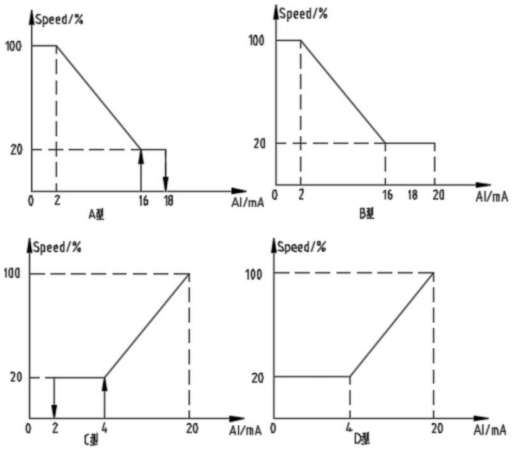
Operation Instruction
1.AUTO Mode: When in AUTO mode, the pump will automatically make necessary adjustments based on the actual system features.
2.AUTO FLOWLIMIT Mode : When the pump is in AUTO FLOWLIMIT mode, flow limiting is automatically activated.
3.Constant Speed Mode: When in constant speed mode, the pump is operated based on the constant speed set by the LCD panel.
4.Proportion Mode: When the pump is in proportion mode, the head increases linearly with changes in flow rate. The maximum head point of proportion curve is set by LCD panel.
5.Constant Pressure Mode: When the pump is in proportion mode, the head remains constant despite changes in flow rate. The head can by set by the LCD panel.
6.Constant Temperature Mode: When the pump is in temperature control mode, it regulates the targeted speed via PI to make the medium temperature achieve the set value. The source and set value of temperature(internal pump resistor or remote temperature resistor) is set by the LCD panel.
7.Constant Temperature Difference Mode: When the pump is in temperature difference control mode, it regulates the targeted speed via PI to make the medium temperature achieve the set value. The temperature difference value is set by the LCD panel. The temperature difference is the detected value of the internal pump resistor and the detected value of system remote temperature resistor(analog volume is connected to the pump).
8.Constant Flow Control: When the pump is in constant flow mode, it changes its targeted rotational speed based on the flow change. The flow value is set by the LCD panel.
9.0-10V Analog Signal Control: When in 0-10V analog signal control mode, the pump adjusts the operating status of pumps based on the voltage range of input analog signal. There are four optional kinds of curves.
10.4-20mA Control: When in 4-20mA control mode, the pump adjusts the operating status of pumps based on the voltage range of input analog signal. There are four optional kinds of curves.
11.485 Mode: When the motor is in the 485 control mode, the speed and operation commands are decided by Modbus communication data. The Modbus RTU is currently supported.
12.CAN Communication: When the pump is in CAN control mode, the speed and operation commands are decided by CAN communication date.
13.LIN Communication: When the pump is in LIN control mode, the speed and operation commands are decided by LIN communication date.
14.PWM Mode: When the pump is in PWM operation mode, it operates at a rotational speed corresponding to the duty cycle of the PWM signal.

0-10V Control Curves



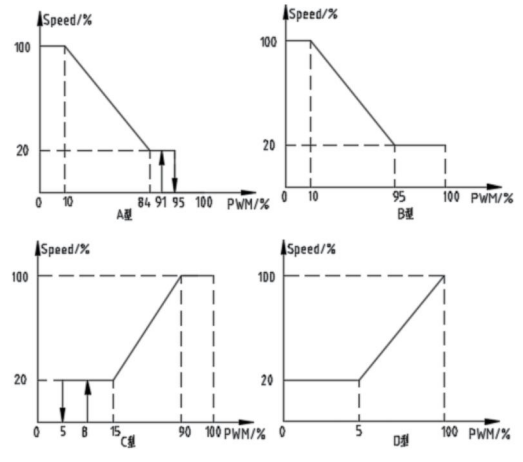
The default is type C

4-20mA Control Curves

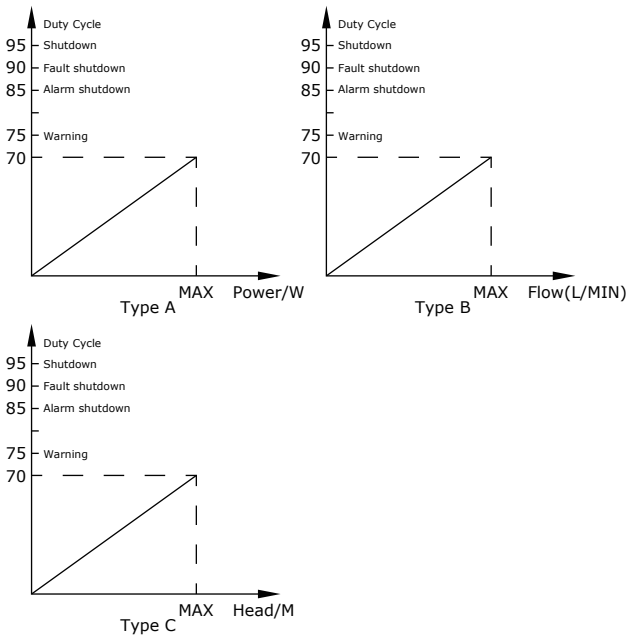


The default is type C

PWM Control Curves



PWM Output Function
There are three optional functions of PWM output. See below (The default is type A):



Relay Function
Relay is to output signals and feedback the current status of the pump:

No.	Model	Function	Instruction	Default State
1	Relay 1	Fault status indication	Relay operates when the pump is in fault state	
2		Pump ready operation status indication	Relay operates when the pump is fault-free and in shutdown status	
3		Pump operation status indication	Relay operates when the pump is in operation	Default
4	Relay 2	Fault status indication	Relay operates when the pump is in fault state	Default
5		Pump ready operation status indication	Relay operates when the pump is fault-free and in shutdown status	
6		Pump operation status indication	Relay operates when the pump is in operation	

Factory default wiring : relay 1

Power output
CN14 terminal outputs 24V ±0.3V with a maximum load capacity of 100mA, which is used to power external sensors.

Analog Signal function

No.	Model	Function	Instruction	Default State
1	0-10V	0-10V signal	Connect the 0-10V control signal to the 0-10V terminal	-
2	4-20mA	4-20mA signal	Connect the 4-20mA control signal to the 4-20mA terminal	-
3	NTC2	Tempera-ture signal	The remote medium temperature of the system on the NTC2 terminal	-

Digital IO function

No.	Model	Function	Instruction	Default State
1	K3	Operation	When terminal is not connected, the pump is in operational state	Default
2		Shutdown	When terminal grounding, the pump is in shutdown state	
3	K2	Max. speed	When terminal grounding, the pump is in operation at the maximum speed	
4		Invalid	When terminal is not connected the pump operates based on control logic	Default
5	K1	Min. speed	When terminal grounding, the pump is in operation at the minimum speed	
6		Invalid	When terminal is not connected , the pump operates based on control logic	Default

The control logic priority of panel and terminal is shown in the table below

No.	Panel	External Terminal
1	"Stop"	
2		"Stop"
3	"Max. curve"	
4		"Max. curve"
5	"Min. curve"	
6		"Min. curve"
7	"Start"	

LCD Panel Function

Set pump functions via LCD panel, including control mode, relay function, analog quantity function, digital IO function. All settings can be saved in the event of pump power loss. When power on, the LCD panel waits for 3s to start the pump.

Night Mode

When the night mode is enabled, within 2 hours, the pump detects that the temperature has decreased by 12℃, it automatically turns on night mode and operates at the minimum speed of 1000 ±50rpm; within 2 hours, the pump detects that the temperature has increased by 12℃, it resumes the previous control mode.

The night mode is available under following control modes:
（1） Auto;
（2） AutoLimit;
（3） Constant pressure;
（4） Proportion;
（5） Constant flow.

Flow Limit Function

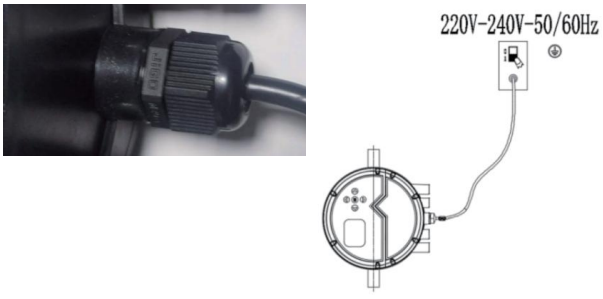
Under the Auto Flow Limit Mode, the switch of "flow limit enabling" will be turned on automatically. Under other control modes, the flow limit value shall be manual set via LCD panel enable settings page, the default value is 90% maximum flow value.

System Function

When the pump is in refrigerating system, users should set it as refrigerating function in the LCD panel. The pump is set to heating function by default at the factory.

Electrical connection

Power Connection
The specification of the terminal nut of this product is M20×1.5, and its outer diameter range for threading is Φ8- Φ 13 (mm). The threading requirements for the terminal nut are described as follows:



The power cord is round

Notes: there is a risk of external water ingress at the threading position if using flat wire or loose wire.

Using the plug designed for the pump to connect the power. The illustrated power cord is 3G*0.75mm2. The installation, wiring of power cord or replacement when it damaged must be carried out by professionals.

Notes: times of start or stop by turning on and off power shall not exceed 4 times per hour.

Signal Connection

The specification of the terminal nut of this product is M16×1.5, its outer diameter range for threading is Φ3.5—Φ5.5(mm).

The threading requirements for the terminal nut are described as follows:

Signal wire is round

Notes: there is a risk of external water ingress at the threading position if using flat wire or loose wire.

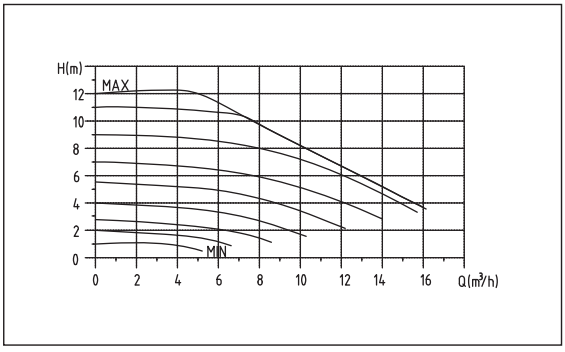
Product range

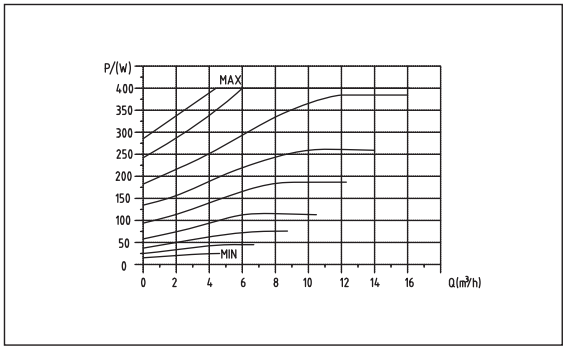
Pump model	Protection class	Sound pressure dB (A)	Max flow (m^3/h)	Max Head (m)	Rated flow (m^3/h)	Rated head (m)	Power (W)	Port-to-port length (mm)
Mega S 25-12 Pro	IPX4D	<39	10	12	5.5	7.5	220	180
Mega S 32-12 Pro	IPX4D	<39	10	12	5.5	7.5	220	180
Mega S 32-12F Pro	IPX4D	<45	15.5	12	11	7	400	220

Performance curves and technical data

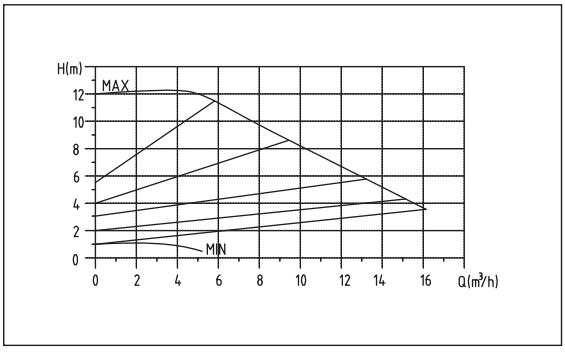
Mega S 32-12F Pro

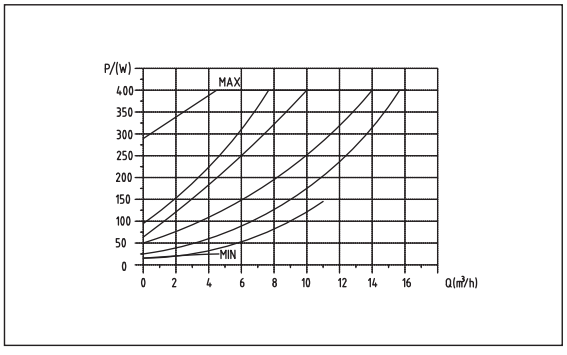
Constant-speed curve



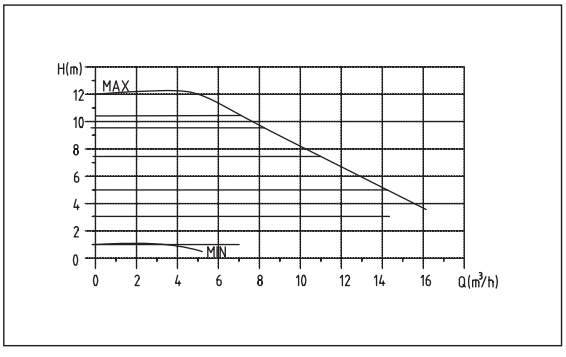


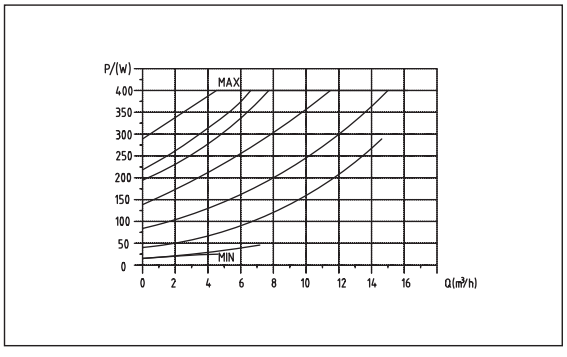
Proportional pressure curve





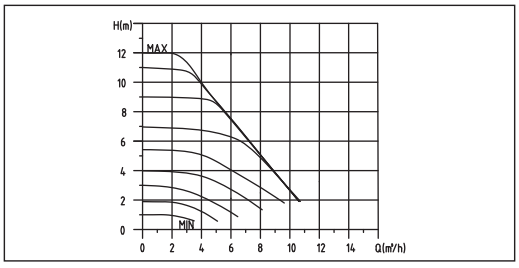
Constant pressure curve

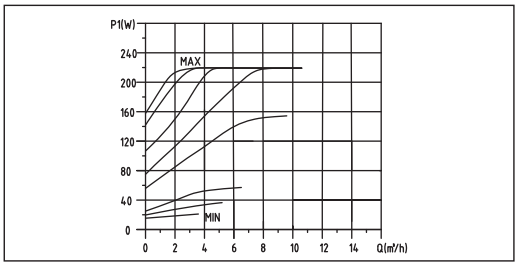




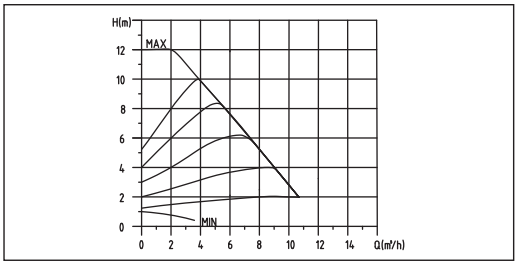
Mega S 25-12 Pro/Mega S 32-12 Pro

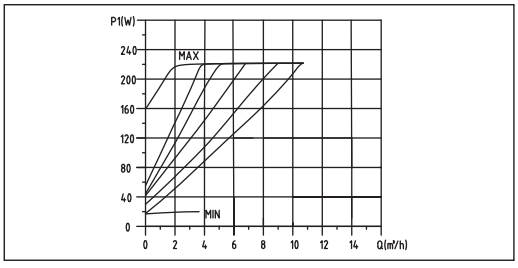
Constant-speed curve



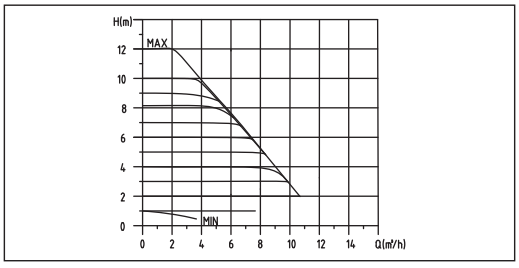


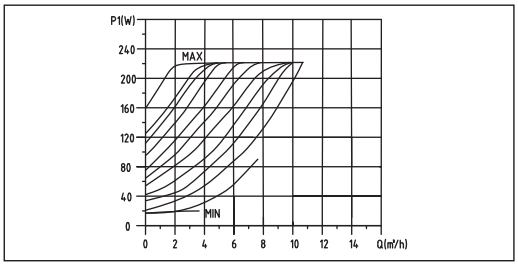
Proportional pressure curve



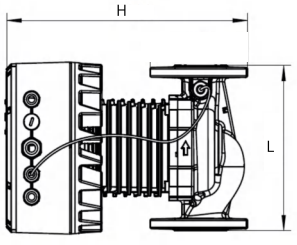


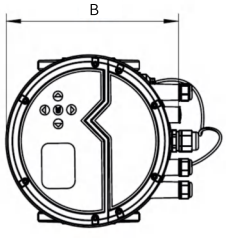
Constant pressure curve

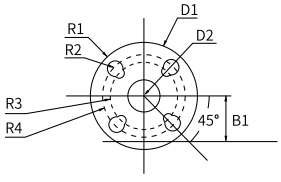




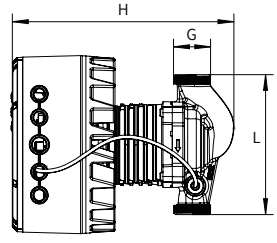
Dimensions

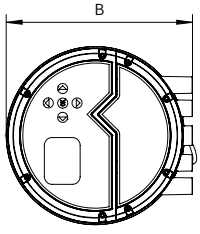






Pump model	Pump dimensions [mm]			Flange dimensions [mm]						
	L	B	H	B1	D1	D2	R1	R2	R3	R4
Mega S 32-12F Pro	220	240	335	65	150	40	9.5	7	50	55





Pump dimensions [mm]				
Pump model	L	B	H	G
Mega S 25-12 Pro	180	240	285	G11/2”
Mega S 32-12 Pro	180	240	285	G2”

Instant circulation pump

Instant E 15-1.5

Instant 15-1.5

Instant Pro 15-1.5

Application

Instant circulation pumps are designed for hot water circulation in water supply systems of private houses and flats.

The pumps can be used for open and closed systems. Constructioned for indoor installation.

A water-conducting part of these pumps is made of corrosion-resistant brass to protect them from chemical contact with hot water. The pumps are energy-efficient and silent due to their advanced functional drawing of multi-circulation hot water recirculation. Reduced installation length and compact size of these pumps allow integrating them into the recirculation circuit even in the tightest space. If applicable, dismountable design will allow easily purging the flow part of the pump.

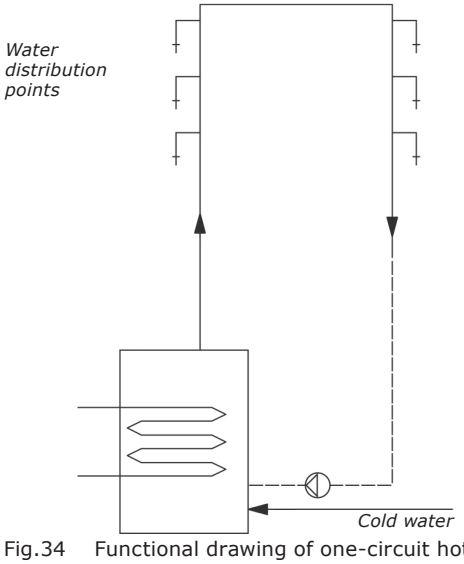


Fig.34 Functional drawing of one-circuit hot water recirculation

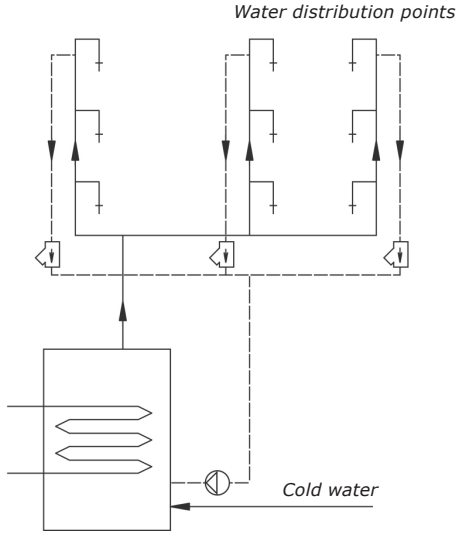


Fig.35 Functional drawing of multi-circuit hot water recirculation

Type key

Example	Instant (Pro)	15	-1.5

Product type
Instant (Pro)

Nominal diameter of inlet and outlet ports (DN) ,[mm]

Maximum head[mm]

Operating conditions

Pumped liquids

- Pure, non-viscous, non-aggressive, and non-explosive liquids without solids or fibers.
- Cooling liquids without mineral oils.
- Domestic hot water with hardness max. 14 °dH, max. 110 °C.
- Softened water.

Kinematic water viscosity υ = 1 mm^2/s (1 cSt) at 20 °C. When a circulation pump is used to pump a more viscous liquid, performance of the hydraulic system decreases.

Liquid temperature

From +2 to +110 °C. It is recommended to maintain a temperature from 50 to 60 °C to minimize lime deposits and prevent legionella.

Ambient and liquid temperature

A temperature of pumped liquid should always be higher than ambient temperature. Otherwise,appear may condensation in the housing.

Maximum system pressure

1.0MPa (10bar)

Inlet pressure

To avoid cavitation noise and pump bearings damage, the following minimal pressure should be set up for an inlet port:

Liquid temperature	75 °C	90 °C	110 °C
Inlet pressure	0.005MPa	0.05MPa	0.108MPa
	0.05bar	0.5 bar	1.08 bar

Construction

Instant pumps design allows disconnecting the motor of the pump from the housing for easier maintenance. A rotor bearing is lubricated with pumped liquid. The pumps feature:

- parts contacting with pumped liquid are isolated from stator placed in a sealed stainless steel case;
- friction decrease in a bearing and absence of slop provide significant decrease in consumed power and noise.

Instant pumps are equipped with single-phase permanent-magnet motors.

The motor has full elec tric resistance and heat protection.

The motor does not require any additional protection.

Enclosure class: IP 44.

Insulation class: H.

Dry-running protection

Instant pumps have dry-running protection. Its operation uses the shift of a spheric rotor if operated without water. If the pump elbow is filled with liquid, water presses the rotor and fixes it in the space. If the pump runs dry, the pump elbow is filled with air in which the rotor loses its fixed position. As a result, the magnetic field created by the rotor is also shifted in the space and changes its magnetization degree in the measured point. The pump motor recognizes it and stops. As soon as the rotor returns to its initial position, the motor starts again and stops again if there is still no water. If there is no water in the system, the pump will work in frequent start-stop cycles until there is water in the system or the pump is manually disconnected from power supply.

This mode will not lead to the pump motor overheating due to its low power and the absence of load. This periodic work allows reducing friction and wear of the rotor bearing, therefore, the pump is protected from critical damages when operated without water.

Material specification

No.	Name	Material
1	Stator surface	Composite
2	Stator winding	Copper wire with lacquer coating
3	Motor housing	Aluminum
4	shielding sleeve	Stainless steel
5	Rotor sleeve	Stainless steel
6	Rotor	Stainless steel
7	Pump housing	Brass
8	Terminal box cover	PC/ABS
9	Motor cover	PPO
10	Cable with plug	Composite
11	Impeller	Composite
12	Terminal box assembly	Engineering plastic
13	Pump housing	HPb57-3
14	Impeller	Composite material
15	Rotor assembly	Assembly

Installation

Instant pumps should be securely fastened at the operation place so that there can be no risk of tipping over, falling or a sudden movement.

The pump should always be installed with the motor shaft in a horizontal position.

Upper position of the electrical connector in an Instant pump is unacceptable.

In order to remove air from the system with an Instant pump you should:

1. Turn on the pump, open the valve.
2. Turn off the pump, close the valve.
3. Repeat steps 1, 2 five times.

Panel display diagram explanation (only Instant Pro 15-1.5)

Location	Location	Location
1	Timing mode: hour display	Timing mode, h and min lights display alternately in timing mode
2	Timing mode: minute display	
3	"88" display, display power, timing value	
4	Power Unit	
5	CS: constant speed mode	
6	A: automatic mode	
7	TC: Temperature Control mode	
8	Start/Stop Press	
9	Add button	
10	Minus button	
11	Toggle button	

Mode Description:
Power-on Initial State: Pump defaults to Constant Speed (CS) level. Lights 4 and 5 are on. Short-press Button 8 to start/stop the pump.
Mode Switching:
Default: CS at power-on.Short-press Button 11 to cycle through modes: CS → A → TC → Timer.
TC → Timer transition:
If running in TC: Stops when switched to Timer (if outside scheduled time); starts at scheduled time.
If stopped in TC: Starts automatically when switched to Timer (if within scheduled time); stops when timer ends.
Timer → CS transition: Runs in CS mode regardless of Timer status.
Mode Details
Constant Speed (CS):
Runs at maximum speed.Displays real-time power.Lights 4 & 5 on.
Automatic (A) Mode:
Auto-adjusts based on system conditions.Displays real-time power.Lights 4 & 6 on.
Temperature Control (TC) Mode:
Lights 4 & 6 on.Stops when temperature ≥50°C (displays "00").Runs in CS mode when temperature ≤ 36°C (displays real-time power).
Timer Mode:
Lights 1 & 2 blink alternately (2s interval); Light 3 steady.Displays current time (auto-updated).Runs at constant speed.Factory default: No timer set (must be configured to activate mode).
Power Memory Function
Non-Timer Mode power loss:
Restores previous mode upon reboot.
With saved timer: Switches to Timer mode if rebooted ≤ 48h; timer erased after >48h (reverts to factory settings).
Timer Mode power loss:
Restores Timer mode if rebooted ≤48h; after >48h, reverts to CS mode (timer erased, requires reconfiguration).
Flushing Function
Automatically flushes pipes at constant speed for 15 minutes after >8 hours of standby.
Activation conditions: Only in TC or Timer modes.Indicators: Light 4 on, Light 3 blinking. Displays real-time power during flush.
Timing instructions:
Timing setting: Press the buttons "+ and-" for a long time at the same time to enter the timing, displaying F0, with F0-F6 and 7 time points. Press "+ or-" to select the time point. When F0 ~ F6 are displayed, the display is not bright. The factory default is "-:-" state, F0 is the current time (F0 will take effect when the setting is completed,The pump system automatically updates the time on this basis). F1 ~ F6 are timing time points. First, the current time F0 must be set. If it is not set, F1 ~ F6 cannot be set.
Time point setting:
When F0 is displayed, press button 11 once to enter F0 setting. Light 1 is on. Press "+ or-" to set hours. It is a "-and 0~23" cycle. Press + or-"for more than 3 seconds without loosening. It is cycled with-, 0, 5, 10, 15 and 20,Complete hour setting
Press button 11 again, light 2 is on, press "+ or-" to set minutes, which is a "-and 0~59" cycle, Press + or-"for more than 3 seconds without loosening, which is based on-, 0, 10, 20,..... 50 cycles, after minutes,
Press button 11 again to display F1, and set the time in turn. If you want to set F3 directly after setting F1, you can press "+ or-" to jump F3 when F2 is displayed. The rest of the time points are similar.
After all time point settings are completed, press the buttons "+ and-" for a long time to exit the timing setting. If there is no operation within 30s during the timing setting, the pump will also launch the timing setting;
No matter in what mode to enter the timing setting, after the exit setting, or enter the mode before.
Pay attention to timing setting

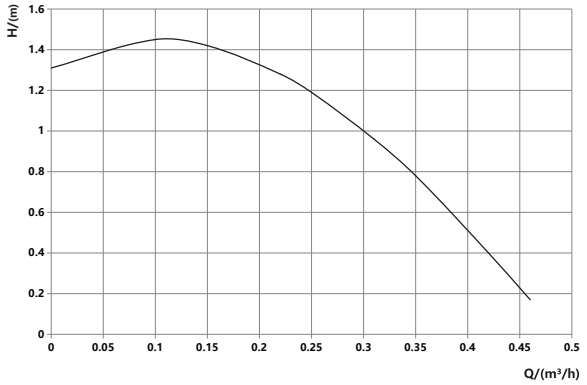
The timing of the pump must have a start and end time. The system recognizes the first time point in F1 ~ F5 as the start time (F6 cannot be used as the start time, but only as the end time), the second as the end time, the third bit as the start time, the fourth as the end time, and so on;
If only one time point is set, it can only be the beginning and no end, and the default is invalid. If 3 or 5 time points are set, the first 2 or 4 time points, every 2 time points form a time period, and the last time point is invalid;
Hours and minutes must be set at the same time for a time point. If only hours or minutes are set for a time point, the time point setting is invalid, and the setting will return to the "-" State;
If two or more timing time periods are set and the first 1 or 2 time periods are deleted, the first two or four time points must be deleted at the same time. Delete the last time period, delete any or all of its time points;
If 3 or 5 time points are set, only 1 time point is deleted, and the remaining time points are automatically formed into 1 or 2 time periods.
If there is a timing, if you want to delete it all and reset it, you need to enter the timing setting. Press the key 11 for more than 3 seconds, and "FF" will be displayed. It will be displayed for 3 seconds and then disappear, indicating that the timing of F1 ~ F6 has been cleared. The timing can be reset without resetting F0.
If the timing settings are invalid, you cannot switch to the timing mode after exiting the timing settings.

Example:

Point of time	F0 Current Time	F1 Time point 1	F2 Time point 2	F3 Time point 3	F4 Time point 4	F5 Time point 5	F6 Time point 6	Explain
Example1	7:30	8:30	9:30	----	----	----	----	Pump runs in F1 ~ F2, others stop
Example2	7:30	----	9:30	----	----	----	----	Only set any time point from F1 to F6, and the pump defaults to no timing.
Example3	7:30	----	9:30	10:30	11:30	----	----	The pump runs in F2 ~ F3, the rest stops, and the time point F4 is invalid. If F3 is deleted, the pump will run in F2 ~ F4.
Example4	7:30	8:30	9:30	10:30	11:30	----	----	The pump runs in F1 ~ F2,F3 ~ F4 two time periods, and the rest stops. 1. If you want to delete the time period F1 ~ F2,you need to enter the timing and delete the two time points F1 and F2 at the same time. 2. If you want to delete the period F3 ~ F4, you need to enter any time point to delete F3 and F4 regularly or delete F3 and F4 at the same time. 3. If only F1 or F2 is deleted, the pump will run from F2 to F3 or F1 to F3, F4 will fail, and so on. 4. If you want to delete all of them, you can enter the timing and press the button 11 for a long time to enter the quick delete.

Performance curve and technical data

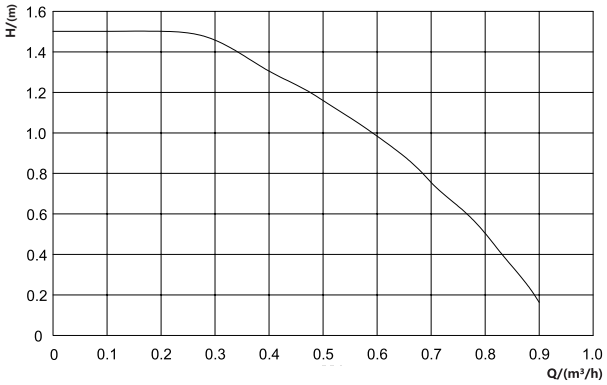
Instant E 15-1.5



P(W)	I(A)	Voltage [V]
28	0.28	220-240

Maxmun system pressure:1.0MPa (10bar)
Liquid temperature:from 2 to110 °C

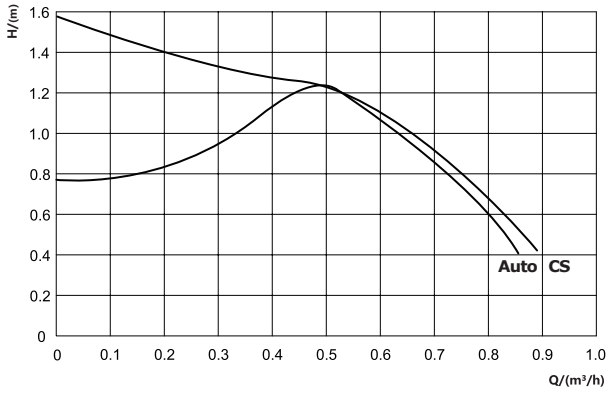
Instant 15-1.5



P(W)	I(A)	Voltage [V]
5	0.08	220-240

Maxmun system pressure:1.0MPa (10bar)
Liquid temperature:from 2 to110 °C

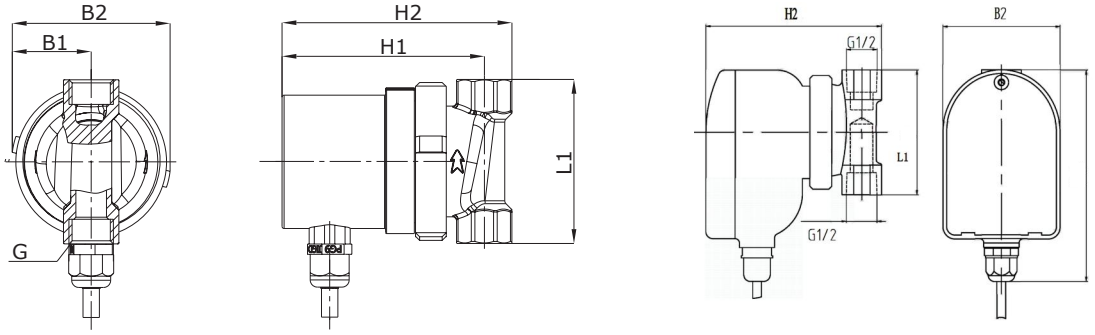
Instant Pro 15-1.5



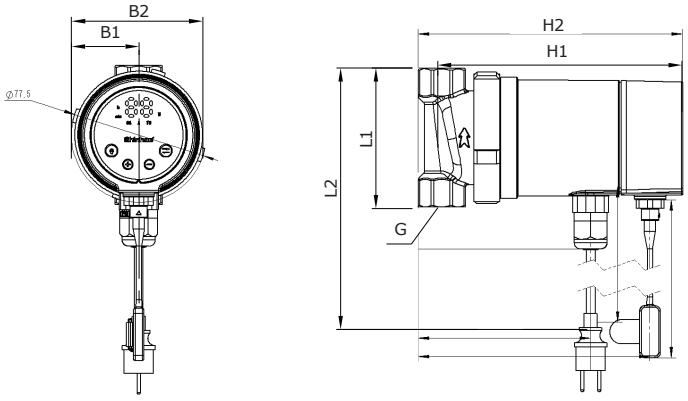
P(W)	I(A)	Voltage [V]
8	0.07	220-240

Maxmun system pressure:1.0MPa (10bar)
Liquid temperature:from 2 to110 °C

Dimensions



Pump type	Size [mm]					
	L1	H1	H2	B1	B2	G [inch]
Instant 15-1.5	80	99	112	38	77	1/2”
Instant E 15-1.5	85	/	120	/	80	1/2”



Pump type	Size [mm]						
	L1	L2	H1	H2	B1	B2	G [inch]
Instant Pro 15-1.5	80	135	127.5	141	33	66	1/2”

Instant 15-12E pump

Fig.36 Instant 15-12E

Type key

Example	Instant	15	-12	E
Product type Instant				
Nominal diameter of inlet and outlet ports (DN),[mm]				
Maximum head [m]				
Product series code				

Application

Instant hot water circulation pump is mainly used for water circulation or pressurization in domestic hot water systems. The front of the product has an operation panel for easy operation.

Application Scenarios

Usage Scenario 1 (There is no water return pipe in water-ways, no power supply at the furthest water point, and the pump has circulation and pressurization functions)

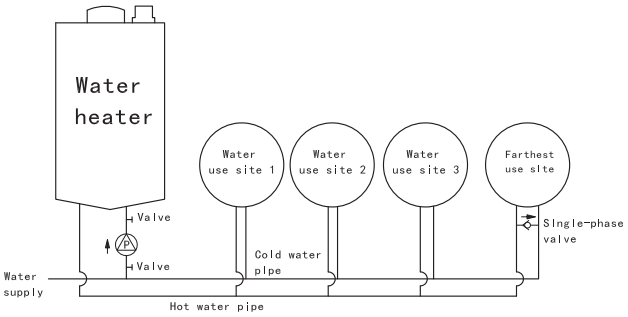


Fig.37 Usage Scenario 1

Note: Valves should be installed on both sides of the pump for convenient maintenance

Usage Scenario 2 (There is no water return pipe in water-ways, the furthest water point has power supply. The pump has circulation function)

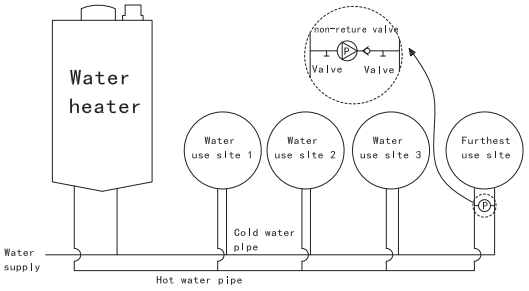


Fig.38 Usage Scenario 2

Note: Valves should be installed on both sides of the pump for convenient maintenance

Usage Scenario 3 (Water channel with return pipeline, pump with circulation and pressurization function)

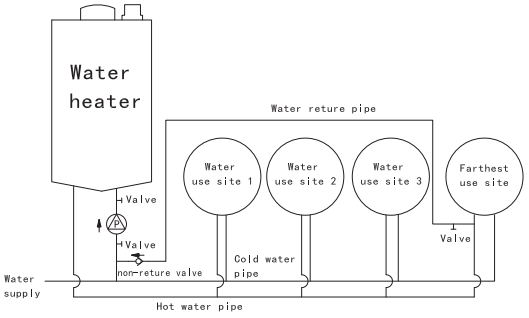


Fig.39 Usage Scenario 3

Usage Scenario 4 (Water channels have return pipeline, and the pump has the function of circulation.)

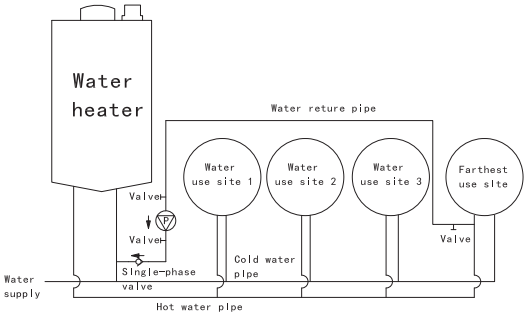


Fig.40 Usage Scenario 4

Note: Valves should be installed on both sides of the pump for convenient maintenance

Operating conditions

Conditions of use(keep the shaft horizontal)

Medium: clear water	Medium temperature: 4℃~80℃
Ambient temperature: 0℃～40℃。	0.1bar(Liquid temperature≤60℃) 0.28 bar(Liquid temperature≤80℃)
Medium hardness: 25°dH	Relative humidity of the air: 95%(MAX)

Conditions of storage

Humidity of storage environment 30%~95% Stacking height: less than 6 layers	Storage ambient temperature: -20℃~60℃ (there is no freezing in the pipeline and pump)

Electric control instructions

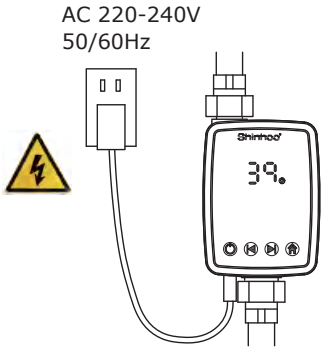


Fig.41 Wiring Diagram

Check that the supply voltage and frequency are consistent with the parameters indicated on the pump nameplate.
Use the adapter that comes with the pump to connect to the power supply.
The light on the control panel indicates that the power is on.

Display interface and Function Description during pump operation

● **One-click start function:** After the user touches the "Start" button, the pump starts to run. When the water temperature reaches the set temperature upper limit or there is no flow in the pipeline, the pump stops running. After starting, click the "Start" button again to shut down the pump.

● **Timing function:** The current time is within the set period, if the water temperature reaches than the lower limit, the pump starts to run. When the water temperature reaches the upper limit or there is no flow in the pipe, the pump stops running.

● **All-day mode function:** If the water temperature is reaches the set lower limit, the pump starts to run. When the water temperature reaches the set upper limit or there is no flow in the pipeline, the pump stops running.

● **Faucet start function:** Lift the faucet for about 1s, the pump starts to run, and stops running when the water temperature reaches the set temperature upper limit or there is no flow in the pipeline.

● **Pressurization function:** When there is fluid flow in the pump, the pump starts and is in pressurization mode; When the liquid does not flow, the pump stops. This mode does not have temperature control.

Pump parameter setting

● **"One-click start" parameter setting:** After the screen is lit up, hold down the "HOME" button for 2s, then the corresponding mode on the screen starts to blink, tap the "HOME" button, select the "one-button start" mode to blink, tap the "Forward" button to select the parameter to be set, the corresponding parameter blinks after selection, tap the "Back" button parameter value increases in cycles. After the parameters are set as required, Hold down the "HOME" button" for 2s to exit the parameter setting screen, or tap the HOME button to enter the next mode setting.

● **"Timing mode" parameter setting:** After the screen is lit up, hold down the "HOME" button for 2s, then the corresponding mode on the screen starts to blink. Tap the "HOME" button and select the "Timing mode" mode to blink. Tap the "Forward" button to select the parameter to be set, the corresponding parameter blinks after selection, tap the "Back" button parameter value increases in cycles. Tap the "Start" button to select Early, Middle, or Late. After the parameters are set as required, hold down the HOME button for 2s to exit the parameter setting screen, or tap the HOME button to enter the next setting mode.

● **"All-day mode" parameter setting:** After the screen is lit up, hold down the "HOME" button for 2s, then the corresponding mode on the screen starts to blink. Tap the "HOME" button and select "All-Day Mode" to blink. Tap the "Forward" button to select the parameter that you want to set, the corresponding parameter blinks after selection, tap the "Back" button parameter value increases in cycles. After the parameters are set as required, hold down the HOME button for 2s to exit the parameter setting screen, or tap the HOME button to enter the next mode setting.

● **Time calibration (time alignment):** After the screen is lit up, hold down the "HOME" button for 2s, then the corresponding mode on the screen starts to blink. Tap the "HOME" button and select "Time Settings" to blink. Tap "Forward" to select a parameter to be set, the corresponding parameter blinks after selection, tap the "Back" button parameter value increases in cycles. After the timing is complete, hold down the "HOME" button for 2s to exit the parameter setting screen, or tap the "HOME" button to enter the next mode setting.

Pump operation and fault self-check

After the power is turned on, the corresponding mode light will be on in the mode area, and the water temperature and running indicator will be on in the operation display area.
The failure of the electric pump is displayed as follows on the display interface:

Fault type	Fault code	Protection mode
Over-voltage protection	E0	Test under full load conditions: Detects the input voltage above 29V±5%, after 2 seconds the pump enters overvoltage protection. The pump will work normally if the voltage returns to the normal state.
Under-voltage protection	E1	Test under full load conditions: the detection input voltage is lower than 19V±5%, after 2S it enters the under-voltage protection. After The pump will work normally if the voltage returns to the normal state.
Over-current protection	E2	The pump will stop working immediately if the current is too high. And it will be restarted after 8s. The pump will be completely protected and will not be restarted unless the power is re-energized if the protection accumulates to 5 times.
Light load protection	E3	The pump is not loaded or the load is low, or the flow sensor is not working properly.
Phase loss protection	E4	Power on to detect phase loss, the pump will stop working immediately when the phase-loss fault is detected. The pump will be restarted after 8s. The pump will be completely protected and will not be restarted unless the power is re-energized if the protection accumulates to 5 times.
Stalled rotor protection	E5	The pump will stop working after the rotor locked 3s, Pump will stop working, and restart after 8s. The pump will be completely protected and will not be restarted unless the power is re-energized if the protection accumulates to 5 times.
The temperature parameter is invalid	F0	The lower limit of temperature is higher than the upper limit of temperature.
Timing parameter setting is invalid (early)	F1	The start time of the timing is earlier than the end time.
Timing Parameter Settings are invalid (Medium)	F2	
Timing Parameter Settings are invalid (late)	F3	
Battery low voltage	F4	Check the battery voltage when the battery is powered on. If the battery voltage is low, a fault message is displayed 3s after the battery is powered on, indicating that the battery needs to be replaced. (Battery failure will affect the system time in timing mode.)
Temperature sensor anomaly	FF	The temperature sensor is not connected properly or is abnormal.

If a fault is displayed, the power supply must be disconnected for troubleshooting.
After troubleshooting, reconnect the power supply and start the pump.

Startup and mode selection

Before starting the electric pump, ensure that the system is filled with liquid and the power supply is in good contact.

Setting	Setting instructions
One-click start	After touching the "Start" button, the pump will start to run. When the water temperature reaches the set temperature upper limit or there is no flow in the pipeline or the set temperature upper limit cannot be reached after continuous running for 3m, the pump will stop running. Suitable for use without long periods of hot water or out of the range of other modes.
Timing mode	When the water temperature in the pump is lower than the set temperature lower limit, the pump starts to operate, and when the water temperature in the pump reaches the set temperature upper limit or there is no flow in the pipeline, the pump stops running. This mode is suitable for water use time stabilization.
All-day mode	The pump runs 24 hours. Suitable for all day long pressurization or cycling.
Faucet start	Lift the faucet for about 1s, the pump starts to run, turn off the tap, and stops running when the water temperature reaches the set temperature upper limit or there is no flow in the pipeline. Suitable for bathing and other occasions.
Pressurization mode	Set the temperature range to 00-00, pump in pressurized mode, when there is fluid flow in the pump, the pump starts; When the liquid does not flow, the pump stops. Suitable for home water pressure is low, do not need temperature control function occasions.
Time set up	Set the time before the product is used, so that the pump time is consistent with the current time, and avoid the timing mode inconsistent with the expected setting time.
Temperature setting	The minimum temperature should be set higher than the current water temperature and the current ambient temperature to avoid the pump can not start after the pipeline water temperature is reduced; The set maximum temperature should be less than the current heat source temperature 2-3 ° C, to avoid the long-term circulation pipe temperature can not reach the set temperature, the pump can not stop. Avoid the pump inlet temperature is less than the current heat source temperature, resulting in frequent pump start.
Time setting	A maximum of 3 time periods can be set, which is 24h system. When 3 time periods are not required, the unnecessary time can be set as 0000-0000

Construction

Instant hot pump is of the canned-rotor type. In these pumps, the rotor of the motor is washed by pumped liquid.
Water in such pumps is used to:
1.Lubricate the bearings of an motor and remove wear debris.
2.Cooling of the stator winding.

Construction advantages of Instant hot pump:

•An energy-efficient brand new permanent- magnet motor and increased starting torque.
•A ceramic shaft and bearings with the same temperature extension coefficient provide increased reliability of the equipment.
•A thrust bearing is made of ceramic that extends the service life of the pump.
•A rotor can and thrust bearing are made of stainless steel to resist corrosion.
•Simplified pump connection to power supply with a plug.

Material specification

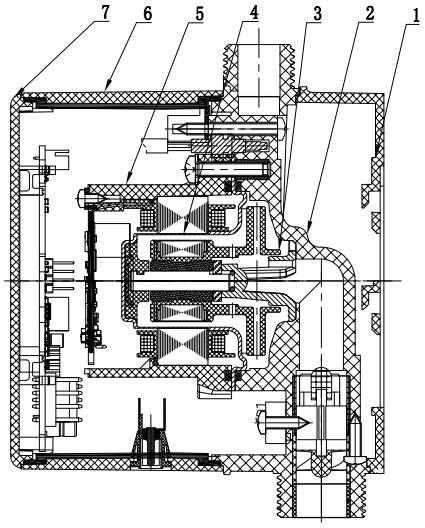


Fig.42 Sectional drawing

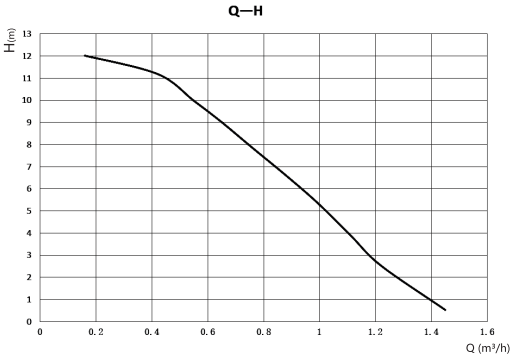
No.	Name	Material
1	Base	Composite material
2	Pump housing	Composite material
3	Assembled rotor	Assembly
4	Shielding sleeve assembly	Stainless steel
5	Box base	Composite material
6	Terminal box base	Composite material
7	Terminal box cover	ABS

Performance curve and technical data

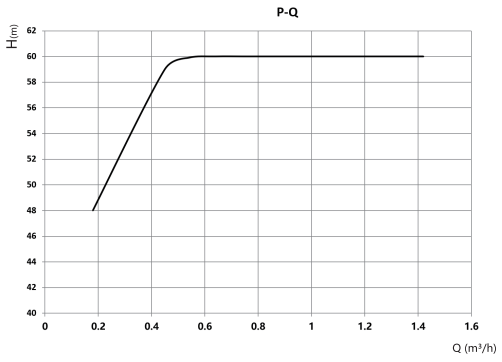
Performance curve

Maximum flow	> 1.4 m³/h
Maximum head	12 m
Maximum power	60W
Rated flow	0.6 m³/h
Rated head	8m

Head



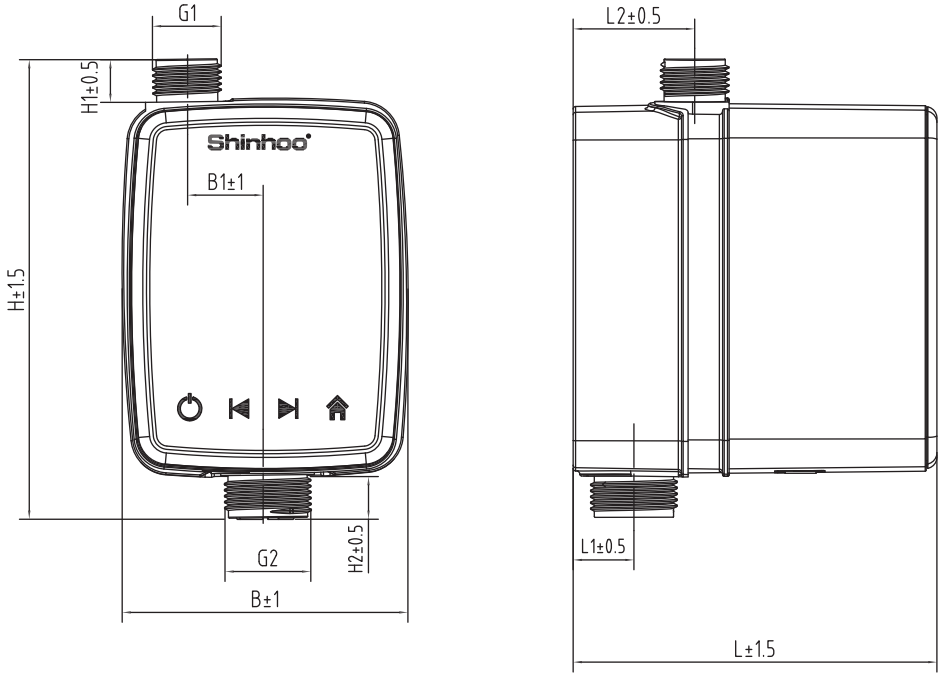
Power



Technical data

Power voltage	AC 220-240V，50/60Hz	
Protection class	IP44	
Insulation class	H	
Ambient relative air humidity（RH）	≤95%	
System pressure level	1.5MPA (15bar)	
Sound pressure	Liquid temperature	Inlet pressure (Min)
	≤60℃	0.01MPa (0.1bar)
	≤80℃	0.028MPa (0.28bar)
Noise level	＜42dB（A）	
Ambient temperature	0～40℃	
Temperature rating	TF80	
Surface temperature	≤80℃	
Liquid temperature	4℃～80℃	

Dimensions



Pump model	Size(mm)									
	L	L1	L2	H	H1	H2	B	B1	G1	G2
Instant 15-12E	110	18.5	37	140	13	13	87	23	1/2"	3/4"

Aquamaster booster pump

Fig.43 Aquamaster pump

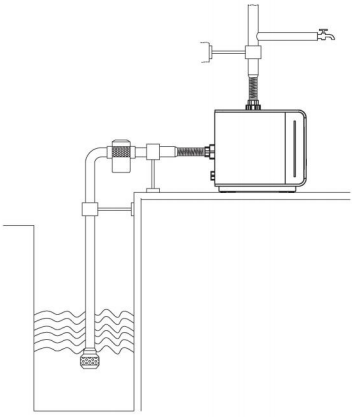


Fig.46 Suction from well or tank

Application

1.Commercial water pressurization
2.Drawing water from groundwater for domestic use
3.Domestic water supply pressurization

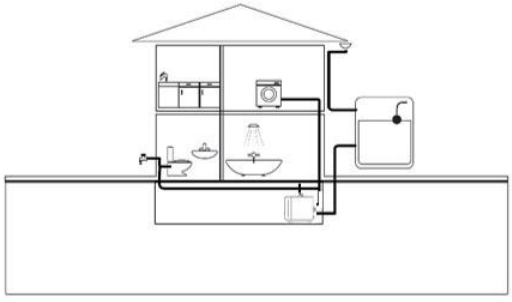


Fig.44 Tower water supply

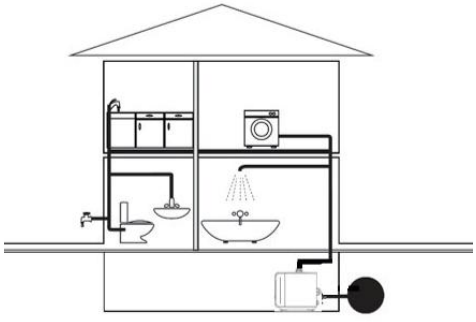


Fig.45 Pressurization of urban tap water

Operating conditions

Technical data Pumped liquids

Pumped liquids: fresh water	Temperature range: 0 to 50℃
PH:6.5-8.5	Medium hardness :25°dH
Solid impurity content in the medium: the diameter and length of solid impurities ≤ 0.1mm, and the volume ratio is ≤0.1%.	

Environment requirements

Installation: Keep the shaft Horizontal	Altitude: <1000m
Environment temperature range: 0 to+55℃ (There is no freezing phenomenon in the pipeline and pump)	Environment humidity:<95%

Storage requirements

Temperature range duringstoring:-20 to +60 ℃(There is no freezing phenomenon in the pipeline and water pump)	Maximum relative humidityduring storage:95%RH

Function description

1. Constant pressure control function
Under the corresponding gear, when the outlet flow is within a certain range, the outlet head can reach the corresponding value stably

Temperature protection function:
2. Display real-time temperature.
3. High temperature mode: When the temperature is higher than 60 ℃(±10%) for two consecutive times during operation, the pump stops; when the water temperature is lower than 55℃ (±10%), the pump restarts automatically.

4. Anti-freeze mode:
When the temperature is lower than 5℃ for two consecutive times in standby mode, the pump restarts immediately. After continuous operation for 40m, the pump waits for continuous detection.

Electric control instructions

This pump has a built-in control program, the user only need to according to their own water needs, fouows the performance curve , through the operating panel to select the appropriate pressure gear.

Material specification

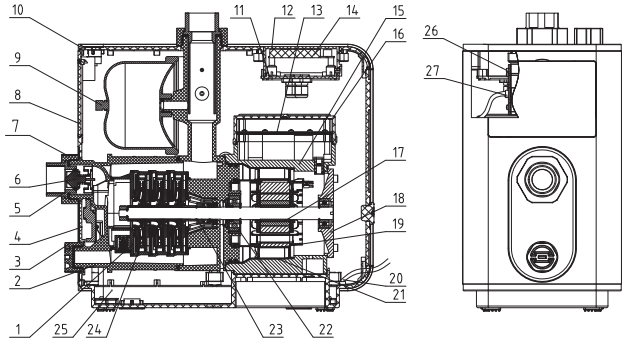


Fig.47

NO.	Component Name	Material Name
1	Guide Vane	Engineering Plastic
2	Pump Body	Engineering Plastic
3	Plug screw	Engineering Plastic
4	Middle Shell	Engineering Plastic
5	Pipe Fitting	Stainless Steel
6	Check Valve	Assembly
7	Pipe Nut	Engineering Plastic
8	Pressure Tank	Assembly
9	Front Cover	Engineering Plastic
10	Top Cover	Engineering Plastic
11	Outer Box Base	Engineering Plastic
12	Outer box lid	Engineering plastic
13	Drive board	Assembly
14	Display board	Assembly
15	Base frame	Cast aluminum
16	Inner box lid	Engineering plastic
17	Rear end cap	Cast aluminum
19	Rotor	Assembly
18	Power cord	Assembly
21	Stator winding	Assembly
20	Water cooled shell	Stainless steel
22	Bearing	Assembly
23	Mechanical seal	Assembly
24	Impeller	Assembly
25	Base	Engineering plastic
26	Temperature sensor	Assembly
27	Pressure sensor	Assembly

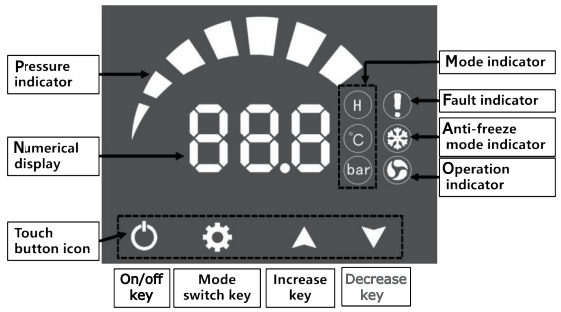


Fig.48 Operation interface

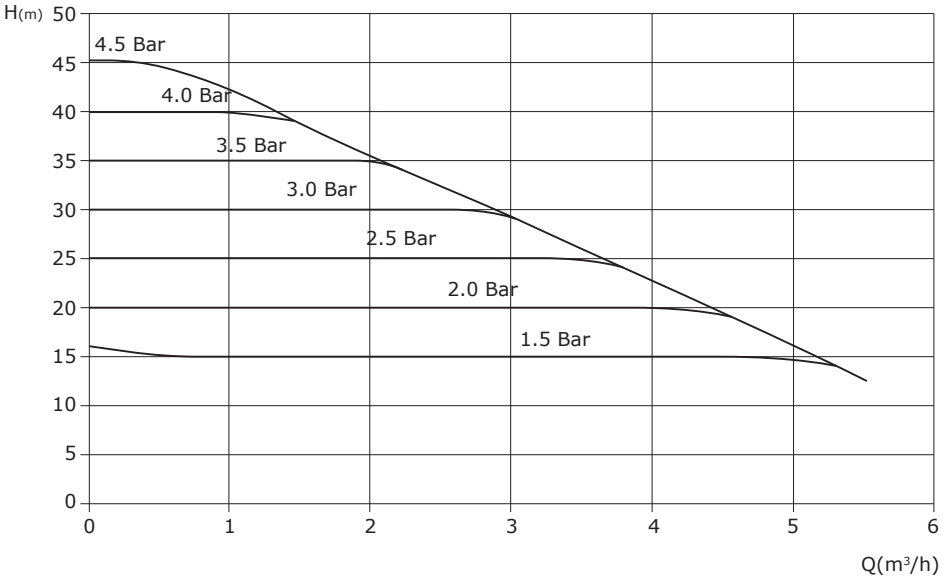
Construction

Pumps feature

- Variable frequency constant pressure water supply.
- Water-cooled motor.

Performance curves and technical data

Performance curves



Technical data

Rated voltage:220-240V	Rated current:2.9A	Frequency:50Hz
Max. flow:5.5m³/h	Max. head:45m	Max.input power:600W
Rated flow :3m³/h	Rated head:30m	Protection class:IP44
Direction:Counterclockwise when viewed from pump inlet	Insulation class:F	Max. head:8m(self-priming)

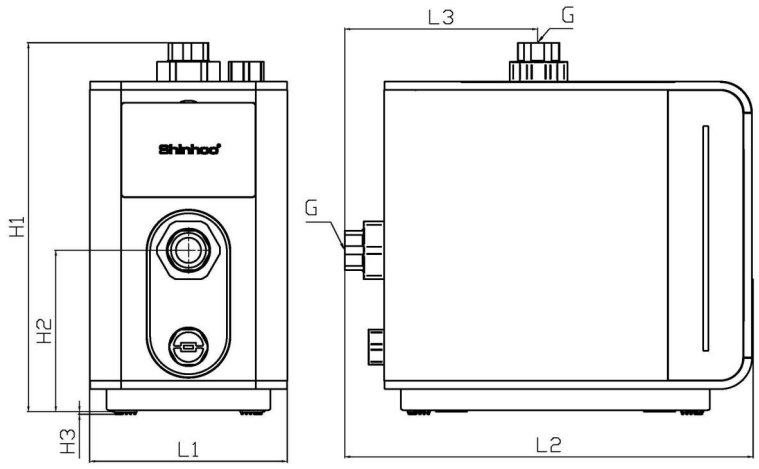


Fig.49 External dimensions

Dimensions

Pump model	Size（mm）						
	L1	L2	L3	H1	H2	H3	G(inch)
Aquamaster 03-30 EC	188	390	185	351	153.5	2.5	G1″(internal thread)

AHM Series
Horizontal Multistage Centrifugal Pump

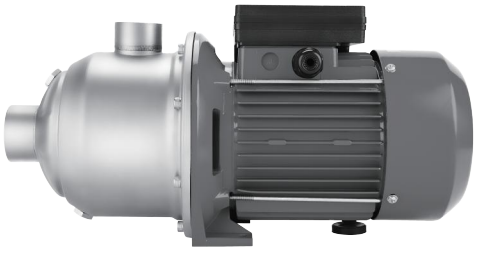


Fig.50 AHM Series
Horizontal Multistage Centrifugal Pump

Type key

Example **AHM - 8 04 T**

- Product type AHM
- Rated flow
- Number of impellers
- Three-phase motor

Application

Pressurized water supply
HVAC circulation system
Industrial water circulation system
Cooling water circulation system

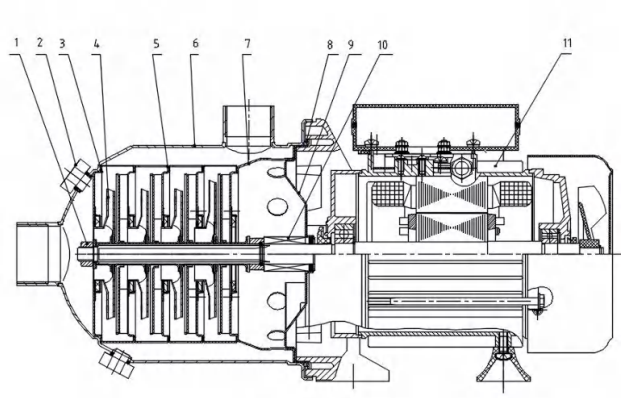
Operating conditions

Requirements of Medium
The pump system is suitable for transporting drinking water, hot water and cooling water.
0~90℃ (clear water), -35~110℃ (water, ethylene glycol (≤50%) mixed liquor)

Requirements of Environment
Using method: keep the axle level
Ambient temperature: -40℃~55℃
Altitude: <3000m
Ambient humidity: ≤95%
No freeze inside the Pipeline and pump

Max. System pressure: 10bar
Insulation class: F
Max. Efficiency of units: 49%
Protection level: IP54
Vibration: ＜2.8mm/s

Material specification



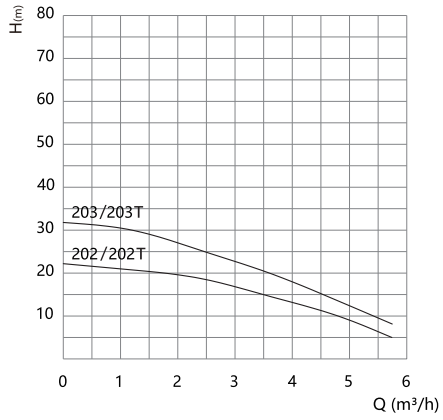
NO.	Components	Quantity	Materials
1	Locking nut	1	Stainless steel
2	Hex head cap G1/4	2	Stainless steel
3	First-stage guide vane	1	Component
4	Impeller	4	Stainless steel
5	Intermediate guide vane	3	Component
6	Pump housing	1	Stainless steel
7	Last-stage guide vane	1	Component
8	Gasket	1	EPDM
9	Stabilized current cap	1	Stainless steel
10	Mechanical seal	1	Component
11	Motor assembly	1	Component

Product range

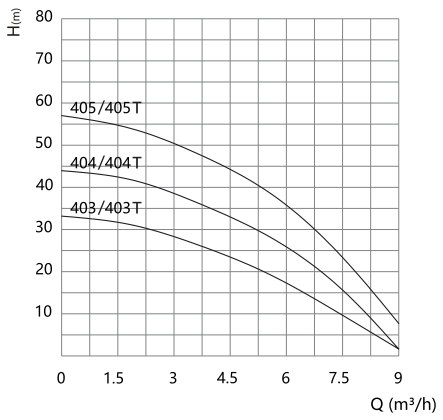
Pump model	Power	Max. Head(m)	Max. Flow(m^3/h)
AHM 202/AHM 202T	1~220V/50Hz 3~380V/50Hz	22	5
AHM 203/AHM 203T		33	5
AHM 403/AHM 403T		33	8
AHM 404/AHM 404T		42	8
AHM 405/AHM 405T		57	8
AHM 803/AHM 803T		36	12
AHM 804/AHM 804T		48	12
AHM 805T	3~380V/50Hz	59	12
AHM 1603T		36	26
AHM 1604T		48	26

Performance curves and technical data

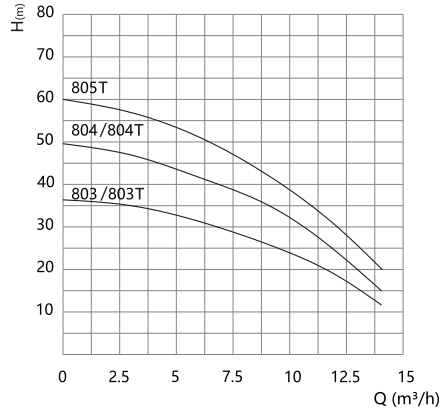
AHM 202/203
AHM 202T/203T



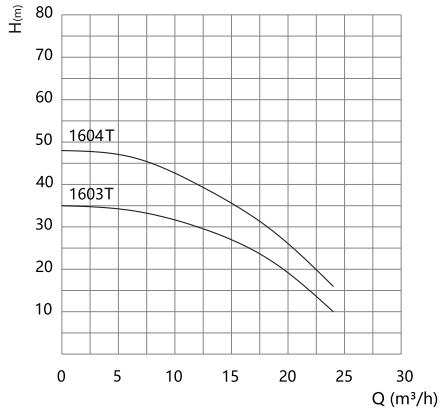
AHM 403/404/405
AHM 403T/404T/405T



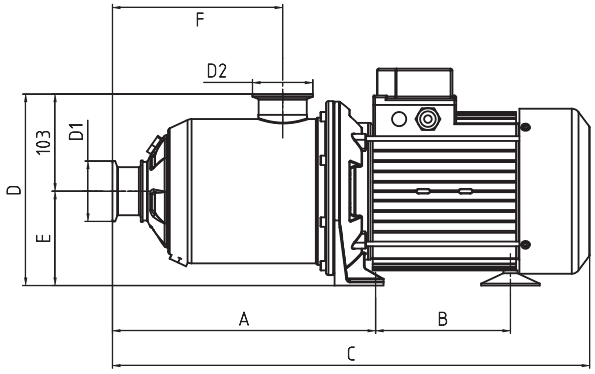
AHM 803/804
AHM 803T/804T/805T

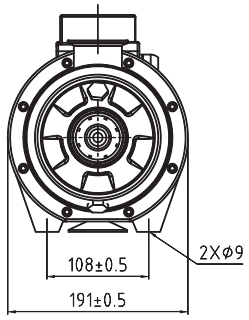


AHM 1603T/1604T



Dimensions





Pump model	ΦD1 (mm)	ΦD2 (mm)	A (mm)	B (mm)		C (mm)		D (mm)		E (mm)		F (mm)	Weight (kg)	
				1-220V	3-380V	1-220V	3-380V	1-220V	3-380V	1-220V	3-380V		1-220V	3-380V
AHM 202M/AHM 202T	50.5	50.5	205	85	85	375	375	205	198	90	90	107	9.2	9.2
AHM 203M/AHM 203T	50.5	50.5	205	85	85	375	375	205	198	90	90	107	9.2	9.7
AHM 403M/AHM 403T	50.5	50.5	201	85	85	371	371	205	198	90	90	104	10.4	9.8
AHM 404M/AHM 404T	50.5	50.5	250	100	100	448	448	210	198	90	90	153	13.6	14.3
AHM 405M/AHM 405T	50.5	50.5	250	100	100	448	448	210	213	90	90	153	15.4	16.3
AHM 803M/AHM 803T	64	64	212	100	100	410	410	210	213	90	90	115	14.5	15.3
AHM 804M/AHM 804T	64	64	272	145	145	500.5	500.5	227	230	100	100	175	18.3	18.8
AHM 805T	64	64	272	-	145	-	500.5	-	230	-	100	175	-	19.7
AHM 1603T	64	64	233	-	145	-	461.5	-	230	-	100	136	-	15.7
AHM 1604T	64	64	278	-	145	-	506.5	-	230	-	100	181	-	20.5

F-AHM Series Horizontal Multistage Centrifugal Pump

Fig.51 F-AHM Series
Horizontal Multistage Centrifugal Pump

Type key

Example **F - AHM 16 03 T**

- Product type F-AHM
- Rated flow
- Number of impellers
- Three-phase motor

Application

Constant pressure water supply
HVAC circulation system
Industrial water circulation system
Cooling water circulation system

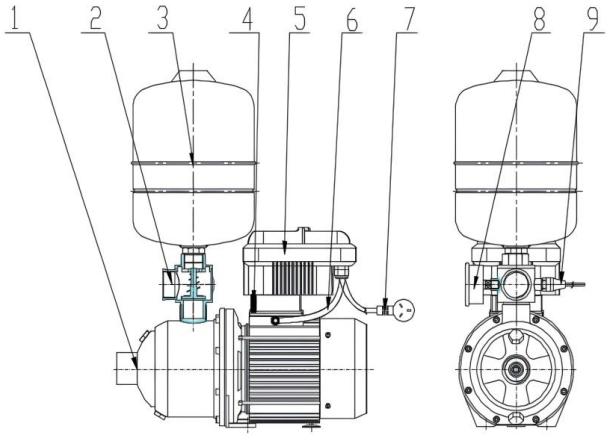
Operating conditions

Power: 1～220V/50Hz,3～380V/50Hz
Max. System pressure: 7bar
Insulation class: F
Protection level: IP42

Requirements of Environment
Working ambient temperature: -15℃～110℃

Requirements of Medium
The pump system is suitable for transporting drinking water, hot water and cooling water.
0~90℃ (clear water), -35~110℃ (water, ethylene glycol (≤50%) mixed liquor)

Material specification



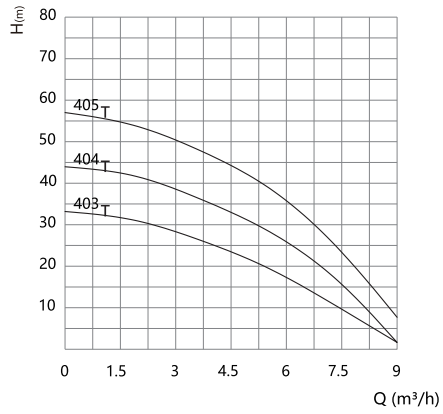
NO.	Components	Quantity	Materials
1	pump housing	1	Stainless steel
2	Five-port check valve	1	Nickel-plated copper
3	Pressure tank	1	/
4	Cross recessed pan head bolt	2	Stainless steel
5	Inverter	1	/
6	Connection Wire	1	/
7	Power cord (three-phase)	1	/
8	YTN-60Z Vibration -resistance oil pressure gauge	1	/
9	Pressure transducer	1	/

Product range

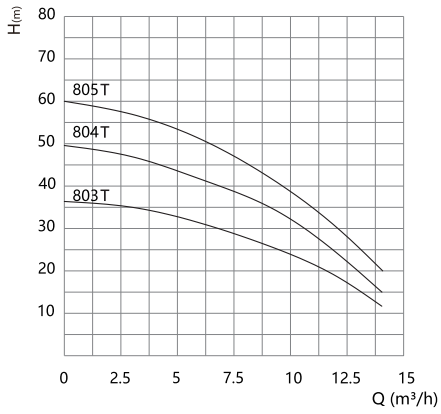
Pump model	Power	Max. Head(m)	Max. Flow(m^3/h)	Inlet	Outlet
F-AHM 403T	1~ 220V/50Hz	33	8	G1¼ ″	G1″
F-AHM 404T		42	8		
F-AHM 405T		57	8		
F-AHM 803T		35	12	G1½″	G1¼″
F-AHM 804T		48	12		
F-AHM 805T		59	12		
F-AHM 1603T	3~ 380V/50Hz	36	26	G2″	G1½ ″

Performance curves and technical data

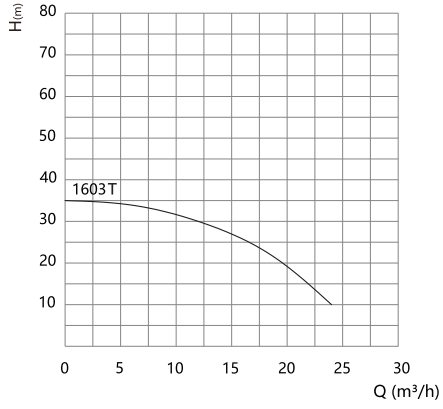
F-AHM 403T/404T/405T



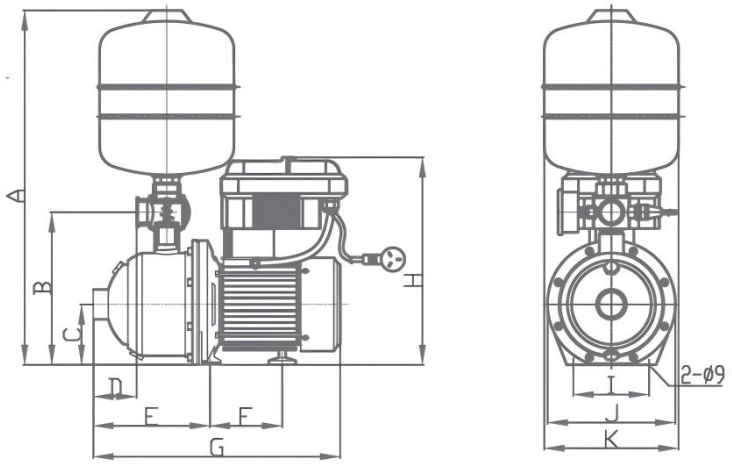
F-AHM 803T/804T/805T



F-AHM 1603T



Dimensions



Product type	Rated power (KW)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)	J (mm)	K (mm)
F-AHM 403T	0.55	525	225	90	64.5	201	85	371	308	108	ϕ190	200
F-AHM 404T	0.75	525	225	90	101	250	100	448	308	108	ϕ190	200
F-AHM 405T	1.1	565	225	90	101	250	100	448	316	108	ϕ190	200
F-AHM 803T	1.1	570	226.5	90	76.5	212	100	410	316	108	ϕ190	200
F-AHM 804T	1.5	570	228	90	137	272	145	500.5	331	108	ϕ190	200
F-AHM 805T	1.85	570	228	90	137	272	145	500.5	331	108	ϕ190	200
F-AHM 1603T	1.85	570	228	90	89.5	233	145	461.5	331	108	ϕ190	200

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