



# BAPI-Com, Two Wire Multifunction Sensor with Setpoint Slider (BA/BS4SCOM) Temperature/Humidity Sensor

Installation and Operating Instructions

24632\_ins\_BS4SCOM

rev. 07/01/15

## Product Identification and Overview

- Power and Communication on Just Two Wires
- Available with Temperature Sensing, Temperature Setpoint, Optional Occupant Override, Optional Display and Optional %RH Sensing
- Thermistor, Voltage, Resistance or Dry Contact Outputs
- Up to 500 Foot Wire Runs — Perfect for Existing Wires

Many existing buildings have two wire sensors that lack the features customers expect in today's sophisticated systems. The BAPI-Com system uses those existing two wires and offers the owner a full function temperature sensor with temperature setpoint, occupant override, an optional easy-to-read display and optional %RH sensing.

The BAPI-Com consists of two modules: the Room Sensor and the Communication Output Module. The Communication Output Module is externally powered and then powers the Room Sensor on two wires. It also communicates with the Room Sensor over those same two power wires to receive the local temperature, humidity, setpoint and override signals as well as powering the display.

The Communication Output Module then sends each parameter (temperature, humidity, setpoint and override) to the individual output terminals for the BAS controller to receive and interpret. An Occupied/Unoccupied input is also available on the Communication Output Module to indicate to the Remote Sensor that the control zone is in Occupied or Unoccupied mode for display indication.

**Note:** *Not all wires are guaranteed to work. The system has been tested with wires meeting the wire spec of Belden 9841 cable. The units should work to a distance of 500 feet and possibly more on 22AWG to 14AWG wire. Electrical noise is unpredictable but can be limited with wire that is twisted to limit noise imbalance and shielded to limit overall induced noise. If a shield is used, BAPI recommends to only ground the shield at one end to avoid induced ground loop noise. The preferred earth grounding location should be at the Communication Output Module or BAS controller end.*

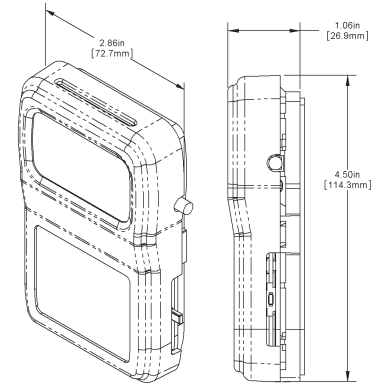


Fig 1: BAPI-Com Room Sensor

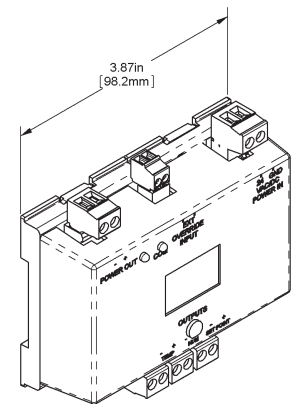


Fig 2: BAPI-Com Communication Output Module

## Wall Sensor Mounting

BAPI recommends mounting to an inside wall away from discharge vents. Avoid baseboard radiation and any sunlit walls.

### JUNCTION BOX MOUNTING: (Fig. 3)

1. Pull the wire through the wall and out the junction box, leaving about 6" free.
2. Pull the wire through the hole in the base plate.
3. Secure the base to the box using the #6-32x1/2" mounting screws provided.
4. Terminate the unit according to the guidelines in the Termination section.
5. Plug any back box holes or conduit with insulation to avoid wall drafts from affecting the sensor reading.
6. Attach the cover by latching it to the top of the base, rotating the cover down and snapping it into place. Secure the cover by backing out the lock-down screws using a 1/16" Allen wrench until the screws are flush with the cover.

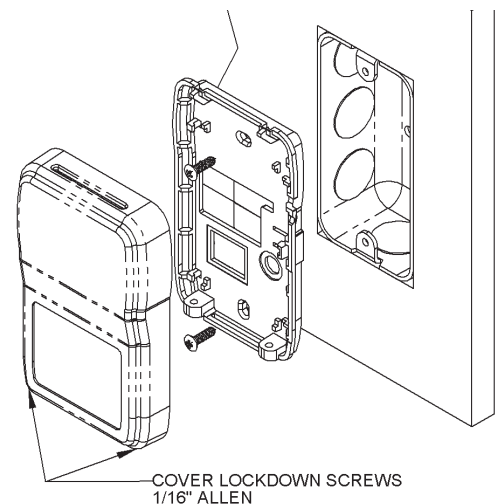


Fig 3: Sensor Mounting  
Mounting hardware is provided for both junction box and drywall installation (junction box installation shown)

Specifications subject to change without notice.



# BAPI-Com, Two Wire Multifunction Sensor with Setpoint Slider (BA/BS4SCOM) Temperature/Humidity Sensor

Installation and Operating Instructions

24632\_ins\_BS4SCOM

rev. 07/01/15

## Wall Sensor Mounting continued...

### DRYWALL MOUNTING:

1. Place the base plate against the wall where you want to mount the sensor.
2. Using a pencil to 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. Pull the wire through the wall and out of the 1/2" hole, leaving about 6" free.
5. Pull the wire through the hole in the base plate then secure the base to the drywall anchors using the #6x1" mounting screws provided.
6. Terminate the unit according to the guidelines in the Termination section.
7. Plug any wall holes with insulation to avoid wall drafts from affecting the sensor reading.
8. Attach cover by latching it to the top of the base, rotating the cover down and snapping it into place. Secure the cover by backing out the lock-down screws using a 1/16" Allen wrench until the screws are flush with the cover (see Fig 3).

**NOTE:** In any wall mount application, the mixing of room air and air from within the wall cavity can lead to erroneous readings, condensation and premature failure of the sensor. To prevent this, plug the conduit hole in the junction box with insulation.

## Communication Output Module Mounting

Select an indoor location for the communication module within 500 feet of the sensor and close to the controller so that point wiring is manageable. Blue mounting tabs on the EZ Mount Base are located on top and bottom and can be extended or pushed in by pulling or pushing on the blue tabs for each kind of mounting technique.

### DIN Rail Mounting: (Fig 4)

1. Pull the blue mounting tabs out.
2. Catch EZ mount hook on DIN rail (shown in Fig 4) and rotate module down until the bottom mounting tab snaps into place on the DIN rail.
3. Connect wires per the Termination Section.
4. To release from the rail, pull both bottom tabs simultaneously.

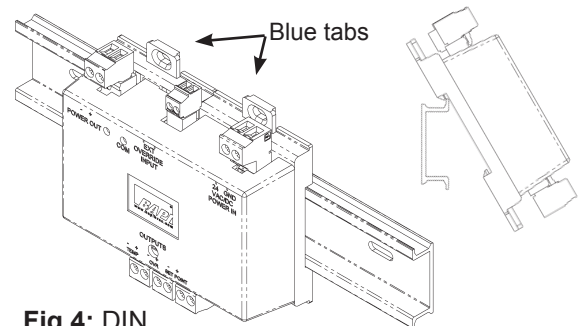
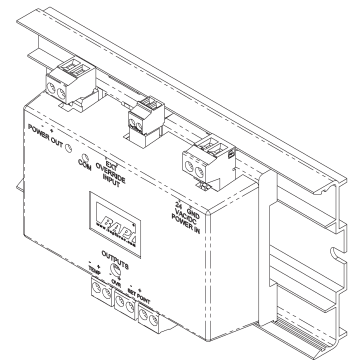


Fig 4: DIN Rail Mount

### Snaptrack Mounting: (Fig 5)

1. Push the blue mounting tabs in. The edges of the EZ Mount base will fit into the 2.75" snaptrack slots.
2. Connect wires per the Termination Section.

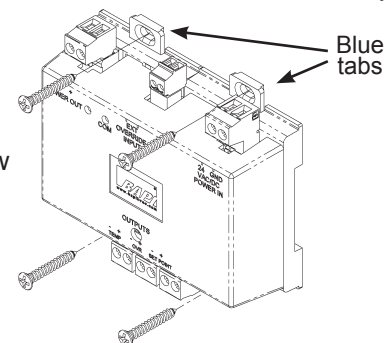
Fig 5: Snaptrack Mount



### Surface Screwed Mounting: (Fig 6)

1. Pull the blue mounting tabs out.
2. Place the EZ unit against the surface and mark the screw holes.
3. Drill 1/8 pilot holes for #6 flathead screws.
4. Screw EZ unit to surface. Note: The mounting holes are elongated to allow for alignment.
5. Connect wires per the Termination Section.

Fig 6: Screw Mount



Specifications subject to change without notice.



# BAPI-Com, Two Wire Multifunction Sensor with Setpoint Slider (BA/BS4SCOM) Temperature/Humidity Sensor

Installation and Operating Instructions

24632\_ins\_BS4SCOM

rev. 07/01/15

## Front Panel Control Descriptions

### OPTIONAL DISPLAY:

The display shows the current temperature unless the setpoint slide is moved, then the display shows the current setpoint for 3 to 4 seconds. The display can also be set up to show only the temperature or only the setpoint. See the Optional Technicians Adjustments section on pg 5.

### SETPOINT SLIDER:

When the setpoint slider is moved enough, the display will show the setpoint and will change the setpoint in 0.1° degree increments across the setpoint range that was specified at the time of the order. (If there is no display, then the user must rely on the side legend to determine the setpoint.) Moving the slider also changes the setpoint output value from the communication output module based on the setpoint output range selected at the time of the order. Sliding upward increases the setpoint and sliding downward decreases the setpoint. (Reverse Acting is field programmable. See the Optional Technicians Adjustments section on pg 5).

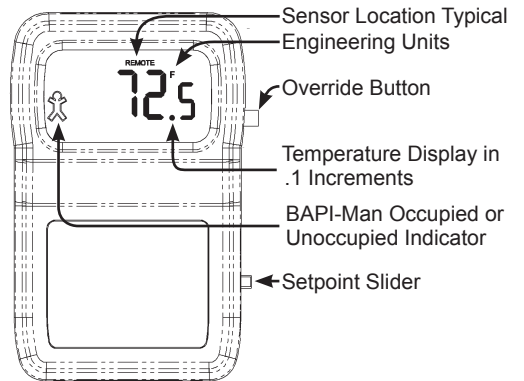


Fig 7: BAPI-Com Room Sensor with Override, Setpoint and Display

### OPTIONAL OVERRIDE BUTTON FOR DISPLAY UNITS:

When the override button is pressed, the BAPI-Man will be displayed as solid (Fig 8) for 3 to 5 seconds and the override output of the communication output module will go to less than 15Ω. (The override signal from the output module can be on the Temperature, Setpoint or Humidity outputs or on a separate Override output depending on how it is ordered.)

After pressing the override button, the unit must receive a confirmation closure across the communication output module's "Ext. Override Inputs" for the BAPI-Man to remain visible on the screen. Pressing the Override button will light the BAPI-Man icon; however, if no confirmation closure is received, then the BAPI-Man will go blank (disappear) after 5 seconds.

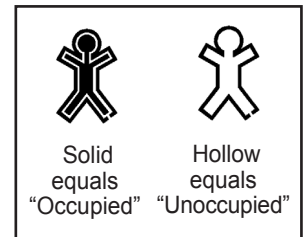


Fig 8: BAPI-Man Icon

Upon receiving a first confirmation closure on the "Ext. Override Inputs", the BAPI-Man will show occupied (solid) whenever the closure signal is present and then show unoccupied (hollow) whenever the confirmation signal is removed. The only way to make the BAPI-Man go blank or disappear from the display at this point is to cycle power.

### OPTIONAL OVERRIDE BUTTON FOR UNITS WITHOUT DISPLAY:

When the override button is pressed, the override output on the communication output module will go to less than 15Ω. (The override signal from the output module can be on the Temperature, Setpoint or Humidity outputs or on a separate Override output depending on how the unit is ordered.)

## Communications Output Module Indicators

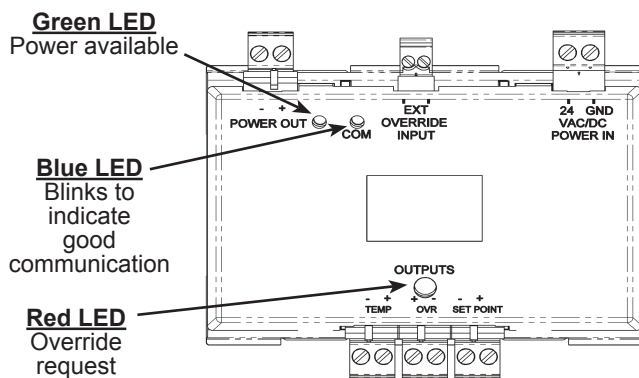


Fig 9: Communication Output Module Termination with Dedicated Override Output (-J Option)

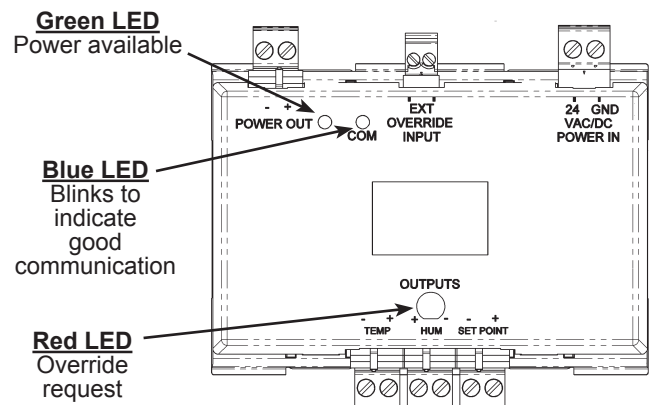


Fig 10: Communication Output Module Termination with Humidity Output

Specifications subject to change without notice.



# BAPI-Com, Two Wire Multifunction Sensor with Setpoint Slider (BA/BS4SCOM) Temperature/Humidity Sensor

Installation and Operating Instructions

24632\_ins\_BS4SCOM

rev. 07/01/15

## Typical System Termination for BAPI-Com with Override as a Dedicated Output

**General Wiring Note:** 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 high or low voltage AC power wiring.



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.

### BAPI-COM ROOM SENSOR TERMINATION

**Terminal Description**

- + J1 ..... Power & Communication Out
- J1 ..... Power & Communication Out

**Terminal Description**

- EXT SEN ... Optional External Sensor (Purchase 10K-2 Thermistor sensor separately. No polarity)
- EXT SEN ... Optional External Sensor

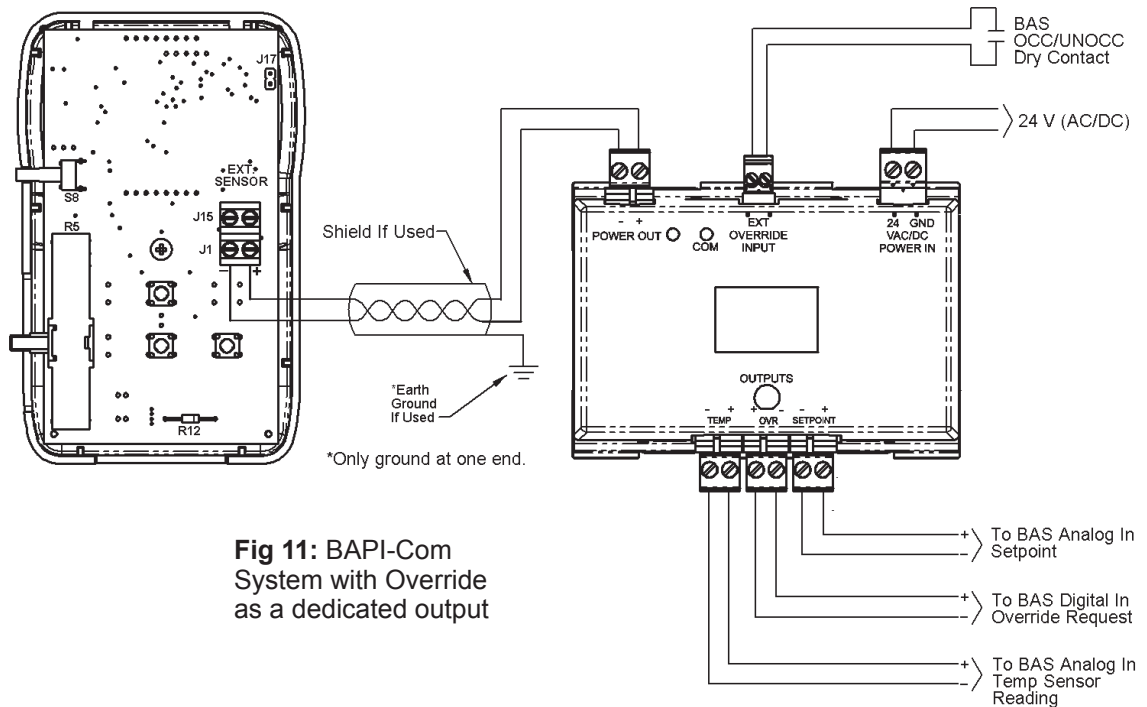
### COMMUNICATION OUTPUT MODULE WITH DEDICATED OVERRIDE OUTPUT TERMINATION

**Terminal**

**Description**

- GND POWER IN ..... Input Power Common
- 24 POWER IN ..... Input Power 24VAC/VDC
- EXT OVERRIDE INPUT ..... Override Input Dry Contact to Light the BAPI-Man Icon
- EXT OVERRIDE INPUT ..... Override Input Dry Contact to Light the BAPI-Man Icon
- + POWER OUT ..... Power & Communication Out to Room Sensor
- POWER OUT ..... Power & Communication Out to Room Sensor (not GND)
- + TEMP ..... Temperature Output (0 to 5V, 0 to 10V or resistive value)
- TEMP ..... \*Temperature Output (temperature common)
- + OVR ..... Independent Override Contact (isolated N.O. contact)
- OVR ..... Independent Override Contact (isolated N.O. contact)
- + SETPOINT ..... Setpoint Output (0 to 5V, 0 to 10V or resistive value)
- SETPOINT ..... \*Setpoint Output (setpoint common)

\*In Common Ground (-CG) configuration, "- TEMP" and "- SETPOINT" are the same as GND.  
In Differential Ground (-DF) configuration, "- TEMP" and "- SETPOINT" are isolated from GND.



**Fig 11:** BAPI-Com System with Override as a dedicated output



# BAPI-Com, Two Wire Multifunction Sensor with Setpoint Slider (BA/BS4SCOM) Temperature/Humidity Sensor

Installation and Operating Instructions

24632\_ins\_BS4SCOM

rev. 07/01/15

## Typical System Termination for BAPI-Com with Humidity as a Dedicated Output

**General Wiring Note:** 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 high or low voltage AC power wiring.



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.

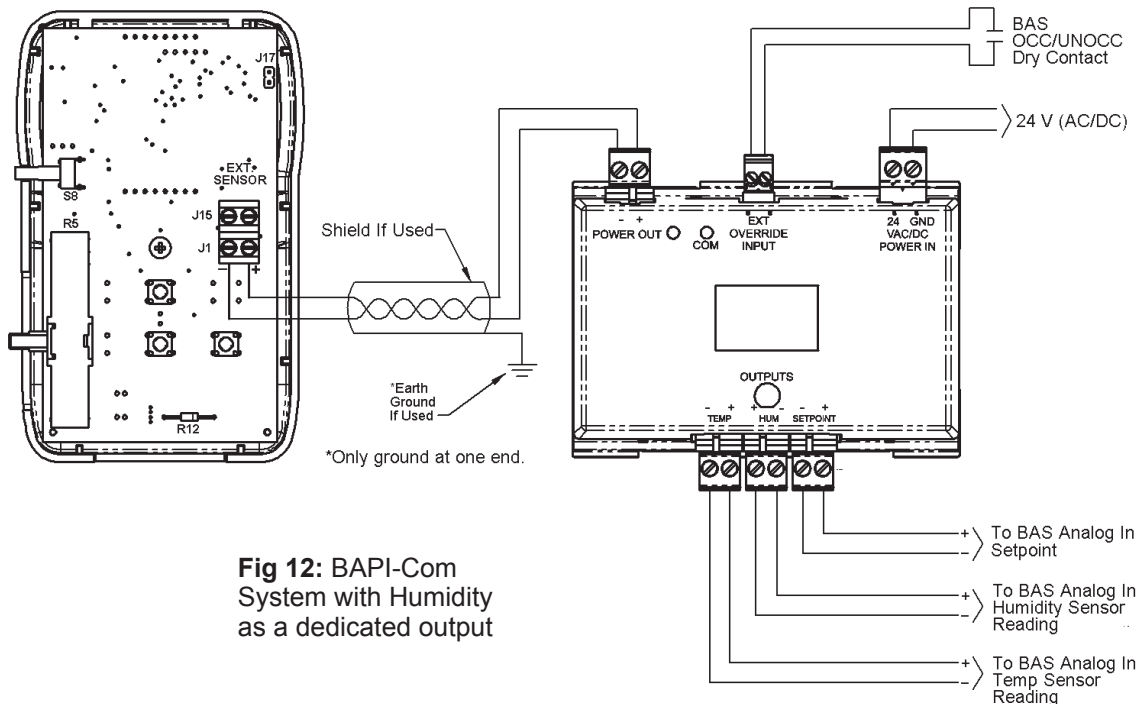
### BAPI-COM ROOM SENSOR TERMINATION

Terminal	Description	Terminal	Description	
+ J1	Power & Communication Out	EXT SEN	Optional External Sensor	(Purchase 10K-2 Thermistor sensor separately. No polarity)
- J1	Power & Communication Out	EXT SEN	Optional External Sensor	

### COMMUNICATION OUTPUT MODULE WITH DEDICATED OVERRIDE OUTPUT

Terminal	Description
GND POWER IN	Input Power Common
24 POWER IN	Input Power 24VAC/VDC
EXT OVERRIDE INPUT	Override Input Dry Contact to Light the BAPI-Man Icon
EXT OVERRIDE INPUT	Override Input Dry Contact to Light the BAPI-Man Icon
+ POWER OUT	Power & Communication Out to Room Sensor
- POWER OUT	Power & Communication Out to Room Sensor (not GND)
+ TEMP	Temperature Output (0 to 5V, 0 to 10V or resistive value)
- TEMP	*Temperature Output (temperature common)
+ HUM	Humidity Output (0 to 5 or 0 to 10 Volts)
- HUM	Humidity Output (0 to 5 or 0 to 10 Volts)
+ SETPOINT	Setpoint Output (0 to 5V, 0 to 10V or resistive value)
- SETPOINT	*Setpoint Output (setpoint common)

\*In Common Ground (-CG) configuration, "- TEMP" and "- SETPOINT" are the same as GND.  
In Differential Ground (-DF) configuration, "- TEMP" and "- SETPOINT" are isolated from GND.



**Fig 12:** BAPI-Com System with Humidity as a dedicated output



# BAPI-Com, Two Wire Multifunction Sensor with Setpoint Slider (BA/BS4SCOM) Temperature/Humidity Sensor

Installation and Operating Instructions

24632\_ins\_BS4SCOM

rev. 07/01/15

## Optional Technicians Adjustments (The unit is set up in the factory per your order. Adjustments are not required.)

The unit is shipped ready to install per the order and does not require any special setup or programming. The following Setup or Program Menu Changes are available if the installer decides to change the factory settings. The unit must have a display to make these adjustments.

### ENTERING PROGRAM MODE AND MAKING CHANGES:

1. Remove cover and install the shunt jumper across the J17 pins (see Fig. 13).
2. Use the Up and Down buttons on the back of the circuit board (Fig. 14) to advance to the parameter to adjust. (Moves up or down from page to page or from setting to setting.)
3. Use the "Enter" button on the back of the circuit board (Fig. 14) to select the menu parameter. This selects the currently displayed menu or selects the new parameter and stores it into memory. You can adjust and quit (remove J17) any time during this procedure. Be sure to press the Enter button to store your selection or it will not be saved.

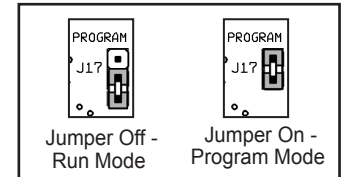


Fig 13: J17 Program Jumper

### PROGRAM MODE MENUS:

The Program Mode Menu consists of menu pages P0 through P12 for configuring the sensor.

#### Menu Description

- |   |   |                                   |  |                                       |   |                                       |   |   |   |
|---|---|-----------------------------------|--|---------------------------------------|---|---------------------------------------|---|---|---|
| <b>P0</b>   | <b>°F or °C Display:</b> Use the Up/Down buttons to select °C or °F. "0"= °C, "1"= °F   |                                   |  |                                       |   |                                       |   |   |   |
| <b>P1</b>   | <b>Display Mode:</b> Determines what is displayed on the LCD. <ul style="list-style-type: none"> <li>0 - Not used (Do not select)</li> <li>1 - Temperature Display Only (no setpoint or humidity)</li> <li>2 - Setpoint Display Only (no temp or humidity)</li> <li>3 - Temperature and Setpoint Display alternating every 5 seconds (no humidity)</li> <li>4 - Humidity Display Only (no temperature or setpoint)</li> <li>5 - Temperature and Humidity Display alternately every 5 seconds (no setpoint)</li> <li>6 - Setpoint and Humidity Display alternately every 5 seconds (no temperature)</li> <li>7 - Temperature, Setpoint and Humidity Display alternately every 5 seconds</li> </ul>   |                                   |  |                                       |   |                                       |   |   |   |
| <b>P2</b>   | <b>Temperature Offset:</b> Use the Up/Down buttons to change the offset in .1° increments (+10 °F/°C to -10 °F/°C maximum)  |                                   |  |                                       |   |                                       |   |   |   |
| <b>P3</b>   | <b>Temperature Max:</b> Use the Up/Down buttons to set the maximum temperature in .1° increments (from +99.9 °F/°C to -99.9 °F/°C, span should not exceed 122°F or 50°C)  |                                   |  |                                       |   |                                       |   |   |   |
| <b>P4</b>   | <b>Temperature Min:</b> Use the Up/Down buttons to set the minimum temperature in .1° increments (from +99.9 °F/°C to -99.9 °F/°C, span should not exceed 122°F or 50°C)  |                                   |  |                                       |   |                                       |   |   |   |
| <b>P5</b>   | <b>Setpoint Max:</b> Use the Up/Down buttons to set the max Setpoint temp in .1° increments (from +99.9 °F/°C to -99.9 °F/°C)   |                                   |  |                                       |   |                                       |   |   |   |
| <b>P6</b>   | <b>Setpoint Min:</b> Use the Up/Down buttons to set the min Setpoint temp in .1° increments (from +99.9 °F/°C to -99.9 °F/°C)   |                                   |  |                                       |   |                                       |   |   |   |
| <b>P7</b>   | <b>Humidity Max:</b> Use the Up/Down buttons to set the max Humidity in .1% increments (from 99.9% to 0%)   |                                   |  |                                       |   |                                       |   |   |   |
| <b>P8</b>   | <b>Humidity Min:</b> Use the Up/Down buttons to set the min Humidity in .1% increments (from 99.9% to 0%)   |                                   |  |                                       |   |                                       |   |   |   |
| <b>P9</b>   | <b>Humidity Offset:</b> Use the Up/Down buttons to change the Humidity offset in .1% increments (from +10% to -10%)   |                                   |  |                                       |   |                                       |   |   |   |
| <b>P10</b>  | <b>Test &amp; Balance:</b> This sets the output of the unit to the maximum and minimum temperature readings <ul style="list-style-type: none"> <li>0 - Low Value: Sets the output to the Minimum Temperature (from P4 above)</li> <li>1 - Normal Value: Sets the output to the Actual Temperature Reading (including the Temperature Offset in P2 above)</li> <li>2 - High Value: Sets the output to the Maximum Temperature (from P3 above)</li> </ul> Note: Leaving page P10 automatically puts the Test & Balance to the Normal mode   |                                   |  |                                       |   |                                       |   |   |   |
| <b>P11</b>  | <b>Sensor Location Indication:</b> Sets the properties of the "Location" indication on the LCD when the temperature is displayed. <ul style="list-style-type: none"> <li>0 - "Blank" Location Indication: Typically means the sensor is inside the display enclosure.</li> <li>1 - "Inside" Location indication: Typically means the sensor is installed away from the sensor display location, possibly in an adjacent clean room or operating room. Requires an External Sensor (-ES option)</li> <li>2 - "Outside" Location Indication: Typically means the sensor is installed away from the sensor display location, possibly in an outside air or intake duct or an adjacent room. Requires an External Sensor (-ES option)</li> <li>3 - "Remote" Location Indication: Typically means the sensor is installed away from the sensor display location. Requires an External Sensor (-ES option)</li> </ul> |                                   |  |                                       |   |                                       |   |   |   |
| <b>P12</b>  | <b>Reverse Acting:</b> Sets parameter outputs to Reverse Acting (RA) instead of Direct Acting. <table border="0" style="width: 100%;"> <tr> <td>0 - All outputs are Direct Acting</td> <td>1 - Temperature output is Reverse Acting</td> </tr> <tr> <td>2 - Setpoint output is Reverse Acting</td> <td>3 - Temperature and Setpoint outputs are Reverse Acting</td> </tr> <tr> <td>4 - Humidity output is Reverse Acting</td> <td>5 - Temperature and Humidity outputs are Reverse Acting</td> </tr> <tr> <td>6 - Setpoint and Humidity outputs are Reverse Acting.</td> <td>7 - Temperature, Setpoint and Humidity outputs are Reverse Acting</td> </tr> </table>  | 0 - All outputs are Direct Acting | 1 - Temperature output is Reverse Acting | 2 - Setpoint output is Reverse Acting | 3 - Temperature and Setpoint outputs are Reverse Acting | 4 - Humidity output is Reverse Acting | 5 - Temperature and Humidity outputs are Reverse Acting | 6 - Setpoint and Humidity outputs are Reverse Acting. | 7 - Temperature, Setpoint and Humidity outputs are Reverse Acting |
| 0 - All outputs are Direct Acting                     | 1 - Temperature output is Reverse Acting  |                                   |  |                                       |   |                                       |   |   |   |
| 2 - Setpoint output is Reverse Acting                 | 3 - Temperature and Setpoint outputs are Reverse Acting   |                                   |  |                                       |   |                                       |   |   |   |
| 4 - Humidity output is Reverse Acting                 | 5 - Temperature and Humidity outputs are Reverse Acting   |                                   |  |                                       |   |                                       |   |   |   |
| 6 - Setpoint and Humidity outputs are Reverse Acting. | 7 - Temperature, Setpoint and Humidity outputs are Reverse Acting   |                                   |  |                                       |   |                                       |   |   |   |

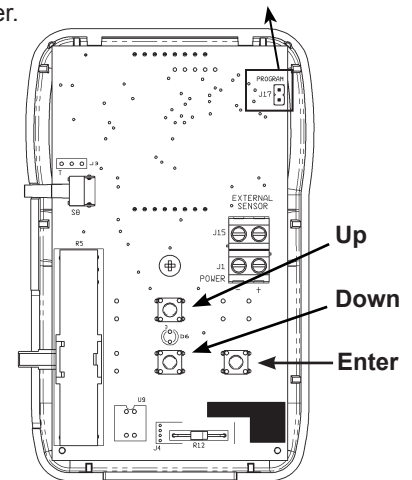


Fig 14: BAPI-Com Setup Buttons (Enter, Up and Down buttons)

Specifications subject to change without notice.



# BAPI-Com, Two Wire Multifunction Sensor with Setpoint Slider (BA/BS4SCOM) Temperature/Humidity Sensor

Installation and Operating Instructions

24632\_ins\_BS4SCOM

rev. 07/01/15

## Diagnostics

### Possible Problem

No display on the Sensor

### Possible Solution

Check the Room Sensor J1 terminals for 15 to 18VDC

Check the voltage on the Communication Output Module "Power Out" terminals for 18VDC

Check the voltage on the Communication Output Module "Power In" terminals for 20 to 30 VAC/VDC

No output on the output module

Check wiring and power.

Output module blue led not blinking

Check connections

## Specifications

### ROOM SENSOR

<b>Power:</b>	15 to 18VDC, from the Comm. Output Module
<b>Wiring:</b>	2 wires, Up to 500ft
AWG gauge	22 to 14AWG
Twist per foot	5 per ft preferred
Shielding	Preferred
Wire spec typical	Belden 9841
External sensor	22 to 18 AWG, TSP, shield grounded, 25' max
<b>Temperature Sensor:</b>	Thermistor, $\pm 0.36^{\circ}\text{F}$ ( $\pm 0.2^{\circ}\text{C}$ )
<b>External Sensor:</b>	10K-2 thermistor (Purchased separately) Wired 25' maximum from sensor
<b>RH/Temp Sensor:</b>	(Communicating Integrated Circuit)
Humidity:	Capacitive Polymer, $\pm 2\%$ RH (10% to 90%) @25°C, Fully Compensated
Temperature:	Semiconductor Band Gap, $\pm 0.3^{\circ}\text{C}$ @ 25°C
<b>Communication:</b>	Polling system (All messages are confirming)
Baud rate	1200 baud
Poll Rate	400 ms
Type	FSK
<b>Indication OPT.:</b>	LCD, (Temp/Humd/Setpoint/Occupied)
Window	2.5"x1.5"
Main digit	3.5 digits, 0.6" high, $\pm 99.9$
<b>Options:</b>	
Setpoint	Slidepot, Rev. Acting (RA) or Direct Acting (DA)
Display	Fahrenheit or Celsius
Override	Pushbutton
<b>Test &amp; Balance:</b>	Available with display only
Adjust	Low Temp/Normal/High Temp
<b>Material:</b>	ABS Plastic, UL94V-0
<b>Ambient:</b>	32° to 122°F (0° to 50°C) 0 to 95% RH Non-condensing
<b>Agency:</b>	RoHS

### COMMUNICATION OUTPUT MODULE

<b>Power in:</b>	20 to 30 VDC/AC, 25mA max 1.7VA @ 30 VAC
<b>Terminations:</b>	
Comm. & PWR	2 wires to the sensor, 22-14 AWG
Power In	2 wires, 12 to 28 AWG
Output	2 wires per output, 12-28 AWG
Override Input	2 wires, 16 to 30 AWG
<b>Outputs:</b>	Three Maximum
Volts	0 to 5VDC or 0 to 10VDC, I <sub>max</sub> =20mA, DA or RA (Factory Configured only)
Contact	Reed switch, 0.5A@24VDC
Resistance	400Ω to 20KΩ span, V <sub>max</sub> =15VDC, DA or RA (Factory Configured only)
Thermistor	10K-2, 10K-3 or 10K-3 [11K] (Factory Configured)
<b>Input (DI):</b>	External dry contact connection (Closed = Occupied)
<b>Indicators:</b>	
Power	Green LED (On=Powered)
Communication	Blue LED, Blinks during normal communication
Occupied	Red LED (On=Occupied request)
<b>Mounting:</b>	3 EZ mount methods
DIN Rail	35mm, Quick tab release
Snap Track	4" length, 2.75" wide
Screw Mount	Four tabs w/0.125" holes
<b>Material:</b>	ABS Plastic, UL94V-0
<b>Ambient:</b>	32° to 122°F (0° to 50°C) 0 to 95% RH Non-condensing
<b>Agency:</b>	RoHS

Specifications subject to change without notice.