STM-W/O

Dual-purpose Water / Oil Heaters

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Version：Ver.G (English)

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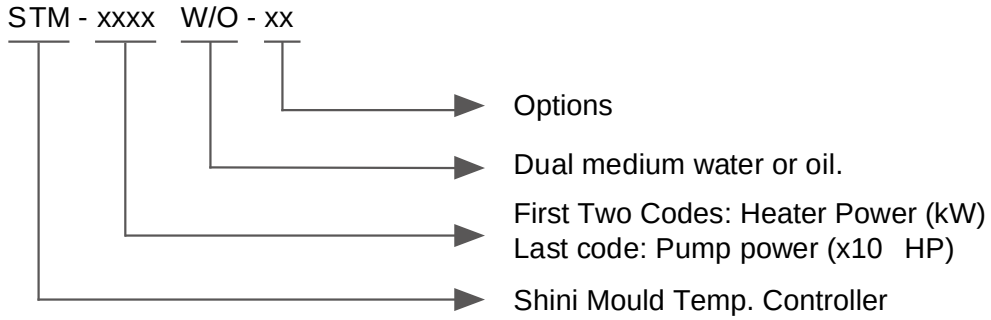
1. General Description

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

STM-W/O series of dual-purpose heaters are mainly used to heat up the mould and maintain its temperature, although they can be also used in other similar applications. The mould return oil (water) of this series dual-purpose heaters are indirectly cooled 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. This unique design allows user to choose between water and oil as heat transfer medium. Adopt high performance special controller to ensure stable temperature control.

Picture1-1: STM-907W/O

1.1 Coding Principle



1.2 Features

- The controller adopts 4.3''LCD user-friendly interface for easy operation;
- P.I.D multi-stage temperature control system can maintain a mould temperature with accuracy of ±0.5℃.
- Equipped with heater power switching function, which can switch between 3KW, 6kW and 9kw;
- Multiple safety devices including power reverse phase protection, pump overload protection, overheat protection and low level protection that can automatically detect abnormal performance and indicate this via visible alarm.
- Adopts water or oil ad heating medium, the maximum temperature can reach: water is 90℃ and oil is 160℃.
- Equipped with pump reversion evacuation, automatic water supplying and negative pressure operation.
- RS485 communication interface that can achieve centralized monitoring online;

1.3 Accessory option

- Water manifolds, teflon hose and transfer oil are optional.
- Displays of mold temperature and return water temperature of mold are optional.
- Flow displayer is optional;
- Electronic pressure displayer is optional;

All service work should be carried out by a person with technical training or corresponding professional experience. The manual contains instructions for both handling and servicing. Chapter 6, which contains service instructions intended for service engineers. Other chapters contain instructions for the daily operator.

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

Our company provides excellent after-sales service. Should you have any problem during using the machine, please contact the company or the local vendor.

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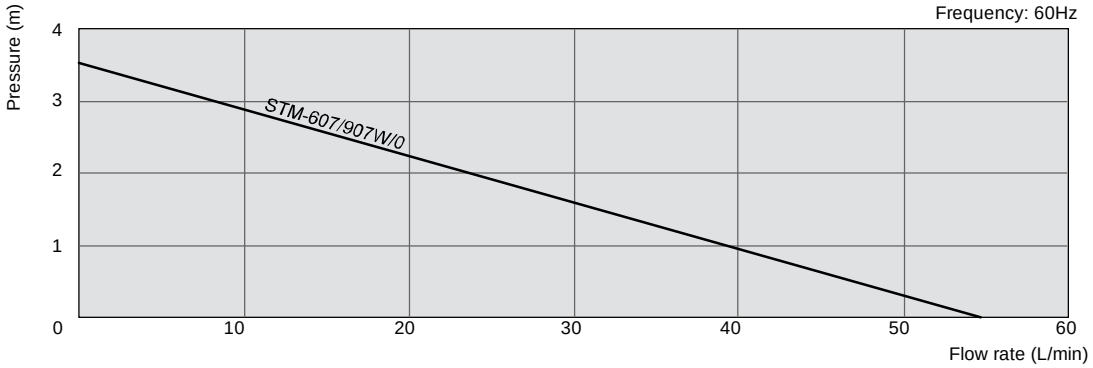
Tel: +86 (0)573 8522 5288
Shinden Precision Machinery (Chongqing), Inc.:
+86 (0)23 6431 0898

1.4 Pump Performance



Picture1-2：Pump Performance

1.5 Safety Regulations

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

1.5.1 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!

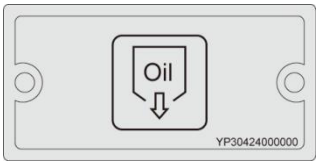
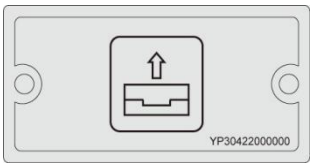
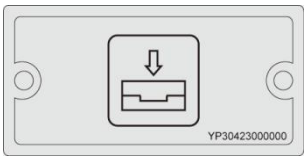
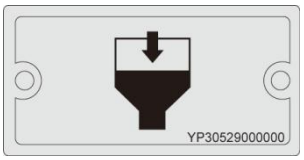
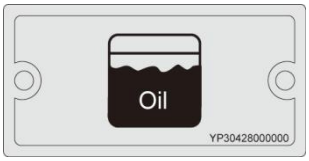
Do not touch the switch with wet object or hands.
Do not use the machine before fully aware of its performance.
Be careful not to touch or hit the switch or sensor.
Please keep enough operation space, and keep away obstacles.

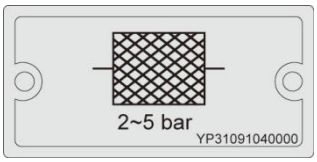
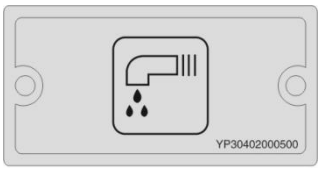
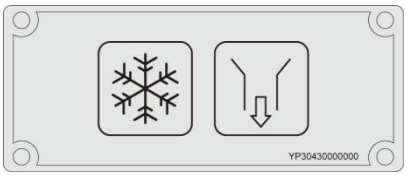
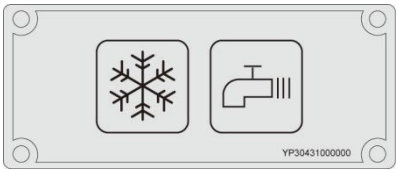
To avoid producing statics, clean the floor from oil or water to keep a dry environment.
Protect the machine against severe vibration or collision.
Do not remove safety signs or make it dirty.
Drunken, medicine-taking, or men without proper judgement should not operate the machine.

Warning!

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

1.5.2 Signs and Labels

	Please according to schedule to make regular maintenance.
	Oil discharge valve: oil discharge port when machine is changing oil.
	From mould: connector for circulating water/oil of coming from mould
	To mold: connector for circulating water/ oil to go to mould.
	Oil inlet: Machine oil inlet
	High liquid level: the highest oil level to which machine can reach under room temperature.

	1. To maintain temperature stability, 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.
	Overflow port: oil/water
	Water outlet: cooling water outlet
	Water inlet: cooling water intlet

1.5.1 Operation Regulations

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

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

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˚C.
5) It is equipped with pump overload device: In case of overload, the pump and pipe heater will stop. At this time, check the pump overload reasons (phase shortage, pipeline blockage, bearing damage, etc.). After resolving these problems, reset the overload protector (RESET) to resume operation.

6) Before turn off the pump, wait until oil temperature falls blow 50˚C. Or the life of the unit would be affected.

1.6 Exemption Clause

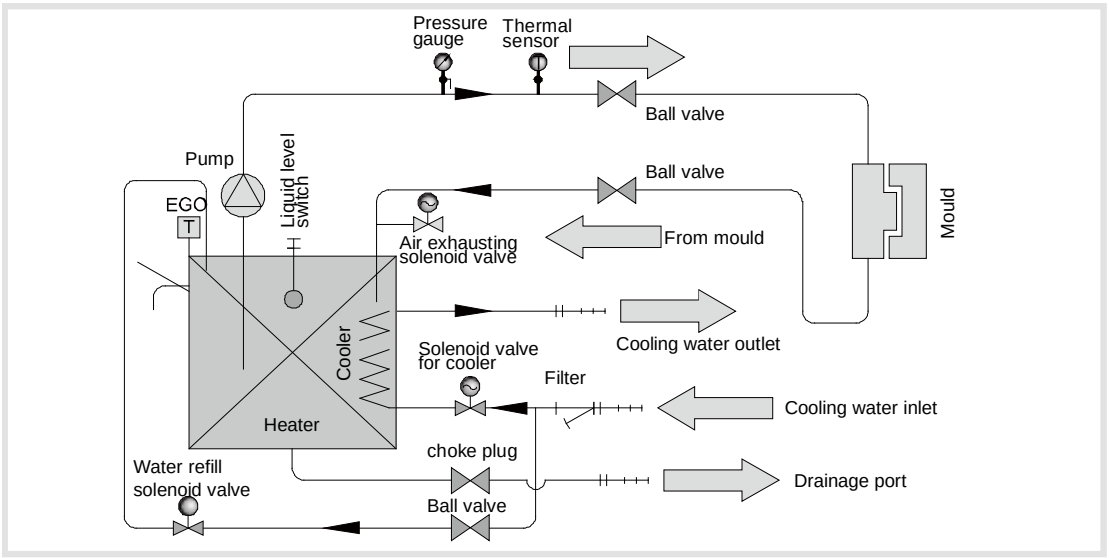
The following statements clarify the responsibilities and regulations born by any buyer or user who purchases products and accessories from Shini (including employees and agents).

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 Charateristics and Working Principle

2.1 Working Principle



Picture 2-1：Working Principle

The medium returned from the mould returns to the heater through the pipes, and is transported to the mould after being pressurized by the pump, and so on. In this process, when the liquid level drops below the high liquid level, the system will give out the low level alarm and start the make-up solenoid valve to refill the water and ensure normal system operation (The water can be replenished automatically when using water, and the heat transfer oil needs regular replenishment when using oil). If the medium continues to drop to a low level without replenishment, the system will give out low level alarm and stops. If the temperature is too high, the system will activate the solenoid valve to let cooling water cool down the high temp. medium indirectly to maintain a constant temperature. If the temp. keep rising and reach to the set point of EGO, the system will alarm and stop operation.

3. Installation and Debugging

3.1 Installation Space

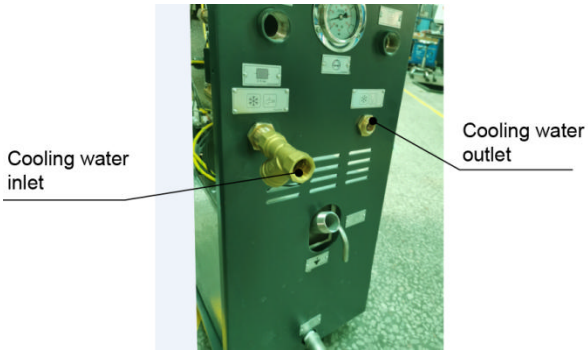
During installation of the machine, keep at least 500mm installation space around the machine as shown by the picture. Do not install the machine in a position crowded with other objects. This would cause inconvenience to operation, maintenance and repair.

Do not sit on the machine.

Keep away flammable and explosive goods.

Picture 3-1：Installation Space

3.2 Circulating Medium Requirement



Picure 3-2：Pipe Connection

Attention!

The cooling water inlet and outlet are shown in the picture, don't connect them reversely! When the service temperature is above 100℃, the cooling water must be connected with high temperature resistant pipe.

3.2.1 Cooling Water Requirement

Connect the cooling water inlet to the clean water, connect the outlet to the drainage port, and then turn on the water supply.

The water quality please refer to ***Industrial Boiler Water Quality*** GB1576-2001

The cooling water inlet is 1/2'' PT female thread, and the outlet is 3/8'' PT male thread.

Customers can select the copper insert or Tonflon pipe by on demands.

3.2.2 Oil Requirement

Open fire is prohibited near the running machine, avoid direct skin oil contact, and wear gloves when treating the waste oil. Once the skin is covered with oil, rinse it immediately with soapy water and clean water.

Add heat transfer oil till it gets to the float ball triggered high level switch. At this time, the machine stops alarming and run normally.

Recommended heat transfer oil: Shell S2 XC

3.3 Power Connection

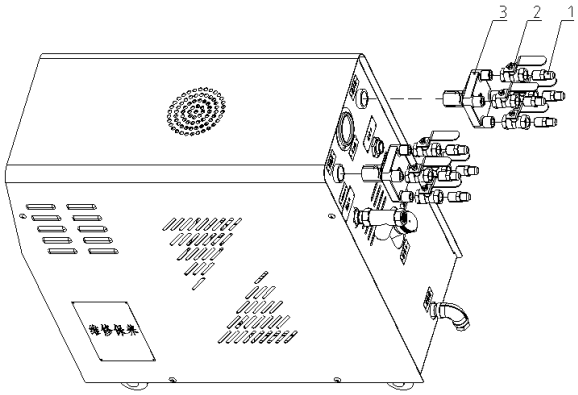
The oil/water heaters need a proper electrical grounding to ensure the equipment safe operation.

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

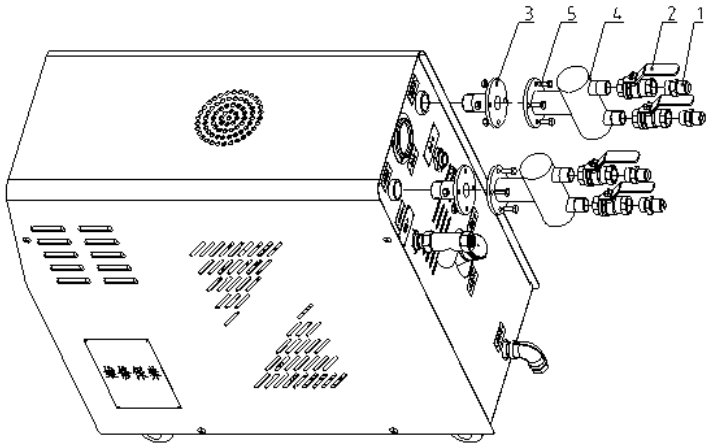
3.4.1 Installation steps for options water manifold (dewaxing)



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

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 level valve.
2) Install level valve with copper joint to the welding water manifold.
3) Install water manifold to the machine.
4) Connect water manifold with manifold joint via 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℃.

4. Application and Operation

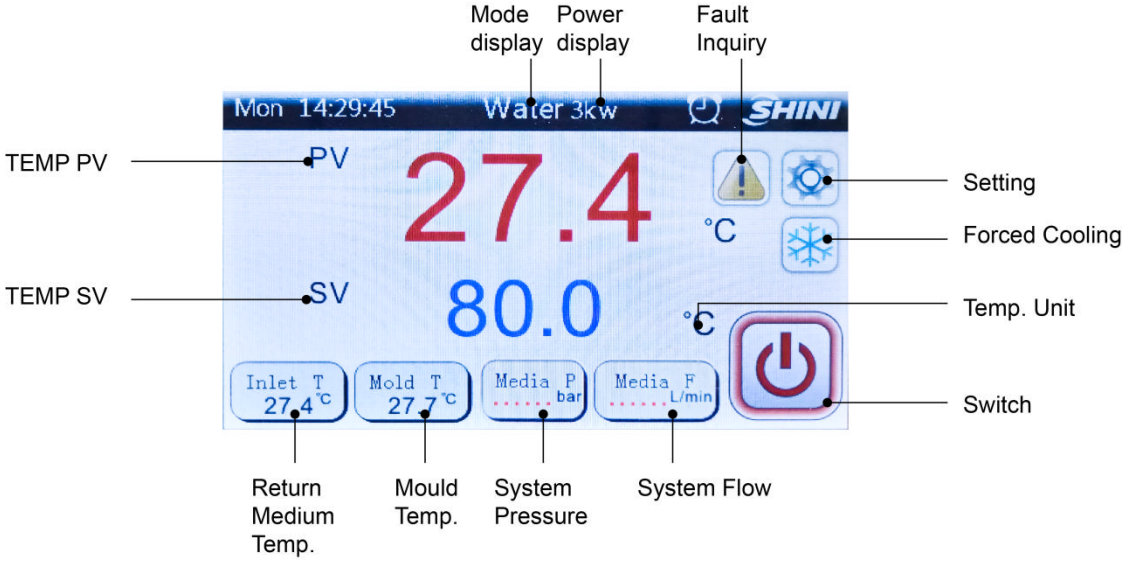
4.1 Machine Startup

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



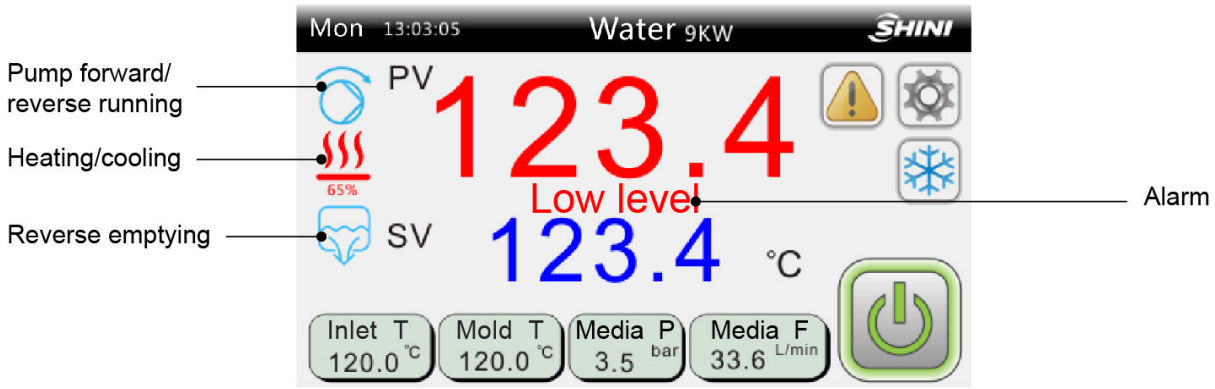
Picture 4-2：Standby Screen

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

Name	Function Type	Description
Mode	Show	Display the set media type

display	Only	
Power display	Show Only	Display the set heater power
Fault inquiry	Press Key	If there is a fault, click this button to enter the "Current Fault Inquery" page; Otherwise, click this button to enter the "Inquiry" page.
Setting	Press Key	Enter the user setting screen
Forced cooling	Button	Press  to turn on the forced cooling function, press  to turn off the forced cooling function;
Temp. unit	Show Only	Display the set temp. unit. This machine supports ℃ / ℉ switching.
Fault inquiry	Press Key	1. In case of system failure, it will flash in the main screen. At this time, click to query current fault information; 2. When there is no fault currently, press to enter the "Historical Fault" Inquery.
Switch	Press Key	 Standby status,  Running status;
Return medium temp.	Show Only	Display the medium temp. returned from the mould, and it is optional. When it not select this function, the overall display is gray;
Mould temp.	Show Only	Display the mould real temp., and it is optional. When it not select this function, the overall display is gray;
System pressure	Show Only	Display the medium output pressure of the machine, and it is optional. When it not select this function, the overall display is gray;
System flow	Show Only	Display the medium real-time flow, and it is optional. When it not select this function, the overall display is gray;
Temp. set value	Press Key	Click this key to set the heating temp.
Temp. PV	Show Only	Used to display the control temp. PV.

4.2.2 Operation Screen



Picture 4-3：Operation Screen

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

Icon Name	Description
Pump forward/reverse running	This icon indicates that the unit starts the pump forward / reverse running
Heating/cooling	This icon indicates that the unit starts heating control. The bottom is the heating percentage.
Reverse emptying	This icon indicates that the unit starts emptying
Alarm	Alarm info. display, and the running indicator is on.

4.2.3 Startup and Shutdown

4.2.3.1 Startup logic

After system powered on, turn the main power switch on the door plank to the ON position. At this time, the controller screen is on, and press the set button to enter the model switching option to select the water/oil mode (the default is water type). See User Parameter Settings for details.

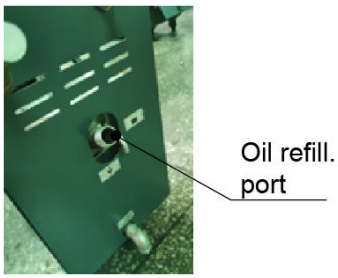
When using water:

Press the < Start > button on the screen. When the button is green, it indicates that the machine is running, and it will start water refilling. When the water is refilled to the high level, the machine starts to run. When the water level is

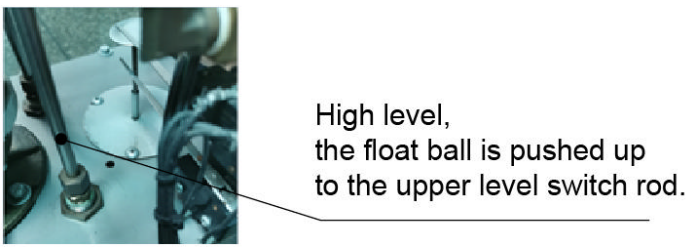
lower than the high level, the machine will refill the water automatically and give an alarm to indicate the water level is low. If the medium can't be refilled, and the water level continuously drops to the low level, the machine will stop and give an alarm to indicate the low level.

When using oil:

Press the start button on the screen, and it will give an alarm to indicate low oil level. Open the oil filling port to add the heat transfer oil till the low level alarm is dismissed, and the machine starts and works normally at the time. It also can open the cover plate, refill the heat transfer oil to the high level, and press the start button. During operation, if the oil level is lower than the high level, the buzzer will give an alarm, and the controller screen will display low oil level, prompting the operator to refill the heat transfer oil. The alarm signal will dismiss after the heat transfer oil is refilled to the high level. If the medium can't be refilled, and the oil level continuously drops to the low level, the machine will stop and give an alarm to indicate the low level.



Picture 4-4：Oil Refilling Port



Picture 4-5：Level Switch Rod

4.2.3.2 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 ˚C, 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 carefull of the electric shock danger!

Attention !

The pump running direction must be corret!

Attention !

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

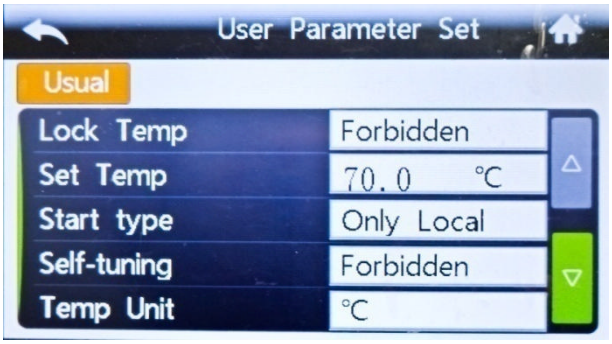
4.3 User Setting

In the "Operation" screen, click the < Setting > button to enter the "User Setting" screen:

Picture 4-6：User Setting Screen

4.3.1 User Parameter Settings

In the "User Setting" screen, click the < User Parameters > button to set user parameters:



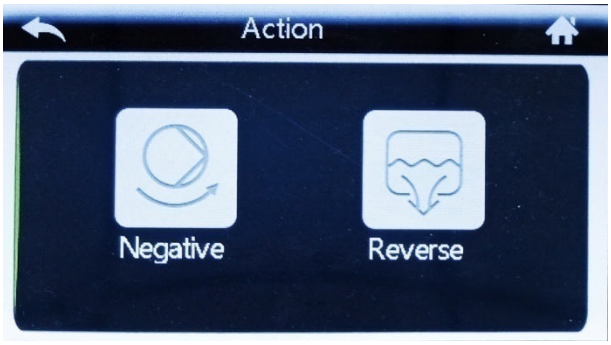
Picture 4-7：User Parameter Screen

Table 4-3：User Parameter Specification

Parameter Name	Initial Value	Setting Range	Unit	Ramark
Lock temp.	disable	disable/use		When selecting “Use”, it is not allowed to set temperature on the main screen.
Set temp.	80.0	0-160.0	℃	Water type: 0-90℃; Oil type: 0-160℃
	176.0	32.0-320.0	℉	
Model switching	water type	water type /oil type	/	When selecting the oil type, disable the water make-up valve;
Heating power	9kW	0 kW~3 kW~6 kW ~9 kW		0kW: Disable heating. The machine is connected with cold water through the water chiller to control the low temp. 3kW: Only use the auxiliary heating output points 6kW： Only use main heating output points 9kW： Main heating and auxiliary heating are used together
Auto-tuning	disable	disable/use		
Temp. unit	℃	℃/℉		Temp.display unit
Decimal point	0.1	1/0.1		The main screen displays the min.temp. unit.

4.3.2 Action Setting

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



Picture 4-8：Action Setting Screen

4.3.2.1 Negative Pressure Emptying

Action: Click the < Negative Pressure Emptying > button, and the pump starts negative pressure operation.

Specific logic: During operation, it can press the button to select whether the pump is running forward or reverse. Then, wait for the pump stop [Pump Stop Delay] to start the reverse or forward running automatically.

This function is mainly to solve the system micro leakage when the pump is running forward to ensure continuous production.

4.3.2.2 Reverse Emptying

After the machine stops, open the pump reversing and emptying valve, which can start/stop manually or automatically (The default reversal time is 60S. See the Project Parameter Table for specific settings).

Note: If the reverse emptying function is on during machine running, stop the machine first, and then activate the reverse emptying action.

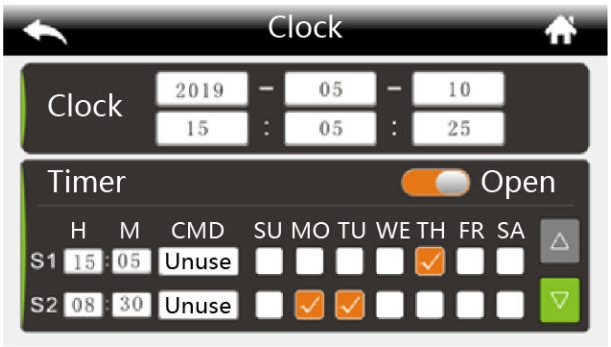
4.3.3 Clock Timing

Click the < Clock Timing > button in the user setting screen to enter the following screen:

Picture 4-9：Clock Timing Screen

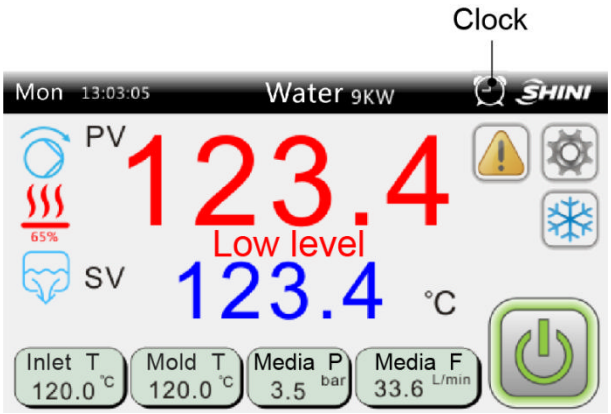
Timing main switch: used to select the timing on/off function, and it can inquire on the main screen if the timing is switched on. It can set six groups of time in total, and each group of time can be selected through the switch: disable, timing on or off.

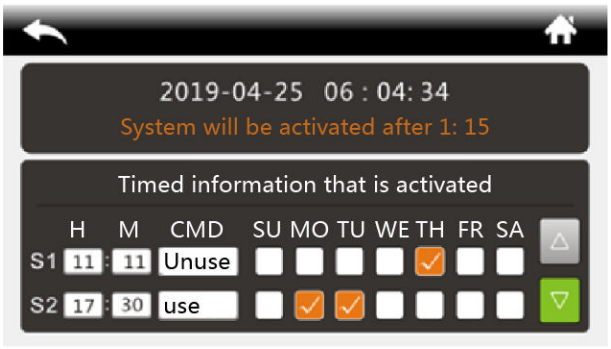
After timing main switch is turned on, it can set the timing on/off, as shown in the picture below:



Picture 4-10：Set Timing Switch Screen

If the "Timing Main Switch" is set to "ON", press the < Clock > button in the "Operation" screen to enter the Timing Inquiry and Modification Screen.

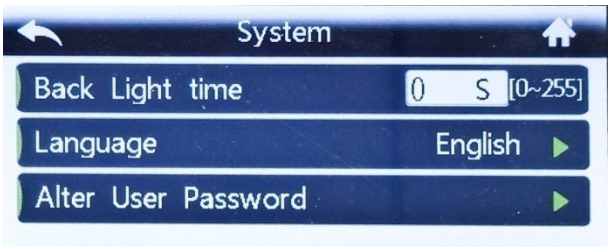




Picture 4-11：Timer Inquiry and Modification Screen

4.3.4 System Setting

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



Picture 4-12：System Setting Screen

Set the backlight time: setting range is 0 ~ 255 secs.

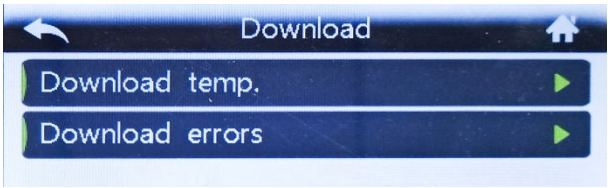
Language: Chinese or English

The default user password is 123. See "Password Modification" for details;

4.3.5 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:



Picture 4-13：Data Download Screen

4.3.5.1 Temp. Data Download

Picture 4-14： Temp. Data Download Screen

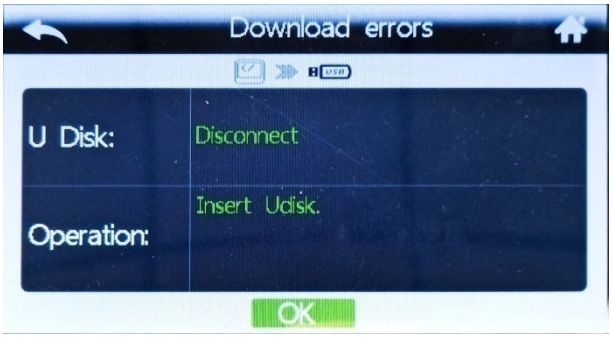
Local data backup: copy the temp. data on the display board to the U disk (the data of display board can be saved for up to 48 hrs.). Copy the temperature data stored on the display board to the USB flash disk. Insert the U disk, wait until the "U disk" displays "connected" status, and then follow the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

4.3.5.2 Alarm Record Download



Picture 4-15： Alarm Record Download Screen

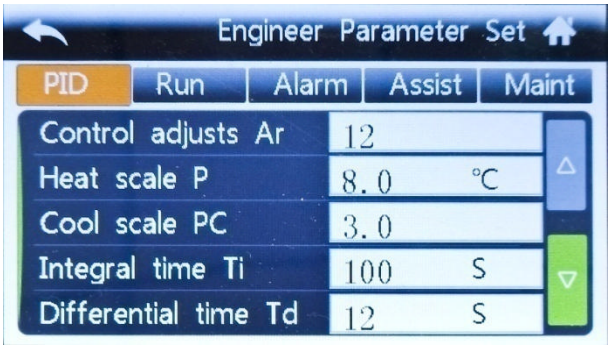
4.3.6 Advanced Setting

4.3.6.1 Project Setting

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

Picture 4-16：Project Screen

In the "Project" screen, click the < Project Parameter > button to enter the project parameter setting



Picture 4-17：Project Parameter Setting Screen

The detailed description of each project parameter is as below Table:

Table 4-4：Project Parameter Description

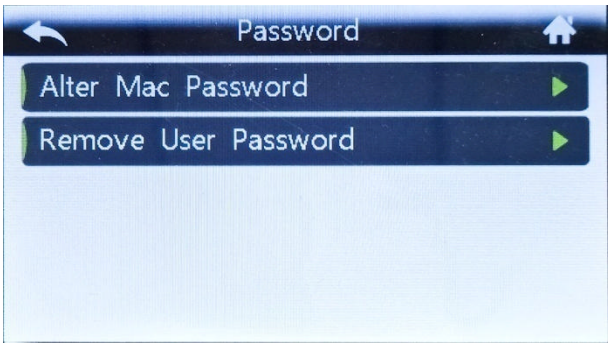
Running	Probe Specification	K Type	K-type Thermocouple /PT100	/	
	Number of probes	Control loop	control loop~control + return medium ~ control + mould ~control + return medium + mould	/	Control loop: Only has control temp. probe Control+ return mould: control temp. + return medium temp. Control + mould: control temp. + mould temp. Control+mould+mould: control temp. + return medium temp. + mould temp.

	Shutdown temp.	35.0	0~60.0	℃	Shutdown: stop when it cools down to this temp.
		95.0	32.0-140.0	℉	
	Reverse run time	60 secs.	0-600 secs.	secs.	Reverse emptying action: After shutdown, start the pump reverse running and valve emptying function; it can start/stop by manual or start/stop 【 reverse time 】 automatically; Note: If the reverse emptying function is started during machine operation, shut down the machine first, and then start the reverse emptying action;
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	℉	
Fault	Different mould temp. alarm	0.0	0-50.0	℃	(1) Mould temp.-medium output temp. |>【mould temp. deviation 】, delay 【 temp. difference alarm delay】secs., it alarms “Large mould 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.	
	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	℃	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.
		0.0	0-90.0	℉	
	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
Fault	Heater alarm	0.0	0~999	分	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	0~200.0	℃/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.	
Assist	Control temp. compensation	0.0	-30.0~30.0	℃	Compensate the measurement error of the medium output temp.
		0.0	-54.0~54.0	℉	
	Return medium temp. compensation	0.0	-30.0~30.0	℃	Compensate the measurement error of the return medium temp.
		0.0	-54.0~54.0	℉	
	Return medium temp. compensation	0.0	-30.0~30.0	℃	Compensate the measurement error of the return medium temp.
		0.0	-54.0~54.0	℉	
	Mould temp. compensation	0.0	30.0~30.0	℃	Compensate the measurement error of the mould temp.
		0.0	-54.0~54.0	℉	
	Analog quantity AI1 compensation	0.0	-30.0~30.1	bar	Compensate the pressure measurement error
	Analog quantity AI2 compensation	0.0	-30.0~30.2	L/min	Compensate the flow measurement error
Assist	Comm. address	0	0-31		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		
Maintenance	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.	

In the “Project” screen, click <Password Mgmt.> to enter the password mgmt. settings.



Picture 4-18： Password Mgmt. Screen

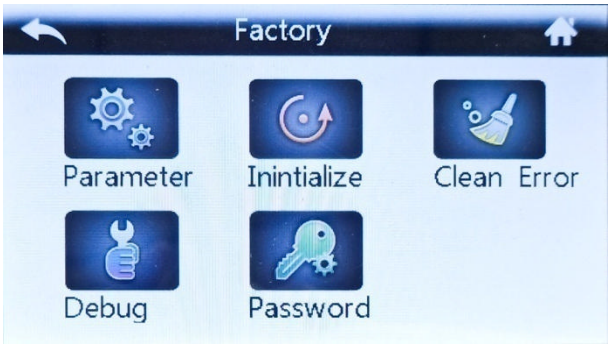
1) Project password modification

The default value of the project password is 3588. See "Password Modification" for details.

Clear the user password.

It can clear the user password with one click.

In the "Project" screen, click < Factory Setting >, and enter the password to enter the "Factory Setting" screen.



Picture 4-19：Factory Setting Screen

Important: It’s strictly prohibited to change the factory default settings without permission! If necessary, please contact the manufacturer!

4.3.6.2 Data Communication

Interface specification and communication definition:

Use the 9-pin serial port male connector, the pin is defined as pin No.3 foot +, No. 8 foot – comm. protocol:

MODBUS –RTU uses RS485 serial port

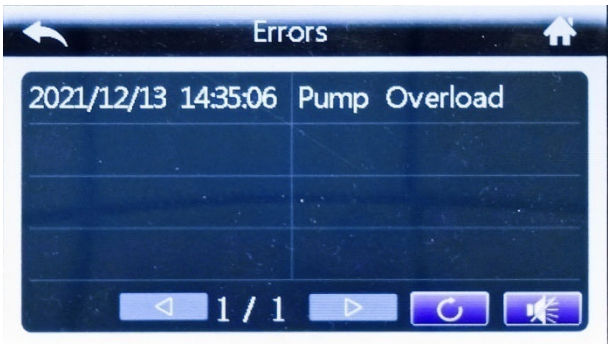
Note: The min. address is 1. If it reads and writes from zero, an error will occur.

Comm. parameters can be set in the"Project Setting" - Project Parameter - "Assist".

Parameter Address Table refer to Appendix 1 and Appendix 2

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:



Picture 4-20：Current Fault Screen

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

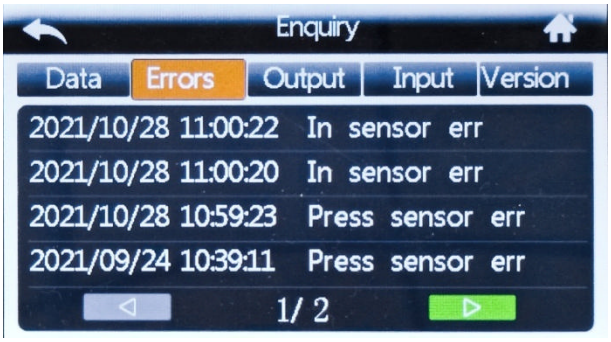
Press Key	Key Name	Description
	Fault reset	After trouble-shooting, press this key to reset the fault.
	Silence	Eliminate the system alarm sound
	Page up	Turn the page to query the fault information, gray key can’t be pressed, and green key can be pressed.
	Page down	Turn the page to query the fault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

4.5 Inquiry Screen

4.5.1 History Fault Inquiry

When there is no fault currently, click the < Fault Inquiry > button in the

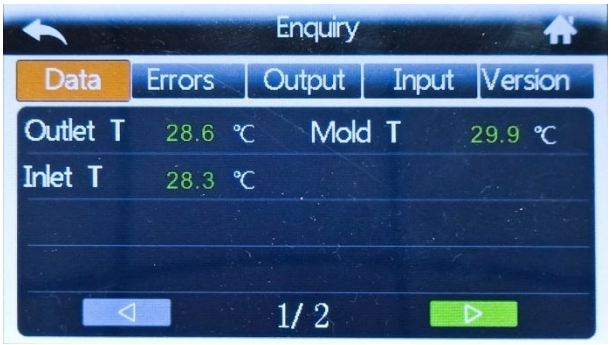
"Operation" screen to enter the history fault inquiry.



Picture 4-21：History Fault Inquiry Screen

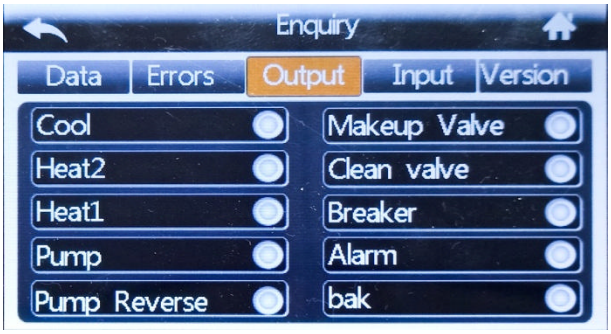
4.5.2 Data Inquiry

It can check all probes' temperature, pressure of current system, and query the system running time and other data:



Picture 4-22：Data Inquiry Screen

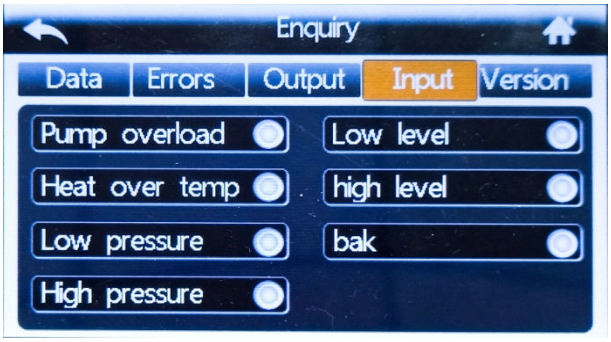
4.5.3 Output Inquiry



Picture 4-23：Output Inquiry Screen

When the indicator is gray, it means that corresponding relay has no output. When the indicator light is green, it indicates that corresponding relay is outputting.

4.5.4 Input Inquiry

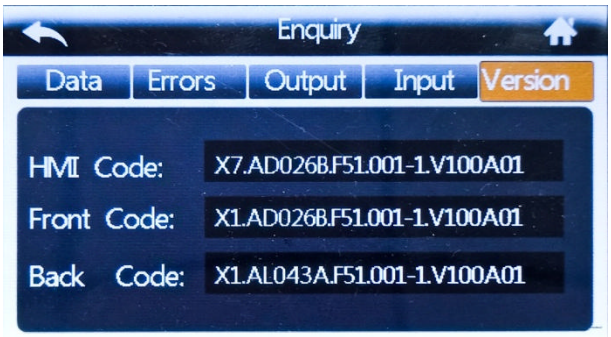


Picture 4-24：Input Inquiry Screen

When the indicator light is gray, it indicates that corresponding switch input is invalid.

When the indicator light is green, it indicates that corresponding switch input is valid.

4.5.5 Version Inquiry



Picture 4-25：Version Inquiry Screen

Take real display value as standard.

4.6 Password Management

4.6.1 Login

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

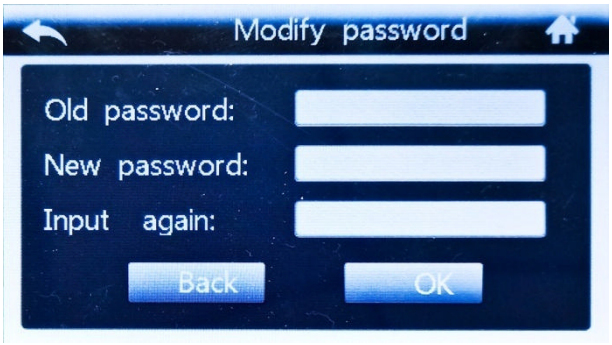
Table 4-6：User and Password Function

User Name	Password (can be modified)	Function
User	123	Enter【User Setting】screen
Project	3588	Enter【Project Setting】【User Setting】screen

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 4-26：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 Controller Exception List

No.	Fault Name	Detection Logic	Machine Action after Alarm	Reset Mode
1	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".	Stop temp. control	Manual reset
2	Pump overload	1. Power-on detection 2.Pump overload input point is valid, and the alarm delays 2 secs. Stop and release.	Stop temp. control	Manual reset
3	Heater overheat	1. Power-on detection 2. Alarm action: 1) EGO input point is valid, the alarm delays 2 secs., and open the circuit breaker output point. 2) PV－【SV】> 【overheat release output temp. 】, open the circuit breaker, it alarms EGO overheat. The temp. must reach the set temp. once that can be valid. Control without processing when the temperature is set from high to low. Note: It alarms when one of the conditions is met.	Stop temp. control	Manual reset
4	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.	Stop temp. control	Manual reset
5	High pressure	1. Power on detection 2. High pressure input point is valid, and the alarm delays 2 secs.	Stop temp. control	Manual reset

6	The liquid level slightly low	Press the start button to start the detection and start-up refilling stage: It detects the water level is not at high level after start up, it needs water refilling. If the liquid level is between high and low levels after the refilling delay time (adjustable, range 0-300s, preset 90s), it will give low liquid level alarm without shutdown. Temp. control stage: If it can't detect the high level signal input, open the make-up valve and give the low level alarm. When there is a high level signal input, it will automatically reset the low liquid level fault, and close the water make-up valve after delay [water make-up time];	Maintenance status	Manual reset
7	Low liquid level	Press the start button to start detection Detection method: Start-up stage: If the liquid level is at low level after the refilling delay time (adjustable, range 0-300s, preset 90s), it will give low liquid level alarm, shut down and release. Temp. control stage: If it detects no signal input of the low liquid level, the alarm will delay 2 secs, and it will shut down and release.	Stop temp. control	Manual reset
8	Abnormal control probe	Probe fault	Stop temp. control	Manual reset
9	Abnormal return medium probe	Probe fault	Stop temp. control	Manual reset
10	Abnormal mould probe	Probe fault	Stop temp. control	Manual reset
11	Pressure sensor fault	1. Check whether the sensor input signal is normal. 2. AI 1 input is defined as "disabled", disable the fault.	Maintenance status	Manual reset

12	Flow sensor fault	1. Check whether the sensor input signal is normal. 2. AI2 input is defined as "disabled", disable the fault.	Maintenance status	Manual reset
13	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.	Maintenance status	Manual reset
14	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.	Maintenance status	Manual reset

15	Too low temp.	【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. Notes: The temp. must reach the set temp. once that can be valid. Control without processing when the temperature is set from high to low.	Maintenance status	Manual reset
16	Too high temp.	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. Notes: The temp. must reach the set temp. once that can be valid. Control without processing when the temperature is set from high to low.	Maintenance status	Manual reset
17	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.	Stop temp. control	Manual reset
18	Too high pressure	1. Machine shutdown when it alarms, and reset manually. 2. Use flow sensor. When it running, the medium flow is lower than the【High pressure alarm】, it delays 2 secs. and alarms “high pressure”. When the【High pressure alarm】= 0, disable this fault.	Stop temp. control	Manual reset

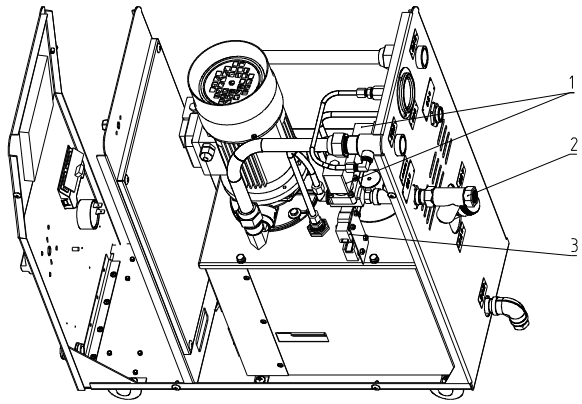
19	Interference Alarm	1. In the temp. control stage, the temp. drops or rises beyond the [Interference alarm] temp. within 1s. 2. When the【Interference alarm】= 0, disable this fault.	Maintenance status	Manual reset
20	Heater alarm	1. In the temp. control stage, when the control temp. can't reach the set temp. of - 5 ℃ within the【Heater alarm】time, it alarms. When it reach the set temp., it will dismiss the alarm automatically. 2. When the【Heater alarm】= 0, disable this fault.	Maintenance status	Auto reset
21	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.	Stop temp. control	Manual reset
22	Overtime when communicating with the rear plate	The comm. wire between the display panel and the control board breaks	Maintenance status	Auto reset
23	Rear plate data error	Parameter data verification error	Stop temp. control	Please contact the manufacturer.

5. Trouble-shooting

Failures	Possible reasons	Solutions
LCD displays nothing after switch on power and press ON/OFF key.	Did not connect through power supply. Main switch broken. Power supply wires problems. Control circuit fuse melt. Transformer broken.	Connect through power supply. Replace main switch. Check electrical wires. Fix 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 (F1)to equal to 1.1 times of motor rated current. Please refer to Mian Components for detailed description of overload relaly. Reset overload relay: Wait for one minute, then press the blue button to reset.
EGO overheat.	EGO temperature setting mistakes. EGO poor temperature detecting. Heater contactor K1 and K2 problems.	Correctly set EGO temperature. (EGO temperature setting value= temperature setting value+10℃) Replace EGO. Replace the contactor.
Low liquid level.	Insufficient water in the tank. Poor level switch.	Check whether the water tank and pipe are leaked and replenish water again. Replace the level switch.
Low pressure	Low pressure of external water supply. Poor pressure switch.	Increase the pressure of external water supply. Replace the pressure switch.
High pressure	The ball valve of the mould circulating water is not opened or the pipeline is blocked.	Check the ball 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. Afetr a while pump still fails to run.	PCB output relay problems. Electrical circuit problems.	Check or replace the PCB. Check electrical circuit.
Differences between setting 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 up.	Heater contactor problems. Heater problems. Thermocouple problems. PCB output point problems.	Replace the contactor. Replace pipe heater. Replace thermocouple. Check and repair PCB.
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 trippingoff after short heater output.	Heater tube short circuit or shell contact. Problems of circuit breaker.	Replace pipe heater. Replace circuit breaker.

6. Maintenance and Repair



1. Clean solenoid valve; Period: trimonthly
2. Clean Y-type filter; Period: monthly
3. Clean micro switch; Period: trimonthly

Service time of high temp. heat transfer oil:
≤ 120℃ Period: replace annually
≤120℃~≤160℃ Period: replace half yearly

Pay attention to the following rules during maintenance:

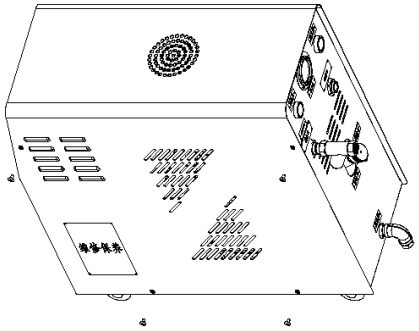
1) It requires more than two persons to check the machine. First reduce the temperature, cut off the power supply and drain the oil and water; Operate after full inspection and maintenance of the machine.
2) It's dangerous when the machine is in a high temperature during operation; Stop the machine first 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.

⚠ ***Attention !***

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

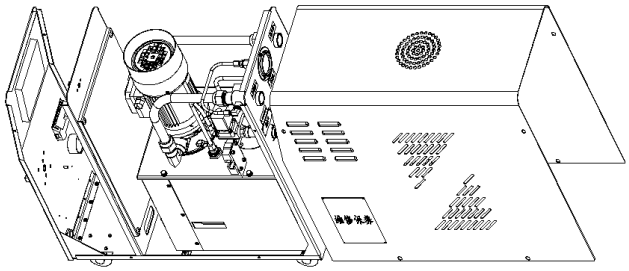
6.1 Open the Cover

1) Remove the screws from the cover plate.



Picture 6-1：Open the Cover 1

2) Remove the cover plate.



Picture 6-2：Open the Cover 2

6.2 Y Type Strainer

1) Clean soft water should be used as cooling water. Filter screen is used in the strainer to stop impurities and pollutants entering into water pipe.

2) Impurities or pollutants may cause errors and bad temperature control. Clean filter screen of the strainer periodically. Open cover under the Y type filtering valve and clean up the inside in accordance with the chart after operations complying with steps in the next chapter.

Picture 6-3：Y Type Strainer

6.3 Solenoid Valve

Replace solenoid valve:

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

Picture 6-4：Solenoid Valve

Note!

Because the heat transfer oil may become carbonized agglutination after a long time heating, which will shorten the lifespan of the pump, so it is suggested to replace every three monthes.

Designated oil medium “shell Heat Transfer Oil S2”.

Flash point	210℃
Fire point	255℃
Initial boiling point	355℃
Signition point	360℃

Note: For failures caused by heat transfer oil of other brands, our after-sale service is not available.

6.4 Maintenance Schedule

6.4.1 About the Machine

Model _____ SN _____ Manufacture date _____

Voltage_____Φ_____V Frequency _____ Hz Power _____ kW

6.4.2 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.

6.4.3 Daily Checking

☐Check machine startup function.

☐Check all the electrical wires.

6.4.4 Weekly Checking

☐Check loose eletrical connections.

☐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.

6.4.5 Trimonthly Checking

☐Check level switch.

☐Check the contactor [2].

☐Replace the hot kerosene with a using temperature above 160 degree [3].

6.4.6 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].

6.4.7 Yearly Checking

☐Replace the hot kerosene with a using temperature above 120 degree [5].

6.4.8 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（Protocol：Modus-RTU）

D-Map (40000+i)	English	Chinese	Range	Description	Type
1	CONTROL PV	Control temp.	-50 ~ 500	(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	Water output 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	Day(0), Mon.(1), Tues.(2), …, Sta.(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	Operate it with bit address, as shown in Appendix 2	read only
14	DO STATUS	Contact output status	0 ~ 255	Operate it with bit address, as shown in Appendix 2	read only
15	DI STATUS	Contact input status	0 ~ 255	Operate it with bit address, as shown in Appendix 2	read only
16	ALARM STATUS	Alarm status	0 ~ 255	Operate it with bit address, as shown in Appendix 2	read only
17	CONTROL PV ERROR	Control temp. input alarm	0 ~ 255	Operate it with bit address, as shown in Appendix 2	read only
18	RET PV ERROR	Return water temp. input alarm	0 ~ 255	Operate it with bit address, as shown in Appendix 2	read only
19	ENT PV ERROR	Water output temp. input alarm	0 ~ 255	Operate it with bit address, as shown in Appendix 2	read only
20	REMOTE ERROR	Remote control input alarm	0 ~ 255	Operate it with bit address, as shown in Appendix 2	read only
21	KEY STATUS	KEY key status	0 ~ 255	Operate it with bit address, as shown in Appendix 2	read only
22	LED STATUS	LED indicator status	0 ~ 255	Operate it with bit address, as shown in Appendix 2	read only
30		Switching value status	-	As shown in Appendix 2	read only
31		Relay status	-	As shown in Appendix 2	read only
32		Fault info. 1	-	As shown in Appendix 2	read only
33		Fault info. 2	-	As shown in Appendix 2	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
113		Close negative pressure running	1		Write only
114		Start negative pressure running	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秒	0-600 secs.	Read / write
152		Heating power	0~3	0kw(0)~3kw(1)~6kw(2)~9kw(3)	Read / write
200	SV	Control target value（℃）	-50 ~ 500℃	(Different displays depending on whether the temp. unit ° C has a decimal point.)	Read / write
201	PB	Heating control belt	0 ~ 550℃	(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 belt	0 ~ 550℃	(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℃	(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℃	(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℃	(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℃	(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	Day(0), Mon.(1), Tues.(2), …, Sta.(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	Day(0), Mon.(1), Tues.(2), …, Sta.(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	Chek time setting	0 ~ 9999	Unuse (0)	Read / write
612	RUNNING TIME	Device using time	0 ~ 9999		read only

700	LANGUAGE	Language setting	0, 1	Chinese(0), English1)	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 circuit, control + medium return, control + mould, control + return medium + mould	Read / write

(Different displays depending on whether the temp. unit ° C has a decimal point.)

E.g.) Without decimal point, 100 = 100 ℃;

E.g.) With decimal point, 100 = 10.0℃

Note: The min. address is 1 (40001).

If the address starts from 0, there will be an error in reading and writing! (E.g.:, Reading and writing (40000) will be wrong!)

Appendix 2：

Bit Address Variable

D-Map（40000+i.j)	Name	B0	B1	B2	B3	B4	B5	B6	B7
		B8	B9	B10	B11	B12	B13	B14	B15
13	MMI STATUS	Control	Cooling	Auto-tuning	Suction	Reserve	Buzzer Off	/	Input power
		/	/	/	/	/	/	/	/
14	DO STATUS	Pump forward action	Pump reverse action	Water refilling	Suction	Alarm	Breaker	Air	/
		/	/	/	/	/	/	/	/
15	DI STATUS	Pump overload	EGO	Llow pressure	High pressure	Low level	High level	/	Start control
		/	/	/	/	/	/	/	/
16	ALARM STATUS	Phase alarm	Temp. alarm	Deviation alarm	Interference alarm	Heater 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
		/	/	/	/	/	/	/	/
22	LED STATUS (KEY LED)	RUN	AUTO-TUNING	SUCTION	COOLING	BUZZER OFF	AUTO-START	SUCTION OFF	F
	LED STATUS	Power	Heater output	Auxiliary heater output	Cooling output	Pump forward action	Pump reverse action	Refilling	Alarm
30	Switching status (Read only) 0：Close 1：Open	Pump overload	Pump overheat	Low pressure	High pressure	Low liquid Level	High liquid Level	Remote switch	/
		/	/	/	/	/	/	/	/

31	Relay status (Read only) 0：Close 1：Open	Back up	Alarm output	Circuit breaker	Emptying valve	Make-up valve	Pump reverse running	Pump forward action	Main heating
		Auxiliary heating	Cooling valve	Solid state output 1	Solid state output 2	/	/	/	/
32	Fault info.1 (Read only) 0：no fault, 1：fault	Pump overload	Heater overheat	Low pressure	High pressure	Low liquid Level	/	/	Liquid level slightly low
		3-phase power phase stagger	Control probe fault	Return temp. probe fault	Mould probe fault	Pressure sensor fault	Flow sensor fault	Return medium temp. difference	Interference alarm
33	Fault info.2 (Read only) 0：no fault, 1：fault	Heater alarm	/	/	/	High temp.	Low temp.	/	Unit needs maintenance
		/	/	/	Overheat alarm	Mould temp. difference alarm	Low flow alarm	3-phase shortage	/