RT226-F5 Digital Thermostat User Manual

Application: RT226-F5 is a versatile room controller for individual room temperature and VAV control applications. The controller can be connected to any system that supports Modbus RTU protocol via the RS-485 connection. The bus is galvanically isolated from the controller's other electronics. The controller has a display and touch buttons for commissioning the controller and adjusting the user parameters, temperature set point, for example.

Technical Specification

Supply Voltage：24（18-30）V AC　50HZ/60Hz
Temperature setting range：5℃-45℃
Accuracy：0.1℃
Temperature display range：0℃-60℃
Control type：PID
Ambient temperature-operation：0℃-50℃
Ambient temperature-transport：-10℃-60℃
Temperature input: thermostat built-in sensor and external sensor（NTC10K B3977）

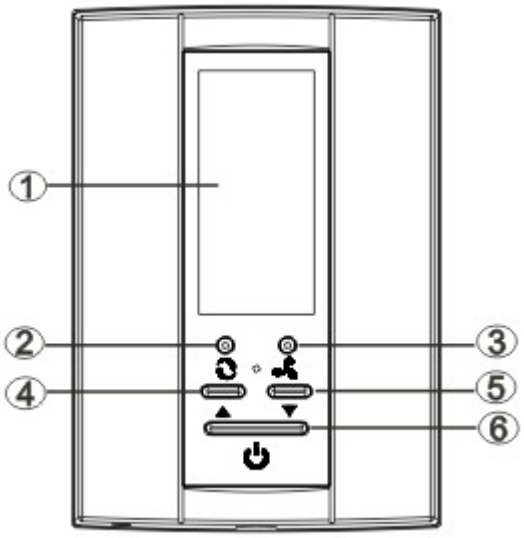
Features

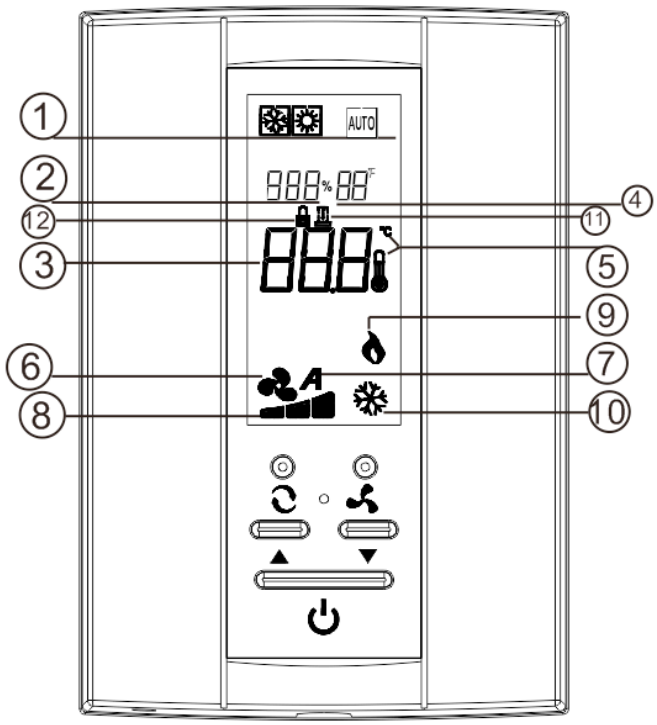
- ℃/℉ optional
- Cool, heating, auto three mode optional, PID output control
- DC electrodeless fan speed adjustable，automatic and manual control type optional，show the fan speed and opening percents
- Display shows both set points and room temperature simultaneously
- Separately heating and cooling temperature setting
- Permanent user setting retention during power loss, no batteries are required
- Remote control

Button and Display

Thermostat Buttons and Switches

① Display area
② System button (COOL, HEAT , AUTO mode)
③ Fan speed option button (HI MED LOW AUTO)
④ Raise button
⑤ Lower button
⑥ Power button

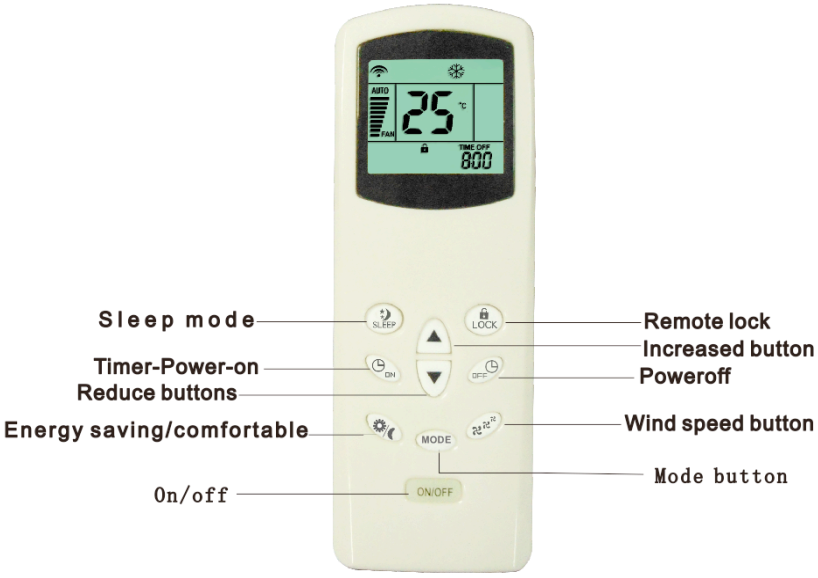


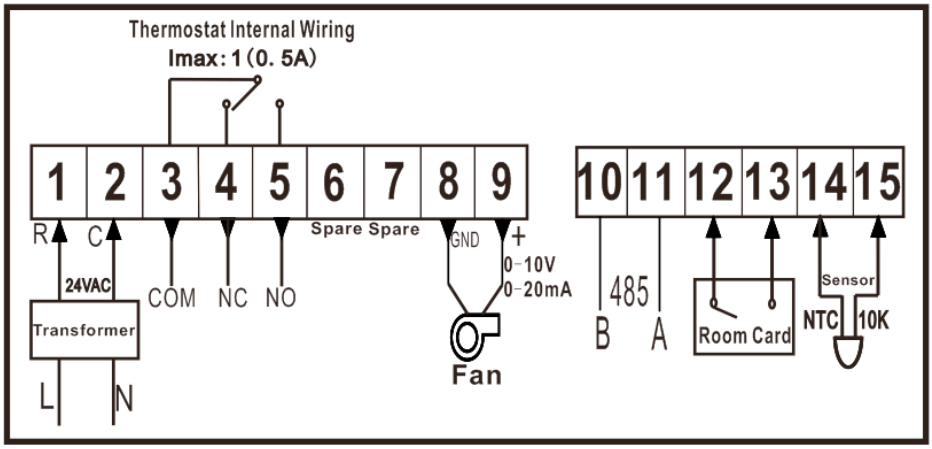


The Display

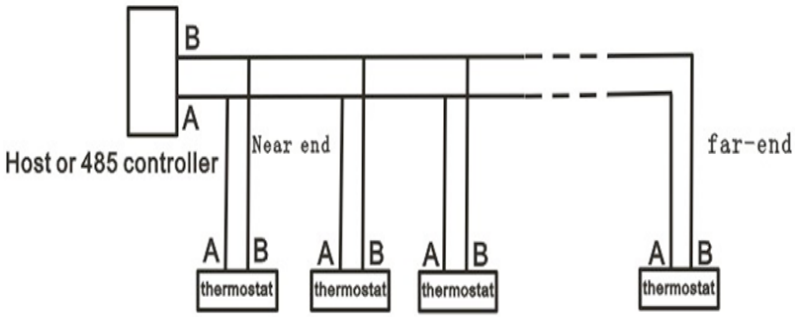
① Shows working mode
② Shows setting temperature
③ Shows measure temperature
④ Shows sleep mode
⑤ Temperature unit mark
⑥ Shows fan speed option
⑦ Shows fan rotate in Auto speed
⑧ Shows fan speed option
⑨ Shows heating output
⑩ Shows cooling output
⑪ Shows room card mode
⑫ Shows child lock mark(At the same time hold down the "▲" "▼" button more than 3 seconds, the keypad locking, conversely, unlock.)

Match with the RT226-F5 remote control / Optional





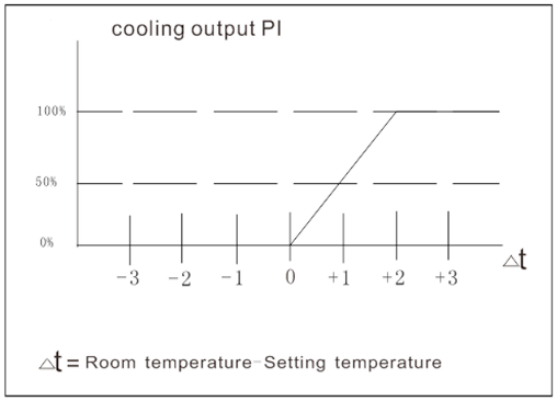
RS485 communication function show：



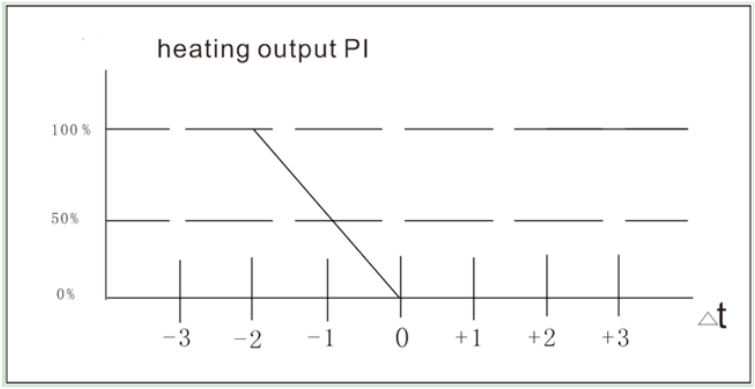
When the 485 communicate distance is more than 300 meters, need to add the terminal resistance at the communicate start and end position. Especially when the total device in the RS 485 bus is less (eg: less than 22pcs). When add the terminal resistance，only need to short circuit the J5 wire of the terminal resistance on the thermostat

Function Description

Cooling mode：



Heating mode：



The relationship between the output PI and temperature difference

If we set the P-band is 2℃, when the room temperature is higher 2℃ than the setting temperature, the terminal 11 will 100% output, the cooling equipment actuator will 100% open; when the room temperature is equal or lower than setting temperature, the terminal 11 will stop output(0% output), the cooling equipment actuator will fully close. The LCD will display the current output PI value.

Fan and the first section mark show 10-40%, fan and the second section mark show 41-70%, fan and the third section mark show 71-100%.

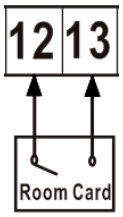
The operation mode is total three: cooling, heating, auto。

After connecting the external sensor, in the auto mode, when the difference of the inlet air temperature and room temperature is 5℃, the mode automatically switch。When the inlet air temperature is high 5℃ than the room temperature, it will switch to heating, if lower than 5℃, it will switch to cooling.

When in the auto mode, if the external sensor is not connected, it will switch to other mode forced（room temperature is high than 25℃, it will be heating mode. Otherwise, it will be cooling mode）。

Room card function

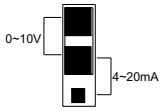
When the terminal 12 and 13 connect with the room card input signal, the room card input signal control the thermostat into the economical mode, show  。When in the economical operate mode, the setting temperature is depended on the 8 item and 9 item in the initialize menu. The room card ON or OFF is still depended on the 10 item of the initialize menu. The input of the room card is node signal, the maximum voltage is 5V DC。



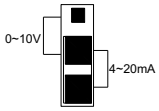
Analog output choose the wire jumper

Open the thermostat，the cover of the wire jumper lie the below of the thermostat

As the following figure show，the analog output of **the wire jumper's choose.**



0~10V output



4~20mA output

Configuration Menu

The configuration menu allows you to set certain thermostat operating characteristics to your system or personal requirements. Switch off the thermostat, long press button more than 3 seconds to enter the configuration menu, The display will show the first item in the configuration menu 1. Press button to shift to the next menu item, use ▲ or ▼to select. To exit the menu , pressing power button to switch off the thermostat. Thermostat will exit the configuration menu if no buttons are pressed within 20 seconds. The configuration menu chart summarizes the configuration options. An explanation of each option as follows:

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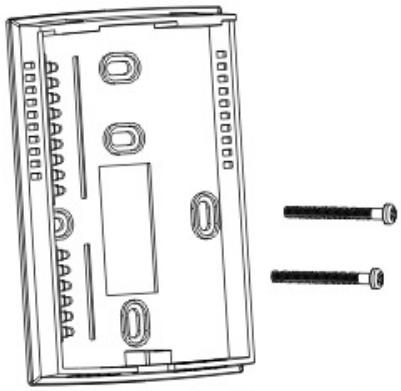
Item	Displayed	Description	Setting range	Factory default
1	CL	Temperature correction	-4°C — 4°C	0
2	AH	Temperature setting maximum	20°C — 45°C	35
3	AL	Temperature setting minimum	5°C — 20°C	5
4	FC	Temperature scale	C：Celsius degree F：Fahrenheit degree	C
5	bL	Backlight choose	1．OFF 2．Automatically ON 10S 3． ON all the time	2
6	rE	Memorize option before power loss	rE: With memorize option before power loss rd: without memorize option before power loss	rE
7	Ad	485 communicate address	1 — 255	1
8	CA	Heating energy-saving temperature	10°C — 18°C	18
9	CC	Cool energy-saving temperature	25°C — 30°C	25
10	LE	Room card input	SC: with room card, activate the energy mode by open circuit OC: with room card, activate the energy mode by close circuit OO: without room card function	SC
11	LI	Temperature display option	0: Show setting temperature and room temperature 1: only show room temperature 2: only show setting temperature	0
12	dO	Proportional band	1°C — 10°C	5
13	dI	Integral time	0min — 10min	5
14	d3	Temperature sensor control option	0: Return air temperature sensor active 1:Room temperature sensor active 2 :Mix temperature sensor active	2

INSTALL THE THERMOSTAT

1

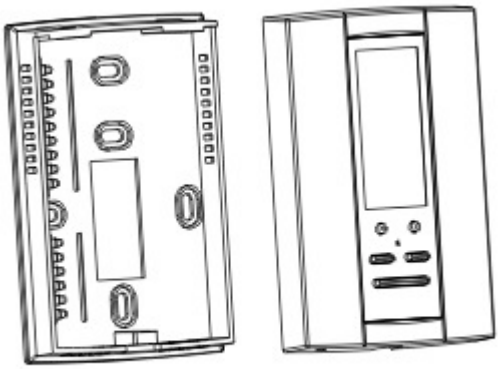
Unscrew the screw, open the front shell

2



Installation fastening screw

3



Close to front cover

Installation:

- ✓ Please cut off the power source before install, remove, clean or recondition the thermostat.
- ✓ Please read the use manual carefully before install the thermostat
- ✓ Only the project company who has corresponding safety knowledge can install the thermostat.
- ✓ All of the connection must conform the national standard.
- ✓ Please operate the thermostat In strict accordance with the user manual.

CUSTOMER ASSISTANCE

After reading this guide, if you have any question about the operation of your thermostat, please contact your installer or service provider.

RT226-F5 communication protocol

This protocol is in standard MODBUS as a reference, mainly use for communication between thermostat and upper computer. This protocol don't describe the MODBUS, about standard MODBUS, please refer to the relevant standard documents.

一、Basic description

Number	Parameter	Protocol provision
1	Operating mode	RS-485,master-slave； thermostat is the slave machine
2	Physical interface	A(+),B(-),GND three-wire system，or A(+),B(-) two-wire system
3	Baud rate	9600
4	Byte format	10 format（1 start bit+8 data bits +1 stop bit）
5	Transmission mode	RTU format（consult MODBUS standard）
6	Thermostat address	1—247
7	Command code	3，6(3—read thermostat， 6—set thermostat)
8	CRC check code	CRC-16(consult MODBUS standard)
9	CRC verification mode	CRC-16(consult MODBUS standard)
10	Data frame interval	Greater than 4 bytes

二、Read the thermostat frame format

Command frame（give by upper computer）：Read the conditioner state

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Thermostat address	03	00	00	00	08	CRC low	CRC high

Response frame（give by thermostat）

Byte 1	Byte 2	Byte 3	Byte 4…….Byte 19	Byte 20	Byte 21
Thermostat address	03	10	Air conditioning state value	CRC low	CRC high

Air conditioning state value instruction form

Byte	Value	instruction	Register address
Byte 4	00	Thermostat state is high byte: general is 00	0(ON/OFF)
Byte 5	00/01	Thermostat state is low byte: 00 –means closed，01—means open	
Byte 6	00	Thermostat mode is high byte: general is 00	1(MODE)
Byte 7	01-03	Thermostat mode is high byte: 1-cooling，	

		2-heat，3-ventilate	
Byte 8	00	Thermostat fan speed is high byte, general is 0	2(Fan speed)
Byte 9	FF(Auto speed)or **0a~64**（Manual fan speed）	Thermostat fan speed is low byte	
		FF –Auto speed	
		Manual fan speed Percent 1~64	
Byte 10	XX	Setting temperature high byte	3(setting temperature)
Byte 11	YY	Setting temperature low byte	
Byte 12	00	Child lock state high byte	4(room temperature)
Byte 13	00	Child lock state low byte	
Byte 14	00	The current thermostat temperature high byte	5
Byte 15	00	The current thermostat temperature low byte	
Byte 16	00	Auto speed of fan speed Percent is high byte	Auto fan speed Percent under the fan mode
Byte 17	00~64	Auto speed fan speed Percent	
Byte 18	00	Reserved words 2 high byte	7
Byte 19	00	Reserved words 2 low byte	

三、Read the thermostat frame format

Command frame 1：Read the thermostat ON/OFF state

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8

Thermostat address	03	00	00（start address）	00	01	CRC low	CRC high

Response frame（give by thermostat）

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Thermostat address	03 (command code)	02 (Byte count)	ON/OFF state high byte	ON/OFF state low byte	CRC low	CRC high

ON/OFF state value：0000 – Fan coil OFF， 0001 – Fan coil ON

Command frame 2：Read the thermostat mode state

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Thermostat address	03	00	01（start address）	00	01	CRC low	CRC high

Response frame（give by thermostat）

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Thermostat address	03 (command code)	02 (Byte count)	Mode state High byte	Mode state Low byte	CRC low	CRC high

Mode state value：0001 – cool ， 0002 – heating，0003 – ventilated

Command frame 3：Read the thermostat fan coil state

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Thermostat address	03	00	02（start address）	00	01	CRC low	CRC high

Response frame（give by thermostat）

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Thermostat address	03 (command code)	02 (Byte count)	Fan speed High byte	Fan speed Low byte	CRC low	CRC high

Fan speed state value：00FF – auto，000A ~0064—manual mode Fan speed Percent

Command frame 4：Read thermostat setting temperature

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Thermostat address	03	00	03（start address）	00	01	CRC low	CRC high

Response frame（give by thermostat）

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Thermostat address	03 (command	02 (Byte	Setting temperature	Setting temperature	CRC low	CRC high

	code)	count)	High byte （XX）	Low byte (YY)		

Setting temperature value 0Xxxyy (0x012c)　high byte 01 low byte 2c

0x012c= 300 （setting temperature only can be the multiple of 5，the range is 50~350）setting temperature is 30.0℃

Command frame 5：Read the thermostat child lock state

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Thermostat address	03	00	04（start address）	00	01	CRC low	CRC high

Response frame（give by thermostat）

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Thermostat address	03 (command code)	02 (Byte count)	Child lock High byte	Child lock Low byte	CRC low	CRC high

Child lock state：0000 – unlock ， 0001– lock

Command frame 6：Read thermostat current temperature

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Thermostat address	03	00	05（start address）	00	01	CRC low	CRC high

Response frame（give by thermostat）

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Thermostat address	03 (command code)	02 (Byte count)	Current temperature High byte （XX）	Current temperature Low byte (YY)	CRC low	CRC high

Room temperature value 0Xxxyy (0x012c)　high byte 01 low byte 2c

0x012c= 300 the room temperature is 30.0℃

Command frame 7：Read thermostat fan speed the proportion of opening

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Thermostat address	03	00	06（start address）	00	01	CRC low	CRC high

Response frame（give by thermostat）

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Thermostat address	03 (command code)	02 (Byte count)	Fan valve Percent High byte （XX）	Fan valve Percent Low byte (YY)	CRC low	CRC high

0000 ~0064—Fan valve Output Percent

四、Set the thermostat frame format

Command frame 1（give by upper computer）set the thermostat ON/OFF

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Thermostat address	06	00	00(start address)	Setting value high byte	Setting value low byte	CRC low	CRC high

Setting value: 0000 – thermostat OFF,　0001 – thermostat ON;

Response frame: correctly operate, the instruction will return to the same;

Operation is not correct does not response, the upper computer will manage;

The rule about subsequent response of setup command is same with this.

Command frame 2（give by upper computer）set the mode

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Thermostat address	06	00	01(start address)	Setting value high byte	Setting value low byte	CRC low	CRC high

Setting value: 0001 – cooling，　0002 – heat，　0003 – ventilate;

Command frame 3（give by upper computer）set the fan speed

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8

Thermostat address	06	00	02(start address)	Setting value high byte	Setting value low byte	CRC low	CRC high

Setting value: 0000 - Auto speed, 0001- High speed, 0002- Mid speed, 0003- Low speed

Setting value：00FF - Fan valve Auto output，000A~0064 Manual set the fan valve output Proportion；

Command frame 4（give by upper computer）set the setting temperature

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Thermostat address	06	00	03(start address)	Setting temperature high byte	Setting temperature low byte	CRC low	CRC high

High byte 01 Low byte 2c

0x012c= 300 （setting temperature only can be the multiple of 5，the range is 50~350）setting temperature is 30.0℃

Command frame 5（give by upper computer）set the child lock

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Thermostat address	06	00	04(start address)	Child lock high byte	Child lock low byte	CRC low	CRC high

Setting value: 0000 – unlock ， 0001– lock