NAIMEITE

Electrical Oven – Filter Paper Curing Tunnel Oven

- *Operation Manual*

深圳市耐美特工业设备有限公司

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Change Record

Version	Release date	founder	Change description
V1.0	July 17 , 202 _ _ _	NMT - Fuyong	

Program Version Management

Version	Release date	Founder
V1.0	July 17 , 2023 _ _ _	NMT -Wang Peng

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Statement

I Equipment structure and main parameters

1.1 Equipment overview

The function of the Filter Paper Curing Tunnel Oven is mainly to paper curing used for assembly of type ecologic cartridge filtrant element to filtration of lubricant oil and fuel. The equipment is controlled by PLC and can realize the fully automatic operation mode; it adopts PLC to cooperate with HMI has the characteristics of easy operation, convenience, speed, high precision and stable movement.

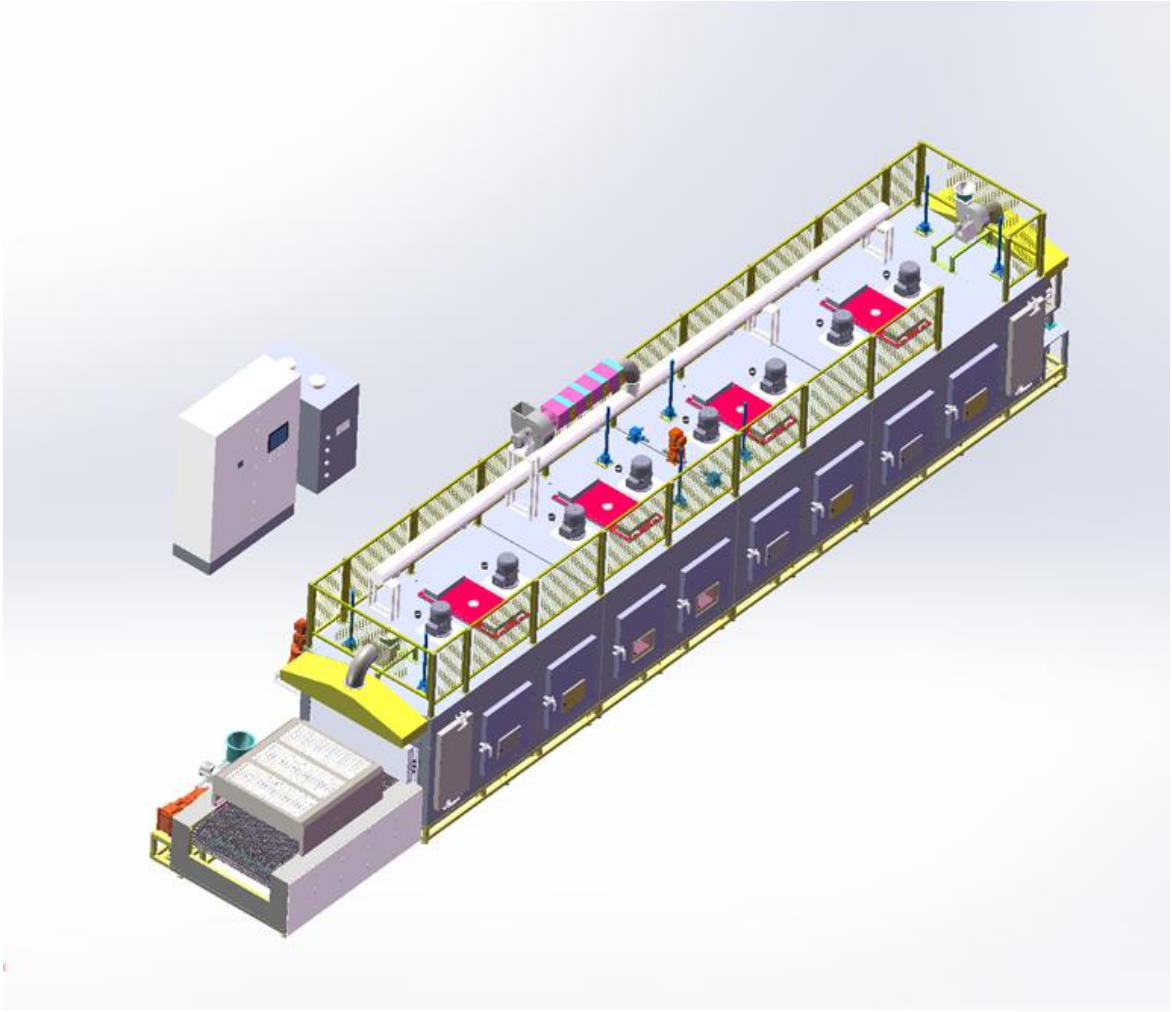


Figure 1.1 General Overview

Main Parameters

Rated voltage: 380V AC, 50HZ, three-phase, UVW- N- PE

Equipment control voltage: 24V DC

II Touch screen and operation interface instructions

2.1 Operation process

2.1.1 Power-on inspection

1. Before operating the equipment, please check whether the limit switch sensor and connectors have fallen off.
2. Check whether the signal line is damaged or whether the signal line runs smoothly.
3. Check whether the entry/exit is at the designated position.
4. Check whether the screws are loose and whether the joints are loose or leaking.
5. Use a multimeter to check whether there are short circuits in the main circuit and auxiliary circuit of the electrical control cabinet.
6. Check all safety doors and emergency stop switches for abnormalities.

2.1.2 Start-up steps

1. Turn on the main power switch in the electrical control cabinet (4P), this switch is the main power switch for this device.
2. The inverter circuit breaker (3P) panel and guide rail socket circuit breaker (2P) , control electric circuit breaker (2P) are opened in sequence.
3. Turn on the power key switch at the HMI panel
4. When the power indicator is always on , the boot is complete.
5. Wait for the HMI to start automatically.

2.1.3 Automatic operation

Switch the manual mode to automatic mode, click the "Start System" button, and the equipment will produce automatically. Figure 2-1-3 _ _

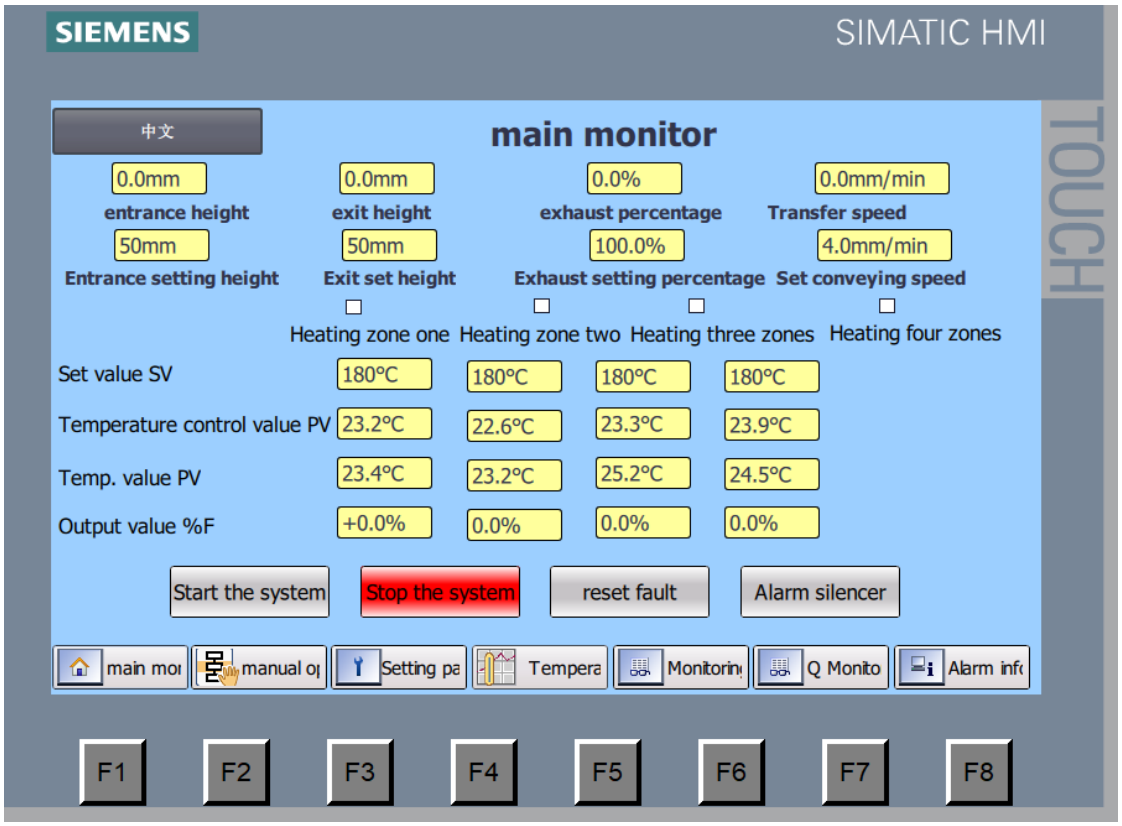


Figure 2-1-3 _ _

2.1.4 Shutdown operation

Press the "Stop System" button during automatic operation to complete the equipment shutdown.

2.2 Check fault information and Trouble Shooting

2.2.1: Historical alarm information

View the alarm history of the device
See Figure 2-2-1 below :

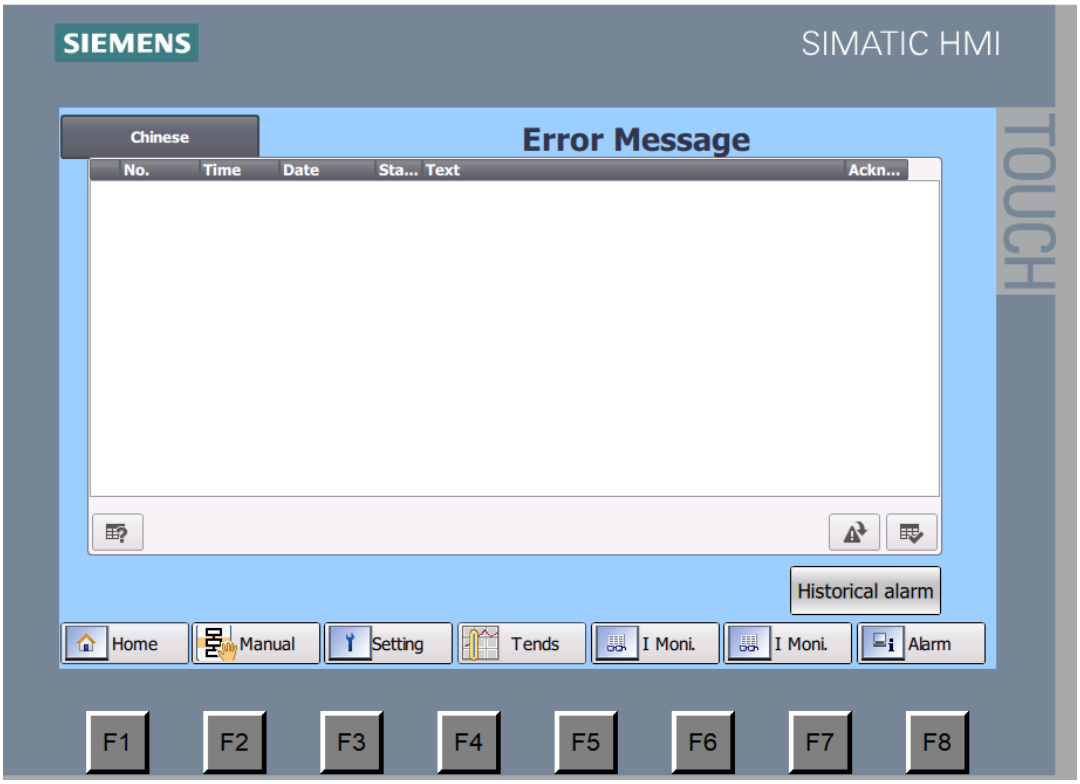


Figure 2-2-1 _

2.2.2 Equipment abnormal alarm processing

When the equipment is abnormal, the machine will stop and a corresponding alarm will pop up on the man-machine interface. According to the information displayed on the alarm interface , the specific failure of the machine will be found out, and corresponding processing will be made in time. If it cannot be solved, please contact the supplier in time, and tell the supplier the specific phenomenon of the on-site failure, so that it can be dealt with quickly.

2.3 Introduction to human-machine screen

2.3.1 Fixed screen

The fixed screen of the HMI is on the top row and the bottom row of the HMI screen. No matter how the screen is switched on the HMI, the fixed screen will always be displayed, as shown in Figure 2 - 3-1 :

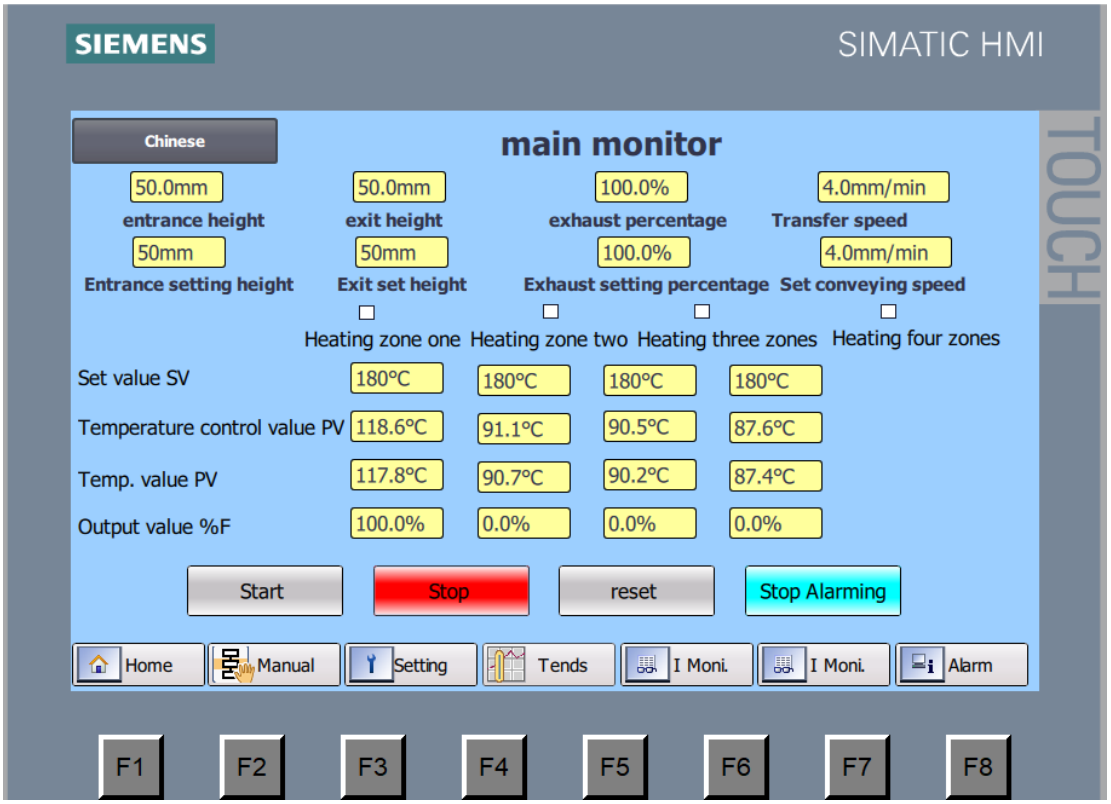

SIEMENS
SIMATIC HMI
Chinese
main monitor
TOUCH
50.0mm
entrance height
50.0mm
exit height
100.0%
exhaust percentage
4.0mm/min
Transfer speed
50mm
Entrance setting height
50mm
Exit set height
100.0%
Exhaust setting percentage
4.0mm/min
Set conveying speed
Heating zone one
Heating zone two
Heating three zones
Heating four zones
Set value SV
180°C
180°C
180°C
180°C
Temperature control value PV
118.6°C
91.1°C
90.5°C
87.6°C
Temp. value PV
117.8°C
90.7°C
90.2°C
87.4°C
Output value %F
100.0%
0.0%
0.0%
0.0%
Start
Stop
reset
Stop Alarming
Home
Manual
Setting
Tends
I Moni.
I Moni.
Alarm
F1
F2
F3
F4
F5
F6
F7
F8

Figure 2-3-1 _

2.3.2 Manual operation screen

In the "manual mode" allows the operation equipment to act independently, for example: the switch of the fan, the operation of the conveyor belt .....
As shown in Figure 2-3-4 below :

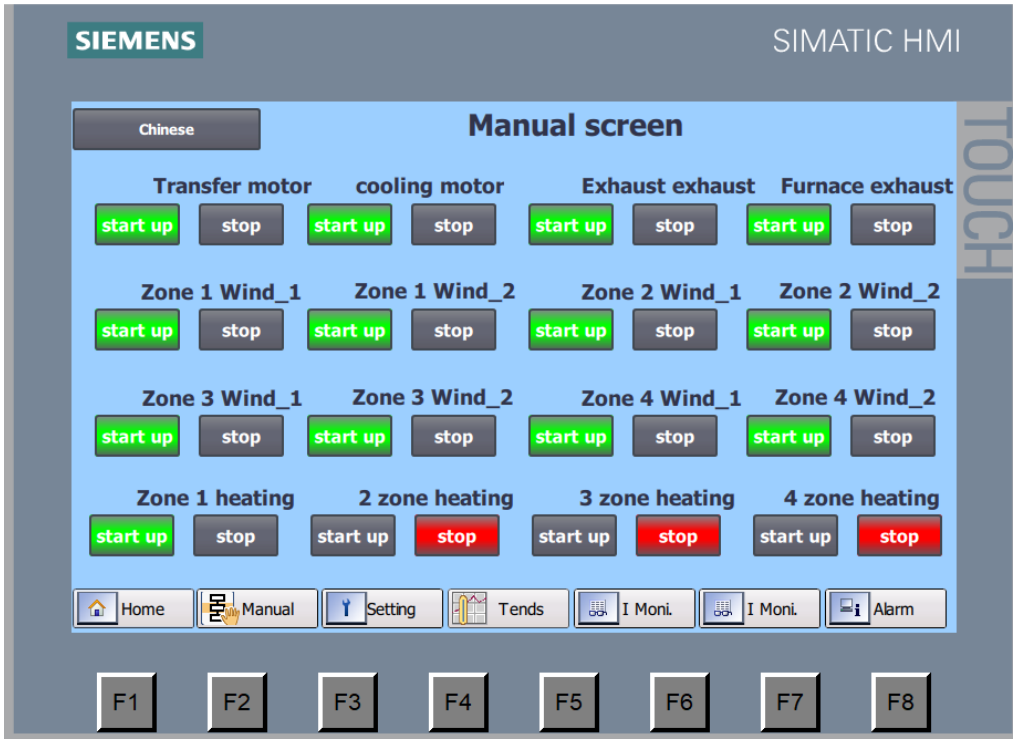
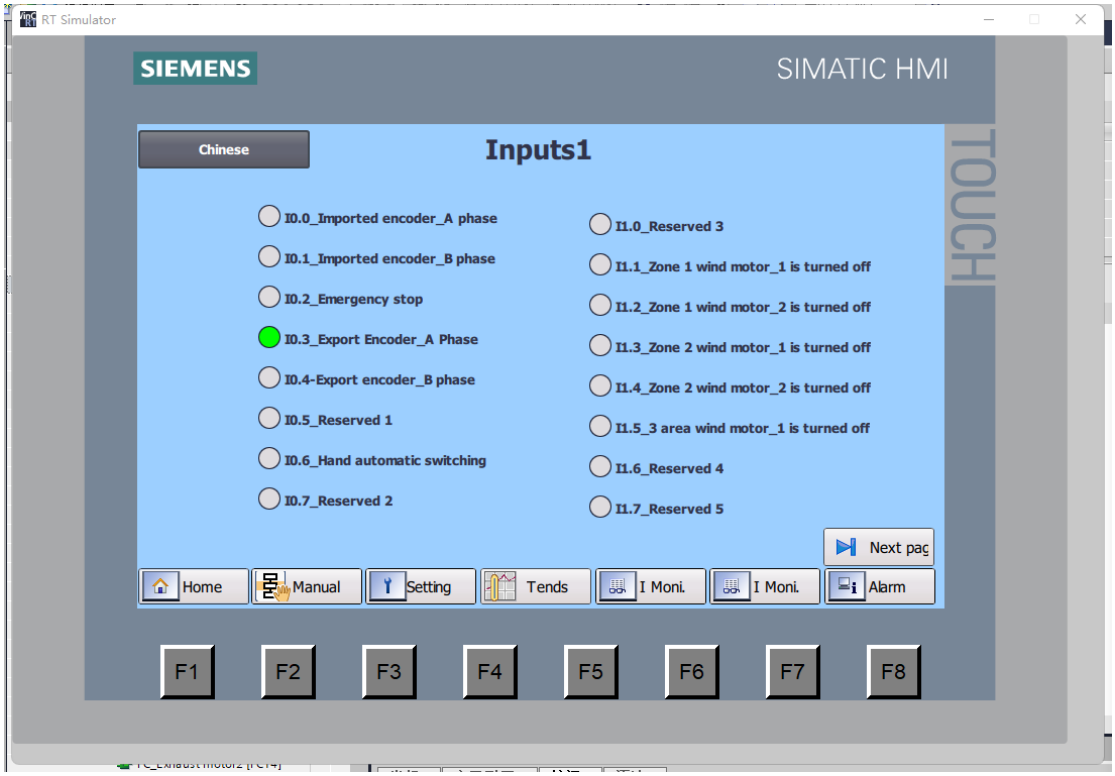


Figure 2-3-4 _ _

2.3.3 I/O list

Used to monitor the status of the input and output signal points of the PLC . Gray indicates that there is no input signal or output signal.
indicates there is an input signal or output signal; see Figure 2-3-5 below for details :


RT Simulator
SIEMENS
SIMATIC HMI
Chinese
Inputs1
TOUCH
I0.0_Imported encoder_A phase
I0.1_Imported encoder_B phase
I0.2_Emergency stop
I0.3_Export Encoder_A Phase
I0.4-Export encoder_B phase
I0.5_Reserved 1
I0.6_Hand automatic switching
I0.7_Reserved 2
I1.0_Reserved 3
I1.1_Zone 1 wind motor_1 is turned off
I1.2_Zone 1 wind motor_2 is turned off
I1.3_Zone 2 wind motor_1 is turned off
I1.4_Zone 2 wind motor_2 is turned off
I1.5_3 area wind motor_1 is turned off
I1.6_Reserved 4
I1.7_Reserved 5
Next pag
Home
Manual
Setting
Tends
I Moni.
I Moni.
Alarm
F1
F2
F3
F4
F5
F6
F7
F8

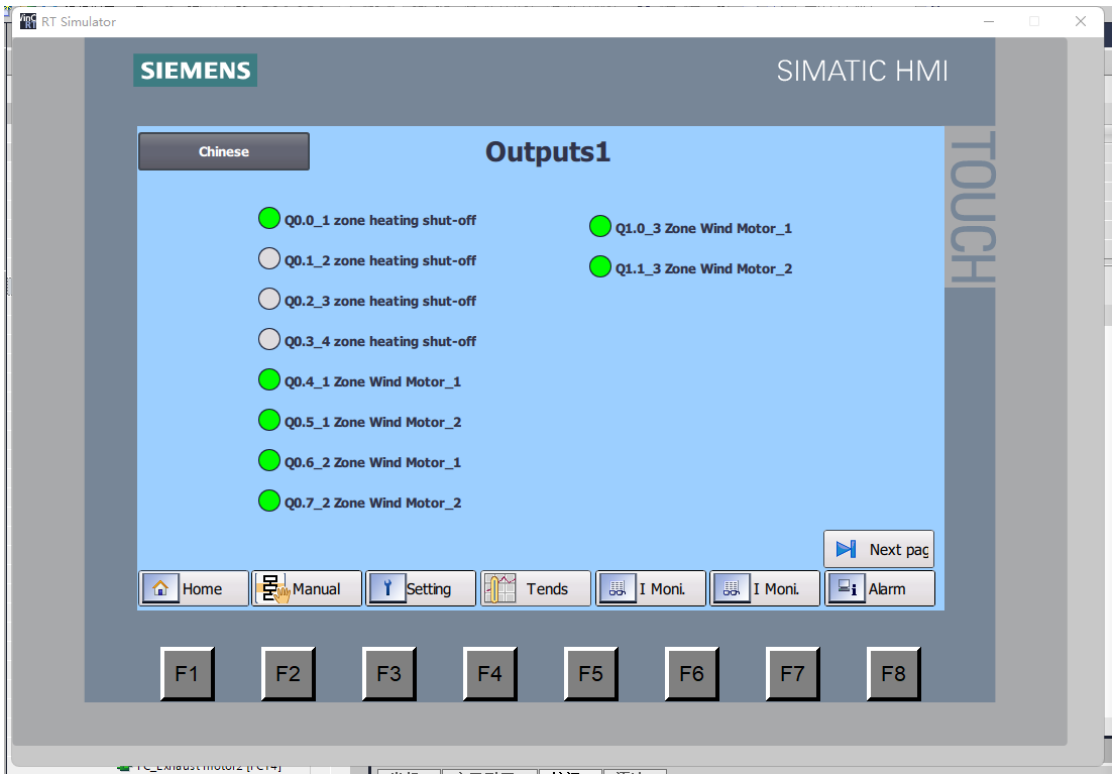

RT Simulator
SIEMENS
SIMATIC HMI
Chinese
Outputs1
TOUCH
Q0.0_1 zone heating shut-off
Q0.1_2 zone heating shut-off
Q0.2_3 zone heating shut-off
Q0.3_4 zone heating shut-off
Q0.4_1 Zone Wind Motor_1
Q0.5_1 Zone Wind Motor_2
Q0.6_2 Zone Wind Motor_1
Q0.7_2 Zone Wind Motor_2
Q1.0_3 Zone Wind Motor_1
Q1.1_3 Zone Wind Motor_2
Next pag
Home
Manual
Setting
Tends
I Moni.
I Moni.
Alarm
F1
F2
F3
F4
F5
F6
F7
F8

Figure 2-3-5 _ _

2.3.4 Setting parameters

1. Click the Set Parameters button to enter the temperature parameter setting page
2. This screen can set the temperature value, temperature over-temperature value, PID auto-tuning, far/near switching, etc.

The PID self-tuning operation is as follows:

1. Turn on the air supply and heating of the device in "manual mode";
2. Select the temperature zone that needs to be adjusted, and click the [Setting] button. When the button displays [Setting] , it means that the setting is being performed;
3. The conditions for using the tuning function are that when the temperature adjustment fluctuation range is relatively large, the tuning function can be used to adjust the PID parameters.

See Figure 2-3-6 below for details :

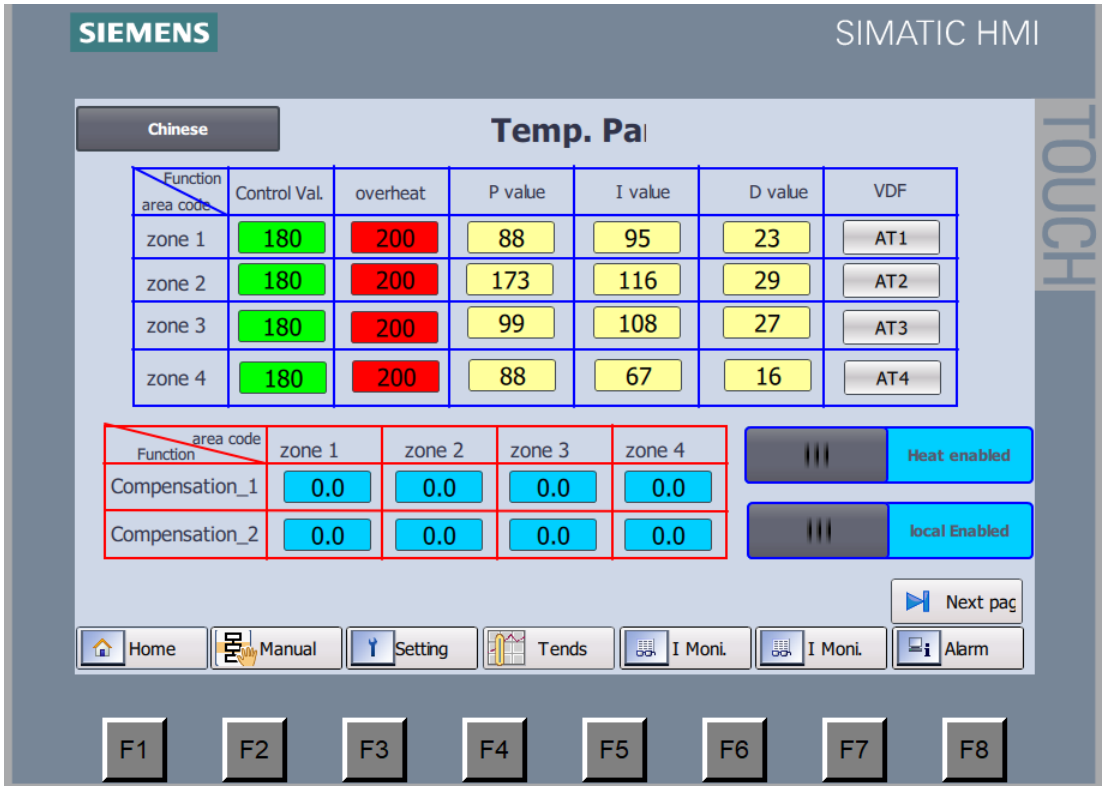


Figure 2-3-6 _

2.3.5 Inputting and Outputting parameter settings

- Click the Set Parameters button and click the next page to enter the entrance and exit parameter

settings

- This screen sets the opening height of the inlet/outlet door, position calibration, operating speed, etc.
- See Figure 2-3-7 below for details :

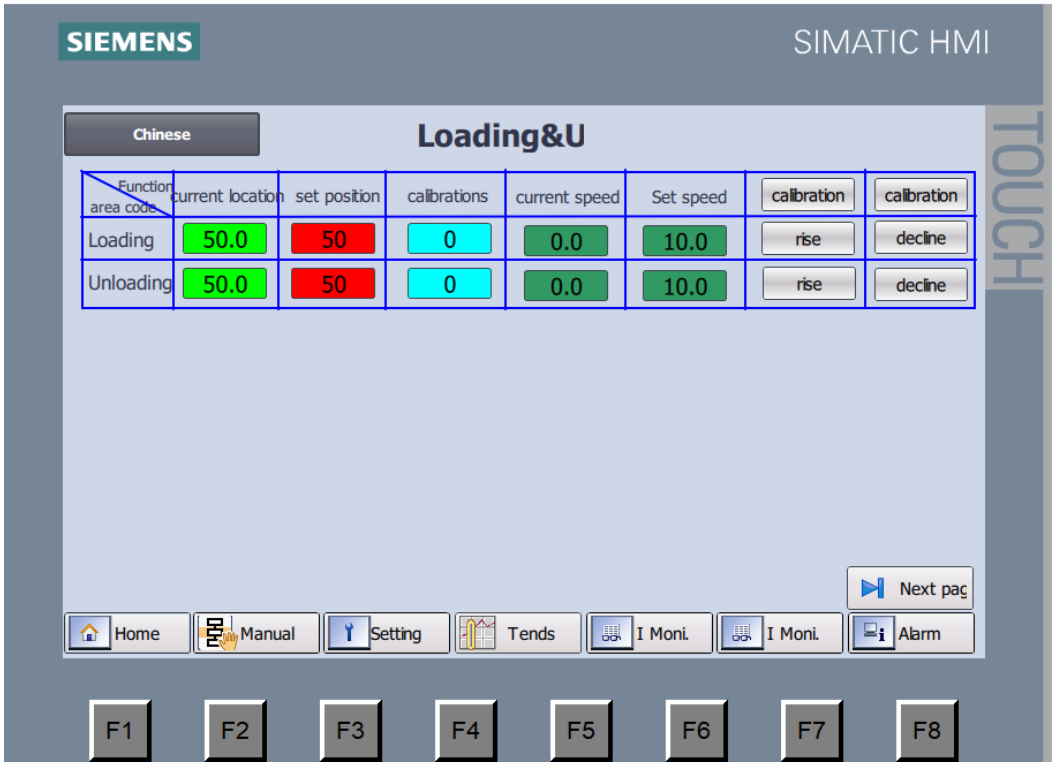


Figure 2-3-7 _ _

2.3. 6 Recipe parameter setting

- Click the parameter setting button, click the next page twice to enter the formula parameter setting
- This screen sets the formula name, formula number, temperature of each temperature zone, exhaust air ratio, conveying speed,
- The height of the in/out door, etc.
- See Figure 2-3-8 below for details

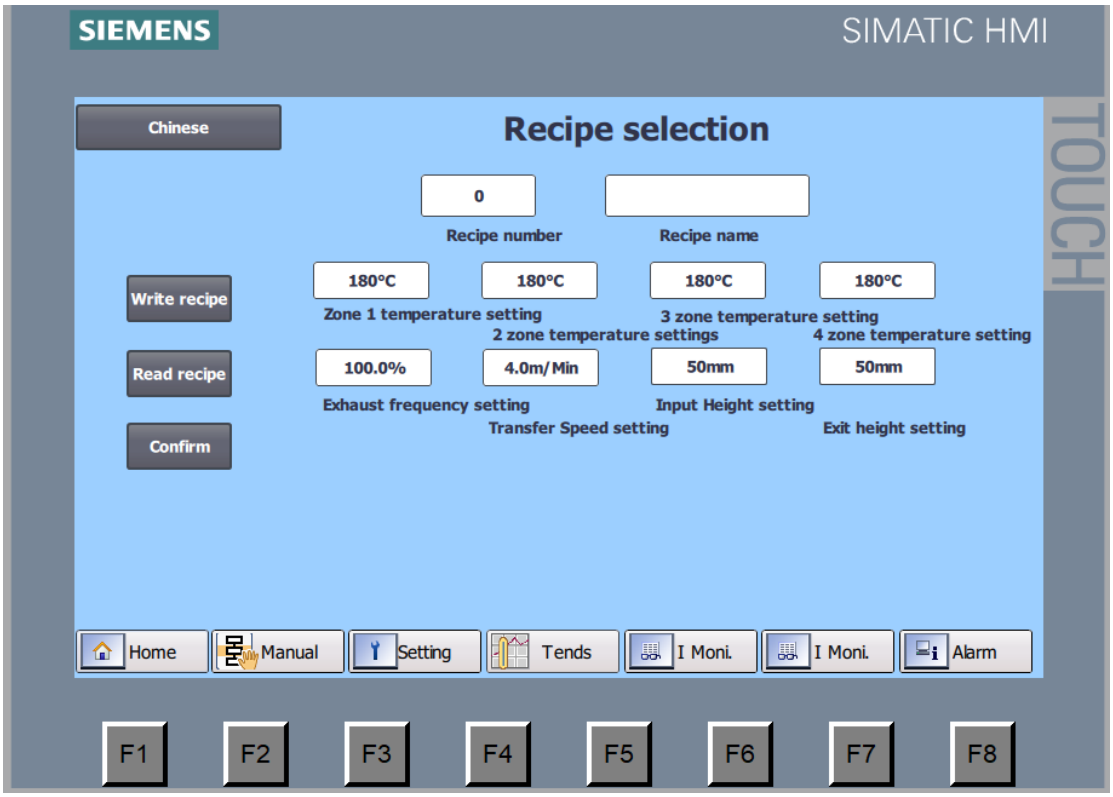


Figure 2-3-7 _ _

2.3.7 Temperature trend _

- Display the temperature change curve, intuitively respond to the change and fluctuation of the measured temperature.

See Figure 2-3-9 below for details :

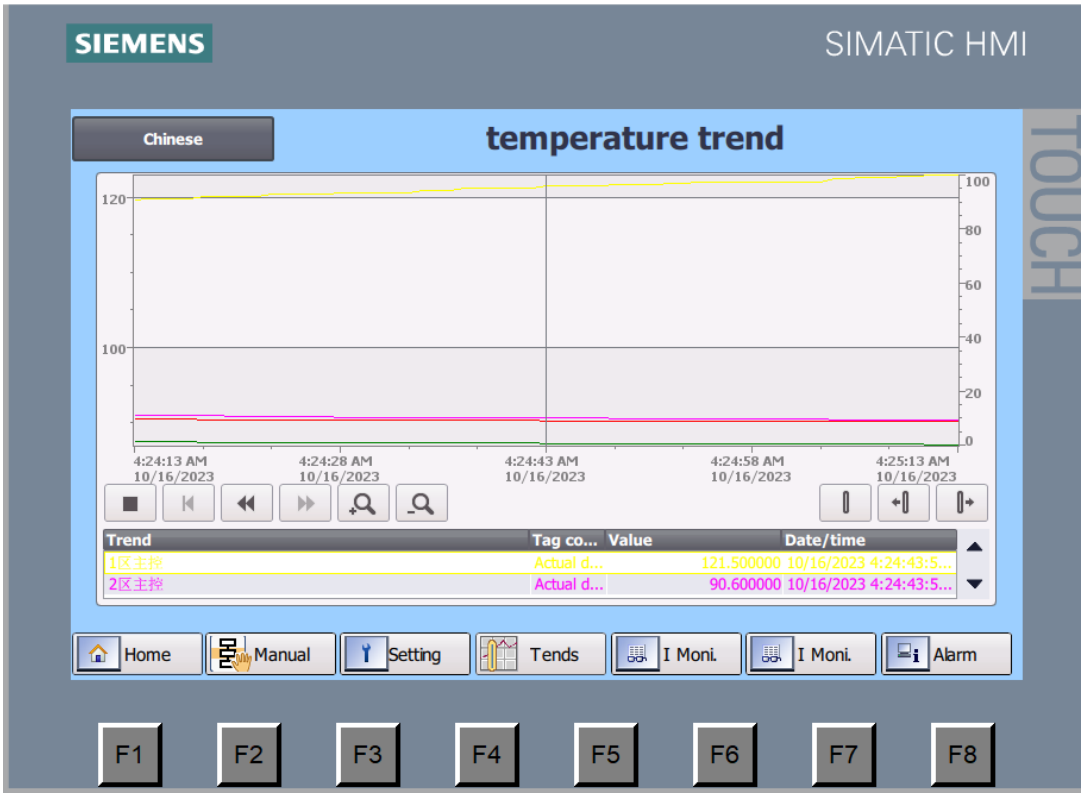


Figure 2-3-9 _ _

III Precautions for safe operation and maintenance

3.1 Maintenance of electrical parts

3.1.1 Maintenance of distribution cabinet

The power distribution cabinet is as follows:

1. Check whether the temperature and humidity in the control cabinet are within the applicable range of the components .
2. Check whether the wiring is loose .
3. Check and verify whether each sensor is malfunctioning and whether the wiring is loose .
4. Check and verify whether the instruments are accurate and reliable.
5. Check whether the insulation parts are damaged or damp, and whether the protective grounding connection is reliable.
6. Check whether the auxiliary circuit components, including instruments, relays, control

switch buttons, protection fuses, etc. are normal.

7. Check whether the auxiliary circuit terminals and connectors are firm and reliable.
8. Check whether it is in normal working condition and whether the signal indication is accurate.
9. Regularly clean the dust and dirt inside and outside the cabinet, fasten the connecting bolts of the wires, and check the aging of each lead wire.

3.1.2 Specific guidance on maintenance of each electrical component

1. Switch maintenance : _
   1) Check whether the mounting bolts are tight, and tighten them if they are loose.
   2) Check whether the rotation of the switch is flexible . If there is any blockage, add lubricating oil to the rotating parts.
   3) Check whether the switching phases are synchronized , whether the contact is good, whether there are burns or overheating marks , and if there is any problem, perform mechanical adjustment or repair.
2. Programmable controller maintenance:
   1) Ensure that the PLC operating environment temperature is 0-60 ℃ .
   2) Keep the relative humidity of the environment between 5% and 95%.
   3) Regularly check the dust inside the PLC to ensure the smooth flow of the air duct and the insulation of the components.
   4) Check in time for abnormal noises in the PLC control cabinet to prevent small animals from chewing the circuits and contaminating the equipment with excrement, causing damage to the equipment.
   5) Take effective waterproof measures to prevent water from leaking or splashing on the PLC and ancillary equipment, causing damage to the equipment .
   6) Take effective measures to prevent foreign objects, especially metal objects, from falling into the PLC.

3.2 Maintenance of the gas circuit part

3.2.1 Main content of maintenance of pneumatic components

If there is a gas line, please maintain it as follows:

1. Check the trachea for blockage and aging, and replace the aged trachea.

2. Check each connecting piece for blockage, damage, aging, etc., clear the blockage, and replace the aging and damaged ones to ensure normal gas line pressure.
3. Check whether the solenoid valve is malfunctioning, ensure the correct and stable operation of the equipment, and check regularly
4. Check the Sanliantong sediment and clean it up in time.
5. Check whether each instrument is accurate and reliable.

3.2.2 Maintenance of solenoid valve

If there is a solenoid valve, please maintain it as follows:

1. Check the solenoid valve before use
2. Check that the surrounding area is clean and free of impurities. If there is a large amount of impurities, it should be purged in time, otherwise the solenoid valve may not open or even leak.
3. Check that the manual function of the solenoid valve is normal, manually pull up or press the red button , there is no sticking phenomenon.
4. Check that the wires of the solenoid valve are connected correctly and the solenoid valve can be closed normally.
5. The use and maintenance of the solenoid valve during use
6. The dust-proof cover of the solenoid valve cannot be lost during use and should be tightly closed. It has the function of dustproof and waterproof, which can ensure the normal operation of the solenoid valve.
7. It is strictly forbidden to press or hang heavy objects on the solenoid valve during use, so as not to damage the solenoid valve.
8. It is strictly forbidden to allow a large amount of water to enter the solenoid valve during use, otherwise the core shaft will be corroded, which may cause the solenoid valve to fail to open or even leak.
9. The working voltage of the solenoid valve is DC24V, and the working voltage requirements of the solenoid valve during use are required. Otherwise, the solenoid valve may be damaged or the solenoid valve may not be able to shut off the air source in time, causing an accident.

****Note: Electrical equipment carries certain risks during maintenance and upkeep, so the power must be cut off and a warning sign must be placed. Professional personnel are required to operate it.**

When employees are using the equipment, they should not touch or move the sensors at will to avoid malfunction of the equipment, resulting in personal danger or equipment damage, resulting in unnecessary losses. When problems arise, contact professional staff promptly.

3.3 Others

3.3.1Common abnormal problems and solutions

Problems	reason	Solution
Running signal feedback failure	Circuit breaker tripped, overload	Stop the equipment, switch to manual mode; check each circuit breaker, motor protector
SCR failure	Damaged thyristor	Check whether the thyristor is damaged
##Motor failure	Frequency converter alarm	Check whether the frequency converter alarms
Temperature control module communication timeout	Communication disconnected	Check whether the temperature control module is powered on and whether the communication indicator is flashing

3.3.2 Periodical maintenace of Screw and Conveyor Chain

Position	Parts	Frequency	Lubrication
Unloading & Loading Door	Srcew	Lubricate when it is dry	Ordinary lubricating grease
Conveyor	Conveyor and Chain	Every two weeks	High – temperature Lubrication

3.4 Machinery safety

3.4.1 Prevent general mechanical damage

First of all, the enterprise must take measures to ensure that the machinery itself is in a safe state. As an employee, there are always dangers when operating the machinery. The operator should pay attention to:

1. Before taking up the job, they must go through training and master the operation essentials of the equipment before taking up the job.
2. Operate in strict accordance with the safety operating procedures of the equipment.
3. Safety checks should be carried out on mechanical equipment before operation, and they can only be put into use after they are confirmed to be normal.

4. Personal protective equipment must be worn correctly.
5. Avoid working overtime for a long period of time or working tiredly.

3.4.2 Mechanical safety of equipment

In the equipment, mechanical damage mainly comes from the operating area of the machine. Due to the movement of the mechanism components, the body and other objects must not enter the operating area of the machine during the product pressure maintaining process. There are the following considerations:

1. When the equipment is running, its internal working area is closed, please do not let people or other foreign objects enter the working area, so as not to cause personal injury or equipment damage.
2. The moving parts of the equipment are dangerous, please do not touch them during exercise, so as not to cause casualties or equipment damage.
3. The positioning components such as sensors of the equipment ensure the normal operation of the equipment. Non-professionals are not allowed to touch, block, move, etc.
4. Two or more people cannot operate a machine at the same time to avoid accidents.
5. If you are not familiar with parameter setting, remember not to change the original setting value easily.
6. Remember - emergency stop cannot guarantee safety. If the machine loses power during emergency stop , the cylinder driven by the single-head solenoid valve will still reset , which may cause injury.
7. During normal operation, the safety door of the equipment must be closed, and please stop the equipment when it needs to be opened.
8. Pay attention to equipment safety warning labels, handle with care, and do not enter prohibited areas.

3.5 Electrical safety

Table 2.1 Electrical Safety Guidelines

Danger	
Do not use in places where there is water, in corrosive or flammable gas environments and near flammable substances	Will cause fire
Do not place flammable materials around electrical components	
Do not use in places with strong vibration and impact	Will cause equipment failure
Do not use where the wire is soaked in oil or water	May cause electric shock, injury, fire, etc.
Do not operate wiring and equipment with wet hands	May cause electric shock, injury, fire accident
Do not put your hands into the equipment control cabinet	May cause burns, scalds, and electric shock accidents
Do not subject the wire to crushing, or subject it to excessive external force, heavy pressure, or pinching	May cause electric shock, breakdown, fire
Do not subject electrical components to strong impact	Will cause malfunction
Do not frequently turn on and off the power supply of the control cabinet	Will cause equipment failure
After the power failure is over and the power supply is restored, it may restart, so please do not approach the machine. Do a good job of machine settings to avoid accidents when restarting and ensure personal safety.	May cause injuries
Do not modify, disassemble or repair by yourself	May cause fire, electric shock, injury, or malfunction
Do not open the control box or change the wiring at will	May cause electric shock or malfunction
Do not replace electrical components without authorization	May cause electric shock, fire, malfunction
Do not alter or tear electrical labels (number	May cause electric shock or injury

tubes, safety guide stickers, etc.)	
Wiring work is performed by professional electricians	Electric shock accidents may occur when people without relevant professional knowledge perform wiring operations
Follow the electrical schematic diagram for correct wiring	Failure to connect correctly may cause electric shock, injury, failure, or damage
Make sure the wires and terminals are well connected, and the energized parts must be insulated effectively by insulating materials	Improper wiring may cause short circuit, electric shock, injury, etc.
Comply with the required working voltage, working environment, etc.	May cause damage to components

※ **Note: The electrical components of the equipment must be overhauled by personnel with electrical work qualification certificates!**

※ **Note: Live operation is prohibited!** When replacing electrical components, you must first disconnect the main power supply and use relevant measuring instruments (multimeters) to confirm that the power supply is turned off before replacement.

※**Note: During emergency stop, the equipment is still charged!** When the emergency stop button is pressed, the equipment will stop all operations, but the power will not be disconnected, and maintenance operations are not possible.