STM-SHT

High-temp. Oil Heater

Date: Apr.,2022

Version: Ver.A (English)

Contents

Table Index

Picture Index

1. General Description

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

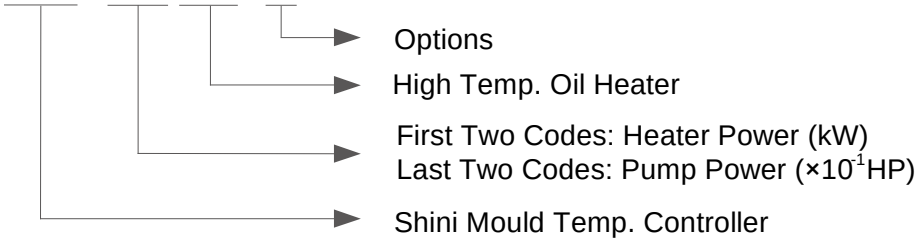
STM-SHT series of high temperature oil heaters are used to heat up the mould and maintain temperature, although they can be used in other similar applications.

This series of oil heater adopts indirect cooling method of the return oil through the cooler, and then the oil is pressurized by the pump, finally it is sent to the mould after being heated up by the pipe heater to achieve constant heating temperature.

Picture 1-1: STM-1815SHT

1.1 Coding Principle

STM - xxxx SHT - xx



1.2 Feature

- The maximum working temperature can reach up to 350℃/662℉, and the control accuracy can reach ±0.5℃/±0.9℉.
- The controller adopts 3.2''LCD for easy operation.
- In-build weekly timer with ℃/℉ unit conversion.
- Adopt P.I.D multi-stage temperature control system and SSR solid-state relay heating output.
- The magnetic-driven pump with stainless steel inside for high-pressure, explosion-proof, and no seal leakage.
- Multiple safety devices, including power reverse phase protection, pump overload protection, overheat protection, and low-level protection, can automatically detect abnormally and indicate via an alarm.
- Stainless steel pipe heater.
- RS485 communication interface that can achieve centralized monitoring online.
- With alarm buzzer.

1.3 Options

- For models optional with mold temperature and mold return oil temperature display, and add “TS” at the end of the model code.
- For models optional with magnetic filter to prolong the service life the magnetic pump, and add “MF” at the end of the model code.

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
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 Technical Specifications

1.4.1 Specification

Table 1-1：Specification

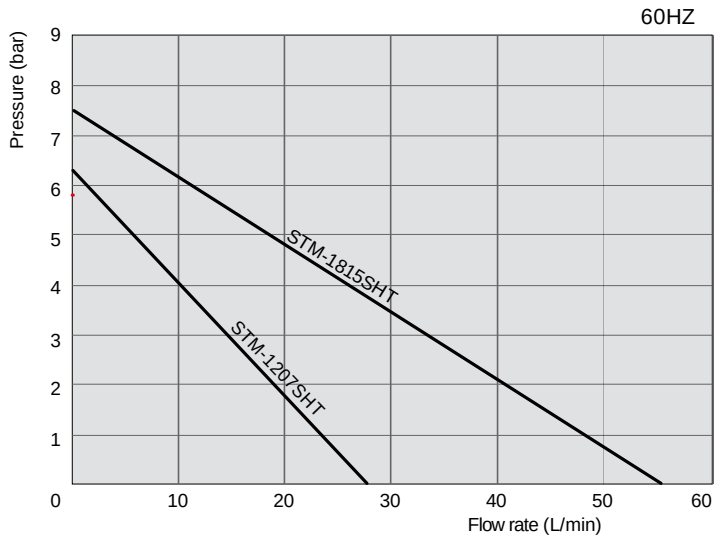
Model	Ver.	Max. Temp.	Heater (kW)	Pump (kW) (50/60 Hz)	Max. pump Flow (50/60Hz) (L/min)	Max. pump Pressure (bar) (50/60 Hz)	Heating Tank Number	Main Oil Tank (L) / Sub. Oil Tank (L)	Cooling Method	Inlet/ Outlet (inch) (inch)	Dimensions (mm) (H×W×D)	Weight (kg)
STM-1207 SHT	A	350℃	12	0.55/0.63	25.5/28.5	4.8/6.3	1	6/7	Indirect	3/4 / 3/4	710x390x1020	90
STM-1815 SHT	A		18	1/1.1	50/55.5	5.8/7.6	2	9/12	Indirect	1 / 1	940x430x1050	184

We reserve the right to change specifications without prior notice.

Notes：

1) In order to maintain stable temp. of heat transfer media, cooling water pressure should be no less than 2kgf/cm2 , but also no more than 5kgf/cm2.
2) Pump testing standard: Power of 50 / 60Hz, purified water in 20OC.
   (There is ± 10% tolerance for either max. flowrate or max. pressure).
3) Power supply: 3Φ, 230/400/460/575VAC, 50/60Hz.

1.4.2 Pump Performance



Picture 1-2：Pump Performance

1.4.1 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

1.5 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!

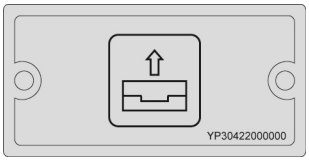
Do not touch the switch with wet object or hands.
Do not use the machine before fully aware of its performance.
Be careful not to touch or hit the switch or sensor.
Please keep enough operation space, and keep away obstacles.
To avoid producing statics, clean the floor from oil or water to keep a dry 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.

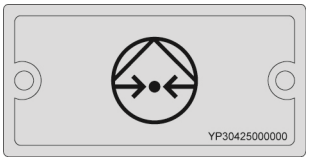
Warning !

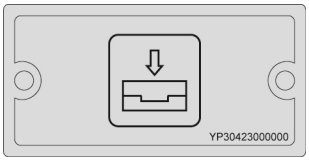
High temperature, take care of hands! This label is attached on the surface of heating parts.

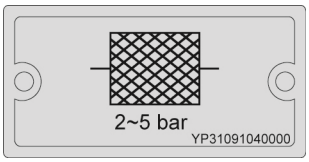
1.5.2 Signs and Labels

<table>
<tr>
<td>

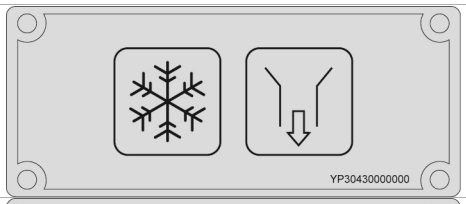
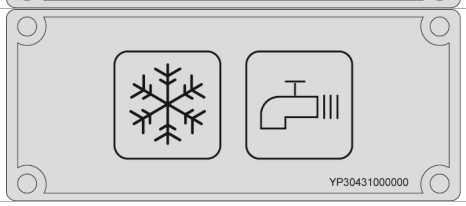

</td>
<td>Please according to schedule to make regular maintenance.</td>
</tr>
<tr>
<td>


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


</td>
<td>Pump pressure meter: indicating actual pressure of system.</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>

	Water outlet: drainage outlet.
	Water inlet: inlet for replenishing water and cooling water.

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℃.
5) Motor overload may be caused by phase shortage, pipe obstruction, broken bearing, etc. Motor overload relay will trip off to stop the machine when this happens. Fixing the problems, press RESET on overload relay to clear the alarm.
6) Before turn off the pump, wait until oil temperature falls blow 50℃. Or the life of the unit would be affected.
7) Please firstly open cooling water before start the machine, and close cooling water after stop the machine.

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).

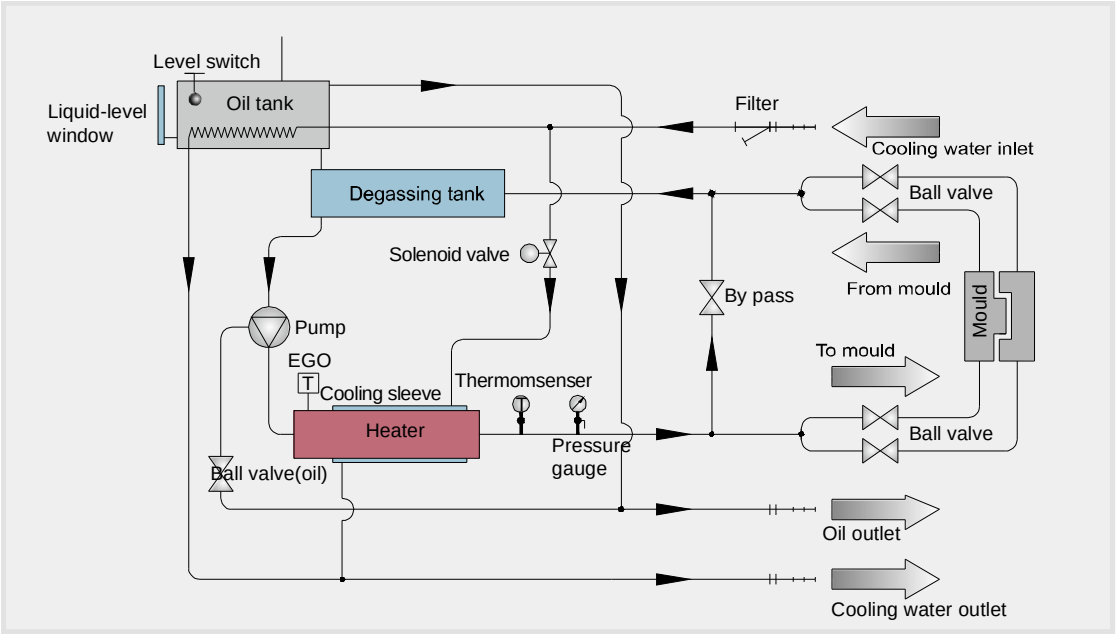
Shini is exempted from liability for any costs, fees, claims and losses caused by reasons below:

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 Characteristics and Working Principle

2.1 Working Principle



Picture 2-1: Working Principle

The high-temperature oil from the mold flows back to the pipe heater through the pipeline, and then it is sent to the mould by the pump, thus forming the circulation. In the process, if the oil temperature is too high, system will activate the solenoid valve to let cooling water cool down high temperature oil indirectly to achieve constant temperature control. If the oil temperature keeps increasing and reaches to the set point of EGO (overheat protector), the system will sound alarm and stop operation. If oil level falls down below the set point, the level switch installed on the oil tank will give the low level alarm and stop working.

3. Installation and Debugging

3.1 Installation Space

Notes for Installation and Positioning：

1) Machine just can be installed in vertical position. Make sure there's no pipe, fixed construction or other objects above the installing location and around the machine which may block machine's installation, hit objects or injure human person.
2) For easy maintenance, leaving 500mm space around machine is suggested, and no stacking objects on the machine.
3) Machine should be placed on water-level floor to keep balance. If it needs to be installed on the rising surface (e.g. the scaffold or the interlayer), should ensure its construction and size could support the weight and size of the machine.

Picture 3-1: Installation Space

3.2 Pipe Connection

1) The inlet and outlet specifications of the oil heater's heating tank and cooling tank.
   STM-1207SHT：3/4'' PT female thread
   STM-1815SHT：1'' PT female thread

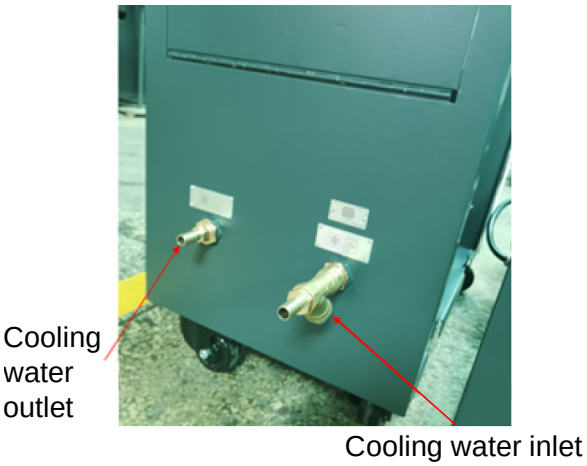
2) Cooling Water Connection

Connect the cooling water inlet to the clean water source, the outlet to the drainage port, and then turn on the water source. In order to ensure the stability of machine's temperature control, the cooling water flow shall not be less than 10L/Min, the cooling water pressure shall be 2~5bar, and the water quality shall be cleaned water without impurity particles.

Table 3-1：Cooling Water Inlet and Outlet Specification

Model	Cooling Water Inlet and Outlet Size	Inserted Core Type
STM-1207SHT	ϕ13mm（ext. diameter）	Pagoda insert core
STM-1815SHT	Inlet ϕ16mm（ext. diameter） Inlet ϕ13mm（ext. diameter）	Pagoda insert core

Note: The cooling water inlet and outlet are shown in the figure below, and don' t connect it reversely!



Picture 3-2: Cooling Water Pipe Connection

3.3 Power Connection

The oil heater needs well electrical grounding to ensure safe running of the electrical equipments.

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 4-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

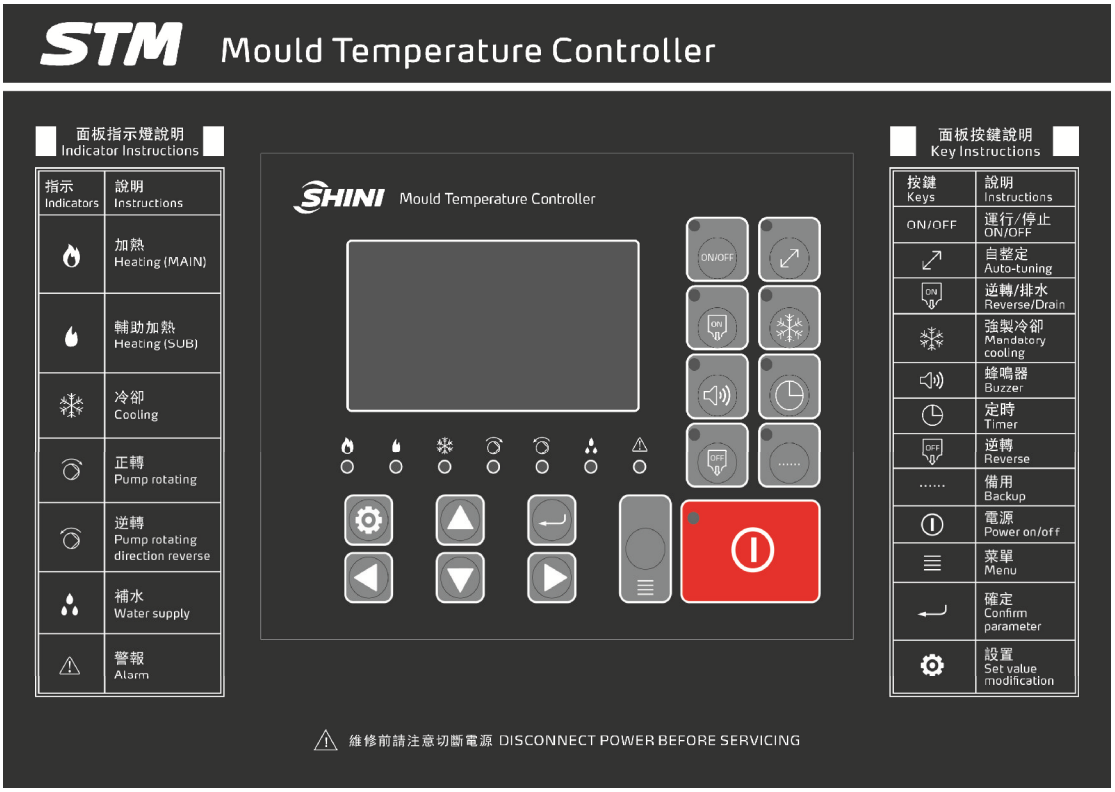
3.4.1 Installation Steps of the Optional Water Flow Regulator

1) Install the Teflon pipe connector, straight pipe connector and Teflon pipe plug on the water flow regulator;
2) Lock the water flow regulator with the shut-off valve and the flange;
3) Lock another flange at the machine inlet / outlet;
4) Fix the two flanges together with the bolts.

Important:
When the working temperature of the machine is less than or equal to 200 ℃, it can use the Teflon pipe with temp. resistant of 200℃.
When the working temp. is 200 ℃ ~350℃, it must use the corrugated pipe with temp. resistant of 350℃;

4. Operation Guide

4.1 Control Panel



Picture 4-1: Control Panel

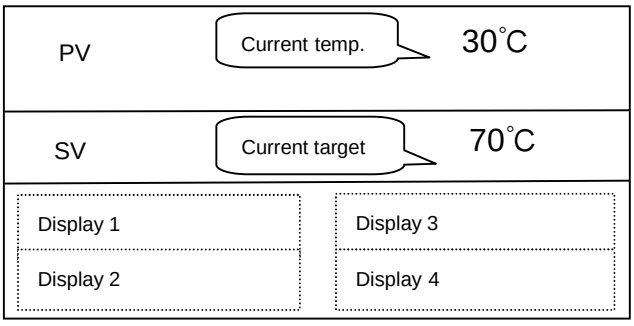
Table 4-1: Control Panel

No.	Name	Functions	Remarks
	Heating(Main)	Heating output indicator	-
	Heating(SUB)	Auxiliary heating output indicator	-
	Cooling	Cooling indicator	-
	Pump rotating	Display pump positive action indicator	-
	Pump rotating direction reverse	Pump reverse action indicator	-
	Water supply	Water refilling indicator	-
	Alarm	Send alarm indicator	Refer to table 4-2 for errors instruction.

ON/OFF	ON/OFF	Run/stop key	-
No.	**Name**	**Functions**	**Remarks**
	Auto-tuning	Auto tuning key	-
	Reverse/Drain	Reverse running/discharge	-
	Mandatory cooling	Forced cooling key	Hold the button for 2 secs. to enable force cooling. It stop heating while enable 100% cooling. It stops after the temperature drops below Cooling Temp.
	Buzzer	Buzzer off switch	After press" BUZZER" button, " BUZZER" LED on, Buzzer and alarm relay in idle mode even error occurs.
	Timer	Reserved timing key	-
	Reverse	Reserve key	-
.....	Backup	Backup key	Reserve
	Power ON/OFF	Power on/off key	-
	Menu	Menu key	Parameter confirmation
	Confirm parameter	Confirm key	-
	Set valve modification	Setting key	-
	-	Up key	-
	-	Down key	-
	-	Left key	-
	-	Right key	-

4.2 Menu Introduction

4.2.1 Main screen



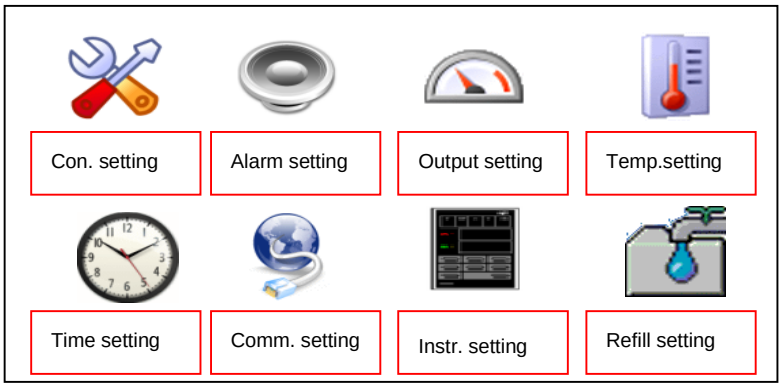
Picture 4-2: Main Menu Screen

Table 4-2: Main Menu Screen Specification

Items	Description
Display 1	Display system time
Display 2	Reserved time(start reserved function) / output percentage (start temp. control)
Display 3	System status / return-water temp. (To enable the return water and mold temp. display function, just press the SET key on the main screen to display the return water temp.)
Display 4	System status / mold temp. (To enable the return water and mold temp. display function, just press the SET key on the main screen to display the mold temp.)

Notes: The SV value range varies from different models.

4.2.2 MENU Screen



Picture 4-3: MENU Screen

In the main screen, press the <MENU>key, it pops up the password prompt, and input the password to enter the MENU screen, the initial password is 0000.

4.2.3 Machine Startup and Shutdown Operations

4.2.3.1 Startup

1) Confirm that the power specification outside the factory is the same as that of the machine voltage.
2) Connect the machine main power wire to the external power.
3) Turn the main power switch on the door plank to the ON position
4) Press the power <ON/OFF> key on the controller, and the screen starts to display.
5) Press the < Set >key on the controller to set the temp. to be controlled by the machine.
6) Make sure to connect the external pipeline and open the valve, and press the <Run/Stop> key on the controller to start the machine.

4.2.3.2 Shutdown

1) Press the < Forced Cooling > key or < Set > key to set the temperature and cool the machine temp. below 50 ℃.
2) Press the <Run/Stop> key on the controller, and the machine stops running and turns to standby mode.
3) Press the power < ON/OFF> key on the controller, and then the display screen will turn off.
4) Turn the main power switch on the door plank from the ON to the OFF position to shut down the machine.

4.3 Parameter Table

4.3.1 Parameter Setting Table

Table 4-3: Control Setting

Parameter	Description	Range	Default
P	proportional band	1-100℃(2℉-212℉)	13℃(55℉)
I	heating integral time	1-999S	100S
D	heating to differential time	1-999S	15S
heating cycle	heating output cycle	3-60S	15S
cooling cycle	cooling output cycle	1-30S	15S

Table 4-4: Alarm Setup

Parameter	Description	Range	Default
Phase detection	for three-phase detection	use/not use	not use
Return water temp.	Control temp. and return temp. deviation alarm (only effective in normal humidity control)	0-100℃(0= not use)	0
Mould temp. deviation	Control temp. and mould temp. deviation alarm (only effective in normal humidity control)	0-100℃(0= not use)	0
Disruption alarm	Temp. sudden drop alarm	0-300℃(0= not use)	0
Heater alarm	It doesn't reach set temp. in required time	0-3600S	0
Over temp. alarm	PV>SV+ overheat alarm set temp., it alarms and stops	0-50℃	15℃

Table 4-5: Output Setting

Parameter	Description	Range	Default
Auxiliary output	auxiliary output OFF temp.	0-300℃(0= not use)	0
Cooling temp.	forced cooling temp.	0-100℃(0= not use)	35℃
Overhaul temp.	set machine running time before maintenance	0-10000H(0= not use)	0
Total running time	total machine running time		

Table 4-6: Temp. Setting

Parameter	Description	Range	Default
Temp. upper limit	SV upper limit temp. can be set	0-300℃	300℃
Temp. lower limit	SV upper lower temp. can be set	0-300℃	0℃
Temp. unit	℃/℉ setting	℃、℉	℃
Decimal point	temp. value of decimal point can be set	0.1、1	1
Control temp. offset	control temp. offset	-100-100℃	0℃
Return water temp. offset	return water temp. offset	-100-100℃	0℃
Mould temp. offset	mould temp. offset	-100-100℃	0℃

Notes: The SV value range varies from different models.

Table 4-7: Time Setting

Parameter	Description	Range	Default
Current time	Current time setting	hr./min./week	No
Reserve the week	Reserve power ON/OFF	ON/OFF	OFF

Table 4-8: One Week ON/OFF Setup

Parameter	Description	Range	Default (start, stop)
Mon.	Reserved ON/OFF time on Mon.	hr/min.，hr/min.	01:02，08:09
Tues.	Reserved ON/OFF time on Tue.	hr/min.，hr/min.	02:03，09:10
Wed.	Reserved ON/OFF time on Wed.	hr/min.，hr/min.	03:04，10:11
Thu.	Reserved ON/OFF time on Thu.	hr/min.，hr/min.	04:05，11:12
Fri.	Reserved ON/OFF time on Fri.	hr/min.，hr/min.	05:06，12:13
Sat.	Reserved ON/OFF time on Sat.	hr/min.，hr/min.	06:07，13:14
Sun.	Reserved ON/OFF time on Sun.	hr/min.，hr/min.	07:09，14:15

Table 4-9: Communication Setup

Parameter	Description	Range	Default
Comm. protocol	comm. protocol	Modbus-RTU	Modbus-RTU
Comm. unit No.	comm. address	1-99	1
Comm. speed	comm. speed	4800、9600、19200	9600
Comm. length	data length	7,8Bit	8Bit
Stop bit	stop bit	1,2Bit	1Bit
Check bit	stop bit	None, odd, even	Even

Table 4-10: Instrument Setup

Parameter	Description	Range	Default
Language	language selection	Chinese/English	Chinese
Far-end setting	far-end setting	use/not use	not use
Password setting	password setting	0-9999	0
Return water and mould temp. display	Return water and mould temp. display	use/not use	not use
DISP	TFT version		
MAIN	control board version		

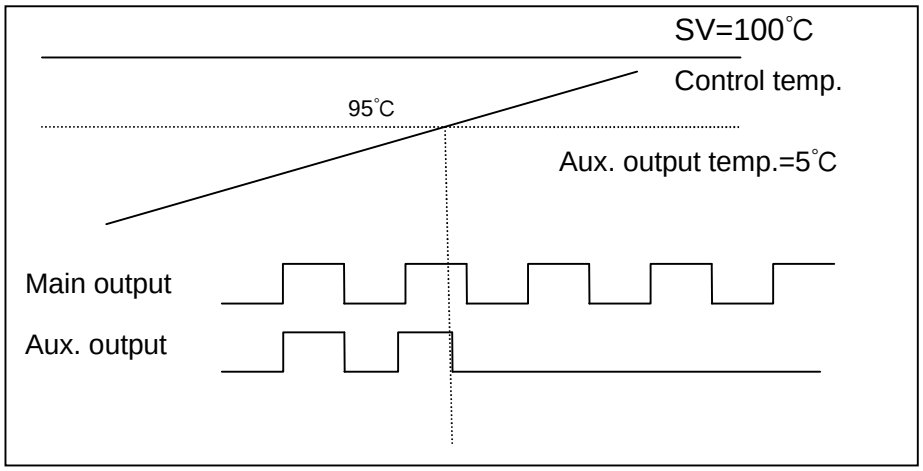
Table 4-11: Refilling Setup

Parameter	Description	Range	Default
Startup refill time	startup refill time	0-601S	0
Intermittent refill time	intermittent refill time	0-600S	0

4.3.2 Output Setting

4.3.2.1 Main output and auxiliary output of heating control

1) When control temp. is smaller than set value, initiate main output and auxiliary output to promptly improve the temp.
2) Alternatively select the main output and auxiliary output.

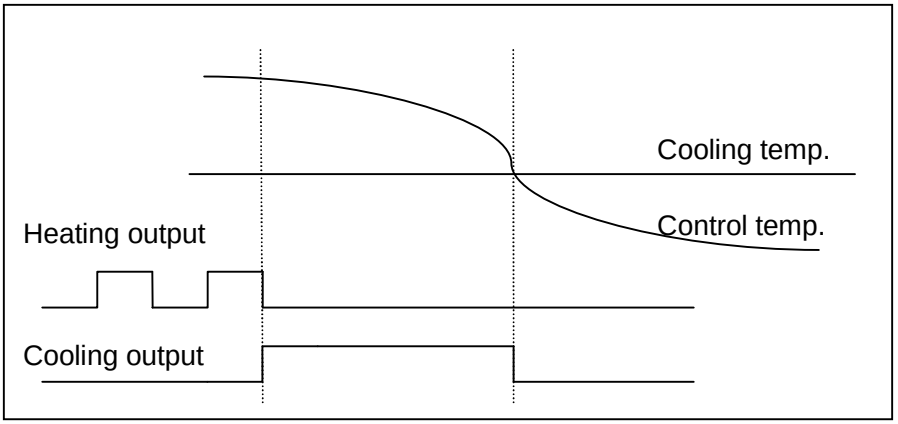


4.3.2.1 Forced cooling

Press the forced cooling key to stop heating and 100% output the cooling control.

Control temp. is lower than the cooling temp., automatically dismiss the forced cooling to terminate the control.

Forced cooling key is available to stop forced cooling for normal control.

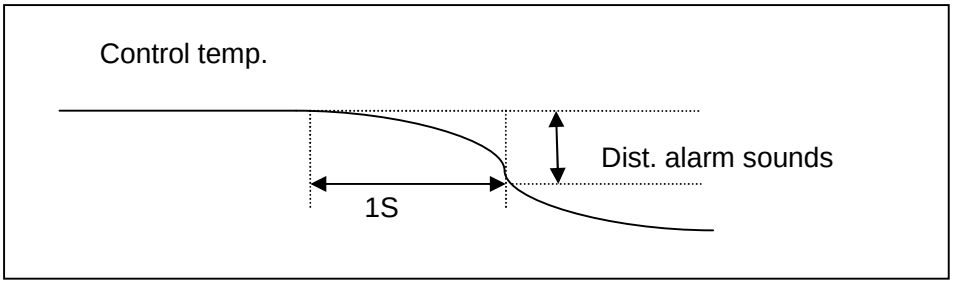


4.3.3 Alarm Settings

4.3.3.1 Disruption alarms

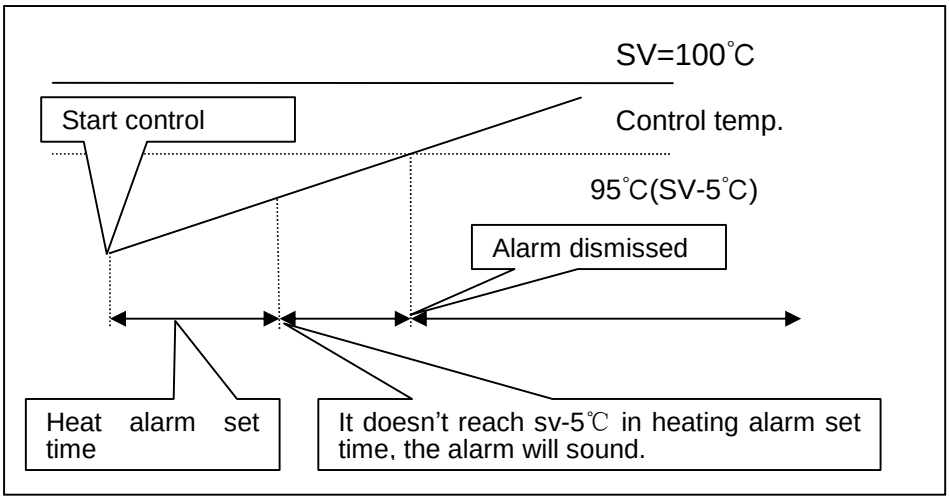
1) If the control temp. is kept over the value of disruption alarm for 1 sec., it is considered being interrupted, which will alarm.

2) The disruption alarm only works in controls without cooling output.
3) Once it sounds alarm, it will keep alarming till BUZZER key is pressed to cancel the alarm.



4.3.3.2 Heater Alarm

1) In heater alarm setting time, it will alarm when the control temp. can't reach 5℃ below the set temp.
2) The heater alarm only works in controls, and once it reaches the temp. range, the alarm will be dismissed.
3) Even it sounds the alarm, the temp. control is still effective.



4.4 Errors and Causes

Errors	Causes	Alarm	Temp. control
PCB errors	Regulator error	Occur	Stop
Calibration error		Occur	Stop
ADC error		Occur	Stop
RJC error		Occur	Stop

EEPROM error		Occur	State maintain
Phase alarm	Phase shortage or phase reverse detected	Occur	Stop
EGO over temp.	EGO temp. contact input detected	Occur	Stop
Pump overload	Pump overload contact input detected	Occur	Stop
Insufficient pressure	Low pressure contact input detected	Occur	Stop
Overpressure	High pressure contact input detected	Occur	Stop
Low water (liquid) level	Low water (liquid) level contact input detected	Occur	Stop
Temp. window “----“display	Sensor abnormal	Occur	Stop
Water outlet temp. deviation	Control temp. and water outlet temp. deviation	Occur	State maintain
Return water temp. deviation	Control temp. and return water temp. deviation	Occur	State maintain
Disruption alarm	Control temp. sudden drop	Occur	State maintain
Heater alarm	Control temp. doesn’t rise	Occur	State maintain
Over heat	Overheat alarm sounds	Occur	Stop

Notice：

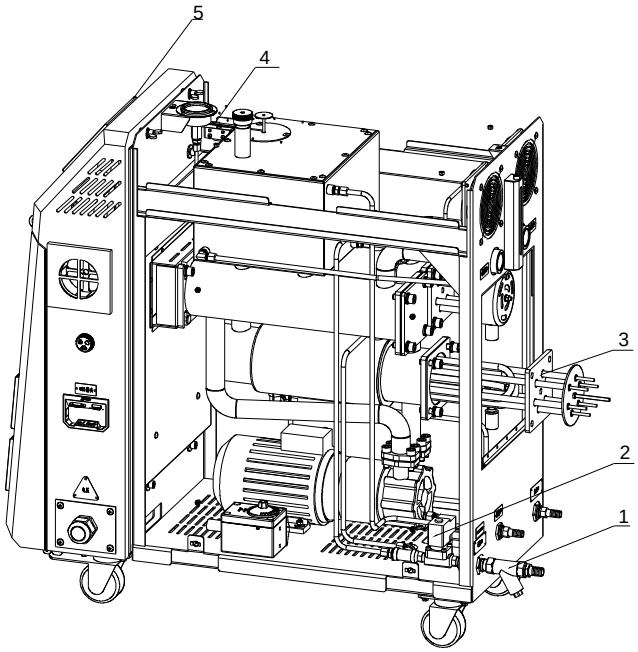
As various alarms above, the controller will activate the protective function as auto shutdown or stop running; please re-press the “operation” to restart according to the Chapter 5 Trouble-shooting.

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. Setting current of thermo relay error.	Check power supply. Check the pump. Check the pump motor. Correctly set the setting current of thermo relay 1.1 times as motor rated current. Please refer to Main Components for detailed description of overload relay. Reset overload relay: Wait for one minute, and 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 the EGO temp. (EGO temp. setting value= temp. setting value+10℃). Replace the EGO. Replace the solid-state relay.
Low liquid level.	Oil tank shortage. Poor liquid level switch.	Check the water tank and whether the pipeline has heat transfer oil leaked and refill it. Replace the level switch.
Insufficient pressure	Insufficient pressure of the external water supply	Increase the pressure of external water supply. Replace the pressure switch.
High pressure	The mold circulating water ball valve doesn't open or the pipe is blocked. Poor pressure switch.	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. After a	PCB output relay problems. Electrical circuit problems.	Check or replace the PCB. Check electrical circuit.

while pump still fails to run.		
Differences between setting temperature and actual temperature is too big.	Too short time after machine startup. Temperature parameter setting error. Cooling solenoid 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 the pump motor. Replace the 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.
Return water temp. deviation	The deviation between control temp. and return water temp.	Check whether there are abnormalities in the mold pipe and hot runner.
Outlet water temp. deviation	The deviation between control temp. and return water temp.	Check whether there are abnormalities in the mold pipe and hot runner.
Mould temp. deviation	The deviation between control temp. and mold temp.	Check whether there are abnormalities in the mold pipe and hot runner.
Interference alarm	Control temp. drops sharply	Check whether the solenoid valve and pipe heater are work normally.
Heater alarm	Control temp. doesn’t rise	Replace the contactor. Replace the pipe heater. Replace the thermocouple. Replace/repair the controller.
Overheat	Overheat alarm occurs	Check whether the contactor, solenoid valve and pipe heaters work normally. Check whether the output signal of the circuit board is abnormal.

6. Maintenance and Repair



1.Clean the Y-type water strainer.
Period: every month.
2.Clean the solenoid valve.
Period: every three months
3.Clean the pipe heater.
Period: every three months.
4.Check the liquid level switch.
Period: every three months.
5.Check the contactor.
Period: every six months.

High temp. heat transfer oils using time:
≤120℃ Period：Once a year.
120℃~160℃ Period：every six months.
＞160℃ Period: every three months

Pay attention to the following rules during maintenance:

1) Need at least two persons present when checking the machine. Let the machine cool down, turn off power supply, drain out the oil and water. Make sure enough place before checking and maintenance.

2) The machine works in high temperature. Stop the machine, wait it to cool down. Put on protective gloves before servicing or maintenance.

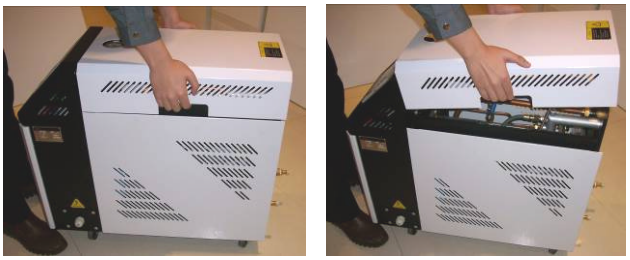
3) In order to prolong the life of the machine and to prevent accidents, check the machine at a fixed frequency.

4) During operation, the oil is heated up to a high temperature, wait it to fall below 50℃ to perform repairing or maintenance.

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

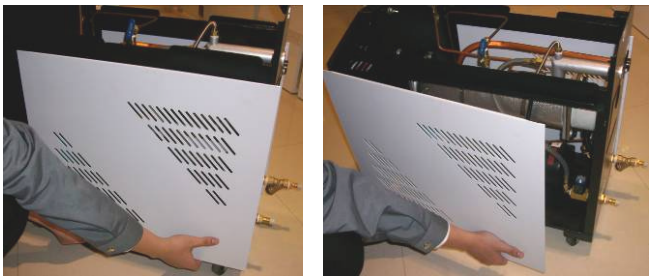
6.1 Open the Covers

1) Lift the top cover gently to open it. (Refer to the pictures below)



Picture 6-1: Open the Covers 1

2) Pull the bottom of side cover outward, and lift it to open. (Refer to the pictures below)



Picture 6-2: Open the Covers 2

3) Open the cover of control box (Refer to the pictures below; First open the cover plate, and screw off two butterfly screws to unlock the cover).

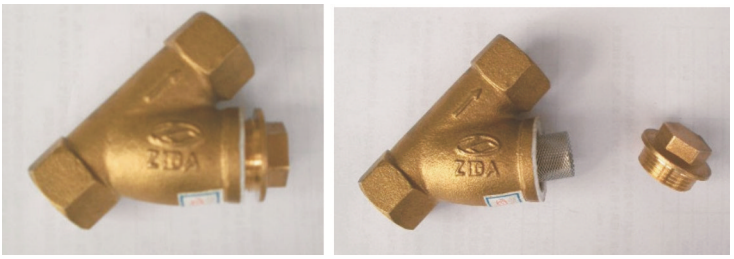
Picture 6-3: Open the Covers 3

6.2 Y Type Strainer

Clean soft water should be used for cooling water. Y-type strainer is mounted on inlet pipe to stop impurities and pollutants entering into water pipe.

Impurities or pollutants may cause errors and poor temperature control. Clean the Y-type strainer periodically.

Cleaning steps: turn off power and cooling water supply. Open the bottom Y-type strainer to clean the inside. As below picture.



Picture 6-4: Y Type Strainer

6.3 Solenoid Valve

Replace solenoid valve:

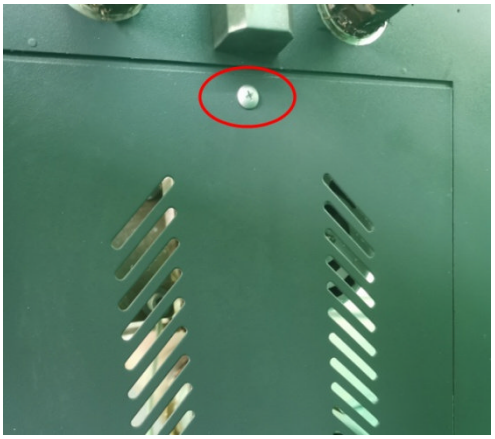
1) Open machine top cover.
2) Take down right side cover.
3) Unfix the solenoid valve for replacement.
4) Install the covers in a reverse order.

Picture 6-5: Solenoid Valve

6.4 Pipe Heater Cleaning

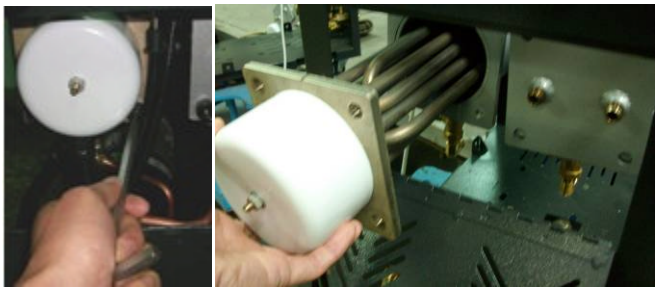
As long time heating of machine, heat transfer oil will carbonize and accumulate on the pipe. Clean the pipe periodically as excessive carbon deposit will reduce heat efficiency. Refer to pictures below

1) Use a screwdriver to remove the screws on the small cover plate of the rear plate and open the small cover plate downward.



Picture 6-6 Pipe Heater 1

2) Take out the pipe heater (As shown in the figure, unscrew the screws and remove the cover).



Picture 6-7: Pipe Heater 2

3) Use the rag soaked in Tianna water, also known as banana water or dipped with banana water to scrub the oil and grease on the pipe heater. After the oil and grease is removed, put the pipe heater in a cool place and let the banana water to evaporate.
4) Install the pipe heater back into the machine in the reverse order. If the electric seal graphite gasket is broken or cracked during the disassembly, please be noted to replace the sealing gasket (Shini material No.: YR20121200000).

Note: The heat transfer oil will be carbonized and bonded under long term of high temperature heating, which will shorten the service life of the pump. It is recommended to replace the heat transfer oil every three months!

Designated to use Solutia heat transfer oil T66

Flash point	184℃
Ignition point	212℃
Normal boiling point	359℃
Spontaneous ignition point	374℃

Note: For the faults caused by using other brands of the heat transfer oil, Shini shall not provide the after-sales service.

6.5 PCB Circuit Board

MAIN terminal board drawing (refer to next page for terminal position and number).

① SENSOR TERMINAL1 (sensor terminal)
2, 3 : control temp. sensor terminal
5, 6 : return water temp. sensor terminal
8, 9 : water out temp. sensor terminal
11, 12 : 1~5V input terminal

② DI TERMINAL (contactor input terminal)
13, 14 : pump overload contactor input terminal
15, 16 : EGO overheat contactor input terminal
17, 18 : under pressure contactor input terminal
19, 20 : overpressure contactor input terminal
21, 22 : lower water limit contactor input terminal
23, 24 : upper water limit contactor input terminal

③ OUTPUT TERMINAL (output terminal for controlling)
1, 2 : heating control output MAIN (RELAY output)
3, 4 : heating control output SUB (RELAY output)
5, 6 : cooling control output (RELAY output)

④ DO TERMINAL (relay contactor output terminal)

1, 2 : pump running contactor output terminal

3, 4 : pump inverse running contactor output terminal

5, 6 : backup water contactor output terminal

7, 8 : SUCTION contactor output terminal

9, 10 : alarm contactor output terminal

11, 12 : relay contactor output terminal

13, 14 : reserve

⑤ PHASE CHECK TERMINAL (phase detect terminal)

1 : R phase connect terminal

2 : S phase connect terminal

3 : T phase connect terminal

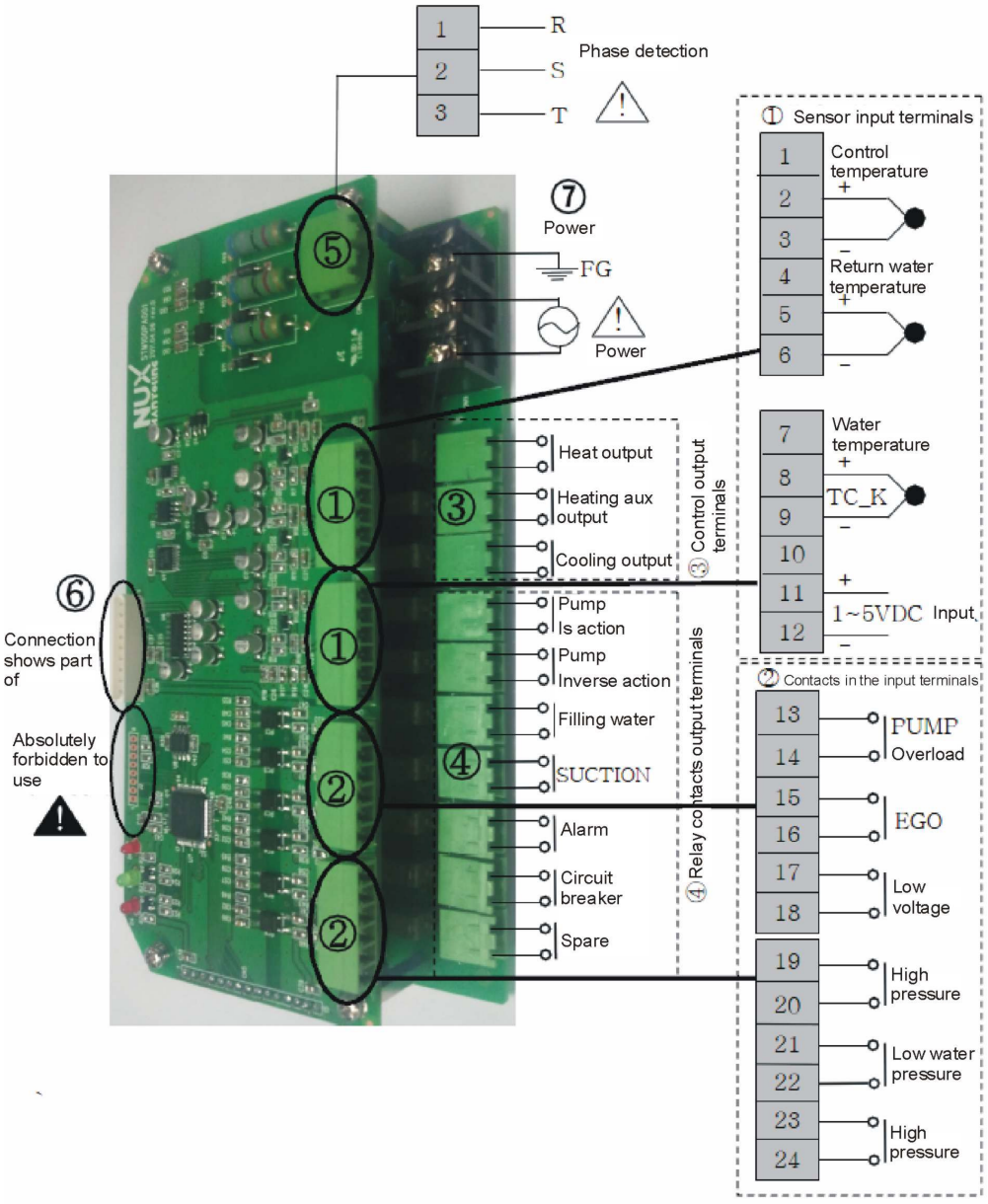
⑥ DISPLAY CN (connect terminal for display)

Connect stub cable with STM100.

⑦ POWER TERMINAL (power supply terminal)

1 : FG terminal

2, 3 : power supply terminal (100~240VAC)


1
2
3
R
S
T
Phase detection
⑦
Power
FG
Power
⑤
①
③
Heat output
Heating aux output
Cooling output
Control output terminals
③
⑥
Connection shows part of
Absolutely forbidden to use
①
Pump
Is action
Pump
Inverse action
Filling water
④
②
SUCTION
Alarm
Circuit breaker
Spare
④ Relay contacts output terminals
② Contacts in the input terminals
13
14
15
16
17
18
19
20
21
22
23
24
PUMP
Overload
EGO
Low voltage
High pressure
Low water pressure
High pressure
① Sensor input terminals
1
2
3
4
5
6
Control temperature
+
–
Return water temperature
+
–
7
8
9
10
11
12
Water temperature
+
TC_K
–
+
1~5VDC Input
–

6.6 Displayer Terminal Connecting Diagram

① DI TERMINAL

1, 2: Run/stop di terminal

② COMM TERMINAL

1, 2, 3, 4: rs485 Comm terminal

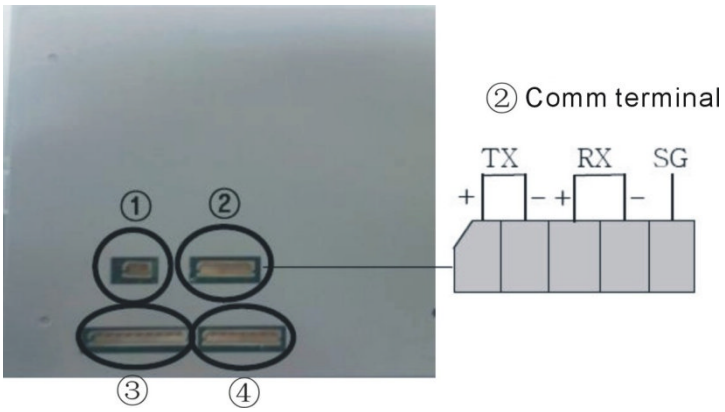
5：Earth terminal

③ MAIN CN

Connect to the electric cables which also connected with stm100

④ TEST PIN

Test pin No connection



6.7 Maintenance Schedule

6.7.1 About the Machine

Model _____ SN _____ Manufacture date _____

Voltage_____Φ_____V Frequency _____ Hz Power _____ kW

6.7.2 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.

6.7.3 Daily Checking

☐Check machine startup function.

☐Check all the electrical wires.

6.7.4 Weekly Checking

☐Check loose electrical 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.

6.7.5 Tri-monthly Checking

☐Check level switch.

☐Check the contactor [2].

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

6.7.6 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].

6.7.7 Yearly Checking

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

6.7.8 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, and suggested replacing frequency is one year.

Appendix 1

STM Comm. Variable Table (Protocol：MODBUS-RTU)

D-Map (40001+i)	English	Chinese	Range	Explanation	Type
1	CONTROL PV	control temp.	-50 ~ 500℃	※1(According to the decimal point of the temp. unit °C, there has different display）	read only
2	RET PV	return water temp.	-50 ~ 500℃		read only
3	ENT PV	outlet 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 data	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 second	0 ~ 59		read only
12	CONTROL STATUS	Control status	0 ~ 3	Fault(0),stop control(1),in control(2), Auto-tuning(3)	read only
13	MMI STATUS	Running status	0 ~ 255	※2（Operate with bit address）（As shown in Table 2 below）	read only
14	DO STATUS	Contact output status	0 ~ 255	※2（Operate with bit address）（As shown in Table 2 below）	read only
15	DI STATUS	Contact input status	0 ~ 255	※2（Operate with bit address）（As shown in Table 2 below）	read only
16	ALARM STATUS	Alarm status	0 ~ 255	※2（Operate with bit address）（As shown in Table 2 below）	read only
17	CONTROL PV ERROR	Control temp. input alarm	0 ~ 255	※2（Operate with bit address）（As shown in Table 2 below）	read only
18	RET PV ERROR	Return water temp. input alarm	0 ~ 255	※2（Operate with bit address）（As shown in Table 2 below）	read only
19	ENT PV ERROR	Outlet water temp. input alarm	0 ~ 255	※2（Operate with bit address）（As shown in Table 2 below）	read only

20	REMOTE ERROR	Remote control input alarm	0 ~ 255	※2（Operate with bit address)（As shown in Table 2 below）	read only
21	KEY STATUS	KEY key status	0 ~ 255	※2（Operate with bit address)（As shown in Table 2 below）	read only
22	LED STATUS	LED status	0 ~ 255	※2（Operate with bit address)（As shown in Table 2 below）	read only
23	DISPLAY VERSION	Displayer version	-		read only
24	CONTROL VERSION	Controller version	-		read only
100	HOUT	Heating end output	0 ~ 100%		read only
101	COUT	Cooling end output	0 ~ 100%		read only
102	CONTRAST	CONTRAST	0 ~ 59	brightest(0) ~ earliest(59)	read/write
103	POWER KEY	POWER KEY	0, 1	1 = Key（button）operation. Automatically reset to 0 after the operation.	write only
104	RUN/RESET KEY	RUN/RESET KEY	0, 1		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
200	SV	Control target value	-50 ~ 500℃	※1(According to the decimal point of the temp. unit °C, there has different display）	read/write
201	PB	Heating control band	0 ~ 550℃	※1(According to the decimal point of the temp. unit °C, there has different	read/write

				display）	
202	TI	Integral time	1 ~ 3600s		read/write
203	TD	Derivative time	1 ~ 3600s		read/write
204	PBC	Cooling control band	0 ~ 550℃	※1(According to the decimal point of the temp. unit °C, there has different display）	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	Not used (0), use(1)	read/write
301	DEV1 ALARM	Outlet water temp. deviation	0 ~ 550℃	※1(According to the decimal point of the temp. unit °C, there has different display）	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
400	OUTPUT MODE	Output mode	0, 1	Heating(0), heating/cooling (1)	read/write
401	SUB HEATING	Auxiliary output	0 ~ 550℃	※1(According to the decimal point of the temp. unit °C, there has different display）	read/write
402	COOLING TEMP	Cooling temp.	-50 ~ 500℃		read/write
500	H.LIMIT TEMP	Upper limit temp.	-50 ~ 500℃	※1(According to the decimal point of the temp. unit °C, there has different display）	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. deviation	-550 ~ 550℃	※1(According to the decimal point of the temp. unit °C, there has different	read/write

				display）	
505	RET TEMP BIAS	Return water temp. offset	-550 ~ 550℃		read/write
506	ENT TEMP BIAS	Outlet water temp. offset	-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	Min. setting	0 ~ 59		read/write
606	SCHDULE DAY	Reversed week setting	0 ~ 127	Sun.(1), Mon.(2), Tues.(4), Wed.(8), Thur.(16), Fri.(32), Sat.(64) ex) 48 = Fri.(32)+Thur.(16)	read/write
607	AUTO-START HOUR	Reversed auto start hour setting	0 ~ 24	Not used (00:00)	read/write
608	AUTO-START MINUTE	Reversed auto start min. setting	0 ~ 59		read/write
609	AUTO-END HOUR	Reversed auto stop hour setting	0 ~ 24	Not used (00:00)	read/write
610	AUTO-END MINUTE	Reversed auto stop min. setting	0 ~ 59		read/write
611	AS SETTING TIME	Check time setting	0 ~ 9999	Not used (0)	read/write
612	RUNNING TIME	Equipment using time	0 ~ 9999		read only
D-Map （40001+i)	English	Chinese	Range	Explanation	
700	LANGUAGE	Language setting	0, 1	Chinese(0), English (1)	read/write
701	REMOTE	Remote control	0, 1	Not used (0), Use (1)	read/write
702	PASSWORD	Password setting	0 ~ 9999		read/write
703	RET/ENT DISP	Return water outlet	0, 1	Not used (0), Use(1)	read/write

		temp.			
704	W-FILL TM T1	Refilling water time T1	0 ~ 600s		read/write
705	W-FILL TM T2	Refilling water time T2	0 ~ 60s		read/write

Notes：

(gray background）means the read-only variable

1) According to the decimal point of the temp. unit ˚C, there has different display.
   For example) When there has the decimal point, 100 = 100˚C
   For example) When there's no decimal point,100 = 10.0˚C
2) Bit Map operates with the bit address

Appendix 2

Bit Address Variable

D-Map (40001+i.j)	Name	Bit							
		0	1	2	3	4	5	6	7
13	MMI STATUS	Control	Cooling	Auto-tuning	Suction	Reserved	Buzzer Off	-	Input power
14	DO STATUS	Pump forward action	Pump reverse action	Refilling water	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	temperature alarm	Deviation alarm	Interference alarm	Heater alarm	-	-	-
17	CONTROL PV ERROR	RJC Error	-Over	+Over	sensor open	AD Error	-	-	-
18	RET PV ERROR	RJC Error	-Over	+Over	sensor open	AD Error	-	-	-
19	ENT PV ERROR	RJC 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 (40001+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-	SUCTIO	COOLIN	BUZZER	AUTO-	SUCTIO	F

	(KEY LED)		TUNING	N	G	OFF	START	N OFF	
	LED STATUS(상태 LED)	power	heater output	auxiliary heater output	Cooing output	pump forward action	pump reverse action	water refilling	alarm

Notes：

（gray background）means the read-only variable

The minimum address is 1（40001）.

If the address starts from 0, there will be an error in reading and writing! (such as the reading and writing (40000) will be wrong!)