STM-W-D

Water Heater

Date:Jun. 2024

Version:Ver.H

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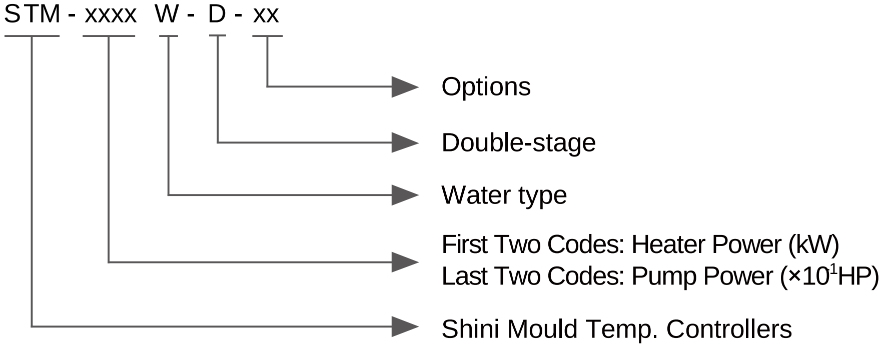
1. General Description

Read this manual carefully before operation to prevent damage of the machine or personal injuries.

STM-W-D series waters heater are used to heat up the mould and maintain temperature, although they can be used in other similar applications. The mould return water of this series dual-purpose heaters are directly cooled (standard model)/ indirectly cooled (high temp. model) by the cooler, then it is pressurized by the pump and sent to the mould after being heated up by high temperature pipe heater for heating to a constant temperature, which ensures stable temperature control.

Picture 1-1: Water Heater STM-W-D

1.1 Coding Principle


STM - xxxx W - D - xx
Options
Double-stage
Water type
First Two Codes: Heater Power (kW)
Last Two Codes: Pump Power (×10¹HP)
Shini Mould Temp. Controllers

1.2 Feature

- Adopt SSR solid-status heating output, and the maximum heating temp. is up to 120℃, with precision of ±0.5℃;
- Vertical design with small footprint;
- The controller adopts 4.3’’touch panel with dual-stage independent displayer for easy operation;
- Adopt high efficiency water cycle pump.
- Multiple safety display and alarm devices including power reverse phase protection, pump overload protection, overheat protection, and high & low level protection.
- Equipped with power-on exhausting, automatic water supplying and air exhausting function.
- Direct cooling with excellent refrigerating effect. Auto refilling device cools down the temperature to set value directly.
- Adopted RS485 communication function to realize central monitoring online;

1.3 Options

- Displays of mould temperature and return oil temperature of mould are optional, and add “TS” at end of the model code.
- For models optional with auto air-blowing function, add "A" at the end of the model code.
- For models optional with manual air-blowing function, add "MA" at the end of the model code.

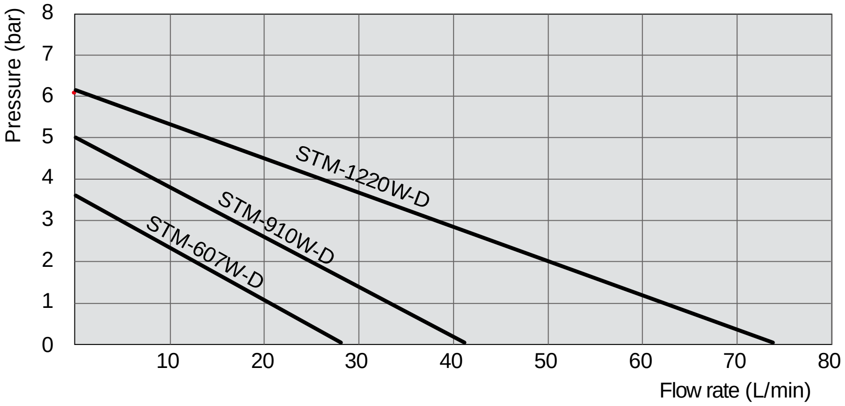
All machine service should be performed by professional technicians. This manual is applicable to the operator and maintenance personnel on the field. The service instruction of Chapter 6 is intended for service engineers, and other chapters are for the operator.

Any modifications of the machine must be approved by SHINI in order to avoid personal injury and machine damage. We shall not be liable for any damage caused by unauthorized change of the machine.

Our company provides excellent after-sales service. If there's any problem during the application, please contact the company or local vendor.

Shini Hotline Service:
Headquarter and Taipei factory:
Tel: + 886 (0)2 2680 9119
Shini Plastics Technologies (Dongguan), Inc.:
Tel: +86 (0)769 8331 3588
Shini Plastics Technologies (Pinghu), Inc.:
Tel: +86 (0)573 8522 5288
Shinden Precision Machinery (Chongqing), Inc.:
+86 (0)23 6431 0898

1.4 Pump Performance



Picture 1-2: Pump Performance

1.5 Reference Formula of Mould Controllers Model Selection

Heater Power (kW) = mould weight (kg) × mould specific heat (kcal/kg℃) × temperature difference between mould and environment (℃) × safety coefficient / heating duration / 860

Note: safety coefficient can select a value from 1.3 to 1.5.

Flow Rate (L/min) = heater power (kw) × 860 / [heating medium specific (kcal/kg℃) × heating medium density (kg/L)×in/outlet temperature difference (℃)× time (60)]

Note: Water specific heat =1kcal/kg℃

Heating medium oil specific heat =0.49kcal/kg℃

Water density =1kg/L

Heating medium oil density =0.842kg/L

1.6 Safety Regulations

Strictly abide by the following safety regulations to prevent damage of the machine or personal injuries.

1.6.1 Safety Signs and Labels

⚠ Danger!

The unit is designed to endure high temp, and high pressure. For safe operation, do not remove the covers or switches.

⚠ Attention!

The unit should be operated by qualified personnel only.

During operation, avoid wearing gloves or clothes that may cause danger.

Turn off main switch when power supply is off.

Stop the unit when there may be power supply problems caused by static electricity.

Put on safety gloves and shoes during installation or relocation.

Components from our company can only be used for replacement.

⚠ Warning!

Do not touch the switch with wet object or hands.

Do not use the machine before fully aware of its performance.

Be careful not to touch or hit the switch or sensor.

Please keep enough operation space, and keep away obstacles.

To avoid producing statics, clean the floor from oil or water to keep a dry environment.

Protect the machine against severe vibration or collision.

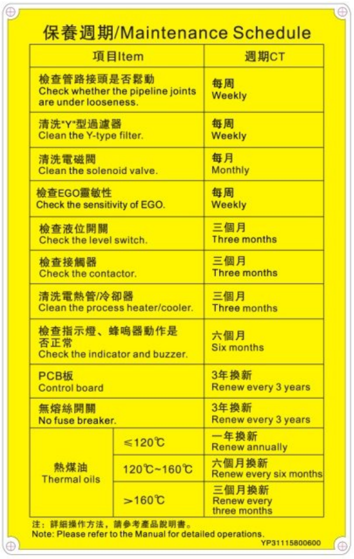
Do not remove safety signs or make it dirty.

Drunken, medicine-taking, or men without proper judgment should not operate the machine.

Warning!

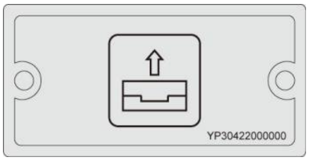
High temperature, take care of hands! This label is attached on the surface of heating parts.

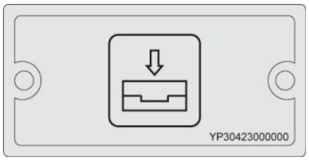
1.6.2 Signs and Labels

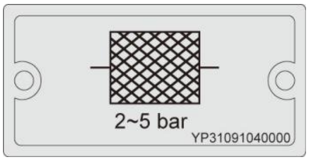
<table>
<tr>
<td>


保養週期/Maintenance Schedule

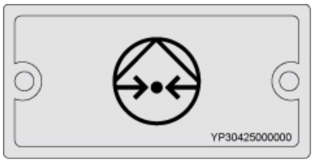
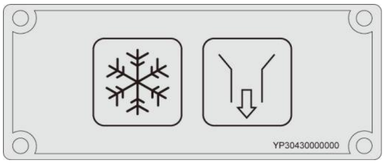
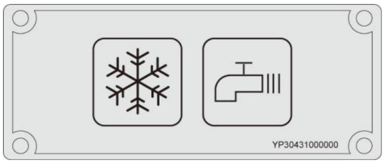
<table>
<tr><th colspan="2">項目Item</th><th>週期CT</th></tr>
<tr><td colspan="2">檢查管路接頭是否鬆動
Check whether the pipeline joints are under looseness.</td><td>每周
Weekly</td></tr>
<tr><td colspan="2">清洗"Y"型過濾器
Clean the Y-type filter.</td><td>每周
Weekly</td></tr>
<tr><td colspan="2">清洗電磁閥
Clean the solenoid valve.</td><td>每月
Monthly</td></tr>
<tr><td colspan="2">檢查EGO靈敏性
Check the sensitivity of EGO.</td><td>每周
Weekly</td></tr>
<tr><td colspan="2">檢查液位開關
Check the level switch.</td><td>三個月
Three months</td></tr>
<tr><td colspan="2">檢查接觸器
Check the contactor.</td><td>三個月
Three months</td></tr>
<tr><td colspan="2">清洗電熱管/冷卻器
Clean the process heater/cooler.</td><td>三個月
Three months</td></tr>
<tr><td colspan="2">檢查指示燈、蜂鳴器動作是否正常
Check the indicator and buzzer.</td><td>六個月
Six months</td></tr>
<tr><td colspan="2">PCB板
Control board</td><td>3年換新
Renew every 3 years</td></tr>
<tr><td colspan="2">無熔絲開關
No fuse breaker.</td><td>3年換新
Renew every 3 years</td></tr>
<tr><td rowspan="3">熱煤油
Thermal oils</td><td>≤120℃</td><td>一年換新
Renew annually</td></tr>
<tr><td>120℃~160℃</td><td>六個月換新
Renew every six months</td></tr>
<tr><td>>160℃</td><td>三個月換新
Renew every three months</td></tr>
</table>

注：詳細操作方法，請參考產品說明書。
Note: Please refer to the Manual for detailed operations.
YP31115800600
</td>
<td>Please according to schedule to make regular maintenance.</td>
</tr>
<tr>
<td>


</td>
<td>From mould: connector for circulating water/oil coming from mould.</td>
</tr>
<tr>
<td>


</td>
<td>To mold: connector for circulating water/ oil to go to mould.</td>
</tr>
<tr>
<td>


</td>
<td>1. To maintain temperature consistency, cooling water pressure must be higher than 2 bar at all time, but should never exceed 5 bar in any case.
2. Clean Y-shape Cooling Water Strainer periodically to ensure perfect cooling capacity.</td>
</tr>
</table>

	Pump pressure gauge
	Water outlet: drainage outlet.
	Water inlet: inlet for replenishing water and cooling water.

1.6.3 Operation Regulations

1) Before operation, make sure that cooling water is clean soft water without pollutants.

※ Low quality water brings limescale, which may cause problems.

※ If the water quality is not good, it will break the pipe heater, damage the pump impeller and reduce the flow, which prevents temperature rise.

2) If problems of drainage or bad temperature control are noted, please clean solenoid valve and cooling water inlet and outlet.
3) Do not move the unit when it is in operation.
4) When in need of repairing, wait until oil temperature falls below 30℃.
5) The mould temperature controller is equipped with pump overload device: When it is overloaded, the pump and pipe heater will stop. At this time, check the fault of pump overload (phase shortage, pipeline blockage, bearing damage, etc.). After everything returns normal, reset the pump overload information in the controller to resume operation.
6) Before turn off the pump, wait until oil temperature falls blow 50℃. Or the life of the unit would be affected.

7) In order to ensure constant heating temperature, the cooling water pressure shall be 2 ~ 5kg / cm2. If the working temperature is below 100℃,it can set the pressure switch to 1.5~2bar; If the setting temperature sets between 100℃ and 200℃, then the recommendable pressure switch setting value should be 2.8 bar. If the cooling water pressure is too low, then the pressure switch setting value can be adjusted properly to ensure normal running. However, it may affect the limitation of setting temperature or cause unstable temperature control.
8) Please connect the cooling water outlet with high temperature resistant pipe when temperature is above 100℃.

1.7 Exemption Clause

The following statements clarify the responsibilities and regulations born by any buyer or user who purchases products and accessories from Shini (including employees and agents).

Shini is exempted from liability for any costs, fees, claims and losses caused by reasons below:

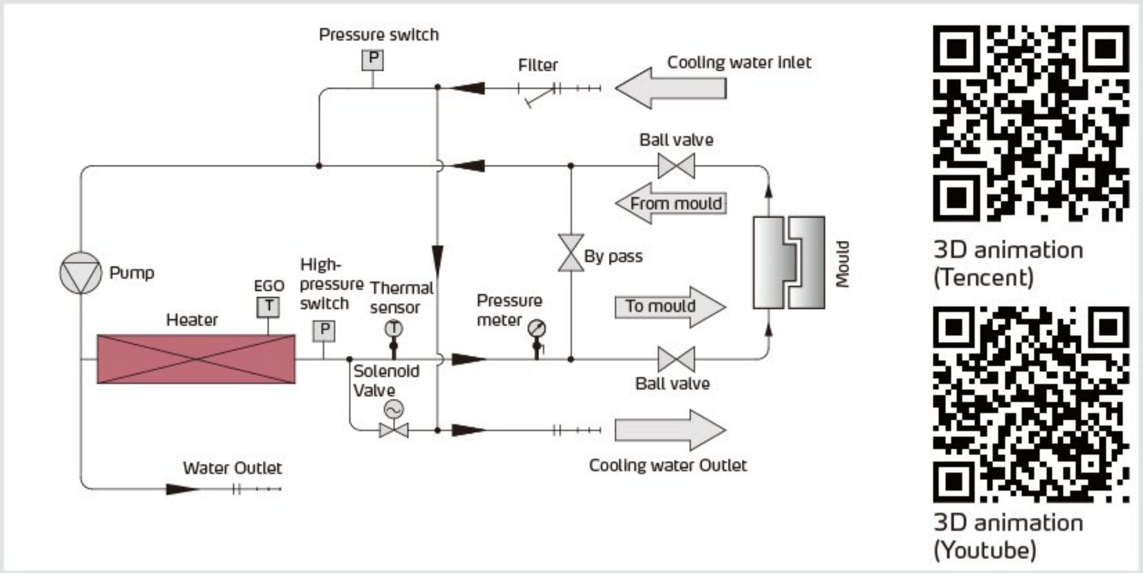
1) Any careless or man-made installations, operation and maintenances upon machines without referring to the Manual prior to machine using.
2) Any incidents beyond human reasonable controls, which include man-made vicious or deliberate damages or abnormal power, and machine faults caused by irresistible natural disasters including fire, flood, storm and earthquake.
3) Any operational actions that are not authorized by Shini upon machine, including adding or replacing accessories, dismantling, delivering or repairing.
4) Employing consumables or oil media that are not appointed by Shini.

2. Structure Characteristics and Working Principle

2.1 Main Functions

STM-W-D series waters heater are used to heat up the mould and maintain temperature, although they can be used in other similar applications. This series of water heater takes water as the heat medium, featuring low cost and environment-friendly, which ensures good working environment of the workshop. As the water is circulating in the high pressure hermetic constantly, the water is still in liquid status even if the water temp. is greater than 100 ℃, making a more stable system. Besides, this series of models are equipped multiple options and accessories to meet different production demands.

2.1.1 Working Principle


Pressure switch
P
Filter
Cooling water inlet
Ball valve
From mould
Pump
EGO
T
High-pressure switch
Thermal sensor
By pass
Mould
Pressure meter
To mould
Heater
P
Solenoid Valve
Ball valve
Water Outlet
Cooling water Outlet
3D animation (Tencent)
3D animation (Youtube)

Picture 2-1: System flow (Direct Cooling)

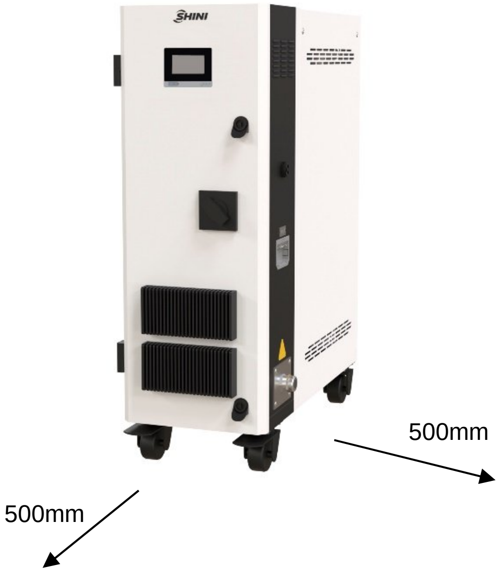
High temperature water returns to the machine and then be pressured by pump to the heater. After being heated, water will be forced to mould and continue the circle. In the process, if the water temperature is too high, the system will activate the solenoid valve to let cooling water cool down the temperature directly until the water is down to the system requirement, thus achieving constant temperature control. If the temperature keeps increasing and reach to the set point of EGO, system will sound high pressure alarm and stop operation; when system pressure is too high (Reach set value of high pressure switch), alarm would sounds and machine halts; when cooling water pressure fails to reach the set value, pressure switch will send a signal of water storage to launch low pressure alarm and machine halts.

3. Installation and Debugging

3.1 Installation Space

During installation of the machine, keep at least 500mm installation space around the machine as shown by the picture. Do not install the machine in a position crowded with other objects. This would cause inconvenience to operation, maintenance and repair. Do not sit on the machine.

Keep away flammable and explosive goods.



Picture 3-1：Installation Space

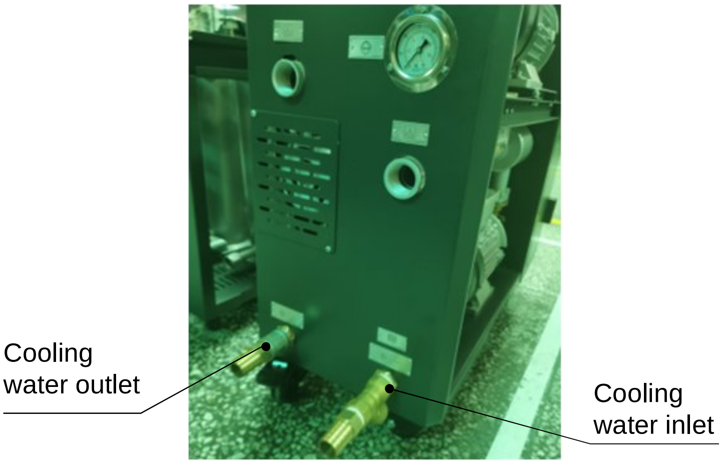
3.2 Pipeline Connection

1) The size of heating tank and return water pipe inlet and outlet
   STM-607W-D/910W-D：3/4’’PT female thread
   STM-1220W-D：1’’PT female thread
2) Cooling water connection
   Connect the cooling water inlet to the clean water source, and connect the cooling water outlet to the drainage port, and then turn on the water source. The cooling water flow shall not be less than 10L / min.

Refer to the ***Water Quality for Industrial Boilers*** GB1576-2001

Table 3-1：Cooling Water Inlet and Outlet Size

Model	Water Inlet and Outlet Size	Joint Type
STM-607W-D/910W-D	ф13mm（ext. diameter）	Pagoda joint
STM-1220W-D	ф25mm（ext. diameter）	Pagoda joint



Picture 3-2：Cooling Water Connection

Note: Cooling water inlet and outlet as shown by the Figure. Please do not connect reversely. Please connect the cooling water outlet with high temperature resistant pipe (The working temp. is not less than the STM heating temp.) when temperature is above 100℃.

3.3 Power Connection

The water heaters need a proper electrical grounding to ensure the equipment safe operation.

1) Make sure the voltage and frequency of the power source comply with those indicated on the manufacturer nameplate that attached to the machine.

2) Power cable and earth connection should conform to your local regulations.
3) Use independent electrical wires and power switch. Diameter of electrical wire should not be less than those used in the control box.
4) The power cable connection terminals should be tightened securely.
5) The machine requires 3-phase 3-wire power source, connect the power lead (L1, L2，L3) to the live wires, and the earth (PE) to the ground.
6) Power supply requirements:

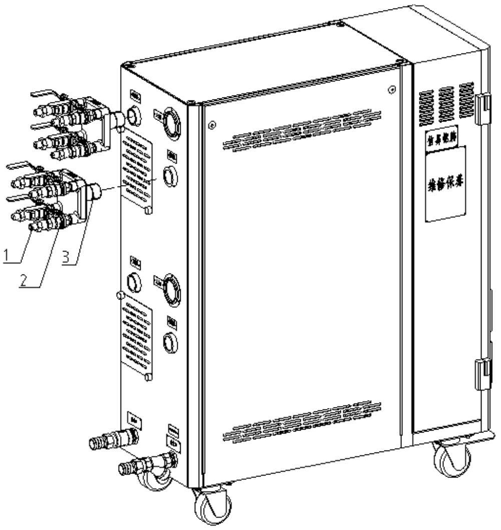
Main power voltage: +/- 5%

Main power frequency: +/- 2%

7) ***Please refer to electrical drawing of each model to get the detailed power supply specifications***

3.4 Options Installation

3.4.1 Installation steps for options water manifold (dewaxing).

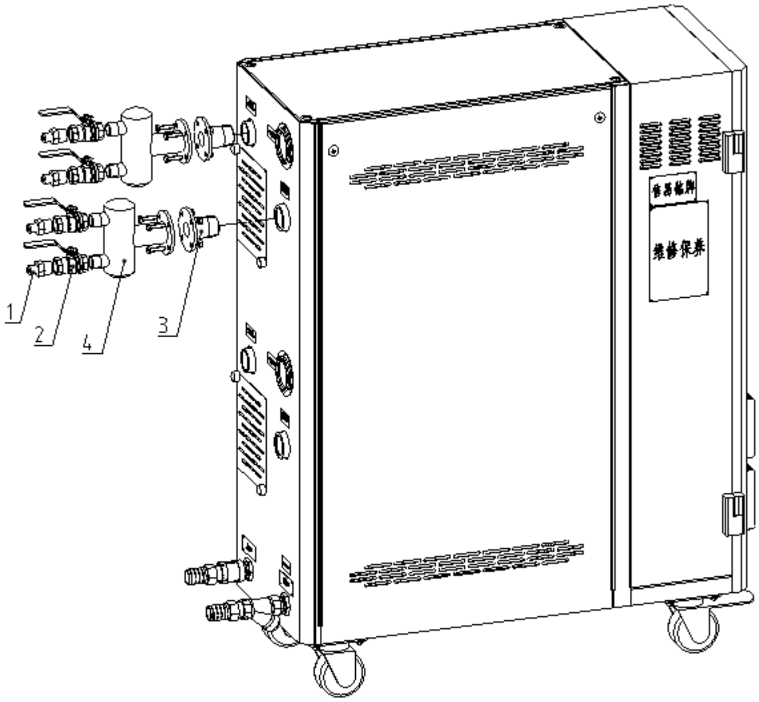


1) Install copper joint to the globe valve;
2) Install globe valve with copper joint to the dewaxing water manifold.
3) Install water manifold to the machine.
4) Install Teflon to copper joint.

⚠ Attention!

Note: For the operating temperature not higher than 200℃, Teflon with temperature resistance 200℃ is usable; for the operating temperature from 200 to 300℃, must use Teflon with temperature resistance 300℃.

3.4.2 Installation steps for options water manifold (welding)



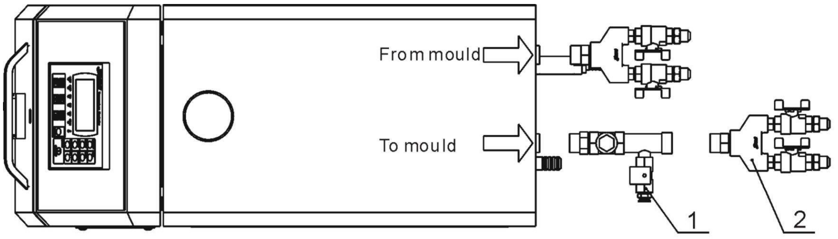
1) Install copper joint to the globe valve;

2) Install globe valve with copper joint to the dewaxing water manifold.
3) Install water manifold to the machine.
4) Connect the water manifold with the connector with screws;
5) Install Teflon to copper joint.

⚠ ***Attention!***

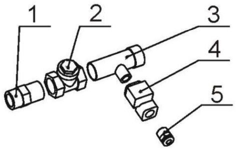
Note: For the operating temperature not higher than 200℃, Teflon with temperature resistance 200℃ is usable; for the operating temperature from 200 to 300℃, must use Teflon with temperature resistance 300℃.

3.4.3 Installation Steps for Function of Water Drainage via. Air Blowing



1. Air blowing joint parts 2. Water distributor

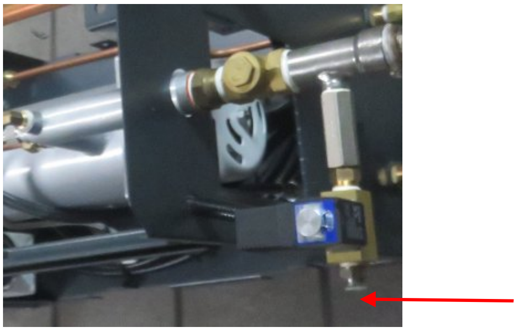
Air blowing joint parts



1. Pipe coupler 2 .Non-return valve 3 .Air blowing joint
4. Solenoid valve 5. Quick pipe joint

1) Connect the air blowing joint parts to “Toward mold mouth” on mold temperature controller and then install the water flow regulator.

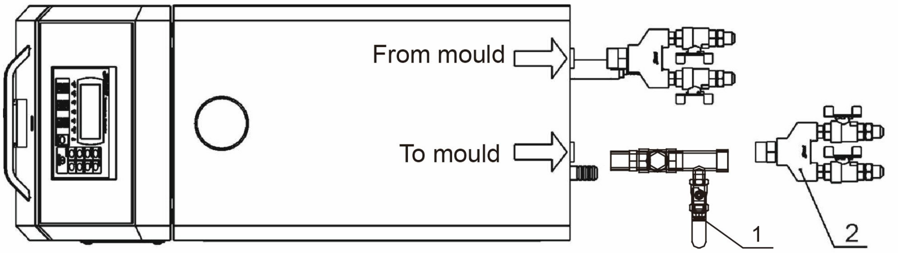
2) When it's in oFF state, enter the user setting screen and click reverse emptying, and it will start the emptying valve; It can start up and shut down by manual, or stop automatically after running the “reverse time”.
3) "Reversal time" is set in the column of emptying time and emptying temperature in "Project Parameter - Operation".
4) The compressed air pressure range is 2 ~ 6bar. It uses the clean high-pressure air without water. Connect the quick air pipe connector shown in above Picture 5. If the high-pressure air in customer’s plant doesn’t meet the requirements, please provide the filter & pressure regulator by yourself.



5) Wiring the solenoid valve.

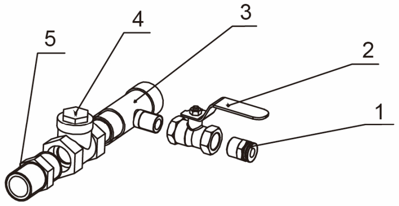
The solenoid valve is connected to the signal output terminal block of the emptying valve. Please refer to the details of each model’s circuit diagram.

3.4.4 Installation and Operation Steps of the Optional Manual Air Drainer



1. Air-blowing connector assemblies 2. Water flow regulator

Assembly drawing of the air-blowing connector



1. Air pipe quick connector 2. Ball valve 3. Air-blowing connector
4. One-way valve 3/4’’ 5. 3/4’’ copper pipe coupler

1) Connect the air blowing joint parts to “Toward mold mouth” on mold temperature controller and then install the water flow regulator.

2) When the machine shuts down, open the globe valve on the manual air-blowing drainer’s joint assembly to drain the water (When the Mould Temp. Controller is ON, the globe valve on the manual air-blowing drainer’s joint assembly is closed).

3) Close the ball valve on the manual air drainer connector after it works for 1-2 mins. to drain the water. Then, close the ball valve on the water flow regulator, and remove the mould.

4) The compressed air pressure range is 2 ~ 6bar. It uses the clean high-pressure air without water. Connect the quick air pipe connector shown in above Picture 5. If the high-pressure air in customer’s plant doesn’t meet above requirements, please provide the filter & pressure regulator by yourself.
5) The compressed air is connected to the quick air pipe connector. There’s no filter & pressure regulator with the machine, which needs to be provided by the customer.

4. Application and Operation

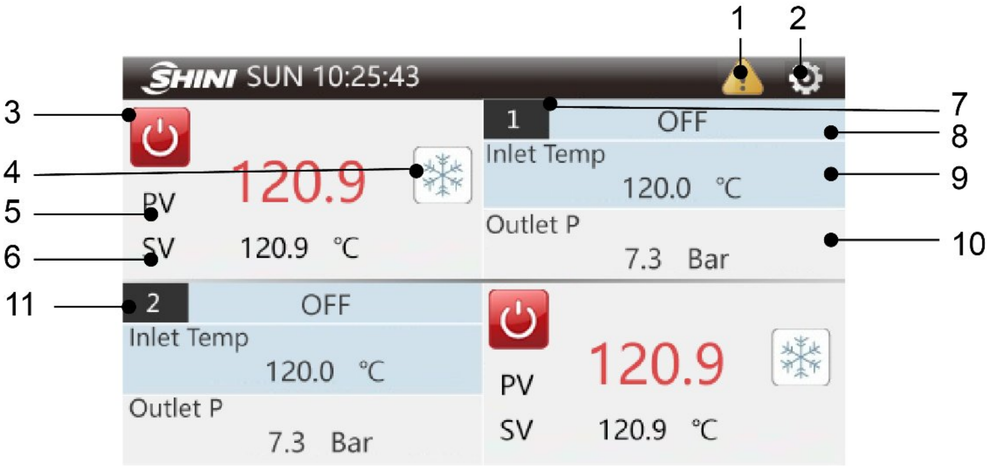
4.1 Machine Startup

After the system is powered on, the panel displays the startup screen, as below:

Picture 4-1: Startup Screen

4.2 Main Screen

4.2.1 Standby Screen



SHINI SUN 10:25:43

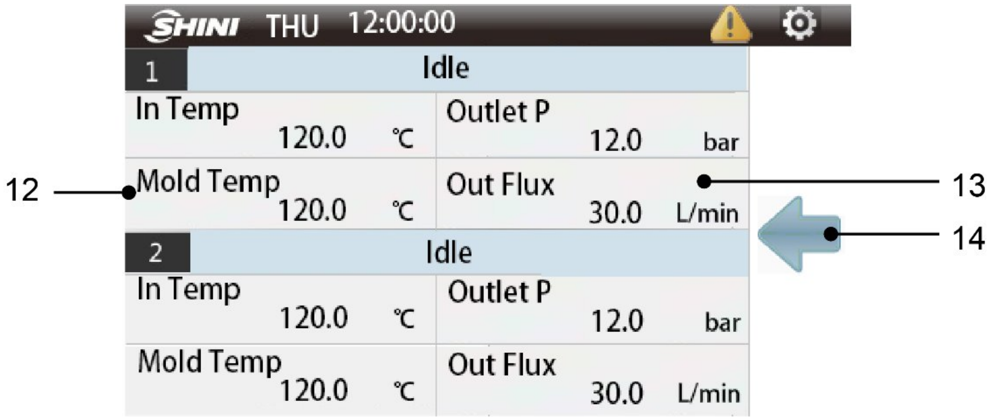
1 OFF
Inlet Temp 120.0 ℃
Outlet P 7.3 Bar

PV 120.9
SV 120.9 ℃

2 OFF
Inlet Temp 120.0 ℃
Outlet P 7.3 Bar

PV 120.9
SV 120.9 ℃

Picture 4-2: Standby Screen(1)



1	Idle		
In Temp 120.0 ℃		Outlet P 12.0 bar	
Mold Temp 120.0 ℃		Out Flux 30.0 L/min	
2	Idle		
In Temp 120.0 ℃		Outlet P 12.0 bar	
Mold Temp 120.0 ℃		Out Flux 30.0 L/min	

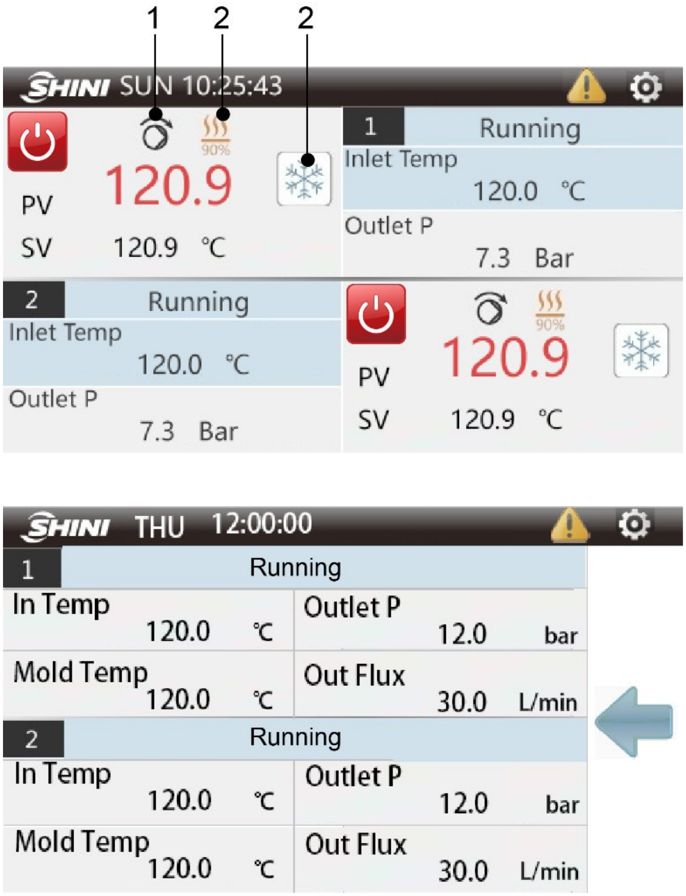
Picture 4-3: Standby Screen(2)

Table 4-1: Standby Screen Icon & Press Key Description

No.	Icon	Name	Function Type	Description
1	⚠	Fault inquiry	press key	1. When the system failure occurs, it will flash on the main interface. Click to enter and query current fault information; 2. When there's no fault in the system, press to enter the "Historical Faults" query.
2	⚙	Setting	press key	Enter the user setting screen
3	⏻	Switch	press key	⏻ standby status， ⏻ running status
4	❄	Forced cooling	button	❄ Press to activate the forced cooling function ❄ Press to close the forced cooling function
5	PV	Actual temp. value	display only	Used to display the actual value of the controlled temp.

6	SV	Set temp. value	press key	Click this button to set the heating temp..
7	1	Machine No.1	display only	It displays machine No.1.
8	OFF	Standby	display only	Display machine running status.
9	Inlet Temp	Return medium temp.	display only	Display the medium temp. returned from the mould, which is optional function. When this function is not optional, it displays gray.
10	Outlet P	Outlet medium pressure	display only	Display the medium real-time pressure, and the machine can exhaust the air and release the pressure based on actual pressure.
11	2	Machine No.2	display only	It displays machine No.2.l
12	Mold Temp	Mold Temp	Only display	Display the mould real-time temperature, and it’s an optional function. When not selecting this function, it will display grey.
13	Out Flux	Out Flux	Only display	Display the medium real-time flow, and it’s an optional function. When not selecting this function, it will display grey.
14	←	Upper Page	Press button	Click on Return to the standby main screen 1

4.2.2 Operation Screen



1 Running
Inlet Temp 120.0 ℃
Outlet P 7.3 Bar
PV 120.9
SV 120.9 ℃

2 Running
Inlet Temp 120.0 ℃
Outlet P 7.3 Bar
PV 120.9
SV 120.9 ℃

1 Running
In Temp 120.0 ℃
Outlet P 12.0 bar
Mold Temp 120.0 ℃
Out Flux 30.0 L/min

2 Running
In Temp 120.0 ℃
Outlet P 12.0 bar
Mold Temp 120.0 ℃
Out Flux 30.0 L/min

Picture 4-4: Operation Screen

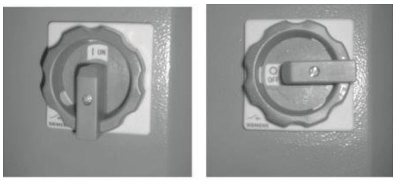
Table 4-2: Operation Screen Icon & Press Key Description

No.	**Icon**	**Name**	**Description**
1	⟳	Pump rotating /reverse rotating	This icon indicates the unit starts pump rotating/reverse rotating.
2	♨ 90% ❄	Heating/cooling	♨ ❄ This icon indicates the unit starts the temp. heating control. The bottom is heating percentage.

4.3 Startup and Shutdown

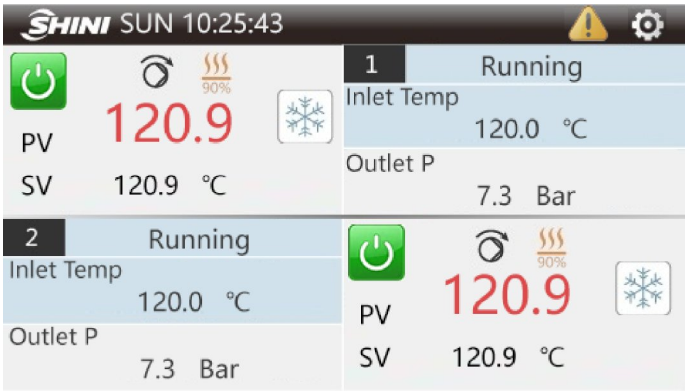
4.3.1 Start-up Steps

1) Connect the pipeline from the water heater’s water outlet and inlet to the mould pipeline properly (Please refer to Chapter 3 for details).
2) Connect the cooling water inlet/refilling port (Please refer to Chapter 3 for details).
3) Open the globe ball valve of all connected pipelines.
4) Turn “ON” the main power switch



ON OFF

Picture 4-5: Main power switch



SHINI SUN 10:25:43

PV 120.9
SV 120.9 ℃

1 Running
Inlet Temp 120.0 ℃
Outlet P 7.3 Bar

2 Running
Inlet Temp 120.0 ℃
Outlet P 7.3 Bar

PV 120.9
SV 120.9 ℃

Picture 4-6: Running Screen

5) Click the value corresponding to the SV to set the required temp. The upper limit temp. is the max. value can be set by the system (The values of various models are as follows)

Table 4-3: Upper Limit Temp. and Maximum Temp. of Each Model

Model	Upper Limit Temp.	Lower Limit Temp.
STM	200°C	Default value: 0°C
STM-HT	300°C	
STM-W/STM-WF/STM-WE/STM-W-D	120°C	
STM-PW	180°C	
STM-W/O	Water 90°C , Oil 160°C	

Note: It requires external cooling water to cool the unit, and the cooling temperature will be greater than the cooling water temperature.

Temp. Unit ——℃/℉(Celsius / Fahrenheit)

Decimal point—— min. temp. unit: 1℃/℉ or 0.1℃/℉, default: 1

6) After setting the temperature, click <Switch Button>, the pump will run T2 time automatically to exhaust the air in the system after the machine refills the water automatically for T1 time. When T2 time is over, the pipe heater will start.

   Water refilling time T2: water refilling interval; After the pump is started, the water refilling valve is still open, and the heater will start to work after the time is over.

Table 4-4: Water Refilling Time of Each Water Heater Model

Model	**STM-607W/W-D/PW /PW-D/HPW/WF STM-910W/W-D//WF**	**STM-1220W/W-D/PW/WF / /STM-2440W/STM-2430WF**	**STM-3650W /STM-3650WF /STM-4875WF**
t1	60S	120S	180S
t2	10S	15S	20S

4.3.2 Shutdown

1) In the standby screen, press the < Forced Cooling > button to turn off the heating output, and the cooling is 100% on.

2) When the temp. drops below 50 ℃, press the < Forced Cooling > button to turn off the forced cooling, and then press the < Switch > key to stop the operation.

3) Turn the main power switch to the OFF position.

⚠ ***Attention!***

When the main power switch is at ON position, be careful of the electric shock danger!

⚠ ***Attention!***

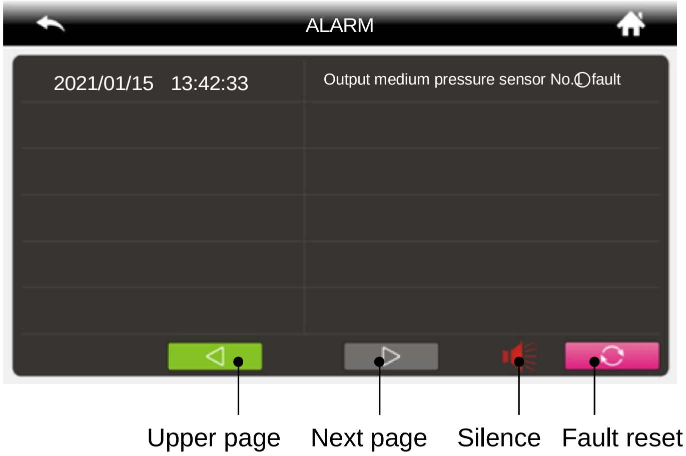
The pump running direction must be correct!

⚠ ***Attention!***

In order to reduce the machine damage and prolong the service life, please start and shut down according to the correct steps.

4.4 Current Fault Inquiry

When the unit fails, in the “Operation” screen, the < Fault Inquiry > button will flicker. At this time, click the < Fault Inquiry > button to silence and enter following screen:


ALARM

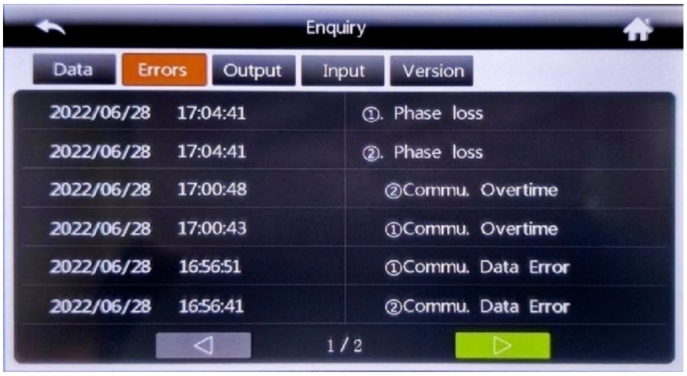
2021/01/15 13:42:33 Output medium pressure sensor No.①fault

Picture 4-7: Current Fault Inquiry Screen

Table 4-5: Current Fault Inquiry Screen Icon Key Description

Press Key	**Key Name**	**Description**
⟳	Fault reset	After trouble-shooting, press this key to reset the fault.
🔊	Silence	Eliminate the system alarm sound
◁	Page up	Turn the page to query the fault information, gray key can’t be pressed, and green key can be pressed.
▷	Page down	Turn the page to query the fault information, gray key can’t be pressed, and green key can be pressed.

When there is no fault currently, click the < Fault Inquiry > button in the "Operation" screen to enter the history fault inquiry.


Enquiry
Data
Errors
Output
Input
Version
1 / 2

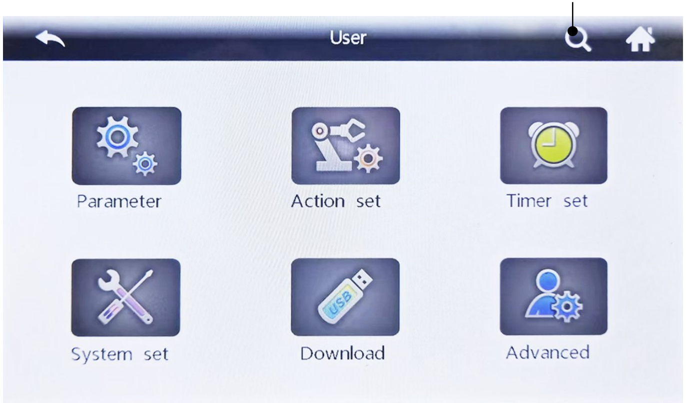
2022/06/28	17:04:41	①. Phase loss
2022/06/28	17:04:41	②. Phase loss
2022/06/28	17:00:48	②Commu. Overtime
2022/06/28	17:00:43	①Commu. Overtime
2022/06/28	16:56:51	①Commu. Data Error
2022/06/28	16:56:41	②Commu. Data Error

Picture 4-8: History Fault Inquiry Screen

4.5 Inquiry Screen

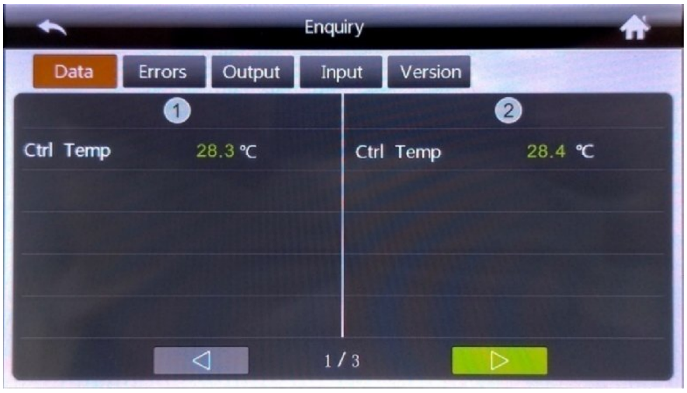
In the "Operation" screen, click the < Setting > button to enter the "User Setting" screen, and click the < Inquiry> button to enter the inquiry screen.

Inquiry

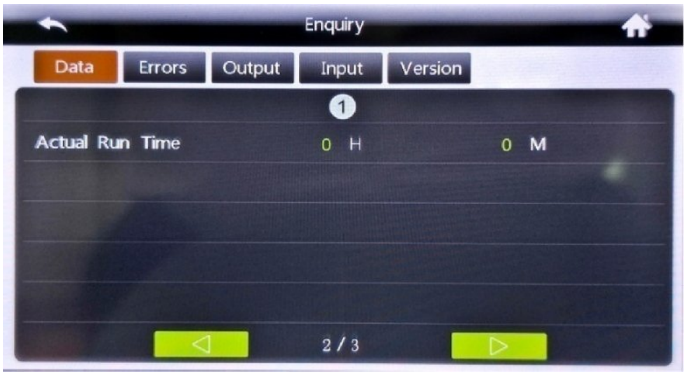

User
Parameter
Action set
Timer set
System set
Download
Advanced

Picture 4-9: User Setting Screen

4.5.1 Data Inquiry


Enquiry
Data
Errors
Output
Input
Version
1
2
1 / 3

①		②	
Ctrl Temp	28.3 ℃	Ctrl Temp	28.4 ℃


Enquiry
Data
Errors
Output
Input
Version
1
2 / 3

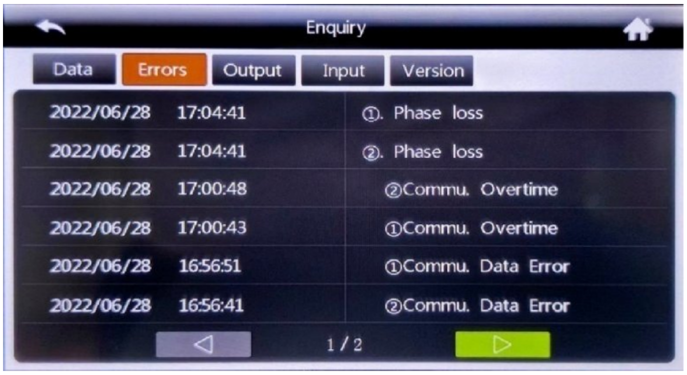
Actual Run Time 0 H 0 M

Picture 4-10: Data Inquiry Screen

It starts to count the unit running time after the assembly is finished, so the new machine will need some time for running.

Check the current temperature or pressure of all probes in the system, and the system running time.

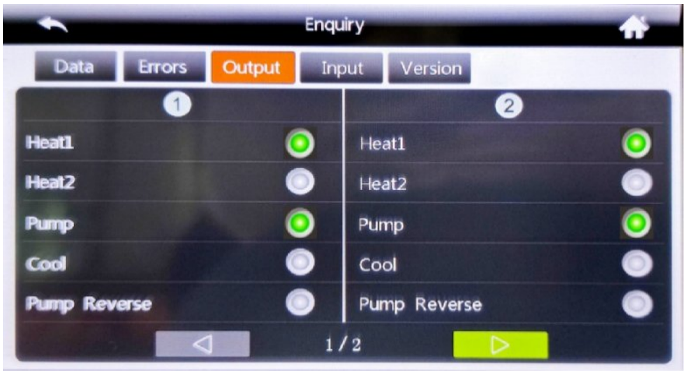
4.5.2 History Fault Inquiry


Enquiry
Data
Errors
Output
Input
Version
1 / 2

2022/06/28 17:04:41 ①. Phase loss
2022/06/28 17:04:41 ②. Phase loss
2022/06/28 17:00:48 ②Commu. Overtime
2022/06/28 17:00:43 ①Commu. Overtime
2022/06/28 16:56:51 ①Commu. Data Error
2022/06/28 16:56:41 ②Commu. Data Error

Picture 4-11: History Fault Inquiry Screen

4.5.3 Output Inquiry


Enquiry
Data
Errors
Output
Input
Version
1
2
1 / 2

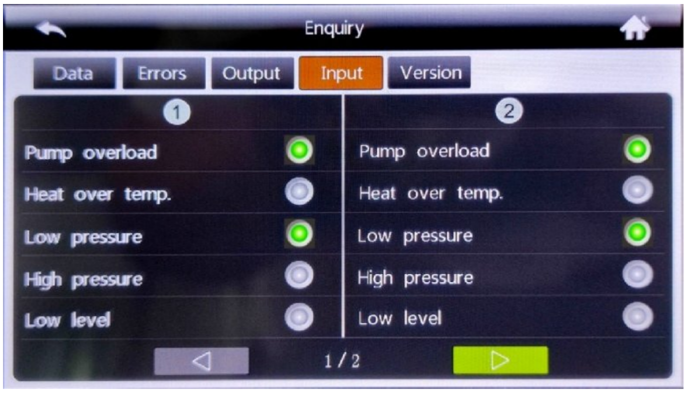
1		2	
Heat1	●	Heat1	●
Heat2	○	Heat2	○
Pump	●	Pump	●
Cool	○	Cool	○
Pump Reverse	○	Pump Reverse	○

Picture 4-12: Output Inquiry Screen

When the indicator ○ is gray, it means that the corresponding relay has no output.

When the indicator ● is green, it means that the corresponding relay is outputting.

4.5.4 Input Inquiry


Enquiry
Data
Errors
Output
Input
Version
1 / 2

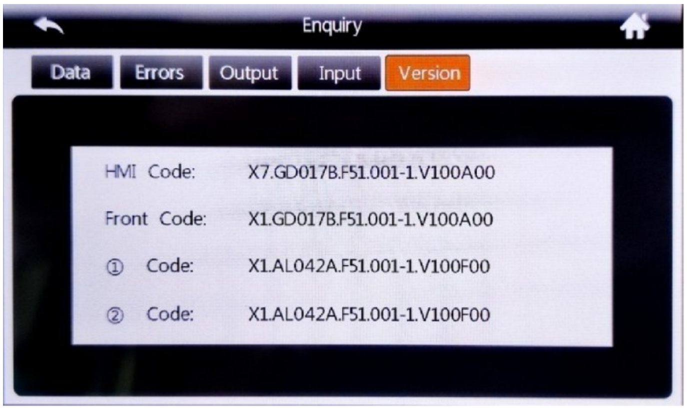
①		②	
Pump overload	●	Pump overload	●
Heat over temp.	○	Heat over temp.	○
Low pressure	●	Low pressure	●
High pressure	○	High pressure	○
Low level	○	Low level	○

Picture 4-13: Input Inquiry Screen

When the indicator ○ is gray, it means that the corresponding switching value input is invalid

When the indicator ● is green, it means that the corresponding switching value input is valid.

4.5.5 Controller Version Inquiry


Enquiry
Data
Errors
Output
Input
Version

HMI Code: X7.GD017B.F51.001-1.V100A00

Front Code: X1.GD017B.F51.001-1.V100A00

① Code: X1.AL042A.F51.001-1.V100F00

② Code: X1.AL042A.F51.001-1.V100F00

Picture 4-14: Version Inquiry Screen

Take actual display as standard.

4.6 Password Management

4.6.1 Login

Two groups of user names and passwords, as shown in the Table below:

Table 4-6: User and Password Function

User Name	Password (can be modified)	Function
User	none	Enter【User Setting】screen
Project	3588	Enter【Project Setting】【User Setting】screen
Manufacturer	6361	Enter the【Manufacturer Set】interface

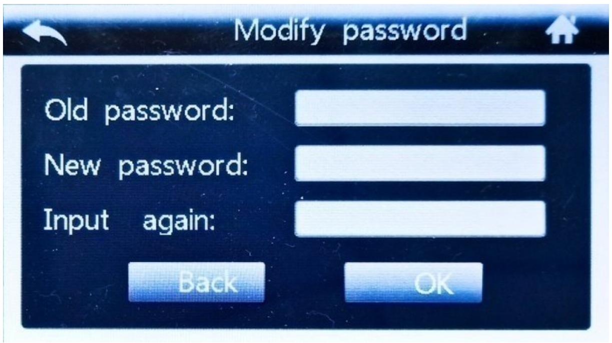
4.6.2 Password Modification

In the "User Setting" screen, click < System Setting >, and then click < Modify User Password >, it can modify the user password;

In the "Project" screen, click < Password Mgmt. >, and then click < Modify Project Password >, it can modify the project's password;

The modifying steps of the two groups of passwords are the same. Take "User" password modification as an example, as follows:

Enter "User Setting" screen, click <System Setting>, and then click < Modify User Password > to enter the screen below:



Picture 4-15: Modifying User Password Screen

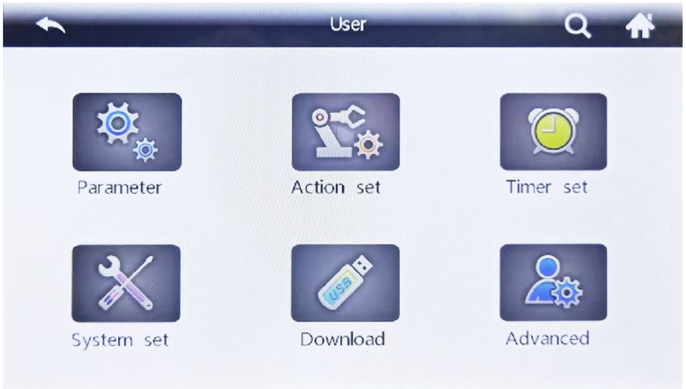
1) Enter the old password.
   If the password is wrong, the password input box displays "Password Error". Press the input box to clear and re-enter the old password.
2) Input the new password;

3) Input the new password again;

4) Confirm

If the passwords of twice inputs are different, it will pop up the prompt box of "different passwords", it indicates the password modification is not success. If the modified password is successful, it will pop up the prompt box of "Password Modified Successfully! Please be noted to save the new password! ".

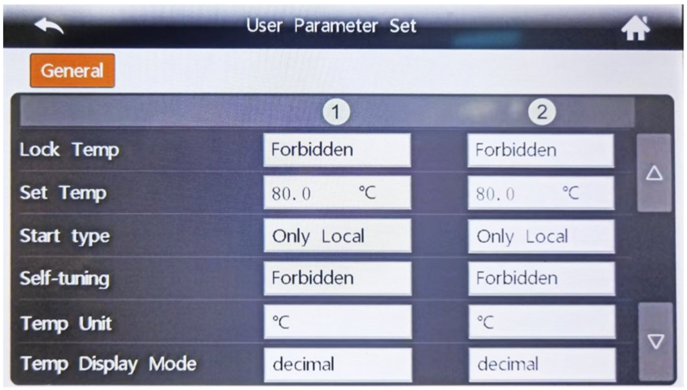
4.7 Setting Screen


User
Parameter
Action set
Timer set
System set
Download
Advanced

Picture 4-16: User Setting Screen

4.7.1 User Parameter Setting

Click the < User Parameter > button in the "Setting Screen" to enter the setting.


User Parameter Set
General
△
▽

	1	2
Lock Temp	Forbidden	Forbidden
Set Temp	80.0 ℃	80.0 ℃
Start type	Only Local	Only Local
Self-tuning	Forbidden	Forbidden
Temp Unit	℃	℃
Temp Display Mode	decimal	decimal

Picture 4-17: User Parameter Setting Screen

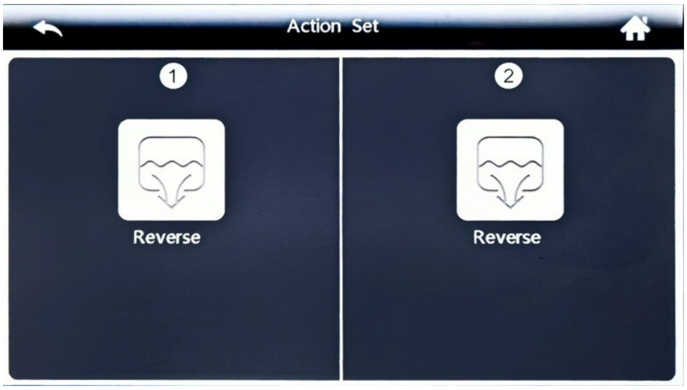
Table 4-7: User Parameter Description

Parameters	**Initial Value**	**Setting Range**	**Unit**	**Remarks**

Locking temp.	disable	disable ~ enable		When selecting the “Enable", it is not allowed to set temp. on the main interface.
Setting temp.	80.0	0-120.0	℃	
Start/stop Mode	local	local ~ local + remote ~ remote		Local: Unit startup and shutdown can only be controlled locally. Local + Remote: unit startup and shutdown can both be controlled locally and remotely. Remote: Unit startup and shutdown can only be controlled remotely.
Auto Tuning	disable	disable ~ enable		
Temp. Unit	℃	℃/℉		Temp. display unit.
Decimal Point	0.1	1/0.1		Main interface has min. temp. unit

4.7.2 Action Setting

Click the < Action Setting > button in the "Setting Screen" to enter this screen.



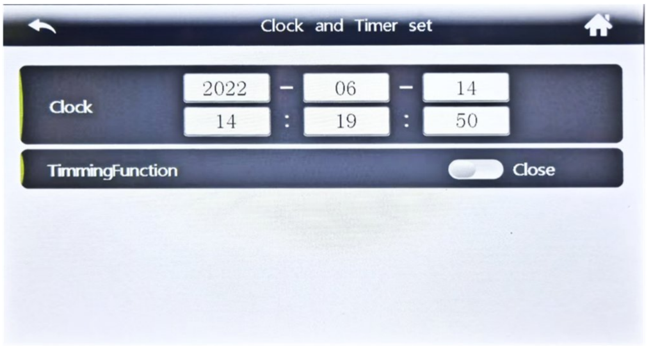
Picture 4-18: Action Setting Screen

Reverse emptying: After machine shutdown, start the pump reverse running and the emptying valve. It can start and stop manually, or run the [reversal time] and stop automatically. The default time is 60s and the start temp. is 60 ℃ (140 ℉).

Note: If the reverse emptying function is activated during machine operation, it will stop first, and then execute the reverse emptying action.

4.7.3 Timer Setting

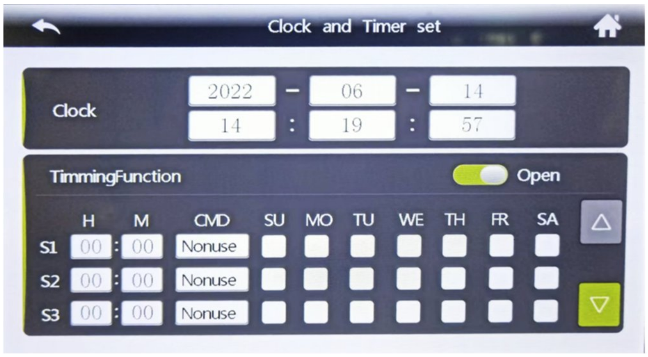
Click the < Timer Setting > button in the "Setting Screen" to enter this screen


Clock and Timer set

Clock 2022 – 06 – 14 14 : 19 : 50

TimmingFunction Close

Picture 4-19: Timer Setting Screen


Clock and Timer set

Clock 2022 – 06 – 14 14 : 19 : 57

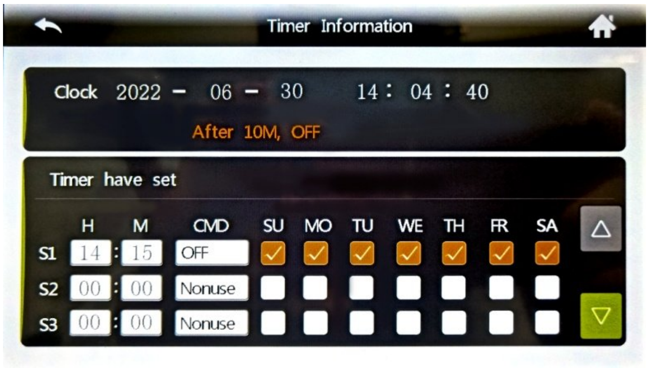
TimmingFunction Open

	H	M	CMD	SU	MO	TU	WE	TH	FR	SA
S1	00	00	Nonuse	☐	☐	☐	☐	☐	☐	☐
S2	00	00	Nonuse	☐	☐	☐	☐	☐	☐	☐
S3	00	00	Nonuse	☐	☐	☐	☐	☐	☐	☐

Picture 4-20: Timing On/Off Setting

Timer main switch: It is used to select the timing on/off function. After it is turned on, the user can check the main screen. There are six groups of time can be set in all, and the time of each group can be selected by the switch: unuse, timing on or timing off.

If the "timer main switch" is turned "ON", press the < Clock > button on the main screen to check the timing and modify the screen.


Timer Information

Clock 2022 – 06 – 30 14 : 04 : 40

After 10M, OFF

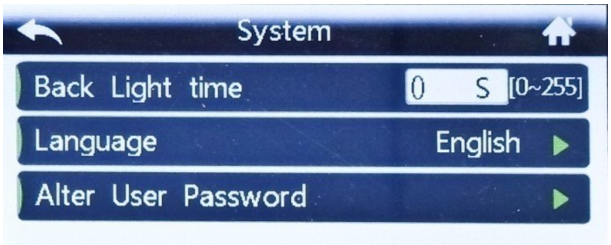
Timer have set

	H	M	CMD	SU	MO	TU	WE	TH	FR	SA
S1	14	15	OFF	☑	☑	☑	☑	☑	☑	☑
S2	00	00	Nonuse	☐	☐	☐	☐	☐	☐	☐
S3	00	00	Nonuse	☐	☐	☐	☐	☐	☐	☐

Picture 4-21: Timer Inquiry and Modification Screen

4.7.4 System Setting

In the "User Setting" screen, click the < System Setting > button to enter the picture below:



Back Light time 0 S [0~255]

Language English

Alter User Password

Picture 4-22: System Setting Screen

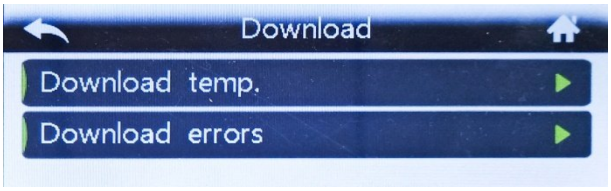
Table 4-8: System Setting Table

Set the backlight time	setting range is 0 ~ 255 secs.
Language	Chinese or English
The default user password	3588

4.7.5 Data Download

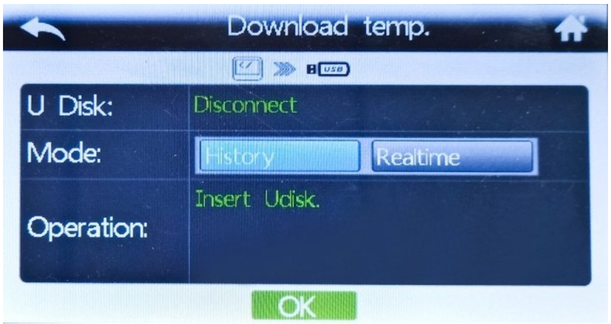
When downloading data, please use the U disk format: FAT32, and the recommended U disk capacity is 16g or below.

In the user setting screen, click the < Data Download > button to enter the following screen:


Download
Download temp.
Download errors

Picture 4-23: Data Download Screen

1) Temp. Data Download


Download temp.
History
Realtime
OK

U Disk: Disconnect

Mode:

Operation: Insert Udisk.

Picture 4-24: Temp. Data Download Screen

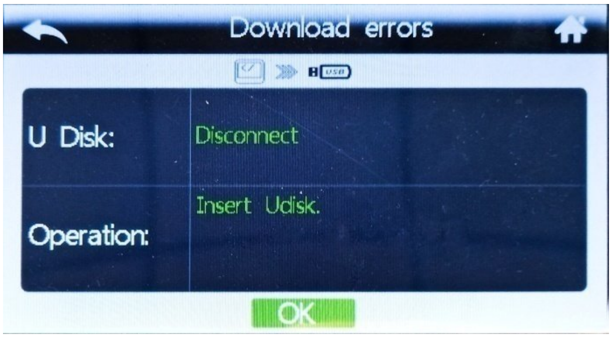
Local data backup: copy the temp. data on the display board to the U disk (the data of display board can be saved for up to 48 hrs.). Copy the temperature data stored on the display board to the USB flash disk. Insert the U disk, wait until the "U disk" displays "connected" status, and then follow the prompts. Other operations are prohibited during the download process.

Real-time data recording: After inserting the U disk and starting the real-time data recording function, the temp. data will be updated in real time and stored in the U disk automatically, and the recording will be interrupted after unplugging the U disk. Operations on other screens are available during recording.

⚠ ***Attention!***

After data export, a folder/SF51XXX will be created in the U disk root directory, and the data will be saved in Excel.
Important: Other operations are prohibited during downloading.

2) Alarm Record Download
The same as "Temp. Data Download" method.

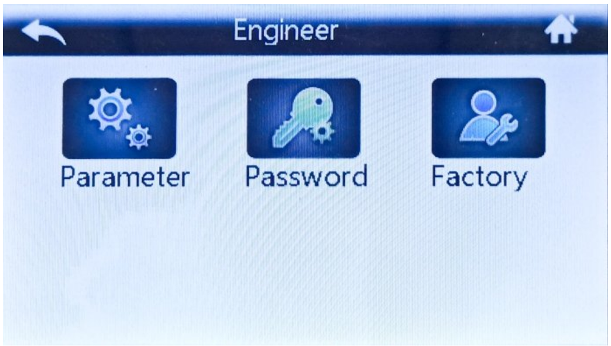


U Disk: Disconnect
Operation: Insert Udisk.

Picture 4-25: Alarm Record Download Screen

4.7.6 Project Setting

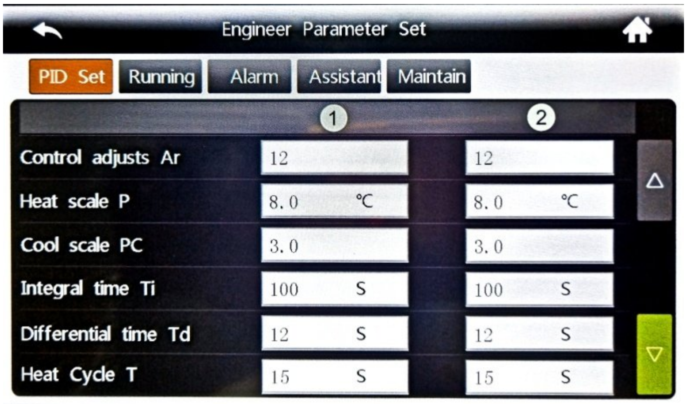
In the "User Settings" screen, click the < Advanced Setting > button and enter the password to enter the “Project” screen.


Engineer
Parameter
Password
Factory

Picture 4-26: Project Screen

1. Project Parameter Setting

Set project parameters, and the specification of each parameter refers to “Project Parameter Table”.


Engineer Parameter Set
PID Set
Running
Alarm
Assistant
Maintain

	①	②
Control adjusts Ar	12	12
Heat scale P	8.0 ℃	8.0 ℃
Cool scale PC	3.0	3.0
Integral time Ti	100 S	100 S
Differential time Td	12 S	12 S
Heat Cycle T	15 S	15 S

Picture 4-27: Project Parameter Setting Screen

Table 4-9: Project Parameter Description

Parameter Name		Initial Value	Setting Range	Unit	Remarks
PID	Control response adjustment Ar	15.0	1~30		Adjust PID control response
	Heating proportional band P	8.0	0.1~200.0℃	℃	
		46.4	32.2-392.0		
	Cooling proportional band PC	3.0	0.1~20.0		The times of heating proportional band
	Integral time Ti	100.0	1~3600	secs.	
	Differential time	12.0	0~3600	secs.	

	Td				
	Heating cycle T	20.0	1~300	secs.	Outputting cycle of the pipe heater
	Cooling cycle TC	20.0	1~300	secs.	Outputting cycle of the cooling valve
	overlap zone db	0.0	-30.0~30.0	℃	For high temp. water heater, it usually sets the db to a positive number (e.g.: 0.5℃)
PID		0.0	-54.0~54.1	℉	
Running	Startup water refilling time	60.0	0~600	secs.	Water heater: forced water refilling time after startup;
	water refilling delay time	10.0	0~600	secs.	Water heater: After the water is refilled, delay the time and stop;
	shutdown temp.	35.0	0~60.0	℃	Forced cooling shutdown temp.: stop the machine when it cools down to this temp. Note: If pressing the off button, it can directly shut down without cooling.
		95.0	32.0-140.0	℉	
	Emptying time	60 secs.	0-600 secs.	secs.	Reverse emptying: After machine shutdown, start the pump reverse running and the emptying valve. It can start and stop manually, or run the [reversal time] and stop automatically. Note: Reverse emptying can only be started when the machine is shut down and the PV temp. is less than the [Emptying Temp.]. High temp. water heater: without pump reverse running.
	Emptying temp.	60.0	0-120.0	℃	
		140.0	32.0-248.0	℉	
	Auxiliary heating output temp. difference	5.0	0-60.0	℃	1.【Auxiliary heating output temp. difference】=0: Only use the main heating output. 2.【Auxiliary heating output temp. difference】! =0: 1) When the control temp. is less than (set temp.-【Auxiliary heating output temp. difference】) temp. difference, start the heating and auxiliary heating output simultaneously to make the temperature climb rapidly in a short time. 2) Control temp. is greater than or
		9.0	0-108.0	℉	

					equal to the (set temp. -【Auxiliary heating output temp. difference】) temp. difference, stop the auxiliary heating.
Running	Cooling valve 2 startup temp. difference	5.0	0-60.0	℃	Flow water heater: At the normal cooling or forced cooling stage: When the PV-SV is greater than the [cooling valve 2 startup temp. difference], open the cooling valve 2 to cool down. Otherwise, don't open it.
		9.0	0-108.0	℉	
	Risen temp. value	5.0	0-60.0	℃	High-temp. water heater: When the parameter – risen temp. value is set to 5℃, and the exhaust solenoid valve's opening time is set to 0.5 sec. After the water is refilled, when the temp. rises by every 5℃, it needs to open the solenoid valve for 0.5 secs. till the temp. stabilizes at the set value.
		9.0	0-108.0	℉	
	Exhaust valve opening time	0.5	0.0-99.0	secs.	High-temp. water heater: When the parameter – risen temp. value is set to 5℃, and the exhaust solenoid valve's opening time is set to 0.5 sec. After the water is refilled, when the temp. rises by every 5℃, it needs to open the solenoid valve for 0.5 secs. till the temp. stabilizes at the set value.
	Plunger pump start temp.	100.0	0.0-180.0	℃	High temp. water heater: Use plunger pump to refill the water and start temp. Only when it reaches this temp. can the plunger pump be used.
		212.0	32.0-356.0	℉	
	Plunger pump start time	10.0	0-180	secs.	High temp. water heater: the plunger pump needs to be started at intervals
	Plunger pump stop time	10.0	0-180	secs.	
	Probe type	K type	K-type thermocoupl	/	/

			e /PT100		
	The number of probes	control circuit	Control loop ~ control+ return medium ~control +mould ~control +return medium +mould	/	/
Running	The cycle of temp. rise and pressure release	0	0-250	secs.	
	The cycle of heat-preservation and pressure release	0	0-100	Min.aaa	
Fault	3-phase power detection	Use	disable / use		Whether it uses the on-board 3-phase power detection;
	Return medium deviation alarm	0.0	0-50.0	℃	(1) |Return medium temp. – medium output temp. |>【return medium temp. deviation】, delay【temp. deviation alarm delay 】secs., it alarms “Large return medium temp. difference”, make auto reset. 0: disable (2) After modifying [SV] or forced cooling, this fault will not be solved in previous temp. rises / drops.
		0.0	0-90.0	℉	
	Different mould temp. alarm	0.0	0-50.0	℃	(1) |Return medium temp. – medium output temp. |>【return medium temp. deviation】, delay【temp. deviation alarm delay 】secs., it alarms “Large return medium temp. difference”, make auto reset. 0: disable (2) After modifying [SV] or forced cooling, this fault will not be solved in previous temp. rises / drops.
		0.0	0-90.0	℉	
	Different temp. alarm delay	5	0-360	secs.	Temp. difference alarm delay time
	Low temp.	0.0	0-50.0	℃	【SV】 − PV >【Low temp.

	deviation alarm	0.0	0-90.0	℉	deviation alarm 】delay two secs., it alarms low temp.,【SV】－PV <【low temp. deviation alarm】, it will reset the fault automatically. When【Low temp. deviation alarm】=0，this function is disabled.
	High temp. deviation alarm	0.0	0-50.0	℃	
Fault	High temp. deviation alarm	0.0	0-90.0	℉	PV－【SV】>【High temp. deviation alarm 】delay two secs., it alarms high temp., ，PV－【SV】<【High temp. deviation alarm】, it will reset the fault automatically. When【 High temp. deviation alarm】=0，this function is disabled.
	Low flow alarm	0.0	0-100	L/min	Use flow sensor, the medium flow is lower than the [Low flow alarm], it delays two secs., and alarms “Low flow”; 0: disable
	High pressure alarm	0.0	0-50	bar	Use pressure sensor, the medium pressure is high than the [High pressure alarm], it delays two secs., and alarms “High pressure”; 0: disable
	Heater alarm	0.0	0~999	Min.	1. If the machine fails to reach the set temp. of - 5 ℃ within the [heater alarm] time, it will give the "heater alarm", and continue to control the temp. Manual reset. 2. Set to 0, disable the limit detection.
	Over temp. trip temp. difference	5.0	0~100	℃	PV－【SV】>【overheat trip output temp. difference】, open the circuit breaker, the EGO will alarm;
		9.0	0-180	℉	
	Interference alarm	0.0	0~200	℃/ sec.	1. Monitor temp. variation trend 2. The temp. rises or drops exceeds the 【Interference alarm temp. 】per second, it will give “Interference Alarm", and reset the fault automatically. 3. Set to 0: disable.
		0.0	0-360.0	℉/ sec.	
	Water refilling	90	0-300	sec.	Only the high temp. water

	alarm time				condition: 1. During the heating process, if the high liquid level signal has invalid timing, and water refilling exceeds the 【water refilling alarm time】, it gives “low liquid level” alarm, and shuts down.
	High pressure alarm time	5	0-99	sec.	High temp. water machine: When the high-pressure switch receives the high-pressure signal, the emptying valve will open according to the set opening time. If it continues the [high-pressure alarm time] and is still in the high-pressure state, the system will give high temp. alarm.
Assist	Control temp. compensation	0.0	-30.0~30.0	℃	Compensate the measurement error of the medium output temp.
	Return medium temp. compensation	0.0	-30.0~30.0	℃	Compensate the measurement error of the return medium temp.
	Return medium temp. compensation	0.0	-30.0~30.0	℃	Compensate the measurement error of the return medium temp.
	Analog quantity AI1 compensation	0.0	-10.0~10.0	bar	Compensate the pressure measurement error
Assist	Analog quantity AI2 compensation	0.0	-30.0~30.0	L/min	Compensation flow measurement error.
	Comm. address	01	0-32		Communication basic info. setting
	Baud rate	19200.0	4800, 9600, 19200		
	Check bit	No parity	No parity, even parity check, odd parity		
	Stop bit	1bit	1 bit, 2 stop bits		
	Comm. port wiring method	9-pin male connector		Refer to the circuit diagram for the wiring description	
Maintenan	Unit	0.0	0-3000	hr.	When the set accumulative

ce	maintenance time				running time is greater than [unit maintenance time], it alarms” Unit Maintenance Fault”;
	Unit maintenance time	0.0	0-3000	hr.	When the set accumulative running time is greater than [unit maintenance time], it alarms” Unit Maintenance Fault”;
	Accumulative total running time (hr.)	0.0	0-3000	hr.	
	Accumulative total running time (min.)	0.0	0-59	Min.	

4.8 Controller Exception List

No.	Fault Name	Detection Logic	Reset Mode	Remark
0	Pump overload	1. Power-on detection 2.Pump overload input point is valid, and the alarm delays 2 secs. Stop and release.	Manual reset	
1	EGO overheat	1. Power-on detection 2. Alarm action: EGO input point alarms delay 2 secs. effectively, and it opens the circuit breaker output point	Manual reset	
2	Low pressure	1. After system powered on, it starts to detect the inlet water pressure. 2. Low pressure input point is valid, and the alarm delays 2 secs.	Manual reset	

3	High pressure	1. Switching detection: Non high temp. water machine: 1）Power-on detection 2）High pressure input point is effective, and the alarm delays two secs. and shuts down. High temp. water machine: When the high-pressure switch receives the high-pressure signal, the emptying valve will open according to the set opening time. If it continues the [high-pressure alarm time] and is still in the high-pressure state, the system will give high temp. alarm. 2. Pressure sensor detection It uses the pressure sensor during the operation stage. If the medium pressure is higher than the [high pressure alarm], it delays two secs. and gives "too high pressure". When [high pressure alarm] is set to 0, disable this function.	Manual reset	
4	Low liquid level	Oil machine: 1. Power-on detection 2. Detection method: When it detects there’s no signal input of the low liquid level, the alarm delays for two secs. High temp. water machine: 1. Detect after the start-up【water refilling time】, if there’s no high liquid level signal input, it alarms for the “low liquid level” and shuts down. 2. During the heating process, if the high liquid level signal has invalid timing, and water refilling exceeds the【water refilling alarm time】, it gives “low liquid level” alarm, and shuts down.	Manual reset	

5	3-phase power phase reverse / phase loss	1. When alarm occurs, the machine stops running. After troubleshooting, reset manually. 2. When powered on, it starts detection, the phase reverse alarm delays 1.2 secs., and the phase shortage alarm delays 3 secs. If it needs to disable the on-board phase sequence detection, please set the project parameter [3-phase power detection] to "disabled".	Manual reset	
6	Abnormal control probe	1. Power-on detection. When it alarms, the machine stops running.	Manual reset	
7	Abnormal return medium probe	1. Power-on detection. When it alarms, the machine stops running.	Manual reset	
8	Abnormal mould probe	1. Power-on detection. When it alarms, the machine stops running.	Manual reset	
9	Pressure sensor fault	1. Check whether the sensor input signal is normal. When it alarms, the machine runs continuously. 2. AI 1 input is defined as "disabled", disable the fault.	Manual reset	
10	Flow sensor fault	1. Check whether the sensor input signal is normal. When it alarms, the machine runs continuously. 2. AI2 input is defined as "disabled", disable the fault.	Manual reset	
11	Large temp. difference of return medium	1. When it alarms, the machine runs normally. After troubleshooting, reset manually. 2. Detecting during unit’s operation: (1)| Control temp. – return medium temp. | >【Return medium temp. deviation 】, it delays【 Temp. difference alarm delay 】secs., and it alarms large return medium temp. difference. When the【Output and return medium temp. difference 】= 0, disable this function. (2) It processes only the temp. exceeds the set value and after a temp. variation cycle. After modifying the [SV], it doesn’t process this fault.	Auto reset	

12	Interference Alarm	1. When it alarms, the machine runs normally. After the fault is dismissed, it will reset automatically. 2. In the temp. control stage, the temp. drops or rises beyond the [Interference alarm] temp. within 1s. When the【Interference alarm】= 0, disable this fault.	Auto reset	
16	Heater alarm	1. When it alarms, the machine runs normally. 2.In the temp. control stage, when the control temp. can’t reach the set temp. of - 5 ℃ within the【Heater alarm】 time, it alarms. When it reaches the set temp., it will dismiss the alarm automatically. When the【Heater alarm】= 0, disable this fault.	Auto reset	
13	Too high temp.	1. When it alarms, the machine runs normally. 2. PV −【SV】 >【High temp. deviation alarm】, it delays 2 secs., and gives high temp. alarm. PV −【SV】<【High temp. deviation alarm】, it resets the fault automatically. When the【High temp. deviation alarm】= 0, disable this function. Note: In order to prevent false alarm after modifying the set temp., the fault can only be solved after the PV temp. reaches the set temp. once.	Auto reset	
14	Too low temp.	1. When it alarms, the machine runs normally. 2. 【SV】− PV > 【Low temp. deviation alarm】, it delays 2 secs., and gives low temp. alarm. 【SV】− PV >【Low temp. deviation alarm】, it resets the fault automatically. When the【Low temp. deviation alarm】= 0, disable this function. Note: In order to prevent false alarm after modifying the set temp., the fault can only be solved after the PV temp. reaches the set temp. once.	Auto reset	
15	Rear plate data error	Parameter data verification error. Please contact the manufacturer in case of this fault,	Manual reset	

16	Unit needs maintenance	Power on detection: Once this fault occurs, the unit can’t start. Enter the project parameter to set the [Unit maintenance time] to 0, and eliminate this fault.	Manual reset	
17	Overheat alarm	1. When it alarms, the machine runs automatically, and the circuit breaker opens. 2. PV－【SV】> 【Overheat release output temp.】, the circuit breaker opens, and it gives overheat alarm. When the【Overheat release output temp.】= 0, disable this function. Note: In order to prevent false alarm after modifying the set temp., the fault can only be solved after the PV temp. reaches the set temp. once.	Manual reset	
18	Too large mould temp. difference	1. When it alarms, the machine runs normally. After troubleshooting, reset manually. 2. Detecting during unit’s operation: (1)| Control temp. – mould temp. | >【Mould temp. deviation 】, it delays【 Temp. difference alarm delay 】 secs., and it alarms large return medium temp. difference. When the【Mould temp. deviation 】= 0, disable this function. (2) It processes only the temp. exceeds the set value and after a temp. variation cycle. After modifying the [SV], it doesn’t process this fault.	Auto reset	
19	Too low flow	1. Machine shutdown when it alarms. After the flow becomes normal, reset manually. 2. Use flow sensor. When it running, the medium flow is lower than the【Low flow alarm】, it delays 2 secs. and alarms “low flow”. When the【Low flow alarm】= 0, disable this fault.	Manual reset	

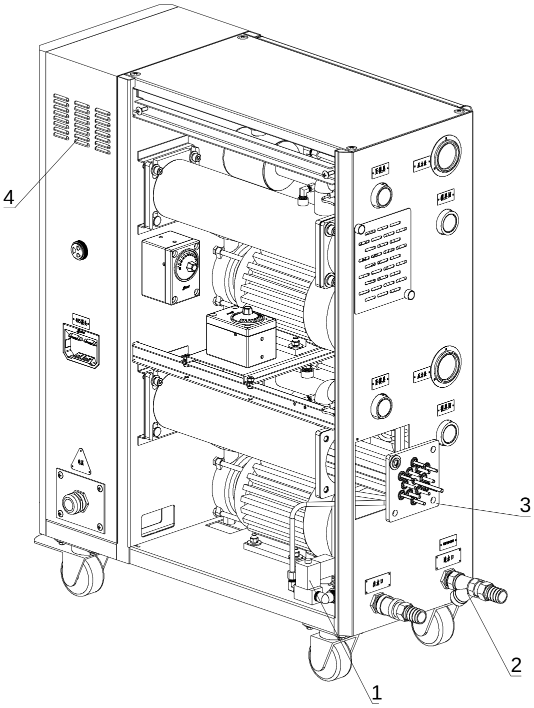
20	3-phase power phase reverse / phase loss	1. When alarm occurs, the machine stops running. After troubleshooting, reset manually. 2. When powered on, it starts detection, the phase reverse alarm delays 1.2m secs., and the phase shortage alarm delays 3 secs. If it needs to disable the on-board phase sequence detection, please set the project parameter [3-phase power detection] to "disabled".	Manual reset	
21	Overtime when communicating with the rear plate	The comm. wire between the display panel and the control board breaks	Auto reset	

5. Trouble-shooting

Failures	Possible reasons	Solutions
After the main power switch is turned on, the screen has no display,	No power connection. The main power switch is damaged. The power circuit fault. The control circuit breaker tripped. The control transformer damaged.	Connect the power source. Replace the power swtich. Check the power circuit. After checking the circuit, replace the fuse. Replace the transformer.
Phase alarm.	Power supply low voltage. Phase shortage. Phase reversal. PCB problems.	Check power supply. Check power supply. Exchange two of the wires of power supply. Replace the PCB.
Pump overload.	Abnormal fluctuations of power supply. Pump blocked. Pump motor problems. Overload relay (F1) setting value error.	Check power supply. Check the pump. Check pump motor. Set the setting current of overload relay to equal to 1.1 times of motor rated current. Please refer to Main Components for detailed description of overload relay. Reset overload relay: Wait for one minute, then press the blue button to reset.
EGO overheats.	EGO temperature setting mistakes. EGO poor temperature detecting. The heater solid-state relay has fault.	Correctly set EGO temperature. (EGO temperature setting value= temperature setting value+10℃) Replace EGO. Replace the contactor.
Low liquid level.	Water shortage. Liquid level sensor failure.	Check whether the water tank and pipeline are leaking and replenish water again. Change the liquid level sensor.
Insufficient pressure.	Insufficient water pressure of external water supply. Pressure switch failure.	Increase the water pressure of external water supply. Replace the pressure switch.
Excess process pressure.	Globe valve of mould circulating water is not open or pipe blockage. Pressure switch failure.	Check the globe valve and pipeline. Replace the pressure switch.
Temp. window displays "----"	Abnormal sensor.	Check and repair sensor.
Once running, pump output indicator lightens but pump cannot start. After a while pump still	PCB output relay problems. Electrical circuit problems.	Check or replace the PCB. Check electrical circuit.

fails to run.		
Differences between set temperature and actual temperature is too big.	Too short time after machine startup. Temperature parameter setting error. Cooling water valve problems.	Wait for a while. Check temperature parameters. Please refer to the standard manual of setting parameters. Replace solenoid valve.
Temperature can't rise.	Heater contactor problems. Heater problems. Thermocouple problems. PCB output point problems.	Replace the solid-state relay. Replace pipe heater. Replace thermocouple. Check and repair PCB controller.
Circuit breaker tripping off at turning on main switch.	Short circuit of main circuit. Transformer short circuit or connected with earth wire. Problems of circuit breaker.	Check electrical wire. Replace circuit breaker.
Circuit breaker tripping off at turning on pump switch.	Pump motor coil short circuit. Problems of circuit breaker.	Check pump motor. Replace circuit breaker.
Circuit breaker tripping off after short heater output.	Heater tube short circuit or shell contact. Problems of circuit breaker.	Replace heater tube. Replace circuit breaker.

6. Maintenance and Repair



1.Clean the solenoid valve.
Period: Every three months.
2.Clean the Y-type filter valve.
Period: monthly.
3.Clean the pipe heater.
Period: Every six months.
4.Check the contactor.
Period: Every three months.

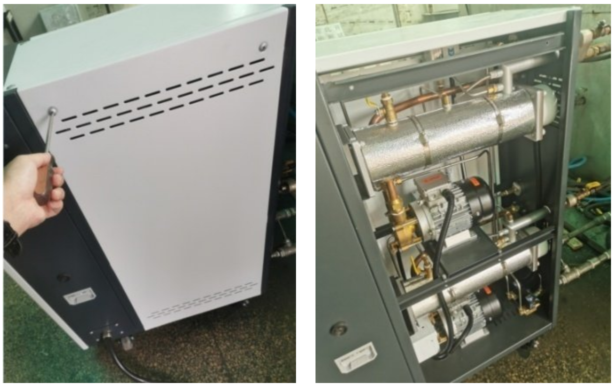
Pay attention to the following rules during maintenance:

1) It requires more than two persons to check the machine. First reduce the temperature, cut off the power supply and drain the oil and water; Operate after full inspection and maintenance of the machine.
2) It’s dangerous when the machine is in a high temperature during operation; Stop the machine first before inspection and maintenance, and wear the safety gloves before operation.
3) It’s necessary to carry out periodic inspections in order to prolong service life of the system and prevent from safety accidents.
4) It is still under high temperature during operation or before and after shutdown. Don’t operate the machine until it drops below 50 ℃ of the normal temperature after shutdown.

Please note that it is dangerous to check or tear down the machine during operation.

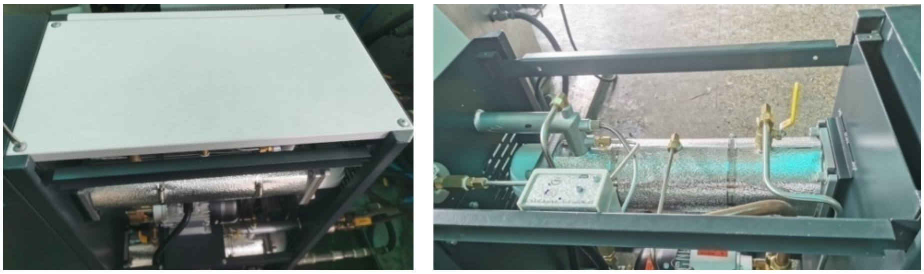
6.1 Open the Covers

1) Remove the screws on the side plate, and then lift the side plate up and take it out.



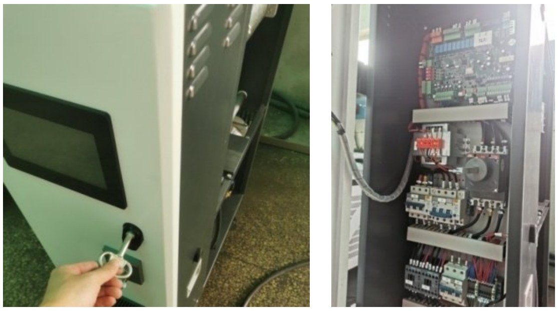
Picture 6-1: Open the Covers 1

2) Remove the four screws on the cover plate, lift it up and remove the cover plate.



Picture 6-2: Open the Covers 2

3) Open the control box (Open the door lock on the door plank with the key, and then open the control box).

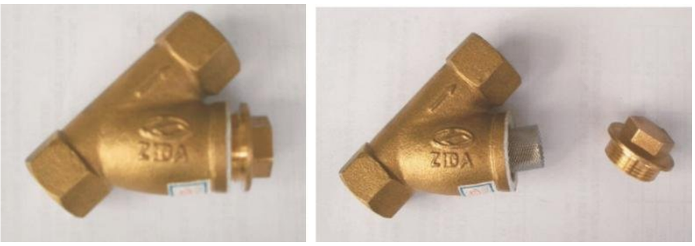


Picture 6-3: Open the Covers 3

6.2 Y Type Strainer

1) Clean soft water should be used as cooling water. Y type strainer is used in the strainer to stop impurities and pollutants to enter into water pipe.

2) Impurities or pollutants may cause errors and bad temperature control. Clean the Y type strainer periodically.
3) Cleaning steps: turn off power and cooling water supply. Open the lower cover of the Y type strainer to clean it (as picture below).

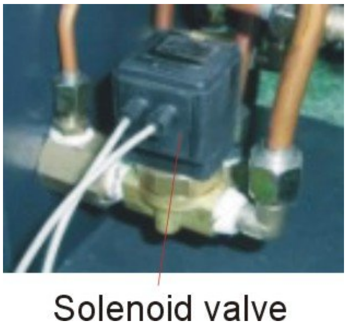


Picture 6-4: Y Type Strainer

6.3 Solenoid Valve

Replace solenoid valve:

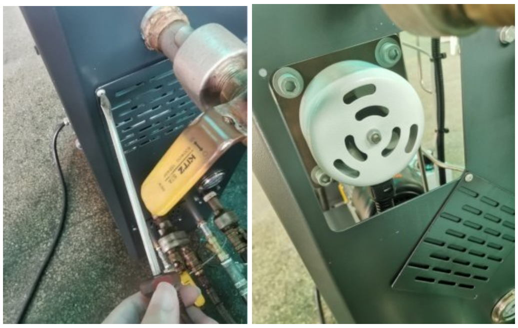
1) Open machine top cover.
2) Take down right side cover.
3) Unfix the solenoid valve for replacement.
4) Install the covers in a reverse order.



Picture 6-5: Solenoid Valve

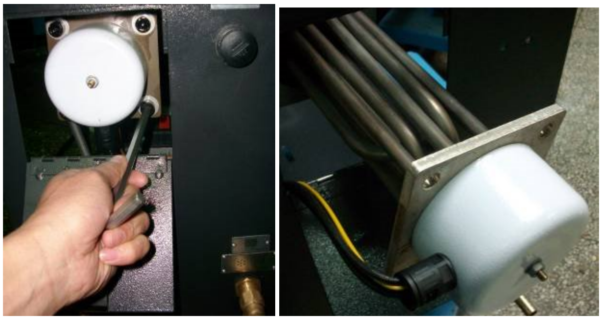
6.4 Pipe Heater

1) Open the heater cover (Refer to picture, remove the screw on the cover).



Picture 6-6: Pipe Heater 1

2) Remove the pipe heater cover (Refer to picture, unlock the screw, loosen the wire clamp, and remove the pipe heater cover).

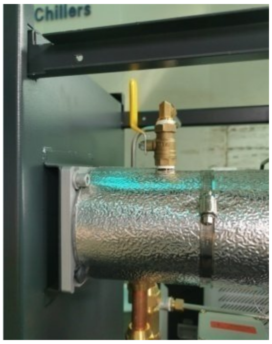


Picture 6-7: Pipe Heater 2

3) After cleaning it, install the pipe heater to the machine according to above opposite orders.

6.5 By-pass Globe Valve

Shut off the by-pass globe vale when water pressure gauge display value is too low.



Picture 6-8: By-pass Globe Valve

6.1 Maintenance Schedule

6.1.1 About the Machine

Model: _____________ SN: _______________ Manufacture date: _______________

Voltage: _____ Φ _______ V Frequency: _________ Hz Power: ______________ kW

6.1.2 Installation & Inspection

☐ Check the installation space is enough as required.

☐ Check the pipes are correctly connected.

Electrical installation

☐ Voltage: _________ V_________ Hz

☐ Fuse melting current: 1 Phase_________ A 3 Phase_________ A

☐ Check phase sequence of power supply.

Daily Checking

☐ Check machine startup function.

☐ Check all the electrical wires.

6.1.3 Weekly Checking

☐ Check loose electrical connectors.

☐ Check and clean Y type filter (1).

☐ Check solenoid valve.

☐ Check motor overload and phase reversal alarm function.

☐ Check whether pipeline joints are under looseness.

☐ Check the sensitivity of EGO.

6.1.4 Trimonthly Checking

☐ Check level switch.

☐ Check the contactor (2).

☐ Replace the hot kerosene with a using temperature above 160 degree (3).

6.1.5 Half-yearly Checking

☐Check damaged pipes.

☐Clean process heater/cooler.

☐Check indicator and buzzer.

☐Replace the hot kerosene with a using temperature above 120~160 degree (4).

6.1.6 Yearly Checking

☐Replace the hot kerosene with a using temperature above 120 degree (5).

6.1.7 3 year Checking

☐PC board renewal.

☐No fuse breaker renewal.

Note: (1). Y-type filter has the function of filling water cooling protection effect, be sure the waterway are clear to avoid cooling failure.

(2). Manufacturer laboratory data for AC contactor is two million times in life. we suggest service life for one million four hundred thousand times, if work eight hours per day, recommended replacing frequency is 1.5 years, if work day and night, replacement is suggested to be done every six months.

(3). Hot kerosene coke will influence the detection accuracy of internal temperature probe and the efficiency of heat elements, three months replacing frequency is suggested.

(4). Hot kerosene coke will influence the detection accuracy of internal temperature probe and the efficiency of heat elements, six months replacing frequency is suggested.

(5). Hot kerosene coke will influence the detection accuracy of internal temperature probe and the efficiency of heat elements, suggested replacing frequency is one year.

Appendix 1

STM Comm. Variable Table (1)

STM Comm. Variables					**Comm. Protocol: MODBUS-RTU**
D-Map（40000 +i)	English	Chinese	Range	Description	Type
1	CONTROL PV.	Control temp.	-50 ~ 500	※1 (Different displays depending on whether the temp. unit ° C has a decimal point.)	read only
2	RET PV	Return water temp.	-50 ~ 500		read only
3	ENT PV	Output water temp.	-50 ~ 500		read only
4	SV	Control target value	-50 ~ 500		read only

5	RTC YEAR	Current year	0 ~ 99	2000(0), 2001(1), …, 2099(99)	read only
6	RTC MONTH	Current month	1 ~ 12		read only
7	RTC DATE	Current date	1 ~ 31		read only
8	RTC DAY	Current week	0 ~ 6	Sun.(0), Mon. (1), Tues.(2), …, Sat.(6)	read only
9	RTC HOUR	Current hour	0 ~ 23		read only
10	RTC MINUTE	Current minute	0 ~ 59		read only
11	RTC SECOND	Current secs.	0 ~ 59		read only
12	CONTROL STATUS	Control status	0 ~ 3	Fault(0), stop control(1), In controlling(2), Auto-tuning(3)	read only
13	MMI STATUS	Running status	0 ~ 255	※2 (Operate it with bit address)(as shown in Appendix 3)	read only
14	DO STATUS	Contact output status	0 ~ 255	※2 (Operate it with bit address)(as shown in Appendix 3)	read only
15	DI STATUS	Contact input status	0 ~ 255	※2 (Operate it with bit address)(as shown in Appendix 3)	read only
16	ALARM STATUS	Alarm status	0 ~ 255	※2 (Operate it with bit address)(as shown in Appendix 3)	read only
17	CONTROL PV ERROR	Control temp. input alarm	0 ~ 255	※2 (Operate it with bit address)(as shown in Appendix 3)	read only
18	RET PV ERROR	Return water temp. input alarm	0 ~ 255	※2 (Operate it with bit address)(as shown in Appendix 3)	read only
19	ENT PV ERROR	Water outlet temp. input alarm	0 ~ 255	※2 (Operate it with bit address)(as shown in Appendix 3)	read only

20	REMOTE ERROR	Remote control input alarm	0 ~ 255	※2 (Operate it with bit address)(as shown in Appendix 3)	read only
21	KEY STATUS	KEY key status	0 ~ 255	※2 (Operate it with bit address)(as shown in Appendix 3)	read only
22	LED STATUS	LED indicator status	0 ~ 255	※2 (Operate it with bit address)(as shown in Appendix 3)	read only
30		Switching value status	-	※3 As shown in Appendix 4	read only
31		Relay status	-	※3 As shown in Appendix 4	read only
32		Fault info. 1	-	※3 As shown in Appendix 4	read only
33		Fault info. 2	-	※3 As shown in Appendix 4	read only
100	HOUT	Heating end output	0 ~ 100%		read only
101	COUT	Cooling end output	0 ~ 100%		read only
102		Backlight time	0 ~ 255	0 ~255	read /write
104	RUN/RESET KEY	RUN/RESET KEY	0, 1	1 = Key (button) operation. After this operation, it will be automatically reset to 0.	write only
105	AUTO-TUNING KEY	AUTO-TUNING KEY	0, 1		write only
106	AUTO-START KEY	AUTO-START KEY	0, 1		write only
107	SUCTION KEY	SUCTION KEY	0, 1		write only
108	COOLING KEY	COOLING KEY	0, 1		write only
109	BUZZER OFF KEY	BUZZER OFF KEY	0, 1		write only
110	SUCTION OFF KEY	SUCTION OFF KEY	0, 1		write only
111	F KEY	F KEY	0, 1		write only
112		Reset	1		write only
120		Flow value		Unit: 0.1L/min	read only
125		Pressure value		Unit:0.1bar	read only

150		Emptying temp.	0-120.0℃	When the PV temp. is less than [Emptying temp.], the reverse emptying can be started.	read /write
151		Emptying time	60 secs.	0-600 secs.	read /write

Appendix 2： STM Comm. Variable Table (2)

D-Map （40000+i)	**English**	**Chinese**	**Range**	**Description**	**Type**
200	SV	Control target value （℃）	-50 ~ 500℃	※1 (Different displays depending on whether the temp. unit ° C has a decimal point.)	read /write
201	PB	Heating control belt	0 ~ 550℃	※1 (Different displays depending on whether the temp. unit ° C has a decimal point.)	read /write
202	TI	Integral time	1 ~ 3600s		read /write
203	TD	Differential time	1 ~ 3600s		read /write
204	PBC	Cooling control zone	0 ~ 550℃	※1 (Different displays depending on whether the temp. unit ° C has a decimal point.)	read /write
205	CT	Heating control cycle	1 ~ 100s		read /write
206	CTC	Cooling control cycle	1 ~ 100s		read /write
300	PHASE ALARM	Phase detection	0, 1	Unuse (0), use(1)	read /write
301	DEV1 ALARM	Output water temp. deviation	0 ~ 550℃	※1 (Different displays depending on whether the temp. unit ° C has a decimal point.)	read /write
302	DEV2 ALARM	Return water temp. deviation	0 ~ 550℃		read /write

303	TURB ALARM	Interference alarm	0 ~ 550℃		read /write
304	HEATER ALARM	Heater alarm	0 ~ 3600s		read /write
401	SUB HEATING	Auxiliary output	0 ~ 550℃	※1 (Different displays depending on whether the temp. unit ° C has a decimal point.)	read /write
402	COOLING TEMP	Cooling temp.	-50 ~ 500℃		read /write
500	H.LIMIT TEMP	Upper limit temp.	-50 ~ 500℃	※1 (Different displays depending on whether the temp. unit ° C has a decimal point.)	read /write
501	L.LIMIT TEMP	Lower limit temp.	-50 ~ 500℃		read /write
502	TEMP UNIT	Temp. unit	0, 1	℃(0), ℉(1)	read /write
503	TEMP DEGREE	Decimal point	0, 1	0.1(0), 1(1)	read /write
504	CTL TEMP BIAS	Control temp. correction	-550 ~ 550℃	※1 (Different displays depending on whether the temp. unit ° C has a decimal point.)	read /write
505	RET TEMP BIAS	Return water temp. correction	-550 ~ 550℃		read /write
506	ENT TEMP BIAS	Output water temp. correction	-550 ~ 550℃		read /write
600	NOW YEAR	Year setting	0 ~ 99	2000(0), 2001(1), …, 2099(99)	read /write
601	NOW MONTH	Month setting	1 ~ 12		read /write
602	NOW DATE	Date setting	1 ~ 31		read /write
603	NOW DAY	Week setting	0 ~ 6	Sun.(0), Mon. (1), Tues.(2), …, Sat.(6)	read /write

604	NOW HOUR	Hour setting	0 ~ 23		read /write
605	NOW MINUTE	Minute setting	0 ~ 59		read /write
606	SCHDULE DAY	Week reserve setting	0 ~ 127	Sun.(0), Mon. (1), Tues.(2), …, Sat.(6)	read /write
607	AUTO-START HOUR	Reserve auto start hr. setting	0 ~ 24	Unuse (00:00)	read /write
608	AUTO-START MINUTE	Reserve auto start min. setting	0 ~ 59		read /write
609	AUTO-END HOUR	Reserve auto shutdown hr. setting	0 ~ 24	Unuse (00:00)	read /write
610	AUTO-END MINUTE	Reserve auto shutdown min. setting	0 ~ 59		read /write
611	AS SETTING TIME	Check time setting	0 ~ 9999	Unuse (00:00)	read /write
612	RUNNING TIME	Device using time	0 ~ 9999		read only
D-Map （40000+i)	English	Chinese	range	Description	Type
700	LANGUAGE	Language setting	0, 1	Chinese(0), English(1)	read /write
702	PASSWORD	Password setting	0 ~ 9999		read /write
703	RET/ENT DISP	Return water output temp.	0, 1	Unuse (0), use(1)	read /write
704	W-FILL TM T1	Water refilling time T1	0 ~ 600s		read /write
705	W-FILL TM T2	Water refilling time T2	0 ~ 60s		read /write
706	RET/ENT DISP	Return loop display settings	0，1，2，3	Display control loop, control+ return medium, control + mould, control+ return medium + mould	read /write

Appendix 3: Bit Address Variable（1）

D-Map	**Name**	**Bit**							

（40000 +i.j)									
		0	1	2	3	4	5	6	7
13	MMI STATUS	Control	Cooling	Auto-tuning	Suction	Reserve	Buzzer Off	-	Input power
14	DO STATUS	Pump forward action	Pump forward action	Water refilling	Suction	Alarm	Breaker	Air	-
15	DI STATUS	Pump overload	EGO	Low pressure	High pressure	Low liquid Level	High liquid Level	-	start control
16	ALARM STATUS	Phase alarm	Temp. alarm	Deviation alarm	Interference alarm	Heating alarm	-	-	-
17	CONTROL PV ERROR	-	-Over	+Over	Sensor Open	AD Error	-	-	-
18	RET PV ERROR	-	-Over	+Over	Sensor Open	AD Error	-	-	-
19	ENT PV ERROR	-	-Over	+Over	Sensor Open	AD Error	-	-	-
20	REMOTE ERROR	-	-Over	+Over	Input Open	AD Error	-	-	-
21	KEY STATUS	RUN	AUTO-TUNING	AUTO-START	SUCTION OFF	COOLING	SUCTION	BUZZER OFF	power

D-Map （40000 +i.j)	Name	Bit							
		0	1	2	3	4	5	6	7
		8	9	10	11	12	13	14	15
22	LED STATUS(	RUN	AUTO-TUNING	SUCTION	COOLING	BUZZER OFF	AUTO-START	SUCTION	F

	KEY LED)							OFF	
	LED STATUS	Power	Heater output	Auxiliary heating output	Cooling output	Pump forward action	Pump reverse action	Water refilling	Alarm

Appendix 4: Bit Address Variables（2）

30	Switching status	0：Close 1：Open (each bit value corresponding to this address)	B0-pump overload B1-heater overheat B2-low pressure B3-high pressure B4-low liquid level B5-high liquid level B6-remote switch	read only
31	Relay status	0：Close 1：Open (Each bit value corresponding to this address)	B0-backup B8-auxiliary heating B1-alarm output B9-cooling valve B2-circuit breaker B10-solid-status output1 B3-emptying valve B11- solid-status output 2 B4-water refilling valve B5-pump reverse running B6-pump forward running B7-main heating	read only
32	Fault info.1	0：no fault，1：fault (Each bit value corresponding to this address)	B0 pump overload B8 3-phase power phase stagger B1 heater overheat B9 control probe fault B2 low pressure B10 return temp. probe fault B3 high pressure B11 mould probe fault B4 low liquid level B12 pressure sensor fault B5 /none B13 flow sensor fault B6 /none B14 return medium temp. difference alarm B7 low liquid level B15 Interference alarm	read only

33	Fault info.2	0：no fault，1：fault (Each bit value corresponding to this address)	B0 heater alarm B8 / B1 / B9 / B2 / B10 / B3 / B11 overheat alarm B4 overheat B12 mould temp. difference alarm B5 low temp. B13 low flow alarm B6 / B14 3-phase power shortage B7 unit needs maintenance B15 /	read only