



# TF228WNM/U

## Communicating Fan Coil Thermostat

### SPECIFICATION DATA



### Specifications

|   |  |
|---|--|
| Physical Layer  | EIA485   |
| Protocol  | Modbus RTU                                     |
| Baud rate   | 4800/9600(Default)/19200                       |
| Parity  | None   |
| Error Checking Mechanism                                | CRC  |
| Rated Power & Frequency                                 | 220/230VAC, 50/60Hz                            |
| Power consumption                                       | <2W  |
| Control   | PI, On/off output                              |
| Accuracy  | ±1°C at 21°C                                   |
| Auto Cycle times  | 100,000 times                                  |
| Manual Cycle times                                      | 10,000 times                                   |
| Protection class  | IP20   |
| Set point range   | 10 ~ 32°C                                      |
| Monitor range   | 0 ~ 37°C                                       |
| Ambient operating limits                                | 0~ +49°C                                       |
| Ambient storage limits                                  | -30 ~ +60°C                                    |
| Humidity limits   | 5~90% RH, non-condensing                       |
| Action Type:  | 1  |
| Pollution Degree  | 2  |
| Protection against electric shock class                 | Class II                                       |
| Electronic control software class                       | Class A  |
| Rated Impulse Voltage:                                  | 2500V  |
| Maximum Temperature for relay wiring                    | 155°C  |
| Wire sectional area (Recommendation)                    | 1.0-1.5mm <sup>2</sup>                         |
| Applied altitude up to                                  | 2000m above sea level                          |
| Working current for the whole product :                 | 4(3)A  |
| 4A:   | When the load of the thermostat is resistance  |
| 3A:   | When the load of the thermostat is inductance. |
| For Fan Load  |  |
| 3A:   | when the load is resistance;                   |
| 2A:   | when the load is inductance                    |
| For Valve load  |  |
| 2A:   | when the load is resistance;                   |
| 1A:   | when the load is inductance                    |
| The valve need have over travel-limit organ to turn off |  |

### General

The TF228WNM/U communicating thermostat is designed for a 3-speed fan and a motorized valve control in fan coil system. The typical application including:

- 2-pipe cool only/heat only/manual changeover
- Ventilation mode
- Manual or automatic 3-speed fan control
- Water valve on/off control

The TF228WNM/U is available in Modbus RTU protocol and can be easily integrated into building automation system.

### Features

- RS485 interface in Modbus RTU slave mode
- Memorized time off
- Cycle Per Hour (CPH)
- Random startup
- Room temperature or setpoint temperature display selectable
- Manual or automatic fan speed selectable
- Temperature units in either °C or °F
- User setting can be stored with power loss
- Freeze protection available
- Keypad lock options
- Heating and cooling setpoint limitation

## Model Selection

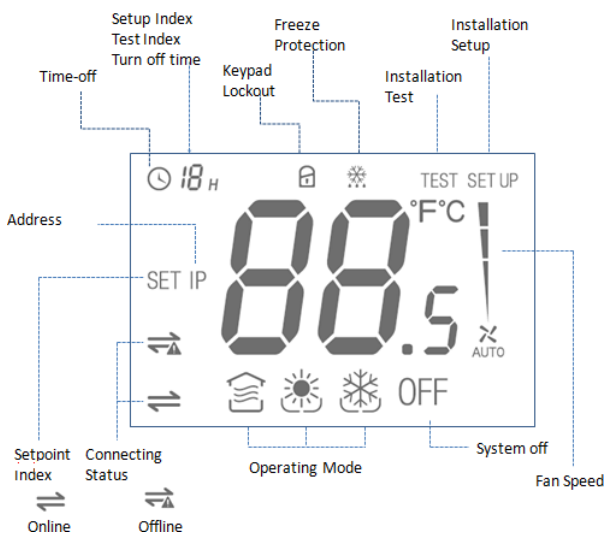
| Model Number | Backlight | Application | Power Supply            | Ventilation Mode | Automatic Fan |
|--------------|-----------|-------------|-------------------------|------------------|---------------|
| TF228WNM/U   | White     | 2 pipes FCU | 220/230 VAC;<br>50/60Hz | Y                | Y             |

## Product Design

Thermostat appearance



## LCD Display



## Function

### Valve Control

Thermostat measures the room temperature via integrated sensor and maintains the setpoint by delivering on/off valve control command outputs.

The fan setting can be selected as manual or automatic 3-speed operation. When in “manual” mode, the fan is switched to the selected speed via control output F<sub>H</sub> (High), F<sub>M</sub> (Medium), F<sub>L</sub> (Low).

While in “automatic” mode, fan speed depends on the difference between room temperature and setpoint. When room temperature reaches the setpoint, the valve will be closed, and the fan will be closed in the meanwhile.

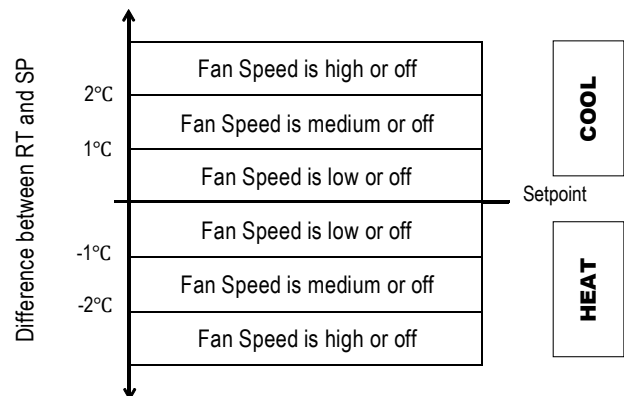


Fig. 1. Fan Speed Ramping Control Algorithm

### Temperature Display

The displayed temperature can be set to room temperature or setpoint. The setting can be changed during ISU (Installation Set Up) process.

### Cycle Per Hour (CPH)

In order to achieve more accurate temperature control, the CPH function enables the thermostat to open the valve several times per hour as the room temperature gets close to the setpoint.

The value can be changed in the ISU. The default value is 4 for heating and 3 for cooling.

## Memorized Time Off

The time off feature will automatically turn off the thermostat after a selectable amount of time. To change the time setting, press and hold the power button for more than 3 seconds and press “up” and “down” button to change the value when the thermostat is working .

NOTE: The setting range is from 0 to 12 hours. The step is 1 hour and the default value is 0.



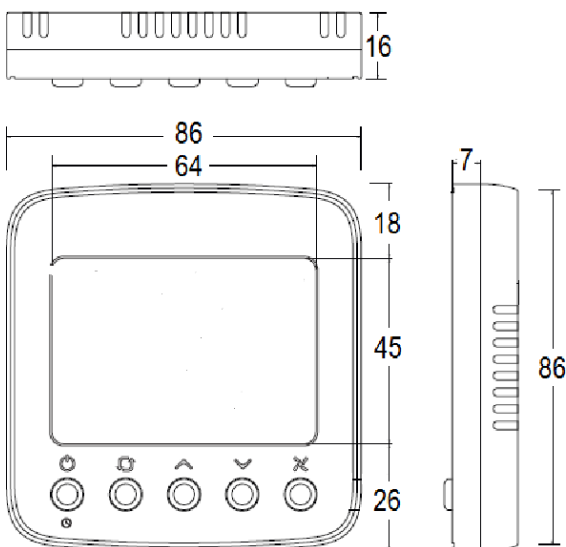
## Backlight

To turn on the backlight, press any key. The backlight will timeout 8 seconds after the last key is pressed. When in ISU and Installation test mode, the backlight will timeout 60 seconds after the last key is pressed.

## Keypad Lockout

Keypad lockout can be set in ISU and the default status is “all keys available”. Keypad lock can be optioned to “mode button locked”, “Fan and mode buttons locked”, “all buttons (except power button) locked” and “all buttons locked”.

## Dimensions (mm)



## Operating Mode

### Comfort Mode

In comfort mode, the setpoint can be changed by pressing up and down button. Applications include cool only, heat only and manual heat/cool changeover.



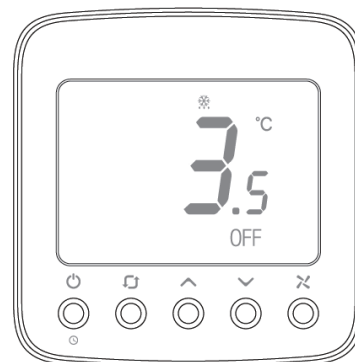
### Ventilation Mode

Press mode button to enter ventilation mode. In ventilation mode, no output for valve while the fan will operate at selected fan speed.



### Freeze Protection Mode

Freeze protection can be selected as enabled (default) or disabled in the ISU. In freeze protection mode (only in heating applications), when thermostat is off and the temperature is below 6°C , the thermostat will activate heating mode until the temperature rises to 8°C .



## ISU (Installation Setup)

Press and hold the “mode” and the “up” buttons together for more than 3 seconds to enter or exit ISU. Change the ISU code by pressing the “mode” button and then change the option setting by pressing the “up” and “down” buttons refer to the following introduction.

| ISU Code | Description              | Options   |
|----------|--------------------------|---|
| 0        | Address                  | 1~64 <b>1(Default)</b>  |
| 1        | System Type              | 0 Cool only   |
|          |                          | 1 Heat only   |
|          |                          | <b>2 Two pipes heating/cooling manual (Default)</b>                     |
| 2        | Temp. Scale              | 0 °F  |
|          |                          | <b>1 °C (Default)</b>   |
| 3        | Fan control Type         | 0 Auto only   |
|          |                          | 1 manual only (3 speed: Low→Med→High→Low)                               |
|          |                          | <b>2 users can choose auto or manual (Default)</b>                      |
| 4        | CPH value (heat)         | 1-12 <b>4 (Default)</b>   |
| 5        | CPH value (cool)         | 1-6 <b>3 (Default)</b>  |
| 6        | Display Temp. adjustment | -2~2°C, 0.5°C. <b>Default 0°C</b><br>(-4~4°F, 1°F. <b>Default 0°F</b> ) |
| 7        | Temp. Display            | <b>0 room temp. (Default)</b>   |
|          |                          | 1 set point   |
| 8        | Heating Range Stops      | 10~32°C. <b>Default 32°C</b><br>(50~90°F. <b>Default 90°F</b> )         |
| 9        | Cooling Range stops      | 10~32°C <b>Default 10°C</b><br>(50~90°F. <b>Default 50°F</b> )          |
| 10       | Keypad lockout           | <b>0 All keys are available (Default)</b>                               |
|          |                          | 1 system button locked out  |
|          |                          | 2 Fan and system button locked out                                      |
|          |                          | 3 All button locked out except power button                             |
|          |                          | 4 All button are locked   |
| 11       | Freeze Protection        | 0 Disabled  |
|          |                          | <b>1 Enable ( Default )</b>   |
| 12       | Power Recovery status    | 0 OFF   |
|          |                          | <b>1 Previous status (Default)</b>                                      |

## Communicating Parameter Setting

When the thermostat is integrated into building automation system, you can make configuration refer below list.

| Addr Registers | Configura-tion parameters | Significance and adjustment  | Prop-erties |
|----------------|---------------------------|--|-------------|
| 01             | Power Switch              | 0-OFF;1-ON   | R/W         |
| 02             | Room Temp                 | Room temperature   | R           |
| 03             | Temp. Scale*              | 0-°F; 1-°C   | R/W         |
| 04             | Setpoint*                 | Set temperature value  | R/W         |
| 05             | Fan Status*               | 0-Low speed; 1-Med speed; 2-High speed; 3-Auto   | R/W         |
| 06             | System Mode*              | 0-Ventilation; 1-Heat; 2-Cool  | R/W         |
| 07             | Valve status              | 0-closed;1-open  | R           |
| 08             | Error Code                | 0-None; 1-Sensor 2-EEprom; 3-Sensor+EEprom   | R           |
| 09             | Baud rate                 | <b>0-9600 ( Default )</b> ; 1-4800; 2-19200  | R/W         |
| 11             | Address*                  | 1~64 <b>1( Default )</b>   | R/W         |
| 12             | System Type*              | 0-Heat only;1-cool only; <b>2-Two pipes heating/cooling manual (Default)</b>                             | R/W         |
| 13             | Fan Control Type*         | 0-Auto; 1-Manual; <b>2-Auto+Manual (Default)</b>   | R/W         |
| 14             | CPH (Heat)*               | 1-12 <b>4(Default)</b>   | R/W         |
| 15             | CPH (Cool)*               | 1-6 <b>3(Default)</b>  | R/W         |
| 16             | Display Temp. adjustment  | 0~8(-2~2°C) step 1(0.5°C)<br><b>4(Default)</b><br>0~8(-4~4°F) step 1 (1°F) <b>4 ( Default )</b>          | R/W         |
| 17             | Temp. Display*            | <b>0- room temp. (Default);</b> 1-set point  | R/W         |
| 18             | Heating Range Stops*      | 100~320 (10~32°C) step5 (0.5°C) <b>320(Default)</b><br>500~900 (50~90°F)step10 (1°F) <b>900(Default)</b> | R/W         |

|    |                         |   |     |
|----|-------------------------|---|-----|
| 19 | Cooling Range stops*    | 100~320 (10~32°C) step5(0.5°C)100<br><b>(Default)</b><br>500~900 (50~90°F) step10(1°F) <b>500</b><br><b>(Default)</b>   | R/W |
| 20 | Keypad lock-out *       | <b>0- All keys are available (Default)</b> ;1- system button locked out;2- Fan and system button locked out;3- All button locked out except power button;4- All button are locked | R/W |
| 21 | Freeze Protection*      | 0- Disabled ; <b>1- Enable (Default)</b>  | R/W |
| 22 | Power Recovery status*  | 0- OFF ; <b>1 Previous status (Default)</b>   | R/W |
| 29 | Turn off time*          | 0~12; step 1 Unit: hour   | R/W |
| 30 | Remain time to turn off | 0~12; step 1 Unit : hour  | R   |

Note: The parameters marked with "\*" can be changed either in ISU on site or modbus.

## Terminal Designations

| No | Terminal | Description                   |
|----|----------|-------------------------------|
| 1  | N        | 220/230Vac Neutral            |
| 2  | L        | 220/230Vac Line               |
| 3  | vO       | Heating / Cooling valve open  |
| 4  | vC       | Heating / Cooling valve close |
| 5  | fH       | High speed fan                |
| 6  | fM       | Medium speed fan              |
| 7  | fL       | Low speed fan                 |
| 8  | D+       | RS 485+                       |
| 9  | D-       | RS 485-                       |

## Wiring

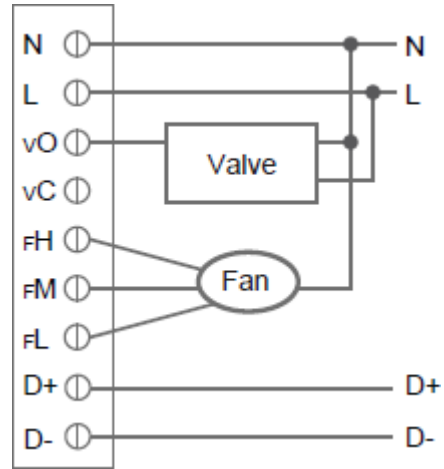


Fig. 2. Honeywell Home VC4013/VN4013/VS4016 Wiring

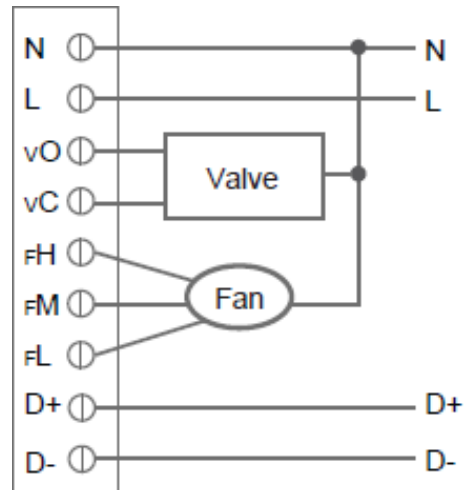


Fig. 3. Honeywell Home VC6013/VN6013 Wiring

## Trouble shooting Tips

| If                                 | Then...  |
|------------------------------------|--|
| Heating system does not respond    | <ul style="list-style-type: none"> <li>• Set the mode to heating by pressing the mode button</li> <li>• Make sure the temperature is set above the room temperature.</li> <li>• Make sure “heat on” icon shows on the display</li> <li>• Wait 5 minutes for the system to respond</li> </ul> |
| Cooling system does not respond    | <ul style="list-style-type: none"> <li>• Set the mode to cooling by pressing the mode button</li> <li>• Make sure the temperature is set below the room temperature</li> <li>• Make sure “cool on” icon shows on the display</li> <li>• Wait 5 minutes for the system to respond</li> </ul>  |
| The fan doesn't work               | <ul style="list-style-type: none"> <li>• Make sure fan mode isn't set to auto</li> <li>• Check heating or cooling system works well.</li> </ul>  |
| The mode button doesn't work       | <ul style="list-style-type: none"> <li>• Make sure keypad is unlocked.</li> <li>• Check that thermostat is on.</li> </ul>  |
| The up or down button doesn't work | <ul style="list-style-type: none"> <li>• Make sure keypad is unlocked.</li> <li>• Make sure the system doesn't work in ventilation mode</li> <li>• Check that thermostat is on.</li> </ul>   |
| The system turns off automatically | <ul style="list-style-type: none"> <li>• Make sure the memorized time off value isn't set to “0”.</li> </ul>   |
| Display                            | <ul style="list-style-type: none"> <li>• Check the Modbus address and Baud rate. Use Master to read registers</li> <li>• Check the wiring.</li> </ul>  |



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