ONYX
CONTROLS

Inside **25.0** °C   Set **22.0**

Fan

System ❄   ❄ Auto

Cool On

Room Thermostat

We provide more control;

More Accuracy;

More Convenience for HVAC Application;

ONX908PIT-V1-S1-F3/B Modulating Digital Thermostat

Installation and operation instructions

The ONX908PIT-V1-S1-F3 modulating digital thermostats are designed to provide Proportional-Integral (PI) modulating control in 2-pipe or 4-pipe fan coil units, zoned commercial heating, Ventilating and various heating and cooling applications.

This thermostat provides modulating analog 0-10V or 4-20mA control. Other available feature includes energy savings card key input, auto-detection of temperature sensor (remote sensor or internal sensor), and optional Celsius or Fahrenheit operation.

SPECIFICATION:

Input Voltage …………………… 24Vac, 50/60 Hz (Digital Thermostat)

24Vac-250Vac; 50/60Hz (Fan)

Output Voltage ……………… Modulating output 4 to 20mA or 0-10VDC

On/Off output for fan 5A 250VAC

Room temperature setting range………5℃ to 35℃ (41℉ to 95℉)

Accuracy……………………………. ±0.1℉ or ±0.2℃

Dimensions………………………… 115mm×90mm×28mm

Color………………………………….. White

FEATURE:

- Large LCD display
- The screen displays the set temperature, the room temperature simultaneously
- Permanent user setting and program setting retention during power loss,
- Special energy saving mode-external input from window contact or hotel card-key overrides the temperature setting to installer defined heating and cooling temperatures
- 0-10Vdc or 4-20mA heat and cool outputs
- 3-speed fan control
- Fahrenheit or Celsius display capability

IMPORTANT SAFETY INFORMATION:

- Always turn off power at the main power source by unscrewing fuse or switching circuit breaker to the off position before installing, removing, cleaning, or servicing this thermostat.
- Read all of the information in this manual before installing this thermostat.
- Only a professional contractor should install this thermostat.
- All wiring must conform to local and national building and electrical codes and ordinances.
- Use this thermostat only as described in this manual.
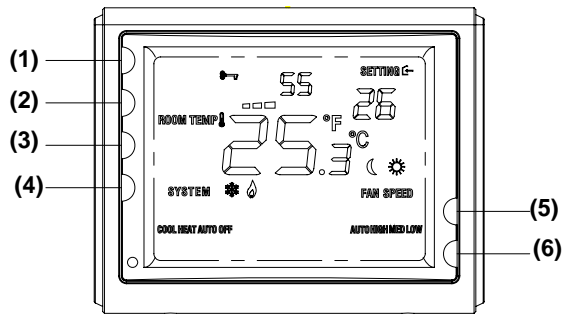
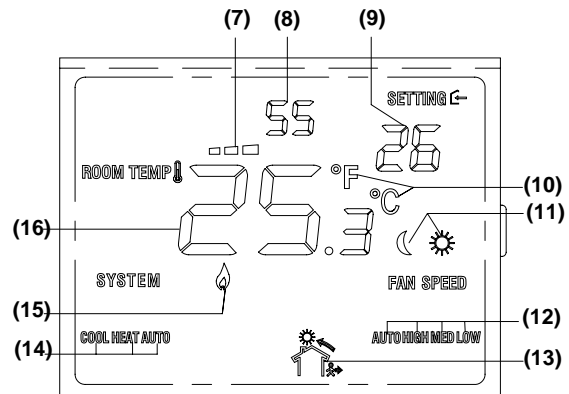# KEYBOARD, DISPLAY AND SWITCH DESCRIOPTION

Figure 1   Figure 2

(1) Power Button

(2) System Button

(3) Fan Button

(4) Setback Button

(5) Raise Temperature setting button

(6) Lower Temperature setting button

(7) Bar Graph Shows approximate Power Output of Modulation Output

(8) Indicates the Portion of Modulating Output

(9)   Setting temperature

(10) Shows temperature display in ℃ or ℉

(11)   ☾   indicates when thermostat is in setback mode. (Energy saving
       mode)

      ☼   indicates when thermostat is in normal operation. (Comfort mode)

(12) Indicates different fan speed

(13) Shows when card key is vacant

(14) Indicates system icon

(15) ♨   indicates when there is a call for On/Off heating

(16)   Shows Current Read temperature

2

INSTALL THE THERMOSTAT

ATTACH THERMOSTAT BASE TO WALL

Screw for mounting thermostat to wall
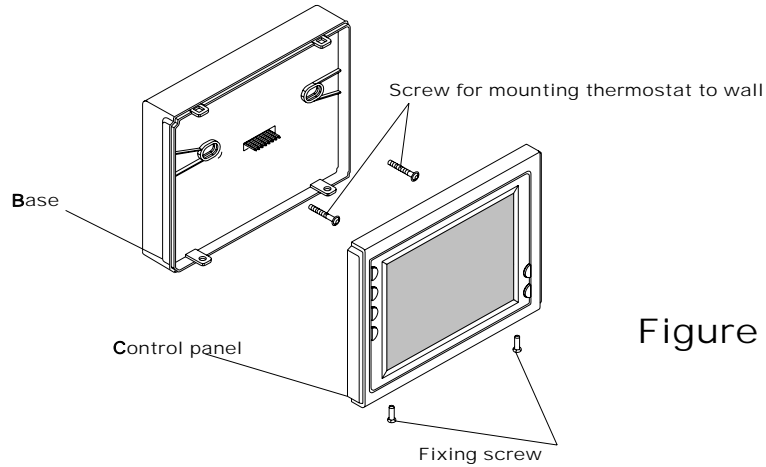
Base

Control panel

Fixing screw

Figure 3

1. Remove 2 screws from the bottom of thermostat. Gently pull the control panel straight off the base. Forcing or prying on the thermostat will cause damage to the unit.
2. Connect wires beneath terminal screws on power supply module using appropriate wiring schematic. See figure 4 or figure 5
3. Push power base into wall.
4. Using two mounting screws mount the power base to the wall. Place a level against bottom of base, adjust until level, and then tighten screws. (Leveling is for appearance only and will not affect thermostat operation.)
5. Replace control panel on the power base and fix power base and control panel by removed two screws in item 1
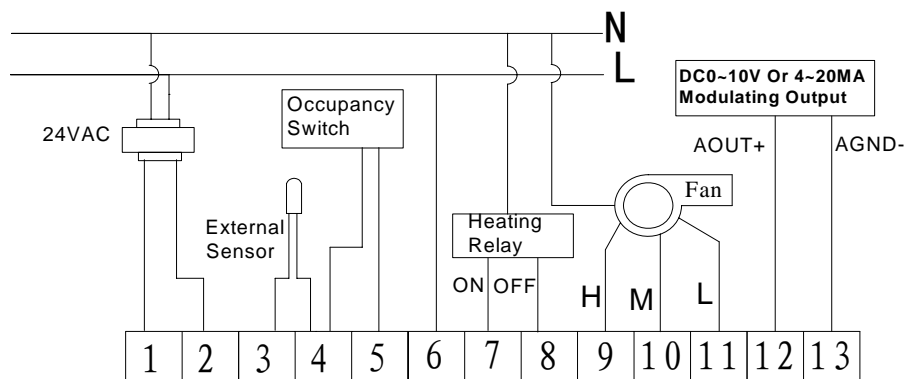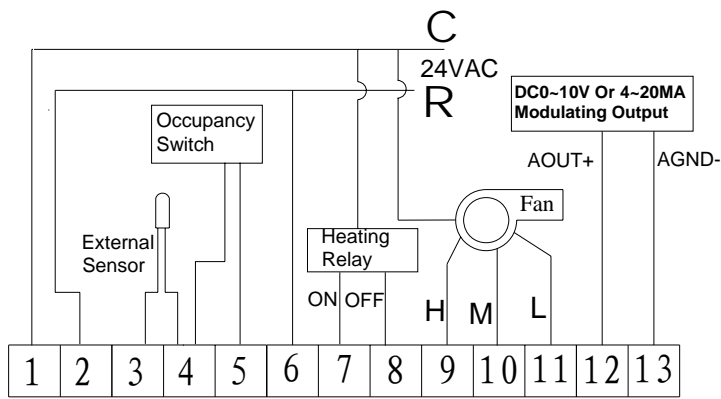
WIRING DIAGRAM

Figure 4

Figure 5

OPERATION

Control

Output 1: Terminal 12 and 13. The main output of the thermostat is modulating PI analog (4~20mA or 0-10Vdc). This signal uses a variable mA signal for the control of analog damper actuator and analog valve actuator in cooling or heating. (User can select On/Off output by terminal 7 and 9 to control heating system. See configuration menu item 12)

Output 2:On/off output from terminal 7 and 8. This output can be used as the main output for heating system or act as the second heating output. (See configuration menu item 12). If it is selected as the second heating output, it will activate the second stage heating when the setting temperature is 1℃ plus P-band value higher than room temperature.

System Button

Pushing system button to select among heat mode, cool mode and auto mode.

Heat mode: Thermostat operates only for heating

Cool mode: Thermostat operates only for cooling

Auto mode: Thermostat operates in automatic change over

Automatic change over function is available only when external sensor installed in terminal 3 and 4. In automatic changeover, the thermostat detects when the system switches between heat mode and cool mode by comparing the air supply temperature with the ambient temperature. If the thermostat is in heat mode, it switches to cool mode when the air supply is cooler than ambient by 5℃(9℉) or more. If it is in cool mode, it switches to heat mode when the air supply is warmer than ambient by 5℃(9℉) or more.

Fan Button

Fan speed switch on three-speed models allows selection of three different settings- (Low/Medium/High)

Setback Button

Holding the setback button for 5 seconds, the thermostat can shift from comfort mode to setback (energy saving). Factory default setting for setback mode in heating is 18℃ and for cooling is 25℃. ☀Shows indicate you are now in comfort mode while ☾ shows indicate you are now in setback mode. Every time you change the setting in comfort mode, the new setpoint will be memorized as the setpoint of the comfort mode.

You can change the setback setting in configuration menu item 5 and 6

Energy Saving Mode

Energy Saving mode is activated by a special input from a card key, occupancy switch or window contact switch. If the signal via input terminals 4 and 5 is calling for energy saving mode. Then the thermostat will control to user/installer defined setback setpoints for increased energy savings. The display will show ◖ symbol to indicate when this mode is active. ☞ Shows energy saving mode is activated by input signal. During energy saving mode, setpoint cannot be changed. The setback setpoint can be change in configuration item No.6 and No.7. Factory default setting for heating is 18℃, for cooling is 25℃.

For example, if the user setpoint is 21℃ and the energy Savings Mode setpoint for cooling (unoccupied cooling setpoint) has been set to 28℃, then the thermostat will control to 28℃ when the input signal activated the Energy Saving mode. .

The energy saving mode input can be configured within the configuration menu item 13 to be activated either a short circuit (default) or open circuit signals.
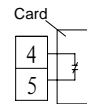
Dip Switch: A two-way DIP switch allows selection of modulating analog output between 4 to 20mA and 0~10V. Open the thermostat, you will find the JP6 in the rear board. Following figure showing you how to select 0~10V output and 4~20mA output via change the dip switch position.
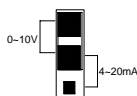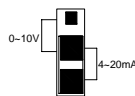
0~10V output   **4~20mA output**

Note: The configuration menu item 15 should match with the Dip Switch Position

CONFIGURATION

Configuration Menu

The configuration menu allows you to set certain thermostat operating characteristics to your system or personal requirements. Switch off the thermostat. Hold button (4) for 5 seconds to enter the configuration menu. The display will show the first item in the configuration menu 1. Press button (4) to shift to the next menu item. Use ▲、▼ to select. To exit the menu , pressing button (1) to switch off the thermostat. If no buttons are pressed within 20 seconds the thermostat will exit the menu. To revert to factory default setting , push (2) button for 3 seconds. Display will show "DEF" blinking 3 times and return to Menu item 1 indicates all the configuration setting has reverted to factory default setting.

The configuration menu chart summarizes the configuration options. An explanation of each option as follows:

1)   **Select ⁰F or ⁰C Readout**

Changes the display readout to Centigrade or Fahrenheit as required.

2)   **Select temperature recalibrates Adjustment 3 LO to 3 HI** –

You can adjust the room temperature display up to 3 higher or lower. Your thermostat was accurately calibrated at the factory but you have the option to change the display temperature to match your previous thermostat. The current or adjusted room temperature will be displayed on the right side of the display.

Item	Press buttons	Displayed（factory default）	Press▲、▼to select	Description
1	(4) For 5 second	FC （℃）	℃/℉	Select ºF or ºC Readout
2	(4)	CL （0）	-3 --- +3	Select temperature display adjustment higher or lower
3	(4)	CH （35℃/95℉）	18 ℃ (64 ℉)—35 ℃ (95 ℉)	Select maximum setpoint
4	(4)	CC （5℃/41℉）	5℃ (41℉)—20℃ (68℉)	Select minimum setpoint
5	(4)	UC （25℃/77℉）	25℃ (77℉)-30℃ (90℉)	Select setback point for cooling
6	(4)	UH （18℃/65℉）	10℃ (50℉)- 18℃ (65℉)	Select setback point for heating
7	(4)	PH （2）	0-10	Select P-band
8	(4)	LP （5）	1-10	Integral action time
9	(4)	FH （100）	（50-100）	Maximum integral part
10	(4)	FL （0）	（0-50）	Minimum of integral part
11	(4)	bL （1）	1/2/3	Select display backlight mode
12	(4)	HF （h1）	h1/OF/h2	Heating output type option
13	(4)	En （AC）	OU/AC	Active temperature sensor OU：Return air temperature sensor active AC：Room temperature sensor active AU: Mix temperature sensor active
13	(4)	rC （SC）	SC/OC/00	Activate energy saving mode option
14	(4)	U （I）	U: 0 - 10 VAC output I: 4 - 20 MA output	Choose the control mode between 0~10VAC output to 4~20MA output
15	Press Power Button return to close			

3) Select maximum temperature set point

This feature provides a maximum set point temperature. The default setting is 35℃ (95℉), It can be changed between 18℃ (64℉) to 35℃ (95℉)

4) Select minimum temperature set point.

This feature provides a minimum set point temperature. The default setting is 5℃ (41℉), It can be changed between 5℃ (41℉) to 20℃ (68℉)

5) Select energy saving setpoint for heating

This feature provides energy saving setpoint temperature for heating. The default setting is 16℃, It can be changed between 10℃to 18℃

6) Select energy saving setpoint for cooling

This feature allows you to set energy saving setpoint temperature for cooling. The default setting is 25℃, It can be changed between 25℃to 30℃

7) Select P-band

The proportional band is the amount of change required by the ambient temperature for the output to go from 0 to 100%. It can be adjust from 0~10℃. Factory default setting is 2℃. For example if the

P-band is set in 2℃ in the heat mode, with a 25℃ set point and an ambient temperature of 25℃, the modulating output is 0%; at 24℃ the output is 50%; and at 23℃ the output is 100%. The intergral gain implies that the longer the error between the ambient and the set point temperatures exists, the more the output will change to eliminate the error. The integral portion of the algorithm eliminates the temperature offset from the set point.

Heat mode (P-band: 2℃)

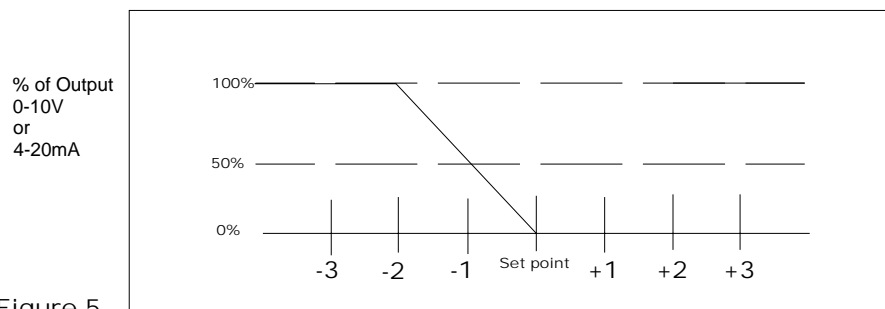When the ambient temperature is below the set point the output is somewhere between 0~100%

Figure 5

Cool mode(P-band: 2℃)

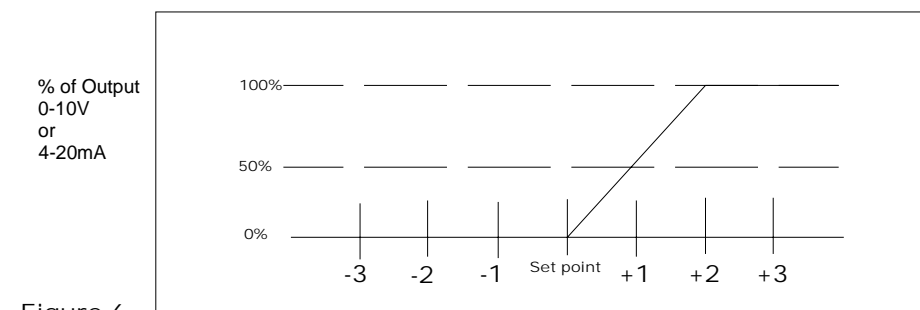When the ambient temperature is above the set point the output is somewhere between 0 and 100%

Figure 6

8) **Select integral action time**

    This feature allows you to set the integral action time for the integral to run from 0 to 100%. The value required depends on the reaction time of the control loop. If the time is chosen too short, the control loop will become instable and oscillate. If the time is chosen too long, the control loop will become sluggish.

9) **Select maximum integral portion**

    This feature allows you to set the maximum modulating output. For example, if you set the maximum integral portion to 80%, the maximum modulating output will be 8V or 16.8mA.

10) **Select minimum integral portion**

    This feature allows you to set the minimum modulating output. For example, if you set the maximum integral portion to 20%, the maximum modulating output will be 2V or 7.2mA.

11) **Display backlight option**

Select 1 the light will be on when any button of the thermostat is touched. Select 2 the display will keep the light on continuously. Select 3 the display will keep the light off continuously Factory default is 1

12) **Heating type option**

'**h1:** Only proportional output for heating control is available, terminal 12 and 13 (See Figure 4) is used as 0-10V or 4-20mA modulating output to control heating or cooling

OF: Only On/Off output for heating control is available. Terminal 7 and 8 (Figure 4) is the On/Off output to control heating. Terminal 12 and 13 is used as 0-10V or 4-20mA modulating output to control only cooling.

'**h2:** 2 stage heating active. Terminal 12 and 13 (See Figure 4) is used as 0-10V or 4-20mA modulating output to control 1st stage heating. Terminal 7 and 8 (Figure 4) is the On/Off output to control 2nd stage heating.

13) **Select active temperature sensor**

This feature provides two active temperature sensor option.

Select OU means return air temperature sensor active

Select AC means room temperature sensor active

Select AU means mix temperature sensor active for seasonal changeover

14) **Activate energy saving mode option**

This feature allows you to select the way to activate the energy saving mode.

Select OC to activate the energy mode by open circuit

Select SC to activate the energy mode by close circuit

Select 00 to cancel the energy mode

15) **Shift between 0~10VAC output to 4~20MA output**

This feature allows you to select the way to shift the mode between 0~10VAC output to 4~20MA output.

NOTE: Do not forget to change the position of the dip switch so that it can match with output option. (See dip switch in Operation Chapter)

CUSTOMER ASSISTANCE

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