Temperature Humidity Controller User's Manual

Suitable for TH-A version series

Features:

1. Using high-precision digital temperature and humidity measuring sensor SHT31 in conjunction with temperature and humidity controller.
2. With temperature and humidity display, 4 loops control output.
3. With the function of PID heating, compressor delay cooling, ON/OFF humidification and dehumidification.
4. With RS485 communication function.

This manual explains the TH series temperature and humidity controller settings, wiring, names of various parts, operation methods, etc. Before using this product, please read this manual carefully, and use it correctly on the basis of understanding the content. Please keep it in a safe place for reference.

National High-tech Enterprise/National Standard Drafting Unit

Hot line: 400-0760-168 Code: KKTH-A03E-A/0-20211101

I. Caution of Install and Connection

⚠ Warning

1) When the fault or abnormality of this product may cause a major accident in the system, please install an appropriate protection circuit externally.
2) Please don't turn on the power supply until all wiring is completed. Otherwise, it may cause electric shock, fire, or malfunction.
3) Don't use it outside the scope of product specifications. Otherwise, it may cause a fire or malfunction.
4) Don't use in places with flammable and explosive gases.
5) Don't touch the high voltage parts such as the power supply terminal after power on. Otherwise, there is a risk of electric shock.
6) Do not disassemble, repair or modify this product. Otherwise, it may cause

⚠ Caution

1)It should not be used in a nuclear facility and human life associated medical equipment.
2)The product may occur radio interference when it used at home.You should take adequate countermeasures.
3)It get an electric shock protection through reinforced Insulation. when it is embedded in the devices and wiring, please subject to the specification of embedded devices.
4)To prevent surge occurs,when using this item in the place of over 30m indoor wiring and wiring in outdoor,you need to set the proper surge suppression circuitry.
5)The product is produced based on mounting on the disk.In order to avoid to touching the wire connectors,please take the necessary measures on the product.
6) Be sure to observe the precautions in this manual, otherwise there is a risk of a major injury or accident.
7) When wiring, please observe the local regulation.
8) To prevent to damage and failure to the machine, the product is connected with power lines or large capacity input and output line.
9) Please don't put metal and wire clastic mixed with this product,otherwise it may lead to electric shock, fire, fault.
10) Please tighten screw torque according to the rules to avoid electric shock and fire.
11) In order not to interfere with this products to dissipate heat, please don't plug casing around the cooling vent hole and equipment.
12) Please don't connect any unused terminal.
13)Please do the cleaning after power off, and use dry cleaning cloth to wipe away the dirt. Please don't use desiccant, otherwise it may casue the deformation or discoloration .
14) Please don`t knock or rub the panel with rigid thing.
15)The readers should have basic knowledge of electrical,control, computer and communications.
16)The illustration, example of data and screen in this manual is convenient to understand,instead of guaranteeing the result of the operation.
17) In order to use this product with safety for long-term,regular maintenance is necessary. The life of some parts of the equipments are by some restrictions, but the performance of some will change for using many years.
18)Without prior notice, the contents of this manual will be change. We hope these is no any loopholes, if you have questions or objections, please contact us.

⚠ Caution of Install and Connection

1. Installation:
1) This product is used in the following environmental standards.
(IEC61010-1) [Overvoltage category Ⅱ, Class of pollution 2]
2) This product is used in the following scope: surrounding environment, temperature, humidity and environmental conditions.
Temperature: 0~50°C, Humidity: 45~85%RH; Environment condition: indoor warranty, the altitude is less than 2000m.
3) Please avoid using in these places: Places where condensation may occur due to severe temperature changes; places where corrosive or flammable gases are generated; places where direct vibration or impact to the product is possible; places where there is water, oil, chemicals, smoke, and steam, and dust, Places with a lot of salt, metal powder, places with high clutter interference, static electricity, magnetic fields, and noise; places directly blown by air-conditioning or heating; places directly exposed to sunlight; places that may cause heat accumulation due to radiation, etc. place.

4) For installation occasions, please consider the following points before installation.
a)In order not to saturate the heat, please open enough ventilation space. b)Please consider the wiring, maintenance environment, etc.c. please ensure that there is more than 50mm of space above and below the product. c)Please avoid installing it directly above devices that generate a lot of heat (such as heaters, transformers, semiconductor operators, large-capacity resistors). d)When the surrounding environment is above 50℃, please use a forced fan or cooler to cool it and donot let the cooled air blow directly onto the product. d)To improve the anti-interference performance and safety, please try to install it away from high-voltage equipment and power equipment. f)Do not install the high-voltage machine and this product in the same disk. g)The distance between this product and the power line should be greater than 200mm. h)Please install the power machine as far apart as possible.

2.Wiring precautions

1) The sensor should be used with controller, and connection cable must be connected correctly according to the diagram.
2) The sensor is digit I2C transmission. To improve the reliability, the cable length needs to be within 3m.
3) To avoid the effect of noise,please put the input dignal away from meter cable,power cable,load cable to wiring.
4) To reduce the influence of heavy-load power cord on this item, please use a noise filter in a place that is easily affected. Be sure to install it on a grounded panel and minimize the wiring between the noise filter output side and the power terminal; do not install fuses, switches, etc. on the wiring of the noise filter output side, Otherwise it will reduce the effect of the filter.
5) It takes 5s from input power to output.If there is a place with interlocking actions circuit signal,please use timer relay.
6) To ensure the signal reliabilty,pls use shielded twisted pair for analog output.
7) Please use shielded twisted pair for remote RS485 communication cable, and ground the shielding layer on the host side, add terminal matching resistance according to the situation to ensure reliable and stable communication.
8) This product donot have fuse; please set according to rated voltage 250V,rated current 1A if needed; fuse type:relay fuse.
9) Please use suitable screw force and crimp terminal. Screw size: M3X8 (with 6.8X6.8 square base) Recommended tightening torque: 0.4N.m
Proper cables: 0.25~1.65mm single cable/multiple core cable.
10) Crimp terminal or bare wire part should be aparted from the adjacent terminal.

II. Model Illustration

TH9□- R A 1 8 □- C

1. C: Version
2. A: Screw type sensor B: Rail type sensor C: Metal housing sensor
3. 10: without communication 18: with RS485 communication
4. Blank: no alarm C:with 1 temperature & 1 humidity alarm
6. Blank: no output, R: relay otuput S: SSR output
   D: DC 4-20mA analog output, V: DC 0~10V output
6. Blank:AC/DC 100～240V power，F:AC/DC 24V power(customized)
7. 80: 160W*80H*100L 9: 96W*96H*100L 7: 72W*72H*100L
   6: 48W*96H*100L 3: 72W*36H*70.5L
8. TH Series Temperature and Humidity Controller

III. Model

No.	Model No.	Temp & Humi control output				Temp & Humi alarm output	Comm RS485	Normal supply
		RELAY	SSR	4～20mA	0-10V			
1	TH9/80□-RC18□	●				●	●	●
2	TH9/80□-RC10□	●				●		●
3	TH9/80□-SC18□		●			●	●	●
4	TH9/80□-SC10□		●			●		●
5	TH9/80□-DC18□			●		●	●	●
6	TH9/80□-DC10□			●		●		●
7	TH9/80□-VC18□				●	●	●	
8	TH9/80□-VC10□				●	●		
9	TH9/80□-RA18□	●					●	●
10	TH9/80□-RA10□	●						●
11	TH9/80□-SA18□		●				●	●
12	TH9/80□-SA10□		●					●
13	TH9/80□-DA18□			●			●	●
14	TH9/80□-DA10□			●				●
15	TH9/80□-VA18□				●		●	
16	TH9/80□-VA10□				●			
17	TH9/80□-A18□						●	●
18	TH9/80□-A10□							●
19	TH7□-RC18□	●				●	●	●
20	TH7□-RC10□	●				●		●
21	TH7□-RA18□	●					●	●
22	TH7□-RA10□	●						●
23	TH7□-SA18□		●				●	●
24	TH7□-SA10□		●					●
25	TH7□-DA18□			●			●	●
26	TH7□-DA10□			●				●
27	TH7□-VA18□				●		●	
28	TH7□-VA10□				●			
29	TH7□-A18□						●	●
30	TH7□-A10□							●
31	TH3□-RA18□	●					●	●
32	TH3□-RA10□	●						●
33	TH3□-A18□						●	●
34	TH3□-A10□							●

●: Standard features
□: Power AC/DC100-240V (default), AC/DC24V (customized) Sensor type options A (default), B, C

IV. Specifications

1. Electrical parameters

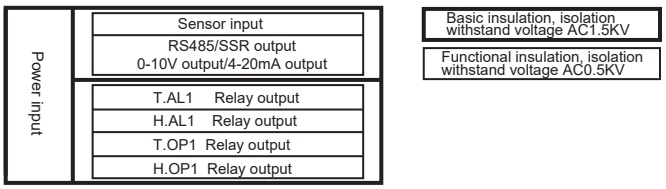
Control output	Relay output, SSR output, DC 4-20mA output, DC 0-10V output (customized)
Relay capacity	AC250V /2A rated load life is greater than 100,000 times (resistive load)
Power supply	100 ~ 240V AC/DC (85-265V)、AC/DC 24V (customized)
Power consumption	< 6VA

Environment	Indoor, temperature: 0~50℃ no condensation, humidity: <85%RH , Altitude>2000m
Storage Environment	-10 ~ 60℃ no condensation
SSR output	DC 24V pulse voltage, Load<30mA
Current output	DC 4 ~ 20mA load< 500Ω
Communication	RS485, Modbus-RT protocol
Current output	Input, output, power VS meter cover > 20MΩ
Communication	RS485, Modbus-RT protocol
Insulation impedance	Input, output, power VS meter cover > 20MΩ
ESD	IEC/EN61000-4-2 Contact ±4KV /Air ±8KV perf.Criteria B
Pulse traip anti-interference	IEC/EN61000-4-4 ±2KV perf.Criteria B
Surge immunity	IEC/EN61000-4-5 ±2KV perf.Criteria B
Voltage drop & short interruption immunity	IEC/EN61000-4-29 0% ~ 70% perf.Criteria B
Isolation strength	Signal, output and power: 1500VAC 1min, between lower than 60V circuits, DC500V,1min
Panel material	The shell & panel frame PC/ABS (Flame Class UL94V-0)
Power failure memory	PET(F150/F200)
Panel Protection level	10 years, time of writing: 1 million times
Panel Protection level	IP65(IEC60529)
Safety Standard	IEC61010-1, Overvoltage category Ⅱ, pollution level 2, Level Ⅱ (Enhanced insulation)

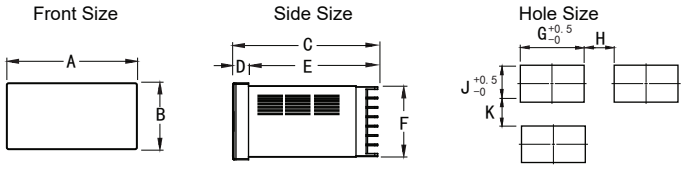
2. Parameters of temperature and humidity sensor:

Power Supply	Minimum value 3.3V, Maximum value 5.5V
Temp measurement Range	Physical range: -40.0~1250.0 ℃, safe range: -40~80.0℃,resolution: 0.1℃
Humi measurement Range	0.0~100.0% RH; Resolution: 0.1℃RH
Temp Accuracy	Within 0.0~80.0℃,Typical value ±0.2℃,Maximum value: ±0.4℃
Humi Accuracy	within 0.0~90.0%RH, Typical value: ±2%RH, Maximum value: ±2.5%RH
Wire Length	Standard: 2M; maximum length with the lead ＜ 3 meters

3. Block diagram of isolation mode:

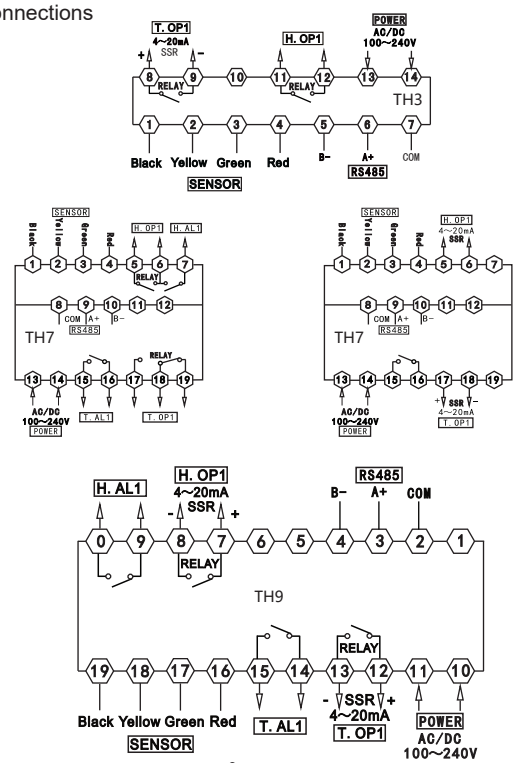


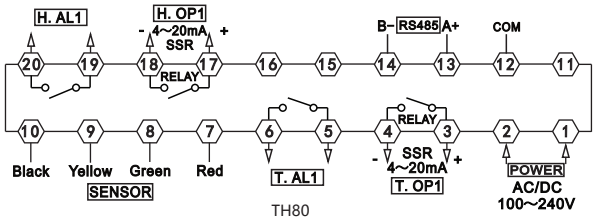
V. Dimension and installation size



Model	A	B	C	D	E	F	G	H(Min)	J	K(Min)
3:(72*36)	72	36	70.5	6.5	64	32	68	25	33	25
6:(96*48)	48	96	97.5	9	88.5	89.5	45	25	92	25
7:(72*72)	72	72	97.5	9	88.5	67	67.5	25	67.5	25
8:(48*96)	96	48	97.5	9	88.5	44.5	92	25	45	25
9:(96*96)	96	96	97.5	9	88.5	91.5	92	25	92	25
80:(160*80)	160	80	96	13	83	75.5	155.5	30	76	30

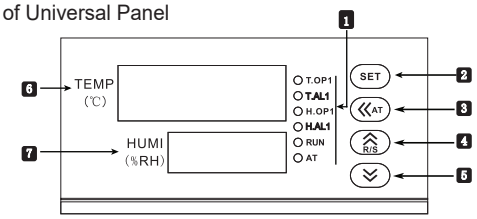
VI. Connections





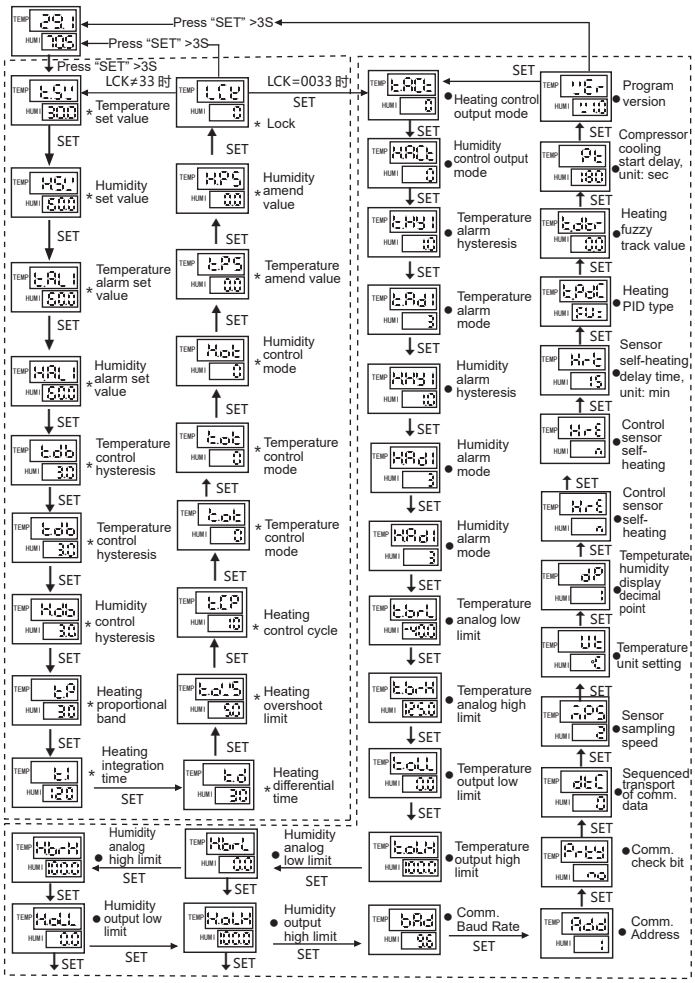
TH80

VII. Name of Universal Panel



No.	Symbol	Name	Function
1	T.OP1	T.OP1 indicate light (red)	Heating output indicator, when the output is ON, the light is on
	T.AL1	T.AL1 indicate light (red)	
	H.OP1	H.OP1 indicate light (red)	Humidifying output indicator, when the output is ON, the light is on
	H.AL1	H.AL1 indicate light (red)	
	RUN	Control- run indicate light (green)	It is runing when the light is on, it stops running when the ligh is off.
	AT	AT indicate light (green)	Heating PID auto-tuning indicate light,it indicates auto-tuning status when lighting on
2	SET	SET function key	Menu key/confirm key, to enter or exit modified mode or confirm modified parameters
3	≪AT	Shift AT key	Activation/shift key/AT auto-tuning key,long press to enter/exit auto-tuning under measure control mode
4	R/S	Increase key /R/S	Increase key, long press it to shift RUN/STOP mode under measure control mode.
5	≫	Decrease	Decrease key
6	TEMP	Temperature Display Window (red)	Temperature measurement value or parameter code display window
7	HUMI	Humidity Display Window(green)	Humidity measurement value or parameter value display window

VIII. Operation & menu



"*" : Engineering menu parameters
"●" : Common menu parameters

a. In the normal measurement control mode after power on, long press " SET " key for more than 3s to enter the menu parameter view mode.
b. In the menu view mode, short press " SET " key to cycle to view the common menu parameters.
c. In the menu view mode, short press the " <<AT " key to flash the displayed menu parameter value to enter the parameter modification mode, and each short press can move one bit to the left; this cycle.

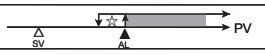
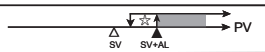
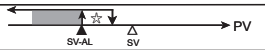
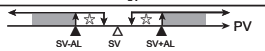
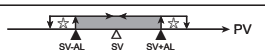
d. In the parameter modification mode, each short press the " R/S " or " ▼ " key can increase the flashing data bit by one or minus one.
e. Under the parameter modify mode, after the parameters are modified, short press the " SET " key to ensure to save the parameters, and exit the menu view mode.
f. In the normal measurement control mode, long press " <<AT" key for more than 3 sec to enter the heating PID auto-tuning state. The auto-tuning TEMP display value needs to be smaller than the T.SV1 value.
h. Under the normal measurement control mode, long press " R/S " key for more than 3 sec to enter or exit the Run or Stop mode.

IX. Menu illustration

No.	Symbol	Menu Name	Description	Setting Range	Factory Setting
1	tEMP	TEMP (℃)	Temperature measured value, unit ℃ or ℉		
2	HUMI	HUMI (%RH)	Humidity measured value, unit %RH		
3	t.SV	T.SV	Temperature set value, when OT= 0 or P=0, it is ON/OFF control, not PID control, when TEMP < T.SV1 - T.DB, heating output is on; when TEMP ≥ T.SV1,it stops heating. When it is set as PID heating control, this value is PID control target set value.	-40.0 ~ 125.0 or -40.0 ~ 257.0	30.0
4	H.SV	H.SV	Humidity set value, when it is set as ON/OFF humidifying control, when HUMI< H.SV1-H.DB, humidifying output is on, when HUMI≥H.SV1, it stops humidifying output.	0.0 ~ 100.0	60.0
5	t.AL1	T.AL1	Temperature alarm set value Not: if alarm mode is set as deviation alarm, negative value will be dealed as absolute value.	-40.0 ~ 125.0 or -40.0 ~ 257.0	5.0
6	H.AL1	H.AL1	Humidity alarm set value Not: if alarm mode is set as deviation alarm, negative value will be dealed as absolute value.	0.0 ~ 100.0	5.0
7	t.db	T.DB	Temperature control hysteresis, it is used in concert with temperature control. Note: when the value is negative, it will be treated as an absolute value.	-30.0 ~ 30.0	3.0
8	H.db	H.DB	Humidity control hysteresis, it is used in concert with humidity control. Note: when the value is negative, it will be treated as an absolute value.	-30.0 ~ 30.0	3.0
9	t.P	T.P	Heating proportional band, the smaller the value is, the faster the system will respond, otherwise, it will be slower. Increasing the proportional band can reduce the oscillation, but the control deviation will be increased. Reducing the proportional band can reduce the control deviation, but it will cause oscillation.	0 ~ 9999	30
10	t.I	T.I	Heating integral time, the smaller the value is, the stronger the integral action will be, the smaller the deviation from the set value will be. If the integral action is too weak, the deviation may not be eliminated.	0 ~ 9999	120
11	t.d	T.D	Heating differential time, reduce the differential action to a suitable value can prevent the system from oscillation. The greater the value is, the stronger the differential actiontion will be.	0 ~ 9999	30
12	t.oVS	T.OVS	Heating overshoot limit, during the PID control, when TEMP (measured value) > T.SV1 (set value) + T.OVS (overshoot), force to close output. Note: the smaller this value is, the smaller the PID adjustment range will be, the worse the control stability will be. Please set the appropriate value according to the actual situation.	0 ~ 100.0	5.0
13	t.CP	T.CP	Heating control cycle, 1 is SSR control output, 4 ~ 255 is relay control output, unit: second	1 ~ 200	10
14	t.ot	T.OT	Temperature control mode, 0: ON/OFF heating; 1: ONOFF cooling; 2: PID heating	0 ~ 2	0
15	H.ot	H.OT	Humidity control mode, 0:ON/OFF humidifying; 1:ONOFF dehumidifying.	0 ~ 1	0
16	t.PS	T.PS	Temperature amend value, display value= measured value + amend value	-30.0 ~ 30.0	0.0
17	H.PS	H.PS	Humidity amend value, display value = measured value + amend value.	-30.0 ~ 30.0	0.0
18	LCK	LCK	Lock function; 010: menu set value can be checked only, cannot be modified. 0033: enter to advanced menu.	0 ~ 9999	0
19	t.ACt	T.ACT	Heating control output mode: 0: relay or SSR control output; 1: reserve; 2: 4~20mA control output (please set it according to the selected meter configuration); 3: change the 4~20mA control output into analog output	0 ~ 3	0
20	H.ACt	H.ACT	Humidifyiny control output mode: 0: relay or SSR control output; 1, 2: reserve; 3: 4~20mA analog output (size 3 without this function)	0 ~ 3	0
21	t.HY1	T.HY1	Temperature alarm hystersis	0 ~ 50.0	1.0
22	t.Ad1	T.AD1 ①	Temperature alarm mode	0 ~ 6	3
23	H.HY1	H.HY1	Humidity alarm hystersis	0 ~ 50.0	1.0
24	H.Ad1	H.AD1 ①	Humidity alarm mode	0 ~ 6	3
25	t.brL	T.BRL	Temperature analog output low limit, note: when T.BRL > T.BRH, it is inverted analog output.	Ref T.SV1	-40.0
26	t.brH	T.BRH	Temperature analog output high limit, note: when T.BRH < T.BRL, it is inverted analog output.	Ref T.SV1	125.0
27	t.oLL	T.OLL	Temperature current output low limit, note: this value must be smaller than T.OLH.	-5.0 ~ 100.0	0.0
28	t.oLH	T.OLH	Temperature current output high limit, note: this value must be greater than T.OLL.	0.0 ~ 105.0	100.0
29	H.brL	H.BRL	Humidity analog output low limit, note: when H.BRL > H.BRH, it is inverted analog output.	0.0~100.0	0.0
30	H.brH	H.BRH	Humidity analog output low limit, note: when H.BRH < H.BRL, it is inverted analog output.	0.0~100.0	100.0
31	H.oLL	H.OLL	Humidity current output low limit, note: this value must be smaller than H.OLH.	-5.0~100.0	0.0
32	H.oLH	H.OLH	Humidity current output high limit, note: this value must be greater than H.OLL.	0.0~105.0	100.0
33	bAd	BAD	RS485 communication baud rate 0: 4800; 1: 9600; 2: 19200	0 ~ 2	9.6
34	Add	ADD	Communication Address	0 ~ 255	1
35	PrtY	PRTY	Communication check bit setting, 0: NO check,1: ODD check, 2: EVEN check	0 ~ 2	NO
36	dtC	DTC	Communication data transport sequence 000; 1st, 3rd are function reserved, 2nd bit is byte sequence exchange	Ref to comm protocol	0
37	APS	MPS	Sampling speeds: 0: 0.5 times, 1: 1 time, 2: 2 times,3: 4 times, 4: 10 times	0 ~ 4	2
38	Ut	UT	Temperature unit setting 25: ℃, 26 : ℉. Note: the unit setting is only for the temperature measurement signal.	C/F	℃
39	dP	DP	Decimal point setting, reserve decimal point	0 ~ 1	1
40	HrE	HRE	Control sensor self-heating, when set to Y, the sensor starts to self-heating	N/Y	N
41	Hrt	HRT	Sensor self-heating delay time, unit: minutes	0 ~ 200	15
42	t.PdC	T.PDC	Heating PID type. 0:FUZ fuzzy PID control, 1: STD standard PID control	FUZ/STD	FUZ
43	t.dtr	T.DTR	TEMP fuzzy tracking value, properly set this value on some occasions, it can get a more stable control display value, this value is independant from the actual measured value. Note: after setting this value, when T.SV is equal to TEMP value, the cotrol output operation is subject to the actual measured value. Set it as 0 to close this function. The temperature unit is: ℃ or ℉.	0 ~ 2.0	0.0
44	Pt	PT	Compressor cooling start delay time, unit: seconds	0 ~ 9999	0
45	VEr	VER	Software Version	--	--

①Alarm parameters and output logic diagram:

Symbol description: "☆" means HY, "▲" means alarm value, "△" means SV value

Alarm code	Alarm mode	Alarm output AL(1) Image:the hatched section means the alarm action
1	High limit absolute value alarm	
2	Low limit absolute value alarm	
3	※High limit deviation value alarm	
4	※Low limit deviation value alarm	
5	※High/low limit deviation value alarm	
6	※High/low limit interval value alarm	

※ For deviation alarm, if alarm value is set as a negative number, it will be used as an absolute value.

X. Key function operations

1. Run or stop mode operation
1) In the measurement mode, long press the " R/S " key to enter the stop mode; the corresponding RUN indicator light is off. In the same way, long press the " R/S " key to enter the running mode.
2) In run mode, all outputs will perform work according to the specified requirements, and all outputs will stop working in stop mode.

2. PID parameter determination and self-tuning operation:
1) The default PID parameters of this product when it leaves the factory are usually not suitable for use occasions; in order to obtain more suitable PID parameters, please use the self-tuning function.
2) Since the instrument will perform control output soon after the power is turned on, in order not to affect the self-tuning effect, you can first set the product to stop mode; or temporarily disconnect the control output load power supply. No matter how you operate, you should ensure that the T.SV1 value is greater than the current TEMP value and the greater the drop, the better.
3) Set the PID type and T.SV1 value; the factory setting is with fuzzy PID.
4) Set to PID control, when it is 4-20mA output, set the OLL and OLH output limiter to the appropriate range; the factory setting is OLL=0%, OLH=100%.
5) When the TEMP<H.SV1 value is at normal room temperature, exit the stop mode and turn on the load power, and immediately press and hold the "<<AT" key to enter the auto-tuning mode, and the AT indicator will light up.
6) The auto-tuning will take some time. In order not to affect the auto-tuning result, please don't modify the parameters or cut off the power in the auto-tuning mode.
7) After the AT light is off, the auto-tuning mode will be automatically exited, and the PID parameters will be automatically updated, and then it will be automatically and accurately controlled.
8) During the auto-tuning process, long press the "<<AT" key, out of range measurement , abnormal display, switch to stop, power failure, etc. will all be suspended.
9) Note: In the case of output limiting operation output, sometimes the best PID parameters cannot be obtained even if auto-tuning is carried out.
10) Experienced users can also set reasonable PID parameters based on experience.

XI. Communication Protocol

Meter adopt RS485 Modbus-RTU communication protocol, RS485 half duplex communication.
Read function code: 0x03;write function code: 0x10/ 0x06. Adpots
16 digit CRC check, the meter does not return for error check.

Data Frame Format

Start Bit	Data Bit	Stop Bit	Check Bit
1	8	1	Setting in PRTY menu

Abnormal communication processing:
When abnormal response, put 1 on the highest bit of function code. For example: Host request function code 0x03,and slave response function code should be 0x83.

Error code:
0x01--- Ilegal function: the function code sent from host is not supported by meter.
0x02--- Illegal add.: the register address designated by host beyond the address range of meter.
0x03--- Illegal data: date value sent from host exceeds the corresponding data range of meter.
Communication cycle:
Communication cycle is the time from host request to slave response data. For example: communication cycle= time of request data sending +slave preparation time + response delay time + response return time.

Take 9600 baud rate as an example: single measurement data communication cycle is not less than 250ms

1. Read multiple registers
Example: The host reads the integer T.SV (given value 50.0)
The address code of T.SV1 is 0x2003, because T.SV is an integer (2 bytes) and occupies 1 data register. The decimal integer 50.0X10=500.

Host Request (read multi-register)							
1	2	3	4	5	6	7	8
Meter Add	Function Code	Start ADD High Bit	Start ADD Low Bit	Data Byte Length High Bit	Data Byte Length Low bit	※CRC Code Low Bit	※CRC Code High Bit
0x01	0x03	0x20	0x03	0x00	0x01	0x7F	0xCA

Slave Normal Answer (read multi-register)						
1	2	3	4	5	6	7
Meter Add	Function Code	Data Byte	Data High Bit	Data Low Bit	※CRC Code Low Bit	※CRC Code High Bit
0x01	0x03	0x02	0x01	0XF4	0XB8	0X53

Function code abnormal answer (e.g.: host request ADD is 0x201E)

Slave Abnormal Answer (read multi-register)				
1	2	3	8	9
Meter ADD	Function Code	Error Code	※CRC Code Low Bit	※CRC Code High Bit
0x01	0x83	0x02	0XC0	0XF1

2. Write Multi-register
Example: the host writes an integer H.SV (given value 50.0)The address code of H.SV is 0x2004, because SV is an integer (2 bytes) and occupies 1 data register. Decimal integer. The hexadecimal memory code of 0X10=500 is 0x01F4

Host Normal Answer (write multi-register)										
1	2	3	4	5	6	7	8	9	10	11
Meter ADD	Function Code	ADD High Bit	ADD Low Bit	Data Byte Length High Bit	Data Byte Length Low Bit	Data Byte Length	Data high	Data low	※CRC Code Low Bit	※CRC Code High Bit
0x01	0x10	0x20	0x04	0x00	0x01	0x02	0x01	0xF4	0x86	0X01

Slave Normal Answer (write multi-register)							
1	2	3	4	5	6	7	8
Meter ADD	Function Code	ADD High Bit	ADD Low Bit	Data Byte Length High Bit	Data Byte Length Low Bit	※CRC Code Low Bit	※CRC Code High Bit
0x01	0x10	0x20	0x04	0x00	0x01	0x4B	0xC8

The host write single register SV (given value 150)

Host Request (write single-register)							
1	2	3	4	5	6	7	8
Meter ADD	Function Code	ADD High Bit	ADD Low Bit	Data Byte Length High Bit	Data Low Bit	※CRC Code Low Bit	※CRC Code High Bit
0x01	0x06	0x20	0x04	0x01	0xF4	0x8A	0x1F

Slave Normal Answer (write single-register)							
1	2	3	4	5	6	7	8
Meter ADD	Function Code	ADD High Bit	ADD Low Bit	Data Byte Length High Bit	Data Low Bit	※CRC Code Low Bit	※CRC Code High Bit
0x01	0x06	0x20	0x04	0x01	0xF4	0x8A	0x1F

Data location error response (for example: the host request write address index is 0x201F)

Slave Abnormal Answer (write single register)				
1	2	3	4	5
Meter ADD	Function Code	Error Code	※CRC Code Low Bit	※CRC Code High Bit
0x01	0x90	0x03	0X0C	0x01

Meter Parameters ADD Reflection Form

No	ADD Reflection (Register ①)	Variable Name	Register	Numerical Magnification	Read/ Write	Remark
1	0x2000 (48193)	TEMP Measured Value	1	0.1/1	R	Decided by DP
2	0x2001 (48194)	HUMI Measured Value	1	0.1/1	R	Decided by DP
3	0x2002 (48195)	Temperature and Humidity Decimal Point Setting DP	1	1	R/W	
4	0x2003 (48196)	Temperature Set Value T.SV	1	0.1	R/W	
5	0x2004 (48197)	Humidity Set Value H.SV	1	0.1	R/W	
6	0x2005 (48198)	Temperature Control Hysteresis T.DB	1	0.1	R/W	
7	0x2006 (48199)	Humidity Control Hysteresis H.DB	1	0.1	R/W	
8	0x2007 (48200)	Temperature Amend Value T.PS	1	0.1	R/W	
9	0x2008 (48201)	Humidity Amend Value H.PS	1	0.1	R/W	
10	0x2009 (48202)	Temperature Analog Output Low Limit T.BRL	1	0.1	R/W	
11	0x200A (48203)	Temperature Analog Output High Limit T.BRH	1	0.1	R/W	
12	0x200B (48204)	Temperature Current Output Low Limit T.OLL	1	0.1	R/W	
13	0x200C (48205)	Temperature Current Output High Limit T.OLH	1	0.1	R/W	
14	0x200D (48206)	Humidity Analog Output Low Limit H.BRL	1	0.1	R/W	
15	0x200E (48207)	Humidity Analog Output High Limit H.BRH	1	0.1	R/W	
16	0x200F (48208)	Humidity Current Output Low Limit H.OLL	1	0.1	R/W	
17	0x2010 (48209)	Humidity Current Output High Limit H.OLH	1	0.1	R/W	
18	0x2011 (48210)	Temperature Alarm Set Value T.AL1	1	0.1	R/W	
19	0x2012 (48211)	Temperature Alarm Hysteresis T.HY1	1	0.1	R/W	
20	0x2013 (48212)	Temperature Alarm Mode T.AD1	1	1	R/W	
21	0x2014 (48213)	Humidity Alarm Set Value H.AL1	1	0.1	R/W	
22	0x2015 (48214)	Humidity Alarm Hysteresis H.HY1	1	0.1	R/W	
23	0x2016 (48215)	Humidity Alarm mode H.AD1	1	1	R/W	
		Reserve				
24	0x2100 (48449)	Heating Proportional Coefficient T.P	1	1	R/W	
25	0x2101 (48450)	Heating Integral Time T.I	1	1	R/W	
26	0x2102 (48451)	Heating Differential Time T.D	1	1	R/W	
27	0x2103 (48452)	Heating Overshoot Limit T.OVS	1	0.1	R/W	
28	0x2104 (48453)	Heating Control Cycle T.CP	1	1	R/W	
29	0x2105 (48454)	Temperature Control Mode T.OT	1	1	R/W	
30	0x2106 (48455)	Humidifying Control Mode H.OT	1	1	R/W	
31	0x2107 (48456)	Heating Control Output Mode T.ACT	1	1	R/W	
32	0x2108 (48457)	Humidifing Control Output Mode H.ACT	1	1	R/W	
33	0x2109 (48458)	Run/Stop Operation	1	1	R/W	1: RUN 2: STOP 3: Start Auto-tuning 4: Stop Auto-tuning
34	0x210A (48459)	Temperature Unit Setting UNIT	1	1	R/W	
35	0x210B (48460)	Sensor Sampling Speed MPS	1	1	R/W	
36	0x210C (48461)	Sensor Self-heating HRE	1	1	R/W	
37	0x210D (48462)	Sensor Self-heating Delay Time HRT	1	1	R/W	
38	0x210E (48463)	Compressor Cooling Start Delay Time PT	1	1	R/W	
39	0x210F (48464)	Communication Address ADD	1	1	R/W	
40	0x2110 (48465)	Communication Baud Rate BAD	1	1	R	
41	0x2111 (48466)	Communication Data Transport Sequence DTC	1	1	R	Note③
42	0x2112 (48467)	Communication Check Bit Setting PRTY	1	1	R	
43	0x2113 (48468)	Heating PID Type T.PDC	1	1	R	
44	0x2114 (48469)	TEMP Fuzzy Tracking Value T.DTR	1	0.1	R	
45	0x2115 (48470)	Lock Function LCK	1	1	R	
46	0x2116 (48471)	Temperature and Humidity Controller Status STATUS	1	1	R	Note②
47	0x2117 (48472)	Temperature and Humidity Controller Name NAME	1	1	R	

Note①: The register number is formed by converting the address to decimal and adding 1, and then adding the register identification code 4 in front;

For example: the register number of the data address 0x2000 is 8192+1=8193 and 4 is added to the front, that is, the register number is 48193; related applications can be seen in Siemens S7-200 PLC.

Note②: Measurement status indication, when the data bit is 1, it means execution, when it is 0, it means no execution.

D7	D6	D5	D4	D3	D2	D1	D0
STOP	ERR	RUN	AT	H.AL1	H.OP1	T.AL1	T.OP1

Note ③: Description of DTC communication data transmission sequence

DTC: □ □ □ — Reserve
Byte transmission sequence: when it is 0, 1, 2, and when it is 1, 2, 1
Reserve

※16 digits CRC check code to obtain C program

```
unsigned int Get_CRC(uchar *pBuf, uchar num)
{
    unsigned i,j;
        unsigned int wCrc = 0xFFFF;
        for(i=0; i<num; i++)
        {
                wCrc ^= (unsigned int)(pBuf[i]);
                for(j=0; j<8; j++)
                {
                        if(wCrc & 1){wCrc >>= 1; wCrc ^= 0xA001; }
                        else
                                wCrc >>= 1;
                }
        }
    return wCrc;
}
```