

Overview

The green revolution is increasing the use of chilled beams and chilled ceilings in commercial buildings. Chilled water is pumped through hollow beams or special hollow ceiling tiles. Radiation cools the space eliminating air handlers, VAV boxes, fan-coil units and the energy to run them.

The temperature of the chilled water has to be regulated above the space's air dew point temperature. If the beam or ceiling temperature is below the space's dew point, they will "sweat", promoting mold growth and dropping water on the occupants and their belongings.

BAPI's Dew Point Sensor is an easy and economical way to measure the dew point temperature. The unit is available with an optional display, temperature setpoint slider and an occupant override pushbutton.

The large format display allows you to easily read Dew Point Temperature and Dry Bulb Temperature. The display alternates between these values and is field adjustable between °F or °C. One or both of the displayed values may be easily turned on or off by an HVAC technician.

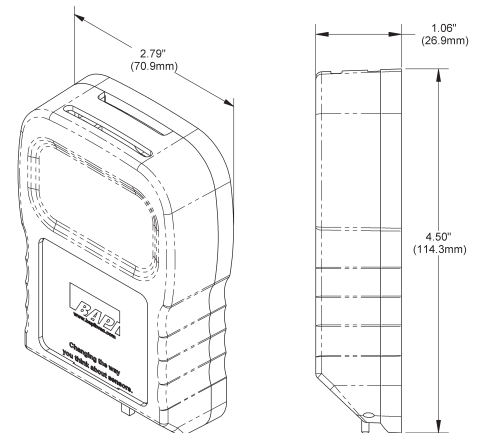


Fig 1: BAPI-Stat 2 Dew Point with Override and Setpoint

Mounting

Mounting hardware is provided for both junction box and drywall installation (junction box installation shown).

Junction Box

1. Pull the wire through the wall and out of the junction box, leaving about six inches free.
2. Pull the wire through the hole in the base plate.
3. Secure the plate to the box using the #6-32 x 1/2 inch mounting screws provided.
4. Terminate the unit according to the guidelines in the **Termination** section.
5. Attach Cover by latching it to the top of the base, rotating the cover down and snapping it into place.
6. Secure the cover by backing out the lock-down screws using a 1/16" Allen wrench until they are flush with the bottom of the cover.

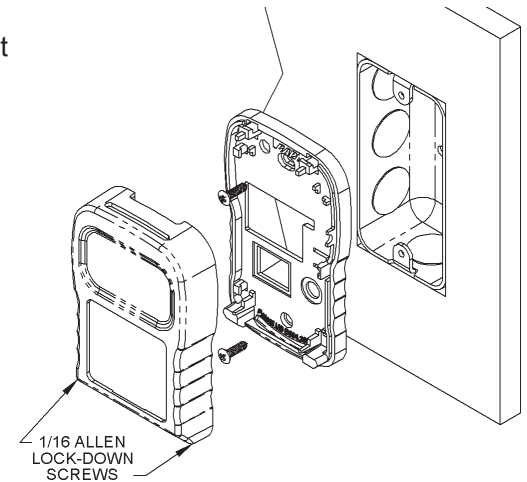


Fig 2: Mounting to a Junction Box

Drywall Mounting

1. Place the base plate against the wall where you want to mount the sensor.
2. Using a pencil mark out the two mounting holes and the area where the wires will come through the wall.
3. Drill two 3/16" holes in the center of each marked mounting hole. Insert a drywall anchor into each hole.
4. Drill one 1/2" hole in the middle of the marked wiring area.
5. Pull the wire through the wall and out of the 1/2" hole, leaving about six inches free.
6. Pull the wire through the hole in the base plate.
7. Secure the base to the drywall anchors using the #6 x 1 inch mounting screws provided.
8. Terminate the unit according to the guidelines in the **Termination** section.
9. Attach cover by latching it to the top of the base, rotating the cover down and snapping it into place.
10. Secure the cover by backing out the lock-down screws using a 1/16" Allen wrench until they are flush with the bottom of the cover.

NOTE: In any wall-mount application, the wall temperature and the temperature of the air within the wall cavity can lead to condensation, erroneous readings and premature failure of the sensor. To prevent these conditions, seal the conduit leading to the junction box or fill the box with insulation.

Specifications subject to change without notice.

Terminations

BAPI recommends using twisted pair of at least 22 AWG. Larger gauge wire may be required for long runs. All wiring must comply with the National Electric Code (NEC) and local codes. Do NOT run this device's wiring in the same conduit as AC power wiring of NEC class 1, NEC class 2, NEC class 3 or with wiring used to supply highly inductive loads such as motors, contactors and relays. BAPI's tests show that fluctuating and inaccurate signal levels are possible when AC power wiring is present in the same conduit as the signal lines.



BAPI recommends wiring the product with power disconnected. Proper supply voltage, polarity, and wiring connections are important to a successful installation. Not observing these recommendations may damage the product and will void the warranty.

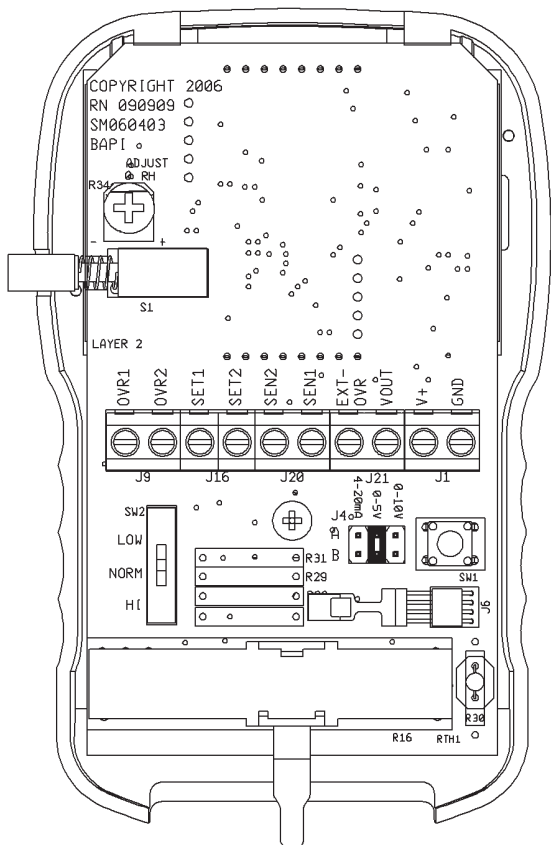


Fig 3: Circuit Board

Terminal

Function

- OVR1 & OVR2.....Override Output (Dry Contact Switch).
OVR2 is internally connected to SET2 & SEN2.
- SET1 & SET2Setpoint output.
SET2 is internally connected to OVR2 & SEN2.
- SEN1 & SEN2Sensor Output (Resistive Output).
SEN2 is internally connected to OVR2 & SET2. (Semiconductor Units: SEN1 = "+", SEN2 = "-")
- EXT-OVR.....Allows remote control of the LCD indicator for occupancy, and is activated by logic LOW or power supply ground at this terminal.
- VOUT.....Dew Point Signal (to analog input of controller)
- V+Power, 15 to 35VDC (No AC Power)
- GND.....To controller power supply ground (GND)

Note 1: Terminals "OVR2", "SEN2", and "SET2" are connected together internally but they are not connected to Ground "GND". If you intend to use "GND" as common, then a jumper must be added from terminal "GND" to "SEN2".

Note 2: The termination screws should be turned fully Counter Clockwise (CCW) to open the jaws fully. Then insert the field wire and turn the screws Clock Wise (CW) to pinch the wire fully closed. If the jaws are left partially open, the inserted wire may be on bottom of, instead of inside, the jaws causing a poor connection.

Optional Test Balance Switch (SW2)

The test and balance switch is used by the balancer to equalize the flow of air or water. This switch can also be used by the commissioning technician to verify sensor termination in a point to point checkout of the control system. The "NORM" position allows the real sensor to be monitored. The "HI" position forces the output to a very hot reading and the "LOW" position forces the output to a very cold output. See Table below for the most common sensor output readings.

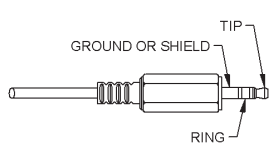
T&B Switch (SW2) Position & Sensor Output

- LOW:** Sets the sensor value to the LOW temperature (see table at right)
- NORM:** The sensor will operate normally
- HI:** Sets the sensor value to the HIGH temperature (see table at right)

Sensor Type	Low Temp (40° F) Resistance Value	High Temp (105° F) Resistance Value
1000Ω RTD	1.02KΩ (41.2°F)	1.15KΩ (101.5°F)
3000Ω Thermistor	7.87KΩ (39.5°F)	1.5KΩ (106.8°F)
10K-2 Thermistor	30.1KΩ (39.2°F)	4.75KΩ (105.8°F)
10K-3 Thermistor	26.7KΩ (35.9°F)	5.11KΩ (108.4°F)
10K-3(11K) Thermistor	7.32KΩ (43.7°F)	3.65KΩ (105.2°F)

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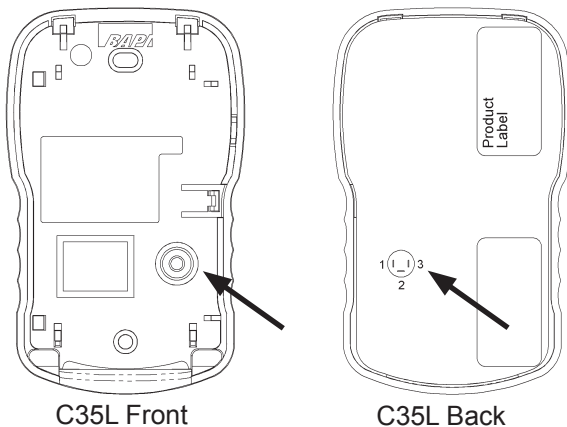
Optional Communications Jack Wiring



C35L Wiring	
	Wire Color
Ground	Black
Tip	White
Ring	Red

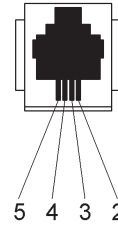
Male Jack shown for clarity

Fig. 4: C35L Communications Jack



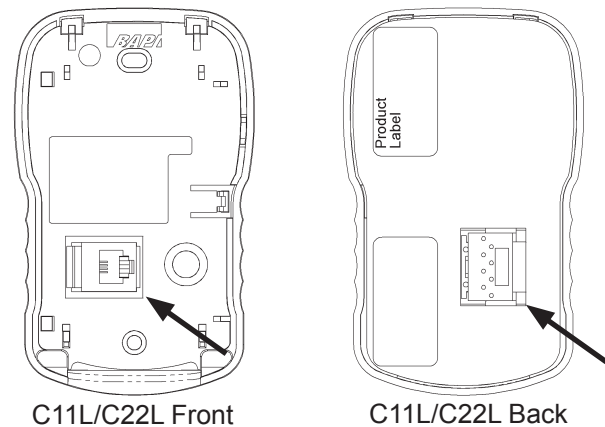
C35L Front

C35L Back



C11L/C22L Wiring	
Comm Jack Pin	Wire Color
1	Not Connected
2	Black
3	Red
4	Yellow
5	White or Green
6	Not Connected

Fig. 5: C11L/C22L Communications Jack



C11L/C22L Front

C11L/C22L Back

User Operation


The display indicates dry bulb temperature in degrees Fahrenheit or Celsius, dew point in degrees Fahrenheit or Celsius, relative humidity in %RH, temperature setpoint in degrees Fahrenheit or Celsius. Temperatures and relative humidity can be displayed in a rotating manner, see the Optional Technicians Adjustments section. The BAPI Man icon indicates that the override button has been pushed.

Temperature: When temperature is displayed the INSIDE icon as well as the appropriate units icon are illuminated.

Dew Point Temperature: When dew point temperature is displayed the letters dP are displayed for 2 seconds just before the dew point temperature is displayed. Then the dew point temperature is displayed with the appropriate units icon illuminated, the INSIDE icon is off.

Relative Humidity: When relative humidity is displayed, the INSIDE icon as well as %RH are illuminated.

Setpoint Slidepot: When the temperature setpoint is active (see technician adjustments), moving the slidepot enough to change the setpoint by one degree will display the setpoint on display units.

Override Button: When pressed, the BAPI Man Icon  will display. A dry resistance of less than 15 ohms appears across the override output (OVR1 to OVR2). Latching the Icon (to make it remain lit on the display when the unit is in override) requires that a digital output on your controller be used to connect terminal EXT-OVR to power supply ground.

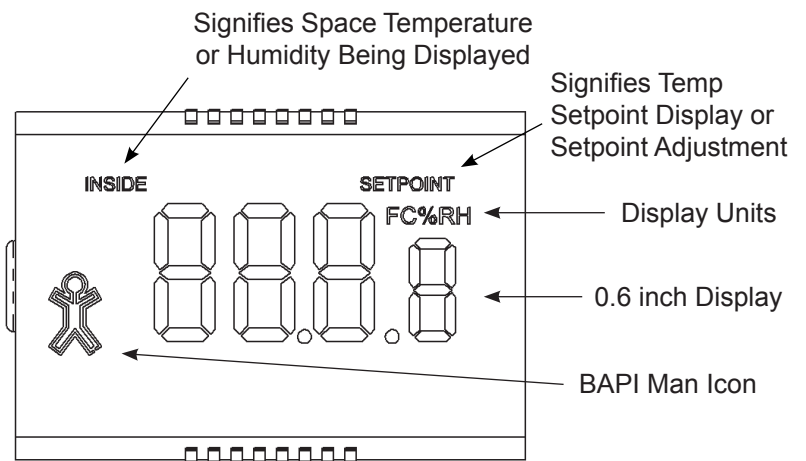


Fig. 6: Dew Point Sensor Display

Specifications subject to change without notice.

Optional Technician Adjustments

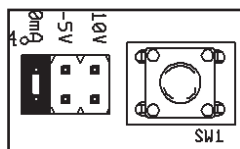


Fig. 7: Calibration Switch

The optional technician adjustment procedure allows a technician to set temperature and humidity offsets, °F or °C display indication and which parameters are shown on the display. When the unit is powered up, pressing Switch SW1 will enter the user calibration adjustment mode (See Fig. 7). When pressed, the LCD will show page zero, P0.

The page numbers auto-scroll to P5 and then the unit returns to the normal run mode. Pressing SW1 when any page number is displayed will show the calibration value that is associated with that page. The variable will auto-scroll and will show all the allowed values for the selected page. Pressing SW1 when the variable value you need is shown will record that value and return to showing page numbers.

Parameter	Page Designator	Adjustment
Temperature Offset	P0	±5° in 0.1° increments
Humidity Offset***	P1	±5% in 0.1% increments or R34 When R34 is selected, humidity offset is set by turning potentiometer R34 situated just above the override switch. See Fig. 8
Display Units	P2	°F or °C
Display DP to Temp Toggle Time	P3	3 to 11 seconds
Display Resolution	P4	0 = 0.5 1 = 0.1
Display Section	P5	0 = Temperature, Dew Point and Temperature Setpoint when active* 1 = Temperature and Temperature Setpoint when active* 2 = Dew Point and Temperature Setpoint when active* 3 = Temperature, Dew Point and Temperature Setpoint** 4 = Temperature and Temperature Setpoint** 5 = Dew Point and Temperature Setpoint** 6 = Temperature Setpoint 7 = Temperature and Dew Point** 8 = Temperature 9 = Dew Point 10 = Temperature, Dew Point and %RH

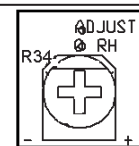


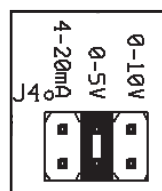
Fig. 8: R34

* "When active" means when moving the setpoint slider.

** Display toggles through selections.

*** If dew point temperature needs adjustment, place display into option 10. Adjust humidity offset for closest reading to your standard.

Dew Point Output Selection



Moving the jumper on connector J4 will change the dew point output from 0 to 5VDC or 0 to 10VDC. Fig. 9 shows the jumper in the 0 to 5VDC, position. The 4 to 20mA position is inactive.

Fig 9: Output Jumpers

Specifications subject to change without notice.

**Diagnostics**Possible Problems:

General troubleshooting

Possible Solutions:

- Determine that the input is set up correctly in the controller's and building automation software.
- Check wiring at the sensor and controller for proper connections.
- Check for corrosion at either the controller or the sensor. Clean off the corrosion, re-strip the interconnecting wire and reapply the connection. In extreme cases, replace the controller, interconnecting wire and/or sensor.
- Label the terminals that the interconnecting wires are connected to at the sensor end and the controller end. Disconnect the interconnecting wires from the controller and the sensor. With the interconnecting wires separated at both ends measure the resistance from wire-to-wire with a multimeter. The meter should read greater than 10 Meg-ohms, open or OL depending on the meter you have. Short the interconnecting wires together at one end. Go to the other end and measure the resistance from wire-to-wire with a multimeter. The meter should read less than 10 ohms (22 gauge or larger, 250 feet or less). If either test fails, replace the wire.

Incorrect Dew Point

- Check power supply/controller voltage supply
- Disconnect sensor and check power wires for proper voltage (see Specifications)
- Check all software parameters
- If available, check the sensor against a calibrated instrument such as a hygrometer
- Determine if the sensor is exposed to an external environment different from the room (conduit draft)

Incorrect Temperature

- Determine that the temperature sensor's wires are connected to the correct controller input terminals and are not loose.
- Check the wires at the sensor and controller for proper connections.
- Make sure that the sensor leads are not touching one another.
- Determine if the sensor is exposed to an external environment different from the room (conduit draft)
- Measure the physical temperature at the temperature sensor's location using an accurate temperature standard. Disconnect the temperature sensor's wire (Terminals SEN1 & SEN2) and measure the temperature sensor's resistance across the sensor output pins with an ohmmeter. Put the ohmmeter's black lead on Terminal SEN2 and the red lead on Terminal SEN1. Compare the temperature sensor's resistance to the appropriate temperature sensor table on the BAPI web site (See below). If the measured resistance is different from the temperature table by more than 5% call BAPI technical support. Don't forget to reconnect the wires.

How to Find the Temperature Sensor Resistance Table

Find BAPI's website at www.bapivac.com; click on "Resource Library" and "Sensor Specs", then click on the sensor type you have.



24027_ins_B2_Rm_Dew_Pt

BAPI-Stat 2 Dew Point Sensor

Installation & Operating Instructions

rev. 06/30/15

Specifications

Power: 15 to 35 VDC @ 4 mA max (No AC power)

Sensing Element: Humidity – Capacitive Polymer, ±1.8% RH Accuracy

Temperature Sensor: Thermistor, RTD or Semiconductor

Mounting: 2"x4" J-Box or drywall mount (screws provided)

Dew Point Temperature Range: -4°F to 122°F (-20°C to 50°C)

Response Time: Less Than 60 Seconds

Operating Environment: 32 to 122°F (0 to 50°C), 0 to 95%RH non-condensing

LCD Display: 3.5 digit numeric (Dew Pt & Dry Bulb Temp)

Measurement Offsets (field adjustable)

±5° (F or C) in 0.1° increments – DB

±5% RH in 0.1% increments – RH

Analog Output (0 to 5VDC or 0 to 10VDC, 1KΩ impedance)

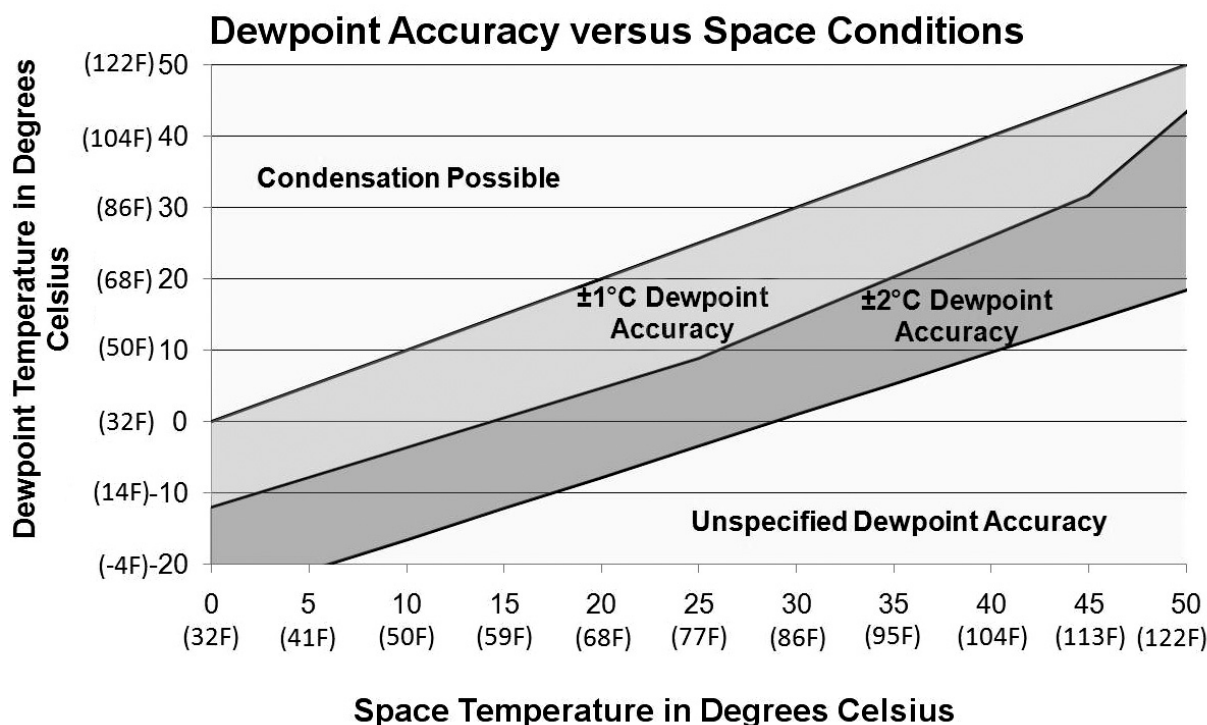
Dew Point Temperature: -4 to 122°F (-20 to 50°C)

Weight: .25lb, (.11kg)

Material: ABS Plastic, Material Rated UL94V-0

Certifications: RoHS

Warranty Period: Two years from manufacture date



Specifications subject to change without notice.