THS-Y/OLED Digital Controller

Version：V2.1(20150514)。

Specifications

Supply voltage：DC 88V～370V,AC 85V～265V,47Hz～63Hz

Temperature measuring range：-40℃～+85℃，precision ±0.5℃（25℃），resolution 0.1℃

Humidity measuring range：0～99.9%RH，precision ±5%RH(20～80%RH)，resolution 0.1%RH

Operating conditions：Temperature-40℃～+70℃，Humidity≤95%RH without condensation

Insulation resistance：between operating power and contacts：be equal or more than 20MΩ

Dielectric strength：between operating power and contacts：

2000VAC，50Hz，1min

Contact capacity：

heater（normally open）、fan（normally open）：6A@250VAC

Break alarm（normally open）、overrun alarm（normally open）：3A@250VAC

abnormal/loss of power alarm（normally close）：3A@250VAC

Power of heater or fan：DC 85V~265V, AC 85V~265V

LED indication

“RUN”：it lights when the controller runs normally.

“HEAT”：it lights when heater runs.

“FAN”：it lights when fan runs.

“ALARM”：it lights when abnormity, including sensor error, break of heater or fan, over the limited alarm value, jump of temperature value and EEPROM error.

Function

(1)When measured value of temperature＜low-limited value of temperature，or measured value of humidity ＞up-limited value of humidity also measured value of temperature＜up-limited value of temperature - up-limited returning difference pf temperature，turn on heater.

(2)When measured value of temperature＞low-limited value of temperature + low-limited returning difference of temperature，or measured value of humidity < up-limited value of humidity - returning difference of humidity, turn off heater.

(3)When measured value of temperature > up-limited value of temperature , or measured value of humidity > up-limited value of humidity, turn on fan.

(4)When measured value of temperature < up-limited value of temperature - up-limited returning difference of temperature, or measured value of humidity < up-limited value of humidity - returning difference of humidity, turn off fan.

(5)When turn on and turn off fan at the same time, turn on fan.

(6)When turn on and turn off heater at the same time , when measured value of temperature <(up-limited value of temperature - up-limited returning difference of temperature)，turn on heater; when measured value of temperature >(up-limited value of temperature - up-limited returning difference of temperature + 0.4℃)，turn off heater.

(7)When measured value of temperature < low-limited value of temperature alarm, or measured value of temperature > up-limited value of temperature alarm, or measured value of humidity > up-limited value of humidity alarm, turn on overrun alarm. The controller displays “OVER”, and the contact of overrun alarm will be closed.

(8) The function of selfcheck disconnection is optional, when turn on the function ,if the condition of disconnection is done and the contact is open, turn on the alarm of break, and the Alarm led will light. The controller will display “HEAT1” or “HEAT2”or “FAN” accordingly .

(9)The contact of alarm/power-off will be closed when controller is abnormal or power off.

(10)Output mode:RS485,0～5V or 4～20mA.

(11) The number of the sensors optional is not more than 2.When you choose one sensor, the controller will display measured data of temperature and humidity .When you choose two sensors, the controller will display measured data by turn. The contacts are only controlled according to setting of “Judge” in the menu.

(12) The function of selfcheck disconnection and the sensors are optional, you can choose “ON” or “OFF” in “Switch” menu. The sensor choosed in the “Judge” menu must be “ON” in “Switch” menu. The controller will not alarm the abnormity of sensor when the sensor is “OFF” in “Switch” menu.

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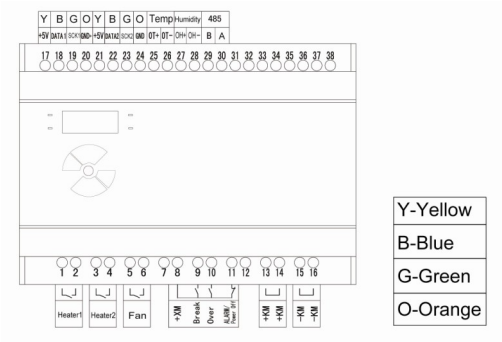
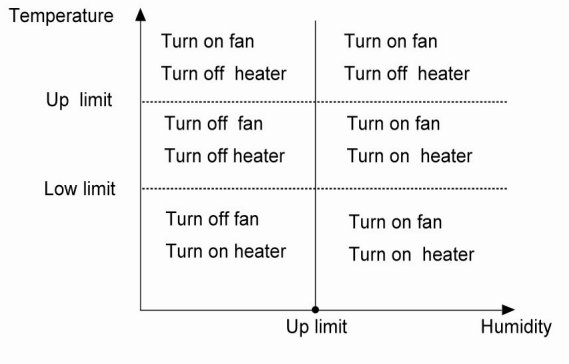
Terminals



In the figure above :NO.13 and NO.14 terminals contact with positive of power supply,NO.15 and NO.16 contact with negative of power supply.NO.17,18,19,20 terminals contact with +5V、DATA、SCK、GND in sensor in turn(NO.21、22、23、24 terminals contact with +5V、DATA、SCK、GND in sensor NO.2 in turn if the controller is THS2-Y.).NO.1,2 terminals contact with heater1,NO.3,4 terminals contact with heater2,NO.5,6 terminals contact with fan.NO.8 terminal is common port of all alarm contacts,NO.9 is break alarm contact,NO.10 is overrun alarm contact,NO.11 is power off /abnormal contact.NO.30 terminal contacts with 485_A,NO.29 terminal contacts with 485_B.NO.25 and NO.26 are analog output port of temperature,NO.27 and NO.28 are analog output port of humidity.

Control graph



High priority logic

①When the judge sensor error or jump of temperature (temperature change ≥2℃ in 3 senconds) ,all contacts of operation are open , contact of overrun is open , contact of abnormal alalrm is close.

Named rules

Model	THS	-Y	-D	/OLED

Model series

THS=Temperature & Humidity (1 sensor)
THS2=Temperature & Humidity(2 sensors)

Struction

Y=EMG38

Output mode

D=RS485, V=0~5V, I=4~20mA
DV=RS485 and 0~5V
DI=RS485 and 4~20mA

Display mode

OLED=OLED display

Alarm

Display alarm

Sensor abnormal：display “SENSOR1” or “SENSOR2” .

EEPROM abnormal：display “CPU” .

Heater1 or heater2 or fan breaks：dispaly “HEAT1” or “HEAT2” or “FAN” accordingly .

Overrun alarm: display “OVER” .

Jump of temperature value: display “T_JUMP” .

Contact alarm

Break alarm：the function that break self-checking is only for the opened contacts of heater and fan .The contact of break alarm will be closed when the controller detects disconnection of heaters or fan.

Overrun alarm：Contact of overrun alarm will be closed when measured value is beyond the setting value of overrun alarm.

Abnormal/power off alarm：contact of abnormal/power off will be closed when the sensor is abnormal ,or measured value is overrun, or the controller is power off， or temperature measured value jumps, or Heater1 or heater2 or fan breaks.

RS485 parameters

Name	Parameter
Communi-cation mode	Half-Duplex RS485
Frame for-mation	（E，8，1）、（O，8，1）、（N，8，2） default：（N，8，2）
Baud rate	19200、9600、4800、2400、1200 for setting default：9600
Address scope	1~247 for setting
Parallel connection	30 interfaces of RS485 (signal re-peater required beyond 30)

Analog output parameters

Name	Parameter
Output style	0~5V（load impedance≥10KΩ） 4~20mA（load impedance≤500Ω） (-40~85℃，0~99.9%RH for default corresponding range , special corre-sponding range can be customized)
Output precision	Level 0.5

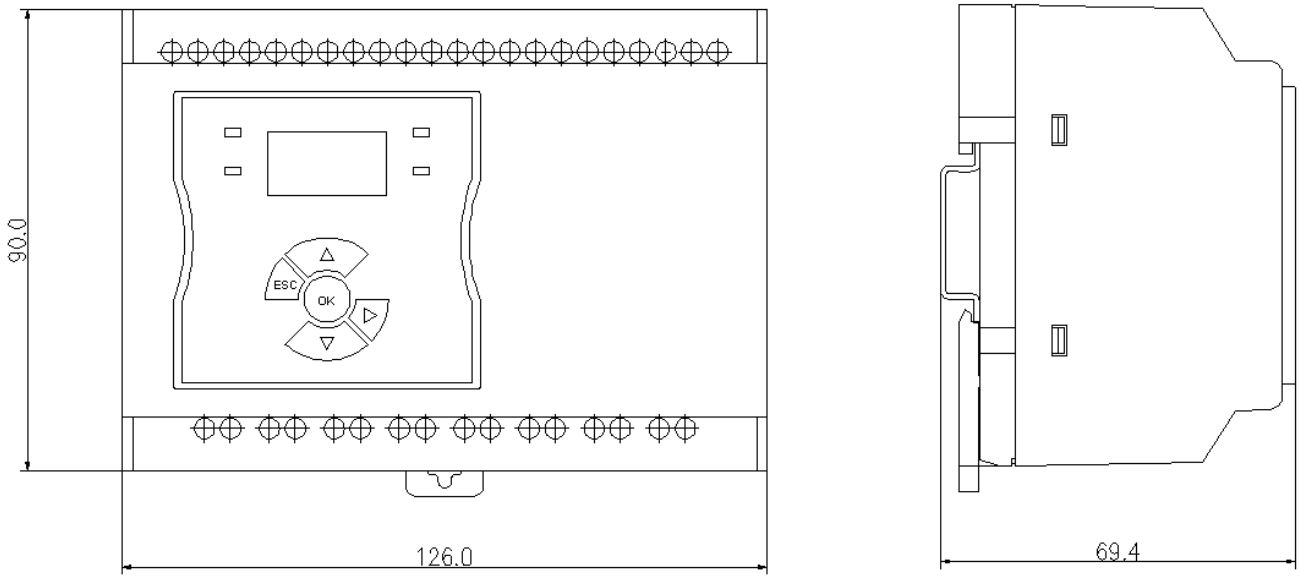
Setting rules of parameter

Name	Parameter setting scope
Tempera-ture setting scope for control	-30~+70℃ Up-limited>low-limited+10℃ Default: Up-limited value=40 ℃ Low-limited value=0℃
Humidity setting scope for control	20%~85%RH indicate up-limit value default：Up-limited value=70%RH
Tempera-ture setting scope for alarm	-30~+70℃ Up-limited ≥ low-limited +10℃ Default: Up-limited value=40℃ Low-limited value=0℃
Humidity setting scope for alarm	20%~85%RH indicate up-limited value default： Up-limited value=70%RH
Returning difference of tem-perature for control	Returning difference of temperature should be set within 1~10℃Default: Up-limited returning difference value =10℃ Low-limited returning difference value=5℃
Returning difference of Humidity for control	Returning difference of temperature should be set within5%~20%RH Default: returning difference value =10%RH
Setting scope for control	up-limited value of temperature - up-limited returning difference of tempera-ture≥low-limited value of temperature + low-limited returning difference of temperature

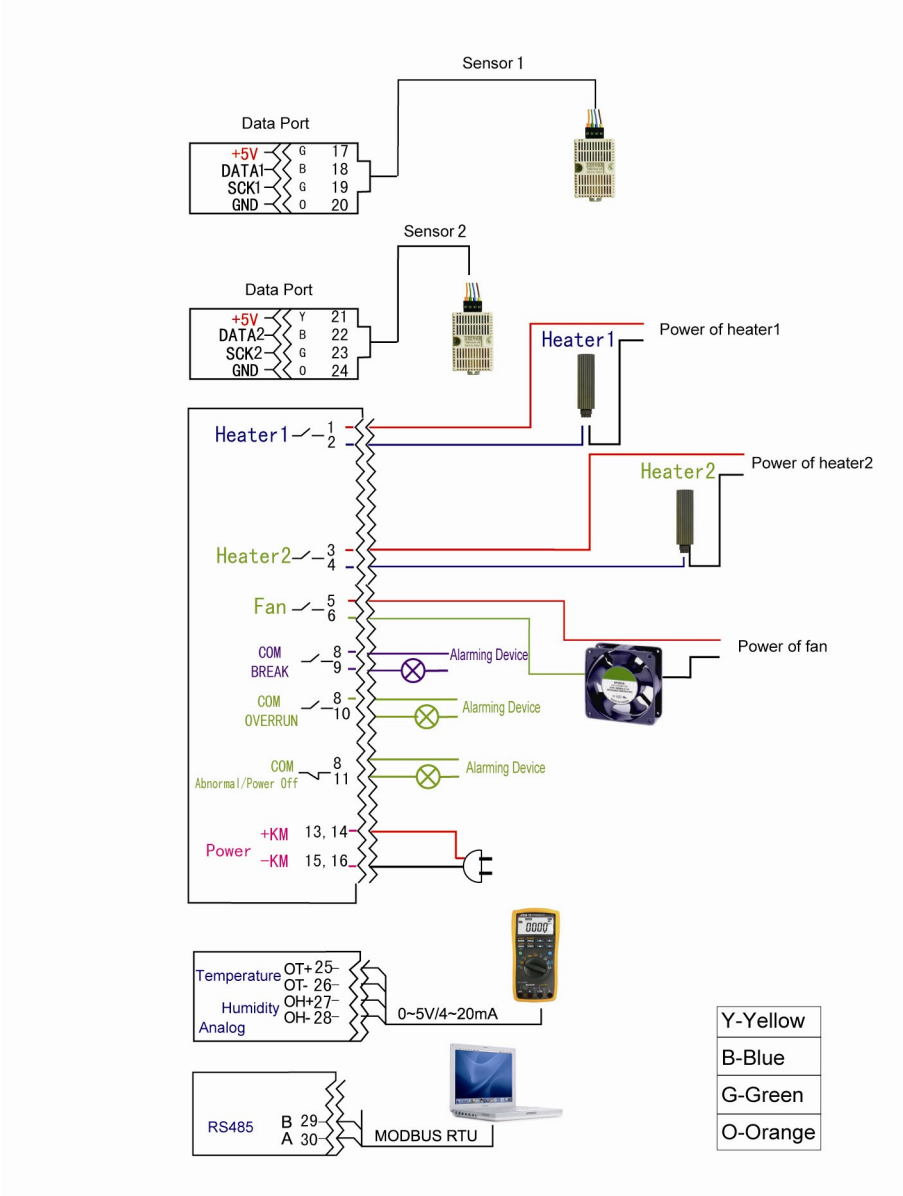
Note: If the setting value isn't in the rated ranges, it will not be confirmed.

When the controller is abnormal, it won't run normally until all the wrongs are resolved.

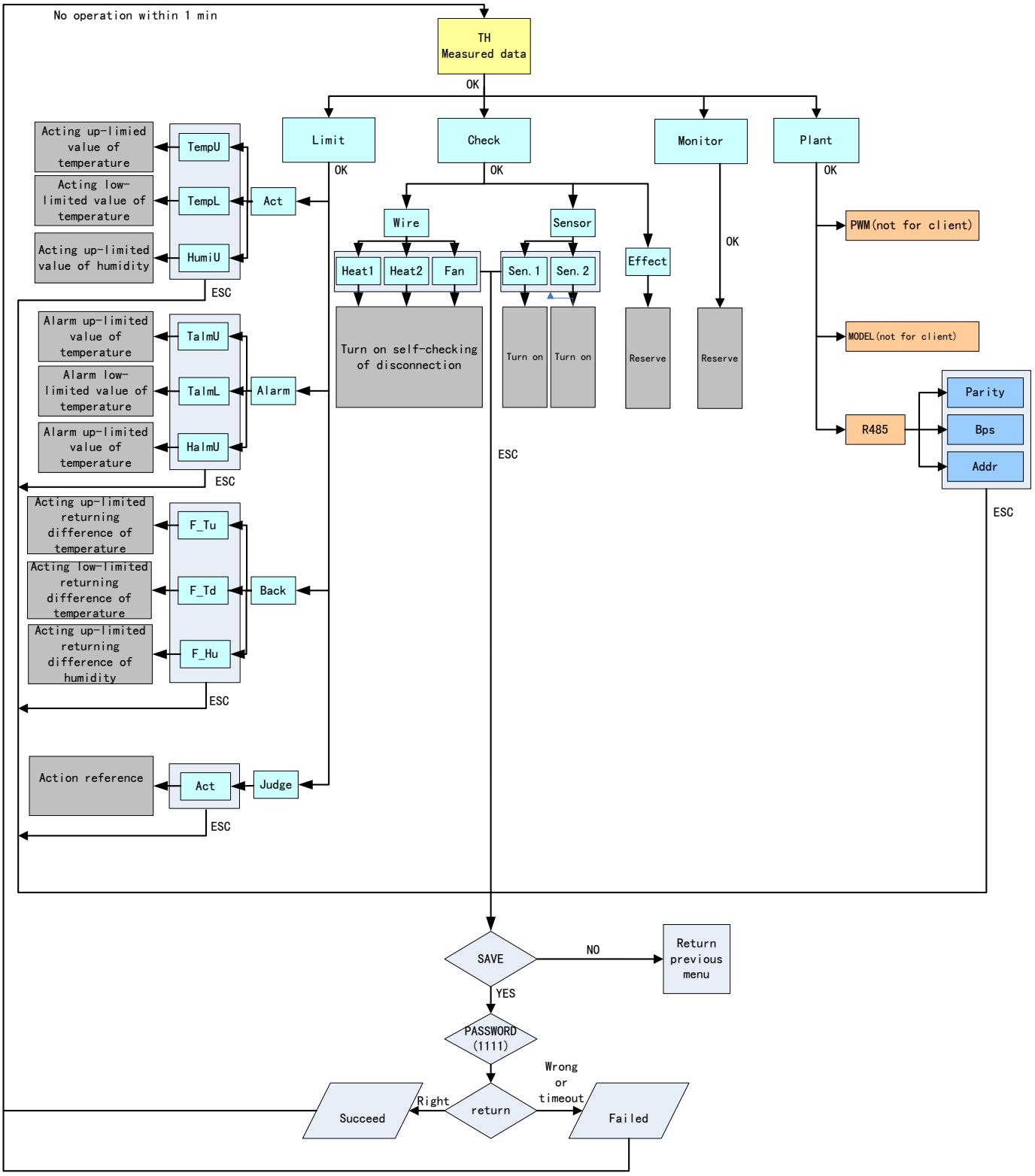
Size diagram (mm)



Connection graph



Operation Menu



Operation steps

Acting limit setting		Overrun alarm setting		RS485 setting	
Up-limited of temperature	40℃	Up-limited of temperature	40℃	Checkout bit	none
Low-limited of temperature	0℃	Low-limited of temperature	0℃	Baud rate	9600
Up-limited of humidity	70%RH	Up-limited of humidity	70%RH	address	001
Up-limited returning differ-ence of temperature	10℃				
Low-limited returning differ-ence of humidity	5℃				
Up-limited returning differ-ence of humidity	10%RH				

Press "▲""▼" to choose, press "►" to move, press "OK" to confirm , press "ESC" to return or save set-ting.

A、Press "OK" to enter into "Device_Setup" interface. Press "OK" to enter into "Limit_Setup" interface . Choose "Act", then press "OK" , and choose "TempU", then press "OK" , then press"►"to move the bit of reverse display , and press"▲""▼"to modify the value of this bit ,in this way, modify TempU to 040.0. After finishing setting , press "OK" to return to the previous menu.

B、Like steps above , in order to set "TempL = 000.0", "HumiU = 070.0".

C、after finishing setting , press "ESC" to enter into "Save" interface , then choose "Yes", and press "OK" to enter into "Password" interface , then press"▲"to modify current bit and press"►"to move the bit of reverse display . Enter the password"1111"in final and then press "OK" to complete set-ting.

D、Like steps above , enter into "Limit_Setup" interface , then choose "Alarm" to set alarm value of overrun.

E、Like steps above , enter into "Limit_Setup" interface , then choose "Back" to set limited returning difference of operation.

F、Enter into "Device_Setup" , choose "Factory", then press "OK" to enter into "Factory_Setup" , than press choose "R485", then press "OK".

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G、Enter into “Uart Param Set” interface , choose “Parity”， then press “OK”， then press “▲”“▼” to choose “Mode： NO”， then press “OK”.

H、Press “▼” to choose “Bps”， then press “OK” to enter into “Uart BPS Set”, then press “▲”“▼” to choose “BPS = 9600”, then press “OK”.

I、Press “▼” to choose“Addr”， then press “OK” to enter into “Device Addr Set”， then set “Addr = 001”, then press “OK”.

J、Press “ESC” to enter into “Save” interface , then choose “Yes”， then press “OK” to enter into “Password” interface , then enter the password“1111”, and then press “OK” to complete setting.

K、Self checking of disconnection is optional , press “OK” to enter into “Device_Setup” interface , choose “Switch”， press “OK”， enter into “Check_Setup” interface , choose “Wire” , then press “OK” , and choose “Heat1” , then press “OK” , then press “▲”“▼” to choose “ON” or “OFF” , After finishing setting , press “OK” to return to the previous menu. Like steps above , in order to set “Heat2” , “Fan” . After finishing setting , press “ESC” to enter into “Save” interface , then choose “Yes” , then press “OK” to enter into “Password” interface , then enter the password“1111”, and then press “OK” to complete setting .

（L、M items are for THS2-Y series ）

L、Acting judgment setting (Acting of heater or fan contacts refers to which sensor) , press “OK” , enter into “Device_Setup” interface . Press “OK” , enter into “Limit_Setup” interface . Choose “Judge” , press “OK” , enter into interface , press “OK” , press “▲”“▼” to choose “Sensor1” or ”Sensor2” ,

M、function of sensors are optional (if the sensor is turn on , the controller will alarm when the sensor is abnormal .), press “OK” , enter into “Device_Setup” interface , choose “Switch” , press “OK” , enter into “Check_Setup” interface , choose “Sensor” , press “OK” , choose “Sen.1” , press “OK” , press “▲”“▼” to choose “ON” or “OFF” , after finishing setting , press “OK” to return to previous menu. Like steps above , set “Sen.2” . After finishing setting , press “ESC” to enter into “Save” interface , then choose “Yes” , then press “OK” to enter into “Password” interface , then enter the password“1111”, and then press “OK” to complete setting .

N、During the setting process , if there is no keyboard operation within 1 minute the controller will fail to save the current setting and exit the setting interface.

RS485 communication protocol

1、Communication data structures

Frame start	address	Function code	Data domain	CRC checkout	Frame end

Address ：address of slaver Function code ：03H for reading；06H for writing；

Data domain：data of transmission CRC checkout ：16 bits CRC checkout

2、Data frame format

The transmission of information is asynchronous and in unit of byte. 11 bits frame format information is between host machine and slaver.

Start bit	Data bit	Checkout bit	Stop bit	formation
1	8	Odd	1	O,8,1
1	8	Even	1	E,8,1
1	8	None	2	N,8,2

3、Information frame format

1）read register Host inquire：（function code is 03H）

address	Function code	start address		Number of registers		CRC checkout	
		High byte	Low byte	High byte	Low byte	Low byte	High byte
01～F7H	03H	00H	-	00H	-		
One byte	One byte	One byte	One byte	One byte	One byte	One byte	One byte

Response from slaver：

address	Function code	Number of bytes	Data（high byte first）	CRC checkout	
01～F7H	03H	-	Content of registers	Low byte	High byte
One byte	One byte	One byte	Number of registers *2 bytes	One byte	One byte

2）write one register data

The Host write format:(function code is 06H for one word writing)

Address	Function code	Writing-in address		Writing-in data		CRC checkout	
		High byte	Low byte	High byte	Low byte	Low byte	High byte
01～F7H	06H	00H	-				
One byte	One byte	One byte	One byte	One byte	One byte	One byte	One byte

NOTE: writing data including decimal fraction. For example, 400 will be written-in if up-limited temperature is amended to 40.0 ℃， corresponding hex data will be 01 90.

Response from Slaver:

Address	Func-tion code	Writing-in address		Writing-in data		CRC checkout	
		High byte	Low byte	High byte	Low byte	Low byte	High byte
01～F7H	06H	00H	-				
One byte	One byte	One byte	One byte	One byte	One byte	One byte	One byte

3）Return from slaver for communication error：

address	Function code	Error code	CRC checkout	
01～F7H	83H/86H	01H/02H/05H/06H	Low byte	High byte
One byte	One byte	One byte	Two bytes	

A）Function code：

Host read error:83H　　host write error:86H

B）Error code：

01H：wrong function code　　02H：wrong address or wrong length of data

05H：wrong data checkout　　06H：wrong setting value (only for writing)

NOTE: reading “number of registers” refers to continuous address .

4 CRC：look up table

5 register address（the setting value and display value do not transfer decimal point)

Function code：read（03H）;write（06H）

（The upper monitor can read but can not write the grey part. ）

Register address	meaning
0001H	Up-limited value of temperature for control
0002H	Up-limited value of humidity for control
0003H	Low-limited value of temperature for control
0005H	Up-limited returning difference of temperature for control
0006H	Up-limited returning difference of humidity for control
0007H	Low-limited returning difference of temperature for control
000EH	Measured data of temperature real-time for control
000FH	Measured data of humidity real-time for control
0010H	State of heater 1 (“0”refers to “turn off”,“0x55”refers to “turn on”,“0xAA”refers to “break”)
0011H	State of heater 2 (“0”refers to “turn off”,“0x55”refers to “turn on”,“0xAA”refers to “break”)
0012H	State of fan (“0”refers to “turn off”,“0x55”refers to “turn on”,“0xAA”refers to “break”)
0013H	Abnormal alarm（ see note “0013H Information”)
0014H	up-limited value of temperature for over alarm
0015H	low-limited value of temperature for over alarm
0016H	up-limited value of humidity for over alarm
002CH	Measured temperature of sensor 1
002DH	Measured humidity of sensor 1
002EH	Measured temperature of sensor 2
002FH	Measured humidity of sensor 2

注：0013H Information

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

D0:sensor error D1:EEPROM error D3:heater1 breaks D4:heater2 breaks

D5:fan breaks D6:overrun alarm D8:jump of temperature

When the event of the bit happens , the value of the bit is 1, otherwise the value of the bit is 0.

The value of all other unused bits is 0.