ComfortVu™ BACnet Thermostat Plus

Model TBPL-24-H (24 Vac model) Installation and Operation Guide

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Overview

The ComfortVu™ BACnet Thermostat Standard Model TBPL-24-H can be used:

- As a stand-alone thermostat that can control equipment using built-in logic
- As part of an MS/TP network of BACnet Thermostats that can be managed from a BMS front-end system
- As part of a BACnet MS/TP network connected to an Carrier BACnet router in an i-Vu® system. The router's control programs provide trending and alarming of the BACnet Thermostat's data.

The TBPL-24-H thermostat has a glass framed enclosure with a backlit touch screen. It has on-board temperature and humidity sensing, and its on-board inputs and outputs are used to control equipment and optional external sensing devices. Inputs and outputs are configured using DIP switches and jumpers. The TBPL-24-H thermostat requires 24 Vac power.

See also:
ComfortVu™ BACnet Thermostat Points List and Technician Settings

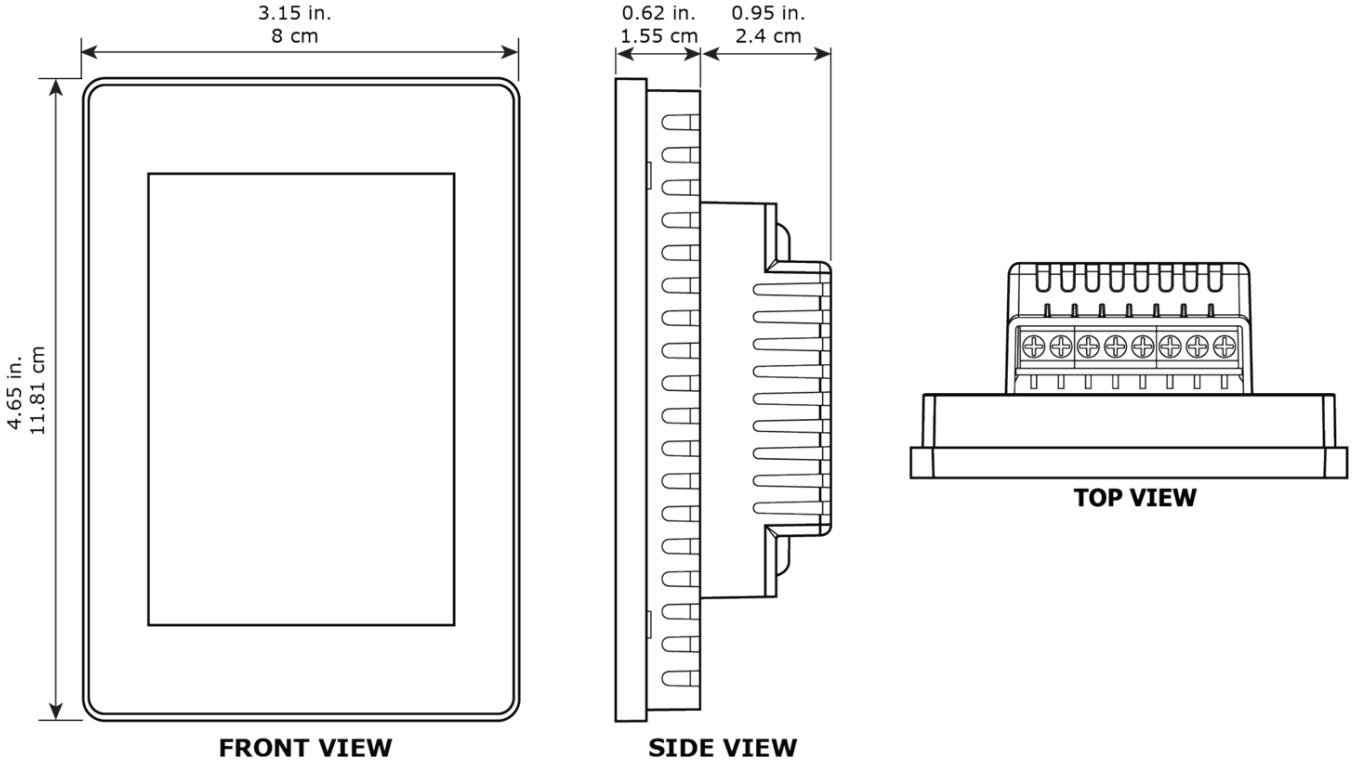
Specifications

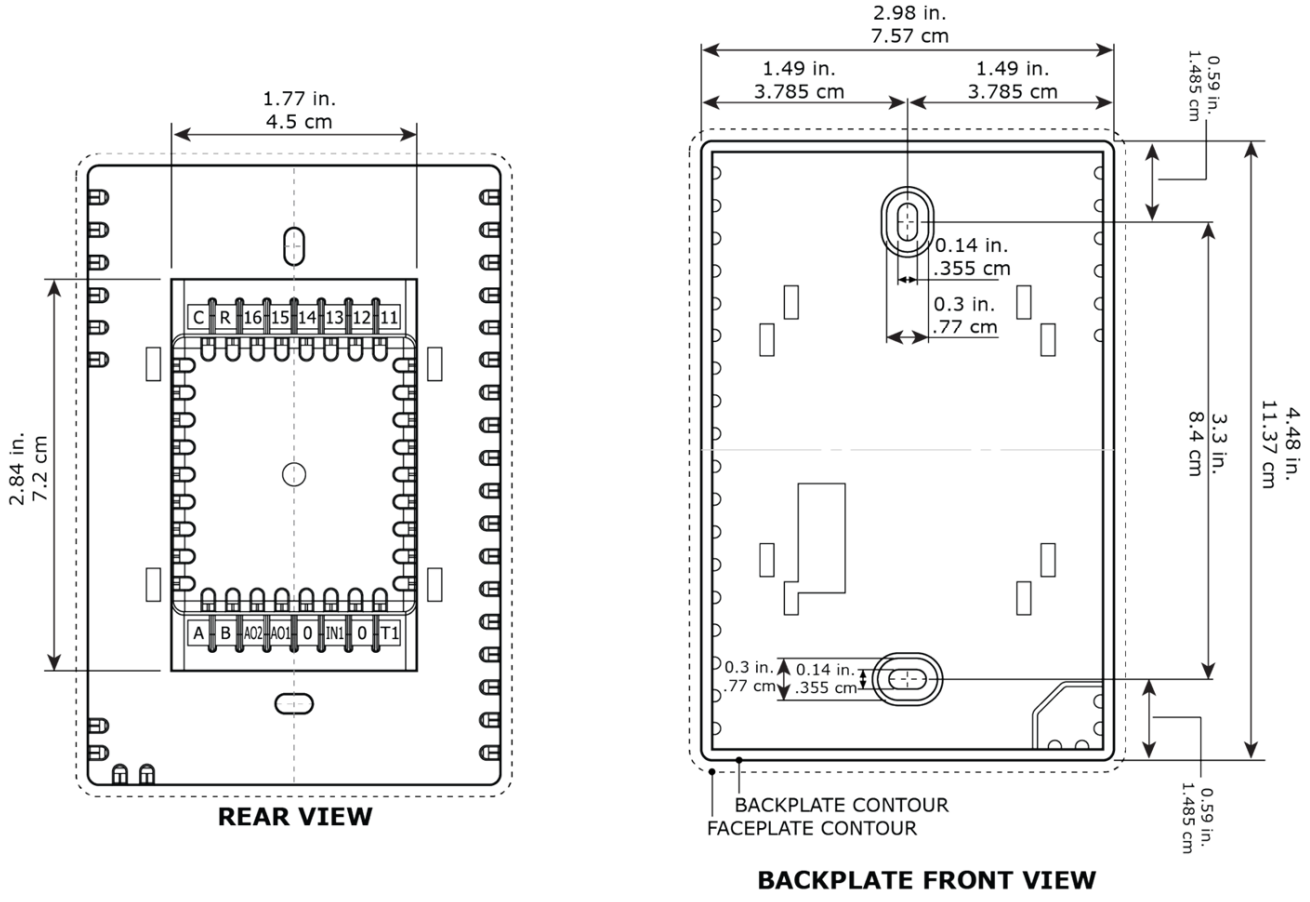
Sensing element:	Range	Accuracy
Temperature	41° F to 95° F (5° C to 35° C)	±1.0° F (0.5° C)
Humidity	10% to 90 %	±3.0% typical
Power	24 Vac, ±10%, 50-60Hz, 4VA **NOTE** Devices connected to outputs, such as a fan, will increase VA requirements.	
Communication	BACnet MS/TP with baud rates up to 76.8 kbps, detected and set automatically by the BACnet Thermostat. Max 127 devices.	
Inputs	T1, 0 – Normally open or normally closed dry contract, or 0-10 Vdc analog input, or 50 kOhm thermistor @ 25°C A, B - Communication +/- (RS485) IN1, 0 - Normally open or Normally closed dry contract, or 0-10 Vdc analog input, or 50 kOhm thermistor @ 25°C C, R - Power: 24 Vac	
Outputs	11, 12, 13 – Digital outputs, 3A 14. 15. 16 – Digital outputs 0.3A AO1 and AO2 – 0-10 Vdc, 5 mA max., not isolated	
Environmental operating range	50° to 122° F (10° to 50° C), 10 to 90% relative humidity, non-condensing	
Mounting	Wall mount on a 4" x 2-1.2 x 2" electrical J-box using provided 6/32 x 1/2" mounting screws	

Specifications

Weight	9.7 oz (0.28 kg)
Compliance	United States of America: FCC CFR47, Chapter 1, Subchapter A, Part 15, Class B Canada: Industry Canada Compliant, ICES-003, Class B Europe: CE Mark, Low Voltage Directive: 2014/35/EU RoHS Compliant: 2011/65/EU Australia and New Zealand: C-Tick Mark, AS/NZS 61000-6-3 Title 24 compliant if connected to a BMS with custom programming for economizer fault detection. CA Prop 65 Warning: This product can expose you to chemicals including Styrene and 1,3 - Propane sultone, which are known to the State of California to cause cancer. For more information, go to www.p65warnings.ca.gov.

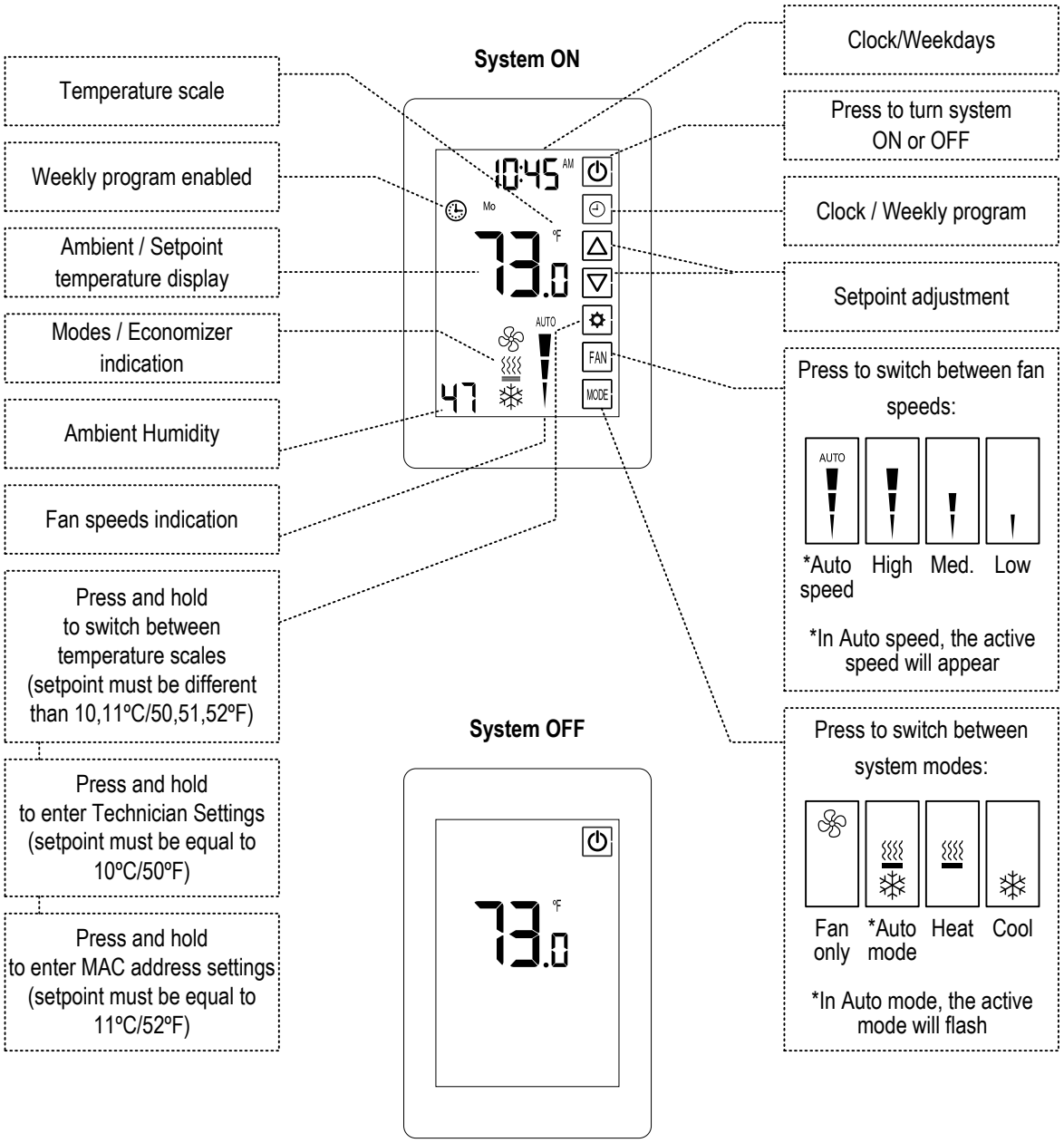
TBPL-24-H Dimensions





Operating instructions

Quick guide

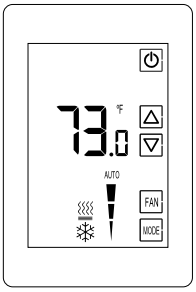


Operating instructions (cont.)

Turning the thermostat ON and OFF

- Press the ⏻ button to turn the unit ON. System mode and fan speed symbols will appear on display.
- Press again to turn the unit OFF. The symbols will disappear.

Unit OFF



Unit ON

Selecting temperature scale

Press and hold the ☼ button to switch between temperature scales.

Celsius

Fahrenheit

Adjusting the Setpoint temperature

In <u>One</u> setpoint configuration:

1. Press the ▲ or ▼ buttons once to view the setpoint temperature.
2. Press again to adjust the setpoint.

Setpoint

In <u>Two</u> setpoints configuration:

1. Press the ▲ or ▼ buttons once. "CL" and the setpoint temperature for cooling will appear on display.
2. Use the ▲ or ▼ buttons to adjust the setpoint for cooling.
3. Press the [Mode] button or wait 3 seconds. "Ht" and the setpoint temperature for heating will appear on display.
4. Use the ▲ or ▼ buttons to adjust the setpoint for heating.

Setpoint For cooling

Setpoint For heating

Notes:

- The setpoint for cooling must be higher than the setpoint for heating.
- For humidity setpoint, see Technician Settings P197.

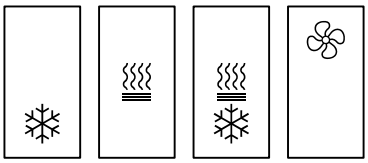
Operating instructions (cont.)

Selecting system mode

Press the [Mode] button to switch between system modes.

Notes:

- During demand for cooling or heating, the active mode will flash.
- In Auto mode, the active mode icon (Cool or Heat) will appear on display.
- Auto mode is not available in 2-Pipe system configuration.



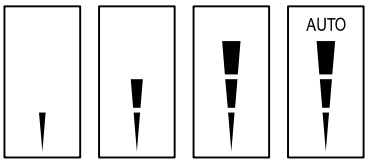
Cool **Heat** **Auto mode** **Fan only**

Selecting Fan speeds (for 2 and 3 fan speeds configuration)

Press the [Fan] button to switch between fan speeds.

Notes:

- In Auto speed, the active fan speed will appear on display.
- Medium speed available in 3 speeds configuration.



Low speed **Medium speed** **High speed** **Auto speed**

Turning Auto fan ON or OFF (fan on demand)

In 1-speed configuration:

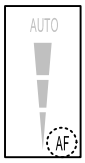
Press the [Fan] button to turn Auto fan ON or OFF.

In 2- and 3-speed configurations:

Press and hold the [Fan] button for 7 seconds to turn Auto fan ON or OFF.

- When ON, the fan will run on demand for cooling or heating.
- When OFF, the fan will run continuously.

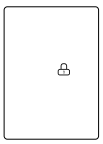
Note: Auto fan cannot be selected in Fan only mode.



Auto fan ON

Locking the thermostat buttons

- Press and hold the [Mode] button for 7 seconds to lock or unlock the thermostat buttons.
- When locked, the lock (🔒) icon will appear on display with any attempt to press the buttons.
- Enable or disable the option to lock different buttons using Technician Settings P4-P7.

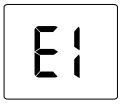


Lock indications

Operating instructions (cont.)

Economy mode

- Activate Economy mode by triggering a window contact, door switch, key-tag, remote economy switch, or through communication – binary value “UnoccupiedByNetwork”.
- When Economy mode is active, the thermostat will use special economy setpoints for cooling and heating set by technician.
  See objects “EconomySetpointinHeat” and “EconomySetpointinCool” in the Technician Settings section of this manual.



Economy by window contact

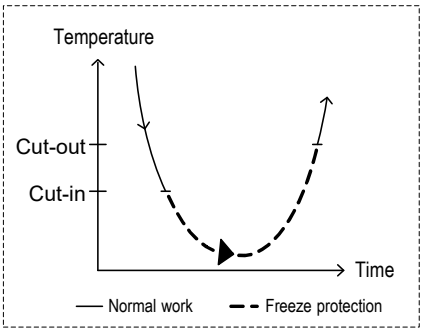
Economy by remote economy switch or through communication

Economy by door switch

Economy by Key-tag

Freeze Protection

The Freeze protection feature will not allow the room temperature to drop below predefined cut-in temperature. Depending on which configuration the system is operating under (W/WO Heat pump), this feature will force the system to operate in heat mode and activate the fan.
This feature will take effect when the thermostat is either ON or OFF.
When the room temperature rises above the predefined cut-out temperature, the thermostat will return to its previous state.
When freeze protection is activated, the display alternates between “AL” and room temperature.



Economizer

Economizer is used to reduce the energy consumed by the cooling systems, by using low external air temperatures to assist in the chilling process. When outdoor temperatures are lower relative to indoor (room) temperatures, the system utilizes the cool outdoor air as a free cooling source.

The outdoor temperature (Teconomizer) triggering the activation of the economizer, can be measured by the temperature sensor connected to T1,0 terminals (technician parameter P08="05") or by setting a temperature value manually through communication - AV#129 "TEconomizerEffective".
When getting the temperature through communication, terminals T1,0 can be used for any other functionality like External sensor/Soft start in heat sensor/De-icing in cool/Door switch/Key tag.

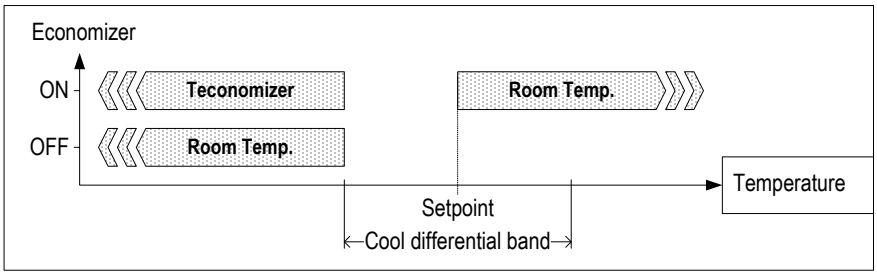
Whenever there is demand for cooling and the outdoor temperature conditions allow the operation of the economizer, it will operate together with the regular cooling system and will not replace it.

Economizer will start when both of the following conditions are satisfied:

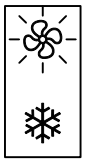
1. $Teconomizer\ temperature < Room\ temperature - \frac{Cool\ differential\ band}{2}$
2. $Room\ Temperature > Setpoint\ temperature$

Economizer will stop when the following condition is satisfied:

1. $Room\ Temperature < Setpoint\ temperature - \frac{Cool\ differential\ band}{2}$



Indication for the Economizer operation:
When Economizer is active, the Cool symbol will appear on display and the Fan symbol will flash.



Economizer active

Weekly program

General

Prior to programming, make sure that Technician Settings P107, P108, and P109 are configured correctly.

Program types

The thermostat can be configured to run four different types of weekly programs (set by Technician Setting P107):

- 7-day program with same parameters for all days.
- 7-day program with different parameters for each day of the week.
- One schedule for the weekdays (Monday to Friday), one schedule for Saturday and another one for Sunday.
- One schedule for the weekdays (Monday to Friday) and another one for Saturday and Sunday.

Daily events

Each daily program can use 2 or 4 schedule events per day (set by Technician Setting P108).

There are two options for settings the schedule events (set by Technician Setting P109):

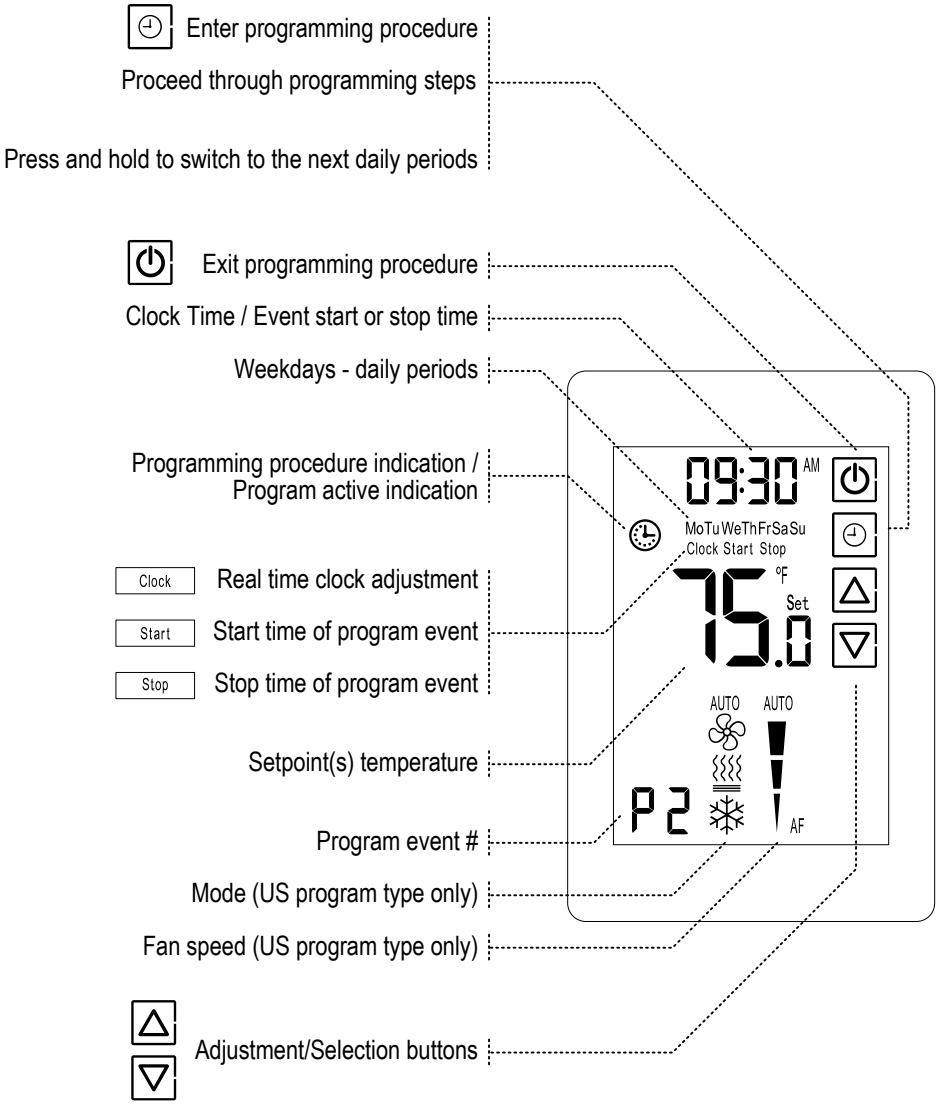
- **"EU Type"** - Start time and Stop time.
- **"US Type"** - Start time, setpoint temperatures, system mode and fan speed.

Enabling/Disabling/Overriding the program

- Select "00" in Technician Setting P107 to disable programming capabilities.
- When programming capabilities are enabled, press and hold the  button to temporarily discard the programmed schedule.
- Press and hold the button again to return to the program.
- The occupant can temporarily change the setpoint temperature to be different than the setpoint temperature specified by the program. Changes will be affective until the next program event begins.

Weekly program (cont.)

Program display



Weekly program (cont.)

Programming procedure

- The detailed programming procedure is described in the next sections. Make sure to follow the right programming procedure, suitable for the program type and features selected by Technician Settings.
- Press the button to enter and proceed through the steps of the real time clock and programming procedure.
- Use the ▲ or ▼ buttons to select or change value of a flashing icon.
- It is recommended to select programming values prior to the actual programming.

Exit the programming procedure

At anytime during the programming procedure, press the button to exit and return to normal display.

Any changed values will be saved.

Adjusting the time and day of the week

1. Press and hold the button. The word “Clock” will appear on display, and the HOURS will flash.

Hours

2. Use the ▲ or ▼ buttons to adjust the hours.

Minutes

3. Press the button again. The MINUTES will flash.
4. Use the ▲ or ▼ buttons to adjust the hours.

Days

5. Press the button again. The DAYS will flash.
6. Use the ▲ or ▼ buttons to select the day.

7. If Technician Setting P107 is not set to “00” (program is enabled), press the button to enter programming procedure. Otherwise, press the button to return to normal display.

Weekly program (cont.)

Adjusting "EU type" daily programs

Start time

1. Press the button. The programmed weekday(s), "P1" indicating the first program event of the day and the word "Start" will appear on display. The HOURS will flash. Use the ▲ or ▼ buttons to adjust the start time hours of the first event.

3. Press the button again. The MINUTES will flash.
4. Use the ▲ or ▼ buttons to adjust the start time minutes of the first event.

Stop time

5. Press the button again. The word "Stop" will appear on display, and the HOURS will flash.

6. Use the ▲ or ▼ buttons to adjust the stop time hours of the first event.
7. Press the button again. The MINUTES will flash.

8. Use the ▲ or ▼ buttons to adjust the stop time minutes of the first event.

- **Follow the steps above for the other schedule events of the same daily period (P2 for two events per day, or P2, P3, and P4 for four events per day).**
- **Follow the steps above for all daily periods.**

Weekly program (cont.)

Adjusting "US type" daily programs

Start time

1. Press the button. The programmed weekday(s), "P1" indicating the first program event of the day and the word "Start" will appear on display. The HOURS will flash.

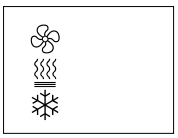
2. Use the ▲ or ▼ buttons to adjust the start time hours of the first event.
3. Press the button again. The MINUTES will flash.

4. Use the ▲ or ▼ buttons to adjust the start time minutes of the first event

.

System mode

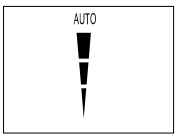
5. Press the button again. The selected system mode for the current programmed event will appear on display.



6. Use the ▲ or ▼ buttons to select the mode (default Auto mode).

Fan speed

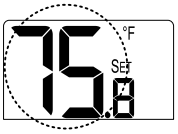
7. Press the button again. The selected fan speed for the current programmed event will appear on display.



8. Use the ▲ or ▼ buttons to select the fan speed (default Auto speed).

Setpoint

9. Press the button again. The setpoint will flash.



Note: If the thermostat is configured to have two setpoints, first adjust the setpoint for cooling and then the setpoint for heating.

10. Use the ▲ or ▼ buttons to select the system mode of the first event.

- **Follow the steps above for the other schedule events of the same daily period (P2 for two events per day, or P2, P3 and P4 for four events per day).**
- **Follow the steps above for all daily periods.**

MAC Address and BACnet Device Instance Number

MAC Address

To set the communication MAC Address:

1. Adjust the setpoint temperature to 11ºC/52ºF. The ⚙ button will appear on display.
2. To enter MAC Address settings, press and hold the ⚙ button for 5 seconds.
3. Use the ▲ or ▼ buttons to change the MAC Address.
4. Switch power supply off and on again for the MAC address changes to take effect.

Note: Set to "0" for no communication.

Caution: Do not use the same MAC address for two devices on the same communication line!

BACnet Device Instance Number

By default, the BACnet Device Instance Number is generated automatically by the thermostat (Vendor ID + MAC address). For example, Carrier's vendor ID is 16, and if the MAC address is 075, the BACnet Device Instance Number is 16075.
Note: If you change the MAC address, you must cycle the thermostat's power to reset the BACnet Device Instance Number.

You can override the automatically-generated BACnet Device Instance Number using the i-Vu application, an Analog Network Output microblock in a control program, or some other BACnet utility. Write the new BACnet Device Instance Number to the present_value property of Analog Value 42 (BACnetDeviceInstanceNumber).

Examples:

In the i-Vu application

1. Use the BACnet Discovery feature to discover the BACnet Thermostat and its BACnet objects.
2. In the navigation tree, select the Analog Value called BacnetDeviceInstanceNumber.
3. Change the Present Value field (shown below) to the desired BACnet Device Instance Number.
4. Click Accept.

In an Analog Network Output microblock

To change the BACnet Device Instance Number to 24113, the microblock's address would be:
bacnet://16075/AV:42/present_value, or
bacnet://16075/BACnetDeviceInstanceNumber

Installation

Mount the BACnet Thermostat on an interior wall in the room to be controlled approximately 1.5 meters (5 feet) from the floor. Locate it where the occupant can easily read the LCD display and use the controls. If the built-in temperature sensor is being used to measure room temperature, place the thermostat where the temperature is representative of the general room conditions. Avoid cold or warm air drafts, radiant heat, and direct sunlight.

WARNING: Risk of electric shock and property damage.
Disconnect power supply before making electrical connections.
The installation is to be performed by a qualified electrician.

WARNING: The integrated circuits in the controller are sensitive to static currents. Take suitable precautions.

Installation procedure

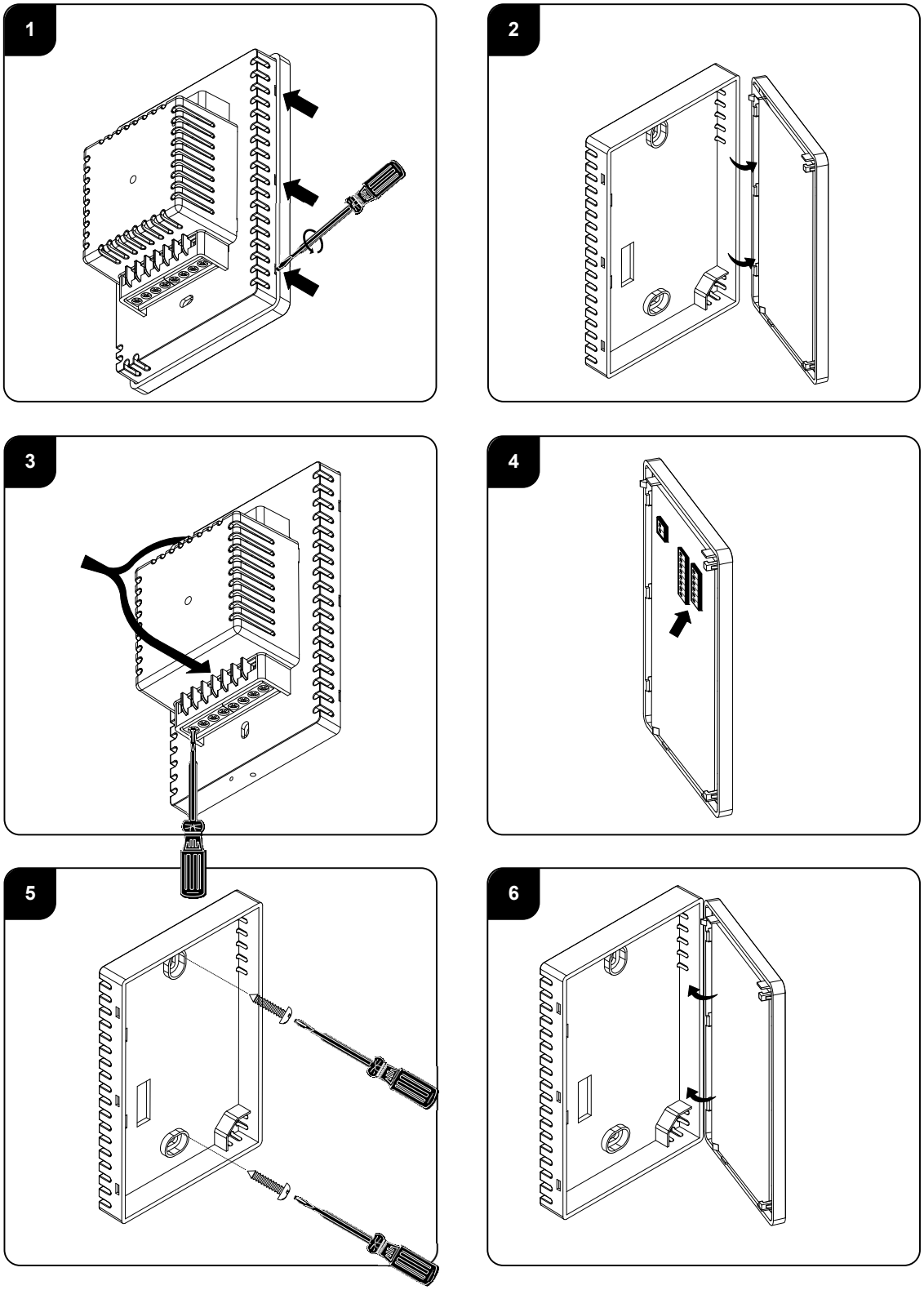
Prerequisite: Disconnect power to the main board before installing the unit.

1. Separate the front display from the back plastic cover by inserting a small flat screwdriver into each of the three slots and rotating it gently. See picture on next page.
2. Remove the front display and keep it in a safe place.
3. Connect wires as shown on the wiring diagram on page 21. All terminals accept 1x0.5mm^2/24 AWG.
4. Set DIP switch positions as explained in this manual.
5. Place the thermostat in the electrical box and tighten the 2 screws.

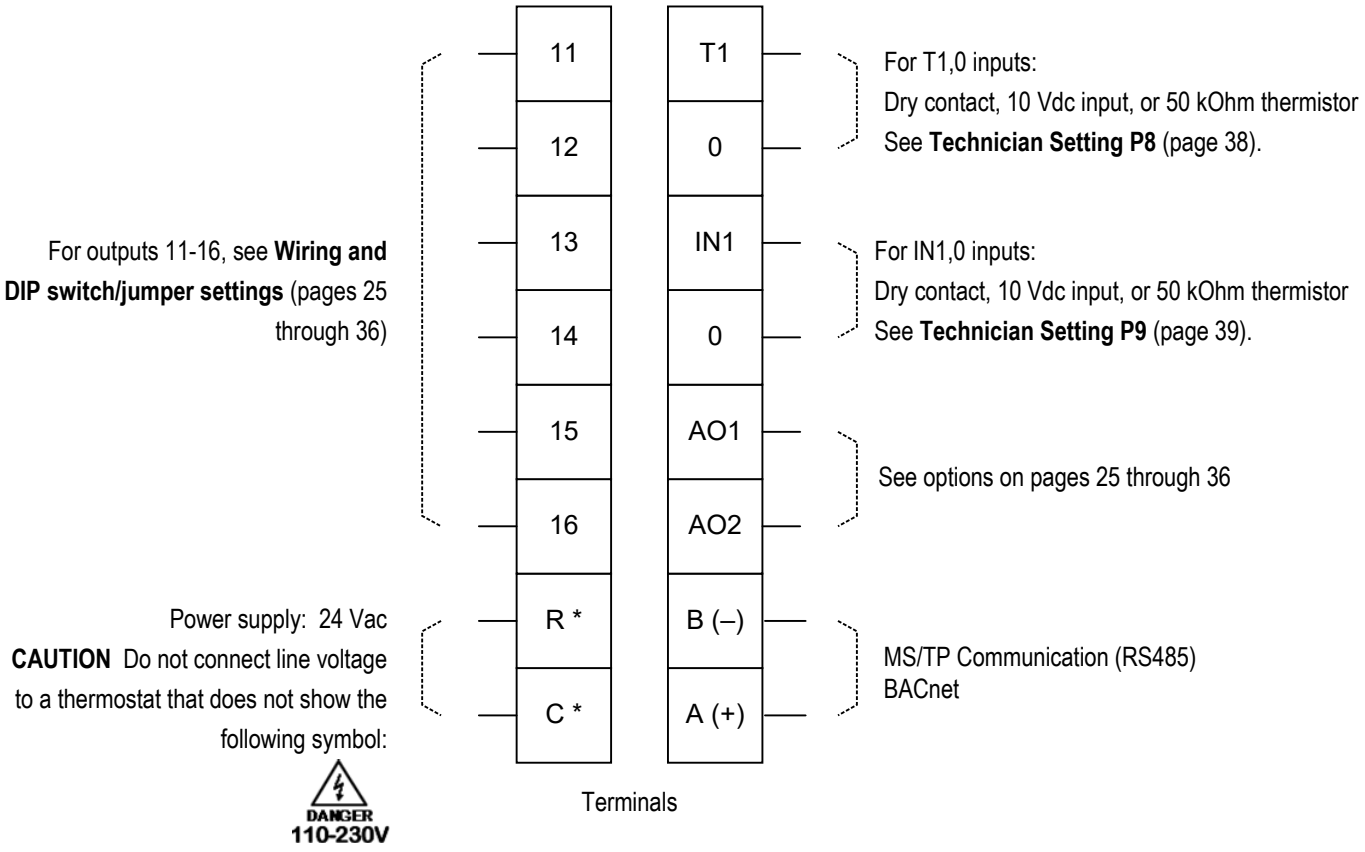
   Europe - Gewiss Box - GW 24 203 or similar

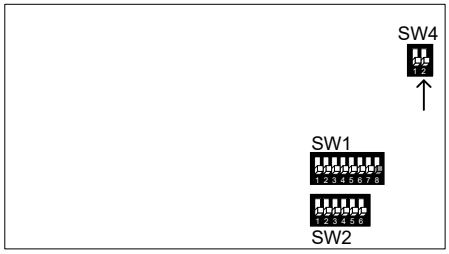
   US - Carlon – B114R or similar
6. Reattach the front display to the back cover by pushing it towards the wall.

Installation (cont.)



Wiring terminals and DIP switches



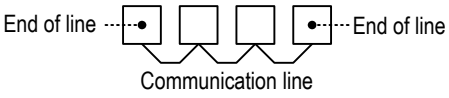


DIP Switch SW4.1 - End of line resistor (120Ω)

First and last units in communication line must be configured with 120Ω End of line resistor.

OFF = Not End of line 

ON = End of line 



SW4.2 – Not used

Always OFF

SW1 and SW2

See **Wiring and DIP switch settings** (pages 25 through 36).

AC configurations

Find the configuration you want in the tables below, then find that configuration number (1 through 21) on the **Wiring and DIP switch/ jumper settings** pages starting on page 25.

AC Configurations <u>without</u> humidification/dehumidification

Outputs / Configuration:	1	2	3	4	5	6	7	8	9	10
Heat elements (max.)	3	2		1	2	1		2	2	1
Compressors (max.)	2	2	2	1	1	1	2	1	2	2
Heat pump		●	●	●		●	●			●
Fan VFS						●	●	●		
Fan speeds	1	1	2 or 3	2 or 3	2 or 3				1	1
Economizer			○	○	○	○	○	○	●	●

AC Configurations <u>with</u> humidification/dehumidification

Outputs / Configuration:	11	12	13	14	15	16	17	18	19	20	21
Heat elements (max.)	3	2	2	1	2	1		1		1	2
Compressors (max.)	2	1	1	1	2	2	2	1	2	1	1
Heat pump		●		●		●	●	●	●	●	
Fan VFS									●	●	●
Fan speeds	1	1	2 or 3	2 or 3	1	1	2 or 3	2 or 3			
Economizer			○	○	●	●	○	○	○	○	○
Humidifier	●	●	●	●	●	●	●	●	●	●	●
Dehumidifier	● or	● or	● or	● or	● or	● or	●				
Reheat (Dehumidify)	●	●	●	●	●	●		●	●	●	●

● Yes ○ Option

FC configurations for 2-pipe systems

Find the configuration you want in the tables below, then find that configuration number (22 through 29) on the **Wiring and DIP switch/jumper settings** pages starting on page 31.

FC Configurations for 2-Pipe systems without humidification/dehumidification

Outputs / Configuration:	22	23	24	25
Cool/Heat valve	●		●	
Cool/Heat valve PID		●		●
Heat element (2nd stage)	○	○	○	○
Fan VFS			●	●
Fan speeds	1 2 3	1 2 3		
Economizer	○ ○	○ ○	○	○

FC Configurations for 2-Pipe systems with humidification/dehumidification

Outputs / Configuration:		26	27	28	29
Cool/Heat valve		●	●	●	
Cool/Heat valve PID					●
Heat element (2nd stage)		○	○	○	○
Fan VFS				●	
Fan speeds		1 2 3	1 2 3		1 2 3
Economizer		○ ○	○ ○	○	○ ○
Humidifier		●	●	●	●
Dehumidify	Dehumidifier	●			
		—or—			
	Reheat	●	●	●	●

● Yes ○ Option

FC configurations for 4-pipe systems / Floor heating

Find the configuration you want in the tables below, then find that configuration number (30 through 44) on the **Wiring and DIP switch/jumper settings** pages starting on page 33.

FC Configurations for 4-Pipe systems without humidification/dehumidification

Outputs / Configuration:	30	31	32	33	34	35	36	37	38	39	44
Cool valve	●	●				●	●	●			
Heat valve	●	●	●	●	●			●		●	●
Cool valve PID			PID	PID	●				PID	PID	●
Heat valve PID						PID	PID		PID		
Heat element (2nd stage)	○		○		○	○	○	○	○		
Fan VFS					●		●	●		●	●
Fan speeds	1 2 3	1 2 3	1 2 3	1 2 3		1 2 3			1 2 3		
Economizer	○ ○	○ ○	○ ○	○ ○	○	○ ○	○	○	○ ○	○	○
Floor heating		●		●						●	●

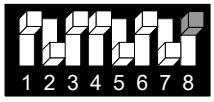
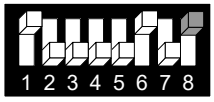
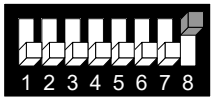
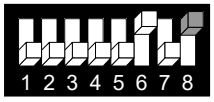
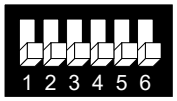
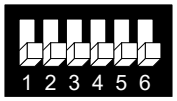
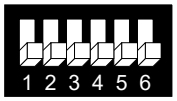
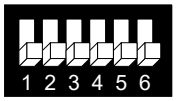
FC Configurations for 4-Pipe systems with humidification/dehumidification

Outputs / Configuration:		40	41	42	43
Cool valve		●	●		●
Heat valve		●	●	●	
Cool valve PID				PID	
Heat valve PID					PID
Heat element (2nd stage)		○	○	○	○
Fan VFS			●		
Fan speeds		1 2 3		1 2 3	1 2 3
Economizer		○ ○	○	○ ○	○ ○
Humidifier			○	○	○
Dehumidify	Dehumidifier	● or			
	Reheat	●	●	●	●

● Yes ○ Option

Wiring and DIP switch configurations – AC systems

Outputs	Config. 1: HC32 1 Speed fan	Config. 2: HP42 1 Speed fan	Config. 3: HP22 2/3 Speeds fan(1)	Config. 4: HP21 2/3 Speeds fan(1)
11	Heat element 3 (3rd stage heat)	Heat element 2 (4th stage heat)	Fan high	Fan high
12	Heat element 2 (2nd stage heat)	Heat element 1 (3rd stage heat)	Fan medium (or Economizer(5))	Fan medium (or Economizer(5))
13	Fan (1 speed)	Fan (1 speed)	Fan low	Fan low
14	Compressor 2	Compressor 2	Compressor 2	Heat element (2nd stage heat)
15	Compressor 1(3)	Compressor 1(3)	Compressor 1(3)	Compressor(3)
16	Heat element 1(2) (1st stage heat)	Heat pump(2)	Heat pump(2)	Heat pump(2)
AO1	X	X	X	X
AO2	X	X	X	X

SW1				
SW2				

(1) SW1.1, SW1.2 – Fan speeds: 2 speeds (Low and High): SW1.1 = OFF, SW1.2 = ON
3 speeds (Low, Med., and High): SW1.1 = OFF, SW1.2 = OFF

(2) SW1.4 – HP (Heat pump): ON = Heat pump active in cool, OFF = Heat pump active in heat
HC (not heat pump): ON = Electrical heater, OFF = Oil/Gas heater (no fan)

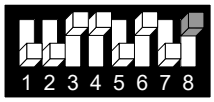
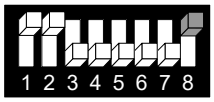
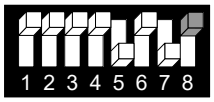
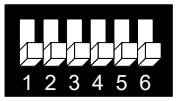
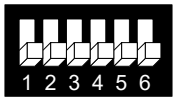
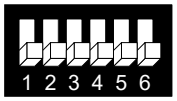
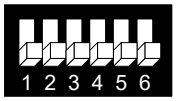
(3) SW1.5 – Compressor delay: ON = Disable, OFF = Enable

(5) SW2.6 – Terminal 12 operation: ON = Economizer
OFF = Fan Medium (3 speeds) / Terminal not in use (2 speeds/VFS)
Important: Economizer will not work in 3 fan speeds configuration.

See drawing on page 21 for DIP switch locations.

Control – Fan on/off, Heat elements, Heat pump, Compressors, Economizer: 24 Vac, 0.5A max

Wiring and DIP switch configurations – AC systems

Outputs	Config. 5: HC21 2/3 Speeds fan (1)	Config. 6: HP21 Fan VFS	Config. 7: HP22 Fan VFS	Config. 8: HC21 Fan VFS
11	Fan high	X	X	X
12	Fan medium (or Economizer (5))	Economizer (5) (option – SW2.6 ON)	Economizer (5) (option – SW2.6 ON)	Economizer (5) (option – SW2.6 ON)
13	Fan low	X	X	X
14	Heat element 2 (2nd stage heat)	Heat element (2nd stage heat)	Compressor 2 (3)	Heat element 2 (2nd stage heat)
15	Compressor (3)	Compressor (3)	Compressor 1 (3)	Compressor (3)
16	Heat element 1 (2) (1st stage heat)	Heat pump (2)	Heat pump (2)	Heat element 1 (2) (1st stage heat)
AO1	X	X	X	X
AO2	X	Fan VFS	Fan VFS	Fan VFS
SW1				
SW2				

(1) SW1.1, SW1.2 – Fan speeds: 2 speeds (Low and High): SW1.1 = OFF, SW1.2 = ON
3 speeds (Low, Med., and High): SW1.1 = OFF, SW1.2 = OFF

(2) SW1.4 – HP (Heat pump): ON = Heat pump active in cool, OFF = Heat pump active in heat
HC (not heat pump): ON = Electrical heater, OFF = Oil/Gas heater (no fan)

(3) SW1.5 – Compressor delay: ON = Disable, OFF = Enable

(5) SW2.6 – Terminal 12 operation: ON = Economizer
OFF = Fan Medium (3 speeds) / Terminal not in use (2 speeds/VFS)
Important: Economizer will not work in 3 fan speeds configuration.

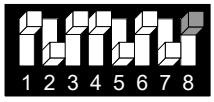
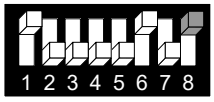
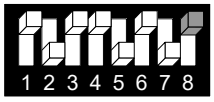
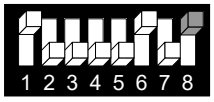
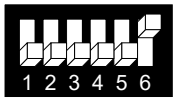
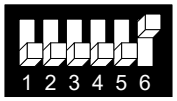
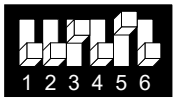
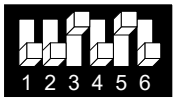
See drawing on page 21 for DIP switch locations.

Fan VFS: 0-10 Vdc, 0.5 mA Not isolated

Control – Fan on/off, Heat elements, Heat pump, Compressors, Economizer: 24 Vac, 0.5A max

Wiring and DIP switch configurations – AC systems

Outputs	Config. 9: HC22 1 Speed fan, Economizer	Config. 10: HP32 1 Speed fan, Economizer	Config. 11: HC32 1 Speed fan, Humidifier, Dehum/Reheat for Dehumidification	Config. 12: HP42 1 Speed fan, Humidifier, Dehum/Reheat for Dehumidification
11	Heat element 2 (2nd stage heat)	Heat element (3rd stage heat)	Heat element 3 (3rd stage heat)	Heat element 2 (4th stage heat)
12	Economizer	Economizer	Heat element 2 (2nd stage heat)	Heat element 1 (3rd stage heat)
13	Fan (1 speed)	Fan (1 speed)	Fan (1 speed)	Fan (1 speed)
14	Compressor 2 (3)	Compressor 2 (3)	Compressor 2 (3)	Heat pump (2)
15	Compressor 1 (3)	Compressor 1 (3)	Compressor 1 (3)	Compressor 2 (3)
16	Heat element 1 (1st stage heat)	Heat pump (2)	Heat element 1 (1st stage heat)	Compressor 1 (3)
AO1	X	X	Humidifier	Humidifier
AO2	X	X	Dehumidifier (4) (option - See SW2.3)	Dehumidifier (4) (option - See SW2.3)

SW1				
SW2				

(2) SW1.4 – HP (Heat pump): ON = Heat pump active in cool, OFF = Heat pump active in heat
HC (not heat pump): ON = Electrical heater, OFF = Oil/Gas heater (no fan)

(3) SW1.5 – Compressor delay: ON = Disable, OFF = Enable

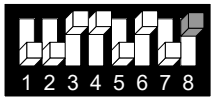
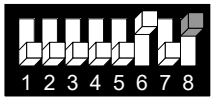
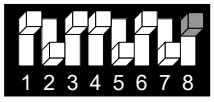
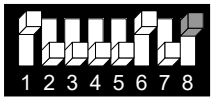
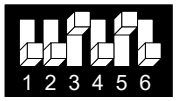
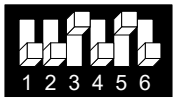
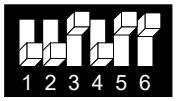
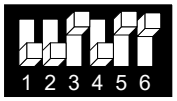
(4) SW2.3 – Dehumidification: ON = Use dehumidifier
OFF = Use reheat for dehumidification

(5) SW2.6 – Terminal 12 operation: ON = Economizer
OFF = Terminal not in use (1 speed)
Important: Economizer will not work in 3 fan speeds configuration.

See drawing on page 21 for DIP switch locations.

Control – Fan on/off, Heat elements, Heat pump, Compressors, Economizer: 24 Vac, 0.5A max

Wiring and DIP switch configurations – AC systems

Outputs	Config. 13: HC21 2/3 Speeds fan (1), Humidifier, Dehum/Reheat for Dehumidification	Config. 14: HP21 2/3 Speeds fan (1), Humidifier, Dehum/Reheat for Dehumidification	Config. 15: HC22 1 Speed fan, Economizer, Humidifier, Dehum/Reheat for Dehumidification	Config. 16: HP32 1 Speed fan, Economizer, Humidifier, Dehum/Reheat for Dehumidification
11	Fan high	Fan high	Heat element 2 (2nd stage heat)	Heat element (3rd stage heat)
12	Fan medium (or Economizer(5))	Fan medium (or Economizer(5))	Economizer	Economizer
13	Fan low	Fan low	Fan (1 speed)	Fan (1 speed)
14	Heat element 2 (2nd stage heat)	Heat element (2nd stage heat)	Compressor 2 (3)	Compressor 2 (3)
15	Compressor (3)	Compressor (3)	Compressor 1(3)	Compressor 1(3)
16	Heat element 1(2) (1st stage heat)	Heat pump (2)	Heat element 1 (2) (1st stage heat)	Heat pump (2)
AO1	Humidifier	Humidifier	Humidifier	Humidifier
AO2	Dehumidifier (4) (option - See SW2.3)	Dehumidifier (4) (option - See SW2.3)	Dehumidifier (4) (option - See SW2.3)	Dehumidifier (4) (option - See SW2.3)
SW1				
SW2				

(1) SW1.1, SW1.2 – Fan speeds: 2 speeds (Low and High): SW1.1 = OFF, SW1.2 = ON
3 speeds (Low, Med., and High): SW1.1 = OFF, SW1.2 = OFF

(2) SW1.4 – HP (Heat pump): ON = Heat pump active in cool, OFF = Heat pump active in heat
HC (not heat pump): ON = Electrical heater, OFF = Oil/Gas heater (no fan)

(3) SW1.5 – Compressor delay: ON = Disable, OFF = Enable

(4) SW2.3 – Dehumidification: ON = Use dehumidifier
OFF = Use reheat for dehumidification

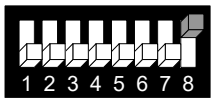
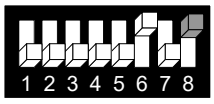
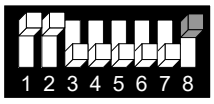
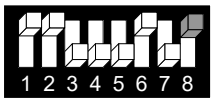
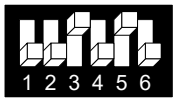
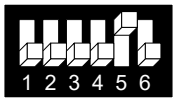
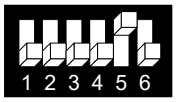
(5) SW2.6 – Terminal 12 operation: ON = Economizer
OFF = Fan Medium (3 speeds) / Terminal not in use (1/2 speeds)
Important: Economizer will not work in 3 fan speeds configuration.

See drawing on page 21 for DIP switch locations.

Humidifier, Dehumidifier: 0-10 Vdc, 0.5 mA Not isolated
Control – Fan on/off, Heat elements, Heat pump, Compressors, Economizer: 24 Vac, 0.5A max

Wiring and DIP switch configurations – AC systems

Outputs	Config. 17: HP22 2/3 Speed fan (1), Humidifier, Dehumidifier	Config. 18: HP21 2/3 Speed fan (1), Humidifier, Reheat for Dehumidification	Config. 19: HP22 Fan VFS, Humidifier	Config. 20: HP21 Fan VFS, Humidifier, Reheat for Dehumidification
11	Fan high	Fan high	X	X
12	Fan medium (or Economizer (5))	Fan medium (or Economizer (5))	Economizer (5) (option – SW2.6 ON)	Economizer (5) (option – SW2.6 ON)
13	Fan low	Fan low	X	X
14	Compressor 2 (3)	Heat element (2nd stage heat)	Compressor 2 (3)	Heat element (2nd stage heat)
15	Compressor 1 (3)	Compressor (3)	Compressor 1 (3)	Compressor (3)
16	Heat pump (2)	Heat pump (2)	Heat pump (2)	Heat pump (2)
AO1	Humidifier	Humidifier	Humidifier	Humidifier
AO2	Dehumidifier	X	Fan VFS	Fan VFS

SW1				
SW2				

(1) SW1.1, SW1.2 – Fan speeds: 2 speeds (Low and High): SW1.1 = OFF, SW1.2 = ON
3 speeds (Low, Med., and High): SW1.1 = OFF, SW1.2 = OFF

(2) SW1.4 – HP (Heat pump): ON = Heat pump active in cool, OFF = Heat pump active in heat
HC (not heat pump): ON = Electrical heater, OFF = Oil/Gas heater (no fan)

(3) SW1.5 – Compressor delay: ON = Disable, OFF = Enable

(5) SW2.6 – Terminal 12 operation: ON = Economizer
OFF = Fan Medium (3 speeds) / Terminal not in use (1/2 speeds/VFS)
Important: Economizer will not work in 3 fan speeds configuration.

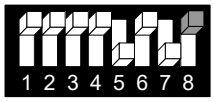
See drawing on page 21 for DIP switch locations.

Humidifier, Dehumidifier: 0-10 Vdc, 0.5 mA Not isolated

Control – Fan on/off, Heat elements, Heat pump, Compressors, Economizer: 24 Vac, 0.5A max

Wiring and DIP switch configurations – AC systems

Outputs	Config. 21: HC21 Fan VFS, Humidifier, Reheat for Dehumidification
11	X
12	Economizer (5) (option – SW2.6 ON)
13	X
14	Heat element 2 (2nd stage heat)
15	Compressor (3)
16	Heat element 1 (2) (1st stage heat)
AO1	Humidifier
AO2	Fan VFS

SW1	
SW2	

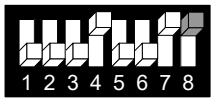
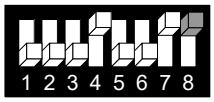
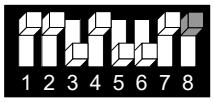
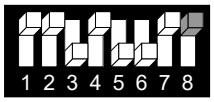
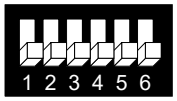
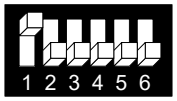
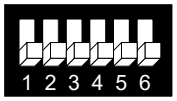
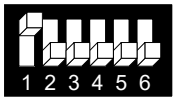
(2) SW1.4 – HC (not heat pump): ON = Electrical heater, OFF = Oil/Gas heater (no fan)
(3) SW1.5 – Compressor delay: ON = Disable, OFF = Enable
(5) SW2.6 – Terminal 12 operation: ON = Economizer
OFF = Terminal not in use

See drawing on page 21 for DIP switch locations.

Humidifier, Dehumidifier: 0-10 Vdc, 0.5 mA Not isolated
Control – Heat elements, Heat pump, Compressors, Economizer: 24 Vac, 0.5A max

Wiring and DIP switch configurations – FC systems – 2-pipe

Outputs	Config. 22: 2-Pipe, 1/2/3 Speeds fan (1)	Config. 23: 2-Pipe, 1/2/3 Speeds fan (1) Cool/Heat PID	Config. 24: 2-Pipe, Fan VFS	Config. 25: 2-Pipe, Fan VFS, Cool/Heat PID
11	Fan high	Fan high	X	X
12	Fan medium (or Economizer (5))	Fan medium (or Economizer (5))	Economizer (5) (option – SW2.6 ON)	Economizer (5) (option – SW2.6 ON)
13	Fan low	Fan low	X	X
14	Heat element (2) (2nd stage heat)	Heat element (2) (2nd stage heat)	Heat element (2) (2nd stage heat)	Heat element (2) (2nd stage heat)
15	Cool/Heat valve (3) (1st stage heat)	X	Cool/Heat valve (3) (1st stage heat)	X
16	X	X	X	X
AO1	X	Cool/Heat valve PID (3) (1st stage heat)	X	Cool/Heat valve PID (3) (1st stage heat)
AO2	X	X	Fan VFS	Fan VFS

SW1				
SW2				

(1) SW1.1, SW1.2 – Fan speeds:
- 1 speed (Low): SW1.1 = ON, SW1.2 = OFF
- 2 speeds(Low and High): SW1.1 = OFF, SW1.2 = ON
- 3 speeds(Low, Medium, and High): SW1.1 = OFF, SW1.2 = OFF

(2) SW1.4 – 2nd heating stage: ON = Enable, OFF = Disable

(3) SW1.5 – Chilled beam option: ON = Enable chilled beam (fan will not run with 1st stage cooling)

(4) SW2.3 – Dehumidification:
- ON = Use dehumidifier
- OFF = Use reheat for dehumidification

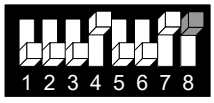
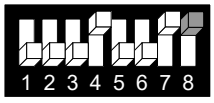
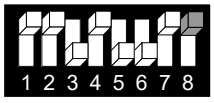
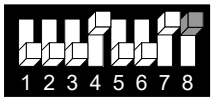
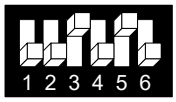
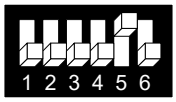
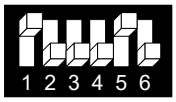
(5) SW2.6 – Terminal 12 operation:
- ON = Economizer
- OFF = Fan Medium (3 speeds) / Terminal not in use (1/2 speeds/VFS)
- Important: Economizer will not work in 3 fan speeds configuration.

See drawing on page 21 for DIP switch locations.

Fan VFS, PID valves: 0-10 Vdc, 0.5 mA Not isolated

Control – Fan on/off, Heat elements, Cool/Heat valves, Economizer: 24 Vac, 0.5A max

Wiring and DIP switch configurations – FC systems – 2-pipe

Outputs	Config. 26: 2-Pipe, 1/2/3 Speeds fan (1), Humidifier, Dehum/Reheat for Dehumidification	Config. 27: 2-Pipe, 1/2/3 Speeds fan (1), Cool/Heat valve, Humidifier, Reheat for Dehumidification	Config. 28: 2-Pipe, Fan VFS, Humidifier Reheat for Dehumidification	Config. 29: 2-Pipe, 1/2/3 speeds fan (1), Cool/Heat PID, Humidifier, Reheat for Dehumidification
11	Fan high	Fan high	X	Fan high
12	Fan medium (or Economizer (5))	Fan medium (or Economizer (5))	Economizer (5) (option – SW2.6 ON)	Fan medium (or Economizer (5))
13	Fan low	Fan low	X	Fan low
14	Heat element (2) (2nd stage heat)	Heat element (2) (2nd stage heat)	Heat element (2) (2nd stage heat)	Heat element (2) (2nd stage heat)
15	Cool/Heat valve (3) (1st stage heat)	Cool/Heat valve (3) (1st stage heat)	Cool/Heat valve (3) (1st stage heat)	X
16	X	X	X	X
AO1	Humidifier	Humidifier	Humidifier	Cool/Heat valve PID (3) (1st stage heat)
AO2	Dehumidifier (4) (option - See SW2.3)	X	Fan VFS	Humidifier
SW1				
SW2				

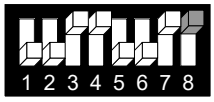
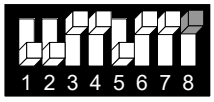
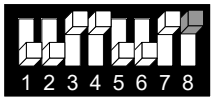
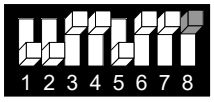
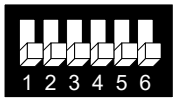
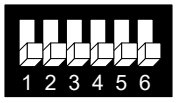
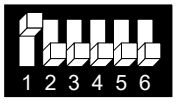
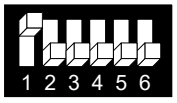
(1) SW1.1, SW1.2 – Fan speeds:	1 speed (Low):	SW1.1 = ON, SW1.2 = OFF
	2 speeds(Low and High):	SW1.1 = OFF, SW1.2 = ON
	3 speeds(Low, Medium, and High):	SW1.1 = OFF, SW1.2 = OFF
(2) SW1.4 – 2nd heating stage:	ON = Enable, OFF = Disable	
(3) SW1.5 – Chilled beam option:	ON = Enable chilled beam (fan will not run with 1st stage cooling)	
(4) SW2.3 – Dehumidification:	ON = Use dehumidifier	
	OFF = Use reheat for dehumidification	
(5) SW2.6 – Terminal 12 operation:	ON = Economizer	
	OFF = Fan Medium (3 speeds) / Terminal not in use (1/2 speeds/VFS)	
	Important: Economizer will not work in 3 fan speeds configuration.	

See drawing on page 21 for DIP switch locations.

Fan VFS, PID valves, Hum., Dehum.: 0-10 Vdc, 0.5 mA Not isolated
Control – Fan on/off, Heat elements, Cool/Heat valves, Economizer: 24 Vac, 0.5A max

Wiring and DIP switch configurations – FC systems – 4-pipe

Outputs	Config. 30: 4-Pipe, 1/2/3 Speeds fan (1)	Config. 31: 4-Pipe, 1/2/3 Speeds fan (1), Floor heating	Config. 32: 4-Pipe, 1/2/3 Speeds fan (1), Cool valve PID	Config. 33: 4-Pipe, 1/2/3 Speeds fan (1), Cool valve PID, Floor heating
11	Fan high	Fan high	Fan high	Fan high
12	Fan medium (or Economizer (5))	Fan medium (or Economizer (5))	Fan medium (or Economizer (5))	Fan medium (or Economizer (5))
13	Fan low	Fan low	Fan low	Fan low
14	Heat element (2) (2nd stage heat)	Floor heating (1st stage heat – no fan)	Heat element (2) (2nd stage heat)	Floor heating (1st stage heat – no fan)
15	Cool valve (3)	Cool valve (3)	X	X
16	Heat valve (1st stage heat)	Heat valve (2nd stage heat)	Heat valve (1st stage heat)	Heat valve (2nd stage heat)
AO1	X	X	Cool valve PID (3)	Cool valve PID (3)
AO2	X	X	X	X

SW1				
SW2				

(1) SW1.1, SW1.2 – Fan speeds:
- 1 speed (Low): SW1.1 = ON, SW1.2 = OFF
- 2 speeds(Low and High): SW1.1 = OFF, SW1.2 = ON
- 3 speeds(Low, Medium, and High): SW1.1 = OFF, SW1.2 = OFF

(2) SW1.4 – 2nd heating stage: ON = Enable, OFF = Disable

(3) SW1.5 – Chilled beam option: ON = Enable chilled beam (fan will not run with 1st stage cooling)

(4) SW2.3 – Dehumidification:
- ON = Use dehumidifier
- OFF = Use reheat for dehumidification

(5) SW2.6 – Terminal 12 operation:
- ON = Economizer
- OFF = Fan Medium (3 speeds) / Terminal not in use (1/2 speeds)
- Important: Economizer will not work in 3 fan speeds configuration.

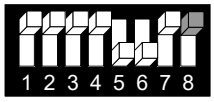
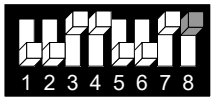
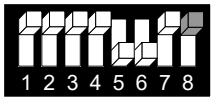
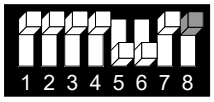
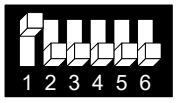
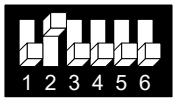
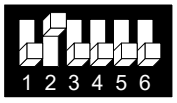
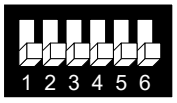
See drawing on page 21 for DIP switch locations.

Fan VFS, PID valves: 0-10 Vdc, 0.5 mA Not isolated

Control – Fan on/off, Heat elements, Cool/Heat valves, Economizer: 24 Vac, 0.5A max

Wiring and DIP switch configurations – FC systems – 4-pipe

Outputs	Config: 34: 4-Pipe, Fan VFS, Cool valve PID	Config: 35: 4-Pipe, 1/2/3 Speeds fan(1), Heat valve PID	Config: 36: 4-Pipe, Fan VFS, Heat valve PID	Config: 37: 4-Pipe, Fan VFS
11	X	Fan high	X	X
12	Economizer(5) (option – SW2.6 ON)	Fan medium (or Economizer(5))	Economizer (5) (option – SW2.6 ON)	Economizer (5) (option – SW2.6 ON)
13	X	Fan low	X	X
14	Heat element (2) (2nd stage heat)	Heat element (2) (2nd stage heat)	Heat element (2) (2nd stage heat)	Heat element (2) (2nd stage heat)
15	X	Cool valve (3)	Cool valve (3)	Cool valve (3)
16	Heat valve (1st stage heat)	X	X	Heat valve (1st stage heat)
AO1	Cool valve PID(3)	Heat valve PID (1st stage heat)	Heat valve PID (1st stage heat)	X
AO2	Fan VFS	X	Fan VFS	Fan VFS

SW1				
SW2				

(1) SW1.1, SW1.2 – Fan speeds:	1 speed (Low):	SW1.1 = ON, SW1.2 = OFF
	2 speeds(Low and High):	SW1.1 = OFF, SW1.2 = ON
	3 speeds(Low, Medium, and High):	SW1.1 = OFF, SW1.2 = OFF
(2) SW1.4 – 2nd heating stage:	ON = Enable, OFF = Disable	
(3) SW1.5 – Chilled beam option:	ON = Enable chilled beam (fan will not run with 1st stage cooling)	
(4) SW2.3 – Dehumidification:	ON = Use dehumidifier	
	OFF = Use reheat for dehumidification	
(5) SW2.6 – Terminal 12 operation:	ON = Economizer	
	OFF = Fan Medium (3 speeds) / Terminal not in use (1/2 speeds/VFS)	
	Important: Economizer will not work in 3 fan speeds configuration.	

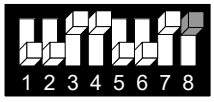
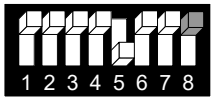
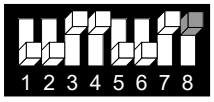
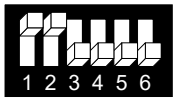
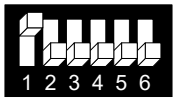
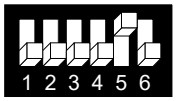
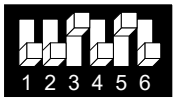
See drawing on page 21 for DIP switch locations.

Fan VFS, PID valves: 0-10 Vdc, 0.5 mA Not isolated

Control – Fan on/off, Heat elements, Cool/Heat valves, Economizer: 24 Vac, 0.5A max

Wiring and DIP switch configurations – FC systems – 4-pipe

Outputs	Config. 38: 4-Pipe, 1/2/3 Speeds fan (1), Heat valve PID, Cool valve PID	Config. 39: 4-Pipe, VFS Fan, Cool valve PID, Floor heating	Config. 40: 4-Pipe, 1/2/3 Speeds fan (1), Humidifier, Reheat for Dehumidification	Config. 41: 4-Pipe, 1/2/3 Speeds fan (1), Humidifier, Dehum/Reheat for Dehumidification
11	Fan high	X	Fan high	Fan high
12	Fan medium (or Economizer(5))	Economizer(5) (option – SW2.6 ON)	Fan medium (or Economizer(5))	Fan medium (or Economizer(5))
13	Fan low	X	Fan low	Fan low
14	Heat element(2) (2nd stage heat)	Floor heating (1st stage heat – no fan)	Heat element(2) (2nd stage heat)	Heat element(2) (2nd stage heat)
15	X	X	Cool valve(3)	Cool valve(3)
16	X	Heat valve (2nd stage heat)	Heat valve (1st stage heat)	Heat valve (1st stage heat)
AO1	Cool valve PID(3)	Cool valve PID(3)	Humidifier	Humidifier
AO2	Heat valve PID (1st stage heat)	Fan VFS	X	Dehumidifier(4) (option - See SW2.3)

SW1				
SW2				

(1) SW1.1, SW1.2 – Fan speeds:
- 1 speed (Low): SW1.1 = ON, SW1.2 = OFF
- 2 speeds(Low and High): SW1.1 = OFF, SW1.2 = ON
- 3 speeds(Low, Medium, and High): SW1.1 = OFF, SW1.2 = OFF

(2) SW1.4 – 2nd heating stage: ON = Enable, OFF = Disable

(3) SW1.5 – Chilled beam option: ON = Enable chilled beam (fan will not run with 1st stage cooling)

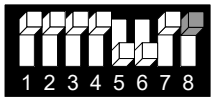
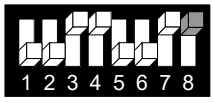
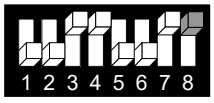
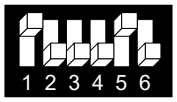
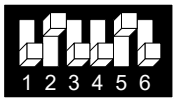
(4) SW2.3 – Dehumidification:
- ON = Use dehumidifier
- OFF = Use reheat for dehumidification

(5) SW2.6 – Terminal 12 operation:
- ON = Economizer
- OFF = Fan Medium (3 speeds) / Terminal not in use (1/2 speeds/VFS)
- Important: Economizer will not work in 3 fan speeds configuration.

See drawing on page 21 for DIP switch locations.

PID valves: 0-10 Vdc, 0.5 mA Not isolated
Control – Fan on/off, Heat elements, Cool/Heat valves, Economizer: 24 Vac, 0.5A max

Wiring and DIP switch configurations – FC systems – 4-pipe

Outputs	Config. 42: 4-Pipe, Fan VFS, Humidifier, Reheat for Dehumidification	Config. 43: 4-Pipe, 1/2/3 Speeds fan (1), Cool valve PID Humidifier, Reheat for Dehumidification	Config. 44: 4-Pipe, 1/2/3 Speeds fan (1), Heat valve PID Humidifier, Reheat for Dehumidification
11	X	Fan high	Fan high
12	Economizer (5) (option – SW2.6 ON)	Fan medium (or Economizer (5))	Fan medium (or Economizer (5))
13	X	Fan low	Fan low
14	Heat element (2) (2nd stage heat)	Heat element (2) (2nd stage heat)	Heat element (2) (2nd stage heat)
15	Cool valve (3)	x	Cool valve (3)
16	Heat valve (1st stage heat)	Heat valve (1st stage heat)	x
AO1	Humidifier	Cool valve PID (3)	Heat valve PID (1st stage heat)
AO2	Fan VFS	Humidifier	Humidifier
SW1			
SW2			

(1) SW1.1, SW1.2 – Fan speeds:
- 1 speed (Low): SW1.1 = ON, SW1.2 = OFF
- 2 speeds(Low and High): SW1.1 = OFF, SW1.2 = ON
- 3 speeds(Low, Medium, and High): SW1.1 = OFF, SW1.2 = OFF

(2) SW1.4 – 2nd heating stage: ON = Enable, OFF = Disable

(3) SW1.5 – Chilled beam option: ON = Enable chilled beam (fan will not run with 1st stage cooling)

(4) SW2.3 – Dehumidification:
- ON = Use dehumidifier
- OFF = Use reheat for dehumidification

(5) SW2.6 – Terminal 12 operation:
- ON = Economizer
- OFF = Fan Medium (3 speeds) / Terminal not in use (1/2 speeds/VFS)
- Important: Economizer will not work in 3 fan speeds configuration.

See drawing on page 21 for DIP switch locations.

PID valves: 0-10 Vdc, 0.5 mA Not isolated
Control – Fan on/off, Heat elements, Cool/Heat valves: 24 Vac, 0.5A max

Technician Settings

Enter Technician Settings mode:

1. Adjust the setpoint temperature to 10ºC or 50ºF.
2. Press and hold the ⚙ button for 10 seconds to enter Technician Settings mode.
   "P01" will appear on display.

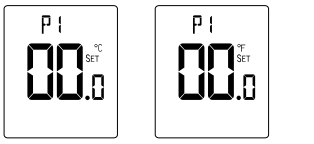
View objects and make adjustments:

- Use the [Mode] button to step forward between different settings.
- Use the [Fan] button to step backward between different settings.
- Press the [On/Off] button to exit Technician Settings and return to normal display.
- If no button is pressed for 60 seconds, the thermostat will automatically exit Technician Settings and return to normal display.
- Use the ▲ or ▼ button to make adjustments when required.

P1 – Offset for temperature readings calibration

Range: -6…+6°C / -9…+9°F.
Default: 0°C / 0°F.

Note: The offset will influence both internal or external sensors.

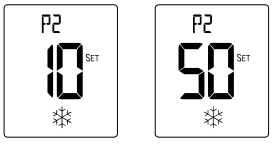


Offset for temperature calibration
(°C) (°F)

P2 – Setpoint limit for cooling

Range: 5…35°C / 41…95°F.
Default: 10°C / 50°F.

Note: The thermostat will stop cooling regardless of the user's setpoint

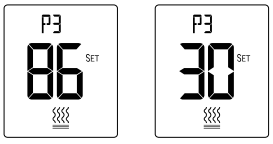


Setpoint limit for cooling
(°C) (°F)

P3 – Setpoint limit for heating

Range: 5…35°C / 41…95°F.
Default: 30°C / 86°F.

Note: The thermostat will stop heating regardless of the user's setpoint

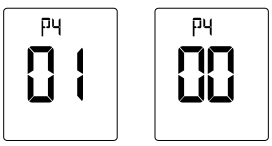


Setpoint limit for heating
(°C) (°F)

P04 – Enable/Disable the option to lock the [Fan] button

"01" [Fan] button can be locked
"00" [Fan] button cannot be locked

Note: When enabled, press and hold both ▼ and [Fan] buttons for 7 seconds to actually lock the buttons.



[Fan] Can be locked **[Fan] Cannot be locked**

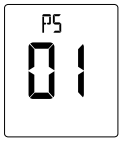
Technician Settings (cont.)

P05 – Enable/Disable the option to lock the [Mode] button

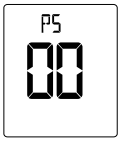
"01" [Mode] button can be locked

"00" [Mode] button cannot be locked

Note: When enabled, press and hold both ▼ and [Fan] buttons for 7 seconds to actually lock the buttons.



[Mode] Can be locked



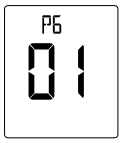
[Mode] Cannot be locked

P06 – Enable/Disable the option to lock the [On/Off] button

"01" [On/Off] button can be locked

"00" [On/On/Off] button cannot be locked

Note: When enabled, press and hold both ▼ and [Fan] buttons for 7 seconds to actually lock the buttons.



[On/Off] Can be locked

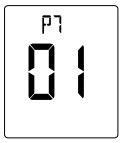
[On/Off] Cannot be locked

P07 – Enable/Disable the option to lock the ▲ or ▼ button (SET)

"01" ▲ or ▼ button can be locked

"00" ▲ or ▼ button cannot be locked

Note: When enabled, press and hold both ▼ and [Fan] buttons for 7 seconds to actually lock the buttons.



▲ or ▼ Can be locked

▲ or ▼ Cannot be locked

P08 – Functionality of T1 terminals

"00" - T1 terminals are not in use

"01" - External sensor

"02" - T3 Soft start in heat sensor (FC) * or De-icing in cool (AC) **

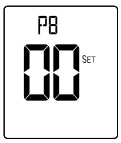
"03" - Door switch

"04" - Key tag

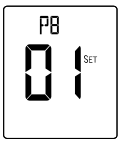
"05" - T Economizer (DIP switch SW2.6 must be ON)

* In heating mode, the fan will not start before there is hot water in the coil.
Note: To view T3 on the BACnet Thermostat, see Technician Settings P84.

** Allow de-icing operation of indoor coil in cooling.

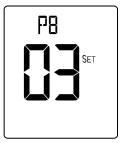


T1 terminals Not in use



T1 sensor (External sensor)

T3 Soft start in heat sensor (FC) or De-icing in cool sensor (AC)



Door switch

Key tag

T Economizer

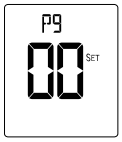
Technician Settings (cont.)

P09 – Functionality of IN1,0 terminals

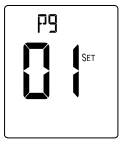
"00" - IN1,0 terminals are not in use
"01" - T2 (Change over sensor) *
"02" - T3 (Soft start in heat sensor) **
"03" - Remote On/Off switch
"04" - Remote Economy switch
"05" - External Passive Infrared detector

* In 2-Pipe system, T2 will sense the water temperature in the pipe in order to select/allow effective system mode.
Note: To view T2 on the BACnet Thermostat, see Technician Settings P83.

** Where T1 terminals are used for external sensor, the IN1,0 terminals can be used for T3 sensor.
Note: To view T3 on the BACnet Thermostat, see Technician Settings P84.

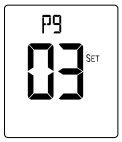


"IN1,0" terminals Not in use

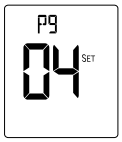


***T2 change over sensor (FC) / De-icing in cool (AC)**

****T3 Soft start in heat sensor (FC) or De-icing in cool sensor (AC)**



Window contact Remote On/Off

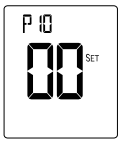


Window contact Remote Economy

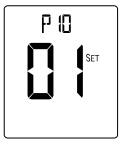
External PIR sensor

P10 – Window contact (terminals IN1,0) polarity

"01" - Normally open
"00" - Normally close



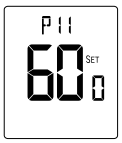
Win. contact Normally close



Win. contact Normally open

P11 – Window contact delay time

Range: 0…999 seconds.
Default: 60 seconds.



Window contact delay time (sec.)

P12 – Door switch (terminals T1,0) polarity

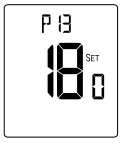
"01" - Normally open
"00" - Normally closed

Door switch Normally closed

Door switch Normally open

P13 – Door switch delay time

Range: 0…999 seconds.
Default: 180 seconds.



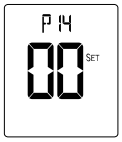
Door switch delay time (sec.)

Technician Settings (cont.)

P14 – Enable/Disable Auto change over mode

"00" - Disable Auto change over mode

"01" - Enable Auto change over mode



Disable Auto mode

Enable Auto mode

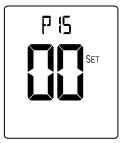
P15 – Motion sensor logic (PIR)

"00" - Thermostat turns off when unoccupied and back on when re-occupied.

"01" - Thermostat turns off when unoccupied and remains off when re-occupied.

"02" - Thermostat uses economy setpoints.

"03" - Unoccupancy – Dehumidification logic (only available with dehumidification configuration – see DIP switch settings)



Unocc. – Off Re-occ. - On

Unocc. – Off Re-occ. - Off

Economy setpoints

Dehumidification logic

P16 – Enable/Disable Motion sensor

"00" - Disable

"01" - Enable

Disable occ. sensor

Enable occ. sensor

P17 – PIR (Motion sensor) delay time before switching to unoccupied mode (ON delay)

Range: 0…250 minutes.

Default: 20 minutes.

PIR ON delay (sec.)

P18 – Door switch or key tag configuration

"00" - Switch On/Off by door switch or key tag

"01" - Changing the setpoint temperature

"02" - Switching fan speed to Low

Switch On or Off

Change setpoints

Switch to fan low

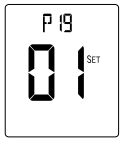
Technician Settings (cont.)

P19 – PIR (Motion sensor) polarity

"00" - Normally open

"01" - Normally closed

PIR Normally open



PIR Normally closed

P25 – Economy setpoint for cooling

Range: 5…35°C / 41…95°F

Default: 30°C / 86°F

EC setpoint in cooling (°C)

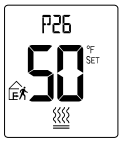
(°F)

P26 – Economy setpoint for heating

Range: 5…35°C / 41…95°F

Default: 10°C / 50°F

EC setpoint in heating (°C)



(°F)

P27 – On-delay time on-delay between heating stages

Range: 0….600 seconds

Default: 5 seconds

On delay heating stages

P28 – Off-delay time between heating stages

Range: 0….600 seconds

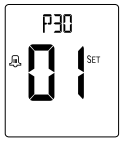
Default: 1 second

Off delay heating stages

P30 – Beeper ON or OFF

"01" - Beeper ON

"00" - Beeper OFF



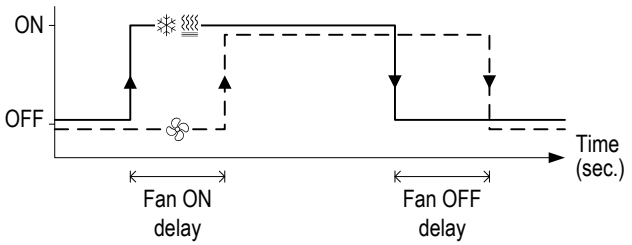
Beeper ON

Beeper OFF

Technician Settings (cont.)

P31 – P34
Fan on/off delay
with fan on demand (auto fan) active.

—— Valve
– – Fan



P31 – Fan ON delay in cooling (FC Only!)
Range: 0…120 seconds
Default: 0 seconds (no delay)

Fan ON delay in cooling (seconds)

P32 – Fan OFF delay in cooling
Range: 0…120 seconds
Default: 0 seconds (no delay)

Fan OFF delay in cooling (seconds)

P33 – Fan ON delay in heating (FC Only!)
Range: 0…120 seconds
Default: 0 seconds (no delay)

Fan ON delay in heating (seconds)

P34 – Fan OFF delay in heating
Range: 0…120 seconds
Default: 30 seconds

Fan OFF delay in heating (seconds)

Technician Settings (cont.)

P35 – Enable/Disable Freeze protection

"00" - Disable Freeze protection
"01" - Enable Freeze protection

Note: If enabled, freeze protection will start when the thermostat is either ON or OFF and regardless of the current system mode.

Disable freeze protection

Enable freeze protection

P36 – Freeze protection cut-in setpoint

Range: 8...15°C / 46…59°F
Default: 8°C / 46°F

The room ambient temperature which will trigger Heating ON.

Freeze protection cut-in setpoint (°C) (°F)

P37 – Freeze protection cut-out setpoint

Range: 10...17°C / 50…63°F
Default: 10°C / 50°F

The room ambient temperature which will switch the Heating back OFF.

Freeze protection cut-out setpoint (°C) (°F)

P40 – View filter counter (hours) – Read only

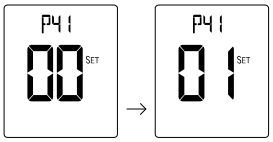
Range: 0…999 hours

The filter counter is related to Fan running time.

View filter Counter (hours)

P41 – Reset filter time

Press the [+] button to reset the filter counter.
The display will change from "00" to "01" and back to "00".



Reset filter counter

P42 – Adjust filter alarm delay time counter (hours)

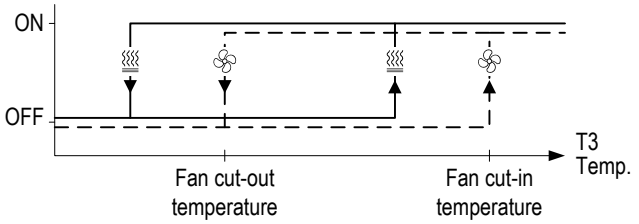
Range: 0…999 hours
Default: 0 hours (0 = Disable)

Adjust filter alarm delay time (hours)

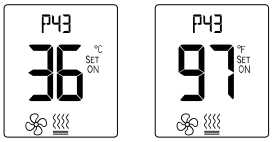
Technician Settings (cont.)

P43 – P44
Soft start in heat
with fan on demand
(auto fan) active.

—— Heat valve
– – Fan

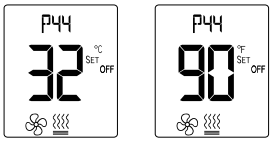


P43 – Soft start in heat – cut-in temperature (FC Only!)
The fan will not start before the temperature
on T3 sensor reaches the cut-in temperature.
See Technician Settings P08/P09.
Range: 14...37°C / 57…99°F
Default: 36°C / 97°F



Soft start heat cut-in temperature
(°C) (°F)

P44 – Soft start in heat – cut-out temperature (FC Only!)
The fan will stop if the temperature on T3 sensor
drops below the cut-out temperature.
See Technician Settings P08/P09.
Range: 12...35°C / 54…95°F
Default: 32°C / 90°F

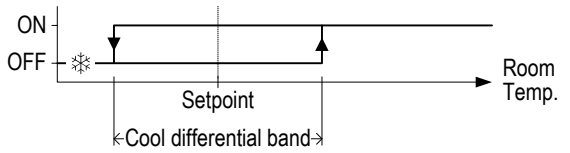


Soft start heat cut-out temperature
(°C) (°F)

Technician Settings (cont.)

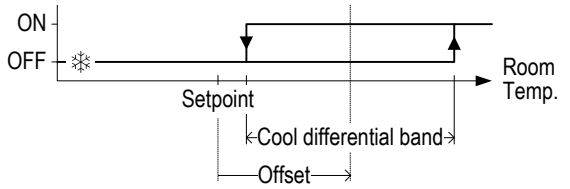
P45 – P46
Cool differential band / offset
(with cool differential band offset = 0)

—— Compressor / Valve

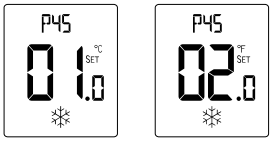


P45 – P46
Cool differential band / offset
(with cool differential band offset ≠ 0)

—— Compressor / Valve

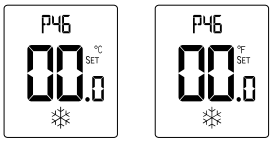


P45 – Cool differential band
Range: 0.5...5°C / 1…10°F
Default: 1°C / 2°F



Cool differential band
(°C) **(°F)**

P46 – Cool differential band offset
Range: -5…+5°C / -9…+9°F
Default: 0°C / 0°F

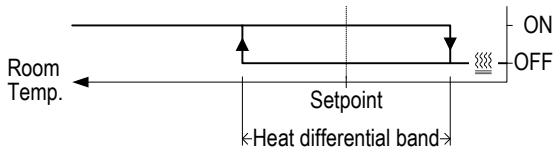


Cool differential band offset
(°C) **(°F)**

Technician Settings (cont.)

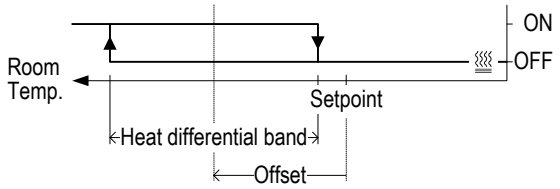
P47-48
Heat differential band / offset
(with heat differential band offset = 0)

—— Compressor / Valve

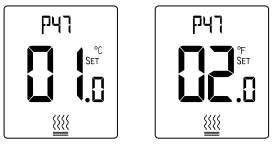


P47-48
Heat differential band / offset
(with heat differential band offset ≠ 0)

—— Compressor / Valve

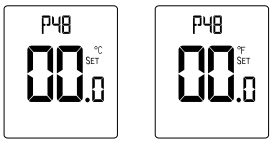


P47 – Heat differential band
Range: 0.5...5°C / 1…10°F
Default: 1°C / 2°F



Heat differential band
(°C) **(°F)**

P48 – Heat differential band offset
Range: -5…+5°C / -9…+9°F
Default: 0°C / 0°F

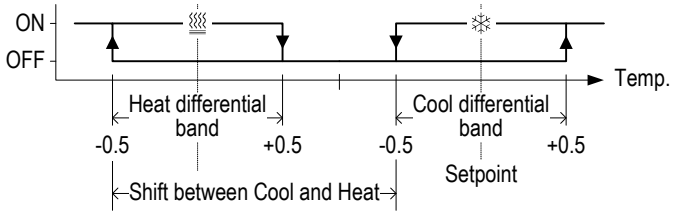


Heat differential band offset
(°C) **(°F)**

Technician Settings (cont.)

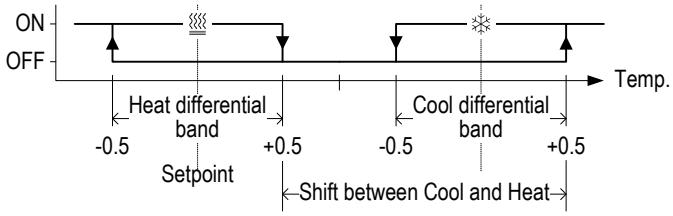
P49
Shift between Cool and Heat
in Auto change over mode
(from cooling to heating)

—— Compressor / Valve



P49
Shift between Cool and Heat
in Auto change over mode
(from heating to cooling)

—— Compressor / Valve



P49 – Shift between Cool and Heat in Auto change over mode
Range: 0...10°C / 0…20°F
Default: 2°C / 4°F

Shift between Cool & Heat in Auto mode
(°C) (°F)

P50 – Shift between Cooling stages (AC only!)
Range: 0...10°C / 0…20°F
Default: 2°C / 4°F

Shift between cooling stages
(°C) (°F)

P51 – Shift between Heating stages
Range: 0...10°C / 0…20°F
Default: 2°C / 4°F

Shift between heating stages
(°C) (°F)

Technician Settings (cont.)

P52 – Cool valve proportional band (FC Only!)
Range: 2...10°C / 4...20°F
Default: 2°C / 4°F

0-10V Valve opening from fully closed to fully open.

Cool valve proportional band (°C) (°F)

P53 – Cool proportional low limit (FC Only!)
Range: 0...100%
Default: 0%

Minimum valve opening.

Cool prop. low limit (%)

P54 – Cool proportional high limit (FC Only!)
Range: 0...100%
Default: 100%

Maximum valve opening.

Cool prop. high limit (%)

P55 – Heat valve proportional band (FC Only!)
Range: 2...10°C / 4...20°F
Default: 2°C / 4°F

0-10V Valve opening from fully closed to fully open.

Cool valve proportional band (°C) (°F)

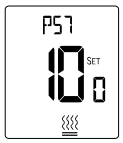
P56 – Heat proportional low limit (FC Only!)
Range: 0...100%
Default: 0%

Minimum valve opening.

Heat prop. low limit (%)

P57 – Heat proportional high limit (FC Only!)
Range: 0...100%
Default: 100%

Maximum valve opening.

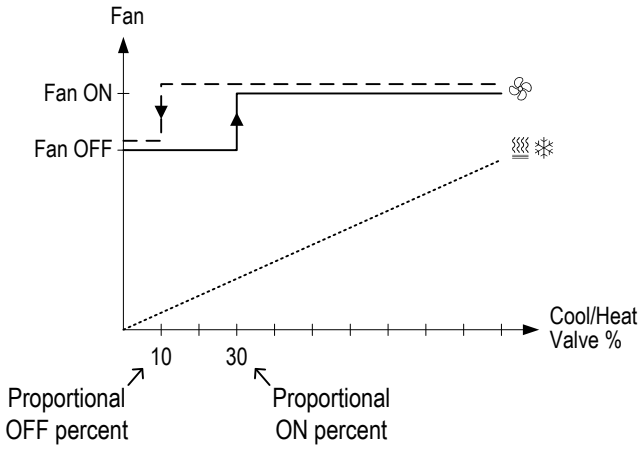


Heat prop. high limit (%)

Technician Settings (cont.)

P60
Fan turns ON when the Cool or Heat valve reaches the "Proportional ON percent"

P61
Fan turns OFF when the Cool or Heat valve drops below the "Proportional OFF percent"



P60 – Proportional ON percent (FC Only!)
Range: 0...30%
Default: 30%

Cool minimum ON percent (%)

P61 – Proportional OFF percent (FC Only!)
Range: 0...100%
Default: 100%

Heat minimum ON percent (%)

P63 – Time on-delay between cooling stages (AC only!)
Range: 0…600 seconds
Default: 5 seconds

On Delay cooling stages

P64 – Time off-delay between cooling stages (AC only!)
Range: 0…600 seconds
Default: 1 seconds

Off Delay cooling stages

Technician Settings (cont.)

P65 – Fan VFS proportional band in cooling
Range: 2...10°C / 4…20°F
Default: 2°C / 4°F

0-10V fan speed from off closed to fully running.

VFS Proportional band in cooling (°C) (°F)

P66 – Fan VFS proportional band in heating
Range: 2...10°C / 4…20°F
Default: 2°C / 4°F

0-10V fan speed from off closed to fully running.

VFS Proportional band in heating (°C) (°F)

P67 – Fan VFS Low speed percent in cooling
Range: 0...30%
Default: 20%

VFS Low % in cooling

P68 – Fan VFS Medium speed percent in cooling
Range: 30...60%
Default: 50%

VFS Med % in cooling

P69 – Fan VFS High speed percent in cooling
Range: 60...100%
Default: 90%

VFS High % in cooling

P70 – Fan VFS Low speed percent in heating
Range: 0...30%
Default: 30%

VFS Low % in heating

Technician Settings (cont.)

P71 – Fan VFS Medium speed percent in heating
Range: 30...60%
Default: 50%

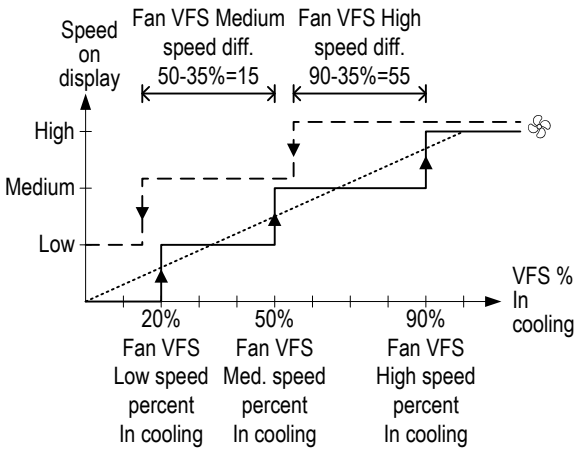
VFS Med % in heating

P72 – Fan VFS High speed percent in heating
Range: 60...100%
Default: 80%

VFS High % in heating

P74
VFS Medium speed differential
(display from medium to low)

P75
VFS High speed differential
(display from high to medium)



P74 – VFS Medium speed differential
Range: 10...50%
Default: 35

VFS Med speed differential

P75 – VFS High speed differential
Range: 10...50%
Default: 35

VFS High speed differential

Technician Settings (cont.)

P76 – Fan VFS Low limit in cooling

Range: 0...100%

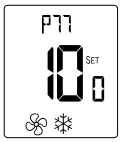
Default: 0%

VFS low limit in cooling

P77 – Fan VFS High limit in cooling

Range: 0...100%

Default: 100%



VFS high limit in cooling

P78 – Fan VFS Low limit in heating

Range: 0...100%

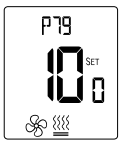
Default: 0%

VFS low limit in heating

P79 – Fan VFS High limit in heating

Range: 0...100%

Default: 100%



VFS high limit in heating

Technician Settings (cont.)

P83 – View T2 temperature sensor readings

Note: If T2 is not connected, 0.0 will appear on display

T2 Sensor Not connected

T2 Sensor readings (°C)

P84 – View T3 temperature sensor readings

Note: If T3 is not connected, 0.0 will appear on display

T3 Sensor Not connected

T3 Sensor readings (°C/°F)

P85 – De-ice in cool – cut-in temperature (AC only!)

Range: -9.5…+8°C / 15...46°F

Default: 0°C / 32°F

The indoor unit coil temperature in which de-icing will start.

De-ice in cool cut-in temperature (°C)

(°F)

P86 – De-ice in cool – cut-out temperature (AC only!)

Range: 2...20°C / 36...68°F

Default: 8°C / 46°F

The indoor unit coil temperature in which de-icing will stop.

De-ice in cool cut-out temperature (°C)

(°F)

P87 – De-ice in heat time (AC only!)

Range: 120...420 Seconds

Default: 300 Seconds

The length of de-icing procedure.

De-ice in heat time

P88 – De-ice in heat break time (AC only!)

Range: 600...1800 Seconds

Default: 1500 Seconds

The time interval between de-icing cycles.

De-ice in heat break time

Technician Settings (cont.)

P89 – De-ice in heat – cut-in temperature (AC only!)

Range: -9.5…+8°C / 15...46°F

Default: 0°C / 32°F

The outdoor unit coil temperature in which de-icing will start.

De-ice in heat cut-in temperature (°C)

De-ice in heat cut-in temperature (°F)

P90 – De-ice in heat – cut-out temperature (AC only!)

Range: 2...20°C / 35...68°F

Default: 16°C / 61°F

The outdoor unit coil temperature in which de-icing will stop.

De-ice in heat cut-out temperature (°C)

De-ice in heat cut-out temperature (°F)

P91 – Compressor delay (AC only!)

Range: 0...360 Seconds

Default: 240 Seconds

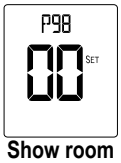
DIP Switch SW1.5 must be in "OFF" position – compressor delay enabled!

Compressor delay

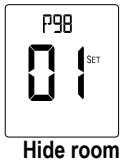
P98 – Display setpoint only (hide room temperature)

"00" - Display both setpoint and room temperatures

"01" - Display only the setpoint temperature



Show room temperature



Hide room temperature

P99 – One or Two setpoints (for cool and for heat)

"00" - One setpoint for cooling and heating

"01" - Two setpoints, one for cool and one for heat

One setpoint

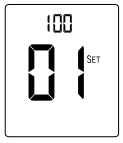
Two setpoints

P100 – Enable screen dimming

"00" - Disable dimming

"01" - Enable dimming

Disable screen dimming



Enable screen dimming

Technician Settings (cont.)

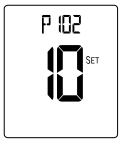
P101 – Screen dimming delay

Range: 0...99 minutes
Default: 5 minutes

Screen dimming delay

P102 – Dimming brightness

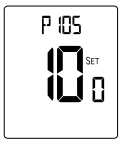
Range: 1, 5, 10, 20, 30...90%
Default: 10%



Dimming brightness (%)

P102 – Screen brightness when ON

Range: 50...100%
Default: 100%



Screen brightness when ON (%)

P107 – Weekly program configuration

"00" - Disable weekly program
"01" - 7 days with the same program
"02" - One program for Monday to Friday
and another program for Saturday and Sunday
"03" - One program for Monday to Friday,
one for Saturday, and another for Sunday
"04" - 7 days with the different program for each day

Weekly program configuration

P108 – Weekly program - events per day

"00" - Two different events per day
"01" - Four different events per day

Weekly program events per day

P109 – Weekly program event configuration

"00" - US Program
Event start time, Mode, Fan speed, Setpoints (one or two)
"01" - Eu program
Event start time, Stop time

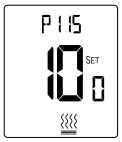
Weekly program event configuration

Technician Settings (cont.)

P114 – Cool PID Kp (FC Only!)
Range: 0...100%
Default: 100%

Cool PID Kp

P115 – Heat PID Kp (FC Only!)
Range: 0...100%
Default: 100%



Heat PID Kp

P116 – Cool PID Ki (FC Only!)
Range: 0...100%
Default: 0%

Cool PID Ki

P117 – Heat PID Ki (FC Only!)
Range: 0...100%
Default: 0%

Heat PID Ki

P118 – Cool PID Kd (FC Only!)
Range: 0...100%
Default: 1%

Cool PID Kd

P119 – Heat PID Kd (FC Only!)
Range: 0...100%
Default: 1%

Heat PID Kd

Technician Settings (cont.)

P122 – Cool Proportional output threshold time (seconds) (FC Only!)

Range: 0...100 seconds

Default: 60 seconds

Cool proportional cooling threshold

P123 – Heat Proportional output threshold time (seconds) (FC Only!)

Range: 0...100 seconds

Default: 60 seconds

Heat proportional cooling threshold

P160 – Minimum compressor ON time

Range: 0...20 minutes

Default: 2 minutes

Minimum compressor ON time

P161 – Minimum compressor OFF time

Range: 0...20 minutes

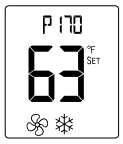
Default: 13 minutes

Minimum compressor OFF time

P170 – Economizer low limit temperature

Range: 9...27ºC / 48...80ºF

Default: 17ºC / 63ºF



Economizer low limit temperature

(°C) (°F)

P187 – Display or hide humidity reading

"00" - Do not display humidity reading

"01" - Display humidity reading

Display or hide humidity readings

P188 – Room temperature limit for disabling dehumidification in unoccupied mode

Range: 10...30ºC / 50...85ºF

Default: 18ºC / 64ºF

Temp. for disabling dehum. In unocc mode

(°C) (°F)

Technician Settings (cont.)

P189 – Dehumidification cycle in unoccupied mode

Range: 0...600 minutes

Default: 20 minutes

Dehumidification cycle in unocc. mode

P190 – Dehumidification break time in unoccupied mode

Range: 0...900 minutes

Default: 40 minutes

Dehumidification break in unocc. mode

P192 – Temperature setpoint for reheat in unoccupied mode

Range: 10...30ºC / 50...86ºF

Default: 15ºC / 59ºF

Setpoint for reheat in unocc. mode

(°C) (°F)

P194 – Humidity differential band

Range: 0...10 %RH

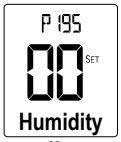
Default: 5%RH

Humidity differential band

P195 – Humidity sensor reading offset

Range: -9…+9 %RH

Default: 0 %RH



offset

Technician Settings (cont.)

P196 – Dead zone between humidification and dehumidification

Range: 0...100 %RH

Default: 0 %RH

Dead zone Hum./Dehum.

P197 – Humidity setpoint

Range: 20...100 %RH

Default: 45 %RH

Humidity setpoint

P198 – Not in use

Communication protocol indication

P200 – Restore defaults

Press the [+] button. The display will change from “00” to “01”.

Press the [On/Off] button to restore default settings.

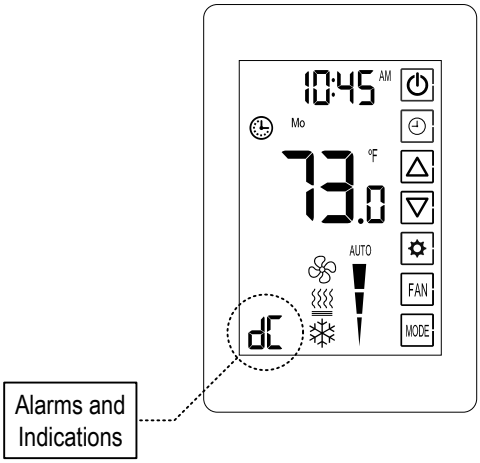
The thermostat will turn Off.

Dead zone Hum./Dehum.

Press the [On/Off] button or wait 60 seconds to return to normal display.

Alarms and indications

F1	T1 Internal sensor or T1 External sensor fault
dC	De-icer in cool indication
dH	De-icer in heat indication
OH	Overheat in heat
OC	Overheat in cool
t2	Teconomizer sensor fault



Document revision history

Important changes to this document are listed below. Minor changes such as typographical or formatting errors are not listed.

Date	Topic	Change description
4/24/19	TBPL-24-H Dimensions	Changed dimension 1.18 cm to 11.81 cm
2/19/19	Specifications	Added CE and C-Tick icons to Compliance specification.
2/19/19	BACnet Device Instance Number	Changed 24075 in first paragraph to 16075. Changed both instances of WebCTRL to i-Vu. Changed image to show i-Vu interface with Present Value of 160102.
2/19/19	Technician Settings > P122 and P123	Changed from percent to time (seconds).