

# **STM-EB**

## **"Budget" Heater**

Date: Aug., 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.

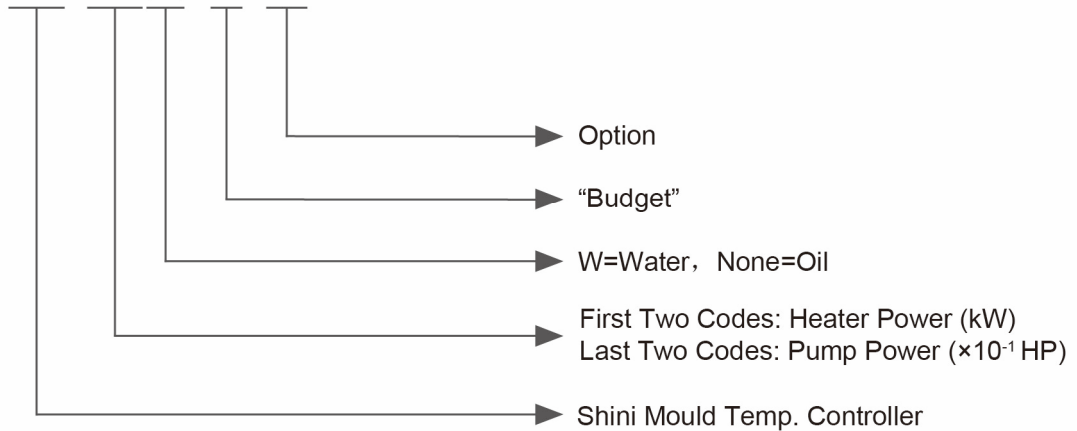
STM-EB (W-EB) series are applicable for heating up the moulds and maintaining temperature, and they also can be used in other similar applications. Firstly, these series adopt different cooling methods to cool down mediums, then mediums are conveyed to the moulds after pressurized by pump and heated up by electrical heated tube. Optimized design ensures accurate heating temperature, the max.temperature can reach: water is 120°C and oil is 200°C.



Picture 1-1: “Budget” Series Heater STM-607W-EB

## 1.1 Coding Principle

STM - xxxx(W) - EB - XX



## 1.2 Feature

- I Microcomputer control ensures stable performance, reliable and perfect functions, with temp. control accuracy up to  $\pm 0.5^{\circ}\text{C}$ .
- I High-efficiency high temp. pump achieves the high efficiency heat exchange.
- I Equipped with power phase reverse protector, pump overload protector and overheat protector and other safety devices, the machine can automatically detect the abnormalities with indicator lights when failure occurs.
- I STM-W-EB is equipped with the low level protector.

## 1.3 Options

- I Water manifolds, Teflon hose and transfer oil are optional.
- I Heat transfer oil is optional (the specification refers to 6.5)(only for mainland)

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

Table1-1: Specification (1)

Model	STM-607-EB	STM-607W-EB	STM-910-EB
Max. Temp. (°C)	200	120	200
Pipe Heater (kW)	6	6	9
Pump Power (kW)	0.55	0.55	0.75
Max. Pump Flow (L/min.)	27	27	42
Max. pump Pressure (bar)	3.8	3.8	5.0
Heating Tank Number	1	1	1
Main / Sub. Oil Tank Capacity (L)	6.0 / 3.3	-	6.0 / 3.3
Water Heating Tank Capacity (L)	-	2.3	-
Cooling Method	Indirect	Direct	Indirect
Inlet/Outlet (inch) CE PT inner thread (inch)	$\frac{3}{4}$ / $\frac{3}{4}$	$\frac{3}{4}$ / $\frac{3}{4}$	$\frac{3}{4}$ / $\frac{3}{4}$
Dimensions (H×W×D)	770×310×830	605×310×830	770×310×830
Weight (kg)	49	38	70

We reserve the right to change specifications without prior notice.

Note:

- 1) Pump testing standard: Power of 50Hz, purified water at 20°C(There is ±10% tolerance for either max. flow rate or max. pressure).
- 2) Power supply: 3Φ, 400VAC, 50Hz Pump curve

Table1-2: Specification (2)

Model	STM-910W-EB	STM-1220-EB	STM-1220W-EB
Max. Temp.°C	120	200	120
Pipe Heater (kW)	9	12	12
Pump Power (kW)	0.75	1.5	1.5
Max. Pump Flow (L/min.)	42	74	74
Max. pump Pressure (bar)	5.0	6.2	6.2
Heating Tank Number	1	1	1
Main / Sub. Oil Tank Capacity (L)	-	3.3 / 11	-
Water Heating Tank Capacity (L)	3.0	-	3.0

Cooling Method	Indirect	Direct	Indirect
Inlet/Outlet (inch) CE PT inner thread (inch)	3/4 / 3/4	1 / 1	1 / 1
Dimensions (H×W×D)	605×310×830	770×350×830	605×350×830
Weight (kg)	60	85	80

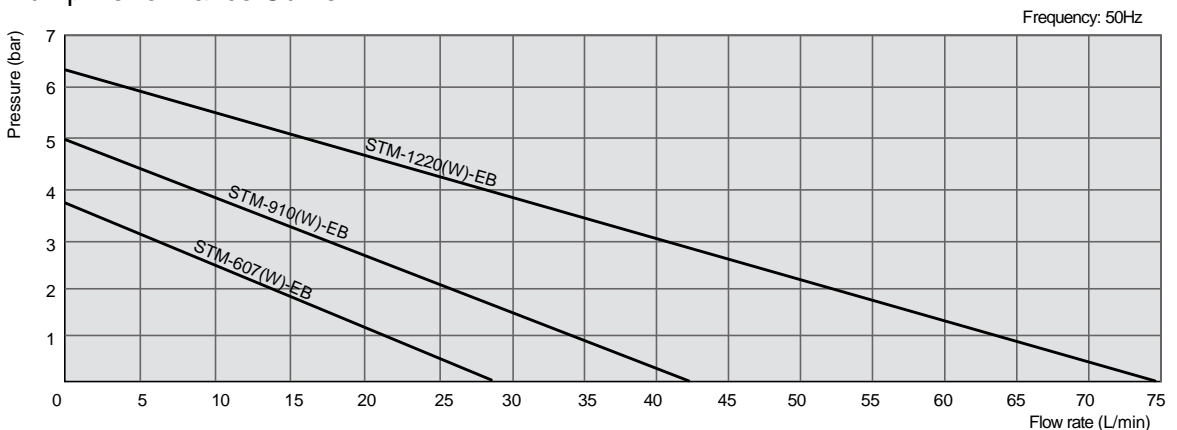
We reserve the right to change specifications without prior notice.

Note:

- 1) Pump testing standard: Power of 50Hz, purified water at 20°C (There is ±10% tolerance for either max. flow rate or max. pressure).
- 2) Power supply: 3Φ, 400VAC, 50Hz Pump curve

### 1.4.2 Pump Performance

#### Pump Performance Curve



Picture 1-2: Pump performance

### 1.4.3 Reference formula of Mould Controllers model selection

Heater Power (kW) = mould weight (kg) × mould specific heat (kcal/kg°C) ×

temperature difference between mould and environment (°C) × safety coefficient

/ heating duration (hr) / 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°C) × heating medium density (kg/L) × in/outlet temperature difference

(°C) × time (60min/hr)]

Note: Water specific heat =1kcal/kg°C

Heating medium oil specific heat =0.49kcal/kg°C

Water density =1kg/L

Heating medium oil density =0.842kg/L

Time for heating=the time needed to heat from room temperature to set temperature

## 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 1-3: Signs and Labels Description

Signs and Labels	Description
	From mould: connector for circulating water/oil coming from mould.
	To mold: connector for circulating water/ oil to go to mould.
	Water outlet: cooling water outlet.
	Water inlet: inlet for replenishing water and cooling water.

### 1.5.3 Operation Regulations

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

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

2) If problems of drainage or bad temperature control are noted, please clean solenoid valve and cooling water inlet and outlet.

3) Do not move the unit when it is in operation.

- 4) When in need of repairing, wait until oil temperature falls below 30°C.
- 5) 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°C. Or the life of the unit would be affected.

## 1.6 Exemption Clause

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

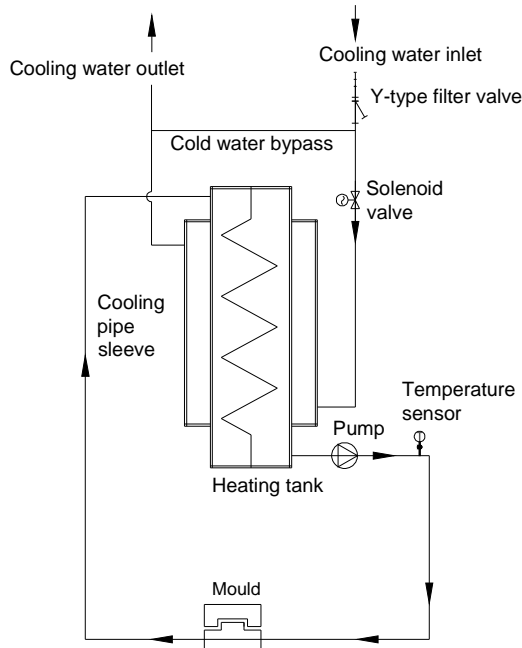
Shini is exempted from liability for any costs, fees, claims and losses caused by reasons below:

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

## 2. Structure Characteristics and Working Principle

### 2.1 Working Principle

#### 2.1.1 System flow for STM-607-EB (Indirect Cooling)



Picture 2-1: STM-607-EB Working principle

The heat transfer oil in the heating tank after heating is pressurized by the pump (At this time, the solenoid valve of the cooling pipe sleeve is closed, and the cold water can't enter the cooling pipe sleeve), heats up the mould after passing through it, and finally returns to the heating tank circularly. When it reaches the set temp., the heating pipe stops heating and the pump continues to run.

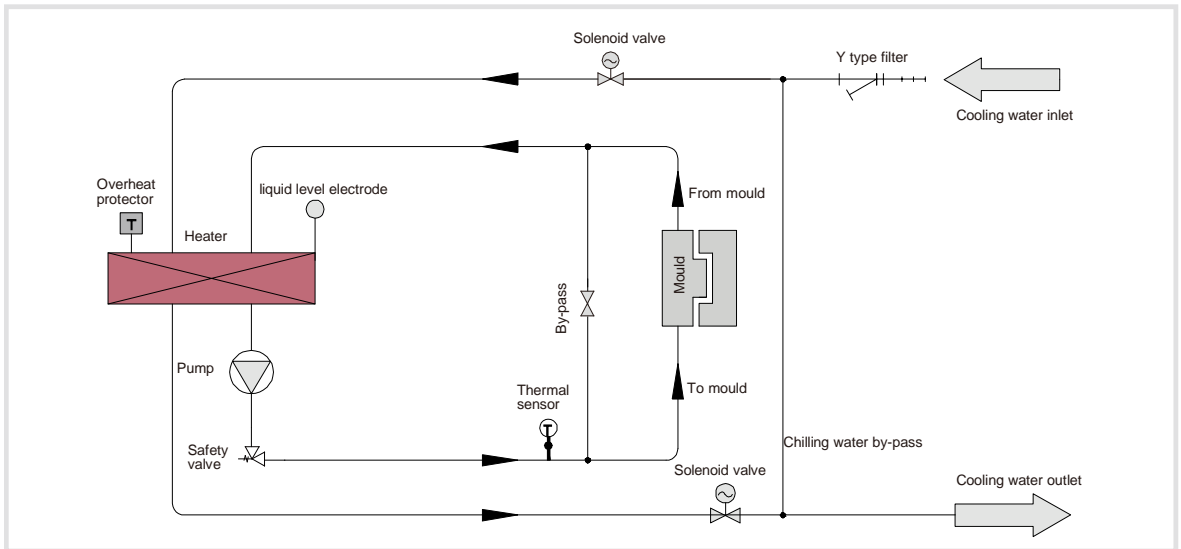
When the temp. is absorbed by the mould, the temp. is lower than the set value, and the pipe heater works again circularly to maintain constant mould temp.

When it needs to cool down the mould or temp., the pipe heater stops heating. Meanwhile, the cooling solenoid valve opens to let cooling water enter the cooling pipe sleeve, which indirectly takes away the heat in the heat transfer oil to cool down its temp.

After cooling, the heat transfer oil starts to cool down the mould temp. when passing through the mould. When the temp. drops to the set value, the cooling

solenoid valve closes; When the temp. is absorbed by the mould, the temp. is lower than the set value. At this time, the pipe heater works again circularly to maintain constant mould temp.

### 2.1.2 System flow for STM-607W-EB (Direct Cooling)



Picture2-2: STM-607W-EB Working principle

The water in the heating tank is sent to the mould by the pump after heating to heat up the mould, and then returns to the heating tank circularly. In the whole cycle, if the water temp. is too high, it will be sent to the control system through the temp. sensor, and then the system will start the solenoid valve to let the cold water enter the system to cool down the water. When it cools down the water to the set temp., the solenoid valve closes, thus achieving the circulation and constant water temperature. If the temp. exceeds the set value of the temperature protector (snap-action thermostat), the system will alarm and shut down. If the water is lost in the system during operation, the water level in the system will decline. When the water level switch detects low water level, the system will open the solenoid valve to make up water. When the water level switch detects the water level, the solenoid valve closes to prevent dry burning of the heating tank.

### 3. Installation and Debugging

#### 3.1 Installation Space

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

Do not sit on the machine or place stuff on that.

Keep away flammable and explosive goods.



Picture 3-1: Installation Space

#### 3.2 Power Supply

Make sure that power supply is the same as required before installation.

Mould heaters are generally set to be used with 3Φ 400V power supply or other specifications according to customers' requirement.

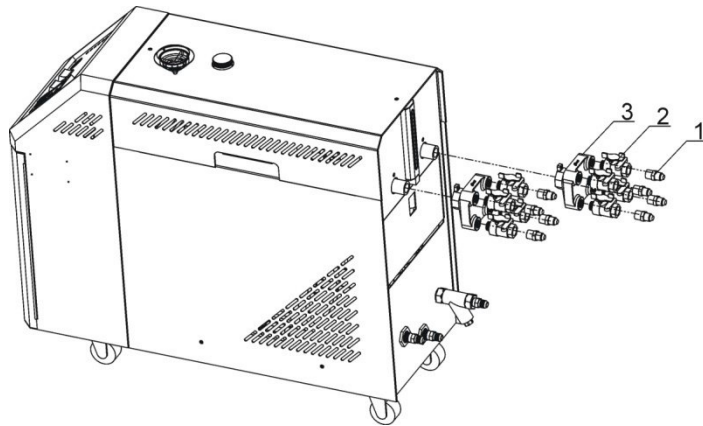
#### 3.3 Operation Procedures

Table3-1: Main Pipe Simension

Model	Main Inlet/Outlet Dimension	Water Flow Regulator	Parts No.
STM-607-EB	3/4"PT Female	3/8" 2-in-2-out	BY40382034050
	3/4"PT Female	3/8" 4-in-4-out	BY40384034050
STM-607W-EB	3/4"PT Female	3/8" 2-in-2-out	BY40382034050
	3/4"PT Female	3/8" 4-in-4-out	BY40384034050

##### 3.3.1 Installation Steps for Options Water Manifold (Dewaxing)





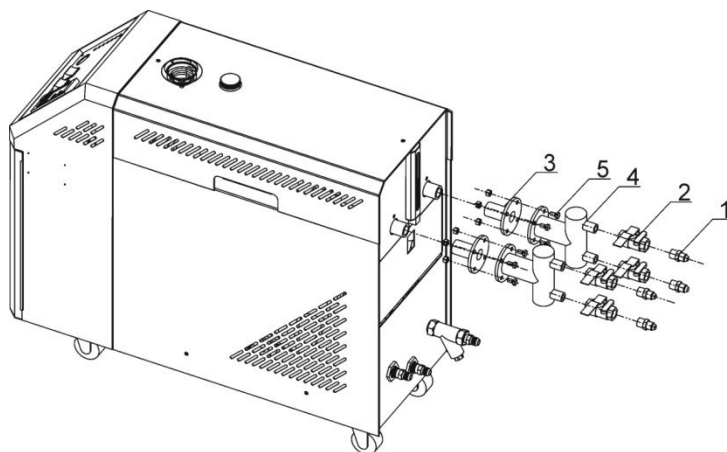
- 1) Install copper joint to the level valve.
- 2) Install level valve with copper joint to the dewaxing water manifold.
- 3) Install water manifold to the machine.
- 4) Install Teflon to copper joint.



Note!

For the operating temperature not higher than 200°C, Teflon with temperature resistance 200°C is usable.

### 3.3.2 Installation Steps for Options Water Manifold (Welding)



- 1) Install copper joint to the level valve.
- 2) Install level valve with copper joint to the welding water manifold.
- 3) Install water manifold to the machine.

- 4) Connect water manifold with manifold joint via screws.
- 5) Install Teflon to copper joint.

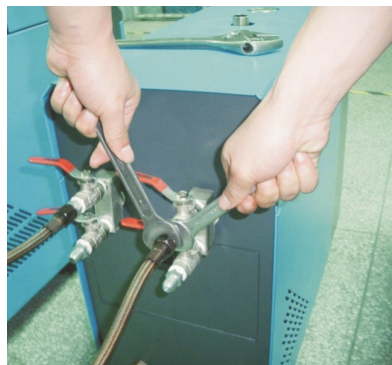


Note!

For the operating temperature not higher than 200°C, Teflon with temperature resistance 200°C is usable.

### 3.3.3 Pipeline Connection

- 1) When connecting the mould from the port, use two wrenches to fix the connector on the fixed side first, and then tighten the side connector. Otherwise, the machine may leak water.



Picture 3-2: Pipeline Connection 1

- 2) If there are unused joints, connect them with Teflon pipes.



Picture 3-3: Pipeline Connection 2

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

It is recommended that the cooling water pressure should not be less than 2bar, and the outer diameter of inlet and outlet pagoda connector is  $\varnothing 13$ .

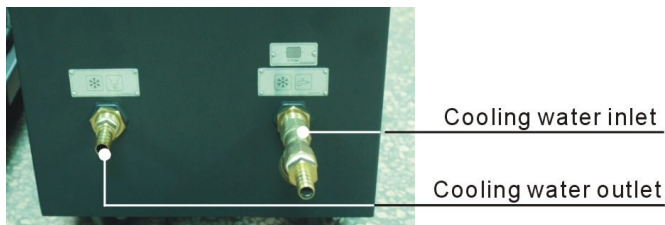
- 4) Manual air exhausting must be done before running the machine to ensure.

the air inside the mould and mould temperature controller is completely discharged.



Attention!

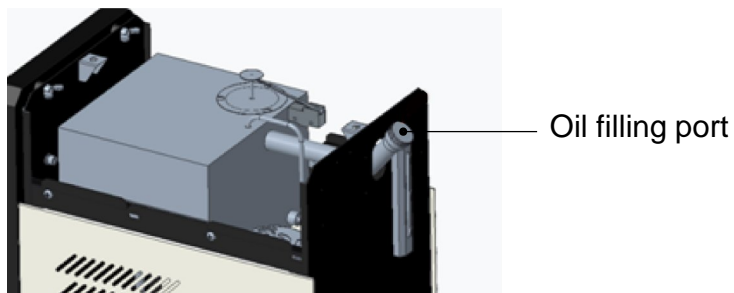
Cooling water inlet and outlet are as shown in picture. No reversal!



Picture 3-4: Pipeline Connection 3

### 3.3.4 Add Heat Transfer Oil

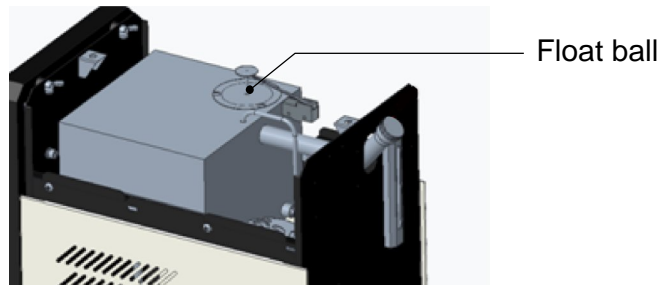
- 1) Fill the oil tank



Picture3-5: Heat transfer oil filling step 1

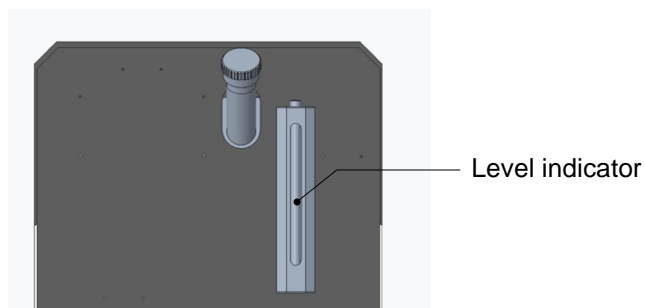
- 2) When float ball floats up, stop oil filling. At this moment, turn the pump on and off several times to exhaust the air in the pipeline; After the air is exhausted, oil passes through the pipeline, float ball drops down. At this moment, re-fill

the oil tank to make the float ball float up. It'd better not to touch the microswitch.



Picture3-6: Heat transfer oil filling step 2

3) Repeat step 2 several times, the oil would full fill in the pipeline. At this time, check level detector at back of the machine, the liquid level should not above half of the indicator.



Picture3-7: Heat transfer oil filling step 3

## 4. Operation Guide


### 4.1 Control Panel



Picture4-1: Touch Panel

Table4-1: Touch Panel Description

Icon	Name	Function	Remark & Notice
	Outlet medium temp.	Outlet medium temp. indicator	-
	Return medium temp	Outlet medium temp. indicator	-
	Heating (MAIN)	Heating output indicator	-
	Cooling	Cooling indicator	-

	Pump rotating	Display pump rotating indicator	-
	Water supply	Water supply indicator	-
	Alarm	Issue alarm indicator	-
	Mandatory cooling	Mandatory cooling key	Press the mandatory cooling key for more than 2 secs. to stop the heating and output 100% cooling control. When the temp. drops below the cooling temperature (Cooling Temp), it will release the mandatory cooling and stop the controlling automatically.
	Select	Up, Down, Left, Right Keys	-
	Confirm parameter	OK key	Parameter confirmation
	Menu	Menu key	
	ON/OFF	Power switch key	-

## 4.2 Startup Steps

Turn on the main power circuit breaker

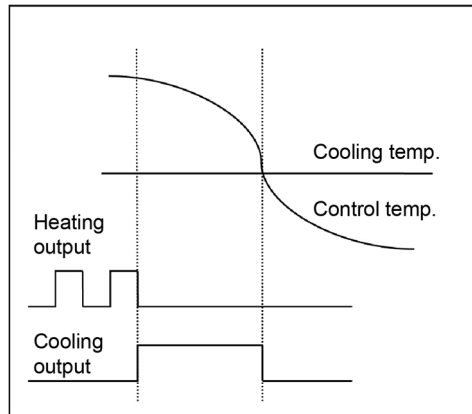


Picture 4-2: Main Power Circuit Breaker

## 4.3 Function Description

### 4.3.1 Mandatory cooling

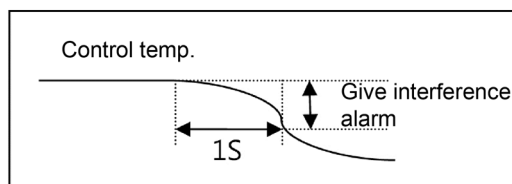
- 1) Press the mandatory cooling button to stop heating and 100% output cooling control
- 2) Control temperature is lower than the cooling temperature, and it will automatically release the mandatory cooling and stop controlling.
- 3) Press the mandatory cooling key to stop the mandatory cooling and start the normal control



Picture 4-3: Mandatory Cooling

### 4.3.2 Interference Alarm

- 1) If the control temperature is maintained above the set interference alarm value for 1 sec., it is considered as the interference and it will give an alarm.
- 2) The interference alarm only works when there is no cooling output in the control.
- 3) Once an alarm is issued, it will last on till the ON/OFF key is pressed to cancel the alarm.



Picture 4-4: Interference Alarm

### 4.3.3 Intermittent Water Supply

- 1) Press the ON/OFF key to start water supplying.



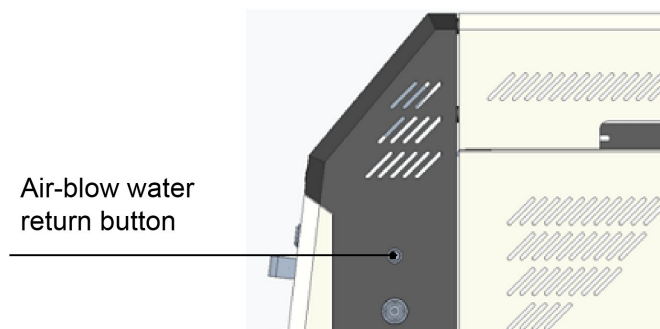


E-04	Pump overload contact input	occur	stop
E-05	EGO contact input	occur	stop
E-06	overheat alarm	occur	stop
E-07	High pressure contact input	occur	stop
E-08	Low pressure contact input	occur	stop
E-09	RET(K) breaks	occur	stop
E-10	RET(K) reversely connected	occur	stop
E-11	Return medium temp. deviation	occur	maintaining state
E-12	Interference alarm	occur	maintaining state
E-13	Heater alarm	occur	maintaining state
E-14	Auto-tuning error	occur	return to temp.

#### 4.3.5 Air-blow water return function

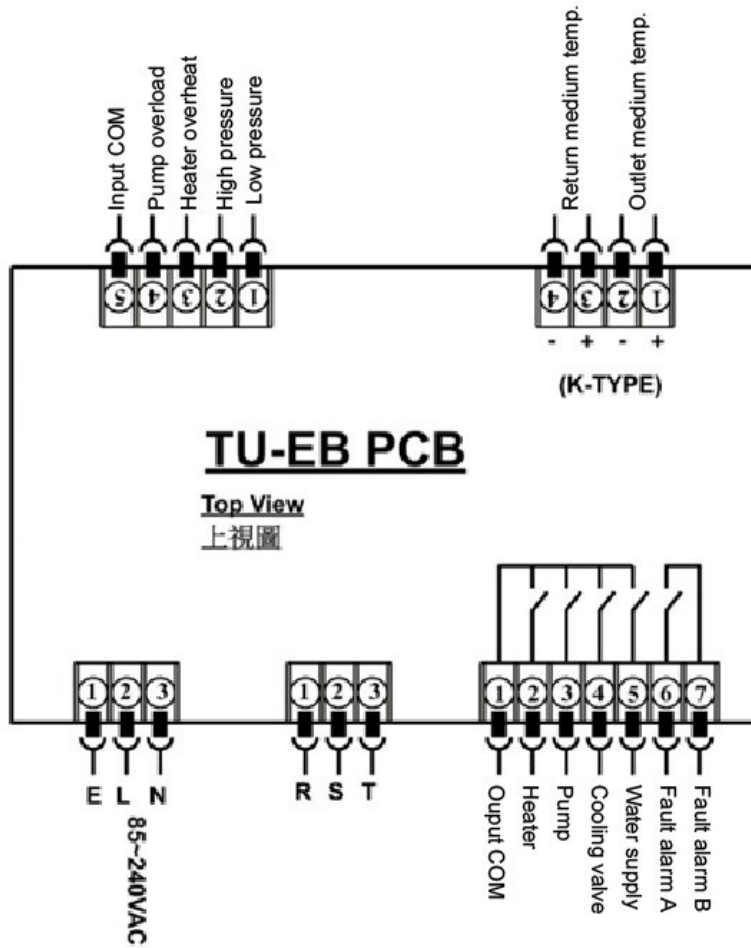
The STM-W-EB has air-blow water return function, which can only be used in standby mode.

When using, please remove the mould outlet pipe, prepare for drainage recycling, and briefly press the air-blow water return button till all the water inside the mould is eliminated.



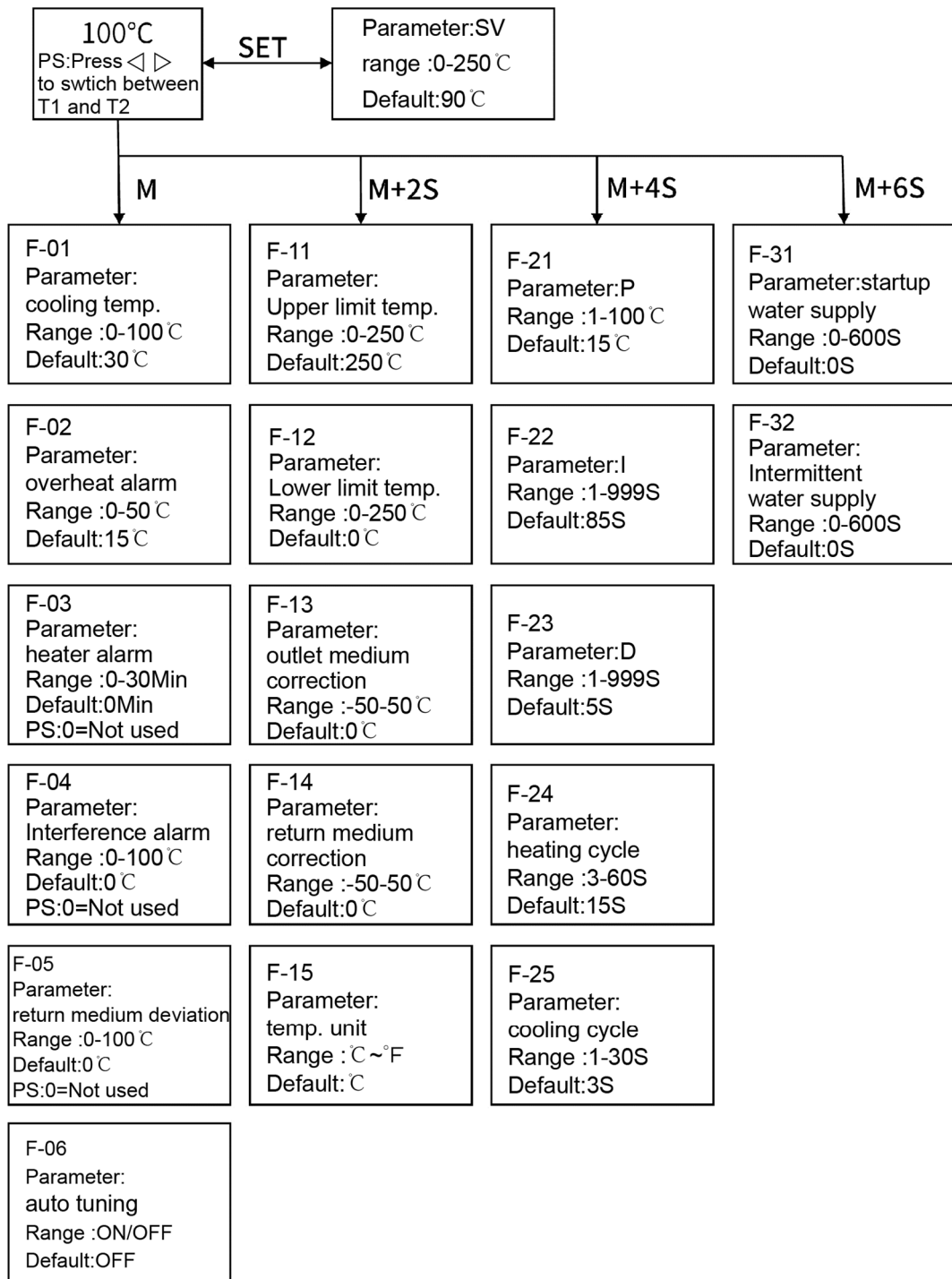
Picture 4-7: Air-blow water return button

## 4.4 Controller Wiring Diagram



Picture 4-8: Controller Wiring Diagram

## 4.5 Process Flow



## 4.6 Shutdown Steps

- 1) Press < Mandatory cooling > key to cool down.
- 2) When the temp. drops below 50 °C, long press the <ON/OFF>key
- 3) Close the circuit breaker.



Attention!

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



Attention!

Pump running direction must be correct!



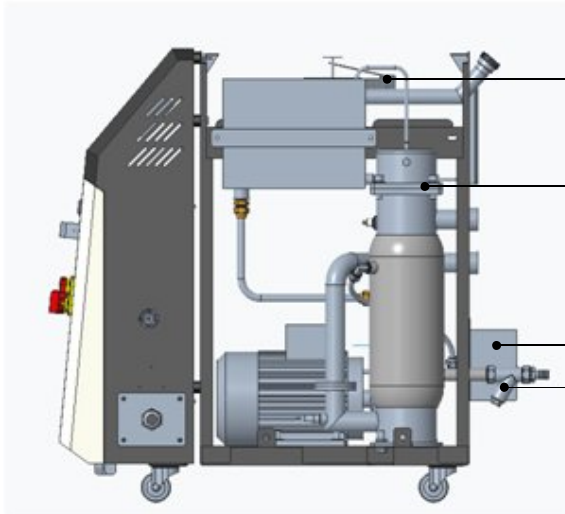
Attention!

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

## 5. Trouble-shooting

ERROR CODE	Functions
Er01	(phase sequence protection) error code, displayed in the SV line
Er02	(insufficient refrigerant ) error code, displayed in the SV line
Er03	(pump overload) error code, displayed in the SV line
Er04	(heater overheat) error code, displayed in the SV line
Er05	(temp. sensor fault) error code, displayed in the SV line
Er06	(high temp.) error code, displayed in the SV line
Er07	(low temp.) error code, displayed in the SV line
Er08	(data error) error code, displayed in the SV line
Er09	(large temp. difference between the output medium and return medium) error code, displayed in the SV line

## 6. Maintenance and Repair



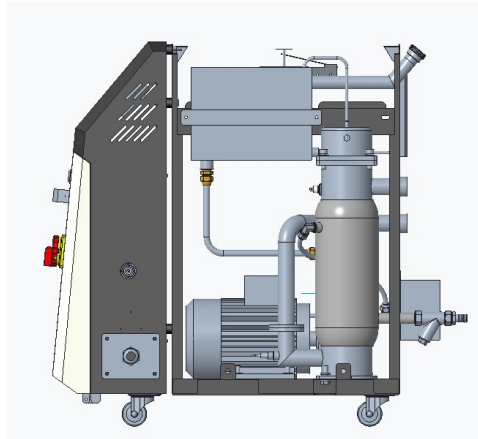
1. Clean the solenoid valve;  
Period: Every 3 months.
2. Clean the Y-type strainer;  
Period: Every month.
3. Clean the pipe heater/cooler.  
Period: Every 6 months;
4. Check the level sensor.  
Period: Every 3 months.

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°C to perform repairing or maintenance. (Please note that it is dangerous to check or tear down the machine during operation.)

### 6.1 Open the Machine

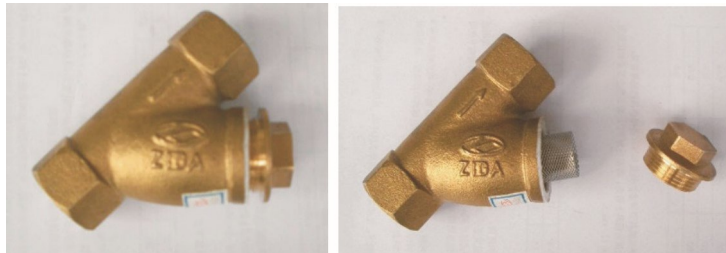
Open the cover plate and side plate.



Picture6-1: Open the machine

## 6.2 Y Type Strainer

- 1) Clean soft water should be used as cooling water. Filter screen is used in the strainer to stop impurities and pollutants entering into water pipe.
- 2) Impurities or pollutants may cause errors and bad temperature control. Clean filter screen of the strainer periodically.
- 3) Cleaning steps: turn off power and cooling water supply. Open Y type water strainer cover at the bottom in below picture. Take out the filter screen, then assemble it back as reverse order after cleaning.



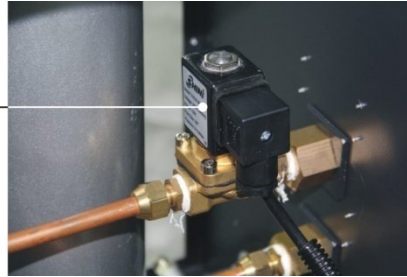
Picture6-2: Y type strainer

## 6.3 Solenoid Valve

Replace solenoid valve:

- 1) Open the cover of machine (as 6.1 Chapter).
- 2) Dismantle the solenoid valve or replace it.
- 3) Assemble it back as reverse order.

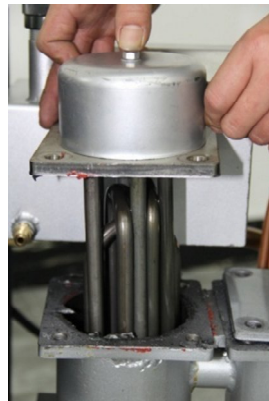
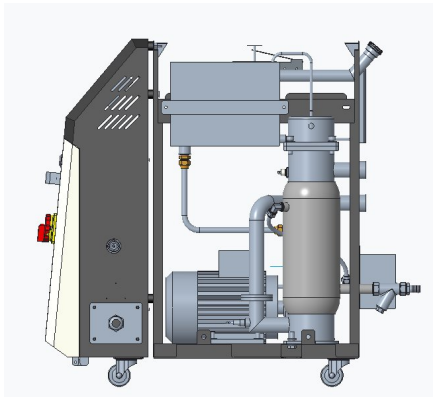
Solenoid valve



Picture6-3: Solenoid valve

## 6.4 Pipe Heater

- 1) Take out pipe heater cover (as picture, loosen the screw and wire clamp; take out the cover and pipe heater.



Picture6-4: Pipe heater

- 2) Assemble it back as reverse order.

## 6.5 Heat Transfer Oil



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

Service time of high temperature oil:

$\leq 120^{\circ}\text{C}$  Period: replace annually

$\geq 120^{\circ}\text{C} \sim \leq 160^{\circ}\text{C}$  Period: replace half yearly

$> 160^{\circ}\text{C}$  Period: replace trimonthly



Use kerosene up to 200 degrees model:

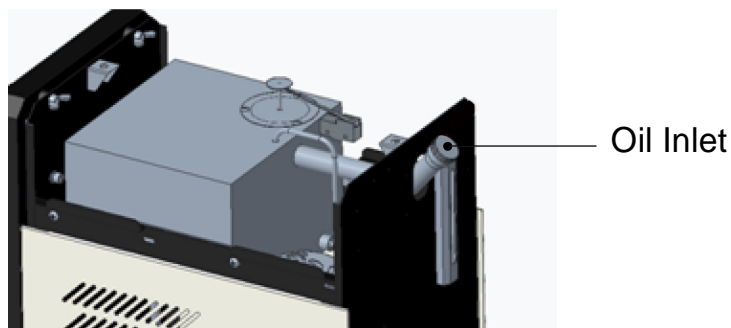
Model: Nanhai MCH32. For using other brands, fire point should be higher than 240 degrees.

Use kerosene up to 300 degrees model:

Model: Goddess HT-3 heat transfer oil. For using other brands, fire point should be higher than 340 degrees.

#### 6.5.1 Heat Transfer Oil Replacement

- 1) Firstly, cut off the power, make sure oil temperature has dropped already (If oil temperature is too high, when open the ball valve of oil tank, high temperature oil would splash and cause human injury due to high pressure.
- 2) Open two oil outlets at machine bottom (one is at heater bottom, another is at cooler bottom) to exhaust oil medium.
- 3) Cover two oil outlets, then fill new oil medium in the oil tank. The filling method refers to 3.3.4.



Picture6-5: Oil Inlet

- 4) Fasten oil inlet cover after the filling of oil.

## 6.6 Maintenance Schedule

### 6.6.1 About the Machine

Model \_\_\_\_\_ SN \_\_\_\_\_ Manufacture date \_\_\_\_\_

Voltage \_\_\_\_\_  $\Phi$  \_\_\_\_\_ V Frequency \_\_\_\_\_ Hz Power \_\_\_\_\_ kW

### 6.6.2 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.

### 6.6.3 Daily Checking

Check machine startup function.

Check all the electrical wires.

### 6.6.4 Weekly Checking

Check loose electrical connections.

Check and clean Y type filter <sup>1</sup>.

Check solenoid valve.

Check motor overload and phase reversal alarm function.

Check whether pipeline joints are under looseness.

Check the sensitivity of EGO.

### 6.6.5 Trimonthly Checking

Check level switch.

Check the contactor <sup>2</sup>.

Replace the hot kerosene with a using temperature above 160 degree <sup>3</sup>.

### 6.6.6 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 <sup>4</sup>.

### 6.6.7 Yearly Checking

Replace the hot kerosene with a using temperature above 120 degree <sup>5</sup>.

### 6.6.8 3 year Checking

PC board renewal.

No fuse breaker renewal.

- Note: 1. Y-type filter has the function of filling water cooling protection effect, be sure the waterway are clear to avoid cooling failure.
2. Manufacturer laboratory data for AC contactor is two million times in life. we suggest service life for one million four hundred thousand times, if work eight hours per day, recommended replacing frequency is 1.5 years, if work day and night, replacement is suggested to be done every six months.
  3. Hot kerosene coke will influence the detection accuracy of internal temperature probe and the efficiency of heat elements, three months replacing frequency is suggested.
  4. Hot kerosene coke will influence the detection accuracy of internal temperature probe and the efficiency of heat elements, six months replacing frequency is suggested.
  5. Hot kerosene coke will influence the detection accuracy of internal temperature probe and the efficiency of heat elements, suggested replacing frequency is one year.