STM-F

"Large Flow" Oil Heater

Date: Mar., 2023

Version: Ver.E (English)

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1. General Description

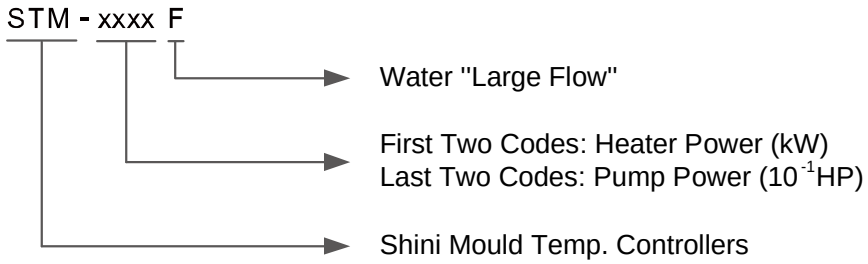
Read this manual carefully before operation to prevent damage of the machine or personal injuries.

STM-F series "Large Flow" oil heater mainly applied in extruder and rubber injection molding or other occasion requires large flow, strong cooling capability. Besides, it's also applicable to the fields with same requirements. This series of heaters adopt indirect cooling method after return oil from the mould passed through the cooler. The oil pressurized by pump, through heater pipe it will be heated, then it returns to the mould to reach the requirement of heating and maintaining constant temperature. Adopts P.I.D temperature controller can ensure stable temperature control.

Picture 1-1："Large Flow" Oil Heater STM-3050F

Picture 1-2："Large Flow" Oil Heater STM-4575F

1.1 Coding Principle



1.2 Feature

1) P.I.D. multi-stage temperature control system can maintain a mould temperature with accuracy of ±0.5℃.
2) 4.3" Touch screen controller with easy to use HMI and clean display.
3) Adopt SSR solid-state relay controller.
4) Multiple safety devices including power reverse phase protection, pump overload protection, overheat protection and low level protection that can automatically detect abnormal operation and indicate this via visible alarm.
5) Adopts large-flow pump with high stability, which is not only suitable for heating up Moulds and maintaining temperature, but also for extrusion molding and applications alike.
6) The cooling efficiency of plate heat exchanger is favorable.
7) Standard equipped with RS485 interface.

1.3 Options

1) The mold return water temperature can be optional, and add“TS”at the end of 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.

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1.4 Technical Specifications

1.4.1 Specification

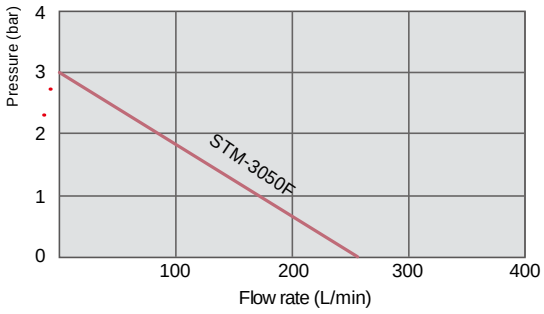
Table 1-1: Specification

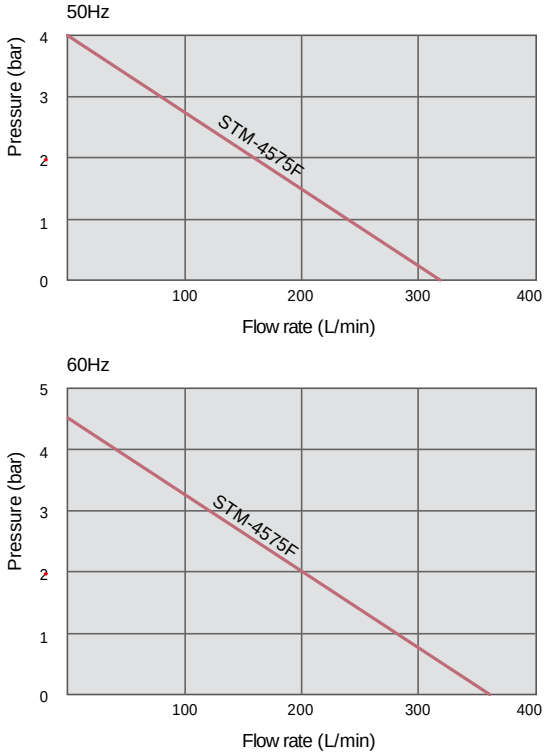
Model	STM-3050F	STM-4575F
Ver.	D	E
Max temp.(℃)	200	200
Heater Power (kW)	30	45
Pump power (kW)	3.7	5.5
Max. pump Flow (L/min)	263	320
Max. pump pressure (bar)	3.0	4.0
Heating Tank Number	2	3
Main / Sub.Oil Tank (L)	100/18	16/51
Cooling Method	Iindirect	Iindirect
Inlet/Outlet (inch)	1.5” / 1.5”	1.5” / 1.5”
Dimensions (mm) (H×W×D)	1240×550×1280	1200×500×1350
Weight (kg)	280	270

Note:： 1) "*" Stands for options.
2) Pump testing standard: Power of 50 Hz, purified water at 20℃. (There is ±10% tolerance for either max. flowrate or max. pressure).
3) Power supply: 3Φ, 400VAC, 50 Hz

We reserve the right to change specifications without prior notice

1.4.2 Pump Performance





Picture 1-3: Pump Performance

1.4.3 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 put spare emergency switch in suitable place and remember the location.

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.

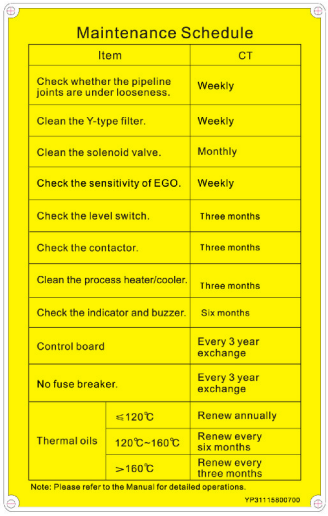
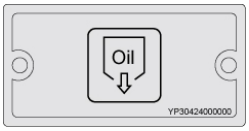
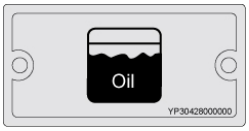
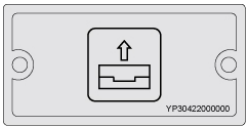
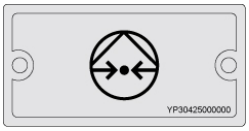
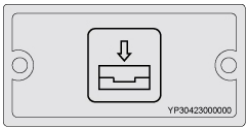
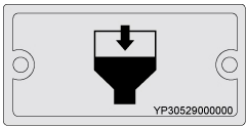
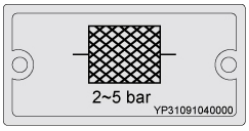
Protect the machine against severe vibration or collision.

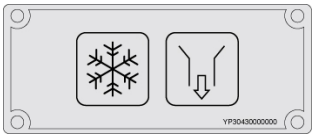
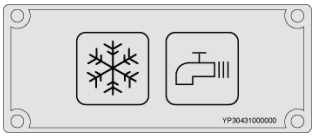
Don’t take off or dirty safety signs privately. Drunken, medicine-taking, or men without proper judgement should not operate the machine.

Warning!

All screws of electric components in cabinet have been tightened and no need for periodical checking.

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.
	High oil level: max. oil level of machine in constant temperature.
	From mould: connector for circulating water/oil of coming from mould
	Pump pressure meter: indicating actual pressure of system.
	To mold: connector for circulating water/ oil to go to mould.
	Oil inlet: Machine oil inlet
	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.

	Water outlet: cooling water outlet
	Water inlet: cooling water intlet

1.5.3 Operation Regulations

1) When cooling water: qualified standard cooler for industrial use is recommented. Reference as Table 1-2.
   ※ Low quality water brings limescales, which may cause problems.
2) When in use, if there's poor water drainage or poor control effect, clean up the solenoid valve at once or check cooling water outlet has blockage or not.
3) Do not move the unit when it is in operation.
4) During repairing, wait until oil temperature falls below 30℃.
5) STM-F possesses pump overload device. When overload occurs, pump and heater will stop working. At this moment, it needs to check overload reasons (phase shortage, pipe obstruction, broken bearing, etc.) After the system runs normally, press RESET on overload relay to rest the operation.
6) Before turn off the pump, wait until oil temperature falls blow 50℃. Or the service life of the unit would be affected.

Table 1-2: Standard Water Quality

No.	Control Items	Cooling Water	
		Direct Cooling Water	Circulating Cooling Water System Replenishment Water
1	pH	6.0-9.0	6.5-8.5
2	SS(mg/L)≤	30	-
3	Turbidity（NTU）≤	-	3
4	BOD5（mg/L）≤	30	10
5	CODcr≤（mg/L）	-	50
6	Fe（mg/L）≤	-	0.3
7	Mn（mg/L）≤	-	0.1
8	Cl（mg/L）≤	250	250
9	GH（CaCO3 /mg/L）≤	450	450
10	Total ALK （CaCO3 /mg/L）≤	500	350
11	Sulfate（mg/L）≤	600	250

12	NH3-N（mg/L）≤	-	10
13	Total P（P mg/L）≤	-	1
14	TDS（mg/L）≤	1000	1000
15	Fecal coliform（/L）≤	2000	2000
16	Petroleum（mg/L）≤	-	1
17	Anionic surfactant（mg/L）≤	-	0.5

1.6 Exemption Clause

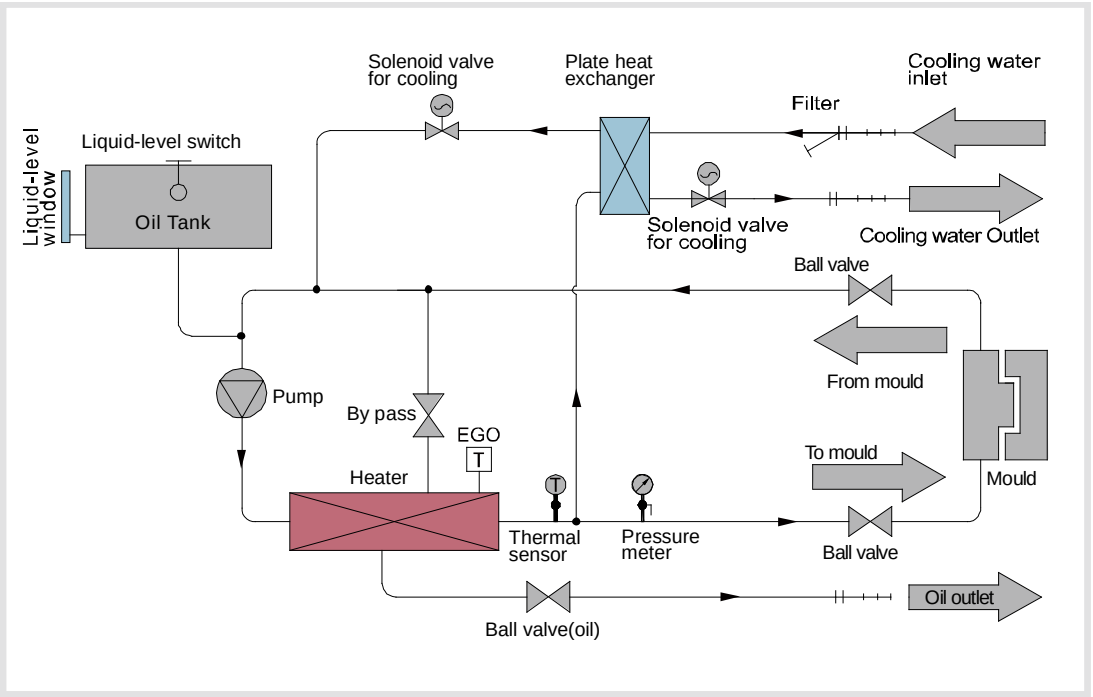
The following statements clarify the responsibilities and regulations born by any buyer or user who purchases products and accessories from Shini (including employees and agents).

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

1. Before use of the machine, careless or man-made installations, operation and maintenances upon machine without referring to the Manual.
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. Use 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

High temperature oil returns to the machine and then be pressured by pump to the heaters. After being heated, oil will be forced to the mould and continue the circle. In the process, if the oil temperature is too high, system will activate solenoid valve to let the oil flow through plate heat exchanger to cool down temperature indirectly until oil temperature is down to system requirement. If the oil temperature keeps increasing and reaches to set point of EGO, system will sound overheat alarm and stops. If level switch located in oil tank, detects liquid level is too low, it will send the signal and system will sound low level alarm and stop operations.

3. Installation and Debugging

3.1 Installation Space

During installation of the machine, keep at least 500mm installation space around the machine as following picture. Don't install the machine in a narrow or crowded place with other objects. This would cause inconvenience to operation, maintenance and repair.

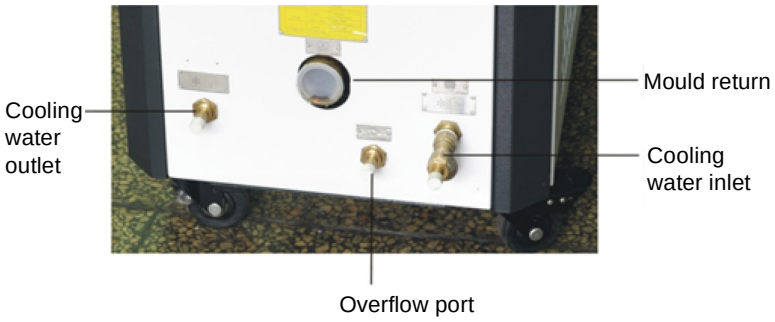
Keep away inflammables and explosive goods.

Picture 3-1: Installation Space

3.2 Pipeline Connection

1) The inlet and outlet size of the heat medium is: 1.5" PT inner thread interface;
2) The cooling water flow rate shall not be less than 10L/Min., if the cooling water flow rate is too low, it will affect the stability of temp. control.
3) The cooling water inlet and outlet size: external dia.: φ13mm, Pagoda plug.
4) After connect the cooling water outlet to drainage port, turn on the water source switch.

Attention: Cooling water discharge port is shown as below. Reverse connection is forbidden!



Picture 3-2: Pipeline Connection

3.3 Power Connection

The Mould Temp. Controller 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***

4. Application and Operation

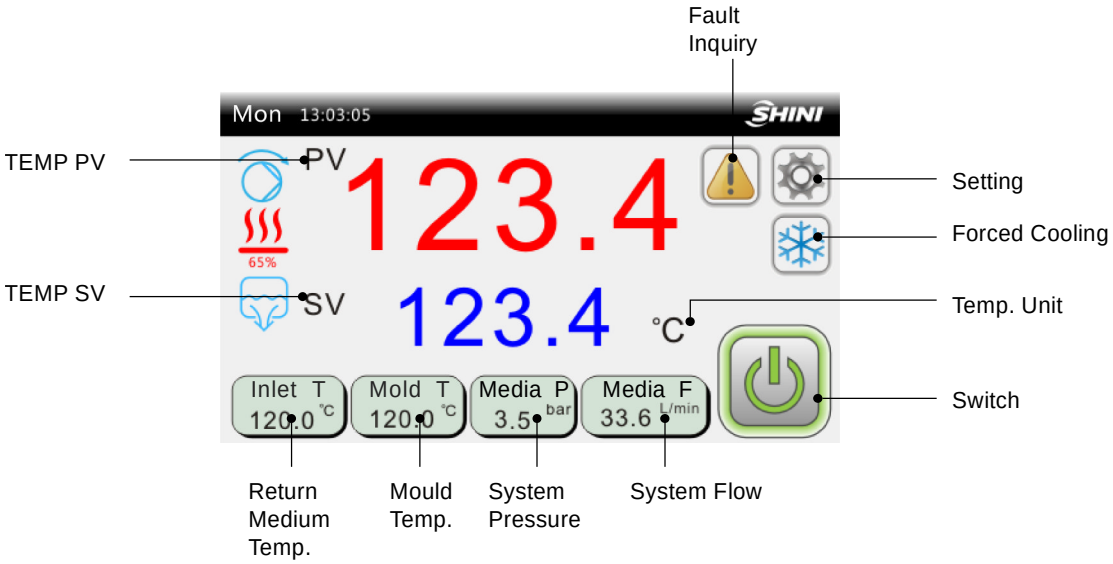
4.1 Machine Startup

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

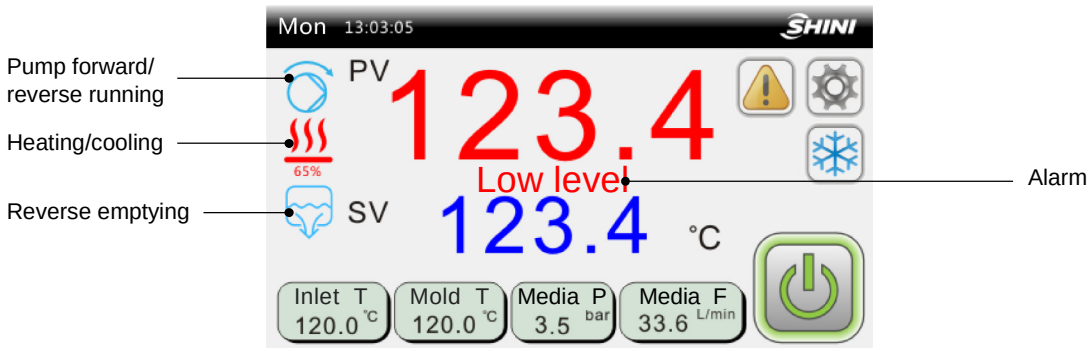


Picture 4-2：Standby Screen

Table 4-1: Standby Screen Specifications

Name	Function Type	Description
Setting	key	Enter the user setting screen
Forced cooling	button	 Start the forced cooling function  Stop the forced cooling function
Temp. unit	only display	Display the set temp. unit. The unit supports ℃/℉ shifting.
Fault inquiry	key	1. When the system fails, the main interface will flicker. At this time, click to check current fault info.; 2. When no fault occurs at current, press it to inquire the "Historical Fault".
Switch	key	 Standby status  Running status
Return medium temp.	only display	Display the medium temp. returned from the mould, which is optional. When not selecting this function, all displays are gray.
Mould temp.	only display	Display the mould present temp., which is optional. When not selecting this function, all displays are gray.
System pressure	only display	Display the medium output pressure, which is optional. When not selecting this function, all displays are gray.
System flow	only display	Display the medium present pressure, which is optional. When not selecting this function, all displays are gray.
Temp. SV	key	Set the heating temp.
TEMP PV	only display	Display the control temp. PV

4.2.1 Operation Screen



Picture 4-3：Operation Screen

Table 4-2: Operation Screen Specification

Items	Description
Pump forward / reverse running	the unit starts the pump forward / reverse running
Heating/cooling	It starts the unit temp. controlling and heating function. The bottom is heating percentage.
Reverse emptying	The unit starts emptying function
Alarm	The alarm displayer and indicator are on.

4.2.2 Startup Steps

1) Please check if all pipelines are connected properly first, including inlet and outlet pipes of cooling water and heat medium, and if all inlet and outlet valves are open.
2) Add the heat transfer oil till the float ball rises and the microswitch pops up. Please be noted that the oil level should not exceed the level indicated by the label of liquid indicator on the real plate.
3) Connect the power supply, please check and ensure the voltage and frequency meet the requirements on the nameplate.
4) Turn on the main power switch on the door panel, and then the screen will light on. Click on the SV on the controller to set the target temp., and click the ON button to start the machine finally.

4.2.3 Shutdown Steps

1) Press the<Forced Cooling>button to turn off the heating output and the

cooling is 100% turned on.

2) When the temp. drops below 50 ˚C, press the<Forced Cooling>button to turn off the forced cooling, and then press the<Run/Stop>button to stop the machine.

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

Note: When the main power switch is in the ON position, please be careful of the electric shock hazard.

Note: The pump running direction must be correct.

Note: In order to prevent machine damage and prolong its lifespan, please turn on and off the machine according to correct steps.

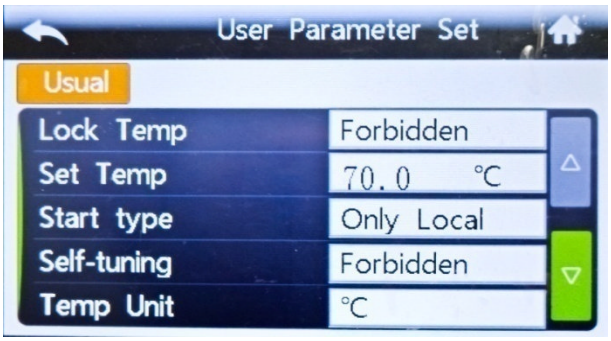
4.3 User Setting

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

Picture 4-4：User Setting Screen

4.3.1 User Parameter Settings

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



Picture 4-5：User Parameter Screen

Table 4-3: User Parameter Specification

Parameter	Initial Value	Setting Range	Unit	Remarks
Locking temp.	disable	disable- use		When selecting the “use”, it’s not allowed to set temperature on the main interface.
Setting temp.	80.0	0-200.0	℃	
Start/stop mode	local	local~local+ remote ~ remote		Local: unit startup/shutdown can only be controlled locally. Local + remote: unit startup/shutdown can only be controlled locally and remotely. Remote: unit startup/shutdown can only be controlled remotely.
Auto turning	disable	disable- enable		
Temp. Unit	℃	℃/℉		Temp. display unit
Decimal point	0.1	1/0.1		The main screen has mini. temp. unit display

4.3.2 Action Setting

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

Picture 4-6：Action Setting Screen

After the machine stops, it will start pump reverse running and exhaust valve, which can be started and stopped manually or automatically (The factory default of reversal running time is 60S, and refer to 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.

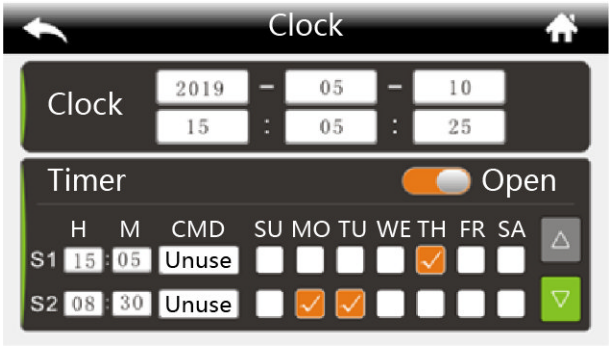
4.3.3 Clock Timing

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

Picture 4-7：Clock Timing Screen

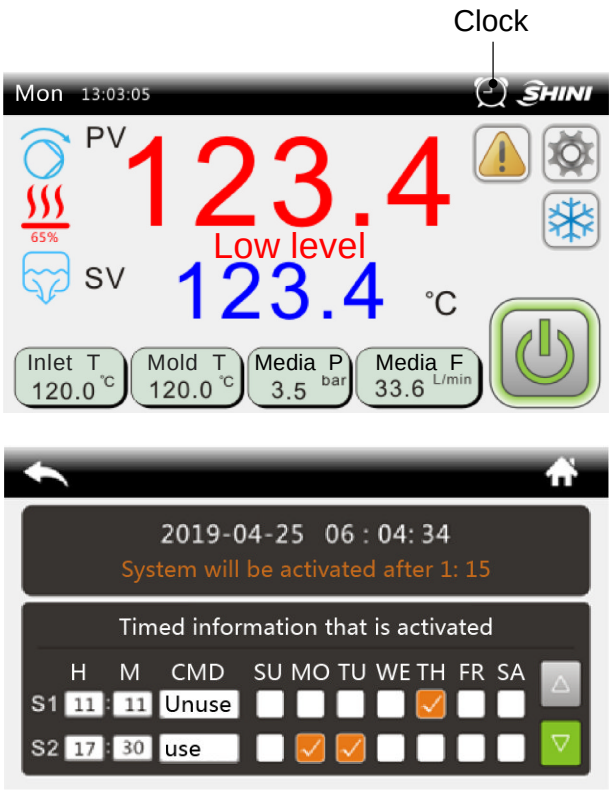
Timing main switch: used to select the timing on/off function, and it can inquire on the main screen if the timing is switched on. It can set six groups of time in total, and each group of time can be selected through the switch: disable, timing on or off.

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



Picture 4-8：Set Timing Switch Screen

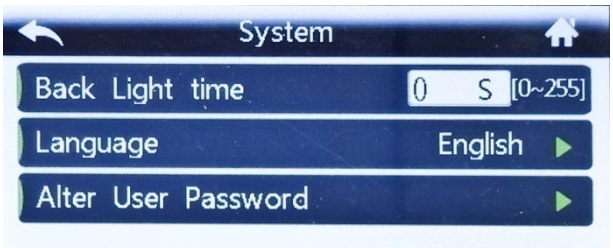
If the "Timing Main Switch" is set to "ON", press the < Clock > button in the "Operation" screen to enter the Timing Inquiry and Modification Screen.



Picture 4-9：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 4-10：System Setting Screen

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

Language: Chinese or English

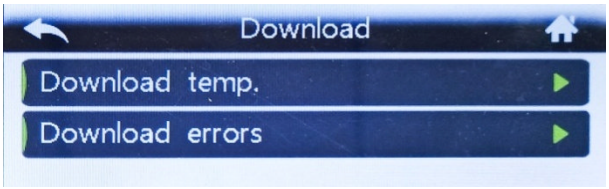
The default user password is 3588. See "Password Modification" for details;

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 4-11：Data Download Screen

4.3.5.1 Temp. Data Download

Picture 4-12： Temp. Data Download Screen

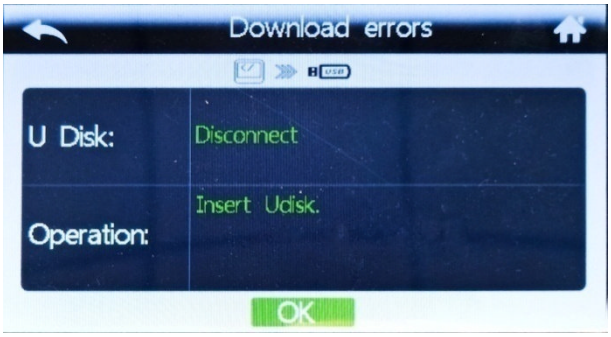
Local data backup: copy the temp. data on the display board to the U disk (the data of display board can be saved for up to 48 hrs.). Copy the temperature data stored on the display board to the USB flash disk. Insert the U disk, wait until the "U disk" displays "connected" status, and then follow the 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 4-13： Alarm Record Download Screen

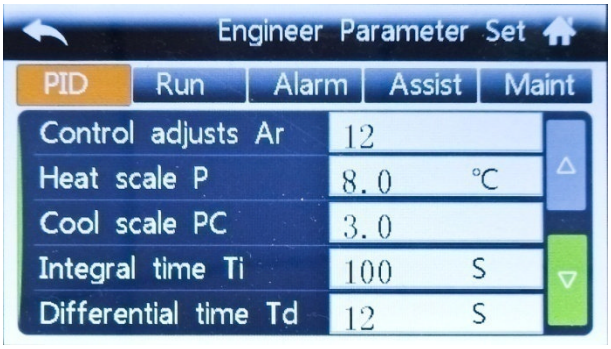
4.3.6 Advanced Setting

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 4-14：Project Screen

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



Picture 4-15：Project Parameter Setting Screen

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

Table 4-4: Project Parameter Description

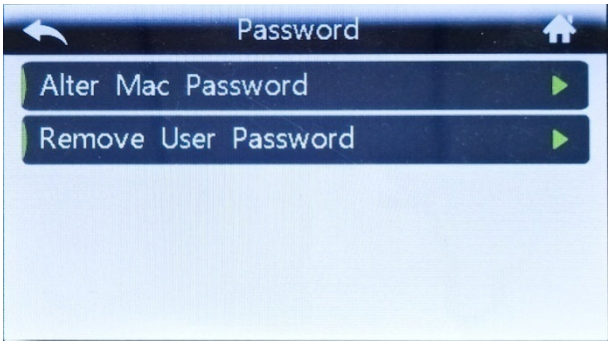
Running	Probe type	K type	K-type thermocouple /PT100	/	
	The number of probes	control circuit	Control loop ~ control+ return medium ~control +mould ~control +return medium +mould	/	Control circuit：Control temp. probe only Control + return medium: control temp. + return medium temp. Control+mould: control temp. +mould temp. Control+mould+mould: control temp. + return medium temp. + mould temp.
	Shutdown temp.	35.0	0~60.0	℃	Shut down: The unit shuts down when it is cooled to this temp.
		95.0	32.0-140.0	℉	
	Reverse time	6 secs.	0-600 secs.	secs.	Reverse emptying running After the machine stops, start the pump reversing and emptying valve; Manual start/stop or auto run【reversal time】and stop is available. Note: If the reverse emptying function is activated during running, the machine will stop at first, and then start the reversal emptying function.
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	0.0	0-50.0	℃	1. |Return medium temp. –

	temp. alarm	0.0	0-90.0	℉	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.
	Different temp. alarm delay	5	0-360	secs.	
	Low temp. deviation alarm	0.0	0-50.0	℃	【SV】－PV >【Low temp. 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.
		0.0	0-90.0	℉	
	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.
	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

Assist	Heater alarm	0.0	0~999	Min.	1. If the machine fails to reach the set temp. of - 5 ℃ within the [heater alarm] time, it will give the "heater alarm", and continue to control the temp. Manual reset. 2. Set to 0, disable the limit detection.
	Overheat tripping temp. difference	15.0	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.	
Maintenance	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 medium 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	Compensation flow measurement error.
	Comm. address	0	0-31		Comm. basic info. setting
	Baud rate	19200.0	4800,960, 019200		
	Check bit	No parity	No parity, even parity check, odd parity		

	Stop bit	1 bit	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.



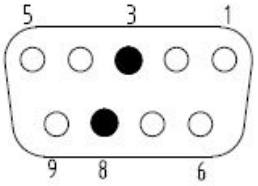
Picture 4-16： Password Mgmt. Screen

1) Project password modification
   The default value of the project password is 3588. See "Password Modification" for details.
2) Clear the user password.
   It can clear the user password with one click.

4.3.6.2 Data Communication

Interface specifications and comm. definitions:

Use a 9-pin serial port male connector, and the foot definition is foot 3 connecting to +, and foot 8 connecting to -



Picture 4-17：Interface Spec. Diagram

Comm. protocol:

MODBUS –RTU uses the RS485 serial port

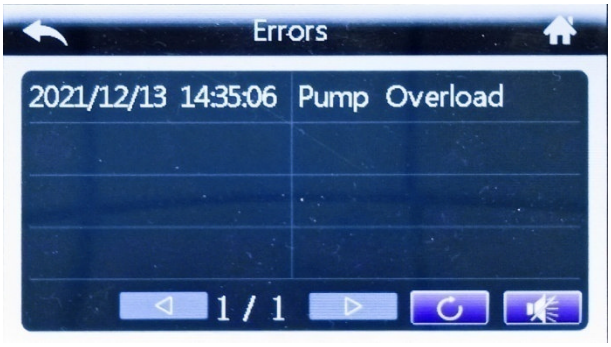
Note: The min. address value is 1. If reading and writing from zero, an error will occur.

Comm. parameters can be set in "Project Settings" - Project Parameters - "Assist".

Note: Please refer to the Appendix 1-3 for the comm. address within the controller.

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 4-18：Current Fault Screen

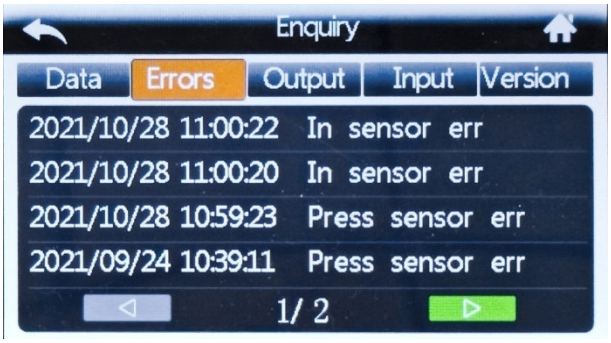
Table 4-5: Current Fault Inquiry Screen Icon Key Description

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 4-19：History Fault Inquiry Screen

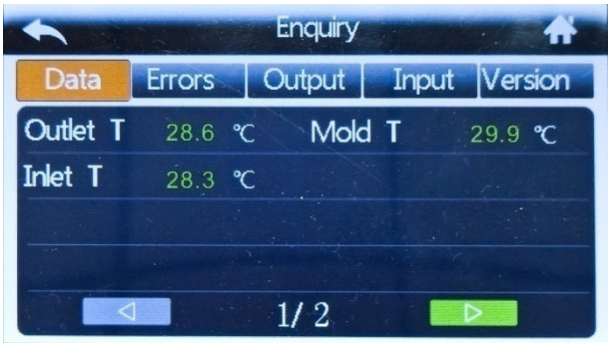
4.5.2 Inquiry Screen

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

Picture 4-20：User Setting Screen

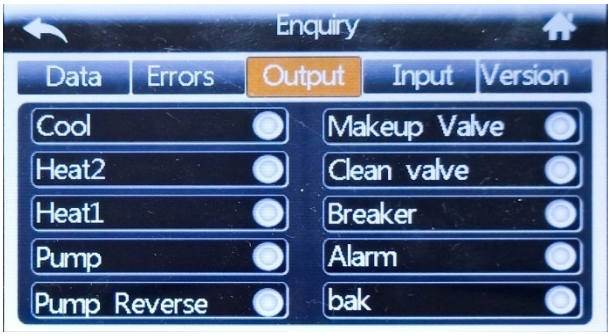
4.5.2.1 Data Inquiry

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



Picture 4-21：Data Inquiry Screen

4.5.2.2 Output Inquiry

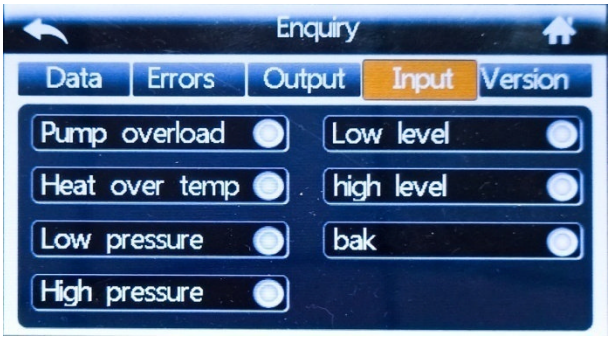


Picture 4-22：Output Inquiry Screen

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.

4.5.2.3 Input Inquiry

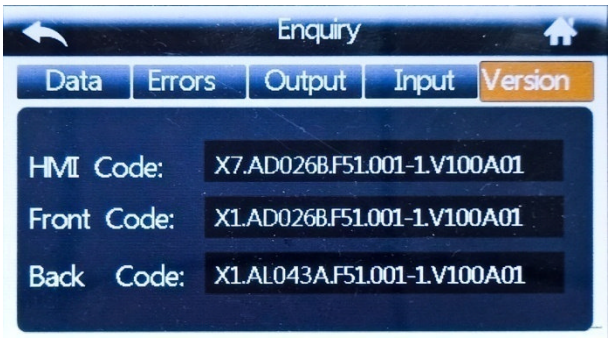


Picture 4-23：Input Inquiry Screen

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.

4.5.2.4 Version Inquiry



Picture 4-24：Version Inquiry Screen

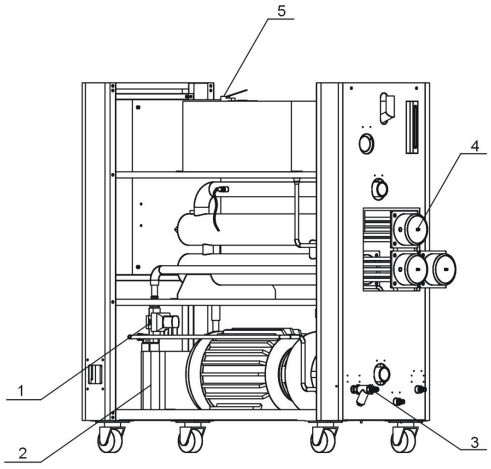
Take real display value as standard.

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 current of overload relay 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 problems.	Correctly set EGO temperature. (EGO temperature setting value= temperature setting value+10℃) Replace EGO. Replace the contactor.
Low liquid level.	Oil shortage.	Fill high temp. oil.
Temp. window displays “----“	Abnormal sensor.	Check and repair sensor.
Once running, pump output indicator works, but pump cannot start. After a while pump still fails to run.	PCB output relay problems. Electrical circuit problems. Pump contactor problem.	Check or replace the PCB. Check electrical circuit. Replace the contactor.
Difference between setting temp. and actual temp. 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 pipe problems. Thermocouple problems. PCB output point problems.	Replace the contactor. Replace pipe heater. Replace thermocouple. Check/ repair PCB.
Circuit breaker trips off when turning on main	Short circuit of main circuit. Transformer short circuit or	Check electrical wire. Replace circuit breaker.

power switch.	connected with earth wire. Problems of circuit breaker.	
Circuit breaker trips off when pump running for a while.	Pump motor coil short circuit. Problems of circuit breaker.	Check pump motor. Replace circuit breaker.
Circuit breaker trips off after heater output for a while.	Heater pipe short circuit or shell contact. Problems of circuit breaker.	Replace heater pipe. Replace circuit breaker.

6. Maintenance and Repair



1. Clean solenoid valve
   Period: trimonthly
2. Clean cooler
   Period: half yearly
3. Clean Y-type filter
   Period: half yearly
4. Clean heater pipe
   Period: half yearly
5. Clean liquid level switch
   Period: trimonthly

Use time of high temperature kerosene

≤120℃	Replacement period: yearly
≥120℃~≤160℃	Replacement period: half yearly
>160℃	Replacement period: trimonthly

Pay attention to the following rules during maintenance:

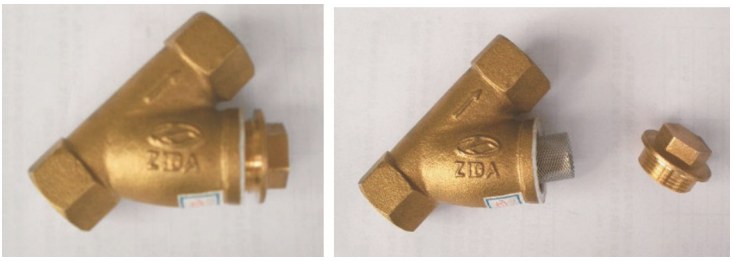
1) Need at least two persons present when checking the machine. Let the machine cool down, turn off power supply, drain out the oil and water. Make sure checking and maintenance space then start operation.
2) It's dangerous that machine works in high temperature. Stop the machine, wait it to cool down. 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) ing operation, the oil is heated up to a high temperature, wait it to fall below 5℃ then to perform repairing or maintenance.

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

6.1 Y Type Strainer Cleaning

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. Impurities or pollutants may cause errors and bad temperature control. It needs to clean the Y type strainer periodly.

Cleaning steps: turn off power and cooling water supply. Open the top cover of filter screen to clean the filter.

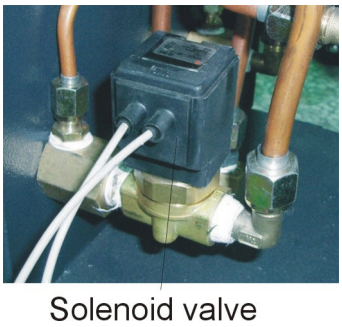


Picture 6-1: Y Type Strainer

6.2 Solenoid Valve

Replacement steps：

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



Picture 6-2: Solenoid Valve

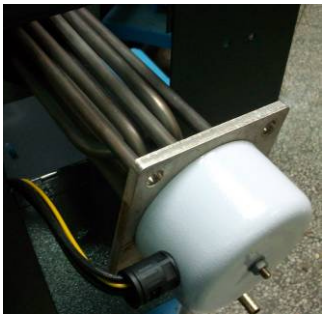
6.3 Heater Pipe Cleaning

After long use of the machine and with high temperature, there will be clingage and limscale accumulated on heater pipe which lower the heating efficiency. At this time, it needs to clean the clingage and limscale accumulated on heater pipe.

1) Open the heater cover (Press the black switch downward, then open the heater cover. As picture)


Picture 6-3: Heater Pipe 1

2) Take out the heater pipe (as picture, loose the screws, take out the heater pipe).

Picture 6-4: Heater Pipe 2

3) Heater pipe cleaning method: immerse the heater pipe into the thinner till all of the clingage fall off. Wet a cloth with some nature water, wipe the heater pipe cleanly and wait for the air drying.
4) After heater pipe cleaning up according to reverse orders to put them back to the machine.

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 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.

6.4.5 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

☐ PCB board replacement

☐ No fuse switch replacement

Note: (1) Y-type strainer 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 it works eight hours per day, recommended replacing frequency is one and half a year, if it works day and night, replacement is suggested to be done every six months.

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

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

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

Appendix 1：

STM Comm. Variable Table (1)
(Comm. Protocol：Modus-RTU)

D-Map(40001+i)	English	Chinese	Range	Description	Type
1	CONTROL PV	Control temp.	-50 ~ 500	※1 (Different displays depending on whether the temp. unit ° C has a decimal point.)	read only
2	RET PV	Return water temp.	-50 ~ 500		read only
3	ENT PV	Output water temp.	-50 ~ 500		read only
4	SV	Control target value	-50 ~ 500		read only
5	RTC YEAR	Current year	0 ~ 99	2000(0), 2001(1), …, 2099(99)	read only
6	RTC MONTH	Current month	1 ~ 12		read only
7	RTC DATE	Current date	1 ~ 31		read only
8	RTC DAY	Current week	0 ~ 6	Sun.(0), Mon. (1), Tues.(2), …, Sat.(6)	read only
9	RTC HOUR	Current hour	0 ~ 23		read only
10	RTC MINUTE	Current minute	0 ~ 59		read only
11	RTC SECOND	Current secs.	0 ~ 59		read only
12	CONTROL STATUS	Control status	0 ~ 3	Fault(0), stop control(1), In controlling(2), Auto-tuning(3)	read only
13	MMI STATUS	Running status	0 ~ 255	※2 (Operate it with bit address)(as shown in Appendix 2)	read only
14	DO STATUS	Contact output status	0 ~ 255	※2 (Operate it with bit address)(as shown in Appendix 2)	read only
15	DI STATU	Contact input status	0 ~ 255	※2 (Operate it with bit address)(as shown in Appendix 2)	read only
16	ALARM STATUS	Alarm status	0 ~ 255	※2 (Operate it with bit address)(as shown in Appendix 2)	read only
17	CONTROL PV ERROR	Control temp. input alarm	0 ~ 255	※2 (Operate it with bit address)(as shown in Appendix 2)	read only
18	RET PV ERROR	Return water	0 ~ 255	※2 (Operate it with bit address)(as	read only

		temp. input alarm		shown in Appendix 2)	
19	ENT PV ERROR	Water outlet temp. input alarm	0 ~ 255	※2 (Operate it with bit address)(as shown in Appendix 2)	read only
20	REMOTE ERROR	Remote control input alarm	0 ~ 255	※2 (Operate it with bit address)(as shown in Appendix 2)	read only
21	KEY STATUS	KEY key status	0 ~ 255	※2 (Operate it with bit address)(as shown in Appendix 2)	read only
22	LED STATUS	LED indicator status	0 ~ 255	※2 (Operate it with bit address)(as shown in Appendix 2)	read only
30		Switching value status	-	※3 As shown in Appendix 3	read only
31		Relay status	-	※3 As shown in Appendix 3	read only
32		Fault info. 1	-	※3 As shown in Appendix 3	read only
33		Fault info. 2	-	※3 As shown in Appendix 3	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

112		Reset	1		write only
120		Flow value		Unit: 0.1L/min	read only
125		Pressure value		Unit:0.1bar	read only
150		Emptying temp.	0-120.0℃	When the PV temp. is less than [Emptying temp.], the reverse emptying can be started.	read / write
151		Emptying time	60 secs.	0-600 secs.	read / write
200	SV	Control target value（℃）	-50 ~ 500℃	※1 (Different displays depending on whether the temp. unit ° C has a decimal point.)	read / write
201	PB	Heating control belt	0 ~ 550℃	※1 (Different displays depending on whether the temp. unit ° C has a decimal point.)	read / write
202	TI	Integral time	1 ~ 3600s		read / write
203	TD	Differential time	1 ~ 3600s		read / write
204	PBC	Cooling control zone	0 ~ 550℃	※1 (Different displays depending on whether the temp. unit ° C has a decimal point.)	read / write
205	CT	Heating control cycle	1 ~ 100s		read / write
206	CTC	Cooling control cycle	1 ~ 100s		read / write
300	PHASE ALARM	Phase detection	0, 1	Unuse (0), use(1)	read / write
301	DEV1 ALARM	Output water temp. deviation	0 ~ 550℃	※1 (Different displays depending on whether the temp. unit ° C has a decimal point.)	read / write
302	DEV2 ALARM	Return water temp. deviation	0 ~ 550℃		read / write
303	TURB ALARM	Interference alarm	0 ~ 550℃		read / write
304	HEATER ALARM	Heater alarm	0 ~ 3600s		read / write
401	SUB HEATING	Auxiliary output	0 ~ 550℃	※1 (Different displays depending on whether the temp. unit ° C has a decimal point.)	read / write

402	COOLING TEMP	Cooling temp.	-50 ~ 500℃		read / write
500	H.LIMIT TEMP	Upper limit temp.	-50 ~ 500℃	※1 (Different displays depending on whether the temp. unit ° C has a decimal point.)	read / write
501	L.LIMIT TEMP	Lower limit temp.	-50 ~ 500℃		read / write
502	TEMP UNIT	Temp. unit	0, 1	℃(0), ℉(1)	read / write
503	TEMP DEGREE	Decimal point	0, 1	0.1(0), 1(1)	read / write
504	CTL TEMP BIAS	Control temp. correction	-550 ~ 550℃	※1 (Different displays depending on whether the temp. unit ° C has a decimal point.)	read / write
505	RET TEMP BIAS	Return water temp. correction	-550 ~ 550℃		read / write
506	ENT TEMP BIAS	Output water temp. correction	-550 ~ 550℃		read / write
600	NOW YEAR	Year setting	0 ~ 99	2000(0), 2001(1), …, 2099(99)	read / write
601	NOW MONTH	Month setting	1 ~ 12		read / write
602	NOW DATE	Date setting	1 ~ 31		read / write
603	NOW DAY	Week setting	0 ~ 6	Sun.(0), Mon. (1), Tues.(2), …, Sat.(6)	read / write
604	NOW HOUR	Hour setting	0 ~ 23		read / write
605	NOW MINUTE	Minute setting	0 ~ 59		read / write
606	SCHDULE DAY	Week reserve setting	0 ~ 127	Sun.(0), Mon. (1), Tues.(2), …, Sat.(6)	read / write
607	AUTO-START HOUR	Reserve auto start hr. setting	0 ~ 24	Unuse (00:00)	read / write
608	AUTO-START MINUTE	Reserve auto start min. setting	0 ~ 59		read / write
609	AUTO-END HOUR	Reserve auto shutdown hr. setting	0 ~ 24	Unuse (00:00)	read / write
610	AUTO-END MINUTE	Reserve auto shutdown min. setting	0 ~ 59		read / write

611	AS SETTING TIME	Check time setting	0 ~ 9999	Unuse (00:00)	read / write
612	RUNNING TIME	Device using time	0 ~ 9999		read only
700	LANGUAGE	Language setting	0, 1	Chinese(0), English(1)	read / write
702	PASSWORD	Password setting	0 ~ 9999		read / write
703	RET/ENT DISP	Return water output temp.	0, 1	Unuse (0), use(1)	read / write
704	W-FILL TM T1	Water refilling time T1	0 ~ 600s		read / write
705	W-FILL TM T2	Water refilling time T2	0 ~ 60s		read / write
706	RET/ENT DISP	Return loop display settings	0，1，2，3	Display control loop, control+ return medium, control + mould, control+ return medium + mould	read / write

Appendix 2：

STM Comm. Variable Table (2)

D-Map (40001+i.J)	Name	BIT			
		0	1	2	3
		4	5	6	7
13	MMI STATUS	Control	Cooling	Auto-tuning	Suction
		Reserve	Buzzer Off	--	Input power
14	DO STATUS	Pump forward action	Pump forward action	Water refilling	Suction
		Alarm	Breaker	Air	-
15	DI STATUS	Pump overload	EGO	Low pressure	High pressure
		Low liquid level	High liquid level	--	Start control
16	ALARM STATUS	Phase alarm	Temp. alarm	Deviation alarm	Interference alarm

		Heating alarm	--	--	--
17	CONTROL PV ERROR	--	-Over	+Over	Sensor Open
		AD Error-	--	--	--
18	RET PV ERROR	--	-Over	+Over	Sensor Open
		AD Error-	--	--	--
19	ENT PV ERROR	--	-Over	+Over	Sensor Open
		AD Error-	--	--	--
20	REMOTE ERROR	--	-Over	+Over	Input Open
		AD Error-	--	--	--
21	KEY STATUS	RUN	AUTO-TUNIN G	AUTO-START	SUCTION OFF
		COOLING	SUCTION	BUZZER OFF	Power
D-Map(40001+i .J)	**Name**	**BIT**			
		0	**1**	**2**	**3**
		4	**5**	**6**	**7**
	STATUS 1	RUN	AUTO-TUNIN G	SUCTION	COOLING
		BUZZER OFF	AUTO-START	SUCTION OFF	F
	STATUS 2	POWER	HEATER OUTPUT	AUXILIARY HEATING OUTPUT	COOLING OUTPUT
		PUMP FORWARD ACTION	PUMP REVERSE ACTION	WATER REFILLING	ALARM

Appendix 3：

Bit Address Variables (3)

D-Map (40001+i.J)	Name	Range	Definition	Type
30	Switching status	0：Close	B0- pump overload B1- heater overheat B2- low pressure B3- high pressure	read only

		1：Open (each bit value corresponding to this address)	B4- low liquid level B5- high liquid level B6- remote switch	
31	Relay status		B0- backup B1- auxiliary heating B2- circuit breaker B3- emptying valve B4- water refilling valve B5- pump reverse running B6-pump forward running B7- main heating B8- auxiliary heating B9- cooling valve B10- solid-status output1 B11- solid-status output 2	
32	Fault info.1		B0 pump overload B1 heater overheat B2 low pressure B3 high pressure B4 low liquid level B5 /none B6 /none B7 low liquid level B8 3-phase power phase stagger B9 control probe fault B10 return temp. probe fault B11 mould probe fault B12 pressure sensor fault B13 flow sensor fault B14 return medium temp. difference alarm B15 Interference alarm	
33	Fault info.2		B0 heater alarm B1 / B2 / B3 / B4 overheat alarm B5 low temp. B6 / B7 unit needs maintenance B8 / B9 / B10 / B11 overheat alarm B12 mould temp. difference alarm B13 low flow alarm B14 3-phase power shortage B15 /	