

BUILDING AUTOMATION PRODUCTS INC.

# 2018 FULL PRODUCT CATALOG



TEMPERATURE



HUMIDITY



PRESSURE



AIR QUALITY



ACCESSORIES



WIRELESS



**BAPI**  
Sensors for HVAC/R



Rev. 08/31/15

## BAPI-BACKED Confidence



### We've got your back...

Most sensor manufacturers will replace their defective products, but only BAPI has the confidence to replace our products **AND PAY YOUR LABOR** to do so.<sup>1</sup>

**BAPI-BACKED** means we stand behind everything we do. We are so confident in the quality of our products that if one fails within the warranty period, we will not only repair or replace it, but we'll pay for your labor to do so.

We stand behind our products, and we also stand behind you with:

- Real-time customer service, sales and technical support
- App notes, instructional videos and documentation available 24/7 online

1. Terms and conditions apply. For more information, visit [www.bapihvac.com/terms-conditions/](http://www.bapihvac.com/terms-conditions/)



Building Automation Products, Inc. • 750 North Royal Avenue, Gays Mills, WI 54631 USA  
Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: [sales@bapihvac.com](mailto:sales@bapihvac.com) • [www.bapihvac.com](http://www.bapihvac.com)



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Ordering Information • Warranties • Certificates of Accuracy and Calibration •  
100 Percent Compatibility Guarantee





We make it easy for you.



1. We now offer a 5 year warranty across all of our products.



Temperature



Humidity



Air Quality



Pressure



ETA



Accessories



Wireless

\*BAPI also offers a lifetime limited warranty on several temperature units. Please contact your sales representative for details.

- 2.



Our products are built to last, which is why we offer a 5 year warranty across all of our products. Of course, all companies offer a warranty, but we take it step further. If our product fails due to a manufacturing defect we will not only repair or replace the unit, but we will also pay the labor to do so. We will do this regardless of whether or not the product is in the warranty period.

3. 0% Restock Fee on all stock sales names within 30 days.

- All items will be inspected when received. BAPI will consider restocking new and unused items only. If an item is in need of relabeling or repackaging it will be considered used.
- Any restock fee is subject to change based on the Technical Product Support Manager's discretion.

4. Advanced Warranty Replacement

BAPI will consider abandoning defective unit(s) when the following are met:

- Product is still under warranty.
- The product was operating in an environment for which it was designed.
- Product was invoiced for less than \$100.
- Multiple units will be considered for abandonment; not to exceed \$500 per RMA.

5. Free Ground Shipping



For more information on any of these items, please see our terms & conditions: [www.bapihvac.com/terms-conditions/](http://www.bapihvac.com/terms-conditions/)

# The BAPI Difference

Changing the way you think about sensors™



- Original solutions to common HVAC/R problems
- Driven by customer feedback

BAPI Originals are made up of quality vendors, talented employees, and committed customers. These 3 ingredients combined create industry leading, original solutions.



99.94%  
Manufacturing  
Efficiency Rate



Live Support



Manufactured  
in the USA



On-Site,  
Multi-Step Testing



Computer Aided  
Workstations

## Marketing Support

We offer a wide range of support both physical and digital to help you and your customers including:

- Catalogs
- Line Cards
- Data Sheets
- Ins/Ops
- Application Notes

- In Person Training
- Webinars
- Online Training
- Videos

These resources are available either through our website or by contacting BAPI.

## Sales Support

Our sales & customer service team offer the following:

### Order Verification:

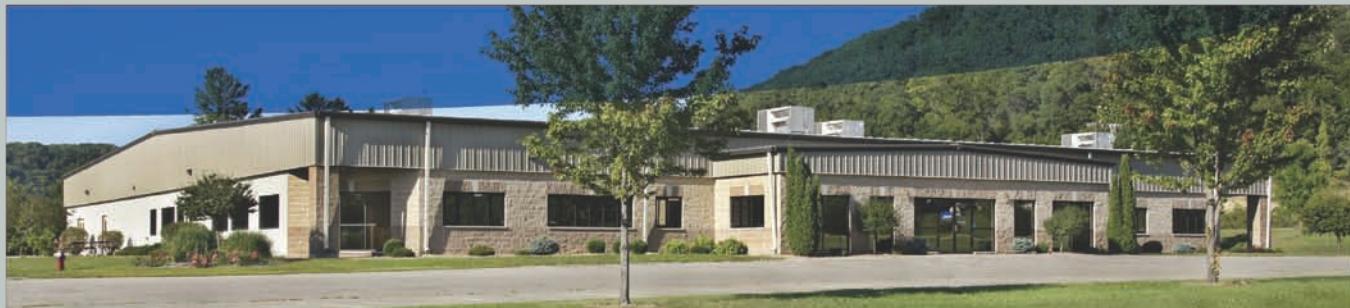
To ensure accuracy, we verify each order so you don't have to worry. If we see something off, we'll contact you to make sure you get what you need.

### Joint Customer Calls & Visits:

When schedules permit, BAPI salespeople are able to travel to your office for in-office training or hold a webinar for your staff.

### Product Samples:

Product samples for customer evaluation are available on request. Contact us for details.



**Building Automation Products, Inc.**  
750 North Royal Avenue  
Gays Mills, WI 54631

**email:** sales@bapihvac.com  
**phone:** +1-608-735-4800  
**website:** www.bapihvac.com



## Company Background

BAPI manufactures sensors and solutions for HVAC/R, and we bring to the table many years of combined experience in all aspects of the industry from product development and engineering to manufacturing and sales. In fact, BAPI introduced many of the products and processes that have become industry standards, and we currently hold the patents for many of these products and processes. Dedication to quality throughout the entire manufacturing process has earned our products a reputation for reliability and longevity.

## Website Resources - [www.bapihvac.com](http://www.bapihvac.com)

**Online Ordering** - The BAPI website features Online Ordering with easy navigation through the product lines and real time information on pricing, orders, shipping and account history.

**Application Notes** - Have you ever had a ground loop problem or AC power noise in your sensor cables? BAPI has a wealth of information available online to help you solve these and many other common industry problems.

### Instruction Sheets, Datasheets & Price

**Sheets** - Although Installation and Operation Sheets are included in the box of every BAPI product, sometimes these sheets do not make it to the job site. Therefore, BAPI instruction sheets are available online whenever you need them. Printable Datasheets and Price Sheets are also only a click away.

**Videos** - BAPI has a library of instructional videos available on the website such as how to conduct a wireless building survey with our Field Verifier Kit.



The BAPI-Guard Video

## The BAPI Difference

BAPI uses only the highest quality sensing elements and meticulous manufacturing, testing and quality assurance procedures to guarantee that our products perform out of the box and far into the future. Here are a few of the extra steps that we take to protect your reputation and bottom line.

**On-Site Multi-Step Testing** - Every BAPI product is tested at multiple stages in the manufacturing process using custom designed fixtures and computer aided testing procedures to eliminate the potential for human error and guarantee a quality product.

**NIST Traceable Precision Instruments** - Product testing and calibration is conducted with precision Instrumentation and state-of-the-art Environmental Chambers, all of which are traceable to National Institute of Standards and Technology (NIST) standards.

**Computer Aided Production Stations** - Every production station features a large computer monitor and access to a wealth of resources on the BAPI network including product specific build documents, schematics and three dimensional product renderings to assure that each product is built to our engineering specifications.

**CE Certified & RoHS Compliant** - BAPI holds itself to a higher standard with CE certification on select models of temperature, humidity and pressure sensors. BAPI is also committed to environmentally responsible manufacturing practices and complies with the European Union's RoHS directive, which restricts the use of certain hazardous substances such as lead and mercury.

**BAPI-BACKED Confidence** - Most sensor manufacturers will replace their defective products, but only BAPI has the confidence to replace our products and pay your labor to do so.





## Room Temperature Sensors

### BAPI-Stat "Quantum Series" of Room Sensors

The Latest Sensor Innovation from BAPI



"Quantum" Units with Optional Setpoint,  
Display and Occupancy Override - pg 4

"Quantum Prime"  
Wipedown Units - pg 6

"Quantum  
Slim" Units  
- pg 7



### BAPI-Stat 4 with LCD

Large Display with Temp  
Setpoint



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### RuP Sensors

Display & Temp Setpoint



pg A10

### BAPI-Stat 3

for Operating Rooms



pg A12

### "X-Combo"

Temp & Humidity  
Setpoint



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### Room Units without LCD

Optional setpoint &  
Override



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### Decora Style Sensor

Fits inside a Wall  
Plate



pg A16

### "Button" Sensor

Smaller than a  
Quarter



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### T1K Transmitters

4 to 20 mA Output



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### BAPI-Com

2-Wire Sensor



pg A22

### "L-Temp"

Echelon Sensor



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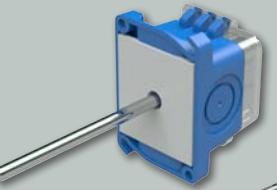
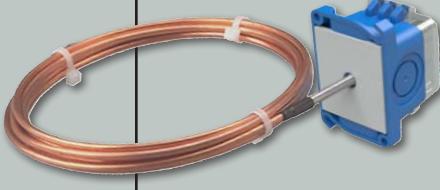
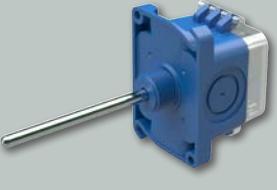
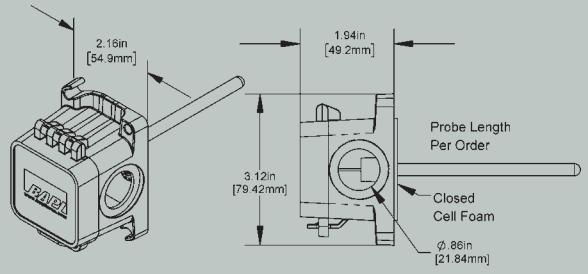
### Wall Plates

w/ optional Override



pg A24



<b>BAPI Non-Room Temperature Sensors</b>			
<b>Duct Sensors</b>  pg A26	<b>Duct Averaging</b>  pg A28	<b>Rigid Averaging</b>  pgs A30	<b>Submersible Duct</b>  pg A32
<b>Submersible Averaging</b>  pg A34	<b>Immersion</b>  pg A36	<b>Immersion with SS Fitting</b>  pg A38	<b>Thermowells for Immersion Sensors</b>  pgs A40
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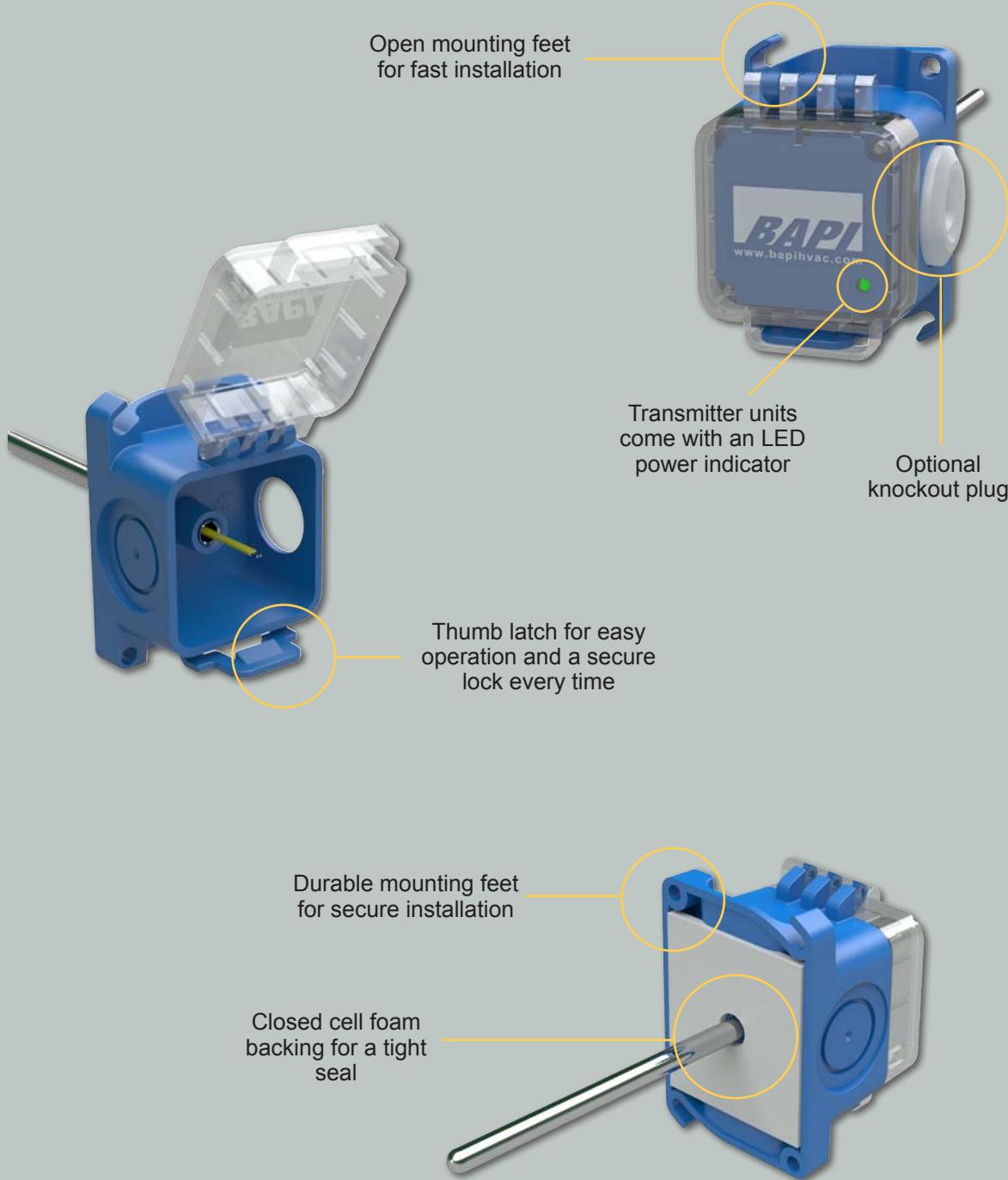


# The BAPI-Box Crossover Enclosure

A3

Temperature Sensors

The new BAPI-Box Crossover features a hinged cover with thumb latch for easy termination. It is available with an optional pierceable knockout plug for the open port. The plug increases the enclosure rating from IP10 to IP44. The BAPI-Box Crossover is available for all of BAPI's non-room temperature and humidity sensors.





## Features & Options

- New BAPI-Stat "Quantum" Enclosure Style with Higher Contrast Display for Improved Clarity at Greater Distances
- Pushbutton or Slider Setpoint Adjustment
- Large Display with Multiple Indicators and Icons
- Optional Fan Speed and Mode Control

The new BAPI-Stat "Quantum" room temperature sensors feature a modern enclosure style with pushbutton or slider setpoint adjustment and override. The LCD can display both temperature as well as room occupancy status. The display has been upgraded for higher contrast, providing improved clarity at greater distances.

The optional occupancy override can be configured in parallel with the sensor or setpoint, or as a separate output. An optional 3.5mm (1/8"), RJ11 or RJ22 Communication Jack can be mounted in the base to provide direct access to the network.

Fan Speed and Mode Control is also available for applications with fan coils, heat pumps or unit ventilators.



## Specifications

### Power for 24 VDC Power Units (default):

0 to 5 VDC Setpoint or Resistive Setpoint ... 9 to 40 VDC (24 VDC nominal)

0 to 10 VDC Setpoint or Resistive Setpoint .15 to 40 VDC (24 VDC nominal)

Any Allowed Setpoint.....15 to 28 VAC (24 VAC nominal)

Note: AC power requires a separate pair of shielded wires.

### Power for Optional 5 VDC Power Units:

0 to 5 VDC Setpoint or Resistive Setpoint

5VDC, +/-1% nominal, Input regulation affects accuracy

**Power Consumption:** 13 mA max DC; .32 VA max AC

### Sensing Element:

Thermistor or RTD (See Sensors Sect. for Specs.)

**Wiring:** 2 to 6 pair of 16 to 22AWG\*

### Mounting:

Standard 2x4" J-box or drywall mount (screws provided)

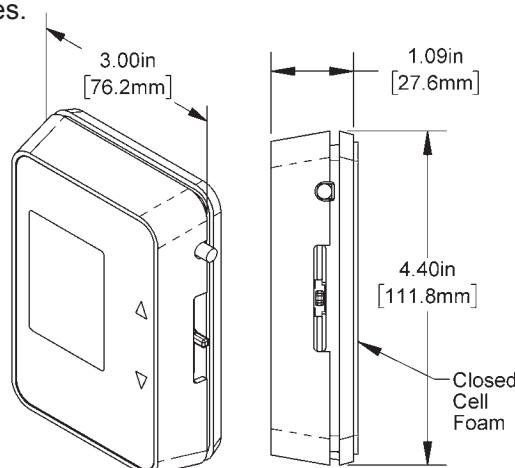
### Environmental Operation Range:

Temperature: 32 to 122 °F (0 to 50 °C)

Humidity: 0 to 95%, non-condensing

### Agency:

RoHS  
\*BAPI recommends that you do not run wiring for the Room Units in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils. Also, these units are not designed for line voltage applications.





# BAPI-Stat “Quantum” with Display

Temperature Sensors

A5

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection.



## BAPI-Stat “Quantum” Temperature Sensor Option Selection Guide:

BA/TQ ( #1 ) - ( #2 ) - ( #3 ) - ( #4 )( #5 ) - ( #6 ) - ( #7 )

### **#1: Display** (required)

- F ..... Temperature Displayed in °F ..... \$125
- C ..... Temperature Displayed in °C ..... \$125

### **#2: Temperature Sensor** (required)

- A ..... 1K Platinum RTD (385 curve)
- B ..... 10K-2 Thermistor
- C ..... 10K-3 Thermistor
- D ..... 10K-3[11K] Thermistor
- E ..... 20K Thermistor
- F ..... 1.8K Thermistor
- G ..... 1K Ω Nickel RTD ..... \$9
- H ..... 3K Thermistor

### **#3: Setpoint Adjustment** (required)

- 1 ..... Slider Setpoint Adjustment
- 2 ..... Pushbutton Setpoint Adjustment
- X ..... No Setpoint Adjustment

### **#4: Setpoint Display Range** (required)

- A ..... -3 to +3
- B ..... -5 to +5
- C ..... 50 to 90 °F or 10 to 32 °C
- D ..... 55 to 85 °F or 13 to 30 °C
- E ..... 60 to 80 °F or 15 to 27 °C
- F ..... 65 to 80 °F or 18 to 27 °C
- X ..... No Setpoint Adjustment

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

### **#5: Setpoint Output Range** (required)

- 00.....0 to 5 V
- 10.....0 to 10 V
- 40.....0 to 1 k
- 60.....0 to 10 kΩ
- 80.....0 to 20 kΩ
- 81.....4.75 k to 24.75 kΩ
- 82.....6.19 k to 26.19 kΩ
- 84.....10 k to 30 kΩ
- X .....No Setpoint Adjustment

### **#6: Occupant Override** (required)

- J ..... Override as a Separate Output
- N ..... Override in Parallel (//) with Sensor
- P ..... Override in Parallel (//) with Setpoint
- X .....No Override

### **#7: Optional Selections\*** (optional)

- A ..... Differential Ground
- B ..... Comm Jack C35 ..... \$10
- C ..... Comm Jack C11 ..... \$20
- D ..... Comm Jack C22 ..... \$25
- E ..... 5 Volt Input Power
- F ..... Test & Balance Switch ..... \$7.50
- G ..... XLD Fan Speed Adjustment
- H ..... X01 Fan Speed Adjustment
- I ..... X02 Fan Speed Adjustment
- J ..... X06 Fan Speed Adjustment
- K ..... HCF Heat/Cool Mode Control
- L ..... H01 Heat/Cool Mode Control

\*When more than one is selected, put in alphabetical order. Additional options and descriptions can be found on pg. I4

### Example Number:

BA/TQ(F) - ( B ) - ( 1 ) - ( C )( 80 ) - ( J )

Actual Number (with brackets removed): BA/TQF-B-1-C80-J

Description: BAPI-Stat “Quantum” Room Temperature Sensor, °F Display, 10K-2 Thermistor Temperature Sensor, Slider Setpoint Adjustment, 50 to 90°F Setpoint Display Range, 0 to 20kΩ Setpoint Output Range, Override as a Separate Output, No additional optional selections.

List Price: \$125 (Base Price) = \$125 List Price

Your Number: BA/



Building Automation Products, Inc. • 750 North Royal Avenue, Gays Mills, WI 54631 USA

Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: [sales@bapihvac.com](mailto:sales@bapihvac.com) • Web: [www.bapihvac.com](http://www.bapihvac.com)



## Features & Options

- New BAPI-Stat "Quantum Prime" Enclosure Style with Higher Contrast Display for Improved Clarity at Greater Distances
- Membrane Keypad for Wipedown Cleaning
- Temperature and Humidity Setpoint Adjustment

The BAPI-Stat "Quantum Prime" is designed for operating rooms, clean rooms and elder care facilities. It features a large display and membrane keypad for wipedown cleaning. It is available with temperature and humidity measurement, temperature and humidity setpoint and occupant override.

The unit includes a number of field adjustments including °F or °C display, temperature and humidity offset and setpoint lockout. The display can also be set to show a large temperature and small %RH reading or a large %RH and a small temperature reading when 4 buttons are present. This unit can be configured with up to four transmitted variables. Contact your BAPI representative for details.



**BAPI-Stat  
"Quantum Prime"  
Temp & Humidity  
Sensor**



## Ordering Information

The BAPI-Stat "Quantum Prime" Wipedown Sensor is a powerful unit with many options. Please call your BAPI representative for ordering. We will provide a quote and keep it on record for future orders.

## Specifications

### Power Supply:

- 10 to 40 VDC (15 to 24 VDC Recommended) for 4 to 20 mA or 0 to 5 VDC Outputs
- 15 to 40 VDC (15 to 24 VDC Recommended) for 0 to 10 VDC Outputs
- 12 to 28 VAC (Requires a separate pair of shielded wires) for 0 to 5 VDC Outputs

### Power Consumption:

- 60 mA max DC: 4 to 20 mA Output (<30mA typical)
- 36 mA max DC: 0 to 5 or 0 to 10 VDC Outputs (6mA typical)
- 0.9 VA max AC: 0 to 5 or 0 to 10 VDC Outputs (0.2VA typical)

**Outputs:** 4 active outputs plus 1 passive temp sensor  
 Volts.....0 to 5 VDC or 0 to 10VDC, Impedance >10KΩ  
 Current.....4 to 20 mA, Impedance <500Ω @ 24 VDC  
 Resistance.....Setpoint, 5 VDC @ 5 mA max  
 Relay Contact....N.O., 500 mA @ 24 VDC max  
 Temp. Sensor ....Passive RTD or Thermistor

### Inputs:

- External Override..5 VDC or 24 VDC/VAC
- External Sensor....10K-2 Themistor purchased separately.

### Sensing Elements for Active Outputs and Display:

- Temperature .....10K-2 Thermistor
- Humidity.....Capacitive Polymer, ±2%RH

**Mounting:** 2"x4" J-box or drywall mount - screws provided

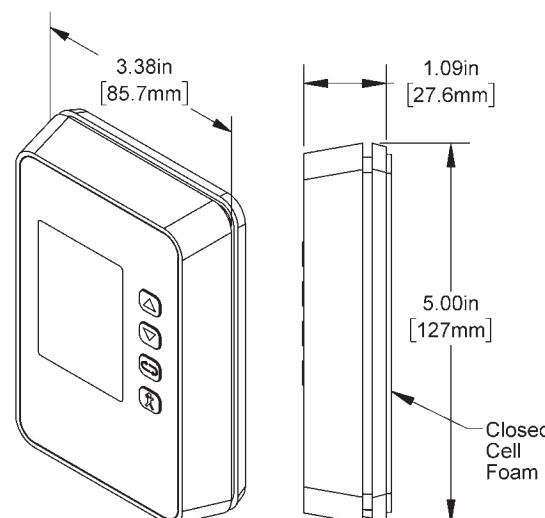
### Environmental Ambient:

- Temperature .....32 to 122°F (0 to 50°C)
- Humidity.....0 to 95%, non-condensing
- Storage .....32 to 185°F (0 to 85°C)

**Wiring:** 2 to 6 pair of 16 to 22 AWG

**Enclosure Material:** ABS Plastic, UL 94, V-0

**Agency:** RoHS



\*AC power requires a separate pair of shielded wires.

\*\*BAPI recommends that you do not run wiring for room units in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils.





CE

Rev. 11/09/17

# BAPI-Stat "Quantum Slim" Sensor

A7

Temperature Sensors

## Features & Options

- New BAPI-Stat "Quantum Slim" Enclosure Style
- White or Black Color Option
- Wide Selection of Temperature Sensing Elements
- Limited Lifetime Warranty

The new BAPI-Stat "Quantum Slim" Temperature Room Sensor is designed for applications where a temperature output is required with a sleek, low profile room enclosure. Available with thermistor and RTD elements. Ideal for locations where aesthetics are as important as the temperature measurement.



**BAPI-Stat "Quantum Slim" Sensors**

## Ordering Information

Part Number	Description	List Price
BA/QS-W-A	White BAPI-Stat "Quantum Slim" with 1K Platinum RTD (385 curve)	\$32
BA/QS-W-B	White BAPI-Stat "Quantum Slim" with 10K-2 Thermistor	\$25
BA/QS-W-C	White BAPI-Stat "Quantum Slim" with 10K-3 Thermistor	\$25
BA/QS-W-D	White BAPI-Stat "Quantum Slim" with 10K-3[11K] Thermistor	\$25
BA/QS-W-E	White BAPI-Stat "Quantum Slim" with 20K Thermistor	\$25
BA/QS-W-F	White BAPI-Stat "Quantum Slim" with 1.8K Thermistor	\$25
BA/QS-W-G	White BAPI-Stat "Quantum Slim" with 1K Ω Nickel RTD	\$42
BA/QS-W-H	White BAPI-Stat "Quantum Slim" with 3K Thermistor	\$25
BA/QS-W-V	White BAPI-Stat "Quantum Slim" with 10K-4 Thermistor	\$25
BA/QS-B-A	Black BAPI-Stat "Quantum Slim" with 1K Platinum RTD (385 curve)	\$37
BA/QS-B-B	Black BAPI-Stat "Quantum Slim" with 10K-2 Thermistor	\$30
BA/QS-B-C	Black BAPI-Stat "Quantum Slim" with 10K-3 Thermistor	\$30
BA/QS-B-D	Black BAPI-Stat "Quantum Slim" with 10K-3[11K] Thermistor	\$30
BA/QS-B-E	Black BAPI-Stat "Quantum Slim" with 20K Thermistor	\$30
BA/QS-B-F	Black BAPI-Stat "Quantum Slim" with 1.8K Thermistor	\$30
BA/QS-B-G	Black BAPI-Stat "Quantum Slim" with 1K Ω Nickel RTD	\$47
BA/QS-B-H	Black BAPI-Stat "Quantum Slim" with 3K Thermistor	\$30
BA/QS-B-V	Black BAPI-Stat "Quantum Slim" with 10K-4 Thermistor	\$30

## Specifications

### Wiring:

One pair of 16 to 22 AWG wires

### Mounting:

Surface or drywall mount (screws provided)

### Sensing Element:

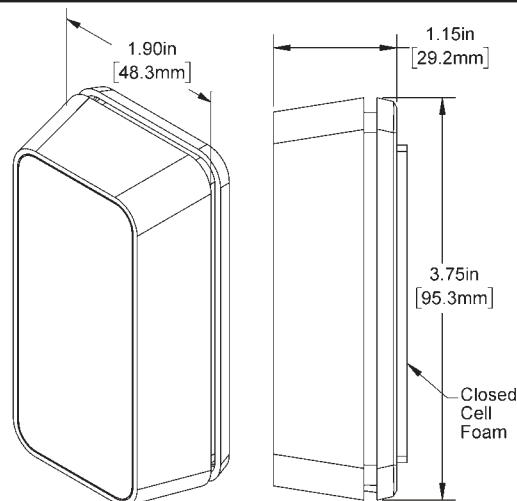
Thermistor or RTD (See Sensors Sect. for Specs.)

### Environmental Operation Range:

Temperature: 32 to 122 °F (0 to 50 °C)

Humidity: 0 to 95%, non-condensing

**Agency:** RoHS, CE



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Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: sales@bapihvac.com • Web: www.bapihvac.com



## Features & Options

- Patented Enclosure Style with Large Display
- Robust Tactile Pushbuttons
- Setpoint Adjust (Slider or Pushbutton)
- Optional Override, Fan Speed & Mode Control
- Optional Communication Jack and Test & Balance

The patented BAPI-Stat 4 Style Enclosure features a large LCD with all the visual indicators on the display itself. It provides local indication of Temperature and Setpoint with Setpoint Adjust and Override.

It also has optional Fan Speed and Mode Control for applications with Fan Coils, Heat Pumps or Unit Ventilators. The Setpoint is available as a slidepot or as pushbuttons and is displayed on the LCD for a short time after an adjustment.

The Override is a momentary signal that can be configured in parallel with the sensor or setpoint, or as a separate output or a latching switch. An optional 3.5mm (1/8"), RJ11 or RJ22 Communication Jack can be mounted in the base to provide direct access to the network.



**BAPI-Stat 4  
Units  
(with Warm  
White and  
Gray Logo  
Plate)**

## Specifications

### Power for 24VDC Power Units:

0 to 5 VDC Setpoint or Resistive Setpoint ..... 9 to 40 VDC (24 VDC nominal)

0 to 10 VDC Setpoint or Resistive Setpoint ... 15 to 40 VDC (24 VDC nominal)

Any Allowed Setpoint..... 15 to 28 VAC (24 VAC nominal)

Note: AC power requires a separate pair of shielded wires.

### Power Consumption:

7 mA max DC; .17 VA max AC

### Sensing Element:

Thermistor or RTD (See Sensors Sect. for Specs.)

### Wiring:

2 to 4 pair of 16 to 22AWG\*

### Communication Jack:

Optional 3.5mm (1/8") Phono Jack

### Mounting:

Standard 2x4" J-box or drywall mount (screws provided)

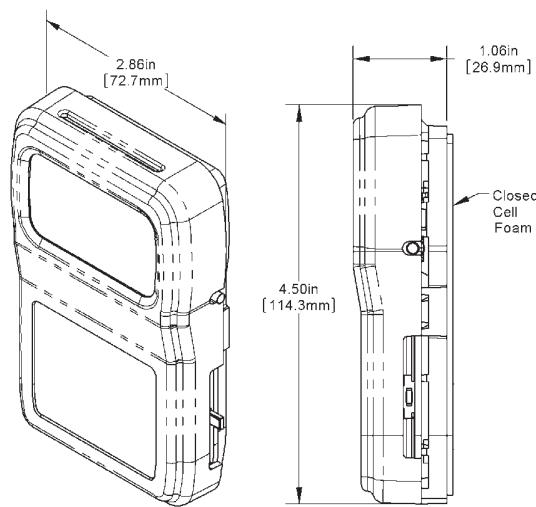
### Environmental Operation Range:

Temperature: 32 to 122 °F (0 to 50 °C)

Humidity: 0 to 95%, non-condensing

### Agency:

RoHS & CE



\*BAPI recommends that you do not run wiring for the Room Units in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils. Also, these units are not designed for line voltage applications.





# BAPI-Stat 4™ Room Unit with Display

## Temperature Sensors

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Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Omit the designator and dashes for optional selections that are not required in your configuration.



### BAPI-Stat 4 Option Selection Guide:

BA/ (#1)(#2) - (#3)(#4) - (#5) - (#6) - (24) - (#8) - (CG) - (#10)

**#1: Room Sensor Style (required)**

BS4M....BAPI-Stat 4, Pushbutton Setpoint..\$125  
BS4S ....BAPI-Stat 4, Slider Setpoint.....\$125

**#2: °F or °C Display (required)**

F ..... Temperature Displayed in °F  
C ..... Temperature Displayed in °C

**#3: Setpoint Display Range (optional)**

A ..... -3 to +3  
B ..... -5 to +5  
C ..... 50 to 90 °F or 10 to 32 °C  
D ..... 55 to 85 °F or 13 to 30 °C  
E ..... 60 to 80 °F or 15 to 27 °C  
F ..... 65 to 80 °F or 18 to 27 °C

**#4: Setpoint Output Range (optional)**

00.....0 to 5 V  
10.....0 to 10 V  
60.....0 to 10 kΩ  
80.....0 to 20 kΩ  
81.....4.75 k to 24.75 kΩ  
82.....6.19 k to 26.19 kΩ  
84.....10 k to 30 kΩ

**#5: Occupant Override (required)**

J ..... Override as a Separate Output  
N ..... Override in Parallel (//) with Sensor  
P ..... Override in Parallel (//) with Setpoint  
Z ..... No Override

**#6: Communication Jack (optional)**

C35L.....3.5 mm Phono Style Jack .....\$10

**#7: Operating Power (required)**

24.....9 to 40 VDC or 15 to 28 VAC

**#8: Temperature Sensor (required)**

1375.....1K Platinum RTD (375 curve)  
1NI.....1K Ω Nickel RTD .....\$9  
1.....1K Platinum RTD (385 curve)  
18.....1.8K Thermistor  
3.....3K Thermistor  
102.....10K-2 Thermistor  
103.....10K-3 Thermistor  
10311....10K-3[11K] Thermistor  
20.....20K Thermistor

**#9: Common Ground Config. (required)**

CG ..... Common Ground

**#10: Logo Plate Color (required)**

WMW....Warm White (matches enclosure)  
GRY.....Gray

*Additional options including Fan Speed and Mode Control are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

**Example Number:**

BA/ (BS4M)(F) - (E)(80) - (N) - (C35L) - (24) - (102) - (CG) - (WMW)

**Actual Number (with parenthesis removed):** BA/BS4MF-E80-N-C35L-24-102-CG-WMW

**Description:** BAPI-Stat 4 with Pushbutton Setpoint, °F Display, 60 to 80°F Setpoint Display Range, 0 to 20kΩ Setpoint Output Range, Override in Parallel with Sensor, 3.5mm Phono Style Comm. Jack, 24V Operating Power, 10K-2 Thermistor Temperature Sensor, Common Ground Config., Warm White Logo Plate Color

**List Price:** \$125 (BAPI-Stat 4M) + \$10 (Comm. Jack) = \$135 List Price

**Your Number:** BA/



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## Features & Options

- Delta Style Enclosure with Display
- Optional Slider or Pushbutton Setpoint Adjustment
- Optional Occupancy Override with LED Indication
- Optional Communication Jack
- Wide Selection of Temperature Sensing Elements

The RuP and RuPS units come in the popular Delta Style Enclosure with LCD. They provide local indication of temperature with pushbutton or slider Setpoint Adjustment and optional Override with LED and Communications Jack.

This unit is also available with Fan Speed and Mode Control for applications with Fan Coils, Heat Pumps or Unit Ventilators.



RuP (above)  
and RuPS  
(right)

## Specifications

### Power RuP:

7 to 35 VDC (15 to 24 VDC recommended)  
12 to 30 VAC (requires a separate pair of shielded wires)

### Power RuPS:

9 to 40 VDC (15 to 24 VDC recommended)  
15 to 28 VAC (Requires a separate pair of shielded wires)

### Power Consumption:

10 mA max. DC, .2 VA maximum AC

### Sensing Element:

Thermistor or RTD (See Sensors Sect. for Specs.)

### Mounting:

Standard 2"x4" J-box or drywall mount (screws provided)

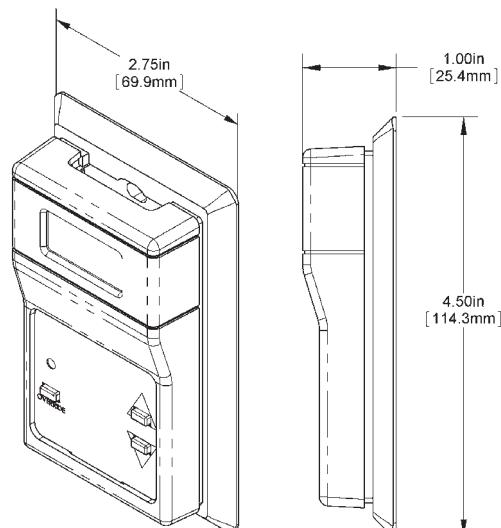
### Environmental Operation Range:

Temp: 32 to 122 °F (0 to 50 °C)

Humidity: 0 to 95%, non-condensing

### Enclosure Material & Rating:

ABS Plastic, UL94 HB



\*BAPI recommends that you do not run wiring for the Room Units in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils.

## Associated Products

### The BAPI-Guard

Prevents tampering, physical damage and unauthorized adjustment of thermostats. Available in two sizes to fit most thermostats.



### VC350A "EZ" - Voltage Converter

BAPI recommends using DC power on room units for a more stable reading. Our 350mA "EZ" unit is a perfect way to convert 24 VAC to 5, 12, 15 or 24 VDC.





# RuP & RuPS Room Units

Temperature Sensors

A11

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Omit the designator and dashes for optional selections that are not required in your configuration.



## RuP & RuPS Option Selection Guide:

BA/ (#1) - (#2) - (#3)(#4) - (#5) - (#6) - (24) - (#8) - (#9) - (CG)

### #1: Room Sensor Style (required)

RuP.....Pushbutton Setpoint.....\$125  
RuPS ... Slider Setpoint Adjustment.....\$125

### #2: °F or °C Display (required)

F ..... Temperature Displayed in °F  
C ..... Temperature Displayed in °C

### #3: Setpoint Display Range (optional)

A ..... -3 to +3  
B ..... -5 to +5  
C ..... 50 to 90 °F or 10 to 32 °C  
D ..... 55 to 85 °F or 13 to 30 °C  
E ..... 60 to 80 °F or 15 to 27 °C  
F ..... 65 to 80 °F or 18 to 27 °C

### #4: Setpoint Output Range (optional)

00.....0 to 5 V  
10.....0 to 10 V  
60.....0 to 10 kΩ  
80.....0 to 20 kΩ  
81.....4.75 k to 24.75 kΩ  
82.....6.19 k to 26.19 kΩ  
84.....10 k to 30 kΩ

### #5: Occupant Override (required)

J.....Override as a Separate Output  
N.....Override in Parallel (//) with Sensor  
P.....Override in Parallel (//) with Setpoint  
Z.....No Override

### #6: Communication Jack (optional)

C35L....3.5 mm Phono Style Jack .....\$10

### #7: Operating Power (required)

24.....9 to 40 VDC or 15 to 28 VAC

### #8: Temperature Sensor (required)

1375.....1K Platinum RTD (375 curve)  
1NI.....1K Ω Nickel RTD .....\$9  
1.....1K Platinum RTD (385 curve)  
18.....1.8K Thermistor  
3.....3K Thermistor  
102.....10K-2 Thermistor  
103.....10K-3 Thermistor  
10311....10K-3[11K] Thermistor  
20.....20K Thermistor

### #9: Setpoint Lockout

(required for RuP Units, not available for RuPS)  
NL.....No Setpoint Lockout  
SL.....Setpoint Lockout Enabled

### #10: Common Ground Config. (required)

CG .....Common Ground

*Additional options including Fan Speed and Mode Control are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

**Example Number:** BA/ ( RuP ) - ( F ) - ( E )( 80 ) - ( N ) - ( C35L ) - ( 24 ) - ( 102 ) - ( NL ) - ( CG )

**Actual Number (with parenthesis removed):** BA/BS4M-F-E80-N-C35L-24-102-NL-CG

**Description:** RuP Unit with Pushbutton Setpoint, °F Display, 60 to 80°F Setpoint Display Range, 0 to 20kΩ Setpoint Output Range, Override in Parallel with Sensor, 3.5mm Phono Style Comm. Jack, 24V Operating Power, 10K-2 Thermistor Temperature Sensor, No Setpoint Lockout, Common Ground Config.

**List Price:** \$125 (RuP) + \$10 (Comm. Jack) = \$135 List Price

**Your Number:** BA/



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## Features & Options

- Designed for Operating Rooms and Clean Rooms
- Temperature and Humidity Setpoint Adjustment
- Membrane Pushbuttons for Wipedown Cleaning

The BAPI-Stat 3 is designed for operating rooms, clean rooms and elder care facilities. It features a large display and membrane pushbuttons for wipedown cleaning. It is available with temperature and humidity measurement, temperature and humidity setpoint and occupant override.

The unit includes a number of field adjustments including °F or °C display, temperature and humidity offset and setpoint lockout. The display can also be set to show a large temperature and small %RH reading, a large %RH and a small temperature reading, or to alternate between the two. This unit can be configured with up to four transmitted variables. Contact your BAPI representative for details.



**BAPI-Stat 3  
Units (shown  
with optional  
humidity  
setpoint)**

## Ordering Information

The BAPI-Stat 3 is a very powerful unit with many options. Please call your BAPI representative for ordering. We will provide a quote and keep it on record for future orders

## Specifications

### Power:

- 10 to 35 VDC for 4 to 20 mA or 0 to 5 VDC Outputs
- 15 to 35 VDC for 0 to 10 VDC Output
- 12 to 28 VAC for 0 to 5 VDC Output\*
- 15 VAC to 28 VAC for 0 to 10 VDC Output\*

Note: 15 to 24 VDC recommended for VDC unit.

### Power Consumption:

- 60 mA max. DC: 4 to 20 mA or 0 to 5 VDC Outputs
- 10 mA max. DC: 0 to 10 VDC Output
- 1.44 VA max. AC: 0 to 5 VDC Outputs
- 0.2 VA max. AC: 0 to 10 VDC Output

### RH/Temp Sensor Construction:

Communicating Integrated Circuit

Humidity: Capacitive Polymer, ±2% RH (10% to 90%)  
@25°C, Fully Compensated

Temp: Semiconductor Band Gap, ±0.3°C @ 25°C

### Optional Direct Temp. Sensor:

Thermistor or RTD (See Sensors Sect. for Specs.)

### Mounting:

2" x 4" J-box or drywall mount - screws provided

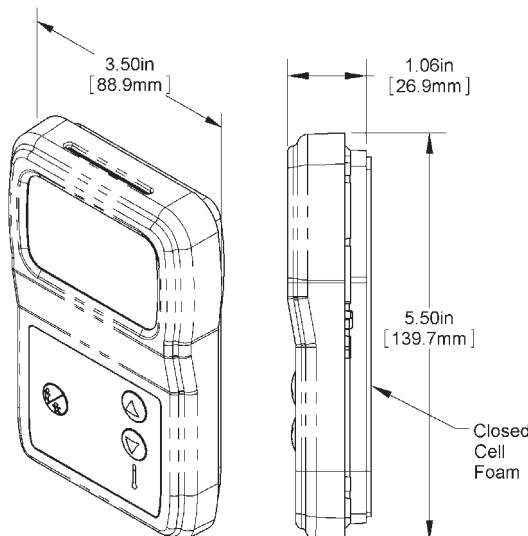
### Environmental Specifications:

Temperature: 32 to 122 °F (0 to 50 °C)

Humidity: 0 to 95%, non-condensing

**Wiring:** 2 to 5 pair of 16 to 22 AWG\*\*

**Material & Rating:** ABS Plastic - UL 94, V-0



\*AC power requires a separate pair of shielded wires.

\*\*BAPI recommends that you do not run wiring for room units in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils.





## Features & Options

- Temperature and Humidity Setpoint Adjustment
- Large Easy-to-Read Display, °F or °C Indication
- Fully Compensated 2% RH Sensor
- Optional Override, Resistive Temperature Sensor and Communication Jack

The BAPI-Stat 4 “X-Combo” Room Unit features local indication of both temperature and humidity with optional Temperature Setpoint, Humidity Setpoint and Local Occupancy Override.

The optional LCD shows room temperature in °C or °F and room humidity in %RH. In addition, the unit has adjustable offsets for both temperature and humidity and the transmitter ranges are field configurable. This unit can be configured with up to four transmitted variables.

## Temp & Humidity Setpoint Adjustment



**BAPI-Stat 4  
“X-Combo”  
Units with  
Warm White  
and Gray  
Logo Plate**

## Ordering Information

The “X-Combo” is a very powerful unit with many options. Please call your BAPI representative for ordering. We will provide a quote and keep it on record for future orders

## Specifications

### Supply Voltage:

DC Power: ..... 16 to 30VDC

AC Power: ..... 18 to 30VAC\*

**Power Consumption:** 50mA max. DC, 1.5VA max. AC

### RH/Temp Sensor Construction:

Communicating Integrated Circuit

Humidity: Capacitive Polymer,  
±2%RH @ 25°C (77°F), 20 to 80%RH

Temp: Semi-conductor Band Gap,  
±0.3°C (±0.54°F) @ 20 to 40°C (68 to 104°F)

### Optional Direct Temp. Sensor:

Thermistor or RTD (See Sensors Sect. for Specs.)

**Available Outputs:** 3 Configurable, 1 Passive Sensor

**Termination:** 8 Terminals, 16 to 22 AWG\*\*

**Mounting:** Standard 2x4" J-Box or Drywall, screws provided

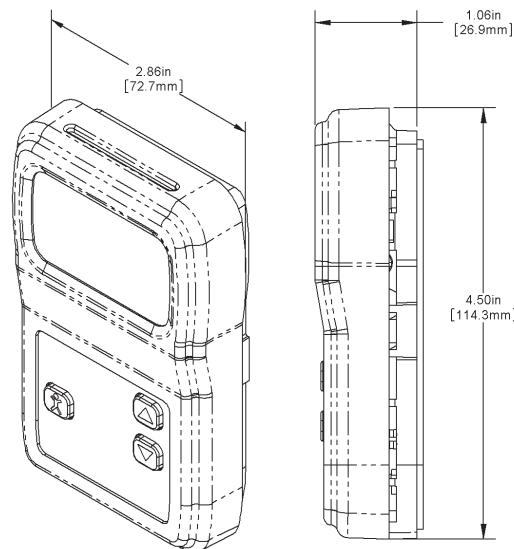
**Enclosure Material:** ABS Plastic, UL94V-0

### Ambient (Enclosure):

Temperature: .32 to 122°F (0 to 50°C)

Humidity: ..... 0 to 95%RH, Non-Cond.

**Agency:** RoHS



\*AC power requires a separate pair of shielded wires.

\*\*BAPI recommends that you do not run wiring for the room units in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils.





## Features & Options

- BAPI-Stat "Quantum", BAPI-Stat 4 and Delta Style Enclosures
- Optional Setpoint, Override and Communication Jack
- Pressure Pickup Port available for BAPI-Stat "Quantum" and Delta Style Units without Setpoint or Override
- Limited Lifetime Warranty

### Setpoint & Legend

Setpoint is available as a slidepot in various ranges with "Cool/Warm" setpoint legend.

### Override

Optional discreet momentary signal that can be configured to be compatible with any controller.

### Communication Jack

Available with a 3.5 mm phono plug style jack.

### Pressure Pickup Port

Pressure Pickup Ports are available for the BAPI-Stat "Quantum" and Delta Style Enclosures without Setpoint or Override. See "Pressure Pickup Ports" in the Pressure Section for ordering.



BAPI-Stat "Quantum"

Delta Style Unit



BAPI-Stat 4 Units

## Specifications

### Environmental Operation Range:

Temperature: 32 to 122 °F (0 to 50 °C)

Humidity: 0 to 95%, non-condensing

### Material & Rating:

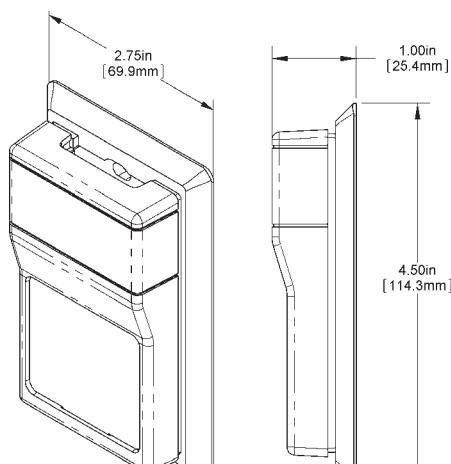
ABS Plastic, UL 94, V-0

### Sensing Element:

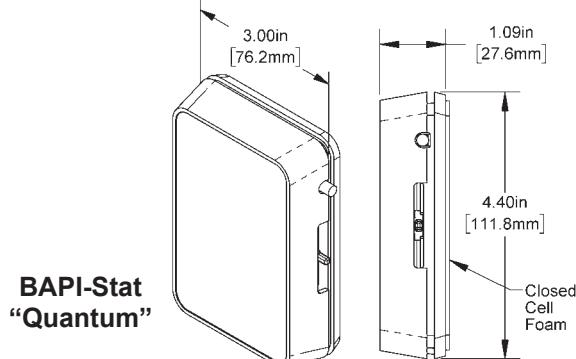
Thermistor or RTD (See Sensors Sect. for Specs.)

### Agency:

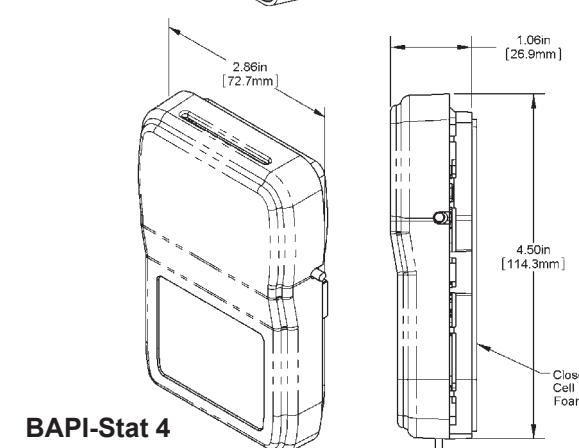
RoHS & CE



Delta Style



BAPI-Stat  
"Quantum"



BAPI-Stat 4





# BAPI Room Units Without LCD

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Temperature Sensors

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



## BAPI-Stat 4 and Delta Style Option Selection Guide:

BA/ (#1) - (#2)(#3)(#4) - (#5) - (#6) - (#7) - (#8)

### #1: Temperature Sensor (required)

1K[375]	1K Platinum RTD (375 curve)	\$25
1K[NI]	1K Ω Nickel RTD	\$35
1K	1K Platinum RTD (385 curve)	\$25
1.8K	1.8K Thermistor	\$18
3K	3K Thermistor	\$18
10K-2	10K-2 Thermistor	\$18
10K-3	10K-3 Thermistor	\$18
10K-3[11K]	10K-3[11K] Thermistor	\$18
20K	20K Thermistor	\$18

### #2: Room Sensor Style (required)

BQ	BAPI-Stat "Quantum"	\$7
B4	BAPI-Stat 4	\$7
R	Delta Style Enclosure	

### #3: Setpoint Output Range (optional)

60	0 to 10 kΩ	\$6
80	0 to 20 kΩ	\$6
81	4.75 k to 24.75 kΩ	\$6
82	6.19 k to 26.19 kΩ	\$6
84	10 k to 30 kΩ	\$6

### #4: Setpoint Legend

(Required for units with Setpoint)

L8	Up/Down Arrows (Quantum Only)
L6	Cool/Warm (Delta or BAPI-Stat 4)
L0	No Legend (Delta or BAPI-Stat 4)

### #5: Override (required)

J	Override as a Separate Output	\$5
N	Override in Parallel with Sensor	\$5
P	Override in Parallel w/ Setpoint	\$5
Z	No Override	

### #6: Communication Jack (optional)

C35	3.5 mm Phono Style Jack	\$7
-----	-------------------------	-----

### #7: Common or Differential Gnd (required)

CG	Common Ground
DF	Differential Inputs

### #8: BAPI-Stat 4 Logo Plate Color

(required for BAPI-Stat 4 Units)

WMW	Warm White (matches enclosure)
GRY	Gray

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options.*

*Pressure Pickup Ports are available for the BAPI-Stat "Quantum" and Delta Style Enclosures without Setpoint or Override. See "Pressure Pickup Ports" in the Pressure Section for ordering.*

**Example Number:** BA/ ( 10K-2 ) - ( B4 )( 80 )( L6 ) - ( N ) - ( C35 ) - ( CG ) - ( WMW )

**Actual Number (with parenthesis removed):** BA/10K-2-B480L6-N-C35-WMW

**Description:** 10K-2 Thermistor, BAPI-Stat 4, 0 to 20K Setpoint Output Range, Cool Warm Legend, Override in Parallel with Sensor, C35 Comm. Jack, Common Ground Configuration, Warm White Logo Plate

**List Price:** \$18 (Thermistor) + \$6 (Setpoint) + \$5 (Override) + \$7 (Comm. Jack) = \$36 List Price

**Your Number:** BA/



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## Features & Options

- Sensor Fits Inside a Decora Style Rocker Switch Plate Cover
- LCD Readout of Local Temperature
- Optional Setpoint Adjustment
- °F or °C Indication (Field Selectable)
- Wide Selection of Temperature Sensing Elements

The low profile Decora Style Room Unit fits inside a Decora Style Rocker Switch Wall Plate Cover. It features measurement and display of local temperature with optional pushbutton setpoint adjustment. The room temperature is shown on an easy-to-read LCD with field-selectable °F or °C display.

The Setpoint values are transmitted as resistive values for easy configuration with the controller. The sensor and setpoint outputs can be configured for "common ground" or "differential" controller inputs.



**Decora Style Units with and without Setpoint Adjustment**

## Specifications

**Power:** 5 VDC to 12 VDC ±5%

**Power Consumption:** 0.5 mA

**Sensing Element:**

Thermistor or RTD (See Sensors Sect. for Specs.)

**Wiring:** 2 to 3 pair of 16 to 22AWG\*

**Mounting:**

Standard 2"x4" J-box with Decora Style Trim Plate

**Environmental Operation Range:**

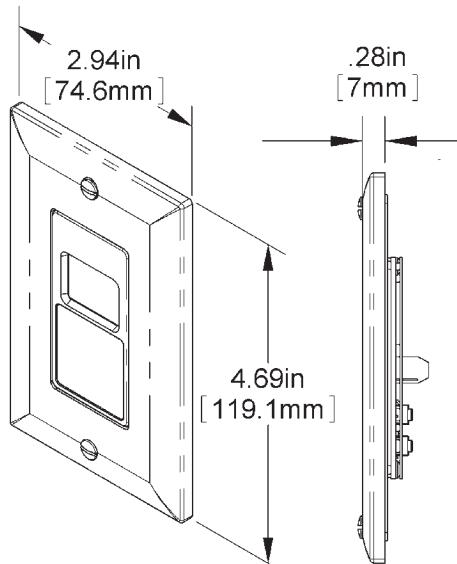
Temperature: 32 to 122 °F (0 to 50 °C)

Humidity: 0 to 95%, non-condensing

**Material:** ABS Plastic

**Material Rating:** UL94, V-0

\*BAPI recommends that you do not run wiring for the Room Units in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils.



## Associated Products

### VC350A "EZ" - Voltage Converter

BAPI recommends using DC power on room units for a more stable reading. Our 350mA "EZ" unit is a perfect way to convert 24 VAC to 5, 12, 15 or 24 VDC.





Rev. 12/12/16

# Decora Style Room Unit

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## Temperature Sensors

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Configurator below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



### Decora Room Sensors Option Selection Guide:

BA/ (#1)(#2) - (#3)(#4) - (#5) - (CG) - (#7)

**#1: Room Sensor Style (required)**

RuPD .... Pushbutton Setpoint Adjustment... \$125

**#2: °F or °C Display (required)**

F ..... Temperature Displayed in °F  
C ..... Temperature Displayed in °C

**#3: Setpoint Display Range (optional)**

A ..... -3 to +3  
B ..... -5 to +5  
C ..... 50 to 90 °F or 10 to 32 °C  
D ..... 55 to 85 °F or 13 to 30 °C  
E ..... 60 to 80 °F or 15 to 27 °C  
F ..... 65 to 80 °F or 18 to 27 °C

**#4: Setpoint Output Range (optional)**

00.....0 to 5 V  
10.....0 to 10 V  
60.....0 to 10 kΩ  
80.....0 to 20 kΩ  
81.....4.75 k to 24.75 kΩ  
82.....6.19 k to 26.19 kΩ  
84.....10 k to 30 kΩ

**#5: Temperature Sensor (required)**

1375.....1K Platinum RTD (375 curve)	\$9
1NI.....1K Ω Nickel RTD .....	\$9
1.....1K Platinum RTD (385 curve)	
18.....1.8K Thermistor	
3.....3K Thermistor	
102.....10K-2 Thermistor	
103.....10K-3 Thermistor	
10311....10K-3[11K] Thermistor	
20.....20K Thermistor	

**#6: Common Ground Config. (required)**

CG ..... Common Ground

**#7: Cover Plate (required)**

NC ..... No Cover ..... -\$10  
-SWC .... Standard White Cover Plate

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

**Example Number:** BA/ (**RuPD**)(**F**) - (**E**)(**80**) - (**102**) - (**CG**) - (**SWC**)

**Actual Number (with parenthesis removed):** BA/RuPDF-E80-102-CG-SWC

**Description:** Decora Style Unit with Setpoint and °F Display, 60 to 80°F Setpoint Display Range, 0 to 20kΩ Setpoint Output Range, 10K-2 Thermistor Temperature Sensor, Common Ground Configuration, Standard White Cover Plate

**List Price:** \$125 (Decora Style Unit) = \$125 List Price

**Your Number:** BA/



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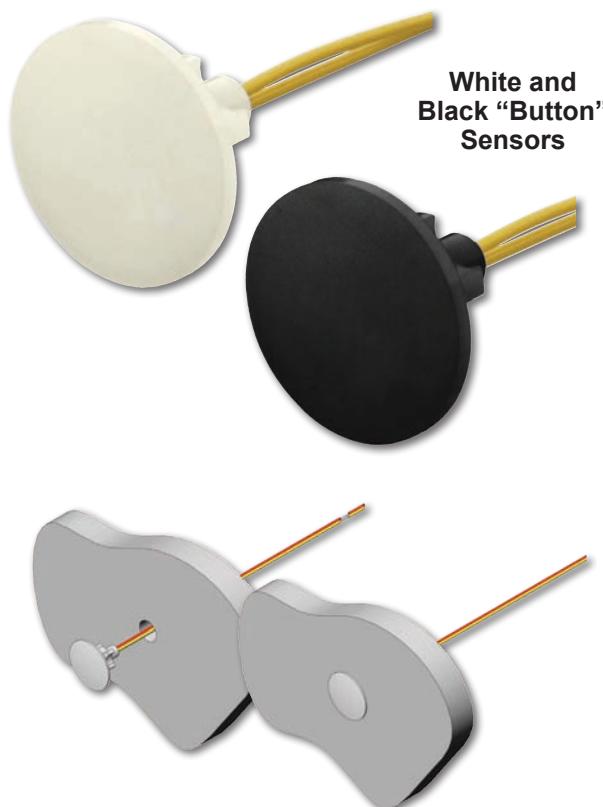


## Features & Options

- Small Flush Sensor Mounting
- Accurate Direct Air Measurement
- Paintable with Latex or Oil Base
- Wide Selection of Sensing Elements
- Limited Lifetime Warranty

The Low Profile "Button" Sensor is ideal for locations where aesthetics are as important as the temperature measurement. The inconspicuous wall sensor mounts easily by pushing through a 1/2" hole and secured with a peel off tape strip. The only visible portion is a flush 7/8" dot on the wall.

The Low Profile "Button" Sensor is available in white or black with multiple thermistor or RTD sensors as shown in the ordering grid. Other sensor types are available on request.



## Specifications

### Thermistor

Temp. Output ..... Resistance  
 Accuracy (Std) .....  $\pm 0.36^\circ\text{F}$ , ( $\pm 0.2^\circ\text{C}$ )  
 Stability .....  $< 0.036^\circ\text{F}/\text{Year}$ , ( $< 0.02^\circ\text{C}/\text{Year}$ )  
 Heat dissipation ..... 2.7 mW/°C  
 Temp. Drift .....  $< 0.02^\circ\text{C}$  per year  
 Probe range .....  $-40^\circ$  to  $221^\circ\text{F}$  ( $-40^\circ$  to  $105^\circ\text{C}$ )

### RTD

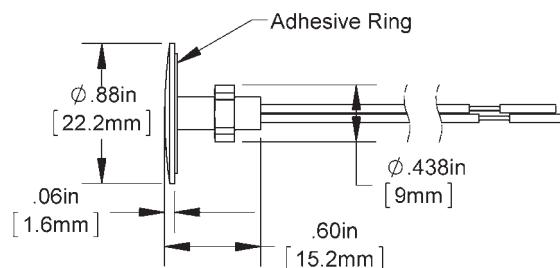
Platinum (PT) .....  $100\Omega$  or  $1\text{K}\Omega$  @ $0^\circ\text{C}$ , 385 curve  
 Platinum (PT) .....  $1\text{K}\Omega$  @ $0^\circ\text{C}$ , 375 curve  
 PT Accuracy (Std) ..... 0.12% @Ref, or  $\pm 0.55^\circ\text{F}$ , ( $\pm 0.3^\circ\text{C}$ )

PT Stability .....  $\pm 0.25^\circ\text{F}$ , ( $\pm 0.14^\circ\text{C}$ )  
 PT Self Heating .....  $0.4^\circ\text{C}/\text{mW}$  @ $0^\circ\text{C}$   
 PT Probe range .....  $-40^\circ$  to  $221^\circ\text{F}$ , ( $-40$  to  $105^\circ\text{C}$ )  
 Nickel (Ni) .....  $1000\Omega$  @ $70^\circ\text{F}$ , JCI curve  
 Ni Probe range .....  $-40^\circ$  to  $221^\circ\text{F}$  ( $-40$  to  $105^\circ\text{C}$ )

### Sensitivity

Thermistor ..... Non-linear  
     Go to [bapihvac.com](http://bapihvac.com) "Sensor Specs"  
 RTD (PT) .....  $3.85\Omega/\text{ }^\circ\text{C}$  for  $1\text{K}\Omega$  RTD  
      $3.75\Omega/\text{ }^\circ\text{C}$  for  $1\text{K}\Omega$  RTD  
 Nickel (Ni) .....  $2.95\Omega/\text{ }^\circ\text{F}$  for the JCI RTD

**Wiring:** One pair of 22 AWG wires



### Wire Insulation:

Etched Teflon, Plenum rated

**Mounting:** 1/2" hole, push in plastic sheath with peel off tape strip.

### Enclosure Material and Ratings:

Plastic, NEMA 1, UL94

### Ambient (Encl.)

0 to 100% RH, Non-condensing  
 $-40^\circ\text{F}$  to  $185^\circ\text{F}$ , ( $-40^\circ$  to  $85^\circ\text{C}$ )

**Agency:** RoHS, CE





Rev. 12/12/16

# Low Profile "Button" Sensor

A19

Temperature Sensors

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Configurator below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



## Button Sensor Option Selection Guide:

BA/ ( #1 ) - ( #2 ) - ( #3 )

**#1: Temperature Sensor (required)**

1K[375] .....	1K Platinum RTD (375 curve).....	\$25
1K[NI].....	1K Ω Nickel RTD .....	\$35
1K .....	1K Platinum RTD (385 curve).....	\$25
1.8K .....	1.8K Thermistor .....	\$18
3K .....	3K Thermistor .....	\$18
10K-2 .....	10K-2 Thermistor .....	\$18
10K-3 .....	10K-3 Thermistor .....	\$18
20K .....	20K Thermistor .....	\$18

**#2: Button Sensor Color (required)**

LPW .....	Button Sensor, White .....	\$7
LPB .....	Button Sensor, Black .....	\$12

**#3: Lead Length (required, 6" Leads are Standard)**

5.....	5 Feet of Plenum-Rated Cable .....	\$2
10.....	10 Feet of Plenum-Rated Cable .....	\$4
15.....	15 Feet of Plenum-Rated Cable .....	\$6

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

**Example Number:** BA/ ( **10K-2** ) - ( **LPW** ) - ( **5** )

**Actual Number (with parenthesis removed):** BA/10K-2-LPW-5

**Description:** 10K-2 Thermistor Temperature Sensor, White Button Sensor, 5 Feet of Plenum-Rated Leads.

**List Price:** \$18 (Thermistor) + \$7 (White Button Sensor) + \$2 (5' Leads) = \$27 List Price

**Your Number:** BA/



Building Automation Products, Inc. • 750 North Royal Avenue, Gays Mills, WI 54631 USA

Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: [sales@bapihvac.com](mailto:sales@bapihvac.com) • Web: [www.bapihvac.com](http://www.bapihvac.com)



## Features & Options

- Delta Style or BAPI-Stat 4 Enclosure
- 4 to 20 mA Temperature Output
- Optional Display on the BAPI-Stat 4
- Optional Setpoint Adjustment, Override and Communication Jack on the BAPI-Stat 4

The T1K Transmitter Room Unit comes in the Delta Style and BAPI-Stat 4 style enclosures. They measure the room temperature and output a 4 to 20mA signal per the custom range selected at the time of order.

The BAPI-Stat 4 Style unit offers a full range of options including setpoint, override, display, communication jack, field offset, field ranging, °F or °C and a new stylish look.



**BAPI-Stat 4 Units  
with and without  
display, setpoint  
and override**



**Delta Style Unit**  
(Not available with  
Display, Setpoint,  
Override or Comm.  
Jack.)

## Specifications

### Power:

12 to 30VDC (28 VDC max. recommended)

### Transmitter Output:

4 to 20mA, 600Ω to 850Ω@24VDC

### Power Consumption:

40 mA maximum

### Sensing Element:

1KΩ Platinum RTD

(See Sensors Sect. for Specs.)

### Environmental Operation Range:

Temperature, Delta: 32 to 122°F (0 to 50°C)

Temperature, BS4: 15°F to 130°F, (-9° to 54°C)

Humidity: 0 to 95%, non-condensing

### Mounting:

2x4" J-box or drywall mount, screws provided

### Wiring:

1 to 3 pair of 16 to 22AWG

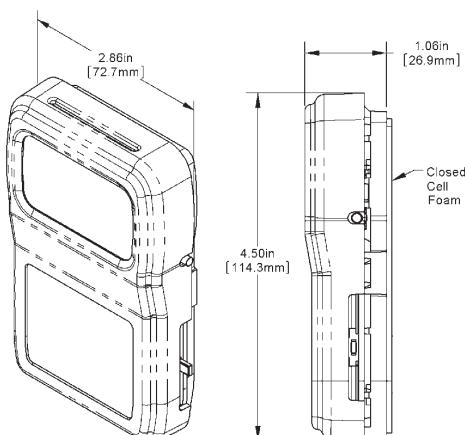
### Material & Rating:

BAPI-Stat 4: ABS Plastic, UL94 V-0

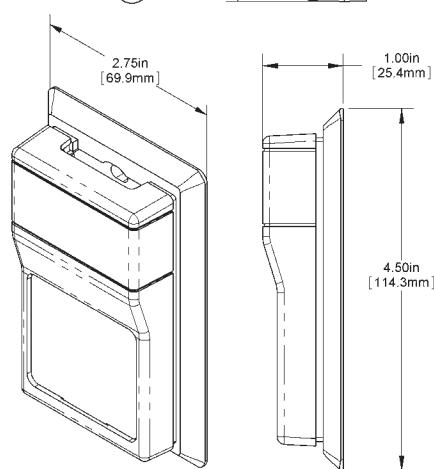
Delta Style: ABS Plastic, UL94 HB

**Agency:** RoHS

**BAPI-Stat 4  
Enclosure**



**Delta Style  
Enclosure**





# T1K Transmitter Room Unit

A21

Temperature Sensors

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



## T1K Room Transmitter Option Selection Guide

BA/ T1K ( #1 ) - ( #2 ) - ( #3 )( #4 )( #5 ) - ( #6 ) - ( #7 ) - ( #8 )

### **#1: Temp Measurement Range (required)**

- 0 to 100F ..0 to 100°F Temperature Range
- 50 to 90F ..50 to 90°F Temperature Range
- 40 to 90F ..40 to 90°F Temperature Range
- 45 to 96F ..45 to 96°F Temperature Range
- 4 to 35C ....4 to 35°C Temperature Range
- 0 to 35C ....0 to 35°C Temperature Range
- 0 to 50C ....0 to 50°C Temperature Range
- 0 to 100C..0 to 100°C Temperature Range

### **#2: Display (required)**

- B4SD .....BAPI-Stat 4 with Display .....\$185
- B4SX .....BAPI-Stat 4, No Display .....\$150
- RX.....Delta Style Encl., No Display .... \$100

### **#3: Setpoint Display Range (required)**

(Setpoint is not available for Delta Style Units)

- A .....-3 to +3
- B .....-5 to +5
- C .....50 to 90 °F or 10 to 32 °C
- D .....55 to 85 °F or 13 to 30 °C
- E .....60 to 80 °F or 15 to 27 °C
- F .....65 to 80 °F or 18 to 27 °C
- X .....No Setpoint Display

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

### **#4: Setpoint Output Range**

- (Required if a Display Range is selected in #3, not available for Delta Style Units)
- |         |                                   |      |
|---------|-----------------------------------|------|
| 16..... | 4 to 20 mA (requires "DF" in #8). | \$60 |
| 60..... | 0 to 10 kΩ.....                   | \$6  |
| 80..... | 0 to 20 kΩ.....                   | \$6  |
| 81..... | 4.75 k to 24.75 kΩ.....           | \$6  |
| 82..... | 6.19 k to 26.19 kΩ.....           | \$6  |
| 84..... | 10 k to 30 kΩ.....                | \$6  |

### **#5: Setpoint Legend**

(Required if a Display Range is selected in #3, not available for Delta Style Units)

- L6.....Cool/Warm Legend
- L0.....No Legend

### **#6: Occupant Override (required)**

- (Override is not available for Delta Style Units)
- J.....Override as a Separate Output ..... \$5
  - N.....Override in Parallel with Sensor.... \$5
  - P.....Override in Parallel with Setpoint.. \$5
  - Z .....No Override

### **#7: Communication Jack (optional)**

(Comm. Jack is not available for Delta Style Units)

- C35L .....3.5 mm Phono Style Jack .....\$10

### **#8: Common or Differential Gnd (required)**

- CG-WMW . Common Ground
- DF-WMW..Differential Inputs

**Example #:** BA/ T1K( 50 to 90F ) - ( B4SD ) - ( F )( 80 )( L6 ) - ( N ) - ( C35L ) - ( CG-WMW )

**Actual # (with parenthesis removed):** BA/T1K[50 to 90F]-B4SD-F80L6-N-C35L-CG-WMW

#### **Description:**

BAPI-Stat 4 Temperature Transmitter, 50 to 90°F Temperature Measurement Range, Display, 65 to 80°F Setpoint Display Range, 0 to 20KΩ Setpoint Output Range, Cool/Warm Legend, Override in Parallel with Sensor, 3.5mm Comm. Jack, Common Ground Config., Warm White Logo Plate Color

#### **List Price:**

\$185 (BAPI-Stat 4 with Display) + \$6 (Setpoint) + \$5 (Override) + \$10 (Comm. Jack) = \$206 List Price

**Your Number:** BA/



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## Features & Options

- Power and Communication on Just Two Wires
- Available with Temperature Setpoint and Optional Override, Display and %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 people expect in today's sophisticated systems. The BAPI-Com uses those existing two wires and offers the owner a full function sensor with temperature setpoint, occupant override, an optional easy-to-read display and optional %RH sensing.

This retrofit sensor can update old systems to a new look without pulling new wire or disrupting the occupants while saving on labor.

The sensors are powered and communicate over two wires to a Communication Output Module for use by a BAS system. The outputs are configurable as a thermistor, voltage, resistance or dry contact override output. The sensor is powered by the Communication Output Module which itself is supplied by any 24VDC/VAC source.



**BAPI-Com Room Sensors & Communication Output Module**

## Ordering Information

The BAPI-Com is a very powerful unit with many options. Please call your BAPI representative for ordering. We will provide a quote and keep it on record for future orders

## Specifications

### ROOM SENSOR SPECS

**Power:** 18VDC, from the Comm. Output Module

**Wiring:** 2 wires, Up to 500ft (new or existing)

AWG gauge: 22 to 14AWG (Shielding Preferred)

**Temp Sensor:** Thermistor,  $\pm 0.36^{\circ}\text{F}$  ( $\pm 0.2^{\circ}\text{C}$ )

### RH/Temp Sensor Construction:

Communicating Integrated Circuit

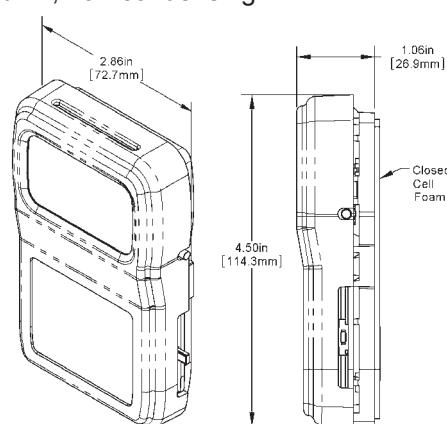
Humidity: Capacitive Polymer,  $\pm 2\%$  RH  
(10 to 90%) @ $25^{\circ}\text{C}$ , Fully Compensated

Temp: Semi-conductor Band Gap,  $\pm 0.3^{\circ}\text{C}$  @  $25^{\circ}\text{C}$

**Pole Rate:** 400 ms

### Ambient:

32 to  $122^{\circ}\text{F}$  (0 to  $50^{\circ}\text{C}$ ),  
0 to 95%RH, non-condensing



### COMMUNICATION OUTPUT MODULE SPECS

**Power in:** ..... 24VDC/AC, 30mA

### Terminations:

Comm. & PWR ..... 2 wires to the sensor

Power in..... 2 wires, 12 to 28 AWG

Output..... 2 wires per output, 12 to 28 AWG

Override Input..... 2 wires, 16 to 30 AWG

### Outputs:

Three Maximum Volts..... 0 to 5 or 0 to 10VDC,  $10\text{k}\Omega$  min

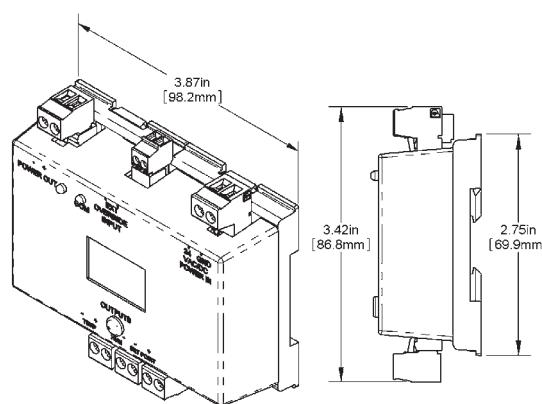
Resistance..... 400 $\Omega$  to 20K $\Omega$  span

Thermistor ..... 10K-2 or 10K-3

**Input (DI):** Ext. Override Dry Contact,  
Closed = Occupied

**EZ Mounting:** ..... DIN Rail, Snaptrack or surface

**Material:** ..... ABS Plastic, UL94V-0, RoHS





## Features & Options

- Optional Setpoint, Display, %RH and Override
- °C or °F Operation (user selectable)
- Standard 4-Wire Termination

BAPI's Echelon® compatible “L-Temp” Unit features measurement and display of local temperature (°C or °F), as well as display of outdoor temperature and outdoor humidity – all in one package.

An onboard Neuron® chip allows connection directly to a LonWORKS® network using star, bus, or loop topology. Additional options include Temperature Setpoint and Occupant Override.



L-Temp Unit with  
Setpoint & Override

## Ordering Information

<u>Part Number</u>	<u>Description</u>	<u>List Price</u>
BA/LC-R	L-Temp Unit.....	\$240
BA/LC-RD	L-Temp Unit with Display .....	\$275
BA/LC-RSOD	L-Temp Unit with Setpoint, Override and Display .....	\$286
BA/LC-H2-R	L-Temp Unit with Humidity .....	\$320
BA/LC-H2-RD	L-Temp Unit with Humidity and Display .....	\$355
BA/LC-H2-RSOD	L-Temp Unit with Humidity, Setpoint, Override and Display .....	\$366

## Specifications

**Power:** 8 to 24VDC (recommended) or 12 to 28VAC

**Power Consumption:** 35 mA maximum DC

### Sensing Elements:

Temp. - Semiconductor Band Gap, Proportional to Absolute Temperature, ±0.3°C

Humidity - Capacitive Polymer, ±2% RH Accuracy

**Wiring:** 4 wire, twisted pair 22 AWG minimum

### Communication:

Neuron® 3120®, 78 kbps using FTT-10A transceiver

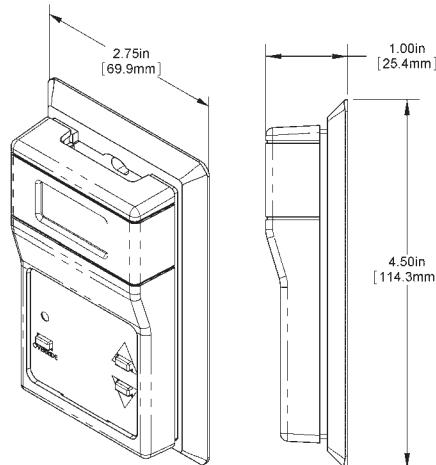
**Mounting:** 2x4" J-box or drywall - screws provided

**Material & Rating:** ABS Plastic, UL94 HB

**Temperature Range:** -40 to 85°C

### Environmental Specifications:

Temperature: 32 to 122 °F (0 to 50 °C) • Humidity: 0 to 95%, non-condensing



\*BAPI recommends that you do not run wiring for the Room Units in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils. For additional wiring info and requirements, refer to Echelon's Bulletin titled "Junction Box and Wiring Guidelines for Twisted Pair LonWORKS® Networks" which can be found at the following URL: "[www.echelon.com/support/documentation/Bulletin/005-0023-01K.pdf](http://www.echelon.com/support/documentation/Bulletin/005-0023-01K.pdf)"

The “L-Temp” and “L-Combo” were designed following the LonMark® Interoperability Guidelines, and incorporates standard configuration property types (SCPT). A complete SNVT/SCPT list with definitions is available upon request. Echelon®, LonWORKS®, Neuron®, and 3120® are trademarks of Echelon Corporation registered in the United States and other countries. LonMark® is a trademark of the LonMark Interoperability Association registered in the United States and other countries.





## Features & Options

- Etched Teflon Leadwires and Foamback Insulator
- Three Override Pushbutton Options
- Wide Selection of Temperature Sensing Elements
- Limited Lifetime Warranty

Wall Plates are ideal for areas where a discreet, rugged zone sensor is required. All Wall Plates feature  $\frac{1}{4}$ " closed cell foam backing which covers the plate and insulates it from wall temperature. All units also feature etched Teflon leadwires and double encapsulated sensors to create a watertight package that can perform in the real world.

### Override

A momentary Override is available as a Keyswitch or three styles of Pushbutton — Standard and Low Profile. The Standard model features a small, momentary pushbutton. The Low Profile Model is water resistant for washdown/wipedown applications and is available with a green LED indicator.



### Color and Finish Options

Wall Plates are available in aluminum or stainless steel with a metallic finish; however, many other color and finish options are available as special orders. Call BAPI for details.



## Specifications

### Material:

Aluminum or Stainless Steel

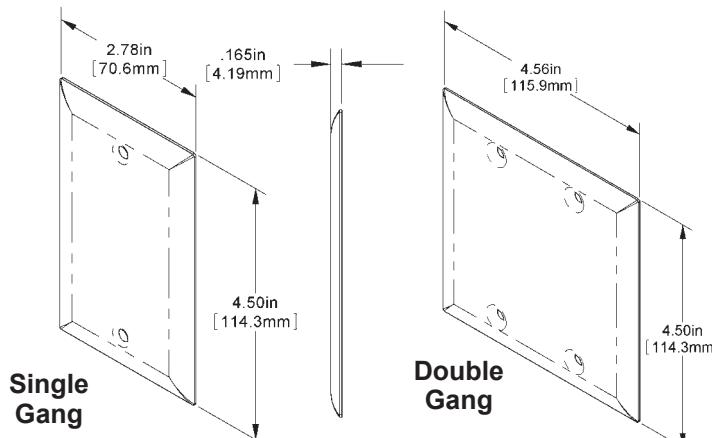
### Sensing Element:

Thermistor or RTD  
(See Sensors Sect. for Specs.)

### Environmental Operation Range:

Temperature:  
-40 °C to 100 °C  
-20 °C to 70 °C with transmitter

Humidity:  
0 to 95%, non-condensing



## Associated Products

### Spanner Security Screws & Spanner Bit

Spanner Security Screws and the Spanner Bit are available for any Stainless Steel Wall Plate Unit. For more info, see Accessories.





Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



## Wall Plate Option Selection Guide

BA/ (#1) - (#2) - (#3) - (#4)

**#1: Temperature Sensor (required)**

	<u>List Price</u>
1K[375] .....	\$25
1K[NI] .....	\$35
1K .....	\$25
1.8K .....	\$18
3K .....	\$18
10K-2 .....	\$18
10K-3 .....	\$18
10K-3[11K] .....	\$18
20K .....	\$18

Transmitters for 4 to 20 mA Temperature Output

T1K[32 TO 212F] .....	\$100
T1K[20 TO 120F] .....	\$100
T1K[0 TO 100F] .....	\$100
T1K[0 TO 100C] .....	\$100
T1K[-7 TO 49C] .....	\$100
T1K[-18 TO 38C] .....	\$100

*Matched Transmitters are also available. Contact your BAPI representative for ordering.*

**#2: Room Sensor Style (required)**

SP .....	Stainless Steel Wall Plate
AP .....	Aluminum Wall Plate

**#3: Override Pushbutton (optional)**

O .....	\$10
O2 .....	\$57
O2G24 .....	\$100

**#4: Security Screws (optional)**

SEC1 .....	\$2
------------	-----

*Additional options, such as rotary setpoint adjustment and communication jacks, are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com).*

**Example Number:** BA/ ( **10K-2** ) - ( **SP** ) - ( **O2G24** ) - (    )

**Actual Number (with parenthesis removed):** BA/10K-2-SP-O2G24

**Description:** 10K-2 Thermistor, Stainless Steel Wall Plate Sensor, Low Profile Pushbutton Override with Green LED

**List Price:** \$18 (Thermistor) + \$100 (Override) = \$118 List Price

**Your Number:** BA/





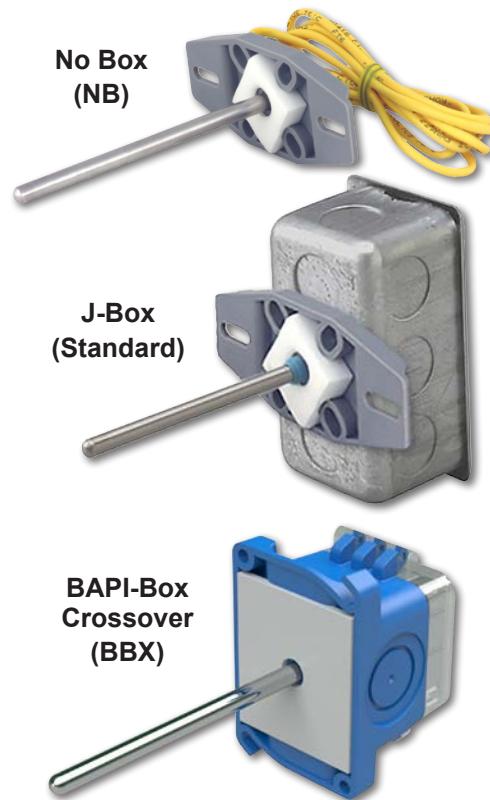
## Features & Options

- Series 304 Stainless Steel Probes: 2, 4, 8, 12 and 18"
- Three Enclosure Styles
- Double Encapsulated Sensors & Etched Teflon Leads
- Limited Lifetime Warranty
- Wide Selection of Temperature Sensing Elements

Single Point Duct Units feature closed cell foam to seal the probe insertion hole and to absorb vibration. Mounting tabs allow for easy installation directly to the wall of the duct.

All Duct Units have etched Teflon leadwires and double encapsulated sensors to create a watertight package that can withstand high humidity and condensation and perform under real world conditions. Duct Units have probe lengths from 2" to 18" to accommodate most duct shapes and sizes. Custom probe lengths are also available.

Duct Units come standard with a 2"x4" steel J-Box but are also available with no box or the new BAPI-Box Crossover enclosure.



### The New BAPI-Box Crossover Enclosure

The new BAPI-Box Crossover features a hinged cover with thumb latch for easy termination. A pierceable knockout plug is available for the open port. See the Accessories section for more info.

*(Units shown with knockplug plug sold separately.)*



## Specifications

### Environmental Operation Range:

Temperature:

BAPI-Box Crossover: -40 to 85 °C

Other Enclosures: -40 to 105 °C

Humidity: 0 to 100%, non-condensing

### Sensing Element:

Thermistor or RTD (See Sensors Section for Specs.)

### Probe Material:

Stainless Steel, 1/4" diameter

### Enclosure Material:

Junction Box: Galvanized Steel

BAPI-Box Crossover:

UV-resistant polycarbonate, UL94, V-0

### Enclosure Rating:

Junction Box: IP20, NEMA 1

BAPI-Box Crossover (BBX):

IP10, NEMA 1

IP44 with knockout plug in open port

### Enclosure Dimensions: H x W x D

BAPI-Box Crossover:

3.1 x 2.2 x 1.9" (79 x 56 x 49mm)

Junction Box

4.2 x 3.9 x 1.94" (106 x 98.4 x 49mm)

*(For enclosure dimension drawings, see the end of the section.)*





Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



## Duct Temperature Option Selection Guide

**BA/ ( #1 ) - ( #2 ) - ( #3 ) - ( #4 )**

**#1: Temperature Sensor (required)**

	<u>List Price</u>
1.8K .....	\$18
3K .....	\$18
10K-2 .....	\$18
10K-3 .....	\$18
10K-3[11K] .....	\$18
20K .....	\$18
1K[375] .....	\$25
1K[NI] .....	\$35
1K .....	\$25

Transmitters below require a BAPI-Box Crossover Enclosure

T1K[32 TO 212F] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 32 to 212°F Range.....	\$125
T1K[20 TO 120F] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 20 to 120°F Range.....	\$125
T1K[0 TO 100F] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°F Range.....	\$125
T1K[0 TO 100C] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°C Range .....	\$125
T1K[-7 TO 49C] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, -7 to 49°C Range .....	\$125
T1K[-18 TO 38C] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, -18 to 38°C Range .....	\$125

*Matched Transmitters are also available. Contact your BAPI representative for ordering.*

**#2: Probe Type and Length (required)**

D-2" .....	Duct, 2" (51mm) length.....	\$7
D-4" .....	Duct, 4" (102mm) length.....	\$7
D-8" .....	Duct, 8" (203mm) length.....	\$7
D-12" .....	Duct, 12" (305mm) length.....	\$7
D-18" .....	Duct, 18" (457mm) length.....	\$7

**#3: Enclosure and Lead Length (optional, J-Box comes standard)**

BBX .....	BAPI-Box Crossover (IP10, NEMA 1).....	\$0
NB-18" .....	No Box, 18" Leads .....	\$0
NB-5' .....	No Box, 5' Leads .....	\$2
NB-10' .....	No Box, 10' Leads .....	\$4
NB-15' .....	No Box, 15' Leads .....	\$6

**#4: Test & Balance or Terminal Strip (optional, requires a BAPI-Box Crossover Enclosure)**

TB .....	Test & Balance Switch .....	\$7.50
TS .....	Terminal Strip Connection .....	\$7

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options.*

**Example Number:** BA/( **10K-2** ) - ( **D-8"** ) - ( **NB-5'** ) - (    )

**Actual Number (with parenthesis removed):** BA/10K-2-D-8"-NB-5'

**Description:** 10K-2 Thermistor, Duct Temperature Sensor, No Box Enclosure with 5' Leads.

**List Price:** \$18 (10K-2 Thermistor) + \$7 (Duct, 8" Length) + \$2 (No Box, 5' Leads) = \$27 List Price

**Your Number:** BA/





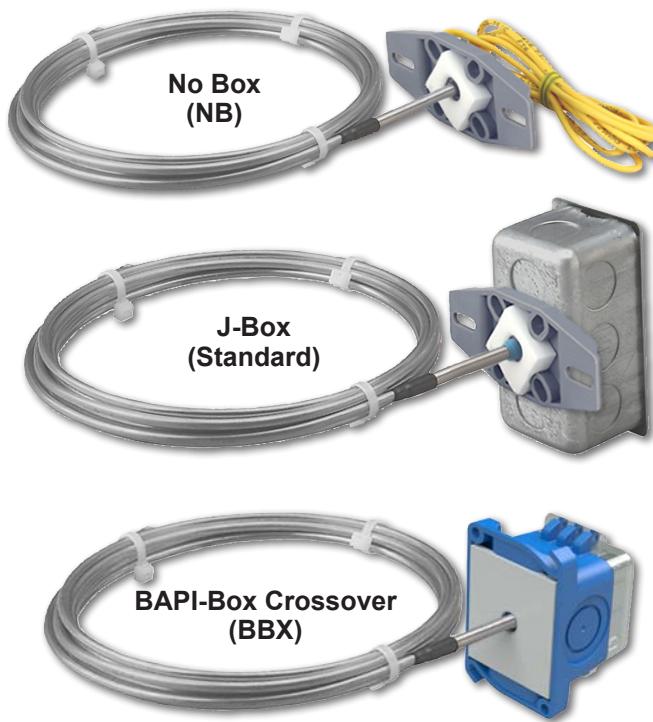
## Features & Options

- Averaging Lengths: 8', 12' and 24'
- Three Enclosure Styles
- Limited Lifetime Warranty

BAPI Duct Averaging Units feature closed cell foam to seal the probe insertion hole and absorb vibration. Mounting tabs allow for easy installation to the duct. All units have etched Teflon leadwires and encapsulated sensors to create a watertight package that can perform under real world conditions.

Averaging probes should be used wherever there is a chance for stratified layers of hot and cold air. Averaging probes are made of bendable aluminum tubing and measure temperature along their entire length. Nylon tie straps are provided for mounting.

Duct Averaging Units come standard with a 2"x4" steel J-Box but are also available with no box or the new BAPI-Box Crossover enclosure.



### The New BAPI-Box Crossover Enclosure

The new BAPI-Box Crossover features a hinged cover with thumb latch for easy termination. A pierceable knockout plug is available for the open port. See the Accessories section for more info.

*(Units shown with knockplug plug sold separately.)*



## Specifications

### Environmental Operation Range:

Temperature:

BAPI-Box Crossover: -40 to 85 °C

Other Enclosures: -40 to 100 °C

Humidity: 0 to 95%, non-condensing

### Sensing Element:

Thermistor or RTD (See Sensors Section for Specs.)

### Probe Material:

Bendable Aluminum, 3/16" diameter

### Enclosure Material:

Junction Box: Galvanized Steel

BAPI-Box Crossover:

UV-resistant polycarbonate, UL94, V-0

### Enclosure Rating:

Junction Box: IP20, NEMA 1

BAPI-Box Crossover (BBX):

IP10, NEMA 1

IP44 with knockout plug in open port

### Encl. Dimensions: H x W x D

BAPI-Box Crossover:

3.1 x 2.2 x 1.9" (79 x 56 x 49mm)

Junction Box

4.2 x 3.9 x 1.94" (106 x 98.4 x 49mm)

*(For enclosure dimension drawings, see the end of the section.)*





# Duct Averaging Units

Temperature Sensors

A29

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



## Duct Averaging Sensor Option Selection Guide

BA/ (#1) - (#2) - (#3) - (#4)

**#1: Temperature Sensor** (required)

		<b>List Price</b>
1.8K	1.8K Thermistor	\$18
3K	3K Thermistor	\$18
10K-2	10K-2 Thermistor	\$18
10K-3	10K-3 Thermistor	\$18
10K-3[11K]	10K-3[11K] Thermistor	\$18
20K	20K Thermistor	\$18
1K[375]	1K Platinum RTD (375 curve)	\$25
1K[NI]	1K Ω Nickel RTD	\$35
1K	1K Platinum RTD (385 curve)	\$25

Transmitters below require a BAPI-Box Crossover Enclosure

T1K[32 TO 212F]	.....1K Plat. RTD Transmitter, 4 to 20 mA Output, 32 to 212°F Range	\$125
T1K[20 TO 120F]	.....1K Plat. RTD Transmitter, 4 to 20 mA Output, 20 to 120°F Range	\$125
T1K[0 TO 100F]	.....1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°F Range	\$125
T1K[0 TO 100C]	.....1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°C Range	\$125
T1K[-7 TO 49C]	.....1K Plat. RTD Transmitter, 4 to 20 mA Output, -7 to 49°C Range	\$125
T1K[-18 TO 38C]	.....1K Plat. RTD Transmitter, 4 to 20 mA Output, -18 to 38°C Range	\$125

*Matched Transmitters are also available. Contact your BAPI representative for ordering.*

**#2: Probe Type and Length** (required)

A-8'	.....Flexible Averaging, 8' (2.4m) length	\$87
A-12'	.....Flexible Averaging 12' (3.7m) length	\$92
A-24'	.....Flexible Averaging 24' (7.3m) length	\$116

**#3: Enclosure and Lead Length** (optional, J-Box comes standard)

BBX	.....BAPI-Box Crossover (IP10, NEMA 1)	\$0
NB	.....No Box (comes with 6" Etched Teflon Leads)	\$0

**#4: Test & Balance or Terminal Strip** (optional, requires a BAPI-Box Crossover Enclosure)

TB	.....Test & Balance Switch	\$7.50
TS	.....Terminal Strip Connection	\$7

*Additional options are available for these units but not shown in the configurator above. Contact your BAPI representative for the complete list of options.*

**Example Number:** BA/ ( **10K-2** ) - ( **A-8'** ) - ( **BBX** ) - (   )

**Actual Number (with parenthesis removed):** BA/10K-2-A-8'-BBX

**Description:** 10K-2 Thermistor, Duct Averaging Sensor, BAPI-Box Crossover Enclosure

**List Price:** \$18 (10K-2 Thermistor) + \$87 (Probe 8' Length) = \$105 List Price

**Your Number:** BA/

Gray shaded items follow the Buy and Resale Multiplier.



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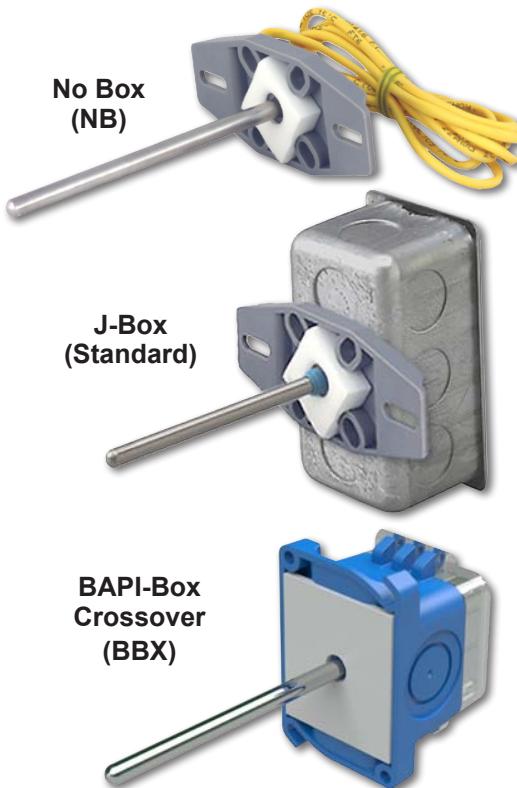
## Features & Options

- Averaging Lengths: 12", 2', 3' and 4'
- Three Enclosure Styles including the new BAPI-Box Crossover with Hinged Cover

BAPI Rigid Averaging Units feature closed cell foam to seal the probe insertion hole and absorb vibration. Mounting tabs allow for easy installation directly to the wall of the duct. All units have etched Teflon leadwires and encapsulated sensors to create a watertight package that can perform under real world conditions.

Averaging probes should be used wherever there is a chance for stratified layers of hot and cold air. Averaging probes are made of 1/4" diameter stainless steel tubing.

Rigid Averaging Units come standard with a 2"x4" steel J-Box but are also available with no box or the new BAPI-Box Crossover enclosure.



### The New BAPI-Box Crossover Enclosure

The new BAPI-Box Crossover features a hinged cover with thumb latch for easy termination. A pierceable knockout plug is available for the open port. See the Accessories section for more info.

*(Units shown with knockplug plug sold separately.)*



## Specifications

### Environmental Operation Range:

Temperature:

BAPI-Box Crossover: -40 to 85 °C

Other Enclosures: -40 to 100 °C

Humidity: 0 to 95%, non-condensing

### Sensing Element:

Thermistor or RTD (See Sensors Section for Specs.)

### Probe Material:

Stainless Steel, 1/4" diameter

### Enclosure Material:

Junction Box: Galvanized Steel

BAPI-Box Crossover:

UV-resistant polycarbonate, UL94, V-0

### Enclosure Rating:

Junction Box: IP20, NEMA 1

BAPI-Box Crossover (BBX):

IP10, NEMA 1

IP44 with knockout plug in open port

### Encl. Dimensions: H x W x D

BAPI-Box Crossover:

3.1 x 2.2 x 1.9" (79 x 56 x 49mm)

Junction Box

4.2 x 3.9 x 1.94" (106 x 98.4 x 49mm)

*(For enclosure dimension drawings, see the end of the section.)*





# Rigid Averaging Units

**Temperature Sensors**

**A31**

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



## Rigid Averaging Sensor Option Selection Guide

**BA/ (#1) - (#2) - (#3) - (#4)**

**#1: Temperature Sensor (required)**

	<u>List Price</u>
1.8K .....	\$18
3K .....	\$18
10K-2 .....	\$18
10K-3 .....	\$18
10K-3[11K] .....	\$18
20K .....	\$18
1K[375] .....	\$25
1K[NI] .....	\$35
1K .....	\$25

Transmitters below require a BAPI-Box Crossover Enclosure

T1K[32 TO 212F] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 32 to 212°F Range .....	\$125
T1K[20 TO 120F] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 20 to 120°F Range .....	\$125
T1K[0 TO 100F] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°F Range .....	\$125
T1K[0 TO 100C] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°C Range .....	\$125
T1K[-7 TO 49C] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, -7 to 49°C Range .....	\$125
T1K[-18 TO 38C] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, -18 to 38°C Range .....	\$125

*Matched Transmitters are also available. Contact your BAPI representative for ordering.*

**#2: Probe Type and Length (required)**

RA-12"	Rigid Averaging, 12" (0.3m) Length .....	\$68
RA-2'	Rigid Averaging, 2' (0.6m) Length .....	\$68
RA-3'	Rigid Averaging, 3' (0.9m) Length .....	\$102
RA-4'	Rigid Averaging, 4' (1.2m) Length .....	\$136

**#3: Enclosure and Lead Length (optional, J-Box comes standard)**

BBX .....	BAPI-Box Crossover (IP10, NEMA 1) .....	\$0
NB .....	No Box (comes with 6" Etched Teflon Leads) .....	\$0

**#4: Test & Balance or Terminal Strip (optional, requires a BAPI-Box Crossover Enclosure)**

TB .....	Test & Balance Switch .....	\$7.50
TS .....	Terminal Strip Connection .....	\$7

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options.*

**Example Number:** BA/ (**10K-2**) - (**RA-2'**) - (**BBX**) - ( )

**Actual Number (with parenthesis removed):** BA/10K-2-RA-2'-BBX

**Description:** 10K-2 Thermistor, Rigid Averaging Sensor, BAPI-Box Crossover Enclosure.

**List Price:** \$18 (10K-2 Thermistor) + \$68 (Probe 2' Length) = \$86 List Price

**Your Number:** BA/



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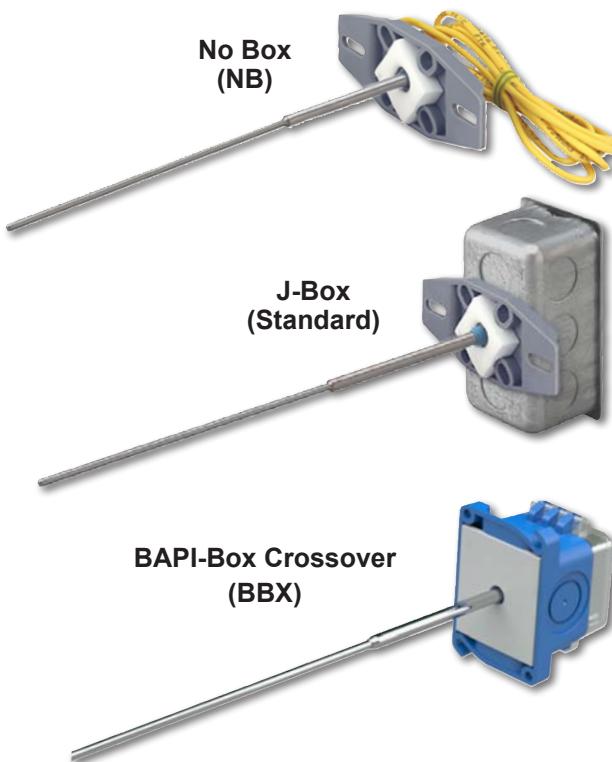
## Features & Options

- 304 Stainless Steel Probes: 12", 18", 24", 36" & 48" lengths
- Very Thin Probe to Fit Between Coil Fins
- Three Enclosure Styles

Submersible Duct Units feature closed cell foam to seal the probe insertion hole and absorb vibration and mounting tabs for easy installation. All units have etched Teflon leadwires and encapsulated sensors to create a watertight package that can perform under real world conditions.

Submersible Duct Units are available in probe lengths of 12", 18", 24", 36" and 48". Custom probe lengths are also available.

Submersible Duct Units come standard with a 2"x4" steel J-Box but are also available with no box or the new BAPI-Box Crossover enclosure.



### The New BAPI-Box Crossover Enclosure

The new BAPI-Box Crossover features a hinged cover with thumb latch for easy termination. A pierceable knockout plug is available for the open port. See the Accessories section for more info.

*(Units shown with knockplug plug sold separately.)*



## Specifications

### Environmental Operation Range:

Temperature:

BAPI-Box Crossover: -40 to 85 °C

Other Enclosures: -40 to 100 °C

Humidity: 0 to 100%, non-condensing

### Sensing Element:

Thermistor or RTD (See Sensors Section for Specs.)

### Probe Material:

Stainless Steel, 1/8" dia. with 4" sleeve (1/4" dia.)

### Enclosure Material:

Junction Box: Galvanized Steel

BAPI-Box Crossover:

UV-resistant polycarbonate, UL94, V-0

### Enclosure Rating:

Junction Box: IP20, NEMA 1

BAPI-Box Crossover (BBX):

IP10, NEMA 1

IP44 with knockout plug in open port

### Encl. Dimensions: H x W x D

BAPI-Box Crossover:

3.1 x 2.2 x 1.9" (79 x 56 x 49mm)

Junction Box

4.2 x 3.9 x 1.94" (106 x 98.4 x 49mm)

*(For enclosure dimension drawings, see the end of the section.)*





# Submersible Duct Units

**A33**

**Temperature Sensors**

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



## Submersible Duct Sensor Option Selection Guide

BA/ (#1) - (#2) - (#3) - (#4)

**#1: Temperature Sensor (required)**

		<b>List Price</b>
1.8K	1.8K Thermistor	\$18
3K	3K Thermistor	\$18
10K-2	10K-2 Thermistor	\$18
10K-3	10K-3 Thermistor	\$18
10K-3[11K]	10K-3[11K] Thermistor	\$18
20K	20K Thermistor	\$18
1K[375]	1K Platinum RTD (375 curve)	\$25
1K[NI]	1K Ω Nickel RTD	\$35
1K	1K Platinum RTD (385 curve)	\$25

Transmitters below require a BAPI-Box Crossover Enclosure

T1K[32 TO 212F]	.....1K Plat. RTD Transmitter, 4 to 20 mA Output, 32 to 212°F Range	\$125
T1K[20 TO 120F]	.....1K Plat. RTD Transmitter, 4 to 20 mA Output, 20 to 120°F Range	\$125
T1K[0 TO 100F]	.....1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°F Range	\$125
T1K[0 TO 100C]	.....1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°C Range	\$125
T1K[-7 TO 49C]	.....1K Plat. RTD Transmitter, 4 to 20 mA Output, -7 to 49°C Range	\$125
T1K[-18 TO 38C]	.....1K Plat. RTD Transmitter, 4 to 20 mA Output, -18 to 38°C Range	\$125

*Matched Transmitters are also available. Contact your BAPI representative for ordering.*

**#2: Probe Type and Length (required)**

SD-12"	Submersible Duct, 12" (0.3m) length	\$117
SD-18"	Submersible Duct, 18" (0.46m) length	\$120
SD-24"	Submersible Duct, 24" (0.6m) length	\$138
SD-36"	Submersible Duct, 36" (0.9m) length	\$142
SD-48"	Submersible Duct, 48" (1.2m) length	\$150

**#3: Enclosure and Lead Length (optional, J-Box comes standard)**

BBX	BAPI-Box Crossover (IP10, NEMA 1)	\$0
NB	No Box (comes with 6" Etched Teflon Leads)	\$0

**#4: Test & Balance or Terminal Strip (optional, requires a BAPI-Box Crossover enclosure)**

TB	Test & Balance Switch	\$7.50
TS	Terminal Strip Connection	\$7

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options.*

**Example Number:** BA/ (**10K-2**) - (**SD-24"**) - (**BBX**) - ( )

**Actual Number (with parenthesis removed):** BA/10K-2-SD-24"-BBX

**Description:** 10K-2 Thermistor, Submersible Duct Sensor, BAPI-Box Crossover Enclosure

**List Price:** \$18 (10K-2 Thermistor) + \$138 (Probe 24" Length) = \$156 List Price

**Your Number:** BA/

Gray shaded items follow the Buy and Resale Multiplier.



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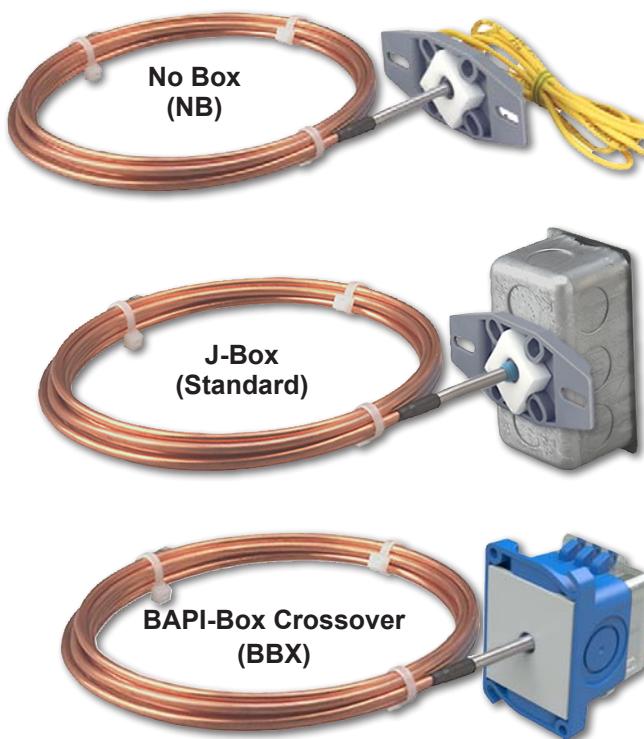
## Features & Options

- Waterproof, Copper-Cased Element
- Continuous Averaging (RTD models only)
- Averaging Lengths: 2', 4' and 8'

Submersible Averaging Units feature closed cell foam to seal the probe insertion hole and absorb vibration and mounting tabs allow for easy installation. All Units have etched Teflon leadwires and encapsulated sensors to create a watertight package that can withstand high humidity and perform in the real world.

Averaging probes should be used wherever there is a chance for stratified layers of hot and cold water. Averaging probes are made of bendable copper tubing and measure temperature along their entire length.

These units come standard with a 2"x4" steel J-Box but are also available with no box or the new BAPI-Box Crossover enclosure.



### The New BAPI-Box Crossover Enclosure

The new BAPI-Box Crossover features a hinged cover with thumb latch for easy termination. A pierceable knockout plug is available for the open port. See the Accessories section for more info.

*(Units shown with knockplug plug sold separately.)*



## Specifications

### Environmental Operation Range:

Temperature:

BAPI-Box Crossover: -40 to 85 °C

Other Enclosures: -40 to 100 °C

Humidity: 0 to 100%, non-condensing

### Sensing Element:

Thermistor or RTD (See Sensors Section for Specs.)

### Probe Material:

Bendable Copper, 3/16" dia. with 4" sleeve

### Enclosure Material:

Junction Box: Galvanized Steel

BAPI-Box Crossover:

UV-resistant polycarbonate, UL94, V-0

### Enclosure Rating:

Junction Box: IP20, NEMA 1

BAPI-Box Crossover (BBX):

IP10, NEMA 1

IP44 with knockout plug in open port

### Encl. Dimensions: H x W x D

BAPI-Box Crossover:

3.1 x 2.2 x 1.9" (79 x 56 x 49mm)

Junction Box

4.2 x 3.9 x 1.94" (106 x 98.4 x 49mm)

*(For enclosure dimension drawings, see the end of the section.)*





# Submersible Averaging Temperature Sensors

A35

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



## Submersible Averaging Sensor Option Selection Guide

BA/ (#1) - (#2) - (#3) - (#4)

### #1: Temperature Sensor (required)

		<u>List Price</u>
1.8K	1.8K Thermistor	\$18
3K	3K Thermistor	\$18
10K-2	10K-2 Thermistor	\$18
10K-3	10K-3 Thermistor	\$18
10K-3[11K]	10K-3[11K] Thermistor	\$18
20K	20K Thermistor	\$18
1K[375]	1K Platinum RTD (375 curve)	\$25
1K[Ni]	1K Ω Nickel RTD	\$35
1K	1K Platinum RTD (385 curve)	\$25

Transmitters below require a BAPI-Box Crossover Enclosure

T1K[32 TO 212F]	1K Plat. RTD Transmitter, 4 to 20 mA Output, 32 to 212°F Range	\$125
T1K[20 TO 120F]	1K Plat. RTD Transmitter, 4 to 20 mA Output, 20 to 120°F Range	\$125
T1K[0 TO 100F]	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°F Range	\$125
T1K[0 TO 100C]	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°C Range	\$125
T1K[-7 TO 49C]	1K Plat. RTD Transmitter, 4 to 20 mA Output, -7 to 49°C Range	\$125
T1K[-18 TO 38C]	1K Plat. RTD Transmitter, 4 to 20 mA Output, -18 to 38°C Range	\$125

*Matched Transmitters are also available. Contact your BAPI representative for ordering.*

### #2: Probe Type and Length (required)

SA-2'	Submersible Averaging, 2' (0.6m) length	\$120
SA-4'	Submersible Averaging, 4' (1.2m) length	\$120
SA-8'	Submersible Averaging, 8' (2.4m) length	\$135

### #3: Enclosure and Lead Length (optional, J-Box comes standard)

BBX	BAPI-Box Crossover (IP10, NEMA 1)	\$0
NB	No Box (comes with 6" Etched Teflon Leads)	\$0

### #4: Test & Balance or Terminal Strip (optional, requires a BAPI-Box Crossover enclosure)

TB	Test & Balance Switch	\$7.50
TS	Terminal Strip Connection	\$7

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options.*

**Example Number:** BA/ ( **10K-2** ) - ( **SA-2'** ) - ( **BBX** ) - ( )

**Actual Number (with parenthesis removed):** BA/10K-2-SD-2'-BBX

**Description:** 10K-2 Thermistor, Submersible Averaging Sensor, BAPI-Box Crossover Enclosure

**List Price:** \$18 (10K-2 Thermistor) + \$120 (Probe 2' Length) = \$138 List

**Your Number:** BA/

Gray shaded items follow the Buy and Resale Multiplier.



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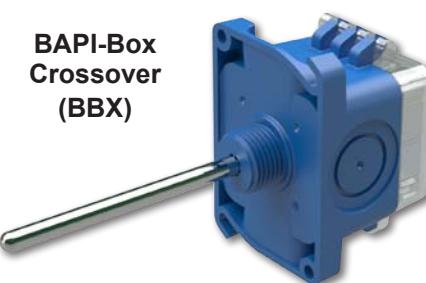
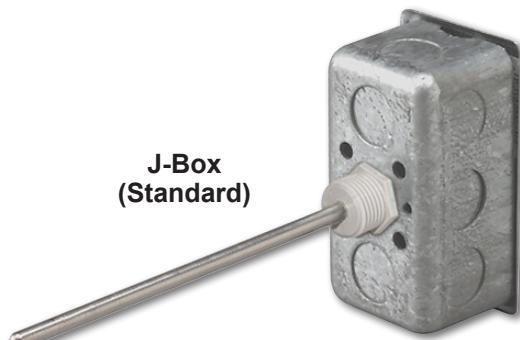
## Features & Options

- Probe Lengths: 2", 4" & 8" (fit standard BAPI Thermowell lengths)
- Series 304 Stainless Steel Probes and three Enclosure Styles
- Double Encapsulated Sensors & Etched Teflon Leadwires

Immersion Units are available in 2", 4" and 8" probe lengths. The sensor is potted inside a 1/4" stainless steel probe with thermally conductive compound.

All Immersion Units have etched Teflon leadwires and double encapsulated sensors to create a watertight package that can withstand high humidity and condensation.

Immersion Units come standard with a 2"x4" steel J-Box but are also available with the metal Weatherproof enclosure or the new BAPI-Box Crossover enclosure.



### The BAPI-Box Crossover

The new BAPI-Box Crossover enclosure features a hinged cover with thumb latch for easy termination. A pierceable knockout plug is available for the open port. See the Accessories section for more info.



*(Shown with knockout plug sold separately.)*

### BAPI Thermowells

Immersion Unit Probes are designed to be inserted into a Thermowell. For more info on Thermowells, see page A40.



## Specifications

### Environmental Operation Range:

Temperature:

BAPI-Box Crossover: -40 to 85 °C

Other Enclosures: -40 to 100 °C

Humidity: 0 to 100%, non-condensing

### Sensing Element:

Thermistor or RTD (See Sensors Section for Specs.)

### Probe Material:

Stainless Steel, 1/4" diameter

### Enclosure Material:

Junction Box: Galvanized Steel

BAPI-Box Crossover:

UV-resistant polycarbonate, UL94, V-0

### Enclosure Rating:

Junction Box: IP20, NEMA 1

BAPI-Box Crossover (BBX):

IP10, NEMA 1

IP44 with knockout plug in open port

### Encl. Dimensions: H x W x D

BAPI-Box Crossover:

3.1 x 2.2 x 1.9" (79 x 56 x 49mm)

Junction Box

4.2 x 3.9 x 1.94" (106 x 98.4 x 49mm)

*(For enclosure dimension drawings, see the end of the section.)*





# Immersion Probes w/ nylon fitting Temperature Sensors

A37

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



## Immersion Sensor Option Selection Guide

BA/ (#1) - (#2) - (#3) - (#4)

**#1: Temperature Sensor** (required)

	<u>List Price</u>
1.8K .....	\$18
3K .....	\$18
10K-2 .....	\$18
10K-3 .....	\$18
10K-3[11K] .....	\$18
20K .....	\$18
1K[375] .....	\$25
1K[NI] .....	\$35
1K .....	\$25

Transmitters below require a BAPI-Box Crossover Enclosure

T1K[32 TO 212F] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 32 to 212°F Range .....	\$125
T1K[20 TO 120F] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 20 to 120°F Range .....	\$125
T1K[0 TO 100F] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°F Range .....	\$125
T1K[0 TO 100C] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°C Range .....	\$125
T1K[-7 TO 49C] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, -7 to 49°C Range .....	\$125
T1K[-18 TO 38C] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, -18 to 38°C Range .....	\$125

*Matched Transmitters are also available. Contact your BAPI representative for ordering.*

**#2: Probe Type and Length** (required)

I-2" .....	Immersion, 2" (51mm) length .....	\$7
I-4" .....	Immersion, 4" (102mm) length .....	\$7
I-8" .....	Immersion, 8" (203mm) length .....	\$7

**#3: Enclosure and Lead Length** (optional, comes standard with Junction Box)

BBX .....	BAPI-Box Crossover (IP10, NEMA 1) .....	\$0
-----------	---	-----

**#4: Test & Balance or Terminal Strip** (optional, requires a BAPI-Box Crossover Enclosure)

TB .....	Test & Balance Switch .....	\$7.50
TS .....	Terminal Strip Connection .....	\$7

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

**Example Number:** BA/ ( 10K-2 ) - ( I-2" ) - ( BBX ) - ( )

**Actual Number (with parenthesis removed):** BA/10K-2-I-2"-BBX

**Description:** 10K-2 Thermistor, Immersion Sensor, BAPI-Box Crossover, No Test and Balance or Terminal Strip.

**List Price:** \$18 (10K-2 Thermistor) + \$7 (Probe 2" Length) = \$25 List Price

**Your Number:** BA/



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## Features & Options

- Probe Lengths: 2", 4" and 8" (fit standard BAPI Thermowell lengths)
- Series 304 Stainless Steel Probes
- Double Encapsulated Sensors
- Two Optional Watertight Enclosures

Immersion Units are available in 2", 4" and 8" probe lengths. This unit is provided with a 1/4" stainless steel probe and a 1/2" NPT double-ended stainless steel fitting.

The sensors are potted inside the probe with a thermally conductive compound. All units have etched Teflon leadwires and double encapsulated sensors to create a watertight package that can withstand high humidity and condensation. Immersion Probes are available with a metal Weatherproof enclosure or the new BAPI-Box Crossover enclosure.



## The BAPI-Box Crossover

The new BAPI-Box Crossover enclosure features a hinged cover with thumb latch for easy termination. A pierceable knockout plug is available for the open port. See the Accessories section for more info.



*(Shown with knockout plug sold separately.)*

## Specifications

### Environmental Operation Range:

Temperature Sensor: -40 to 105 °C  
Humidity: 0 to 100%, non-condensing

### Enclosure Material:

Weatherproof: Cast Aluminum  
BAPI-Box Crossover:  
UV-resistant polycarb., UL94, V-0

### Sensing Element:

Thermistor or RTD  
(See Sensors Section for Specs.)

### Probe Material:

Stainless Steel, 1/4" diameter

### Enclosure Rating:

Weatherproof: IP24, NEMA 3R  
BAPI-Box Crossover (BBX):  
IP10, NEMA 1  
IP44 with knockout plug in open port

### Encl. Dimensions: H x W x D

BAPI-Box Crossover:... 3.1 x 2.2 x 1.9" (79 x 56 x 49mm)  
Weatherproof..... 4.5 x 2.75 x 2.2" (114 x 70 x 55mm)

*(For enclosure dimension drawings, turn to the end of the section.)*





# Immersion Probes w/ stainless steel fitting

## Temperature Sensors

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Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



### Immersion Sensor with SS Fitting Option Selection Guide

BA/ (#1) - (#2) - (#3) - (#4)

**#1: Temperature Sensor (required)**

	<u>List Price</u>
1.8K .....	\$18
3K .....	\$18
10K-2 .....	\$18
10K-3 .....	\$18
10K-3[11K] .....	\$18
20K .....	\$18
1K[375] .....	\$25
1K[NI] .....	\$35
1K .....	\$25

Transmitters below require a BAPI-Box Crossover Enclosure

T1K[32 TO 212F] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 32 to 212°F Range .....	\$125
T1K[20 TO 120F] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 20 to 120°F Range .....	\$125
T1K[0 TO 100F] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°F Range .....	\$125
T1K[0 TO 100C] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°C Range .....	\$125
T1K[-7 TO 49C] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, -7 to 49°C Range .....	\$125
T1K[-18 TO 38C] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, -18 to 38°C Range .....	\$125

*Matched Transmitters are also available. Contact your BAPI representative for ordering.*

**#2: Probe Type and Length (required)**

I-2"-SS .....	Immersion, SS Fitting, 2" (51mm) length - Use 2" BAPI Thermowell .....	\$42
I-4"-SS .....	Immersion, SS Fitting, 4" (102mm) length - Use 4" BAPI Thermowell .....	\$42
I-8"-SS .....	Immersion, SS Fitting, 8" (203mm) length - Use 8" BAPI Thermowell .....	\$42

**#3: Enclosure Style and Probe Mount (required)**

BBX .....	BAPI-Box Crossover (IP10, NEMA 1).....	\$0
BBXO .....	BAPI-Box Crossover (IP10, NEMA 1), Outside Mount (probe out bottom).....	\$0
WP .....	Weatherproof (IP24, NEMA 3R) .....	\$12
WPO .....	Weatherproof (IP24, NEMA 3R), Outside Mount, (probe out the bottom) ....	\$12

**#4: Test & Balance or Terminal Strip (optional, requires a BAPI-Box Crossover Enclosure)**

TB .....	Test & Balance Switch .....	\$7.50
TS .....	Terminal Strip Connection .....	\$7

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

**Example Number:** BA/ ( **10K-2** ) - ( **I-2"-SS** ) - ( **BBX** ) - (  )

**Actual Number (with parenthesis removed):** BA/10K-2-I-2"-SS-BBX

**Description:** 10K-2 Thermistor, Immersion Sensor with SS Fitting, BAPI-Box Crossover.

**List Price:** \$18 (10K-2 Thermistor) + \$42 (Probe 2" Length) = \$60 List Price

**Your Number:** BA/



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## Features & Options

- Three Lengths: 2", 4" and 8"  
(Fit standard Immersion Unit lengths)
- Stainless Steel (304 or 316) or Brass
- Two Part (Welded) or Machined Construction
- Other Lengths Available Upon Request
- Limited Lifetime Warranty

Standard Thermowells available from BAPI include 304 stainless steel (machined), 316 stainless steel (machined), brass (machined), and two part\* (welded) 304 stainless steel. These wells are offered in 2", 4" and 8" lengths with 1/2" NPT external and 1/2" NPSM internal. Other lengths and thread diameters are available upon request.

The Thermowell chosen for an installation is governed mainly by the corrosion conditions the well will face. The machined stainless steel wells all come with a mirror polish to provide maximum corrosion resistance.

Occasionally, the material consideration is one of strength rather than corrosion. For example, a machined stainless steel well may be required for high pressure water service where otherwise a brass or two part stainless steel well would be satisfactory from a corrosion standpoint.

Note: The two part welded stainless steel thermowells are not intended for service in moving water. They may be used in catch basins, sumps or large storage tanks with small inlet and outlet pipes. Do not mount the two part welded stainless steel thermowells close to the inlet or outlet pipe of the tank.

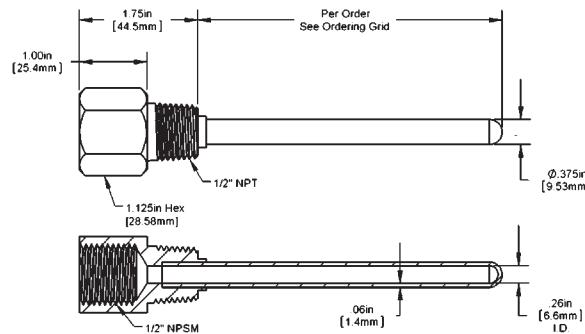


Machined  
Thermowell

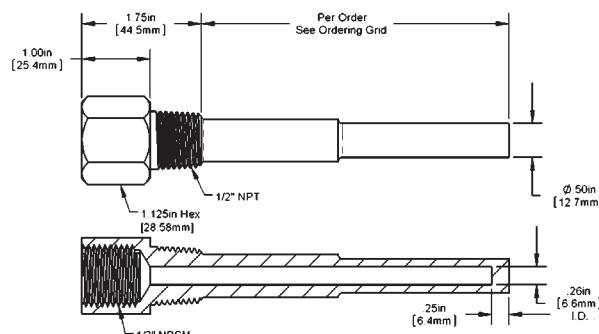


Two Part (welded)  
Thermowell

## Specifications



Two Part (Welded) Thermowell  
304 Stainless Steel



Machined Thermowell  
304 or 316 Stainless Steel or Brass

NPT= National Pipe Taper

NPSM=National Pipe Straight Mechanical (not tapered)



Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

## Ordering Information

Part #	Description	List Price
BA/2"	Two Part (Welded) 304 Stainless Steel - 2"	\$22
BA/4"	Two Part (Welded) 304 Stainless Steel - 4"	\$24
BA/8"	Two Part (Welded) 304 Stainless Steel - 8"	\$28
BA/2" M304	Machined 304 Stainless Steel - 2"	\$32
BA/4" M304	Machined 304 Stainless Steel - 4"	\$44
BA/8" M304	Machined 304 Stainless Steel - 8"	\$65
BA/2" M316	Machined 316 Stainless Steel - 2"	\$44
BA/4" M316	Machined 316 Stainless Steel - 4"	\$50
BA/8" M316	Machined 316 Stainless Steel - 8"	\$80
BA/2" MB	Machined Brass - 2"	\$23
BA/4" MB	Machined Brass - 4"	\$26
BA/8" MB	Machined Brass - 8"	\$45



**Note:** Standard thread size is 1/2" NPT external, and 1/2" NPSM internal. 2" units have an insertion length of 2.5" (5.1 cm). 4" units have an insertion length of 4.5" (11.43 cm). 8" units have an insertion length of 7.5" (19.05 cm).

Gray shaded items follow the Buy and Resale Multiplier.

## Comparing the Wake Frequency and the Resonant Frequency

Well failures, in most cases, are not due to the effects of pressure or temperature on the well. The calculations necessary to provide adequate strength, under given conditions, are familiar enough to permit proper choice of wall thickness and material. The values shown in Table 1 are conservative, and intended primarily as a guide. Less familiar, and more dangerous, are the **vibration effects** to which wells are subjected. Fluid, flowing by the well, forms a turbulent wake (called the Von Karman Trail) which has a definite frequency, based on the diameter of the well and the velocity of the fluid. It is important that the well have sufficient stiffness so that the wake frequency will never equal the resonant (natural) frequency of the well itself. If the resonant frequency of the well coincided with the wake frequency, the well would vibrate to destruction and break off in the piping. Wells are also safe if the resonant frequency is well **below** the wake frequency or if the fluid velocity is constantly fluctuating through the critical velocity point. Nevertheless, if the installation is not hampered by the use of a sufficiently stiff well, we recommend the values given in Table 2 not be exceeded.

**Table 1: Pressure Rating versus Temperature**

Thermowell Material	Temperature in Degrees Fahrenheit						
	70°F	200°F	400°F	600°F	800°F	1000°F	1200°F
	Pressure Rating (Pounds per Square Inch)						
Brass	5000	4200	1000	-	-	-	-
Welded 304 S.S.	982	820	675	604	550	510	299
304 S.S.	7000	6200	5600	5400	5200	4500	1650
316 S.S.	7000	7000	6400	6200	6100	5100	2500

**Table 2:**  
**Maximum Fluid Velocity versus Insertion Length**

Thermowell Material	Fluid Type	Insertion Length (inches)		
		I-2"	I-4"	I-8"
		Maximum Fluid Velocity (Feet per Second)		
Brass	Air/Steam	207	75.5	27.3
	Water	59.3	32.2	19.7
Welded 304 S.S.	Air/Steam	169	61	20
	Water	88	20	10
304 S.S.	Air/Steam	300	109	39.5
	Water	148	82.2	-

The values shown in Table Two are based on operating temperatures of 350°F for brass and 1,000°F for stainless steel (S.S.). Slightly higher velocities are possible at lower temperatures.





## Boiler, Stack or Cryogenic

### Features & Options

- Stainless Steel Probe & Industrial Construction
- Double-ended 1/2" NPT Stainless Steel Fitting
- Optional Weatherproof Enclosure
- Standard or Outside Mount Configurations

The Extreme Temperature Platinum RTD Units are designed for use in applications from -200°C to 600°C. They are packaged to handle vibration, moisture, and wide temperature ranges.

The Immersion Unit has a stainless steel probe with a 1/2" NPT double-ended stainless steel fitting. It is available with a cast aluminum Weatherproof enclosure.

The Remote Unit has a stainless steel probe with PTFE jacketed cable or fiberglass insulated leads and is available as a probe alone or with a BAPI-Box Crossover or Weatherproof enclosure.

These units can be used with a remote mounted BAPI ruggedized temp transmitter to provide a linear proportional 4 to 20 mA output. For more info, see page A58.



### Specifications

**Sensor Type:** Platinum 1KΩ RTD ( $3.85 \Omega/\text{°C}$ )

**Reference Resistance:** 1KΩ at 0°C

**Operating Range:** -328 to 1,112°F (-200 to 600°C)

**Humidity:** 0 to 100%, non-condensing

**Standard Accuracy:** 0.1% at 0°C

**Wiring to Probe:**

PTFE Jacketed Cable or Fiberglass Insulated Leadwire

[1] PTFE Jacketed, -328 to 32°F (-200 to 0°C)

[2] PTFE Jacketed, 77 to 500°F (25 to 260°C)

[3] Fiberglass Ins., 77 to 1,112°F (25 to 600°C)

**Enclosure Material:**

Weatherproof: Cast Aluminum

BAPI-Box Crossover:

UV-resistant polycarb., UL94, V-0

**Enclosure Operating Range:**

Weatherproof: -100 to 1,000 °F (-73 to 538 °C)

BAPI-Box Crossover: -40 to 185 °F (-40 to 85 °C)

**Enclosure Rating:**

Weatherproof: IP24, NEMA 3R

BAPI-Box Crossover (BBX):

IP10, NEMA 1

IP44 with knockout plug in open port

**Encl. Dimensions: H x W x D**

BAPI-Box Crossover:... 3.1 x 2.2 x 1.9" (79 x 56 x 49mm)

Weatherproof.....4.5 x 2.75 x 2.2" (114 x 70 x 55mm)

(For enclosure dimension drawings, see the end of the section)





# Extreme Temp. Platinum RTDs - Immersion & Remote Temperature Sensors

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Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



## Extreme Temp Immersion Option Selection Guide

BA/ (#1) - (#2) - (#3)

**#1: Platinum RTD Temperature Sensor (required)**

	<u>List Price</u>
1K[1] ..... 1K Plat. RTD, -328 to 32 °F (-200 to 0 °C), PTFE Insulation Leads.....	\$145
1K[2] ..... 1K Plat. RTD, 77 to 500 °F (25 to 260 °C), PTFE Insulation Leads .....	\$145
1K[3] ..... 1K Plat. RTD, 77 to 1,112 °F (25 to 600 °C), Fiberglass Insulation Leads .....	\$145

**#2: Probe Type and Length (required)**

I-2" .....	3.5" length of 1/4" Diameter, 316 SS Probe, double-ended 1/2" NPT .....	\$0
I-4" .....	5.5" length of 1/4" Diameter, 316 SS Probe, double-ended 1/2" NPT .....	\$17.50
I-8" .....	8.5" length of 1/4" Diameter, 316 SS Probe, double-ended 1/2" NPT .....	\$17.50

**#3: Enclosure Style and Probe Mount (optional)**

WP .....	Weatherproof (IP24, NEMA 3R) .....	\$12
WPO .....	Weatherproof (IP24, NEMA 3R), Outside Mount, (probe out the bottom) .....	\$12

## Extreme Temp Remote Option Selection Guide

BA/ (#1) - (#2) - (#3)

**#1: Platinum RTD Temperature Sensor (required)**

	<u>List Price</u>
1K[1] ..... 1K Plat. RTD, -328 to 32 °F (-200 to 0 °C), PTFE Insulation Leads.....	\$145
1K[2] ..... 1K Plat. RTD, 77 to 500 °F (25 to 260 °C), PTFE Insulation Leads .....	\$145
1K[3] ..... 1K Plat. RTD, 77 to 1,112 °F (25 to 600 °C), Fiberglass Insulation Leads .....	\$145

**#2: Probe Type and Length (required)**

RP-5' .....	2" SS Sensor with 5' PTFE Jacketed Cable or Fiberglass Insulated Leadwires .....	\$5
RP-10' .....	2" SS Sensor with 10' PTFE Jacketed Cable or Fiberglass Insulated Leadwires ..	\$10
RP-15' .....	2" SS Sensor with 15' PTFE Jacketed Cable or Fiberglass Insulated Leadwires ..	\$15

**#3: Enclosure Style and Probe Mount (optional)**

WP .....	Weatherproof (IP24, NEMA 3R) .....	\$12
BBX .....	BAPI-Box Crossover (IP10, NEMA 1) .....	\$0

**Example Number:** BA/ ( 1K[1] ) - ( I-2" ) - ( WP )

**Actual Number (with parenthesis removed):** BA/1K[1]-I-2"-WP

**Description:** 10K-2 Thermistor, Immersion Sensor with Stainless Steel Fitting, Weatherproof Enclosure, No Test and Balance or Terminal Strip.

**List Price:** \$145 (Plat. RTD) + \$12 (Weatherproof Encl.) = \$157 List Price

**Your Number:** BA/

Gray shaded items follow the Buy and Resale Multiplier.



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## Features & Options

- Clamp-On, Spring-Loaded or Remote Probes
- Junction Box or BAPI-Box Crossover Enclosure

These units are designed to monitor water temperature in retrofit or filled pipe applications. The strap units fit around the outside of a pipe, while the remote probes are strapped directly onto the pipe. All three units measure the water temperature by sensing the surface temperature of the pipe.

Strap Units and Remote Probes come standard with a Junction Box enclosure but are also available with a new BAPI-Box Crossover enclosure.

**Clamp-On Strap** – This unit has a bendable copper sensing plate which forms to the curvature of the pipe. An adjustable hose clamp holds the unit in place around the pipes from 2 to 4.5" (5 to 11.4 cm) in diameter.

**Spring-Loaded Strap** – Instead of removing the pipe insulation, the spring loaded sensing pad is held against the pipe through a hole cut in the insulation. It can be used with 5 to 14.5" (13 to 37 cm) dia. pipes with up to 2" of insulation.

**Remote Probes** - These units have a 1.75" long stainless steel probe with either Plenum-Rated Cable or FEP-Jacketed Cable with a lead length of 18" (Other lengths are available by calling BAPI). Remote Probes are ideal for strap-on applications on any size pipe, or hard-to-access areas.

(See pg A48 for more Remote Probe Options.)



## The BAPI-Box Crossover



The new BAPI-Box Crossover enclosure features a hinged cover with thumb latch for easy termination. A pierceable knockout plug is available for the open port. See the Accessories section for more info.

*(Shown with knockout plug sold separately.)*

## Specifications

### Enclosure Material:

Junction Box: Galvanized Steel  
BAPI-Box Crossover:  
UV-resistant polycarb., UL94, V-0

### Environmental Operation Range:

Temperature Sensor:  
Clamp On: -40 to 85 °C,  
Spring Loaded: -40 to 85 °C  
Remote Probe: -40 to 105 °C  
Temperature Transmitter: -20 to 70 °C  
Humidity: 0 to 95%, non-condensing

### Enclosure Rating:

Junction Box: IP20, NEMA 1  
BAPI-Box Crossover (BBX):  
IP10, NEMA 1  
IP44 with knockout plug in open port

### Sensing Element:

Thermistor or RTD (See Sensors Section for Specs.)

### Encl. Dimensions: H x W x D

BAPI-Box Crossover: ...3.1 x 2.2 x 1.9" (79 x 56 x 49mm)  
Junction Box: .....4.2 x 3.9 x 1.94" (106 x 98.4 x 49mm)  
*(For encl. dimension drawings, turn to the end of the section.)*





# Strap Units and Remote Probe Units

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**Temperature Sensors**

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



## Strap Sensor Option Selection Guide

BA/ (#1) - (#2) - (#3) - (#4)

**#1: Temperature Sensor (required)**

	<b>List Price</b>
1.8K .....	\$18
3K .....	\$18
10K-2 .....	\$18
10K-3 .....	\$18
10K-3[11K] .....	\$18
20K .....	\$18
1K[375] .....	\$25
1K[NI] .....	\$35
1K .....	\$25

Transmitters below require a BAPI-Box Crossover Enclosure

T1K[32 TO 212F] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 32 to 212°F Range .....	\$125
T1K[20 TO 120F] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 20 to 120°F Range .....	\$125
T1K[0 TO 100F] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°F Range .....	\$125
T1K[0 TO 100C] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°C Range .....	\$125
T1K[-7 TO 49C] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, -7 to 49°C Range .....	\$125
T1K[-18 TO 38C] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, -18 to 38°C Range .....	\$125

*Matched Transmitters are also available. Contact your BAPI representative for ordering.*

**#2: Strap Config & Enclosure (optional)**

S .....	Clamp-On Strap - fits 2 to 4.5" (5 to 11.4 cm) diameter pipes .....	\$10
STP .....	Spring Loaded Strap - fits 5 to 14.5" (13 to 37 cm) diameter pipes .....	\$25
RPP .....	Remote Probe with 18" of Plenum Rate Cable .....	\$0
RPPFEP-18" .....	Remote Probe with 18" of FEP-Jacketed Cable .....	\$3
RPPFEP2-18" .....	Remote Probe w/ 18" of FEP-Jacketed Cable (suitable for submersion) .....	\$10

**#3: Enclosure and Lead Length (optional, comes standard with Junction Box)**

BBX .....	BAPI-Box Crossover (IP10, NEMA 1) .....	\$0
-----------	---	-----

**#4: Test & Balance or Terminal Strip (optional, requires a BAPI-Box Crossover Enclosure)**

TB .....	Test & Balance Switch .....	\$7.50
TS .....	Terminal Strip Connection .....	\$7

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options.*

**Example Number:** BA/ ( **10K-2** ) - ( **S** ) - ( **BBX** ) - (    )

**Actual Number (with parenthesis removed):** BA/10K-2-S-BBX

**Description:** 10K-2 Thermistor, Clamp-On Strap, BAPI-Box Crossover Enclosure, No Terminal Strip.

**List Price:** \$18 (10K-2 Thermistor) + \$10 (Clamp-On Strap) = \$28 List Price

**Your Number:** BA/



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## Features & Options

- Quick-Response Sensor
- IP66/NEMA 4 BAPI-Box 2 Enclosure Style
- Well-Vented Sensor Guard

Outside Air Units are designed to be mounted outdoors. The UV-resistant plastic shield keeps the sensor out of the sunlight and allows for excellent air circulation. The units are available in a BAPI-Box 2 polycarbonate enclosure which carries an IP66/NEMA 4 rating.

All Outside Air Units have etched Teflon leadwires and can withstand high humidity and condensation and perform under real world conditions. This is especially important in an outside air application which can be exposed to rain, snow and large temperature swings.



## Weather Shade

External temperature, humidity and air quality sensors can be affected by solar heat gain. The BAPI Weather Shade effectively blocks the solar heat gain, improving the accuracy of the sensor.



(See Accessories for more info.)

**Outside Air Temperature Sensor in a BAPI-Box 2 Enclosure**

## Specifications

### Environmental Operation Range:

Temperature Sensor: -40 to 85 °C

Temperature Transmitter: -20 to 70 °C

Humidity: 0 to 100%, non-condensing

### Sensing Element:

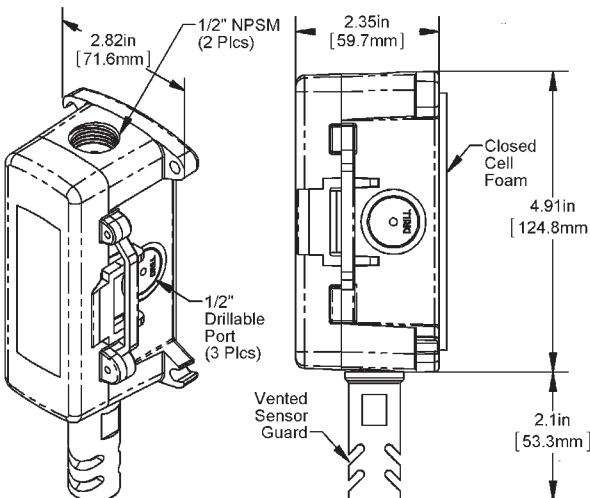
Thermistor or RTD

(See Sensors Section for Specs.)

**Enclosure Rating:** IP66, NEMA 4

### Enclosure Material:

UV-resistant polycarbonate, UL94, V-0





# Outside Air Units

## Temperature Sensors

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Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



### Outside Air Temperature Option Selection Guide

BA/ (#1) - (#2) - (#3) - (#4)

**#1: Temperature Sensor (required)**

		<u>List Price</u>
1.8K	1.8K Thermistor	\$18
3K	3K Thermistor	\$18
10K-2	10K-2 Thermistor	\$18
10K-3	10K-3 Thermistor	\$18
10K-3[11K]	10K-3[11K] Thermistor	\$18
20K	20K Thermistor	\$18
1K[375]	1K Platinum RTD (375 curve)	\$25
1K[NI]	1K Ω Nickel RTD	\$35
1K	1K Platinum RTD (385 curve)	\$25

Transmitters below require a BAPI-Box 2 Enclosure

T1K[32 TO 212F]	1K Plat. RTD Transmitter, 4 to 20 mA Output, 32 to 212°F Range	\$125
T1K[20 TO 120F]	1K Plat. RTD Transmitter, 4 to 20 mA Output, 20 to 120°F Range	\$125
T1K[0 TO 100F]	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°F Range	\$125
T1K[0 TO 100C]	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°C Range	\$125
T1K[-7 TO 49C]	1K Plat. RTD Transmitter, 4 to 20 mA Output, -7 to 49°C Range	\$125
T1K[-18 TO 38C]	1K Plat. RTD Transmitter, 4 to 20 mA Output, -18 to 38°C Range	\$125

*Matched Transmitters are also available. Contact your BAPI representative for ordering.*

**#2: Outside Air Unit (required)**

O	Outside Air Unit	\$0
---	------------------	-----

**#3: Enclosure and Lead Length (required)**

BB2	BAPI-Box 2 Polycarbonate Enclosure (IP66, NEMA 4)	\$12
-----	---	------

**#4: Test & Balance or Terminal Strip (optional)**

TB	Test & Balance Switch	\$7.50
TS	Terminal Strip Connection	\$7

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

**Example Number:** BA/( **10K-2** ) - ( **O** ) - ( **BB2** ) - (   )

**Actual Number (with parenthesis removed):** BA/10K-2-O-BB2

**Description:** 10K-2 Thermistor, Outside Air Temperature Sensor, BAPI-Box 2 Enclosure, No Test and Balance or Terminal Strip.

**List Price:** \$18 (10K-2 Thermistor) + \$12 (BAPI-Box 2 Enclosure) = \$30 List Price

**Your Number:** BA/



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Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: [sales@bapihvac.com](mailto:sales@bapihvac.com) • Web: [www.bapihvac.com](http://www.bapihvac.com)



## Features & Options

- Etched Teflons Leads on Remote Sensors
- Plenum Cable or FEP Cable on Remote Probes
- Double Encapsulated Sensors on Remote Probes

BAPI Remote Sensors feature a .75" long encapsulation shell and etched Teflon leads in lengths of 6", 18", 5', 10', 15', 20', and 25'. Remote Sensors are perfect for tight locations. Additional cable options, lead lengths and probe styles are available.

Remote Probes feature a 1.75" long stainless steel probe with either Plenum-Rated Cable or FEPJacketed Cable. Lead lengths are 18", 5', 10', 15', 20', and 25'. Remote Probes are commonly used in refrigerated case or strap-on applications. They are ideal for hard-to-access areas or spaces where the usual Immersion or Duct Sensors do not fit well. Additional cable options, lead lengths and probe styles are available upon request.

Remote Sensors and Probes are available with a new BAPI-Box Crossover enclosure.



## The BAPI-Box Crossover

The new BAPI-Box Crossover enclosure features a hinged cover with thumb latch for easy termination. A pierceable knockout plug is available for the open port. See the Accessories section for more info.

*(Shown with knockout plug sold separately.)*



## Specifications

### Environmental Operation Range:

Temperature Sensor: -40 to 105 °C

Temperature Transmitter: -20 to 70 °C

Humidity: 0 to 100%, non-condensing

### Probe Material:

Round Probe: Stainless Steel

Concave Probe: Brass

### Enclosure Material:

UV-resist. polycarb., UL94, V-0

### BAPI-Box Crossover Enclosure Rating:

IP10, NEMA 1

IP44 with knockout plug in open port

### Sensing Element:

Thermistor or RTD (See Sensors Section for Specs.)

### Encl. Dimensions: H x W x D

BAPI-Box Crossover: 3.1 x 2.2 x 1.9" (79 x 56 x 49mm)

*(For enclosure dimension drawings, turn to the end of the section.)*





# Remote Sensors & Probes

A49

Temperature Sensors

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



## Remote Sensors and Probes Option Selection Guide:

BA/ (#1) - (#2) - (#3)

### **#1: Temperature Sensor (required)**

1K[375] .....	1K Platinum RTD (375 curve).	\$25
1K[NI].....	1K Ω Nickel RTD .....	\$35
1K .....	1K Platinum RTD (385 curve).	\$25
1.8K .....	1.8K Thermistor .....	\$18
3K .....	3K Thermistor .....	\$18
10K-2 .....	10K-2 Thermistor.....	\$18
10K-3 .....	10K-3 Thermistor.....	\$18
10K-3[11K]....	10K-3[11K] Thermistor.....	\$18
20K .....	20K Thermistor .....	\$18

1K Plat. RTD Transmitters below with 4 to 20 mA Output - require a BAPI-Box Crossover Enclosure	
T1K[32 TO 212F]....	32 to 212°F Range .....
T1K[20 TO 120F]....	20 to 120°F Range .....
T1K[0 TO 100F].....	0 to 100°F Range .....
T1K[0 TO 100C] .....	0 to 100°C Range.....
T1K[-7 TO 49C] .....	-7 to 49°C Range .....
T1K[-18 TO 38C] .....	-18 to 38°C Range .....

*Matched Transmitters are also available. Contact your BAPI representative for ordering.*

### **#2: Probe and Cable Options (required)**

#### REMOTE SENSOR, ETCHED TEFLON LEADS

PP-6" .....	Remote Sensor, 6" Leads.....	\$4
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#### REMOTE SENSOR, PLENUM-RATED CABLE

PP-18" .....	Remote Sensor, 18" Leads.....	\$4
PP-5' .....	Remote Sensor, 5' Leads .....	\$2
PP-10' .....	Remote Sensor, 10' Leads .....	\$0
PP-15' .....	Remote Sensor, 15' Leads .....	\$2
PP-20' .....	Remote Sensor, 20' Leads .....	\$4
PP-25' .....	Remote Sensor, 25' Leads .....	\$6

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

#### REMOTE PROBE, PLENUM-RATED CABLE

RPP-6" .....	Remote Probe, 6" Leads .....	\$0
RPP-18" .....	Remote Probe, 18" Leads .....	\$0
RPP-5' .....	Remote Probe, 5' Leads.....	\$2
RPP-10' .....	Remote Probe, 10' Leads.....	\$4
RPP-15' .....	Remote Probe, 15' Leads.....	\$6
RPP-20' .....	Remote Probe, 20' Leads.....	\$8
RPP-25' .....	Remote Probe, 25' Leads.....	\$10

#### REMOTE PROBE, FEP-JACKETED CABLE

RPFEP-6" .....	Remote Probe, 6" Leads .....	\$3
RPFEP-18" .....	Remote Probe, 18" Leads .....	\$3
RPFEP-5' .....	Remote Probe, 5' Leads.....	\$5
RPFEP-10' .....	Remote Probe, 10' Leads.....	\$10
RPFEP-15' .....	Remote Probe, 15' Leads.....	\$15
RPFEP-20' .....	Remote Probe, 20' Leads.....	\$20
RPFEP-25' .....	Remote Probe, 25' Leads.....	\$25

#### REMOTE PROBE, FEP-JACKETED CABLE SUITABLE FOR SUBMERSION

RPFEP2-6" .....	Remote Probe, 6" Leads .....	\$10
RPFEP2-18" .....	Remote Probe, 18" Leads .....	\$10
RPFEP2-5' .....	Remote Probe, 5' Leads.....	\$15
RPFEP2-10' .....	Remote Probe, 10' Leads.....	\$20
RPFEP2-15' .....	Remote Probe, 15' Leads.....	\$25
RPFEP2-20' .....	Remote Probe, 20' Leads.....	\$30
RPFEP2-25' .....	Remote Probe, 25' Leads.....	\$35

### **#3: Enclosure and Lead Length**

(optional, required for units with a transmitter)	
BBX .....	BAPI-Box Crossover (IP10) .....

**Example Number: BA/( 10K-2 ) - ( RPP-18" ) - ( BBX )**

**Actual Number (with parenthesis removed): BA/10K-2-RPP-18"-BBX**

**Description:** 10K-2 Thermistor, Outside Air Temperature Sensor, Remote Probe with Plenum Rated Cable, 18" Cable Leads, BAPI-Box Crossover Enclosure.

**List Price:** \$18 (10K-2 Thermistor) = \$18 List Price

**Your Number:** BA/



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## Features & Options

- Waterproof, Double Encapsulated Sensors
- Concave Probe or Remote Probes
- Optional BAPI-Box Crossover Enclosure
- FEP-Jacketed Cable in 5 Color Choices

The Concave Probes feature a 0.81" long brass encapsulation shell with a concave indentation so that they fit on the outside of pipes such as condenser lines. Remote Probes feature a 1.75" long stainless steel probe without an indentation.

Both probes come with FEP-jacketed cable in a choice of 5 colors and lead lengths.

Remote probes are commonly used in refrigerators, freezers, dry storage, car wash bays and other hard-to-access areas where immersion or duct sensors do not fit well.

Remote Sensors and Probes are available with a new BAPI-Box Crossover enclosure.

## The BAPI-Box Crossover

The new BAPI-Box Crossover enclosure features a hinged cover with thumb latch for

easy termination. A pierceable knockout plug is available for the open port. See the Accessories section for more info.

*(Shown with knockout plug sold separately.)*



## Specifications

### Environmental Operation Range:

Temperature Sensor: -40 to 105 °C

Humidity: 0 to 100%, non-condensing

### Sensing Element:

Thermistor or RTD (See Sensors Sect. for Specs.)

### Probe Material:

Remote Probe: Stainless Steel

Concave Probe: Brass

### Enclosure Material:

UV-resist. polycarb., UL94, V-0

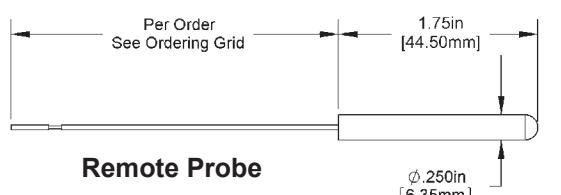
### BAPI-Box Crossover Enclosure Rating:

IP10, NEMA 1 (IP44 w/ knockout plug in open port)

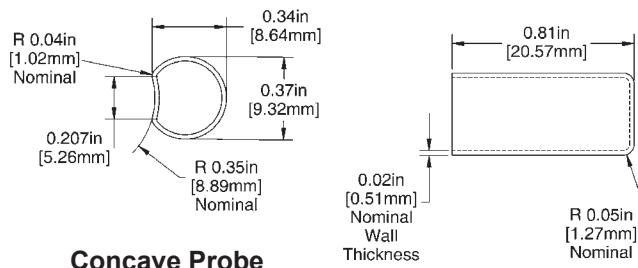
### Encl. Dimensions: H x W x D

3.1 x 2.2 x 1.9" (79 x 56 x 49mm)

*(For BAPI-Box Crossover dimension drawings, turn to the end of the section.)*



Remote Probe



Concave Probe



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# Concave & Remote Probes with Colored Cable

A51

Temperature Sensors

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



## **Concave and Remote Probes with Colored Cables Selection Guide:**

BA/ (#1) - (#2) - (#3) - (#4)

### **#1: Temperature Sensor (required)**

1K[375] .....	1K Platinum RTD (375 curve).	\$25
1K[Ni].....	1K Ω Nickel RTD .....	\$35
1K .....	1K Platinum RTD (385 curve).	\$25
1.8K .....	1.8K Thermistor.....	\$18
3K .....	3K Thermistor.....	\$18
10K-2 .....	10K-2 Thermistor.....	\$18
10K-3 .....	10K-3 Thermistor.....	\$18
10K-3[11K]....	10K-3[11K] Thermistor.....	\$18
20K .....	20K Thermistor.....	\$18
1K Plat. RTD Transmitters below with 4 to 20 mA Output - require a BAPI-Box Crossover Enclosure		
T1K[32 TO 212F]....	32 to 212°F Range .....	\$125
T1K[20 TO 120F]....	20 to 120°F Range .....	\$125
T1K[0 TO 100F].....	0 to 100°F Range .....	\$125
T1K[0 TO 100C] ....	0 to 100°C Range.....	\$125
T1K[-7 TO 49C] .....	-7 to 49°C Range .....	\$125
T1K[-18 TO 38C] .....	-18 to 38°C Range .....	\$125

Matched Transmitters are also available. Contact your BAPI representative for ordering.

### **#2: Probe Type (required)**

RPFEP.....	Remote Probe	
CPFEP.....	Concave Probe.....	\$4

Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)

### **#3: FEP Cable Color and Length (required)**

ORG-18" .....	Orange Cable, 18" Length.....	\$3
ORG-5' .....	Orange Cable, 5' Length .....	\$10
ORG-10' .....	Orange Cable, 10' Length .....	\$20
ORG-15' .....	Orange Cable, 15' Length .....	\$30
ORG-20' .....	Orange Cable, 20' Length .....	\$40
GRN-18" .....	Green Cable, 18" Length.....	\$3
GRN-5' .....	Green Cable, 5' Length .....	\$10
GRN-10'.....	Green Cable, 10' Length .....	\$20
GRN-15'.....	Green Cable, 15' Length .....	\$30
GRN-20'.....	Green Cable, 20' Length .....	\$40
YEL-18" .....	Yellow Cable, 18" Length.....	\$3
YEL-5' .....	Yellow Cable, 5' Length .....	\$10
YEL-10' .....	Yellow Cable, 10' Length .....	\$20
YEL-15' .....	Yellow Cable, 15' Length .....	\$30
YEL-20' .....	Yellow Cable, 20' Length .....	\$40
RED-18".....	Red Cable, 18" Length .....	\$3
RED-5' .....	Red Cable, 5' Length .....	\$10
RED-10' .....	Red Cable, 10' Length.....	\$20
RED-15' .....	Red Cable, 15' Length .....	\$30
RED-20' .....	Red Cable, 20' Length .....	\$40
18" .....	Gray Cable, 18" Length .....	\$3
5' .....	Gray Cable, 5' Length .....	\$5
10' .....	Gray Cable, 10' Length.....	\$10
15' .....	Gray Cable, 15' Length.....	\$15
20' .....	Gray Cable, 20' Length .....	\$20

### **#4: Enclosure (optional)**

BBX .....	BAPI-Box Crossover (IP10) .....	\$0
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**Example Number: BA/( 10K-2 ) - ( CPFEP ) - ( ORG-5' ) - ( BBX )**

**Actual Number (with parenthesis removed): BA/10K-2-CPFEP-ORG-5'-BBX**

**Description:** 10K-2 Thermistor, Concave Probe, 5' of FEP-Jacketed Orange Cable, BAPI-Box Crossover Enclosure.

**List Price:**

\$18 (10K-2 Therm.) + \$4 (Concave Probe) + \$10 (5' Orange Cable) = \$32 List Price

**Your Number:** BA/



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## Features & Options

- Fully Encapsulated Circuitry
- Green Power Indication LED on BBX Models

BAPI's loop powered 4 to 20mA temperature transmitters feature a 1,000Ω Platinum RTD (385 curve) and are available in a wide selection of temperature ranges or custom ranges.

They mount in a variety of enclosures to accommodate any application and terminate with flying leads or terminal screws. The unit is fully encapsulated (ruggedized) with a high thermal conductivity material to prevent circuit overheating and is water resistant.



## Specifications

### Power Required:

7 to 40VDC (All units except XOR-BBX6)  
10 to 40VDC (XOR-BBX6 units)

### Transmitter Output:

4 to 20mA, 850Ω@24VDC

### Output Wiring:

2 Wire Loop  
Flying Leads (4 to 22 AWG)  
or 4 Terminal Block (24 to 12 AWG)

### Calibration Span:

Min. 30°F (16.6°C), Max 1000°F (555°C)

### Calibration Zero:

Min. -148°F (-100°C), Max 900°F (482°C)

### Accuracy:

±0.065% of Span

### Linearity:

±0.125% of Span

### RTD Sensor (2 Wire):

1KΩ, 2 Wire Plat. (PT), 385 Curve  
Matched (M): 13 to 302°F (-25 to 150°C)

with 3-point certificate (25%, 50% & 75%)

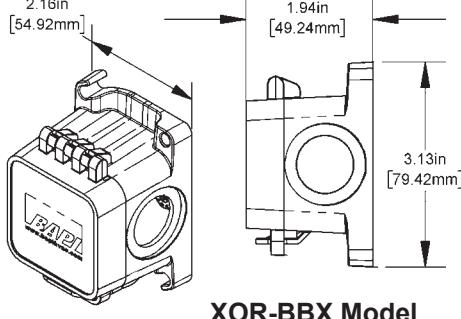
### Mounting Shell:

ABS shell w/ Waterproof Urethane Fill

### Transmitter Ambient:

-4 to 158°F, (-20° to 70°C)

0 to 95% RH, Non-condensing



XOR-BBX Model

### BAPI-Box Crossover Encl. Material:

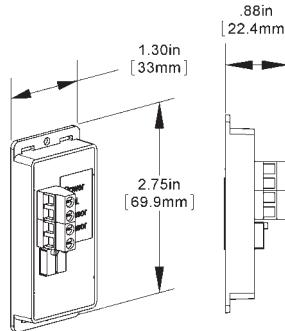
Polycarbonate, UL94V-0, UV-Rated

### BAPI-Box Crossover Encl. Rating:

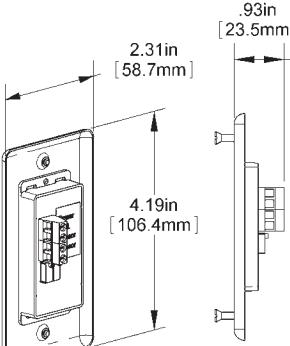
IP10, NEMA 1

### Agency:

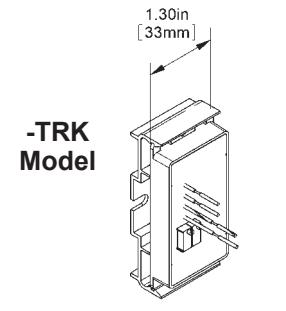
RoHS



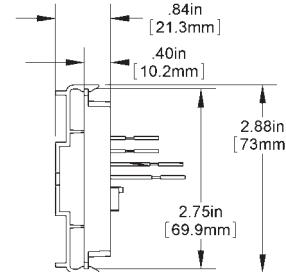
-STM Model  
(shown with optional Terminal Strip)



-XOR Model  
(shown with optional Terminal Strip)



-TRK Model



-EUM Model





# 4 to 20 mA Temperature Transmitters

A55

Rev. 03/23/17

Temperature Sensors

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



## 4 to 20 mA Transmitter Option Selection Guide

BA/ (#1)(#2) - (#3) - (#4)

**#1: Temperature Transmitter Type** (required)

		<u>List Price</u>
T1K.....	1K Platinum RTD, 1KΩ @ 0°C with 4 to 20 mA Output .....	\$100
T1KM.....	1K Platinum RTD, 1KΩ @ 0°C with 4 to 20mA Output and NIST certification .	\$280

**#2: Temperature Transmitter Range** (required)

- [32 TO 212F] ..... 32 to 212°F Range
- [20 TO 120F] ..... 20 to 120°F Range
- [0 TO 100F] ..... 0 to 100°F Range
- [0 TO 100C] ..... 0 to 100°C Range
- [-7 TO 49C] ..... -7 to 49°C Range
- [-18 TO 38C] ..... -18 to 38°C Range

**#3: Configuration and Optional Enclosure** (required)

XOR.....	Transmitter in snaptrack mountable shell, w/ metal plate	
XOR-EUM.....	Transmitter in EU size shell	
XOR-STM.....	Transmitter in snaptrack mountable shell, no metal plate	
XOR-TRK .....	Transmitter with 1.25" inch wide piece of 2-3/4" snap track .....	\$5
XOR-BBX .....	Transmitter in a BAPI-Box Crossover enclosure (IP10).....	\$0

**#4: Screw Terminals** (optional)

TS .....	Terminal Strip terminals for RTD, power and signal .....	\$0
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*Additional options and custom ranges are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

**Example Number:** BA/( T1K )( [0 to 100F] ) - ( XOR-BBX ) - ( )

**Actual Number (with parenthesis removed):** BA/T1K[0 to 100F]-XOR-BBX

**Description:** T1K Transmitter, 0 to 100°F Range in a BAPI-Box Crossover Enclosure.

**List Price:** \$100 (T1K Transmitter) = \$100 List Price

**Your Number:** BA/



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## Features & Options

- Fluid-Filled Chamber Tracks Temperature of Freezer or Cooler Contents, Not Air Temperature, Decreasing False Alarms
- Easy Wall Mount or Wire Shelf Hanger
- Available in Stainless Steel or Aluminum

The BAPI Thermobuffer Temperature Sensor is used to simulate more closely the refrigerator contents rather than the refrigerator air temperature. The fluid-filled chamber allows for slower reaction to abrupt temperature changes, yet still maintains long-term accuracy if the change remains permanent. It eliminates the temperature spikes due to frequent refrigerator or freezer door opening and decreases false alarms.

The Thermobuffer comes in three buffer sizes 1", 2" and 4" and is designed to save valuable shelf space by mounting to the wall or by hanger in a refrigerator or freezer. The buffer chamber is machined in 304 Stainless Steel or aluminum and accommodates a variety of temperature sensors or transmitters to interface with all BAS systems.



Refrigerator  
(1" Hanging  
Bracket)



Walk-in Freezer  
(BAPI-Box w/ 2"  
Cylinder)



### The BAPI-Box Crossover

The new BAPI-Box Crossover enclosure features a hinged cover with thumb latch for easy termination. A pierceable knockout plug is available for the open port. See the Accessories section for more info.

*(Shown with knockout plug sold separately.)*

## Specifications

**Sensor:** Thermistor, RTD or Transmitter

**Probe:** Stainless steel

**Wire:** 22 awg stranded, 2 or 3 wires

**Insulation:**

Etched Teflon, PVC or FEP Jacketed

**Buffer Chamber Construction:**

M304.....Bar stock 304 Stainless Steel  
MAL .....Bar stock Aluminum

**Chamber Fluid:** Customer supplied

Glycol mix.....Food grade required  
1" Chamber.....~7 ml of fluid  
2" Chamber.....~24 ml of fluid  
4" Chamber.....~32 ml of fluid

*Note: Unit requires food grade glycol antifreeze for proper operation.*

**Sensing Element:**

Thermistor or RTD (See Sensors Section for Specs.)

**BAPI-Box Crossover Enclosure Rating:**

IP10, NEMA 1

IP44 with knockout plug in open port

**Enclosure Material:**

BAPI-Box Crossover.....Polycarb., UV rated, UL94 V-0  
Hanging Bracket.....SS Bracket with Steel Clip

**Environmental Operating Range:**

Temp. Sensor ..... -40 to 185°F (-40 to 85°C)

Temp. Transmitter.... -4 to 158°F (-20 to 70°C)

Humidity..... 0-100%RH, Condensing

**Agency:** CE, RoHS

**Encl. Dimensions: H x W x D**

BAPI-Box Crossover: 3.1 x 2.2 x 1.9" (79 x 56 x 49mm)

*(For enclosure dimension drawings, turn to the end of the section.)*





Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



## Thermobuffer Freezer/Cooler Sensor Option Selection Guide

BA/ (#1) - (#2) - (#3) - (#4) - (#5) - (#6)

### #1: Temp Sensor (required)

		List Price
1.8K	1.8K Thermistor	\$18
3K	3K Thermistor	\$18
10K-2	10K-2 Thermistor	\$18
10K-3	10K-3 Thermistor	\$18
10K-3[11K]	10K-3[11K] Thermistor	\$18
20K	20K Thermistor	\$18
1K[375]	1K Plat. RTD (375 curve)	\$25
1K[NI]	1K Ω Nickel RTD	\$35
1K	1K Plat. RTD (385 curve)	\$25

1K Plat. RTD Transmitters below with 4 to 20 mA Output - require a BAPI-Box Crossover Enclosure

T1K[32 TO 212F]	....32 to 212°F Range	\$125
T1K[20 TO 120F]	....20 to 120°F Range	\$125
T1K[0 TO 100F]	....0 to 100°F Range	\$125
T1K[0 TO 100C]	....0 to 100°C Range	\$125
T1K[-7 TO 49C]	....-7 to 49°C Range	\$125
T1K[-18 TO 38C]	....-18 to 38°C Range	\$125

Matched Transmitters are also available. Contact your BAPI representative for ordering.

Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)

### #2: Buffer Material and Length (required)

TB-M304-1	1" 304 SS Buffer (Overall length 1.9")	\$80
TB-M304-2	2" 304 SS Buffer (Overall length 4.3")	\$192
TB-M304-4	4" 304 SS Buffer (Overall length 6.3")	\$192
TB-MAL-2	2" Aluminum Buffer (Overall length 4.3")	\$132
TB-MAL-4	4" Aluminum Buffer (Overall length 6.3")	\$132

### #3: Hanging Bracket Mounting (optional)

HB	Hanging Bracket (30" FEP cable)	\$7
----	------------------------------------	-----

### #4: Enclosure Style (required)

BBX	BAPI-Box Crossover (IP10, NEMA 1)	\$0
NB	No Box	\$0

### #5: Custom Lead Length

(for HB and No Box units)

5	5' of FEP Jacketed Cable	\$5
10	10' of FEP Jacketed Cable	\$10
25	25' of FEP Jacketed Cable	\$25

### #6: Test & Bal. or Terminal Strip (optional)

TB	Test & Balance Switch	\$7.50
TS	Terminal Strip Connection	\$7

### Example Number:

BA/ ( 10K-2 ) - ( TB-M304-1 ) - ( ) - ( BBX ) - ( ) - ( ) = BA/10K-2-TB-M304-1-BBX6

Description: 10K-2 Thermistor, Thermobuffer, 1" 304SS Buffer, BAPI-Box Crossover Enclosure.

List Price: \$18 (10K-2 Thermistor) + \$80 (1" SS Buffer) = \$98 List Price

Your Number: BA/





## Features & Options

- Plenum-rated Etched Teflons Leads or Cable
- Probe Lengths from 1.75" to 48"
- $\frac{1}{4}$ " Stainless Steel Probes
- Fits BAPI Duct, Immersion or Remote Sensor Applications
- Double Encapsulated

BAPI's Duct, Immersion and Remote temperature replacement probes are easy to field swap to save time and money when the old probe becomes damaged or the sensor requirements have changed.

Replacement Probes feature a standard  $\frac{1}{4}$ " stainless steel probe, double encapsulated temperature sensor with minimum 6" 22 AWG Etched Teflon lead wires. The probes are available in various lengths from 1.75" to 48". The leads are available in a variety of lengths including 18", 5', 10', 15', 20', and 25'.

Additional cable options, lead lengths, and probe styles are available upon request. See the order grid to select the probe replacement for your application.

**For detailed specifications on the individual Sensors & Transmitters, turn to "Sensors" Section.**



**Replacement Probes**  
1.75", 4.5", 6.5" & 8.25" Probes  
with Etched Teflon Leads  
(The 1.75" Probe is "No Flare"  
while the other three are  
"Flared")

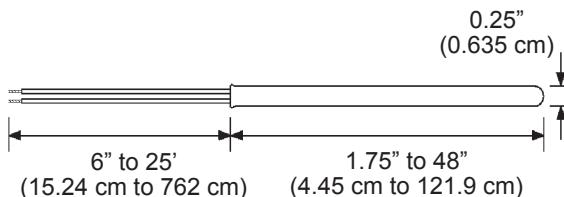
## Specifications

### Thermistor:

Temp. Output ..... Resistance  
Accuracy .....  $\pm 0.36^{\circ}\text{F}$ , ( $\pm 0.2^{\circ}\text{C}$ )  
Probe Range ..... -40° to 221°F (-40° to 105°C)

### RTD:

Platinum (PT) ..... KΩ @0°C, 385 curve,  
Platinum (PT) ..... 1KΩ @0°C, 375 curve  
PT Accuracy (std) .... 0.12% @Ref, or  $\pm 0.55^{\circ}\text{F}$ , ( $\pm 0.3^{\circ}\text{C}$ )  
PT Probe Range ..... -40° to 221°F, (-40 to 105°C)  
Nickel (Ni) ..... 1KΩ @70°F, JCI curve  
Ni Probe Range ..... -40° to 221°F (-40 to 105°C)



### Probe Material:

Rigid Stainless Steel, 0.25" OD

### Probe Length:

1.75 to 48" or custom per order

### Lead Wire:

Twin lead 22awg stranded

### Wire Insulation:

Etched Teflon, PVC or FEP Plenum Rated

### Agency:

RoHS





# Replacement Temperature Probes

**A57**

Rev. 12/14/16

**Temperature Sensors**

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and brackets with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.



## Replacement Temperature Probes Option Selection Guide:

BA/ (#1) - (#2) - (#3) - (#4) - (#5)

### #1: Temperature Sensor (required)

1K[375] .....	1K Platinum RTD (375 curve)	\$25
1K[NI].....	1K Ω Nickel RTD .....	\$35
1K .....	1K Platinum RTD (385 curve)	\$25
1.8K .....	1.8K Thermistor .....	\$18
3K .....	3K Thermistor .....	\$18
10K-2 .....	10K-2 Thermistor.....	\$18
10K-3 .....	10K-3 Thermistor.....	\$18
10K-3[11K]....	10K-3[11K] Thermistor.....	\$18
20K .....	20K Thermistor .....	\$18

### #2: Probe Type (Required)

P-1.75" .....	"No Flare" Probe, 1.75" probe
P-4" .....	"No Flare" Probe, 4.00" probe
P-4.5" .....	"Flared" Probe, 4.5" probe
P-6.5" .....	"Flared" Probe, 6.50" probe
P-8.25" .....	"Flared" Probe, 8.25" probe
P-9.5" .....	"Flared" Probe, 9.50" probe
P-12.25" .....	"Flared" Probe, 12.25" probe
P-18.25" .....	"Flared" Probe, 18.25" probe

### #3: Etched Teflon Leads (Optional)

TFE .....	6 inch Etched Teflon leads .....	\$0
TFE-18" .....	18 inch Etched Teflon leads .....	\$0
TFE-5'.....	5 feet Etched Teflon leads .....	\$2
TFE-10'.....	10 feet Etched Teflon leads .....	\$4
TFE-15'.....	15 feet Etched Teflon leads .....	\$6
TFE-20'.....	20 feet Etched Teflon leads .....	\$8
TFE-25'.....	25 feet Etched Teflon leads .....	\$10

### #4: Plenum-Rated Cable (Optional)

PL-18" .....	18 inch Plenum Rated Cable ...	\$0
PL-5' .....	5 feet Plenum Rated Cable .....	\$2
PL-10' .....	10 feet Plenum Rated Cable ...	\$4
PL-15' .....	15 feet Plenum Rated Cable ...	\$6
PL-20' .....	20 feet Plenum Rated Cable ...	\$8
PL-25' .....	25 feet Plenum Rated Cable ..	\$10

### #5: FEP Jacketed Cable (Optional)

FEP-18" .....	18 inch FEP Jacketed Cable ...	\$3
FEP-5'.....	5 feet FEP Jacketed Cable .....	\$5
FEP-10'.....	10 feet FEP Jacketed Cable ..	\$10
FEP-15'.....	15 feet FEP Jacketed Cable ..	\$15
FEP-20'.....	20 feet FEP Jacketed Cable ..	\$20
FEP-25'.....	25 feet FEP Jacketed Cable ..	\$25

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

**Example Number:** BA/( **10K-2** ) - ( **P-4.5"** ) - ( **TFE-18"** ) - ( ) - ( ) - ( )

**Actual Number (with brackets removed):** BA/10K-2-P-4.5"-TFE-18"

**Description:** 10K-2 Thermistor, Flared 4.5" Probe, 18" of Etched Teflon Leads.

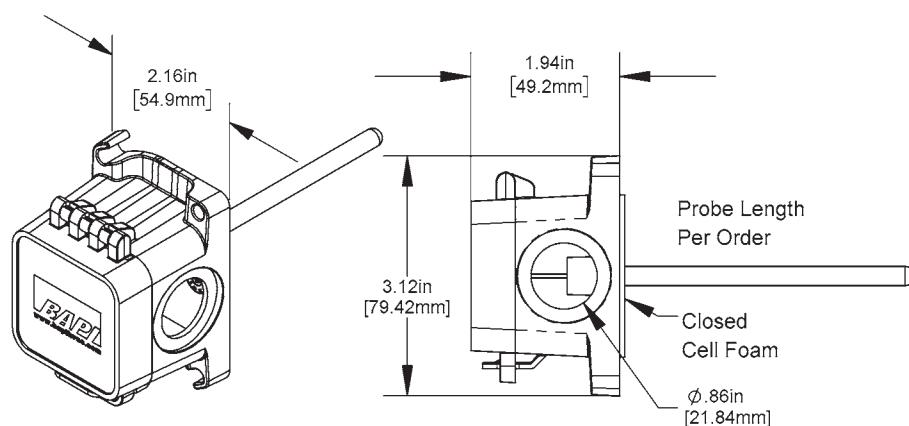
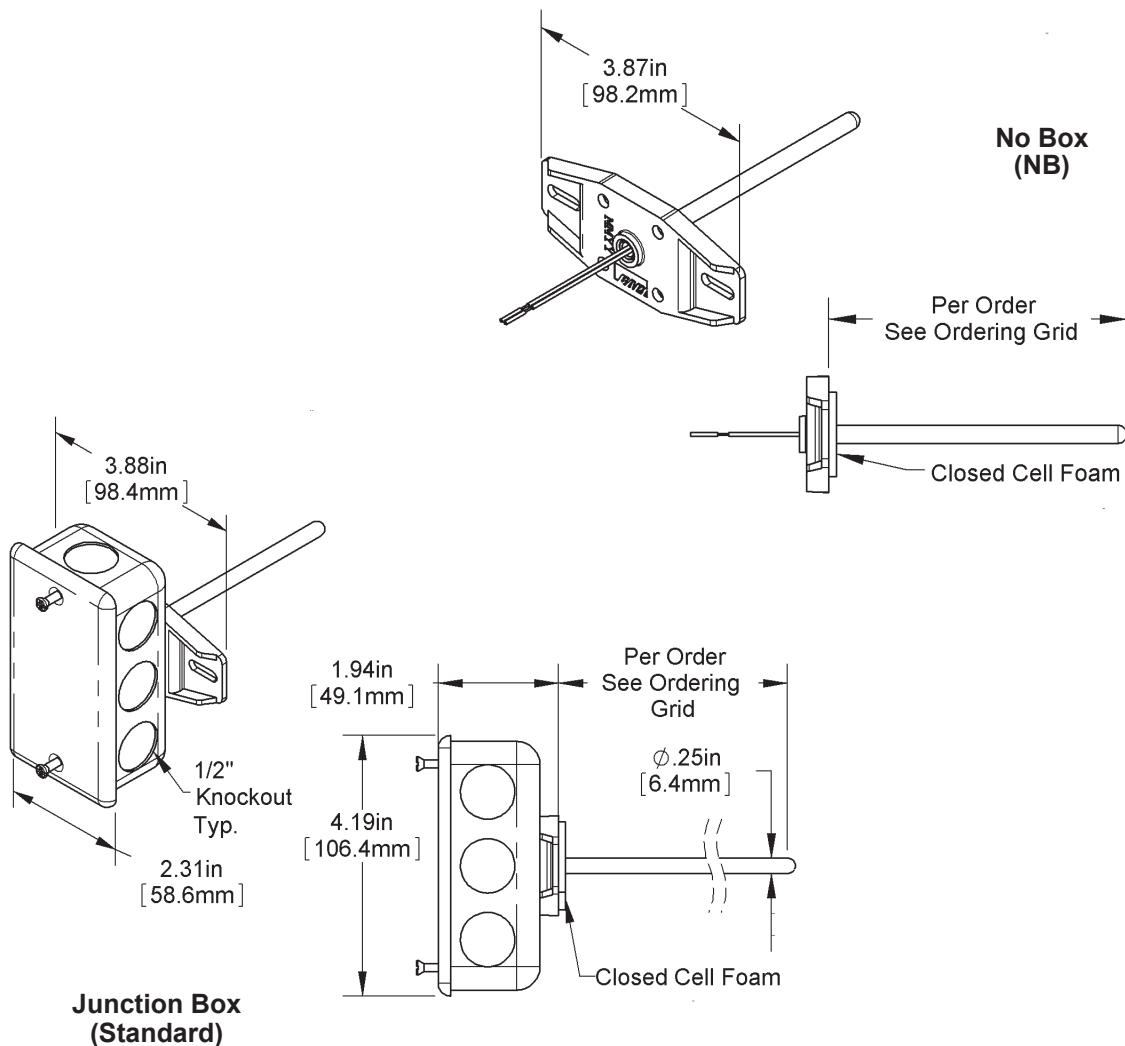
**List Price:** \$18 (10K-2 Thermistor) = \$18 List Price

**Your Number:** BA/



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**BAPI-Box Crossover (BBX)**





Rev. 12/14/16

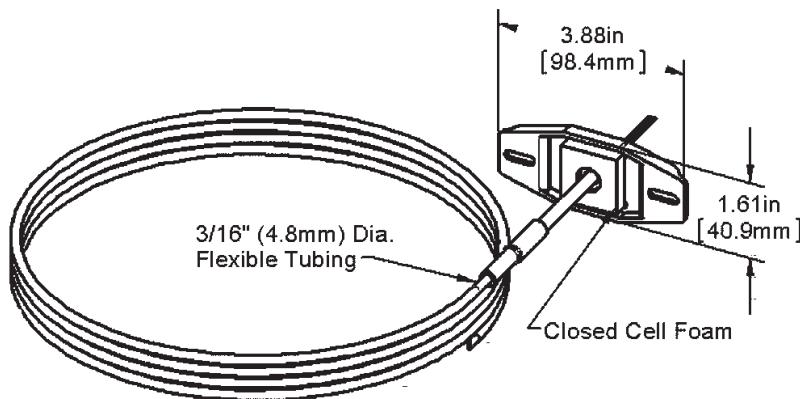
# Duct Averaging Sensor Enclosures

A61

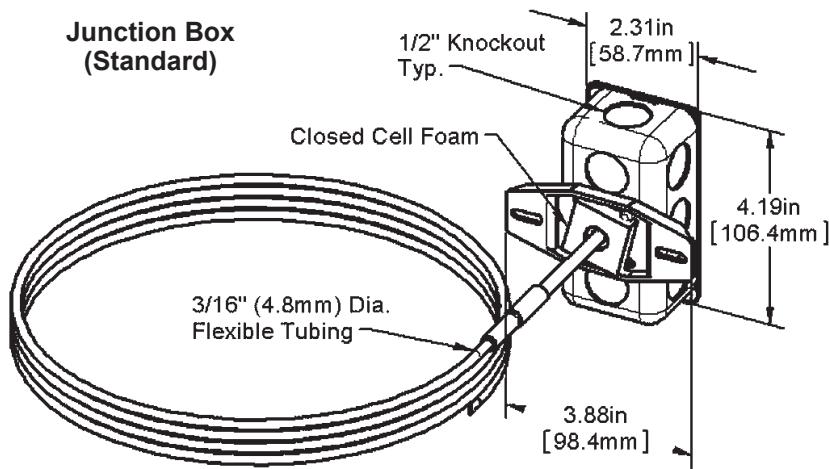
Temperature Sensors



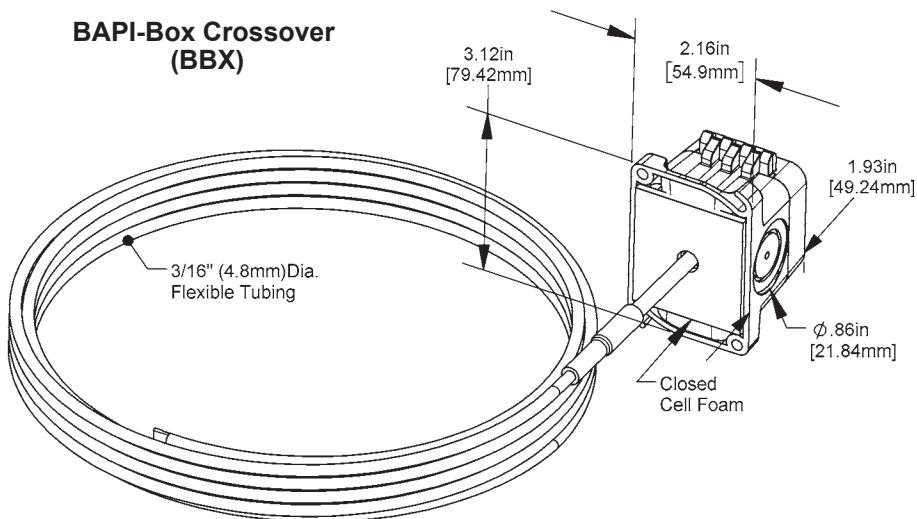
No Box (NB)



Junction Box  
(Standard)

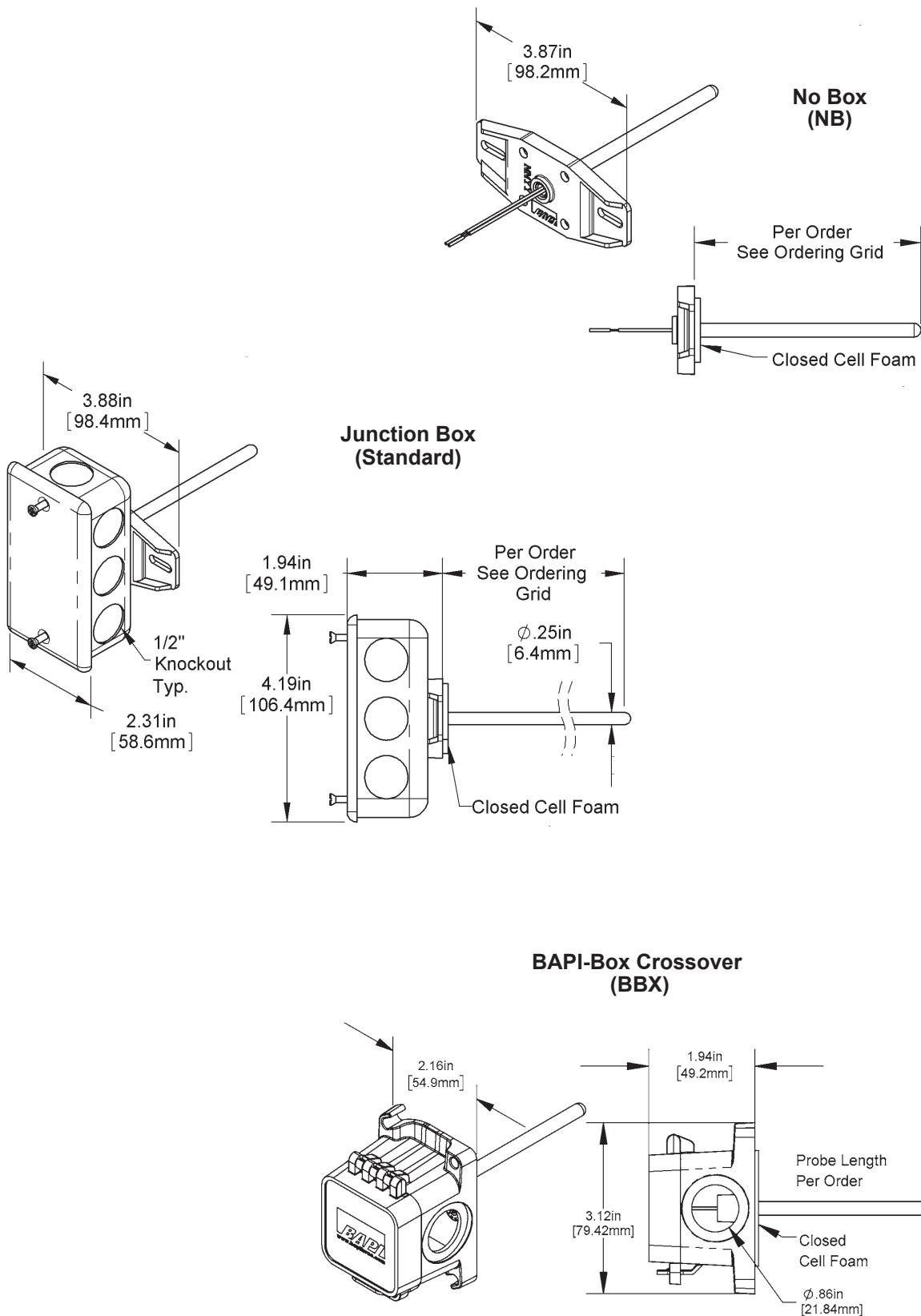


BAPI-Box Crossover  
(BBX)



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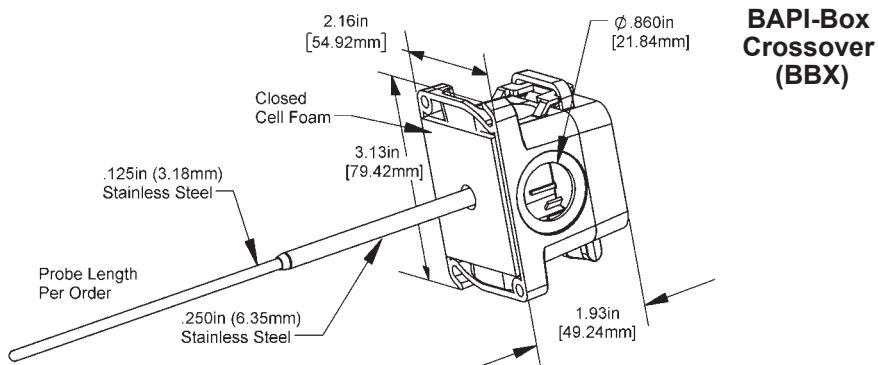
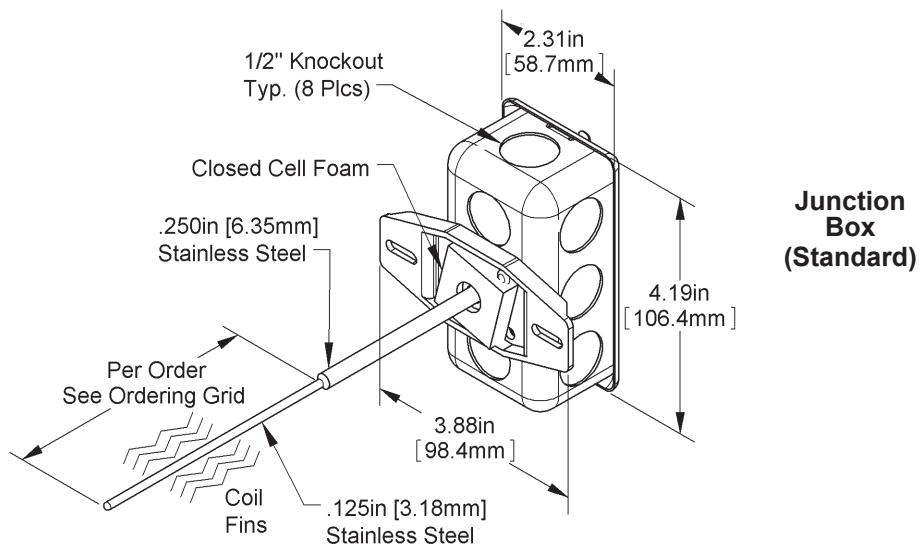
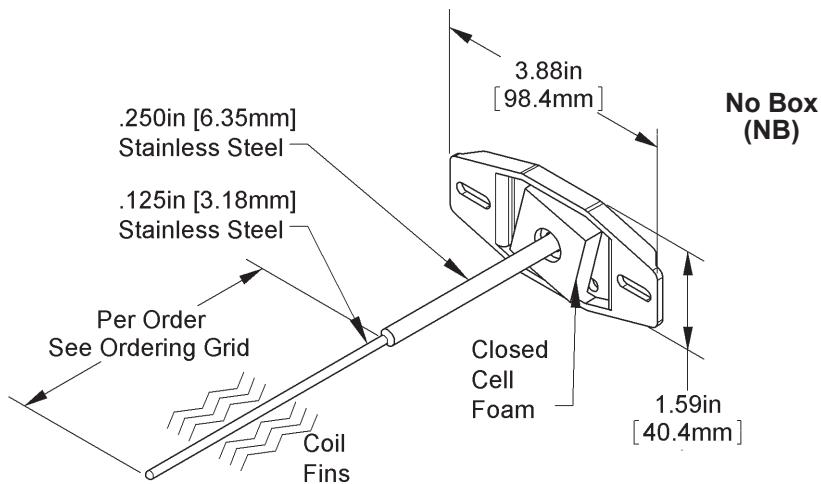


# Submersible Duct Sensor Enclosures

A63

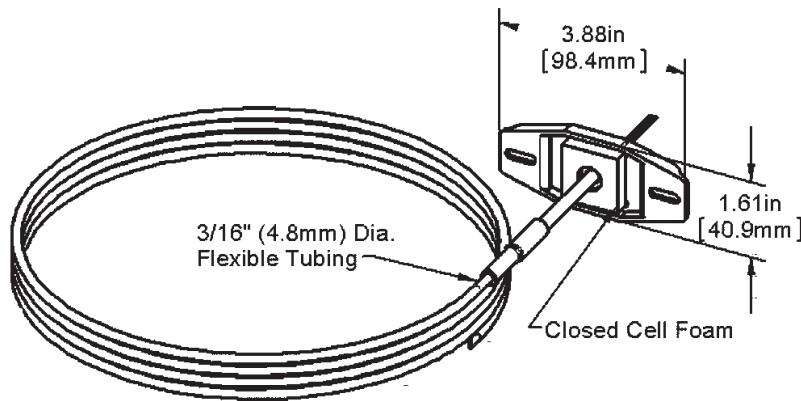
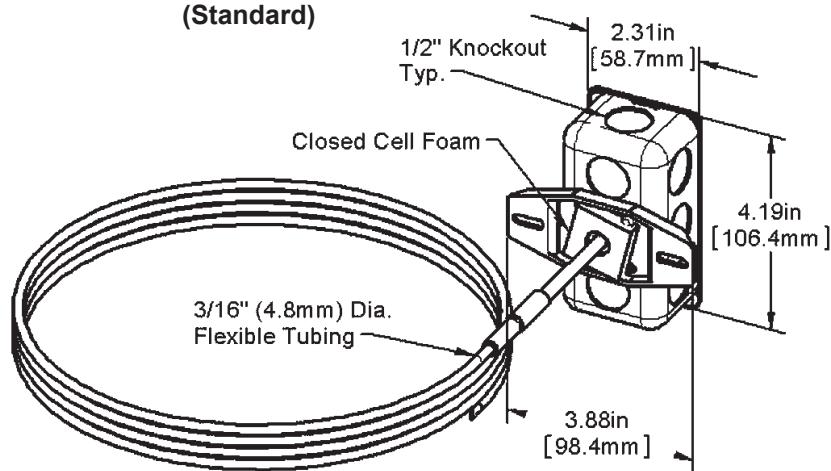
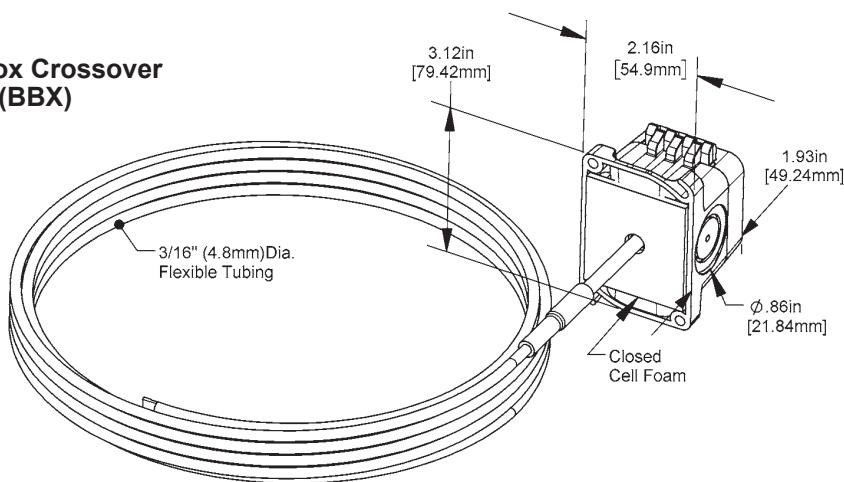
Rev. 12/14/16

Temperature Sensors



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**No Box (NB)****Junction Box (Standard)****BAPI-Box Crossover (BBX)**

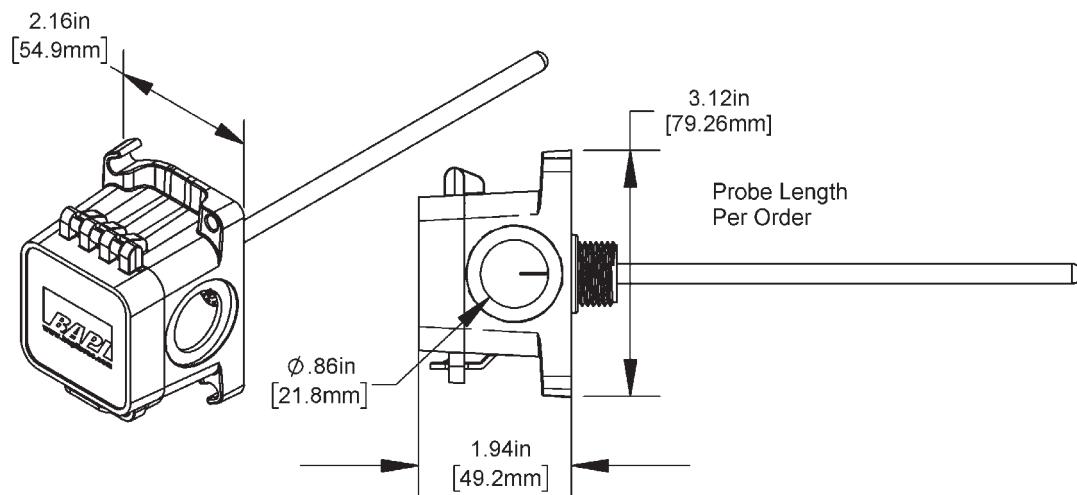
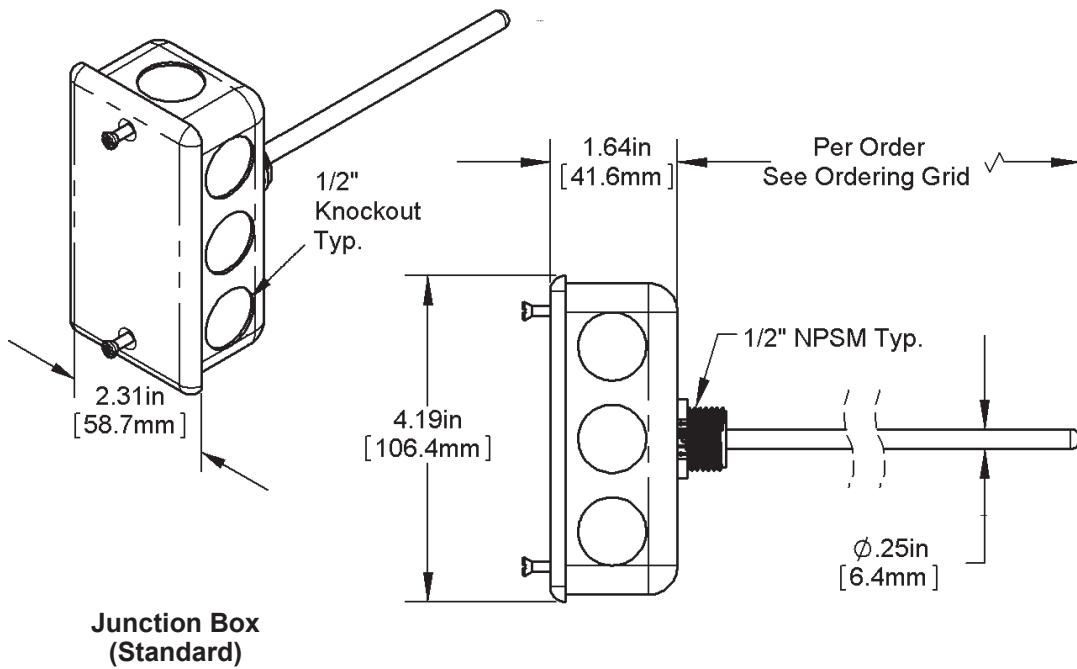


# Immersion Probes w/ nylon fitting Enclosures

A65

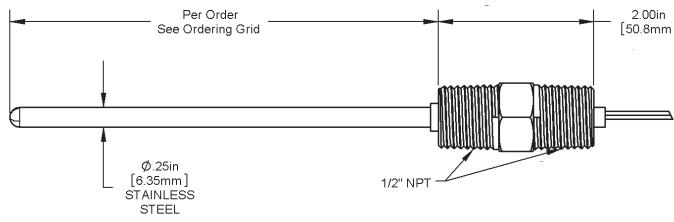
Rev. 12/14/16

Temperature Sensors



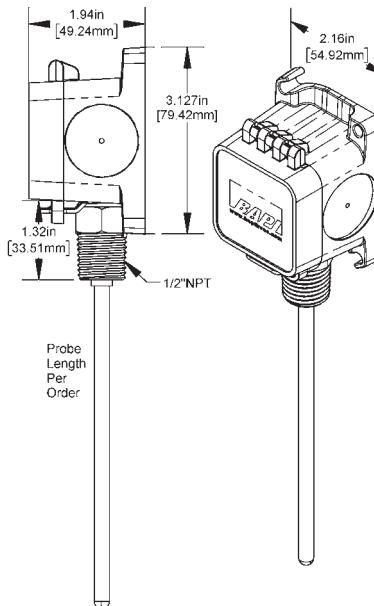
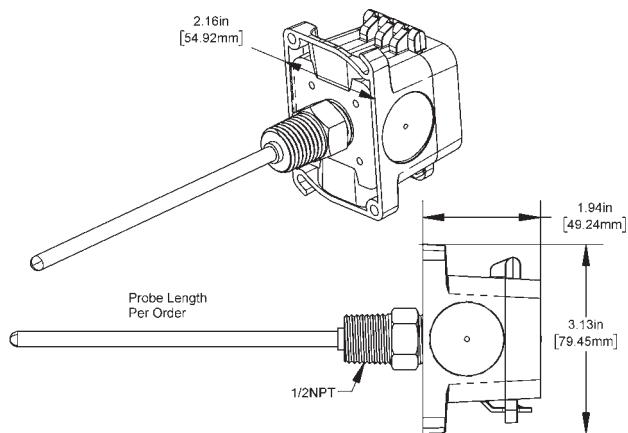
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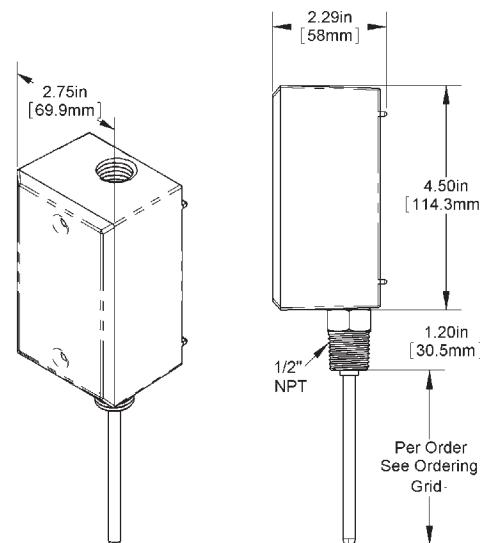
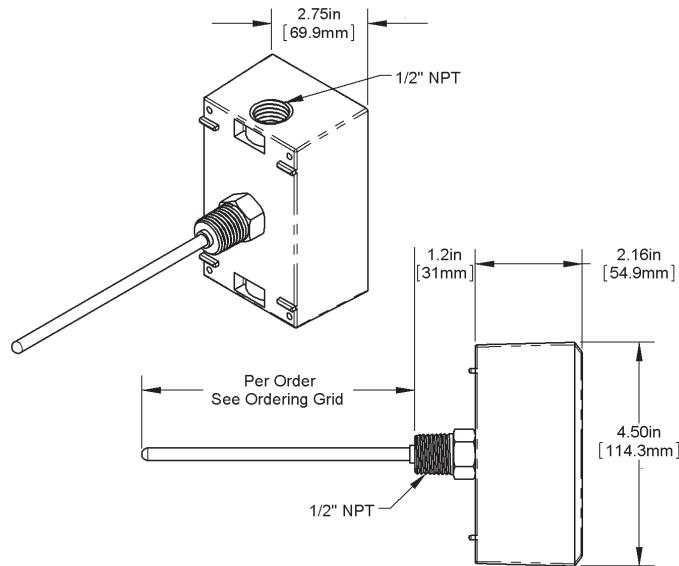
Probe  
without  
Enclosure

**BAPI-Box  
Crossover  
(BBX6)**



**BAPI-Box Crossover (BBXO)  
in an "Outside Mount"  
Configuration**

**Weatherproof  
(WP)**



**Weatherproof (WPO) in an  
"Outside Mount" Configuration**

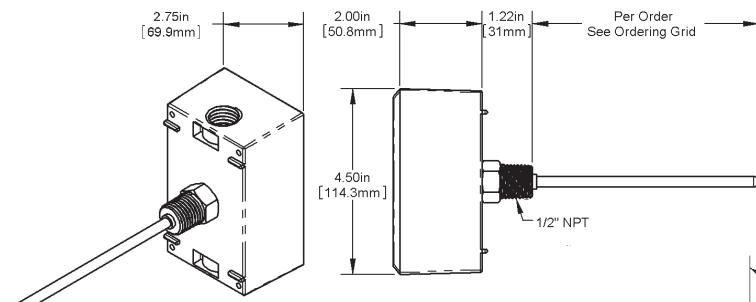




# Extreme Temp. Platinum RTDs - Immersion & Remote Temperature Sensors

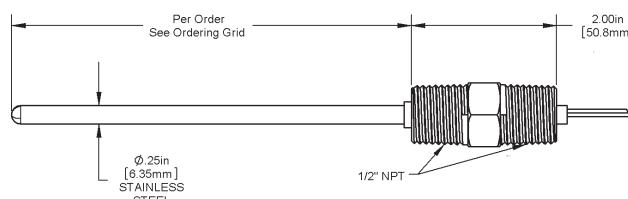
A67

Rev. 7/12/17

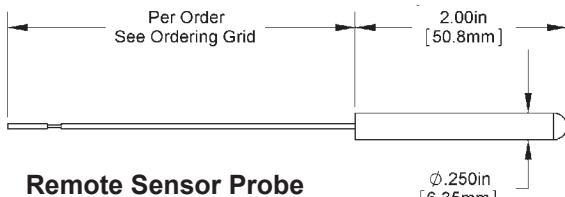
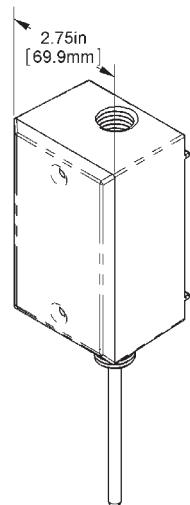


**Immersion Weatherproof Standard Mount (WP)**

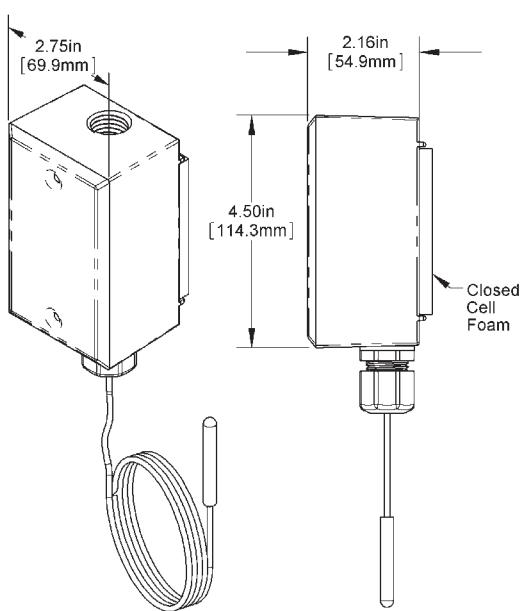
**Immersion Weatherproof Outside Mount (WPO)**



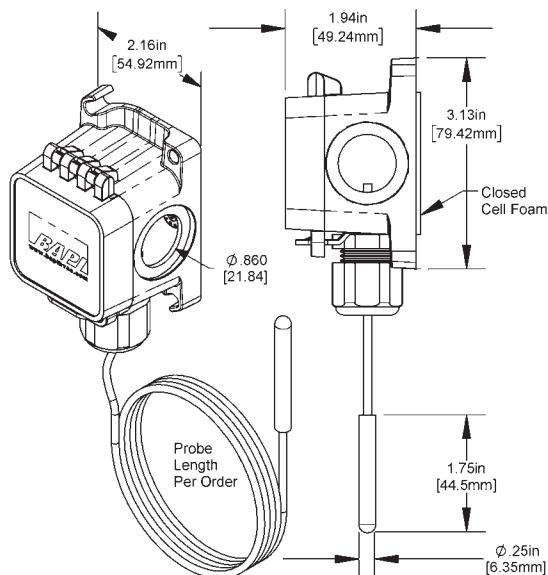
**Immersion Probe without Enclosure**



**Remote Sensor Probe**



**Remote Weatherproof (WP)**



**BAPI-Box  
Crossover (BBX)**



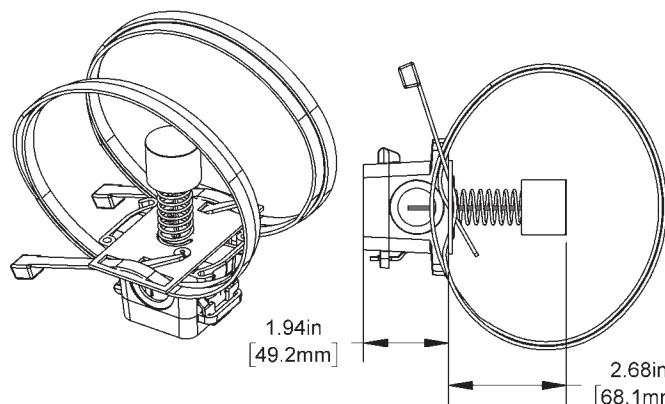
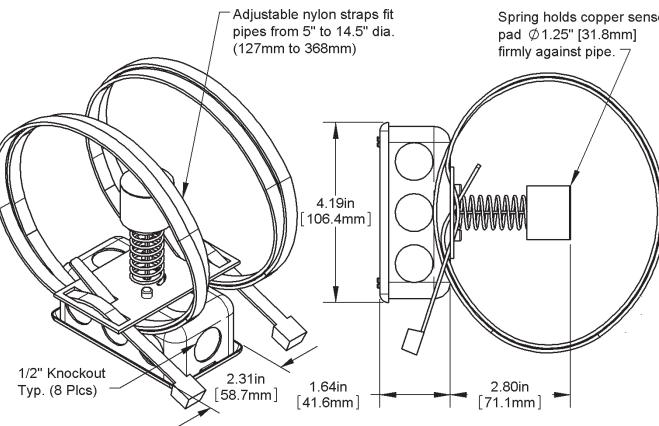
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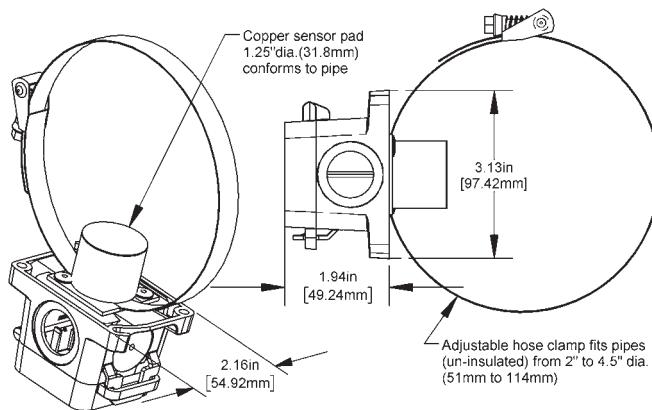
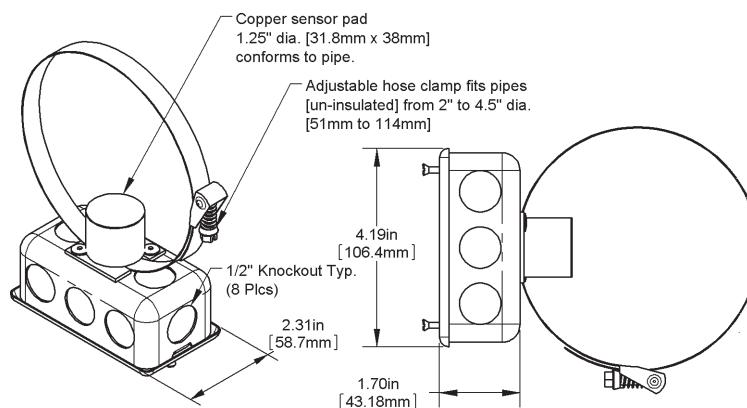
**For Remote  
Probe  
Dimension  
Drawings,  
See Page A69**

**Spring-Loaded  
Strap Junction  
Box (JB)**



**Spring-Loaded Strap  
BAPI-Box Crossover  
(BBX or BBX6)**

**Clamp-On  
Strap  
Junction Box  
(JB)**



**Clamp-On  
Strap BAPI-Box  
Crossover  
(BBX)**



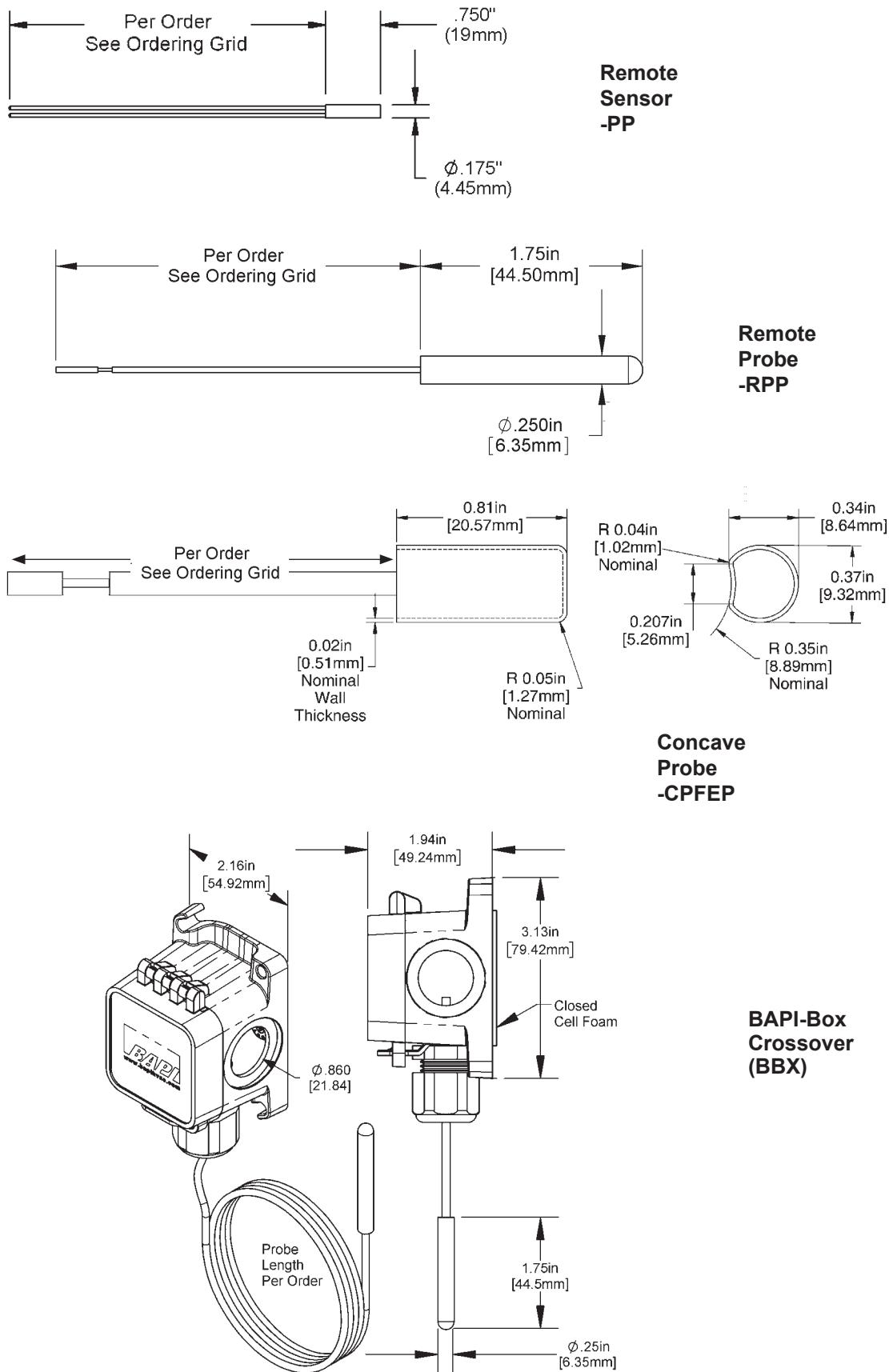


Rev. 12/14/16

# Remote Sensors & Probes

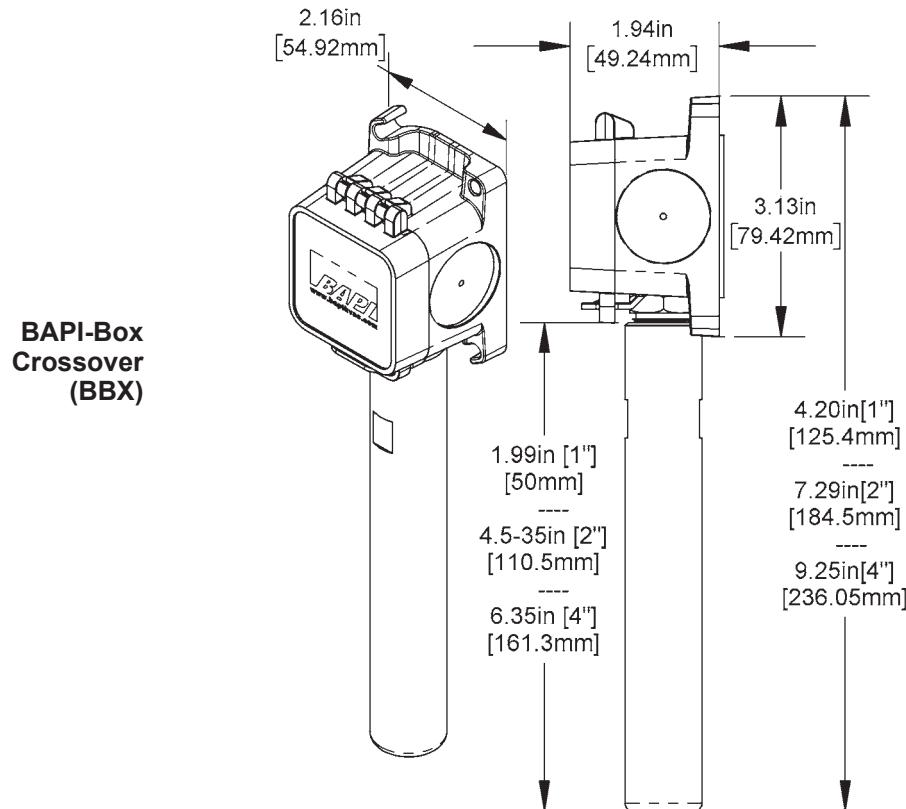
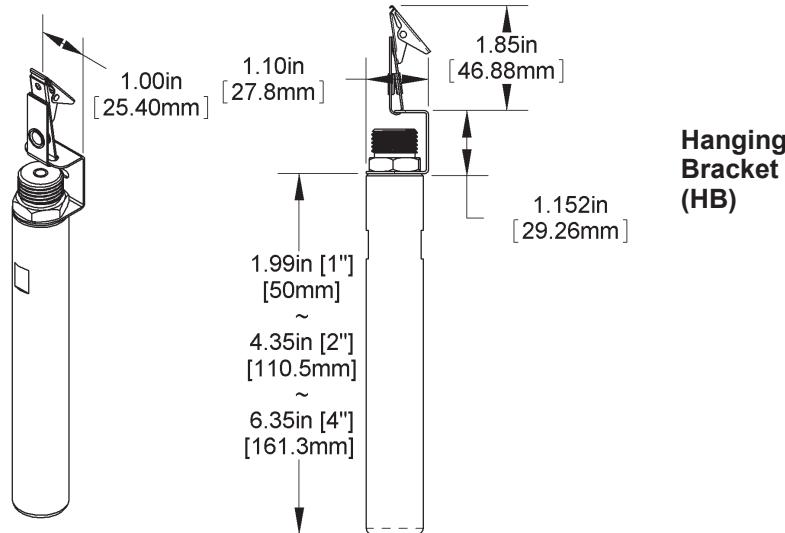
A69

Temperature Sensors



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**BAPI Humidity Only or Temperature/Humidity Sensors****BAPI-Stat "Quantum" Series of Room Sensors**  
The Latest Sensor Innovation from BAPI

pg B2

**BAPI-Stat 4**  
Large Display with Setpoint

pg B4

**"Quantum" & BAPI-Stat 3**  
Wipedown Units for ORs

"Quantum Prime" - pg 6



BAPI-Stat 3 - pg 7

**Delta Style Sensors**  
with Optional Display

pg B8

**"X-Combo"**  
Temp & Humidity Setpoint

pg B10

**BAPI-Com**  
2-Wire Sensor

pg B11

**Dew Point Sensor**  
with optional Temp Setpoint

pg B12

**Vivarium Sensor**  
Flush-mount Washdown Sensor

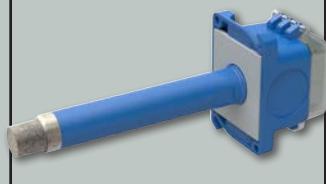
pg B14

**Modbus Sensor**  
in the BAPI-Stat 4

pg B16

**Outside Air**  
with new  
BAPI-Box  
Crossover

pg B18

**Duct Sensor**  
with new BAPI-Box  
Crossover

pg B20

**"L-Combo"**  
Temp & Humidity  
Lon Unit

pg B22



## Features & Options

- New, Modern Enclosure Style
- Optional Temperature Setpoint Adjustment and Occupant Override
- Temperature, Humidity and Room Occupancy Status Display
- Higher Contrast Display for Improved Clarity at Greater Distances

BAPI's new BAPI-Stat Quantum room sensors feature a modern enclosure style with slider setpoint adjustment and occupancy override.

The optional LCD can display both temperature and humidity as well as room occupancy status. The display has been upgraded for higher contrast, providing improved clarity at greater distances.

The optional occupancy override can be configured in parallel with the sensor or setpoint, or as a separate output. An optional 3.5mm (1/8"), RJ11 or RJ22 Communication Jack can be mounted in the base to provide direct access to the network.



## Specifications

### Power:

12 to 35 VDC for 4 to 20 mA or 0 to 5 VDC Output  
15 to 35 VDC for 0 to 10 VDC Output  
15 to 28 VAC for 0 to 5 VDC or 0 to 10 VDC Output  
(AC power requires a separate pair of shielded wires.)

### Power Consumption:

20 mA max. for 4 to 20 mA Output  
4 mA max. for 0 to 5 VDC and 0 to 10 VDC Output  
0.1 VA max. for 0 to 5 VDC and 0 to 10 VDC Output

### RH/Temp Sensor Construction:

Communicating Integrated Circuit

Humidity: Capacitive Polymer,  
±2%RH @ 25°C (77°F), 20 to 80%RH

Temp: Semi-conductor Band Gap,  
±0.3°C (±0.54°F) @ 20 to 40°C (68 to 104°F)

### Field Calibration Adjustment:

±5% in 0.1% increments (Factory Calibrated)

### Optional Passive Temperature Sensor Accuracy:

±0.36°F Thermistor, ±0.5°F RTD  
(Higher accuracy available)

**Wiring:** 2 to 5 pair of 16 to 22 AWG\*

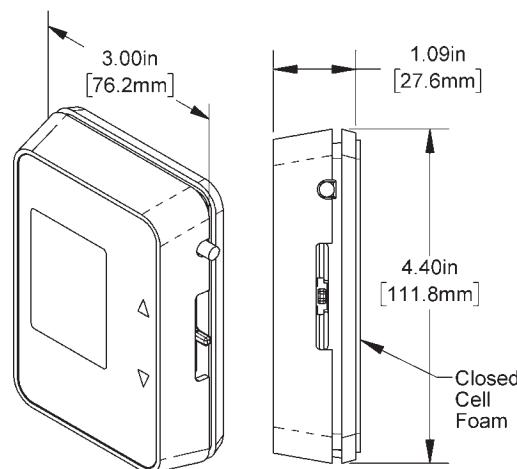
**Mounting:** Standard 2"x4" J-box or drywall mount - screws provided

### Environmental Operation Range:

Temperature: 32 to 122 °F (0 to 50 °C)  
Humidity: 0 to 95%, non-condensing

**Material & Rating:** ABS Plastic, UL 94, V-0

**Agency:** RoHS



\*BAPI recommends that you do not run wiring for the Room Units in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils. Also, these units are not designed for line voltage applications.





# BAPI-Stat "Quantum" Humidity Sensors

## Humidity or Combination Temp/Humidity Sensors

B3

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

### Ordering Information

\*Select humidity output within brackets to complete salesname. A = 4 to 20mA, B = 0 to 5V, C = 0 to 10V

#### HUMIDITY ONLY, NO DISPLAY UNITS

#### LIST PRICE

<b>BA/HQX-X-A-X-XX-X</b>	
BAPI-Stat "Quantum" Room Humidity Sensor, No Display, Humidity Output 4 to 20mA.....	\$260
<b>BA/HQX-X-B-X-XX-X</b>	
BAPI-Stat "Quantum" Room Humidity Sensor, No Display, Humidity Output 0 to 5V .....	\$260
<b>BA/HQX-X-C-X-XX-X</b>	
BAPI-Stat "Quantum" Room Humidity Sensor, No Display, Humidity Output 0 to 10V .....	\$260



#### UNITS WITH °F DISPLAY

##### **BA/HQF-X-[A/B/C]-X-XX-X**

BAPI-Stat "Quantum" Room Sensor w/ Display, Humidity Output see note\* .....

\$295

##### **BA/HQF-A-[A/B/C]-X-XX-X**

BAPI-Stat "Quantum" Room Sensor w/ °F Display, 1K RTD Temp Sensor, Humidity Output see note\* .....

\$320

##### **BA/HQF-B-[A/B/C]-X-XX-X**

BAPI-Stat "Quantum" Room Sensor w/ °F Display, 10K-2 Thermistor Temp Sensor, Humidity Output see note\* ...

\$313

##### **BA/HQF-C-[A/B/C]-X-XX-X**

BAPI-Stat "Quantum" Room Sensor w/ °F Display, 10K-3 Thermistor Temp Sensor, Humidity Output see note\* ...

\$313

#### UNITS WITH °F DISPLAY AND TEMP SETPOINT & OVERRIDE

##### **BA/HQF-A-[A/B/C]-1-D84-P**

BAPI-Stat "Quantum" Room Sensor w/ °F Display, 1K RTD Temp Sensor, Humidity Output see note\*,  
Temp Setpoint 10K to 30K Output at 55 to 85°F Range, Override in Parallel w/ Setpoint .....

\$331

##### **BA/HQF-B-[A/B/C]-1-D84-P**

BAPI-Stat "Quantum" Room Sensor w/ °F Display, 10K-2 Thermistor Temp Sensor, Humidity Output see note\*,  
Temp Setpoint 10K to 30K Output at 55 to 85°F Range, Override in Parallel w/ Setpoint .....

\$324

##### **BA/HQF-C-[A/B/C]-1-D84-P**

BAPI-Stat "Quantum" Room Sensor w/ °F Display, 10K-3 Thermistor Temp Sensor, Humidity Output see note\*,  
Temp Setpoint 10K to 30K Output at 55 to 85°F Range, Override in Parallel w/ Setpoint .....

\$324

#### UNITS WITH °C DISPLAY

##### **BA/HQC-X-[A/B/C]-X-XX-X**

BAPI-Stat "Quantum" Room Sensor w/ Display, Humidity Output see note\* .....

\$295

##### **BA/HQC-A-[A/B/C]-X-XX-X**

BAPI-Stat "Quantum" Room Sensor w/ °C Display, 1K RTD Temp Sensor, Humidity Output see note\* .....

\$320

##### **BA/HQC-B-[A/B/C]-X-XX-X**

BAPI-Stat "Quantum" Room Sensor w/ °C Display, 10K-2 Thermistor Temp Sensor, Humidity Output see note\* ...

\$313

##### **BA/HQC-C-[A/B/C]-X-XX-X**

BAPI-Stat "Quantum" Room Sensor w/ °C Display, 10K-3 Thermistor Temp Sensor, Humidity Output see note\* ...

\$313

#### UNITS WITH °C DISPLAY AND TEMP SETPOINT & OVERRIDE

##### **BA/HQC-A-[A/B/C]-1-D84-P**

BAPI-Stat "Quantum" Room Sensor w/ °C Display, 1K RTD Temp Sensor, Humidity Output see note\*,  
Temp Setpoint 10K to 30K Output at 13 to 30°C Range, Override in Parallel w/ Setpoint .....

\$331

##### **BA/HQC-B-[A/B/C]-1-D84-P**

BAPI-Stat "Quantum" Room Sensor w/ °C Display, 10K-2 Thermistor Temp Sensor, Humidity Output see note\*,  
Temp Setpoint 10K to 30K Output at 13 to 30°C Range, Override in Parallel w/ Setpoint .....

\$324

##### **BA/HQC-C-[A/B/C]-1-D84-P**

BAPI-Stat "Quantum" Room Sensor w/ °C Display, 10K-3 Thermistor Temp Sensor, Humidity Output see note\*,  
Temp Setpoint 10K to 30K Output at 13 to 30°C Range, Override in Parallel w/ Setpoint .....

\$324

Call for additional options not listed above. Common Ground configuration is the default.



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## Features & Options

- Patented BAPI Enclosure Styles
- Humidity Only or Temp./Humidity Combo
- 2% RH Accuracy
- Optional Display, Temperature Setpoint, Override and Comm. Jack
- Full-range Temperature Compensation of RH Signal
- Five Year Warranty

The BAPI-Stat 4 Style room units are available as humidity only sensors or as combination temperature and humidity sensor.

They are available with optional display, temperature setpoint adjustment, occupant override and three styles of communications jack.



**BAPI-Stat 4 Units with Warm White and Gray Logo Plates**

## Specifications

### Power:

10 to 35 VDC for 4 to 20 mA or 0 to 5 VDC Output  
15 to 35 VDC for 0 to 10 VDC Output  
12 to 24 VAC for 0 to 5 VDC Output  
15 to 28 VAC for 0 to 10 VDC Output  
(AC power requires a separate pair of shielded wires.)

### Power Consumption:

20 mA max. for 4 to 20 mA Output  
4 mA max. for 0 to 5 VDC and 0 to 10 VDC Output  
0.1 VA max. for 0 to 5 VDC and 0 to 10 VDC Output

### RH/Temp Sensor Construction:

Communicating Integrated Circuit

Humidity: Capacitive Polymer,  
±2%RH @ 25°C (77°F), 20 to 80%RH

Temp: Semi-conductor Band Gap,  
±0.3°C (±0.54°F) @ 20 to 40°C (68 to 104°F)

### Field Calibration Adjustment:

±5% in 0.1% increments (Factory Calibrated)

### Optional Passive Temperature Sensor Accuracy:

±0.36°F Thermistor, ±0.5°F RTD  
(Higher accuracy available)

### Wiring:

2 to 6 pair of 16 to 22 AWG\*  
Mounting: Standard 2"x4" J-box or drywall mount  
- screws provided

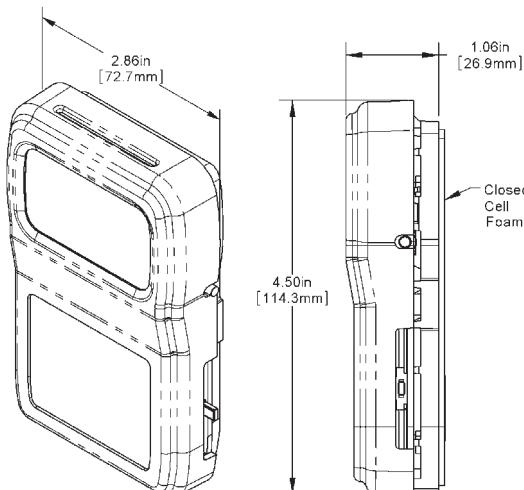
### Environmental Operation Range:

Temperature: 32 to 122 °F (0 to 50 °C)  
Humidity: 0 to 95%, non-condensing

### Material & Rating:

ABS Plastic, UL 94, V-0

Agency: RoHS and CE



\*BAPI recommends that you do not run wiring for the room units in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils.





# BAPI-Stat 4™ Style Humidity Sensor

## Humidity or Combination Temp/Humidity Sensors

B5

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.

### **BAPI-Stat 4 Humidity Sensor Option Selection Guide:**

BA/ (#1) - (#2) - (#3) - (#4)(#5) - (#6) - (#7) - (#8) - (#9) - (#10)



**#1: Temperature Sensor (Optional)**

1K[375] .....	1K Platinum RTD (375 curve) .....	\$25
1K .....	1K Platinum RTD (385 curve) .....	\$25
1.8K .....	1.8K Thermistor.....	\$18
3K .....	3K Thermistor.....	\$18
10K-2 .....	10K-2 Thermistor .....	\$18
10K-3.....	10K-3 Thermistor .....	\$18
10K-3[11K]. 10K-3[11K] .....	Thermistor .....	\$18
20K .....	20K Thermistor.....	\$18

**#5: Setpoint Output Range (optional)**

60.....	0 to 10 kΩ
80.....	0 to 20 kΩ
81.....	4.75 k to 24.75 kΩ
82.....	6.19 k to 26.19 kΩ
84.....	10 k to 30 kΩ

**#6: Setpoint Legend (required)**

L6.....	Cool/Warm
L0.....	No Legend

**#7: Occupant Override (required)**

J.....	Override as a Separate Output .....	\$5
N.....	Override in Parallel with Sensor .....	\$5
P.....	Override in Parallel with Setpoint.....	\$5
Z.....	No Override	

**#8: Communication Jack (optional)**

C35L....	3.5 mm Phono Style Jack .....	\$10
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**#9: Common Ground (required)**

CG .....	Common Ground
----------	---------------

**#10: Logo Plate Color**

WMW... Warm White (matches enclosure)
GRY..... Gray

**#3: Display and Indication (required)**

B4DF .....	Temperature Displayed in °F.....	\$35
B4DC .....	Temperature Displayed in °C .....	\$35
B4X.....	No Display	

**#4: Setpoint Display Range (optional)**

A .....	-3 to +3.....	\$6
B .....	-5 to +5.....	\$6
C.....	50 to 90 °F or 10 to 32 °C .....	\$6
D .....	55 to 85 °F or 13 to 30 °C .....	\$6
E .....	60 to 80 °F or 15 to 27 °C .....	\$6
F .....	65 to 80 °F or 18 to 27 °C .....	\$6

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

**Example Number:** BA/ (**10K-2**) - (**H205**) - (**B4DF**) - (**E80**) - (**L6**) - (**N**) - (**C35L**) - (**CG**) - (**WMW**)

**Actual Number (with parenthesis removed):** BA/1K-2-H205-B4DF-E80-L6-N-C35L-CG-WMW

**Description:** 10K-2 Thermistor Temperature Sensor, 0 to 5V Humidity Output, BAPI-Stat 4 with °F Display, 60 to 80°F Setpoint Display Range, 0 to 20kΩ Setpoint Output Range, Cool/Warm Setpoint Legend, Override in Parallel with the Sensor, 3.5mm Phono Style Comm. Jack, Common Ground Config., Warm White Logo Plate Color

**List Price:**

\$18 (Thermistor) + \$260 (Humidity) + \$35 (Display) + \$5 (Override) + \$10 (Comm. Jack) = \$328 List Price

**Your Number:** BA/



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## Features & Options

- New BAPI-Stat "Quantum Prime" Enclosure Style with Higher Contrast Display for Improved Clarity at Greater Distances
- Membrane Keypad for Wipedown Cleaning
- Temperature and Humidity Setpoint Adjustment

The BAPI-Stat "Quantum Prime" is designed for operating rooms, clean rooms and elder care facilities. It features a large display and membrane keypad for wipedown cleaning. It is available with temperature and humidity measurement, temperature and humidity setpoint and occupant override.

The unit includes a number of field adjustments including °F or °C display, temperature and humidity offset and setpoint lockout. The display can also be set to show a large temperature and small %RH reading or a large %RH and a small temperature reading when 4 buttons are present. This unit can be configured with up to four transmitted variables. Contact your BAPI representative for details.



**BAPI-Stat  
"Quantum Prime"  
Temp & Humidity  
Sensor**



## Ordering Information

The BAPI-Stat "Quantum Prime" Wipedown Sensor is a powerful unit with many options. Please call your BAPI representative for ordering. We will provide a quote and keep it on record for future orders.

## Specifications

### Power Supply:

10 to 40 VDC (15 to 24 VDC Recommended) for 4 to 20 mA or 0 to 5 VDC Outputs  
 15 to 40 VDC (15 to 24 VDC Recommended) for 0 to 10 VDC Outputs  
 12 to 28 VAC (Requires a separate pair of shielded wires) for 0 to 5 VDC Outputs

### Power Consumption:

60 mA max DC: 4 to 20 mA Output (<30mA typical)  
 36 mA max DC: 0 to 5 or 0 to 10 VDC Outputs (6mA typical)  
 0.9 VA max AC: 0 to 5 or 0 to 10 VDC Outputs (0.2VA typical)

**Outputs:** 4 active outputs plus 1 passive temp sensor  
 Volts.....0 to 5 VDC or 0 to 10VDC, Impedance >10KΩ  
 Current.....4 to 20 mA, Impedance <500Ω @ 24 VDC  
 Resistance.....Setpoint, 5 VDC @ 5 mA max  
 Relay Contact....N.O., 500 mA @ 24 VDC max  
 Temp. Sensor ....Passive RTD or Thermistor

### Inputs:

External Override..5 VDC or 24 VDC/VAC  
 External Sensor....10K-2 Themistor purchased separately.

### Sensing Elements for Active Outputs and Display:

Temperature .....10K-2 Thermistor  
 Humidity.....Capacitive Polymer, ±2%RH

### Mounting:

2"x4" J-box or drywall mount - screws provided

### Environmental Ambient:

Temperature .....32 to 122°F (0 to 50°C)  
 Humidity.....0 to 95%, non-condensing  
 Storage .....32 to 185°F (0 to 85°C)

### Wiring:

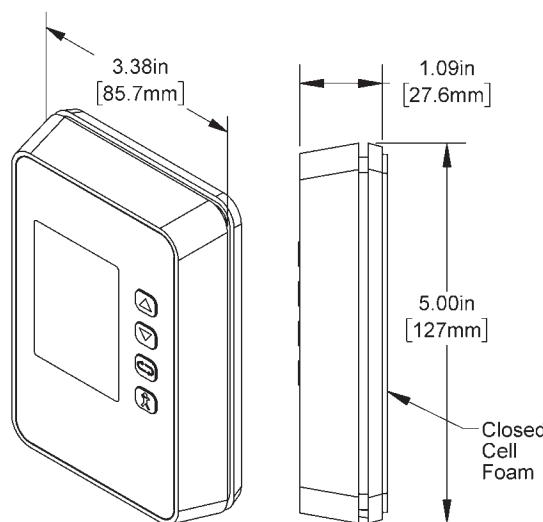
2 to 6 pair of 16 to 22 AWG

### Enclosure Material:

ABS Plastic, UL 94, V-0

### Agency:

RoHS



\*AC power requires a separate pair of shielded wires.

\*\*BAPI recommends that you do not run wiring for room units in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils.





Rev. 12/12/16

# BAPI-Stat 3™ Temp/Humidity Unit

**Humidity or Combination Temp/Humidity Sensors**

B7

## Features & Options

- Designed for Operating Rooms and Clean Rooms
- Temperature and Humidity Setpoint Adjustment
- Membrane Pushbuttons for Wipedown Cleaning

The BAPI-Stat 3 is designed for operating rooms, clean rooms and elder care facilities. It features a large display and membrane pushbuttons for wipedown cleaning. It is available with temperature and humidity measurement, temperature and humidity setpoint and occupant override.

The unit includes a number of field adjustments including °F or °C display, temperature and humidity offset and setpoint lockout. The display can also be set to show a large temperature and small %RH reading, a large %RH and a small temperature reading, or to alternate between the two. This unit can be configured with up to four transmitted variables. Contact your BAPI representative for details.



**BAPI-Stat 3  
Units (shown  
with optional  
humidity  
setpoint)**

## Ordering Information

The BAPI-Stat 3 is a very powerful unit with many options. Please call your BAPI representative for ordering. We will provide a quote and keep it on record for future orders

## Specifications

### Power:

- 10 to 35 VDC for 4 to 20 mA or 0 to 5 VDC Outputs
- 15 to 35 VDC for 0 to 10 VDC Output
- 12 to 28 VAC for 0 to 5 VDC Output\*
- 15 VAC to 28 VAC for 0 to 10 VDC Output\*

Note: 15 to 24 VDC recommended for VDC unit.

### Power Consumption:

- 60 mA max. DC: 4 to 20 mA or 0 to 5 VDC Outputs
- 10 mA max. DC: 0 to 10 VDC Output
- 1.44 VA max. AC: 0 to 5 VDC Outputs
- 0.2 VA max. AC: 0 to 10 VDC Output

### RH/Temp Sensor Construction:

Communicating Integrated Circuit

Humidity: Capacitive Polymer, ±2% RH (10% to 90%)  
@25°C, Fully Compensated

Temp: Semiconductor Band Gap, ±0.3°C @ 25°C

### Optional Direct Temp. Sensor:

Thermistor or RTD (See Sensors Sect. for Specs.)

### Mounting:

2" x 4" J-box or drywall mount - screws provided

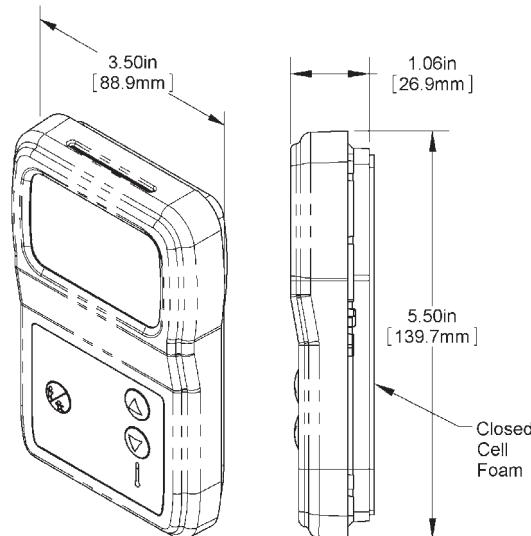
### Environmental Specifications:

Temperature: 32 to 122 °F (0 to 50 °C)

Humidity: 0 to 95%, non-condensing

**Wiring:** 2 to 5 pair of 16 to 22 AWG\*\*

**Material & Rating:** ABS Plastic - UL 94, V-0



\*AC power requires a separate pair of shielded wires.

\*\*BAPI recommends that you do not run wiring for room units in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils.



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## Features & Options

- Low Profile Delta Style Enclosure with Optional Display
- Humidity Only or Temperature/Humidity Combo
- 2% and 3% RH Accuracies
- Optional Communications Jack
- User Adjustable Toggle Rate Between Temp & Humidity Display
- Wide Selection of Temperature Sensing Elements
- Full-range Temperature Compensation of RH Signal
- Five Year Warranty

The Delta Style room units are available as Humidity Only sensors or as Combination temperature and humidity sensors. They feature an optional display with a user adjustable toggle rate between humidity and temperature and can display in either °C or °F.

The unit is available with the entire line of BAPI temperature sensors. If a temperature transmitter and humidity transmitter are desired, then see the "X-Combo" Unit on pages B10-11 of this section.



**Delta Style Enclosures with and without Display**

## Specifications

### Power:

- 10 to 35 VDC (0 to 5 VDC or 4 to 20 mA Outputs)
- 15 to 40 VDC (0 to 10 VDC Output)
- 12 to 24 VAC (0 to 5 VDC Output)
- 15 to 28 VAC (0 to 10 VDC Output)

Note: If AC power is used, it must be shielded from the signal wiring

### Power Consumption:

- 22 mA max. DC (0 to 5 VDC or 4 to 20 mA Outputs)
- 6 mA max DC (0 to 10 VDC Output)
- 0.53 VA max. AC (0 to 5 VDC Output)
- 0.14 VA max. AC (0 to 10 VDC Output)

### Sensing Elements:

Temperature - Thermistor or RTD  
(See "Sensors" section for specs.)

Humidity - Capacitive Type,  
±2% or ±3%RH @ 25°C (77°F), 20 to 80%RH

### %RH Calibration Adjustment:

±5% POT

**Wiring:** 2 to 3 pair of 16 to 22 AWG\*

\*BAPI recommends that you do not run wiring for the room units in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils.

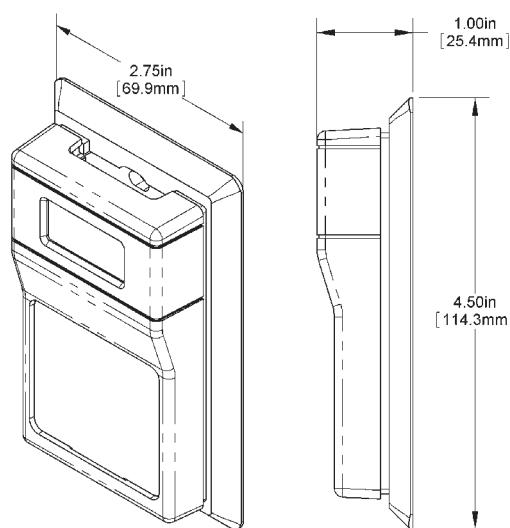
**Mounting:** 2"x4" J-box or drywall mount - screws provided

### Environmental Operation Range:

Temp: 32 to 122 °F (0 to 50 °C)  
Humidity: 5 to 95%, non-condensing

**Material & Rating:** ABS Plastic, UL94 HB

**Agency:** RoHS and CE





# Delta Style Room Humidity Units

**Humidity or Combination Temp/Humidity Sensors**

B9

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.

## **Delta Style Room Humidity Sensor Option Selection Guide:**

BA/ ( #1 ) - ( #2 ) - ( #3 ) - ( #4 ) - ( #5 )



### **#1: Temperature Sensor** (optional)

	<u>List Price</u>
1K[375] .....	\$25
1K .....	\$25
1.8K .....	\$18
3K .....	\$18
10K-2 .....	\$18
10K-3 .....	\$18
10K-3[11K]....	\$18
20K .....	\$18

### **#2: Humidity Output** (required)

H200 .....	\$240
H210 .....	\$240
H212 .....	\$240

### **#3: Display and Indication** (required)

RD .....	\$35
R .....	No Display

### **#4: Communication Jack** (optional)

C35L .....	\$10
------------	------

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

**Example Number:** BA/ ( **10K-2** ) - ( **H200** ) - ( **RD** ) - ( **C35L** ) - ( )

**Actual Number (with parenthesis removed):** BA/10K-2-H200-RD-C35L

**Description:** 10K-2 Thermistor Temperature Sensor, 4 to 20mA or 0 to 5V Interchangeable Humidity Output, Delta Style Room Enclosure with Display, 3.5mm Phono Style Comm. Jack

**List Price:** \$18 (Thermistor) + \$240 (Humidity) + \$35 (Display) + \$10 (Comm. Jack) = \$303 List Price

**Your Number:** BA/



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## Features & Options

- Temperature and Humidity Setpoint Adjustment
- Large Easy-to-Read Display, °F or °C Indication
- Fully Compensated 2% RH Sensor
- Optional Override, Resistive Temperature Sensor and Communication Jack

The BAPI-Stat 4 "X-Combo" Room Unit features local indication of both temperature and humidity with optional Temperature Setpoint, Humidity Setpoint and Local Occupancy Override.

The optional LCD shows room temperature in °C or °F and room humidity in %RH. In addition, the unit has adjustable offsets for both temperature and humidity and the transmitter ranges are field configurable. This unit can be configured with up to four transmitted variables.

## Temp & Humidity Setpoint Adjustment



**BAPI-Stat 4  
"X-Combo"  
Units with  
Warm White  
and Gray  
Logo Plate**

## Ordering Information

The "X-Combo" is a very powerful unit with many options. Please call your BAPI representative for ordering. We will provide a quote and keep it on record for future orders

## Specifications

### Supply Voltage:

DC Power: ..... 16 to 30VDC  
AC Power: ..... 18 to 30VAC\*

### Power Consumption:

50mA max. DC, 1.5VA max. AC

### RH/Temp Sensor Construction:

Communicating Integrated Circuit

Humidity: Capacitive Polymer,  
±2%RH @ 25°C (77°F), 20 to 80%RH

Temp: Semi-conductor Band Gap,  
±0.3°C (±0.54°F) @ 20 to 40°C (68 to 104°F)

### Optional Direct Temp. Sensor:

Thermistor or RTD (See Sensors Sect. for Specs.)

### Available Outputs:

3 Configurable, 1 Passive Sensor

### Termination:

8 Terminals, 16 to 22 AWG\*\*

### Mounting:

Standard 2x4" J-Box or Drywall, screws provided

### Enclosure Material:

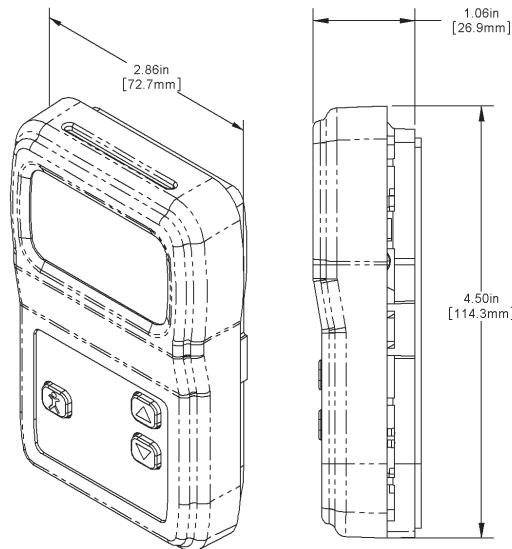
ABS Plastic, UL94V-0

### Ambient (Enclosure):

Temperature: .32 to 122°F (0 to 50°C)  
Humidity: ..... 0 to 95%RH, Non-Cond.

### Agency:

RoHS



\*AC power requires a separate pair of shielded wires.

\*\*BAPI recommends that you do not run wiring for the room units in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils.





Rev. 12/16/16

# BAPI-Com, Two-wire Multifunction Sensor

**Humidity or Combination Temp/Humidity Sensors**

B11

## Features & Options

- Power and Communication on Just Two Wires
- Available with Temperature Setpoint and Optional Override, Display and %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 people expect in today's sophisticated systems. The BAPI-Com uses those existing two wires and offers the owner a full function sensor with temperature setpoint, occupant override, an optional easy-to-read display and optional %RH sensing.

This retrofit sensor can update old systems to a new look without pulling new wire or disrupting the occupants while saving on labor.

The sensors are powered and communicate over two wires to a Communication Output Module for use by a BAS system. The outputs are configurable as a thermistor, voltage, resistance or dry contact override output. The sensor is powered by the Communication Output Module which itself is supplied by any 24VDC/VAC source.



**BAPI-Com Room Sensors & Communication Output Module**

## Ordering Information

The BAPI-Com is a very powerful unit with many options. Please call your BAPI representative for ordering. We will provide a quote and keep it on record for future orders

## Specifications

### ROOM SENSOR SPECS

**Power:** 18VDC, from the Comm. Output Module

**Wiring:** 2 wires, Up to 500ft (new or existing)

AWG gauge: 22 to 14AWG (Shielding Preferred)

**Temp Sensor:** Thermistor,  $\pm 0.36^{\circ}\text{F}$  ( $\pm 0.2^{\circ}\text{C}$ )

### **RH/Temp Sensor Construction:**

Communicating Integrated Circuit

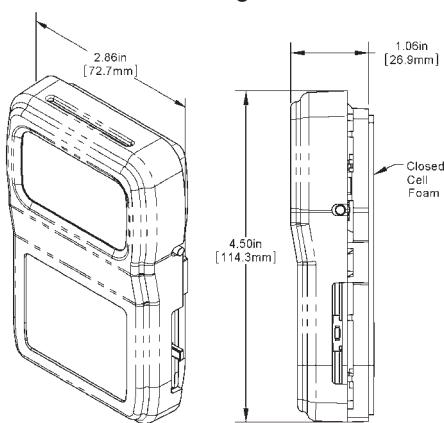
Humidity: Capacitive Polymer,  $\pm 2\%$  RH  
(10 to 90%) @ $25^{\circ}\text{C}$ , Fully Compensated

Temp: Semi-conductor Band Gap,  $\pm 0.3^{\circ}\text{C}$  @  $25^{\circ}\text{C}$

**Pole Rate:** 400 ms

### **Ambient:**

32 to  $122^{\circ}\text{F}$  (0 to  $50^{\circ}\text{C}$ ),  
0 to 95%RH, non-condensing



### COMMUNICATION OUTPUT MODULE SPECS

**Power in:** ..... 24VDC/AC, 30mA

### **Terminations:**

Comm. & PWR ..... 2 wires to the sensor  
Power in..... 2 wires, 12 to 28 AWG  
Output..... 2 wires per output, 12 to 28 AWG  
Override Input..... 2 wires, 16 to 30 AWG

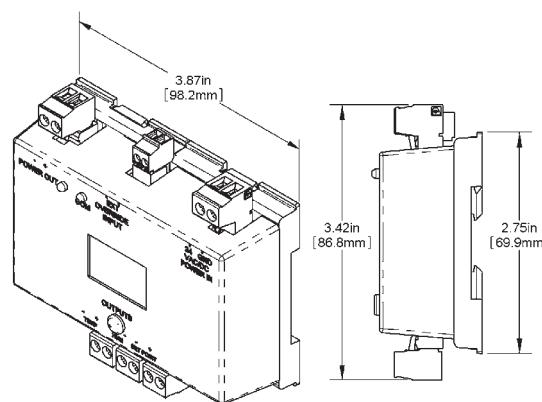
### **Outputs:**..... Three Maximum

Volts..... 0 to 5 or 0 to 10VDC,  $10\text{k}\Omega$  min  
Resistance..... 400 $\Omega$  to 20K $\Omega$  span  
Thermistor ..... 10K-2 or 10K-3

**Input (DI):** Ext. Override Dry Contact,  
Closed = Occupied

**EZ Mounting:** ..... DIN Rail, Snaptrack or surface

**Material:**..... ABS Plastic, UL94V-0, RoHS



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## Features & Options

- Accurate Dew Point and Dry Bulb Temperature in One Unit
- $\pm 1.8^{\circ}\text{F}$  ( $1^{\circ}\text{C}$ ) Dew Point Accuracy for the Normal Range
- No Installation Calibration or Recalibration Required

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", causing mold and dripping water.

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 LCD can display Dew Point Temperature and Dry Bulb Temperature and is field adjustable between  $^{\circ}\text{F}$  or  $^{\circ}\text{C}$ .



Dew Point Sensors with Setpoint, Display and Override

## Specifications

**Power:** 15 to 35 VDC @ 4 mA max

**Sensing Element:**

Humidity – Capacitive Polymer,  
 $\pm 2\%$  RH Accuracy, 10% to 90%@ $25^{\circ}\text{C}$

**Optional Temperature Sensor**

Thermistor or RTD  
(See "Sensors" Section for Specs.)

**Mounting:**

2"x4" J-Box or drywall mount, screws provided

**Dew Point Temperature Range:**

-4 to  $122^{\circ}\text{F}$  (-20 to  $50^{\circ}\text{C}$ )

**Operating Environment:**

Temperature: 32 to  $122^{\circ}\text{F}$  (0 to  $50^{\circ}\text{C}$ )

Humidity: 0 to 95%RH non-condensing

**Response Time:** Less Than 60 Seconds

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

**Measurement Offsets** (field adjustable)

$\pm 5^{\circ}$  (F or C) in 0.1° or 0.5° increments – DB

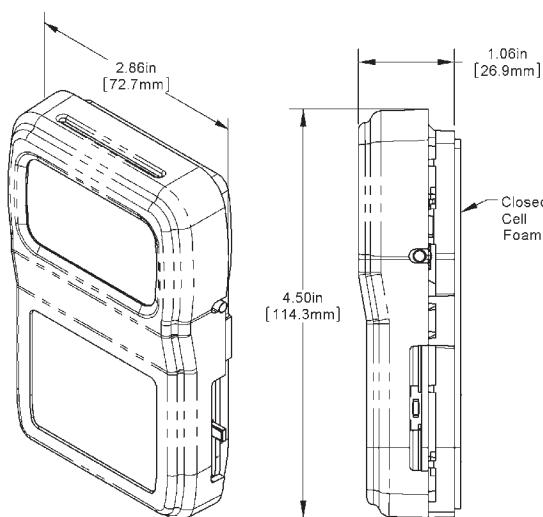
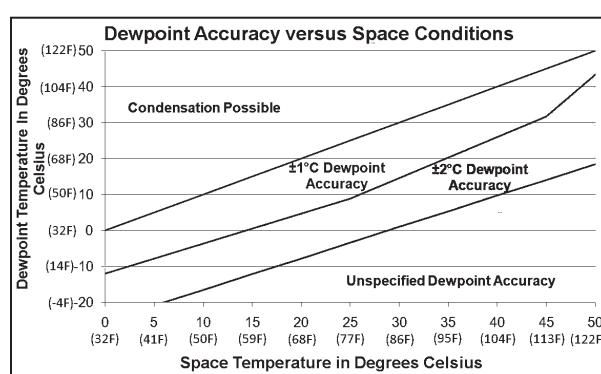
$\pm 5$  RH in 0.1% or 0.5% increments – RH

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

Dew Point Temperature: -4 to  $122^{\circ}\text{F}$  (-20 to  $50^{\circ}\text{C}$ )

**Material:** ABS Plastic, Material Rated UL94V-0

**Certifications:** CE, RoHS



Note: BAPI recommends that you do not run wiring for the room units in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils.





Rev. 12/16/16

# Dew Point Sensor

B13

## Humidity or Combination Temp/Humidity Sensors

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.

### BAPI-Stat 4 Humidity Sensor Option Selection Guide:

**BA/ (#1) - (#2) - (#3) - (#4)(#5) - (#6) - (#7) - (#8) - (#9)**



**#1: Dew Point Output (required)**

DP05.....	0 to 5V Dew Point Output .....	\$260
DP10.....	0 to 10V Dew Point Output .....	\$260

**#2: Temperature Sensor (optional)**

1K[375] .....	1K Platinum RTD (375 curve) .....	\$25
1K .....	1K Platinum RTD (385 curve) .....	\$25
1.8K .....	1.8K Thermistor.....	\$18
3K .....	3K Thermistor.....	\$18
10K-2 .....	10K-2 Thermistor .....	\$18
10K-3 .....	10K-3 Thermistor .....	\$18
10K-3[11K]. 10K-3[11K] Thermistor .....	Thermistor .....	\$18
20K .....	20K Thermistor.....	\$18

**#3: Display and Indication (required)**

B4DF .....	Temperature Displayed in °F.....	\$35
B4DC .....	Temperature Displayed in °C .....	\$35
B4DX .....	No Display	

**#4: Setpoint Display Range (optional)**

A .....	-3 to +3
B .....	-5 to +5
C .....	50 to 90 °F or 10 to 32 °C
D .....	55 to 85 °F or 13 to 30 °C
E .....	60 to 80 °F or 15 to 27 °C
F .....	65 to 80 °F or 18 to 27 °C

**#5: Setpoint Output Range (optional)**

60.....	0 to 10 kΩ
80.....	0 to 20 kΩ
81.....	4.75 k to 24.75 kΩ
82.....	6.19 k to 26.19 kΩ
84.....	10 k to 30 kΩ

**#6: Setpoint Legend (required)**

L6.....	Cool/Warm
L0.....	No Legend

**#7: Occupant Override (required)**

J.....	Override as a Separate Output
N.....	Override in Parallel (//) with Sensor
P.....	Override in Parallel (//) with Setpoint
Z.....	No Override

**#8: Communication Jack (optional)**

C35L.....	3.5 mm Phono Style Jack .....	\$10
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**#9: Logo Plate Color (required)**

WMW.....	Warm White (matches enclosure)
GRY.....	Gray

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

**Example Number:** BA/ (**DP05**) - (**10K-2**) - (**B4DF**) - (**E)(80**) - (**L6**) - (**N**) - ( ) - (**WMW**)

**Actual Number (with parenthesis removed):** BA/DP05-10K-2-B4DF-E80-L6-N-WMW

**Description:** 0 to 5V Dew Point Output, 10K-2 Thermistor Temperature Sensor, BAPI-Stat 4 Unit with Display and °F Indication, 60 to 80°F Setpoint Display Range, 0 to 20kΩ Setpoint Output Range, Cool/Warm Setpoint Legend, Override in Parallel with Sensor, Warm White Logo Plate Color

**List Price:** \$260 (Dew Point) + \$18 (Thermistor) + \$35 (Display) = \$313 List Price

**Your Number:** BA/



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## Features & Options

- Flush Mount Stainless Steel Wall Plate for Washdown Applications
- Temperature and Humidity Combination Sensor
- Optional Remote Display for Temp and Humidity Setpoint Adjustment and Alarms
- 30 Day Data Logging

The Vivarium Wall Plate features a flush mount stainless steel wall plate with internal splash guard for washdown applications. The chamber behind the vented slots on the stainless steel plate, protects the sensing element while allowing necessary airflow for accurate sensing. It is available as a humidity sensor alone or as a temperature/humidity combination sensor.

The optional Remote Wireless Display allows for temperature and humidity setpoint adjustment, room monitoring, data logging and alarm notification. Alarm notification can be accomplished through an audible alarm located on the remote display.

Typical applications for the unit include vivariums, greenhouses, pharmaceutical laboratories, food production, schools and hospitals.



Vivarium Wall Plate Sensor and Remote Wireless Display



## Specifications

### STAINLESS STEEL WALL PLATE SPECS

#### Power:

7 to 35 VDC or 12 to 28 VAC\* (0 to 5V outputs)  
15 to 35 VDC or 15 to 28 VAC\* (0 to 10V outputs)

\*AC power requires a separate pair of shielded wires.

#### Power Consumption:

14 mA max @ 12VDC; .28 VA maximum AC

#### RH/Temp Sensor Construction

Communicating Integrated Circuit

Humidity: Capacitive Type, ±2% RH, 0 to 90% @23°C  
Temp: Semi-conductor Band Gap, ±0.2°C, 0 to 60°C

#### Optional Direct Temperature Sensor:

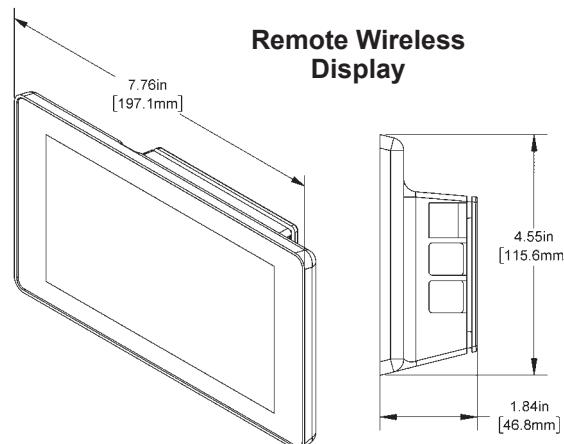
Thermistor or Semiconductor

#### Wiring:

4 to 8 22AWG flying leads\*\*

#### Mounting:

Standard 2" by 4" J-box or drywall mount (screws provided)



Remote Wireless Display

### REMOTE WIRELESS DISPLAY

**Power:** 120 VAC converted to 5.25V with the provided Micro USB Power Supply

**Power Consumption:** 2.4 Amps

**Mounting:** Drywall Mount or Self Standing

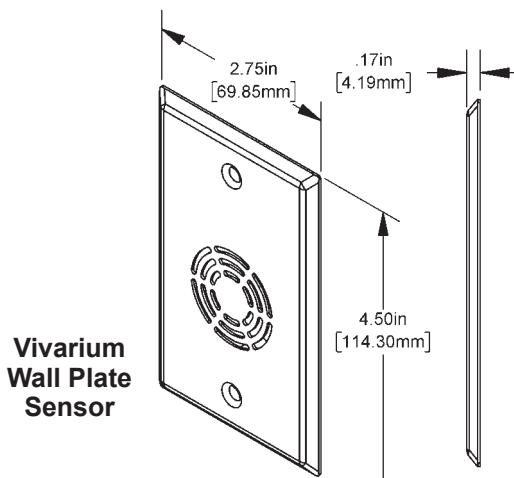
### SPECS FOR WALL PLATE AND DISPLAY

#### Environmental Operation Range:

Temperature: 0 to 120 °F (-18 to 49 °C)

Humidity: 0 to 95%, non-condensing

**Agency:** RoHS and FCC



Vivarium Wall Plate Sensor





# Vivarium Washdown Wall Plate Sensor

B15

Rev. 03/17/17

## Humidity or Combination Temp/Humidity Sensors

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.

### Vivarium Unit Option Selection Guide:

BA/V( #1 )( #2 ) - ( #3 ) - ( #4 )



#### #1: Direct Temperature Sensor or Temperature Voltage Output (required)

- A ..... 1K Platinum RTD (385 curve)
- B ..... 10K-2 Thermistor
- C ..... 10K-3 Thermistor
- D ..... 10K-3[11K] Thermistor
- E ..... 20K Thermistor
- F ..... 1.8K Thermistor
- 00.....0 to 5 V
- 10.....0 to 10 V
- X ..... No Temperature Sensor

#### #2: Temperature Voltage Output Span (required)

- G.....45 to 96F or 7 to 36C
- C.....50 to 90F or 10 to 32C
- D.....55 to 85F or 13 to 30C
- E.....60 to 80F or 16 to 26C
- GG....0 to 100F or -18 to 38C
- TT ....0 to 100F or -18 to 49C
- X .....No Temp Voltage Output Span

#### #3: Humidity Voltage Output (required)

- B ..... 0 to 5 V (0 to 100%RH)
- C.....0 to 10 V (0 to 100%RH)

#### #4: Remote Wireless Display (required)

- D.....Remote Display, includes wall mount bracket and power cord
- X .....No Remote Wireless Display

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

**Example Number:** BA/V( 00 )( E ) - ( C ) - ( D )

**Actual Number (with parenthesis removed):** BA/V00E-C-D

**Description:** Vivarium Wall Plate, 0 to 10V Temperature Output, 60 to 80°F Temperature Voltage Output Span, 0 to 10V Humidity Output, with Remote Display.

**List Price:** Call for Pricing

(Wall Plate units starting at \$550 List Price. Remote Wireless Display option starting at \$800 List Price.)

**Your Number:** BA/



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## Features & Options

- Modbus Serial Communications Protocol
- BAPI-Stat 4 Style Enclosure with Optional Large Display
- Robust Tactile Pushbuttons on Display Units
- Setpoint Adjustment on Display Unit with Optional Humidity Measurement, Fan Speed Control and Occupant Override
- Five Year Warranty

The BAPI-Stat 4MB unit features an optional large LCD with all the visual indicators on the display itself. Display units provide local indication of temperature with temperature setpoint adjustment and optional occupant override.

The unit is also available with humidity measurement and fan speed/mode adjustment for applications with fan coils, heat pumps or unit ventilators.

### VC350A "EZ" - Voltage Converter

BAPI recommends using DC power on room units for a more stable reading. Our 350mA "EZ" unit is a perfect way to convert 24 VAC to 5, 12, 15 or 24 VDC. See "Accessories" for more info.



**BAPI-Stat  
4MB  
Units**

## Specifications

### Power:

9 to 40 VDC (24 VDC nominal)

24 VAC +20%/-30%.

Note: AC power requires a separate pair of shielded wires.

### Power Consumption:

7 mA max DC; .28 VA maximum AC

### Sensing Element:

Thermistor or Semiconductor

### Sensor Accuracy:

Temp:  $\pm 0.2^\circ\text{C}$  from 32 to 122°F (0 to 50°C)

%RH:  $\pm 2\%$ RH @ 25°C (77°F), 20 to 80%RH

**Wiring:** 2 pair of 14 to 22 AWG\*

### Mounting:

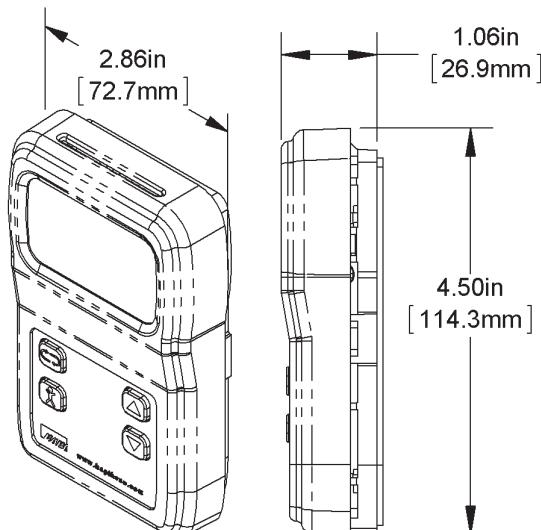
Standard 2" by 4" J-box  
or drywall mount (screws provided)

### Environmental Operation Range:

Temperature: 32 to 122 °F (0 to 50 °C)

Humidity: 0 to 95%, non-condensing

**Agency:** RoHS and CE



\*BAPI recommends that you do not run wiring for the Room Units in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils. Also, these units are not designed for line voltage applications.





# BAPI-Stat 4 Modbus Room Sensor

## Humidity or Combination Temp/Humidity Sensors

B17

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.

### BAPI-Stat 4 Modbus Sensor Option Selection Guide:

BA/BS4MB( #1 ) - ( #2 ) - ( #3 ) - ( #4 ) - ( #5 )



#### #1: Display (required)

		<u>List Price</u>
F	Display with Temperature in °F .....	\$130
C	Display with Temperature in °C.....	\$130
X	No Display .....	\$130

#### #2: Setpoint (required for display units)

C	50 to 90 °F or 10 to 32 °C
D	55 to 85 °F or 13 to 30 °C
E	60 to 80 °F or 15 to 27 °C
F	65 to 80 °F or 18 to 27 °C
G	45 to 96 °F or 7 to 36 °C
L	70 to 74 °F or 21 to 23 °C

#### #3: Humidity Measurement (required)

HN	No Humidity Measurement	
H2	Humidity Measurement.....	\$150

#### #4: Fan Speed and Mode Control (required)

FN	No Fan Speed Adjustment
F0	Fan Speed Mode 0 (available for display units only)
F1	Fan Speed Mode 1 (available for display units only)

#### #5: Override (required)

J	Override Enabled (available for display units only)
Z	No Override

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

**Example Number:** BA/**BS4MB( F ) - ( E ) - ( H2 ) - ( FN ) - ( J )**

**Actual Number (with parenthesis removed):** BA/BS4MBF-E-H2-FN-J

**Description:** BAPI-Stat 4MB Unit with Pushbutton Setpoint, °F Display, 60 to 80°F Setpoint Display Range, Humidity Measurement, No Fan Speed Adjustment, Override Enabled.

**List Price:** \$130 (Base Price) + \$150 (Humidity) = \$280 List Price

**Your Number:** BA/



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## Features & Options

- 10 Points of Calibration from 10 to 90%RH
- Humidity Only or Temp./Humidity Combination
- Replaceable Filter
- 2% and 3%RH Accuracies
- BAPI-Box 2 or BAPI-Box Enclosure Styles
- Wide Selection of Temperature Sensing Elements

Humidity control is an important aspect of any climate control system. Therefore, humidity sensors must be both accurate and dependable. BAPI's humidity transmitters are calibrated at 10 points from 10 to 90% RH for accuracy, eliminating field calibration.

The Outside Air Units are also extremely dependable, featuring two of the most watertight enclosures available today. The BAPI-Box and BAPI-Box 2 are made of UV-resistant polycarbonate and carry an IP66 rating. The BAPI-Box is only available for units with a temperature transmitter and a humidity transmitter.

**BAPI-Box 2  
Enclosure**



## Weather Shade

External temperature, humidity and air quality sensors are affected by radiant heat from the surfaces of buildings and parking lots. The BAPI Weather Shade effectively blocks the radiant heat, improving the accuracy of the sensor.



(See Accessories for more info.)

**BAPI-Box  
Enclosure**  
(only available  
for units with a  
humidity and  
temperature  
transmitter)

## Specifications

### Power and Consumption:

10 to 35 VDC, 22 mA max. (for units with 0 to 5 VDC or 4 to 20 mA Humidity Outputs)

15 to 35 VDC, 6 mA max. (for units with 0 to 10 VDC Humidity Output)

12 to 27 VAC, 0.53 VA max. (for units with 0 to 5 VDC Humidity Outputs)

15 to 27 VAC, 0.14 VA max. (for units with 0 to 10 VDC Humidity Output)

### Enclosure Dimensions: H x W x D

BAPI-Box ..... 5 x 4.1 x 2.5" (127 x 104 x 63.5mm)

BAPI-Box 2: ..... 4.9 x 2.8 x 2.35" (125 x 71.6 x 60mm)

(For enclosure dimension drawings, turn to the end of the section.)

### Sensor:

Humidity:

Capacitive 2% or 3%RH  
(10 to 90% RH @ 23°C)

Temperature:

Thermistor or RTD  
(See Sensors section for specs)

### Enclosure Rating:

IP66, NEMA 4

### Enclosure Material:

UV-res. Polycarbonate, UL 94, V-0

### Environmental Operation Range:

Temp: -40 to 158°F (-40 to 70°C)

Humidity: 0% to 100% RH

Fully Temperature Compensated



**Humidity or Combination Temp/Humidity Sensors**Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.

**Outside Air Humidity Sensor Option Selection Guide****BA/ ( #1 ) - ( #2 ) - ( #3 )**

<b>#1: Temperature Sensor or Transmitter</b> (optional)	<b>List Price</b>
1.8K .....	\$18
3K .....	\$18
10K-2 .....	\$18
10K-3 .....	\$18
10K-3[11K] .....	\$18
20K .....	\$18
1K[375] .....	\$25
1K[Ni].....	\$35
1K .....	\$25

Temperature Transmitters below require a BAPI-Box Enclosure

T1K[32 TO 212F].....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 32 to 212°F Range.....	\$125
T1K[20 TO 120F].....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 20 to 120°F Range.....	\$125
T1K[0 TO 100F].....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°F Range.....	\$125
T1K[0 TO 100C] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°C Range .....	\$125
T1K[-7 TO 49C] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, -7 to 49°C Range .....	\$125
T1K[-18 TO 38C] .....	1K Plat. RTD Transmitter, 4 to 20 mA Output, -18 to 38°C Range .....	\$125

*Matched Transmitters are also available. Contact your BAPI representative for ordering.***#2: Humidity Output** (required)

H200 .....	±2% Humidity Transmitter with Interchangeable Output of 0 to 5 V or 4 to 20 mA....	\$240
H210 .....	±2% Humidity Transmitter with 0 to 10 V Output .....	\$240
H212 .....	±2% Humidity Transmitter with 2 to 10 V Output .....	\$240
H300 .....	±3% Humidity Transmitter with Interchangeable Output of 0 to 5 V or 4 to 20 mA....	\$240
H310 .....	±3% Humidity Transmitter with 0 to 10 V Output .....	\$240
H312 .....	±3% Humidity Transmitter with 2 to 10 V Output .....	\$240

**#3: Enclosure Style** (required)

O-BB2.....	BAPI-Box 2 (IP66, NEMA 4X) .....	\$12
O-BB.....	BAPI-Box (for units with a humidity and temp transmitter only) (IP66, NEMA 4X) .....	\$12

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)***Example Number:** BA/( **10K-2** ) - ( **H200** ) - ( **O-BB2** )**Actual Number (with parenthesis removed):** BA/10K-2-H200-O-BB2**Description:** 10K-2 Thermistor, 0 to 5V or 4 to 20mA Humidity Output, BAPI-Box 2 Enclosure.**List Price:** \$18 (Thermistor) + \$240 (Humidity) + \$12 (BAPI-Box 2) = \$270 List Price**Your Number:** BA/

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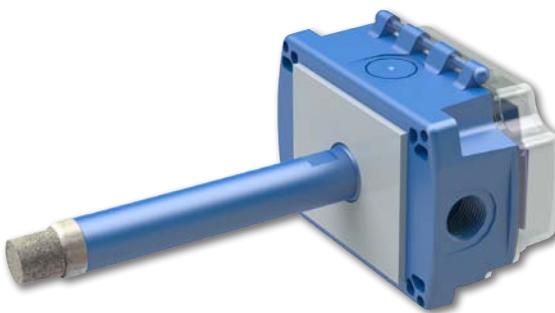


## Features & Options

- 10 Points of Calibration from 10 to 90% RH
- Humidity Only or Temp./Humidity Combination
- Replaceable Stainless Steel Filter
- Green Power Indication LED on BAPI-Box Crossover Units
- 2% and 3% RH Accuracies

Humidity control is an important aspect of any climate control system. Therefore, humidity sensors must be both accurate and dependable. BAPI's humidity transmitters are calibrated at 10 points from 10 to 90% RH for accuracy, eliminating field calibration.

The Duct Units are also extremely dependable, featuring two of the most watertight enclosures available today. The BAPI-Box and BAPI-Box Crossover Enclosures are made of UV-resistant polycarbonate and carry an IP66 rating. The BAPI-Box is only available for units with a temperature transmitter and a humidity transmitter.



**BAPI-Box**

(only available for units with a temperature transmitter and a humidity transmitter)



### The BAPI-Box Crossover Enclosure

The BAPI-Box Crossover features a hinged cover with thumb latch for easy termination. A pierceable knockout plug is available for the open port. See the Accessories section for more info.

*(Unit shown with knockplug plug sold separately.)*

## Specifications

### Power and Consumption:

10 to 35 VDC, 22 mA max. (for units with 0 to 5 VDC or 4 to 20 mA Humidity Outputs)

15 to 35 VDC, 6 mA max. (for units with 0 to 10 VDC Humidity Output)

12 to 27 VAC, 0.53 VA max. (for units with 0 to 5 VDC Humidity Outputs)

15 to 27 VAC, 0.14 VA max. (for units with 0 to 10 VDC Humidity Output)

### Enclosure Dimensions: H x W x D

BAPI-Box Crossover:.....3.1 x 2.2 x 1.9" (79 x 56 x 49mm)

BAPI-Box .....5 x 4.1 x 2.5" (127 x 104 x 63.5mm)

*(For enclosure dimension drawings, turn to the end of the section.)*

### Sensor:

Humidity:

Capacitive 2% or 3%RH  
(10 to 90% RH @ 23°C)

Temperature:

Thermistor or RTD  
(See Sensors section for specs)

### Enclosure Rating:

BAPI-Box Crossover: IP10, NEMA 1  
(IP44 with knockout plug)

BAPI-Box: IP66, NEMA 4X

### Enclosure Material:

UV-res. Polycarbonate, UL 94, V-0

### Environmental Operation Range:

Temp: -40 to 158°F (-40 to 70°C)

Humidity: 0% to 100% RH

Fully Temperature Compensated



**Humidity or Combination Temp/Humidity Sensors**Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.

**Duct Humidity Sensor Option Selection Guide****BA/ (#1) - (#2) - (#3)**

<b>#1: Temperature Sensor or Transmitter</b> (optional)	<b>List Price</b>
1.8K ..... 1.8K Thermistor .....	\$18
3K ..... 3K Thermistor .....	\$18
10K-2 ..... 10K-2 Thermistor .....	\$18
10K-3 ..... 10K-3 Thermistor .....	\$18
10K-3[11K] ..... 10K-3[11K] Thermistor .....	\$18
20K ..... 20K Thermistor .....	\$18
1K[375] ..... 1K Platinum RTD (375 curve).....	\$25
1K[NI].....1K Ω Nickel RTD .....	\$35
1K ..... 1K Platinum RTD (385 curve).....	\$25

Temperature Transmitters below require a BAPI-Box Enclosure

T1K[32 TO 212F].....1K Plat. RTD Transmitter, 4 to 20 mA Output, 32 to 212°F Range.....	\$125
T1K[20 TO 120F].....1K Plat. RTD Transmitter, 4 to 20 mA Output, 20 to 120°F Range.....	\$125
T1K[0 TO 100F].....1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°F Range.....	\$125
T1K[0 TO 100C] .....1K Plat. RTD Transmitter, 4 to 20 mA Output, 0 to 100°C Range .....	\$125
T1K[-7 TO 49C] .....1K Plat. RTD Transmitter, 4 to 20 mA Output, -7 to 49°C Range .....	\$125
T1K[-18 TO 38C] .....1K Plat. RTD Transmitter, 4 to 20 mA Output, -18 to 38°C Range .....	\$125

*Matched Transmitters are also available. Contact your BAPI representative for ordering.***#2: Humidity Output** (required)

H200 .....±2% Humidity Transmitter with Interchangeable Output of 0 to 5 V or 4 to 20 mA....	\$240
H210 .....±2% Humidity Transmitter with 0 to 10 V Output .....	\$240
H212 .....±2% Humidity Transmitter with 2 to 10 V Output .....	\$240
H300 .....±3% Humidity Transmitter with Interchangeable Output of 0 to 5 V or 4 to 20 mA....	\$240
H310 .....±3% Humidity Transmitter with 0 to 10 V Output .....	\$240
H312 .....±3% Humidity Transmitter with 2 to 10 V Output .....	\$240

**#3: Enclosure Style** (required)

D-BBX.....BAPI-Box Crossover (IP10, NEMA 1) .....	\$0
D-BB .....BAPI-Box (for units with a humidity and temperature transmitter only) .....	\$12

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)***Example Number:** BA/( **10K-2** ) - ( **H200** ) - ( **D-BBX** )**Actual Number (with parenthesis removed):** BA/10K-2-H200-D-BBX**Description:** 10K-2 Thermistor, 0 to 5V or 4 to 20mA Humidity Output, BAPI-Box Crossover IP10-rated Enclosure.**List Price:** \$18 (Thermistor) + \$240 (Humidity) = \$258 List Price**Your Number:** BA/



## Features & Options

- Optional LCD with User Selectable °C or °F Display
- 2% RH Accuracy with Full-range Temp Compensation
- Optional Setpoint Adjustment and Occupancy Override

The Echelon compatible “L-Combo” Room Unit features measurement of local temperature and relative humidity. Units with an LCD can also display outdoor temperature and outdoor humidity.

Additional options include Temperature Setpoint, Humidity Setpoint and Local Override. An onboard Neuron® chip allows connection directly to a LonWorks® network using star, bus, or loop topology. The LCD can toggle between temperature and humidity at a user adjustable rate, and the user can select °C or °F.



L-Combo Unit with Setpoint & Override

## Ordering Information

Part Number	Description	List Price
BA/LC-H2-R	L-Combo Temp/Humidity Unit without Display	\$320
BA/LC-H2-RD	L-Combo Temp/Humidity Unit with Display	\$355
BA/LC-H2-RSOD	L-Combo Temp/Humidity Unit with Setpoint, Override and Display	\$366

## Specifications

**Power:** 8 to 24VDC (recommended) or 12 to 28VAC

**Power Consumption:** 35 mA maximum DC

### Sensing Elements:

Temp. - Semiconductor Band Gap, Proportional to Absolute Temperature, ±0.3°C

Optional Humidity - Capacitive Polymer, ±2% RH Accuracy

**Wiring:** 4 wire, twisted pair 22 AWG minimum

### Communication:

Neuron® 3120®, 78 kbps using FTT-10A transceiver

### Mounting:

Standard 2x4" J-box or drywall - screws provided

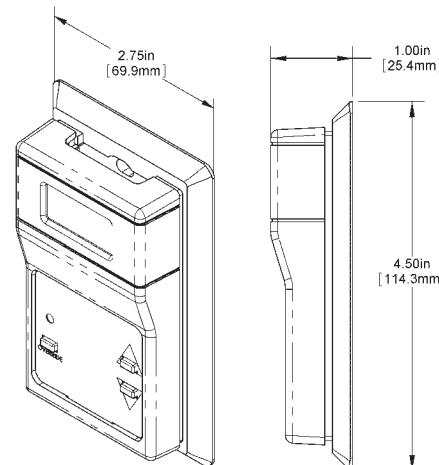
### Environmental Specifications:

Temperature: 32 to 122 °F (0 to 50 °C)

Humidity: 0 to 95%, non-condensing

**Material & Rating:** ABS Plastic, UL94 HB

**Range:** -40 to 85°C



\*BAPI recommends that you do not run wiring for the Room Units in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils. For additional wiring info and requirements, refer to Echelon's Bulletin titled "Junction Box and Wiring Guidelines for Twisted Pair LonWorks® Networks" which can be found at the following URL: "[www.echelon.com/support/documentation/Bulletin/005-0023-01K.pdf](http://www.echelon.com/support/documentation/Bulletin/005-0023-01K.pdf)"

The “L-Temp” and “L-Combo” were designed following the LonMark® Interoperability Guidelines, and incorporate standard configuration property types (SCPT). A complete SNVT/SCPT list with definitions is available upon request. Echelon®, LonWorks®, Neuron®, and 3120® are trademarks of Echelon Corporation registered in the United States and other countries. LonMark® is a trademark of the LonMark Interoperability Association registered in the United States and other countries.



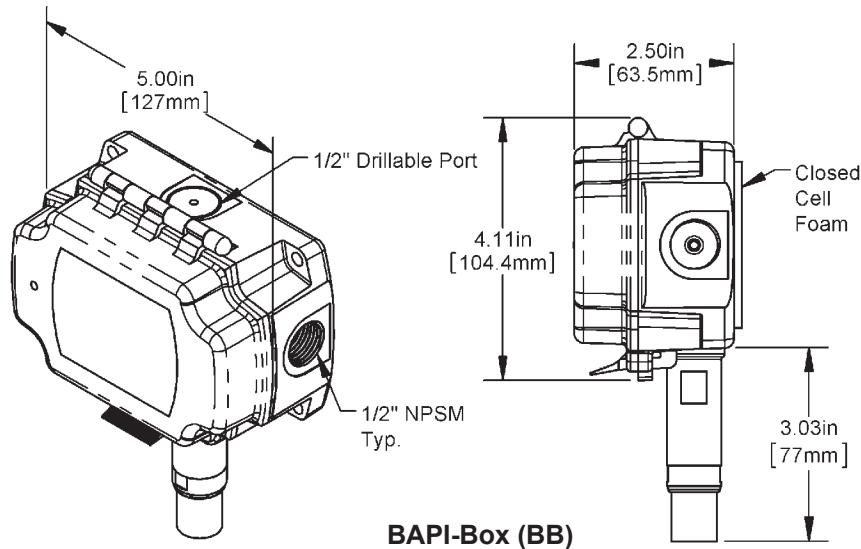


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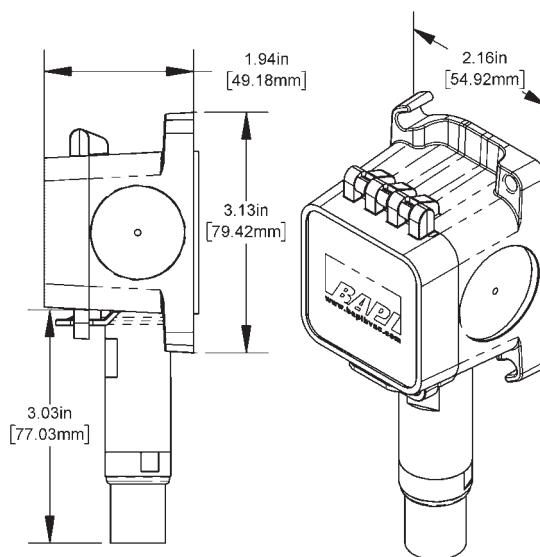
# Outside Air Units

B23

## Humidity or Combination Sensor Dimension Drawings



**BAPI-Box (BB)**

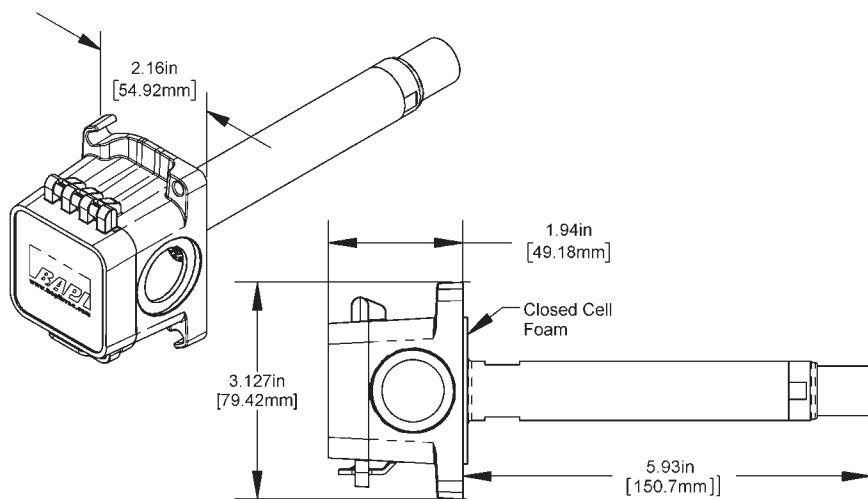
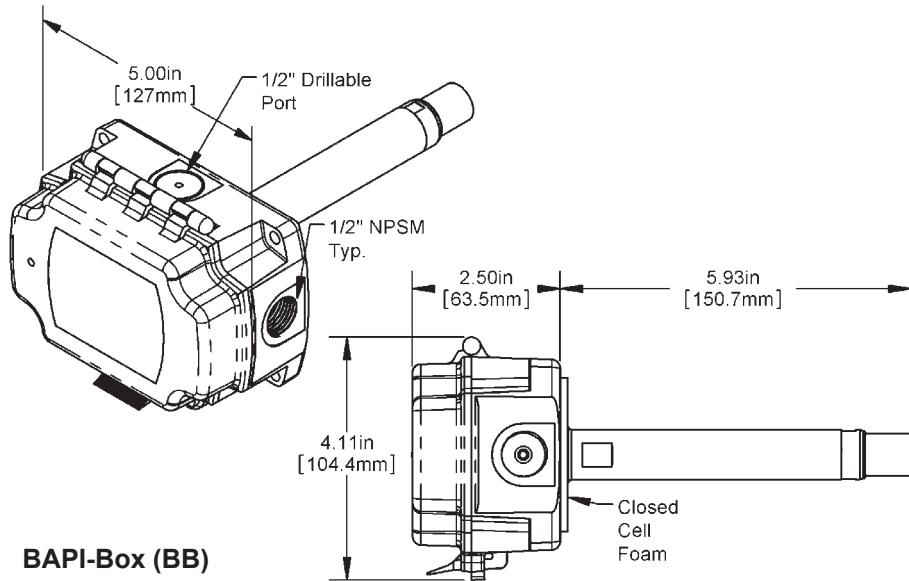


**BAPI-Box Crossover (BBX6)**



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## Zone Pressure Sensors

**EZ Pressure**  
Panel Mount with Low & Standard Ranges



pg C2

**ZPM Multi-Sensor**  
Pressure Sensor with Low, Standard  
and High Ranges



pg C4

**ZPT Touch Pressure**  
Low & Standard Ranges



pg C6

**ZPS Pressure Sensor**  
Low, Standard & High Ranges



pgs C8-11

**Fixed Range Pressure**  
Low & Standard Ranges



pg C12

**Room Pressure**  
Pickup Port



pg C14

**Ceiling Square**  
Pickup Port



pg C14

**Wall Pressure**  
Pickup Port



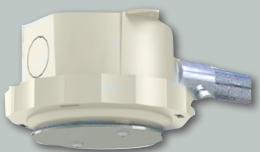
pg C14

**Button Pressure**  
Pickup Port



pg C14

**Outside Air**  
Pickup Port



pg C16

**Pressure Probes**  
and Accessories



pg C18

**Pressure Switch**



pg C20



## Features & Options

- 10 Pressure Ranges & Three Outputs – All Field Selectable
- Standard Range (-5 to +5 WC or -1,250 to +1,250 Pascals) or Low Range (-1.0 to +1.0 WC or -250 to +250 Pascals)
- Free NIST Certificate Included with Each Pressure Unit
- Snaptrack, DIN Rail or Surface Mounting

Measuring building pressure, air velocities and volumes doesn't get any easier than with the BAPI EZ Pressure Sensor. The revolutionary mounting system allows for 2.75" snaptrack, DIN rail or surface mounting, and the three Outputs and 10 Pressure Ranges are field selectable by simply turning the rotary switch and pressing the "Next" button.

Besides being easy to set up and install, it is also accurate, rugged and economical. The heart of the unit is a micro-machined silicon pressure sensor with excellent accuracy, repeatability and stability. The unit also features short circuit proof outputs and reverse polarity protected inputs to perform under real world conditions.

The LCD display helps with troubleshooting because it displays the actual differential pressure over the entire operational range regardless of which individual pressure range is selected for output to the system controller.



**EZ Pressure Sensor**



## Specifications

### Power:

7 to 40 VDC (4 to 20 mA Output)  
7 to 40 VDC or 18 to 28 VAC (0 to 5 VDC Output)  
13 to 40 VDC or 18 to 28 VAC (0 to 10 VDC Output)

### Power Consumption:

20 mA max, DC only at 4 to 20 mA Output  
4.9 mA max DC at 0 to 5 or 0 to 10 VDC Output  
0.12 VA max AC at 0 to 5 or 0 to 10 VDC Output

### Load Resistance:

4 to 20 mA Output 850 Ω Maximum @ 24 VDC  
0 to 5 VDC or 0 to 10 VDC output 1KΩ minimum

### Accuracy for Standard Pressure Ranges at 72°F:

±0.25% of range

### Accuracy for Low Pressure Ranges at 72°F:

±0.5% of range for the three lowest unidirectional and bidirectional ranges

±0.25% of range all other ranges

**Stability:** ±0.25% F.S. per year

### Environmental Operation Range:

14°F to 140°F (-10°C to 60°C)

### Storage Temperature:

-40 to 203°F (-40 to 95°C)

### Temperature Error for Standard Ranges:

0.01% FS/F (0.02% FS/C)  
(±5.0" W.C. @ 14 to 140°F [-10 to 60°C])

### Temperature Error for Low Ranges:

0.04% FS/F (0.07% FS/C)  
(±1.0" W.C. @ 14 to 140°F [-10 to 60°C])

**Overpressure:** Proof: 27.68" W.C. (1 PSI),  
Burst: 41.52" W.C. (1.5 PSI)

**Wiring:** Removable terminal block (14 to 24 AWG)\*  
2 wires (4 to 20mA Current loop)\*  
3 wires (AC or DC powered, Voltage out)\*

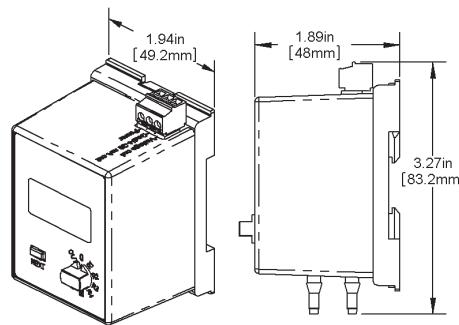
**Humidity:** 0 to 95% RH, non-condensing

**Port Connection:** 1/4" tubing (1/8" to 3/16" I.D.)

**Enclosure Material:** ABS Plastic, UL94, V-0

### Mounting:

DIN Rail, Snaptrack or Surface Mountable



\*BAPI recommends that you do not run wiring for the pressure transmitter in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils.





# EZ Pressure Sensor (Standard and Low Ranges)

C3

## Zone Pressure Sensors (ZPS)

Datasheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

### **Ordering Information (for units without a factory specified range or output)**

PART NUMBER	DESCRIPTION	LIST PRICE
ZPS-SR-EZ-NT-IN	Standard Range Unit, Inches WC, Display, No Tube or Probe included	\$320
ZPS-SR-EZ-NT-PA	Standard Range Unit, Pascals, Display, No Tube or Probe included	\$320
ZPS-SR-EZ-ST-IN	Standard Range Unit, Inches WC, Display with Static Pressure Probe	\$320
ZPS-SR-EZ-ST-PA	Standard Range Unit Pascals, Display with Static Pressure Probe	\$320
ZPS-LR-EZ-NT-IN	Low Range Unit, Inches WC, Display, No Tube or Probe included	\$320
ZPS-LR-EZ-NT-PA	Low Range Unit, Pascals, Display, No Tube or Probe included	\$320
ZPS-LR-EZ-ST-IN	Low Range Unit, Inches WC, Display with Static Pressure Probe	\$320
ZPS-LR-EZ-ST-PA	Low Range Unit Pascals, Display with Static Pressure Probe	\$320

Note: Pressure Range and Output Range for these units will be selected in the field.

**For units with a factory specified range or output, use Selection Guide below**

### **Standard and Low Range EZ Pressure Option Selection Guide**

**ZPS - ( #1 ) - ( #2 ) - ( #3 ) - ( #4 )**

#### **#1: Pressure Output (required)**

- 20.....4 to 20 mA
- 05.....0 to 5 V
- 10.....0 to 10 V

#### **#2: Pressure Range (required)**

##### LOW RANGES

WC Ranges	Pascal Ranges
LR51..0 to 0.10	LR61 .....0 to 30
LR52..0 to 0.25	LR62 .....0 to 50
LR53..0 to 0.50	LR63 .....0 to 100
LR54..0 to 0.75	LR64 .....0 to 175
LR55..0 to 1.00	LR65 .....0 to 250
LR56..-0.10 to 0.10	LR66 .....-30 to 30
LR57..-0.25 to 0.25	LR67 .....-50 to 50
LR58..-0.50 to 0.50	LR68 .....-100 to 100
LR59..-0.75 to 0.75	LR69 .....-175 to 175
LR60..-1.00 to 1.00	LR70 .....-250 to 250

*Custom Ranges are available for these units. Contact your BAPI representative for ordering. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

#### **#2: Pressure Range continued...**

##### STANDARD RANGES

WC Ranges	Pascal Ranges
SR71..0 to 1.00	SR81.....0 to 250
SR72..0 to 2.00	SR82.....0 to 300
SR73..0 to 2.50	SR83.....0 to 500
SR74..0 to 3.00	SR84.....0 to 1,000
SR75..0 to 5.00	SR85.....0 to 1,250
SR76..-1.00 to 1.00	SR86.....-250 to 250
SR77..-2.00 to 2.00	SR87.....-300 to 300
SR78..-2.50 to 2.50	SR88.....-500 to 500
SR79..-3.00 to 3.00	SR89.. -1,000 to 1,000
SR80..-5.00 to 5.00	SR90.. -1,250 to 1,250

#### **#3: Static Pressure Tube (required)**

EZ-NT .. No Tube included

EZ-ST .. Static Pressure Tube included

#### **#4: Display (optional)**

D ..... LCD (See Note below)

**Note:** The display is always present. If you do not select the display option, the display will show the word "On" rather than the current pressure.

**Example Number:** ZPS - ( **05** ) - ( **SR72** ) - ( **EZ-ST** ) - ( **D** )

**Actual Number (with parenthesis removed):** ZPS-05-SR72-EZ-ST-D

**Description:** 0 to 5 V Output, 0 to 2" WC Pressure Range, EZ Unit with Static Tube and Display.

**List Price:** \$320 for all units

**Your Number:** ZPS-



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## Features & Options

- 10 Field Selectable Pressure Ranges and 5 Field Selectable Outputs
- Optional Display Shows Pressure Over the Entire Operational Range Regardless of Which Pressure Range is Selected
- Standard, Low and High Range Units
- Ranges and Outputs Can Be Set Without Power
- Free NIST Certificate Included with Each Unit

BAPI's Zone Pressure Multi-Sensor is the most flexible pressure sensor on the market. Output, range, units, directionality, and response time are quickly set in the field with no tools, no power and no small components.

The optional LCD display helps with troubleshooting because it displays the actual differential pressure over the entire operational range regardless of which individual pressure range is selected for output to the system controller. Three LEDs on the face of the unit indicate when the pressure is "Out of Range Low", "In Range" or "Out of Range High".



## Specifications

### Power:

- 7 to 40 VDC (4 to 20 mA Output)  
7 to 40 VDC or 18 to 32 VAC (0 to 5 or 1 to 5 V Output)  
13 to 40 VDC or 18 to 32 VAC (0 to 10 or 2 to 10 V Output)

### Power Consumption:

- 20 mA max, DC only at 4 to 20 mA Output  
4.9 mA max DC at 0 to 5 VDC or 0 to 10 VDC Output  
0.12 VA max AC at 0 to 5 VDC or 0 to 10 VDC Output

### Load Resistance:

- 4 to 20 mA Output 850 Ω Maximum @ 24 VDC  
0 to 5 V or 0 to 10 V output 6K to 10KΩ minimum

### Accuracy for Standard Pressure Ranges at 72°F: ±0.25% of range

### Accuracy for Low Pressure Ranges at 72°F:

- ±0.5% of range for the three lowest unidirectional and bidirectional ranges, ±0.25% of range all other ranges

### Accuracy for High Pressure Ranges at 72°F:

- ±0.25% on all ranges

### Stability:

- ±0.25% F.S. per year

### Environmental Op. Range:

- 4 to 140°F (-20 to 60°C)

### Storage Temperature:

- 40 to 203°F (-40 to 95°C)

### Temperature Error Low Range:

- 0.04% FS/°F (0.07% FS/°C)  
(±1.0" W.C @-4 to 140°F (-20 to 60°C))

### Temperature Error Standard Range:

- 0.01% FS/°F (0.02% FS/°C)  
(±5.0" W.C @-4 to 140°F (-20 to 60°C))

\*BAPI recommends that you do not run wiring for the pressure transmitter in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils.

### Temperature Error High Range:

- 0.015% FS/°F (0.025% FS/°C)  
(0 to 30" W.C @-4 to 140°F (-20 to 60°C))

### Overpressure:

- Proof: 300.1 WC (10.83 PSI)  
Burst: 512.6 WC (18.5 PSI)

### Wiring:

- 2 wires (4 to 20mA Current loop)\*  
3 wires (AC or DC powered, Voltage out)\*

### Humidity:

- 0 to 95% RH, non-condensing

### Port Size:

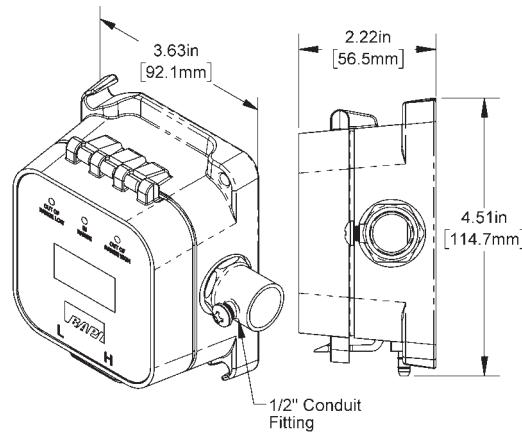
- 1/4" tubing (1/8" to 3/16" I.D.)

### Encl. Material:

- UV-resistant Polycarb., UL94, V-0

### Enclosure Rating:

- IP44, NEMA 2





# Pressure Multi-Sensor, Standard, Low & High Ranges

C5

Rev. 04/07/17

## Zone Pressure Multi-Sensors (ZPM)

Datasheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

### Ordering Information

#### STANDARD RANGE UNITS

PART NUMBER	DESCRIPTION	LIST PRICE
BA/ZPM-SR-NT-D	ZPM Standard Range Unit, No Tube or Probe included, with Display	\$320
BA/ZPM-SR-ST-D	ZPM Standard Range Unit, with Static Pressure Tube, with Display	\$320
BA/ZPM-SR-AT-D	ZPM Standard Range Unit, with Attached Static Tube, with Display	\$320
BA/ZPM-SR-NT-ND	ZPM Standard Range Unit, No Tube or Probe included, No Display	\$320
BA/ZPM-SR-ST-ND	ZPM Standard Range Unit, with Static Pressure Tube, No Display	\$320
BA/ZPM-SR-AT-ND	ZPM Standard Range Unit, with Attached Static Tube, No Display	\$320

#### LOW RANGE UNITS

BA/ZPM-LR-NT-D	ZPM Low Range Unit, No Tube or Probe included, with Display	\$320
BA/ZPM-LR-ST-D	ZPM Low Range Unit, with Static Pressure Tube, with Display	\$320
BA/ZPM-LR-AT-D	ZPM Low Range Unit, with Attached Static Tube, with Display	\$320
BA/ZPM-LR-NT-ND	ZPM Low Range Unit, No Tube or Probe included, No Display	\$320
BA/ZPM-LR-ST-ND	ZPM Low Range Unit, with Static Pressure Tube, No Display	\$320
BA/ZPM-LR-AT-ND	ZPM Low Range Unit, with Attached Static Tube, No Display	\$320

#### HIGH RANGE UNITS

BA/ZPM-HR-NT-D	ZPM High Range Unit, No Tube or Probe included, with Display	\$320
BA/ZPM-HR-ST-D	ZPM High Range Unit, with Static Pressure Tube, with Display	\$320
BA/ZPM-HR-AT-D	ZPM High Range Unit, with Attached Static Tube, with Display	\$320
BA/ZPM-HR-NT-ND	ZPM High Range Unit, No Tube or Probe included, No Display	\$320
BA/ZPM-HR-ST-ND	ZPM High Range Unit, with Static Pressure Tube, No Display	\$320
BA/ZPM-HR-AT-ND	ZPM High Range Unit, with Attached Static Tube, No Display	\$320

Pressure Range, Output Range and Inches of Water Column or Pascal Operation will be selected in the field for these units. Ranges and Outputs shown below:

Custom Ranges are also available. Contact your BAPI representative for ordering information.

Your Number: BA/ZPM-

### Field Selectable Ranges and Outputs

#### STANDARD RANGE UNITS

Inches WC	Pascals
0 to 1.00.....	0 to 250
0 to 2.00.....	0 to 300
0 to 2.50.....	0 to 500
0 to 3.00.....	0 to 1,000
0 to 5.00.....	0 to 1,250
-1.00 to 1.00 .....	-250 to 250
-2.00 to 2.00 .....	-300 to 300
-2.50 to 2.50 .....	-500 to 500
-3.00 to 3.00 ...	-1,000 to 1,000
-5.00 to 5.00 ...	-1,250 to 1,250

#### LOW RANGE UNITS

Inches WC	Pascals
0 to 0.10.....	0 to 30
0 to 0.25.....	0 to 50
0 to 0.50.....	0 to 100
0 to 0.75.....	0 to 175
0 to 1.00.....	0 to 250
-0.10 to 0.10 .....	-30 to 30
-0.25 to 0.25 .....	-50 to 50
-0.50 to 0.50 .....	-100 to 100
-0.75 to 0.75 .....	-175 to 175
-1.00 to 1.00 .....	-250 to 250

#### HIGH RANGE UNITS

Inches WC	Pascals
0 to 5.....	0 to 1,250
0 to 10.....	0 to 2,500
0 to 15.....	0 to 4,000
0 to 25.....	0 to 6,000
0 to 30.....	0 to 7,400

#### OUTPUTS AVAILABLE

4 to 20 mA
0 to 5 V
0 to 10 V
2 to 10 V
1 to 5 V



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## Features & Options

- Touch Interface Through the Cover, No More Dip Switches
- Field Selectable Output, Pressure Ranges and WC or Pascal Units
- Free NIST Certificate Included with Each Pressure Unit
- Standard Range (-5 to +5 WC or -1,250 to +1,250 Pascals) or Low Range (-1.0 to +1.0 WC or -250 to +250 Pascals)
- Custom Pressure Ranges Can be Created in the Field



BAPI's Zone Pressure “Touch” (ZPT) sensor is an accurate, rugged and economical solution for measuring building pressure, air velocities and volumes. The heart of the unit is a micro-machined silicon pressure sensor with excellent accuracy, repeatability and stability.

The touch interface allows for quick and easy set up of all parameters including pressure ranges, output ranges and WC or Pascal units. The interface can even be used to create custom ranges in the field.

The LCD helps with troubleshooting because it displays the actual differential pressure over the entire operational range regardless of which individual pressure range is selected for output to the system controller.



**Touch Pressure Sensor**

## Specifications

### Power:

- 7 to 40 VDC (4 to 20 mA Output)
- 7 to 40 VDC or 18 to 32 VAC (0 to 5 or 1 to 5 V Output)
- 13 to 40 VDC or 18 to 32 VAC (0 to 10 or 2 to 10 V Output)

### Power Consumption:

- 20 mA max, DC only at 4 to 20 mA Output
- 4.9 mA max DC at 0 to 5 VDC or 0 to 10 VDC Output
- 0.12 VA max AC at 0 to 5 VDC or 0 to 10 VDC Output

### Load Resistance:

- 4 to 20 mA Output 850 Ω Maximum @ 24 VDC
- 0 to 5 V or 0 to 10 V output 1KΩ minimum

### Accuracy for Standard Pressure Ranges at 72°F:

±0.25% of range

### Accuracy for Low Pressure Ranges at 72°F:

±0.5% of range for the three lowest unidirectional and bidirectional ranges

±0.25% of range all other ranges

**Stability:** ±0.25% F.S. per year

### Environmental Operation Range:

14°F to 140°F (-10°C to 60°C)

**Storage Temperature:** -40 to 203°F (-40 to 95°C)

### Temperature Error for Standard Ranges:

0.01% FS/F (0.02% FS/C)  
(±5.0" W.C. @ 14 to 140°F [-10 to 60°C])

### Temperature Error for Low Ranges:

0.04% FS/F (0.07% FS/C)  
(±1.0" W.C. @ 14 to 140°F [-10 to 60°C])

**Overpressure:** Proof: 27.68 in W.C (1 PSI),  
Burst: 41.52 in W.C. (1.5 PSI)

### Wiring:

- 2 wires (4 to 20mA Current loop)\*
- 3 wires (AC or DC powered, Voltage out)\*

**Humidity:** 0 to 95% RH, non-condensing

### Port Connection:

1/4" tubing (1/8" to 3/16" I.D.)

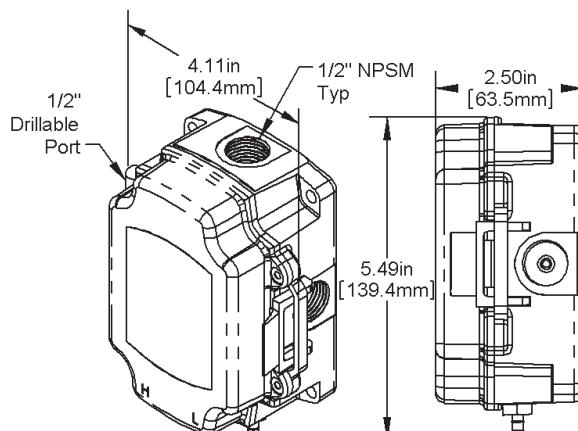
### Enclosure Material:

UV-resistant Polycarbonate, UL94, V-0

**Enclosure Rating:** IP66, NEMA 4

### Mounting:

Four external tabs with holes for #10 screws



\*BAPI recommends that you do not run wiring for the pressure transmitter in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils.





# "Touch" Pressure Sensor (Standard & Low Ranges)

C7

## Zone Pressure Touch Sensors (ZPT)

Datasheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

### **Ordering Information (for units without a factory specified range or output)**

PART NUMBER	DESCRIPTION	LIST PRICE
ZPT-SR-BB-NT-D	Standard Range Unit, Display, No Tube or Probe included	\$350
ZPT-SR-BB-ST-D	Standard Range Unit, Display with Static Pressure Probe	\$350
ZPT-SR-BB-AT-D	Standard Range Unit, Display with Attached Static Probe	\$350
ZPT-LR-BB-NT-D	Low Range Unit, Inches WC, Display, No Tube or Probe included	\$350
ZPT-LR-BB-ST-D	Low Range Unit, Inches WC, Display with Static Pressure Probe	\$350
ZPT-LR-BB-AT-D	Low Range Unit, Inches WC, Display with Attached Static Probe	\$350

Note: Pressure Range and Output Range for these units will be selected in the field.

**For units with a factory specified range or output, use Selection Guide below**

### **Standard and Low Range Touch Pressure Option Selection Guide**

**ZPT - ( #1 ) - ( #2 ) - ( #3 ) - ( #4 )**

#### **#1: Pressure Output (required)**

- 20..... 4 to 20 mA
- 05..... 0 to 5 V
- 10..... 0 to 10 V
- 12..... 2 to 10 V
- 15..... 1 to 5 V

#### **#2: Pressure Range (required)**

##### LOW RANGES

WC Ranges	Pascal Ranges
LR51.. 0 to 0.10	LR61 ..... 0 to 30
LR52.. 0 to 0.25	LR62 ..... 0 to 50
LR53.. 0 to 0.50	LR63 ..... 0 to 100
LR54.. 0 to 0.75	LR64 ..... 0 to 175
LR55.. 0 to 1.00	LR65 ..... 0 to 250
LR56.. -0.10 to 0.10	LR66 ..... -30 to 30
LR57.. -0.25 to 0.25	LR67 ..... -50 to 50
LR58.. -0.50 to 0.50	LR68 ..... -100 to 100
LR59.. -0.75 to 0.75	LR69 ..... -175 to 175
LR60.. -1.00 to 1.00	LR70 ..... -250 to 250

Factory set Custom Ranges are available for these units. Contact your BAPI representative for ordering.

#### **#2: Pressure Range continued...**

##### STANDARD RANGES

WC Ranges	Pascal Ranges
SR71.. 0 to 1.00	SR81..... 0 to 250
SR72.. 0 to 2.00	SR82..... 0 to 300
SR73.. 0 to 2.50	SR83..... 0 to 500
SR74.. 0 to 3.00	SR84..... 0 to 1,000
SR75.. 0 to 5.00	SR85..... 0 to 1,250
SR76.. -1.00 to 1.00	SR86..... -250 to 250
SR77.. -2.00 to 2.00	SR87..... -300 to 300
SR78.. -2.50 to 2.50	SR88..... -500 to 500
SR79.. -3.00 to 3.00	SR89.. -1,000 to 1,000
SR80.. -5.00 to 5.00	SR90.. -1,250 to 1,250

#### **#3: Static Pressure Tube (required)**

- BB-NT.. No Tube included
- BB-ST.. Static Pressure Tube included
- BB-AT .. Attached Static Pressure Probe

#### **#4: Display (optional)**

D ..... LCD (See Note below)

**Note:** The display is always present. If you do not select the display option, the display will show the word "On" rather than the current pressure.

**Example Number: ZPT - ( 05 ) - ( SR72 ) - ( BB-ST ) - ( D )**

**Actual Number (with parenthesis removed): ZPT-05-SR72-BB-ST-D**

**Description:** 0-5 V Output, 0 to 2" WC Pressure Range, Touch Unit with Static Tube and Display.

**List Price:** \$350 for all units

**Your Number:** ZPT-



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## Features & Options

- 10 Field Selectable Pressure Ranges
- 3 Field Selectable Outputs
- Standard Range (-5 to +5 WC or -1,250 to +1,250 Pascals), or Low Range (-1.0 to +1.0 WC or -250 to +250 Pascals)
- Free NIST Certificate Included with Each Pressure Unit

BAPI's Zone Pressure Sensor with Display is an accurate, rugged and economical solution for measuring building pressure, air velocities and volumes. The heart of the unit is a micro-machined silicon pressure sensor with excellent accuracy, repeatability and stability.

The optional LCD display helps with troubleshooting because it displays the actual differential pressure over the entire operational range (-5 to +5 inches W.C. or -1,250 to 1,250 Pascals) regardless of which individual pressure range is selected for output to the system controller.



Patent Pending

## Specifications

### Power:

7 to 40 VDC (4 to 20 mA Output)  
7 to 40 VDC or 18 to 32 VAC (0 to 5 or 1 to 5 V Output)  
13 to 40 VDC or 18 to 32 VAC (0 to 10 or 2 to 10 V Output)

### Power Consumption:

20 mA max, DC only at 4 to 20 mA Output  
4.9 mA max DC at 0 to 5 VDC or 0 to 10 VDC Output  
0.12 VA max AC at 0 to 5 VDC or 0 to 10 VDC Output

### Load Resistance:

4 to 20 mA Output 850 Ω Maximum @ 24 VDC  
0 to 5 V or 0 to 10 V output 1KΩ minimum

### Accuracy for Standard Pressure Ranges at 72°F:

±0.25% of range

### Accuracy for Low Pressure Ranges at 72°F:

±0.5% of range for the three lowest unidirectional and bidirectional ranges

±0.25% of range all other ranges

### Stability:

±0.25% F.S. per year

### Environmental Operation Range:

14°F to 140°F (-10°C to 60°C)

### Storage Temperature:

-40 to 203°F (-40 to 95°C)

### Temperature Error for Standard Ranges:

0.01% FS/F (0.02% FS/C)  
(±5.0" W.C. @ 14 to 140°F [-10 to 60°C])

### Temperature Error for Low Ranges:

0.04% FS/F (0.07% FS/C)  
(±1.0" W.C. @ 14 to 140°F [-10 to 60°C])

### Overpressure:

Proof: 27.68 in W.C (1 PSI),  
Burst: 41.52 in W.C. (1.5 PSI)

### Wiring:

2 wires (4 to 20mA Current loop)\*  
3 wires (AC or DC powered, Voltage out)\*

### Humidity:

0 to 95% RH, non-condensing

### Port Connection:

1/4" tubing (1/8" to 3/16" I.D.)

### Enclosure Material:

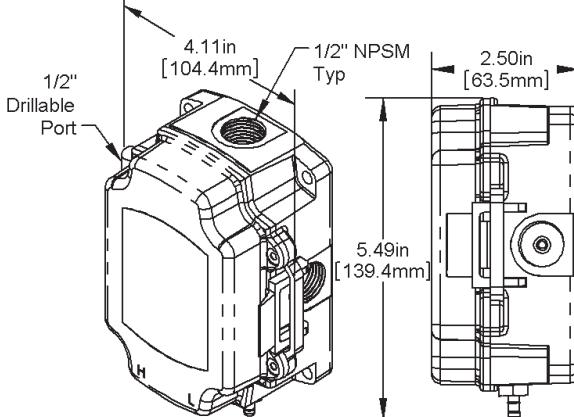
UV-resistant Polycarbonate, UL94, V-0

### Enclosure Rating:

IP66, NEMA 4

### Mounting:

Four external tabs with holes for #10 screws



\*BAPI recommends that you do not run wiring for the pressure transmitter in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils.





# Pressure Sensor (Standard and Low Ranges)

C9

## Zone Pressure Sensors (ZPS)

Datasheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

### **Ordering Information (for units without a factory specified range or output)**

PART NUMBER	DESCRIPTION	LIST PRICE
ZPS-SR-BB-NT-D-IN...	Standard Range Unit, Inches WC, Display, No Tube or Probe included .....	\$350
ZPS-SR-BB-NT-D-PA .	Standard Range Unit, Pascals, Display, No Tube or Probe included .....	\$350
ZPS-SR-BB-ST-D-IN...	Standard Range Unit, Inches WC, Display with Static Pressure Probe .....	\$350
ZPS-SR-BB-ST-D-PA..	Standard Range Unit, Pascals, Display with Static Pressure Probe .....	\$350
ZPS-SR-BB-AT-D-IN...	Standard Range Unit, Inches WC, Display with Attached Static Probe.....	\$350
ZPS-SR-BB-AT-D-PA..	Standard Range Unit, Pascals, Display with Attached Static Probe.....	\$350
ZPS-LR-BB-NT-D-IN ...	Low Range Unit, Inches WC, Display, No Tube or Probe included .....	\$350
ZPS-LR-BB-NT-D-PA..	Low Range Unit, Pascals, Display, No Tube or Probe included .....	\$350
ZPS-LR-BB-ST-D-IN ...	Low Range Unit, Inches WC, Display with Static Pressure Probe .....	\$350
ZPS-LR-BB-ST-D-PA..	Low Range Unit, Pascals, Display with Static Pressure Probe .....	\$350
ZPS-LR-BB-AT-D-IN ...	Low Range Unit, Inches WC, Display with Attached Static Probe.....	\$350
ZPS-LR-BB-AT-D-PA..	Low Range Unit, Pascals, Display with Attached Static Probe.....	\$350

Note: Pressure Range and Output Range for these units will be selected in the field.

*For units with a factory specified range or output, use Selection Guide below*

### **Standard and Low Range ZPS Pressure Option Selection Guide**

#### **ZPS - (#1) - (#2) - (#3) - (#4)**

##### **#1: Pressure Output (required)**

- 20.....4 to 20 mA
- 05.....0 to 5 V
- 10.....0 to 10 V
- 12.....2 to 10 V
- 15.....1 to 5 V

##### **#2: Pressure Range (required)**

###### LOW RANGES

WC Ranges	Pascal Ranges
LR51..0 to 0.10	LR61 .....0 to 30
LR52..0 to 0.25	LR62 .....0 to 50
LR53..0 to 0.50	LR63 .....0 to 100
LR54..0 to 0.75	LR64 .....0 to 175
LR55..0 to 1.00	LR65 .....0 to 250
LR56..-0.10 to 0.10	LR66 .....-30 to 30
LR57..-0.25 to 0.25	LR67 .....-50 to 50
LR58..-0.50 to 0.50	LR68 .....-100 to 100
LR59..-0.75 to 0.75	LR69 .....-175 to 175
LR60..-1.00 to 1.00	LR70 .....-250 to 250

##### **#2: Pressure Range continued...**

###### STANDARD RANGES

WC Ranges	Pascal Ranges
SR71..0 to 1.00	SR81.....0 to 250
SR72..0 to 2.00	SR82.....0 to 300
SR73..0 to 2.50	SR83.....0 to 500
SR74..0 to 3.00	SR84.....0 to 1,000
SR75..0 to 5.00	SR85.....0 to 1,250
SR76..-1.00 to 1.00	SR86.....-250 to 250
SR77..-2.00 to 2.00	SR87.....-300 to 300
SR78..-2.50 to 2.50	SR88.....-500 to 500
SR79..-3.00 to 3.00	SR89.. -1,000 to 1,000
SR80..-5.00 to 5.00	SR90.. -1,250 to 1,250

##### **#3: Static Pressure Tube (required)**

- BB-NT.. No Tube included
- BB-ST.. Static Pressure Tube included
- BB-AT .. Attached Static Pressure Probe

##### **#4: Display (optional)**

- D.....LCD

Factory set Custom Ranges are available for these units. Contact your BAPI representative for ordering.

**Example Number:** ZPS - ( **05** ) - ( **SR72** ) - ( **BB-ST** ) - ( **D** )

**Actual Number (with parenthesis removed):** ZPS-05-SR72-BB-ST-D

**Description:** 0 to 5 V Output, 0 to 2" WC Pressure Range, ZPS Unit with Static Tube and Display.

**List Price:** \$350 for all units

**Your Number:** ZPS-



Building Automation Products, Inc. • 750 North Royal Avenue, Gays Mills, WI 54631 USA

Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: [sales@bapihvac.com](mailto:sales@bapihvac.com) • Web: [www.bapihvac.com](http://www.bapihvac.com)



## Features & Options

- 5 Field Selectable Pressure Ranges & 3 Field Selectable Outputs
- Optional LCD Shows Pressure Over the Entire Operational Range Regardless of Which Individual Pressure Range is Selected
- Inches of Water Column (W.C.) or Pascal Operation
- Free NIST Certificate Included with Each Pressure Unit
- Simple Auto-Zero Process
- Three Year Warranty

Patent Pending



ZPS Pressure Sensor

BAPI's High Pressure Sensor is an accurate, rugged and economical solution for measuring duct/building static pressure, room-to-room differential pressure or air velocities/volumes. The heart of the unit is a micro-machined silicon sensor with excellent accuracy, repeatability and stability.

The LCD aids in troubleshooting by displaying the actual differential pressure over the entire operational range (0 to 30 W.C. or 0 to 7,400 Pascals) regardless of which individual pressure range is selected for output to the controller.

The unit comes in a rugged, IP66-rated enclosure with short circuit proof outputs and reverse polarity protected inputs. The unit accepts standard 1/8" or 5/32" I.D. tubing to the pressure ports. The various Output Ranges and Pressure Ranges are all field selectable with DIP switches, and the auto-zeroing process is very simple (flip a switch, wait five seconds, flip it back and walk away).



## Specifications

### Power:

7 to 40 VDC (4 to 20 mA output)  
7 to 40 VDC or 18 to 28 VAC (0 to 5 VDC output)  
13 to 40 VDC or 18 to 28 VAC (0 to 10 VDC output)

### Load Resistance:

0 to 5 VDC or 0 to 10 VDC Output - 1 kΩ minimum  
4 to 20 mA Output - 850 Ω max @ 24 VDC

### Power Consumption:

4.9 mA max DC at 0 to 5 or 0 to 10 VDC Output  
0.12 VA max AC at 0 to 5 or 0 to 10 VDC Output  
20 mA max, DC only at 4 to 20 mA Output

### Accuracy at 72 °F: ±0.25% on all ranges

### Stability: ±0.25 % F.S. (full scale) per year

### Temperature Error:

Zero: ±0.025% F.S. per °C,  
Span: max ±0.03% F.S. per °C

### Environmental Operation Range:

14°F to 140°F (-10°C to 60°C)

### Storage Temperature: -40 to 203°F (-40 to 95°C)

### Overpressure: Proof: 2 PSI, Burst: 3 PSI

### Wiring: 2 wires (4 to 20mA Current loop)\*

3 wires (AC or DC powered, Voltage out)\*

**Humidity:** 0 to 95% RH, non-condensing

### Port Connection:

1 High Pressure & 1 Low Pressure for push-on 1/4-inch tubing (1/8" to 3/16" I.D.)

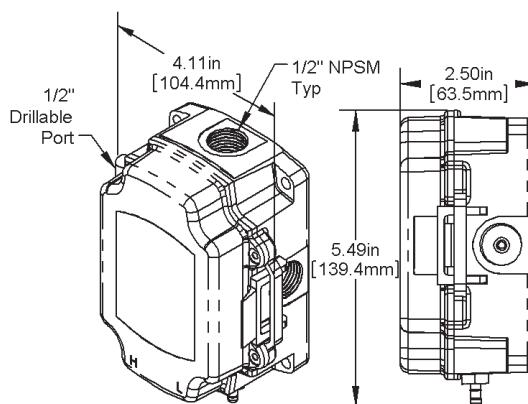
### Enclosure Material:

UV-resistant Polycarbonate, UL94, V-0

### Enclosure Rating: IP66, NEMA 4

### Mounting:

Four external tabs with holes for #10 screws



\*BAPI recommends that you do not run wiring for the pressure transmitter in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators and coils.





# High Pressure Sensor (up to 30" W.C.)

C11

## Zone Pressure Sensors (ZPS)

Datasheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

### ***Ordering Information (for units without a factory specified range or output)***

PART NUMBER	DESCRIPTION	LIST PRICE
ZPS-HR-BB-NT-D-IN ..	ZPS High Pressure with Display, W.C. Ranges, No Tube or Probe included .....	\$350
ZPS-HR-BB-ST-D-IN...	ZPS High Pressure with Display, W.C. Ranges with Static Pressure Probe.....	\$350
ZPS-HR-BB-AT-D-IN...	ZPS High Pressure with Display, W.C. Ranges with Attached Static Tube.....	\$350
ZPS-HR-BB-NT-D-PA .	ZPS High Pressure with Display, Pascal Ranges, No Tube or Probe included ....	\$350
ZPS-HR-BB-ST-D-PA .	ZPS High Pressure with Display, Pascal Ranges with Static Pressure Probe.....	\$350
ZPS-HR-BB-AT-D-PA .	ZPS High Pressure with Display, Pascal Ranges with Attached Static Tube.....	\$350
ZPS-HR-BB-NT-IN ..	ZPS High Pressure without Display, W.C. Ranges, No Tube or Probe included ..	\$350
ZPS-HR-BB-ST-IN .....	ZPS High Pressure without Display, W.C. Ranges with Static Pressure Probe....	\$350
ZPS-HR-BB-AT-IN .....	ZPS High Pressure without Display, W.C. Ranges with Attached Static Tube.....	\$350
ZPS-HR-BB-NT-PA .....	ZPS High Pressure without Display, Pascal Ranges, No Tube or Probe.....	\$350
ZPS-HR-BB-ST-PA .....	ZPS High Pressure without Display, Pascal Ranges with Static Pressure Probe.	\$350
ZPS-HR-BB-AT-PA .....	ZPS High Pressure without Display, Pascal Ranges with Attached Static Tube..	\$350

Note: Pressure Range and Output Range for these units will be selected in the field.

***For units with a factory specified range or output, use Selection Guide below***

### ***High Range ZPS Pressure Option Selection Guide***

**ZPS - (#1) - (#2) - (#3) - (#4)**

**#1: Pressure Output (required)**

- 20..... 4 to 20 mA
- 05..... 0 to 5 V
- 10..... 0 to 10 V
- 12..... 2 to 10 V
- 15..... 1 to 5 V

**#3: Static Pressure Tube (required)**

- BB-NT..... No Tube included
- BB-ST ..... Static Pressure Tube included
- BB-AT ..... Attached Static Pressure Probe

**#4: Display (optional)**

- D ..... LCD

**#2: High Pressure Range (Required)**

WC Ranges

- HR31 ..... 0 to 5
- HR32 ..... 0 to 10
- HR33 ..... 0 to 15
- HR34 ..... 0 to 25
- HR35 ..... 0 to 30

Pascal Ranges

- HR41 ..... 0 to 1,250
- HR42 ..... 0 to 2,500
- HR43 ..... 0 to 4,000
- HR44 ..... 0 to 6,000
- HR45 ..... 0 to 7,400

**Example Number:** ZPS - ( **05** ) - ( **HR32** ) - ( **BB-ST** ) - ( **D** )

**Actual Number (with parenthesis removed):** ZPS-05-HR32-BB-ST-D

**Description:** 0-5 V Output, 0 to 10" WC Pressure Range, ZPS Unit with Static Tube and Display.

**List Price:** \$350 for all units

**Your Number:** ZPS-





## Features & Options

- Single Pressure Range and Single Output Range
- Multiple Color LED Pressure Indication
- Free NIST Certificate Included with Each Pressure Unit
- Simple Auto-Zero Process
- Reverse Wiring Protection

BAPI's Fixed Range Pressure Sensor (FRP) is an economical solution for any cost-conscious application. The FRP features one factory-set pressure range and one factory-set output range.

A single button is used to auto-zero the unit, and a 5-color LED indicates the pressure status.



### Sensor with Attached Static Tube

The unit is available with an Attached Static Tube so it doesn't require two trades to install. Choose the (-AT) option in the Static Pressure Tube section.



**Fixed Range Pressure**



## Specifications

### Power:

18 to 28 VAC, 0.4 VA max  
9 to 32 VDC with 0 to 5V output, 10 mA max  
13 to 32 VDC with a 0 to 10V out, 10mA max

### Accuracy at 72°F

±1% for pressures ≤ 0.25" WC (62.5 Pa)  
±0.5% for pressures > 0.25" WC (62.5 Pa)

### Temperature Error

0.01% FS/F (0.02% FS/°C)  
(±5.0 in WC [1,250 Pa] @ 14 to 140°F [-10 to 60°C])  
0.04% FS/F (0.07% FS/°C)  
(±1.0 in WC [250 Pa] @ 14 to 140°F [-10 to 60°C])

### Environmental Operation Range:

14°F to 140°F (-10°C to 60°C)

### Storage Temperature:

-40 to 203°F (-40 to 95°C)

### Stability:

0.15% FS per year

### Overpressure

Proof: 27.68 in W.C. (1 PSI)  
Burst: 41.52 in W.C. (1.5 PSI)

### Wiring\*:

3-wires, AC or DC powered, Voltage out

### Humidity:

0 to 95% RH, non-condensing

### Port Connection:

1/4" tubing (1/8" to 3/16" I.D.)

\*BAPI recommends that you do not run wiring for the

pressure transmitter in the same conduit as line voltage

wiring or with wiring used to supply highly inductive loads

such as motors, generators, and coils.

### Enclosure Material:

UV-resistant Polycarbonate, UL94, V-0

### Enclosure Rating:

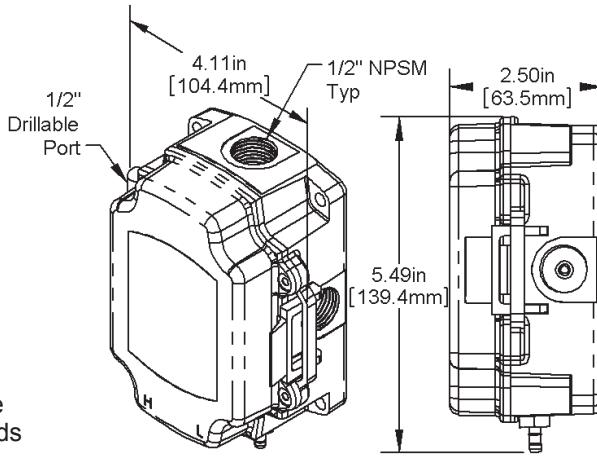
IP66, NEMA 4

### 5-Color LED:

Red – over pressure  
Green – top half of span  
Amber – center of span  
Blue – bottom half of span  
Purple – under pressure

### Mounting:

Four external tabs with holes for #10 screws





# Fixed Range Pressure Zone Pressure Sensors (ZPS)

C13

Datasheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

## Fixed Range Pressure Option Selection Guide

ZPS - ( #1 ) - ( #2 ) - ( #3 )

### #1: Pressure Output (required)

05.....0 to 5 V  
10.....0 to 10 V  
12.....2 to 10 V  
15.....1 to 5 V

### #2: Pressure Range (required)

#### UNIDIRECTIONAL RANGES

WC Ranges	Pascal Ranges
FR51..0 to 0.10	FR61 .....0 to 30
FR52..0 to 0.25	FR62 .....0 to 50
FR53..0 to 0.50	FR63 .....0 to 100
FR55..0 to 1.00	FR65 .....0 to 250
FR91..0 to 1.25	FR82 .....0 to 300
FR73..0 to 2.50	FR83 .....0 to 500
FR74..0 to 3.00	FR84 .....0 to 1,000
FR75..0 to 5.00	FR85 .....0 to 1,250

### #2: Pressure Ranges continued...

#### BIDIRECTIONAL RANGES

WC Ranges	Pascal Ranges
FR56..-0.10 to 0.10	FR66 ..... -30 to 30
FR57..-0.25 to 0.25	FR67 ..... -50 to 50
FR58..-0.50 to 0.50	FR68 ..... -100 to 100
FR60..-1.00 to 1.00	FR70 ..... -250 to 250
FR96..-1.25 to 1.25	FR87 ..... -300 to 3000
FR78..-2.50 to 2.50	FR88 ..... -500 to 500
FR79..-3.00 to 3.00	FR89.. -1,000 to 1,000
FR80..-5.00 to 5.00	FR90.. -1,250 to 1,250

### #3: Static Pressure Tube (required)

BB-NT.. No Tube included  
BB-ST .. Static Pressure Tube included  
BB-AT .. Attached Static Pressure Probe

Factory set Custom Ranges are available for these units. Contact your BAPI representative for ordering.

**Example Number:** ZPS - ( **05** ) - ( **FR73** ) - ( **BB-ST** )

**Actual Number (with parenthesis removed):** ZPS-05-FR72-BB-ST

**Description:** 0 to 5 V Output, 0 to 2.50" WC Pressure Range, FRP Unit with Static Tube.

**List Price:** \$235 for any unit.

**Your Number:** ZPS-





## Wall & Ceiling Pressure Pickup Ports & Temp./Pressure Pickup Combos

### Features & Options

- Economical & Easy to Install
- Includes 80 Micron Filter
- Accommodates 1/8" I.D. to 5/32" I.D. Tubing

Room pressure pickup ports are available as a Wall Plate or a BAPI-Stat "Quantum" enclosure, both sized to fit a common 2" x 4" electrical box. A foam gasket seals the plate or enclosure to the wall. These units are available as a pickup alone or with a temperature sensor.

BAPI also offers a Ceiling Mount Square Cover that fits a standard 3/4" thick suspended ceiling tile, and a Low Profile Port that is ideal for locations where aesthetics are as important as the pressure measurement. The only visible portion is a flush 7/8" dot on the wall.



Wall Plate

BAPI-Stat  
"Quantum"  
EnclosureLow Profile  
PortCeiling Mount  
Square Cover

### Specifications

#### Environ. Oper. Range:

Wall & Ceiling Plates

Temp: 32 to 122°F  
(0 to 50°C)

Humidity: 0% to 95% RH,  
non-condensing

Low Profile Port

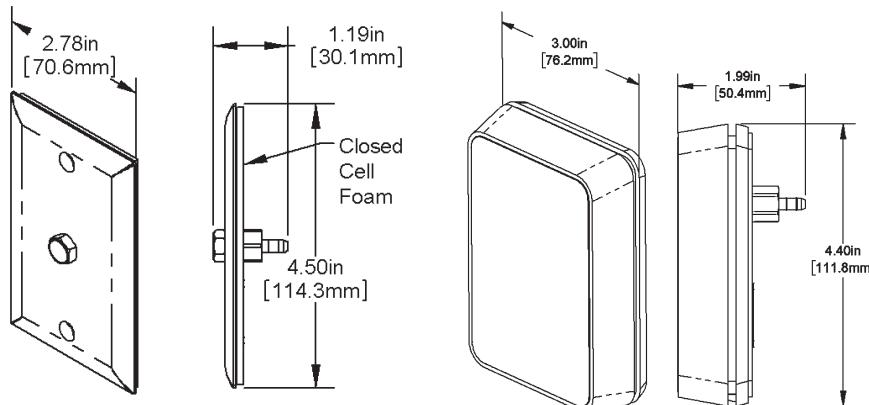
Temp: -40 to 185°F  
(-40 to 85°C)

Humidity: 0% to 100% RH,  
non-condensing

#### Material:

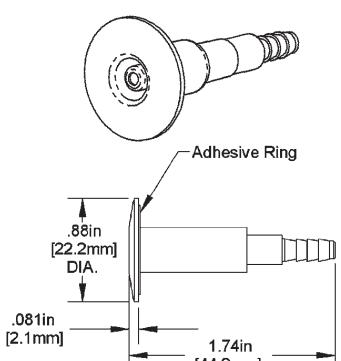
Delta Style & Low Profile:  
ABS Plastic, UL 94, V-0

Wall & Ceiling Plates:  
Stainless Steel

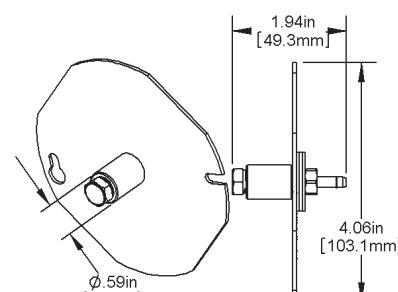


Wall Plate

BAPI-Stat "Quantum" Encl.



Low Profile Port



Ceiling Mount Cover





Rev. 12/19/16

# Zone Pressure Pickup Ports

C15

## Zone Pressure Sensors (ZPS)

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and brackets with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.

### Pressure Pickup Ports Option Selection Guide

ZPS-ACC ( **#1** ) - ( **#2** )

**#1: Pickup Port** (required)

01.....	2" X 4" Stainless Steel Wall Plate with Static Pickup .....	\$18
03.....	Room Mount Delta Style Enclosure with Static Pickup .....	\$15
04.....	BAPI-Stat "Quantum" Enclosure with Static Pickup .....	\$15
05.....	Ceiling Mount Square Cover with Static Pickup.....	\$15
20.....	Low Profile Pressure Pickup Port.....	\$30

**#2: Temperature Sensor** (optional, not available for 05, 06 and 20 above)

18.....	1.8K Thermistor .....	\$18
3.....	3K Thermistor .....	\$18
102.....	10K-2 Thermistor .....	\$18
103.....	10K-3 Thermistor .....	\$18
10311.....	10K-3[11K] Thermistor.....	\$18
20.....	20K Thermistor .....	\$18
1375.....	1K Platinum RTD (375 curve).....	\$25
1.....	1K Platinum RTD (385 curve).....	\$25

*Additional temperature sensors are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

**Example Number:** ZPS-ACC( **03** ) - ( **102** )

**Actual Number (with parenthesis removed):** ZPS-ACC03-102

**Description:** Delta Style Enclosure with Static Pickup, 10K-2 Thermistor Temperature Sensor.

**List Price:** \$15 (Delta Style Enclosure) + \$18 (Thermistor) = \$33 List Price

**Your Number:** ZPS/ACC





## Features & Options

- Rooftop, Wall or Vertical Mount
- Helps Stabilize Readings by Reducing Fluctuations from Wind Gusts

BAPI's Outside Air Pressure Pickup Port is an easy, economical and attractive way of measuring outdoor static pressure. The pickup port also helps stabilize readings because it significantly reduces the pressure fluctuations caused by wind gusts.

Differences in building pressure are caused by the operation of supply fans or exhaust fans and usually measure less than .1 inches of water column (W.C.). A gentle breeze of 10 MPH provides a pressure of .048 inches W.C., while a strong wind of 40 MPH provides .772 inches W.C. A gale of 75 MPH can measure over 2.7 inches. BAPI's pickup port significantly reduces these wind pressures for a stable and accurate reading at the pressure sensor and controller.

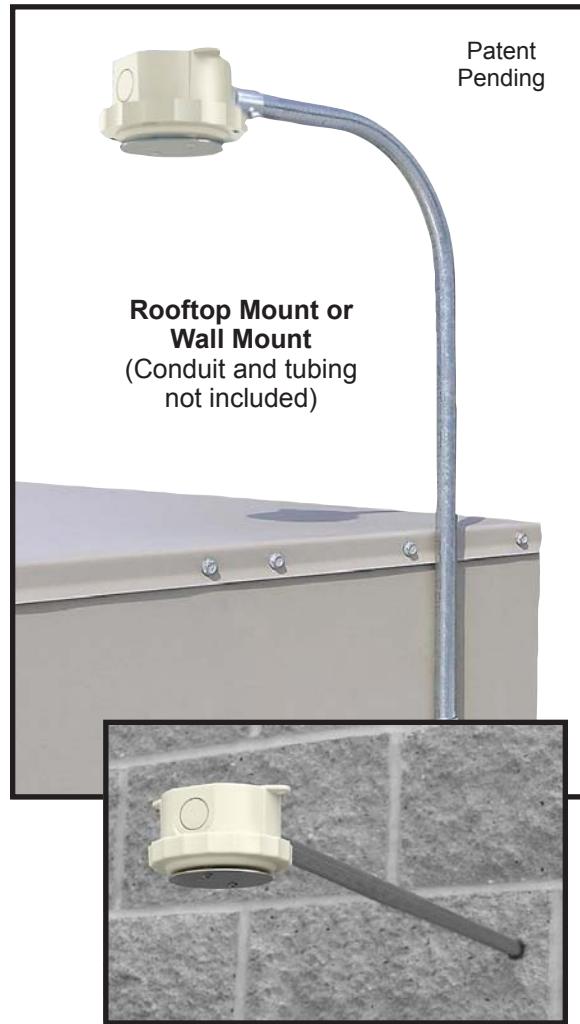
The unit is also very rugged with a UV-resistant and flame-retardant housing to perform and last under harsh conditions. It is available in Rooftop or Wall Mount or Vertical Mount for building soffits or ceilings.

## Ordering Information

### Part Number      Description

**ZPS-ACC10.....** Rooftop or Wall Mount Unit

**ZPS-ACC10-V .....** Vertical Mount Unit



## Specifications

### Environmental Operation Range:

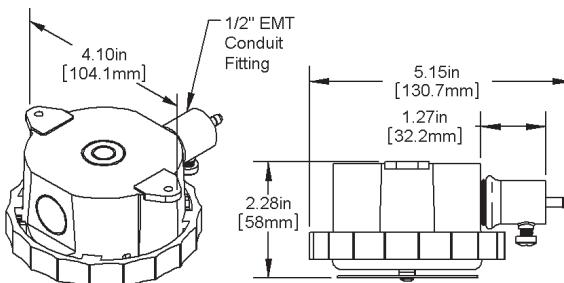
Temperature:  
-40 to 212 °F  
(-40 to 100 °C)

Humidity:  
0% to 100% RH,  
condensing

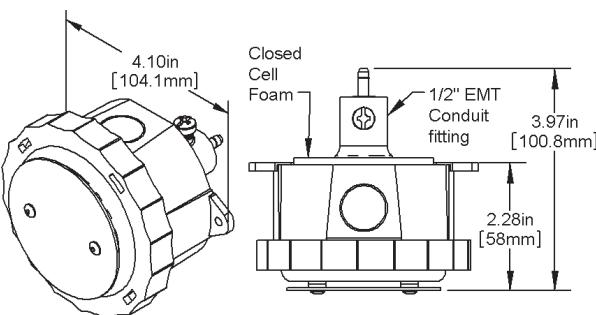
### Material:

UV-resistant plastic

### Rooftop or Wall Mount



### Vertical Mount





# Outside Air Pressure Pickup Port

C17

**Zone Pressure Sensors (ZPS)**

Datasheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

## ***Ordering Information***

<b>PART NUMBER</b>	<b>DESCRIPTION</b>	<b>LIST PRICE</b>
ZPS-ACC10.....	Rooftop or Wall Mount Outside Air Pressure Pickup Port.....	\$45
ZPS-ACC10-V .....	Vertical Mount Outside Air Pressure Pickup Port .....	\$45

## ***Wall & Ceiling Pressure Pickup Ports***

*Wallplates and BAPI-Stat “Quantum” Style units available as pressure pickups alone or as combination pressure pickup and temperature sensor*

Room pressure pickup ports are available as a Wall Plate or a BAPI-Stat “Quantum” enclosure, both sized to fit a common 2” x 4” electrical box. A foam gasket seals the plate or enclosure to the wall. These units are available as a pickup alone or with a temperature sensor.

BAPI also offers a Ceiling Mount Square Cover that fits a standard 3/4” thick suspended ceiling tile, and a Low Profile Port that is ideal for locations where aesthetics are as important as the pressure measurement. The only visible portion is a flush 7/8” dot on the wall.



**BAPI-Stat  
“Quantum”  
Enclosure**



**Wall  
Plate**



**Low Profile  
Port**



**Ceiling Mount  
Square Cover**

*For more info, see pages C14-15*



Building Automation Products, Inc. • 750 North Royal Avenue, Gays Mills, WI 54631 USA

Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: [sales@bapihvac.com](mailto:sales@bapihvac.com) • Web: [www.bapihvac.com](http://www.bapihvac.com)



## Pressure Probe Assemblies

### Overview

The Static Pressure Probe and Total Pressure Probe Assemblies connect to the BAPI Zone Pressure Sensor to provide duct static pressure or duct air velocity. The angled total probe faces into the airflow to sense the moving air's total pressure while the static probe senses static pressure.

Both probe assemblies include a tube and rubber hose with built in surge damper to smooth out variations in airflow for a more stable reading. The Static Pressure Probe is available individually while the Pitot Pressure Probe Assembly includes the total probe and the static probe assemblies.

### ORDERING INFORMATION

**ZPS-ACC07...** Static Pressure Probe Assembly, 6" long

**ZPS-ACC08...** Aluminum static Tube Only (6") w/ Circular Foam

**ZPS-ACC09...** Rubber Hoses w/ Surge Damper  
(includes a bulk head fitting)

**ZPS-ACC11...** Pitot Pressure Probe Assembly, 3.5" long  
(includes the Static & Total Probe Assemblies)

**ZPS-ACC12...** Pitot Pressure Probe Assembly, 6" long  
(includes the Static & Total Probe Assemblies)

**ZPS-ACC13...** Total Tube Only (3.5") with Circular Foam  
(doesn't include hoses & damper)

**ZPS-ACC14...** Total Tube Only (6") with Circular Foam  
(doesn't include hoses & damper)

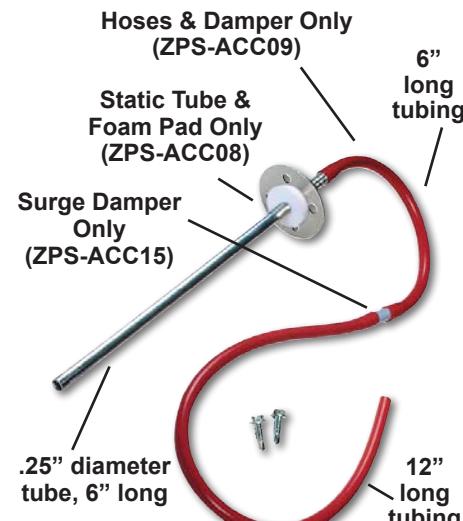
**ZPS-ACC15...** Surge Damper Only, 5 micron

**ZPS-ACC17...** Static Tube Only (0.5") with Circular Foam  
(doesn't include hoses & damper)

**ZPS-ACC18...** 2 Static Pressure Tube Assemblies, 6" Long

**ZPS-ACC21...** Stainless Steel Static Tube Only (6") with Circular Foam and Mounting Screws (doesn't include hoses & damper)

**ZPS-ACC22...** Static Tube Only, Zero Length, with Circular Foam and Mounting Screws



Static Pressure Probe Assembly



Total Pressure Probe Assembly



Static Tube Only,  
Zero Depth

## Silicone Rubber Tubing

### Overview

Made from a material that's used for green house glazing, this synthetic rubber tubing maintains its flexibility and resiliency over time.

### Specifications:

**ID:** 1/8 inch • **OD:** 1/4 inch • **Bend Radius:** 1/4 inch

**Hardness:** 50 durometer • **Tensile Strength:** 1100 psi

**Application Temperature:** -94 to 392°F (-70 to 200°C)

**Material:** Silicone Rubber

### ORDERING INFORMATION

**ZPS-SIL-250-125-50** ..... 50 foot roll of silicone rubber tubing



Silicone Rubber  
Tubing





# Zone Pressure Probes & Accessories

C19

## Zone Pressure Sensors (ZPS)

Datasheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

## Pressure Probe Assemblies

### Ordering Information

PART #	DESCRIPTION	LIST PRICE
ZPS-ACC07....	Static Pressure Probe Assembly .....	\$28
ZPS-ACC08....	Aluminum Static Tube & Foam Pad Only (doesn't include hoses & damper) .....	\$13
ZPS-ACC09....	Rubber Hoses with Built-In Surge Damper (includes a bulk head fitting).....	\$15
ZPS-ACC11....	Pitot Pressure Probe Assembly, 3.5" long (includes static & total probe assemblies).....	\$72
ZPS-ACC12....	Pitot Pressure Probe Assembly, 6" long (includes ZPS-ACC07).....	\$72
ZPS-ACC13....	Total Tube Only (3.5") with Circular Foam (doesn't include hoses & damper) .....	\$14
ZPS-ACC14....	Total Tube Only (6") with Circular Foam (doesn't include hoses & damper) .....	\$14
ZPS-ACC15....	Surge Damper Only, 5 micron .....	\$8
ZPS-ACC17....	Static Tube Only (0.5") with Circular Foam (doesn't include hoses & damper).....	\$10.50
ZPS-ACC18....	2 Static Pressure Tube Assemblies, 6" Long.....	\$56
ZPS-ACC21....	Stainless Steel Static Tube Only (6") with Circular Foam and Mounting Screws (doesn't include hoses & damper).....	\$30
ZPS-ACC22....	Static Tube Only, Zero Length, with Circular Foam and Mounting Screws .....	\$7.50

## Silicone Rubber Tubing

PART NUMBER	DESCRIPTION	LIST PRICE
ZPS-SIL-250-125-50 .....	50 foot roll of silicone rubber tubing.....	\$73.50

Gray shaded items follow the Buy and Resale Multiplier.





## Features & Options

- Easy to Access Field Adjustable Setpoint from 0.1" to 35" W.C.
- UL 353 Listing So the Unit Can Be Used for Safety Controls
- 5 Amp Silver Contacts
- Built In Pressure Snubber for More Stable Readings

The BAPI Differential Pressure Switch is ideal for air filter monitoring, static pressure proving, airflow proving or auxiliary fan actuation.

Because of its UL 353 Limit Control Listing, the BAPI Switch can be used in safety circuits to protect heating appliances, heating systems, processing systems and HVAC/R systems.

The setpoint is field adjustable from 0.1" to 35" W.C., and the unit can measure positive pressure, vacuum or true differential pressure. The seven pressure ranges are field selectable by changing a color-coded spring. The spring for the range that you order is preinstalled, and the other six springs are shipped with the unit so that you can change ranges in the field if you choose.

The unit features a rugged plastic enclosure that protects the electrical terminations and pressure adjustment screw which is easily accessed through a port in the front cover using a square screwdriver bit (BA/SQ1BIT). The quick connect wiring terminations are accessed by opening the hinged cover. The unit is very compact and can be mounted directly on a flat surface with the rugged mounting feet, and the pressure barbs accept 3/16" or 1/4" tubing.

The unit also features an extremely high proof pressure of 100" W.C. so that it will continue to function properly even if it is accidentally connected to an unusually high or low pressure.



**Differential Pressure Switch**

## Ordering Information

Part Number	Description
ZPS-SW1:	Differential Pressure Switch, 0.12" to 0.52" W.C. (30 Pa to 130 Pa)
ZPS-SW2:	Differential Pressure Switch, 0.40" to 1.40" W.C. (100 Pa to 350 Pa)
ZPS-SW3:	Differential Pressure Switch, 1.20" to 2.40" W.C. (300 Pa to 600 Pa)
ZPS-SW4:	Differential Pressure Switch, 2.40" to 6.42" W.C. (600 Pa to 1,600 Pa)
ZPS-SW5:	Differential Pressure Switch, 5.22" to 12.84" W.C. (1,300 Pa to 3,200 Pa)
ZPS-SW6:	Differential Pressure Switch, 11.64" to 23.68" W.C. (2,900 Pa to 5,900 Pa)
ZPS-SW7:	Differential Pressure Switch, 21.68" to 35.32" W.C. (5,400 Pa to 8,800 Pa)
BA/SQ1BIT:	Square Screwdriver Bit to turn the Pressure Adjustment Screw



## Specifications

**Measurement Media:** Air, Combustion Gases

**Operating Temperature:** -40 to 185°F (-40 to 85°C)

**Operating Humidity:** 5 to 95% RH non-condensing

**Contact Ratings:** 28 VA pilot duty, 24 VAC  
1/10 HP, 120-277 VAC  
125 VA Pilot Duty, 125 VAC  
2.5 A Inductive, 125 VAC  
5 A Resistive, 125 VAC  
0.1 A, 30 VDC

**Proof Pressure:** 100" W.C. (3.6 PSI, 24,900 Pa)

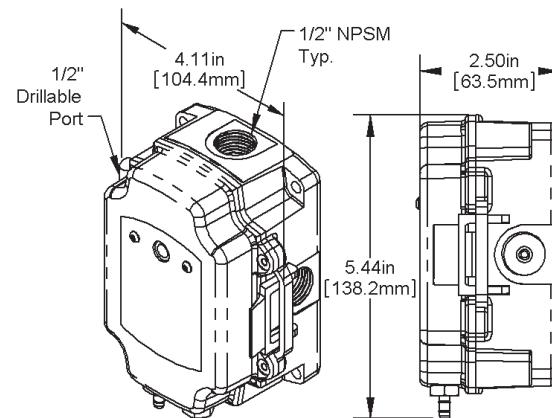
**Pressure Ports:** 1/4" Barbed Fittings

**Switch Type:** SPDT (Silver Contacts)

**Limit Controls:** UL 353 Listed

**Repeatability:** <10% of Setting

**Hysteresis:** 0.07 to 0.09 Inch W.C. For All Ranges



**Differential Pressure Switch**





# Differential Pressure Switch

**Zone Pressure Sensors (ZPS)**

**C21**

Datasheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

## Ordering Information

<b>PART NUMBERS</b>	<b>DESCRIPTION</b>	<b>LIST PRICE</b>
<b>ZPS-SW1:</b>	Differential Pressure Switch, 0.12" to 0.52" W.C. (30 Pa to 130 Pa) .....	\$84
<b>ZPS-SW2:</b>	Differential Pressure Switch, 0.40" to 1.40" W.C. (100 Pa to 350 Pa) .....	\$84
<b>ZPS-SW3:</b>	Differential Pressure Switch, 1.20" to 2.40" W.C. (300 Pa to 600 Pa) .....	\$84
<b>ZPS-SW4:</b>	Differential Pressure Switch, 2.40" to 6.42" W.C. (600 Pa to 1,600 Pa) .....	\$98
<b>ZPS-SW5:</b>	Differential Pressure Switch, 5.22" to 12.84" W.C. (1,300 Pa to 3,200 Pa) ....	\$98
<b>ZPS-SW6:</b>	Differential Pressure Switch, 11.64" to 23.68" W.C. (2,900 Pa to 5,900 Pa)...	\$98
<b>ZPS-SW7:</b>	Differential Pressure Switch, 21.68" to 35.32" W.C. (5,400 Pa to 8,800 Pa) ..	\$98
<b>BA/SQ1BIT:</b>	Square Screwdriver Bit to turn the Pressure Adjustment Screw.....	*\$1

\*Net Price - multipliers do not apply on the Square Screwdriver Bit.

Note: If you are using metal tubing, add “-PIB” to the end of the part number so that the High and Low Pressure ports will be located in the base of the unit rather than in the hinged cover.



## Wall & Ceiling Pressure Pickup Ports

*Wallplates and BAPI-Stat “Quantum” Style units available as pressure pickups alone or as combination pressure pickup and temperature sensor*

Room pressure pickup ports are available as a Wall Plate or a BAPI-Stat “Quantum” enclosure, both sized to fit a common 2" x 4" electrical box. A foam gasket seals the plate or enclosure to the wall. These units are available as a pickup alone or with a temperature sensor.

BAPI also offers a Ceiling Mount Square Cover that fits a standard 3/4" thick suspended ceiling tile, and a Low Profile Port that is ideal for locations where aesthetics are as important as the pressure measurement. The only visible portion is a flush 7/8" dot on the wall.



**BAPI-Stat  
“Quantum”  
Enclosure**



**Wall  
Plate**



**Low Profile  
Port**



**Ceiling Mount  
Square Cover**

*For more info, see pages C14-15*



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Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: [sales@bapihvac.com](mailto:sales@bapihvac.com) • Web: [www.bapihvac.com](http://www.bapihvac.com)

# Zone Pressure — Multi-Sensor (ZPM) —



- 6 Field Selectable Pressure Ranges and 5 Field Selectable Outputs
- Optional Display Shows Pressure Over the Entire Operational Range Regardless of Which Pressure Range is Selected
- Low Range, Standard Range or High Range Units
- IP44-Rated Enclosure
- Free NIST Certificate Included with Each Pressure Unit

BAPI's Zone Pressure Multi-Sensor with Display is an accurate, rugged and economical solution for measuring building pressure, air velocities and volumes. The heart of the unit is a micro-machined pressure sensor with excellent accuracy, repeatability and stability.

The optional LCD display helps with troubleshooting because it displays the actual differential pressure over the entire operational range regardless of which individual pressure range is selected for output to the system controller. Three LEDs on the face of the unit indicate when the pressure is "Out of Range Low," "In Range," or, "Out of Range High."



## VOC Sensors

A better way to ensure true Indoor Air Quality

Quantum Prime



pg D2

Quantum



pg D4

BAPI-Stat 3



pg D6



pg D8

## CO<sub>2</sub> Sensors

with continuous automatic Barometric pressure compensation

Quantum Prime



pg D10

Quantum



pg D12

BAPI-Stat 3



pg D14

BAPI-Stat 4



pg D16



pg D18

## CO Sensors

for Room, Duct or Rough Service

BAPI-Stat 4



pg D20

Duct and  
Rough Service



pg D21

## NO<sub>2</sub> Duct & Rough Service Sensor



pg D22

## Refrigerant Leak Detector



pg D23

## Calibration and Verification Kits



VOC

CO<sub>2</sub>

pg D24

## VOC and CO<sub>2</sub> Sensor White Papers and App. Notes - pages 27-37

- BAPI VOC Sensor Offers an Alternative to CO<sub>2</sub> for Demand Controlled Ventilation, pg 25
- Using the BAPI VOC Sensor for Demand Controlled Ventilation, pgs 26-30
- Calibration Methods for Single and Dual Beam CO<sub>2</sub> Sensors, pg 31
- Common VOCs Detected by BAPI's VOC Sensor, pgs 32-33
- The Effects of Temperature and Altitude on CO<sub>2</sub> Measurement, pgs 34-35



## Features & Options

- New BAPI-Stat "Quantum Prime" Enclosure Style
- VOC Alone or Temperature and Humidity Combination
- Achieves True Indoor Air Quality, Not Just CO<sub>2</sub> Dilution
- Output is Correlated to a CO<sub>2</sub> Value Allowing You to Ventilate Using ASHRAE's CO<sub>2</sub>-Based VRP Algorithm

Humans respire Volatile Organic Compounds (VOCs) as well as CO<sub>2</sub>. The BAPI sensor is able to measure these VOCs and indicate when a space is occupied just as well as a CO<sub>2</sub> sensor.

The advantage of the VOC sensor is that it measures air contaminants from other sources besides respiration, such as building materials, cleaners, perfumes and furniture and carpet off-gassing. Using this sensor for Demand Controlled Ventilation then is a way of achieving true indoor air quality, rather than just CO<sub>2</sub> dilution.

A further benefit is that it requires no additional work on your part. That's because the sensor converts the VOC reading to a CO<sub>2</sub> equivalent level. This lets you use ASHRAE's CO<sub>2</sub>-based VRP schedule to ventilate.

The new BAPI-Stat "Quantum Prime" unit is available as a VOC sensor alone or as a combination temperature and humidity sensor. The optional display alternates between the measured values and is field adjustable between °F or °C. The VOC level is indicated as "Good, Fair or Poor" by three discrete green, yellow and red LED's on the front of the unit. The red LED will begin to flash when the unit exceeds 2,000ppm, indicating that fresh air needs to be brought in.



**BAPI-Stat "Quantum Prime" VOC Sensor  
with Optional Temperature Setpoint and Occupancy Override**



## Specifications

### Power: (No AC Power)

0 to 5 VDC Output Units:

9 to 35 VDC @ 50 mA Max (9 to 15 VDC recommended)

0 to 10 VDC Output Units:

15 to 35 VDC @ 50mA Max (15 VDC recommended)

### Sensing Elements:

Humidity: Capacitive Polymer, ±2% RH Accuracy

VOCs: Micro-machined Metal Oxide

### Temp Sensor: Thermistor or RTD

**Mounting:** 2"x4" J-Box or drywall mount – screws provided

**VOC Detection Range:** 0 to 2,000 CO<sub>2</sub> PPM equivalent

**Response Time:** Less Than 60 Sec. (after Start-Up Time)

**Start-Up Time:** 15 minutes

### Operating Environment:

32 to 122°F (0 to 50°C) • 0 to 95% RH non-condensing

**Material:** ABS Plastic, Material Rated UL94V-0

### LED VOC/CO<sub>2</sub> Equivalent Level Indicator:

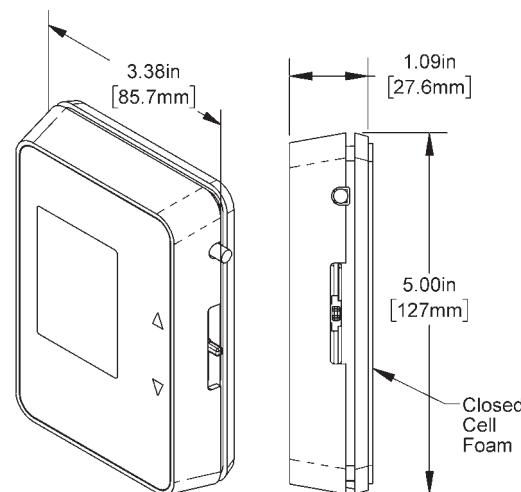
Good, Green < 1,000 PPM

Fair, Yellow = 1,000 to 1,500 PPM

Poor, Red > 1,500 PPM

### Certifications: RoHS

**Warranty Period:** 5 years





# VOC Room Sensor, BAPI-Stat "Quantum Prime"

D3

Air Quality Sensors

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and brackets with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.

## **BAPI-Stat "Quantum Prime" VOC Sensor Option Selection Guide:**

BA/ BQP( #1 ) - ( #2 ) - ( #3 ) - ( #4 ) - ( #5 ) - ( #6 )( #7 ) - ( #8 ) - ( #9 )

### **#1: Display Style (required)**

- F .....Unit with Display and °F indication ... \$35
- C .....Unit with Display and °C indication... \$35
- X .....Unit without Display

### **#2: VOC Output (required)**

- A .....VOC 0 to 5V Output ..... \$475
- B .....VOC 0 to 10V Output ..... \$475

### **#3: Temperature Sensor (required)**

- A .....1K Platinum RTD (385 curve)..... \$25
- B .....10K-2 Thermistor..... \$18
- C .....10K-3 Thermistor..... \$18
- D .....10K-3[11K] Thermistor..... \$18
- E .....20K Thermistor .....
- F .....1.8K Thermistor .....
- G .....1K Ω Nickel RTD .....
- H .....3K Thermistor .....
- X .....No Temperature Sensor

### **#4: Humidity Output (required)**

- A .....±2% Accuracy, Output of 0 to 5V..... \$80
- B .....±2% Accuracy, Output of 0 to 10V.... \$80
- X .....No Humidity Output

### **#5: Setpoint Adjustment (required)**

- 1.....Slider Setpoint Adjustment ..... \$6
- X .....No Setpoint Adjustment

### **#6: Setpoint Display Range (required)**

- A .....-3 to +3
- B .....-5 to +5
- C .....50 to 90 °F or 10 to 32 °C
- D .....55 to 85 °F or 13 to 30 °C
- E .....60 to 80 °F or 15 to 27 °C
- F .....65 to 80 °F or 18 to 27 °C
- X .....No Setpoint Adjustment

### **#7: Setpoint Output Range (required)**

- 00.....0 to 5 V
- 10.....0 to 10 V
- 40.....0 to 1 k
- 60.....0 to 10 kΩ
- 80.....0 to 20 kΩ
- 81.....4.75 k to 24.75 kΩ
- 82.....6.19 k to 26.19 kΩ
- 84.....10 k to 30 kΩ
- X .....No Setpoint Adjustment

### **#8: Occupant Override (required)**

- J .....Override as a Separate Output ..... \$5
- N .....Override in Parallel (//) with Sensor.... \$5
- P .....Override in Parallel (//) with Setpoint.. \$5
- X .....No Override

### **#9: Optional Selections\* (optional)**

- A .....Differential Ground
- B .....Comm Jack C35..... \$10
- F .....Test and Balance Switch ..... \$7.50

\*When more than one is selected, put in alphabetical order. Additional options and descriptions can be found on pg. 14

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

### **Example Number:**

BA/BQP ( F ) - ( A ) - ( B ) - ( A )- ( 1 ) - ( F )( 80 ) - ( N )

**Actual Number (with brackets removed):** BA/BQPF-A-B-A-1-F80-N

**Description:** BAPI-Stat "Quantum Prime" VOC Sensor, °F Display, 0 to 5V VOC Output, 10K-2 Thermistor Temperature Sensor, 0 to 5V Humidity Output, Slider Setpoint Adjustment, 65 to 80 Temp Setpoint Display Range, 0 to 20K Temp Setpoint Output Range, Override in Parallel with the temp sensor, No Additional Options

**List Price:** \$35 (°F Display) + \$475 (VOC Unit) + \$18 (Thermistor) + \$80 (Humidity) + \$6 (Setpoint) + \$5 (Override) = \$619 List

**Your Number:** BA/



Building Automation Products, Inc. • 750 North Royal Avenue, Gays Mills, WI 54631 USA

Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: [sales@bapihvac.com](mailto:sales@bapihvac.com) • Web: [www.bapihvac.com](http://www.bapihvac.com)



## Features & Options

- Achieves True Indoor Air Quality, Not Just CO<sub>2</sub> Dilution
- Output is Correlated to a CO<sub>2</sub> Value Allowing You to Ventilate Using ASHRAE's CO<sub>2</sub>-Based VRP Algorithm
- BAPI-Stat "Quantum" Enclosure with 0 to 5 or 0 to 10 VDC Output

Humans respire Volatile Organic Compounds (VOCs) as well as CO<sub>2</sub>. The BAPI sensor measures these VOCs and indicates when a space is occupied just as well as a CO<sub>2</sub> sensor.

The advantage of the VOC sensor is that it measures air contaminants from other sources besides respiration, such as building materials, cleaners, perfumes and furniture and carpet off-gassing. Using this sensor for Demand Controlled Ventilation then is a way of achieving true indoor air quality, rather than just CO<sub>2</sub> dilution.

A further benefit is that it requires no additional work on your part. That's because the sensor converts the VOC reading to a CO<sub>2</sub> equivalent level. This lets you use ASHRAE's CO<sub>2</sub>-based VRP schedule to ventilate. (More information on the CO<sub>2</sub> equivalent output is available on our website or in the Application Notes at the end of this section of the catalog.)

The BAPI-Stat "Quantum" VOC Room Sensor features 0 to 5 VDC or 0 to 10 VDC output. The VOC level is indicated as "Good, Fair or Poor" by three discrete green, yellow and red LED's on the front of the unit. If the output reaches 2,000 PPM, the red LED will begin to flash because it has hit its maximum output.



VOC Sensor in  
the BAPI-Stat  
"Quantum"  
Enclosure



## Specifications

### Power:

12 to 24 VDC, 35 mA Peak

18 to 24 VAC, 4 VA Peak

### Measurement Range:

0 to 2,000 PPM CO<sub>2</sub> Equivalent

### Selectable Output:

0 to 5 or 0 to 10 VDC > 4KΩ impedance

### Sensing Element:

Micro-machined Metal Oxide

### Termination:

3 Terminals, 16 to 22 AWG

### Wiring:

2 Pair

### Operating Environment:

32 to 122°F (0 to 50°C)

5 to 95%RH non-condensing

### Enclosure Material:

ABS Plastic, Material Rated UL94V-0

### VOC Detection Range:

0 to 2,000 ppm CO<sub>2</sub> Equivalent

### Start-Up Time:

Less Than 2 Minutes (after Start-Up Time)

### Mounting:

2"x4" J-Box or drywall – screws provided

### LED VOC Level Indicator:

Good, Green < 1,000 PPM

Fair, Yellow = 1,000 to 1,500 PPM

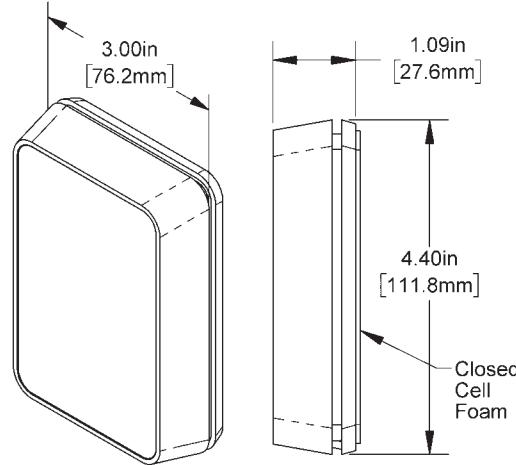
Poor, Red > 1,500 PPM

### Certifications:

RoHS

### Warranty Period:

5 Years





# VOC Room Sensor, BAPI-Stat "Quantum"

**Air Quality Sensors**

**D5**

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

## ***Ordering Information: BAPI-Stat Quantum VOC Sensor***

<b><u>Part #</u></b>	<b><u>Description</u></b>	<b><u>List Price</u></b>
<b>BA/BQX-A</b>	BAPI-Stat "Quantum" VOC Sensor, 0 to 5V Output.....	\$425
<b>BA/BQX-B</b>	BAPI-Stat "Quantum" VOC Sensor, 0 to 10V Output.....	\$425



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## Features & Options

- VOC Alone or Temperature and Humidity Combination
- Achieves True Indoor Air Quality, Not Just CO<sub>2</sub> Dilution
- Output is Correlated to a CO<sub>2</sub> Value Allowing You to Ventilate Using ASHRAE's CO<sub>2</sub>-Based VRP Algorithm

Humans respire Volatile Organic Compounds (VOCs) as well as CO<sub>2</sub>. The BAPI sensor is able to measure these VOCs and indicate when a space is occupied just as well as a CO<sub>2</sub> sensor.

The advantage of the VOC sensor is that it measures air contaminants from other sources besides respiration, such as building materials, cleaners, perfumes and furniture and carpet off-gassing. Using this sensor for Demand Controlled Ventilation then is a way of achieving true indoor air quality, rather than just CO<sub>2</sub> dilution.

A further benefit is that it requires no additional work on your part. That's because the sensor converts the VOC reading to a CO<sub>2</sub> equivalent level. This lets you use ASHRAE's CO<sub>2</sub>-based VRP schedule to ventilate. (More information on the CO<sub>2</sub> equivalent output is available on our website or in the Application Notes at the end of this section of the catalog.)

The unit is available as a VOC sensor alone or as a combination temperature and humidity sensor. The optional display alternates between the measured values and is field adjustable between °F or °C. Optional indication of the VOC level as "Good, Fair or Poor" is available as a three-color LED or arrow on the display.



VOC Sensors with Temp.  
Setpoint and Override.

## Specifications

### Power: (No AC Power)

0 to 5 VDC Output Units:

9 to 35 VDC @ 50 mA Max (9 to 15 VDC recommended)

0 to 10 VDC Output Units:

15 to 35 VDC @ 50mA Max (15 VDC recommended)

### Sensing Elements:

Humidity: Capacitive Polymer, ±2% RH Accuracy

VOCs: Micro-machined Metal Oxide

### Temp Sensor: Thermistor or RTD

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

**VOC Detection Range:** 0 to 2,000 CO<sub>2</sub> PPM equivalent

**Response Time:** Less Than 60 Sec. (after Start-Up Time)

**Start-Up Time:** 15 minutes

### Operating Environment:

32 to 122°F (0 to 50°C) • 0 to 95% RH non-condensing

### LED VOC/CO<sub>2</sub> Equivalent Level Indicator:

Good, Green < 1,000 PPM

Fair, Yellow = 1,000 to 1,500 PPM

Poor, Red > 1,500 PPM

### Material:

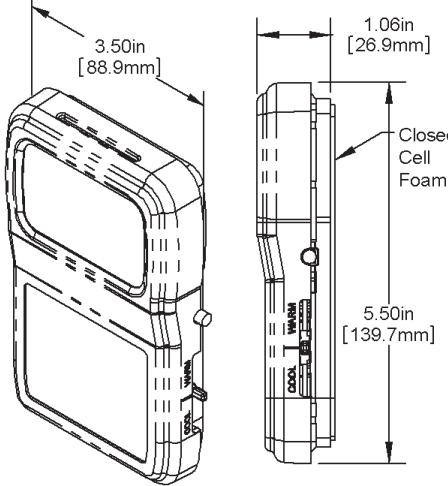
ABS Plastic, Material Rated UL94V-0

### Certifications:

RoHS

### Warranty Period:

5 years





# VOC Room Sensor, BAPI-Stat 3 Enclosure

D7

Rev. 12/19/16

Air Quality Sensors

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.

## VOC BAPI-Stat 3 Room Sensor Option Selection Guide:

BA/BS3 ( #1 ) - ( #2 ) - ( #3 ) - ( #4 )( #5 ) - ( #6 ) - ( #7 ) - ( #8 ) - ( #9 ) - ( #10 )

### **#1: Display Style** (required)

- F .....Unit with Display and °F indication ...\$35
- C .....Unit with Display and °C indication...\$35
- X .....Unit without Display

### **#2: VOC Output** (required)

- VOC05..VOC 0 to 5V Output .....\$475
- VOC10..VOC 0 to 10V Output .....\$475

### **#3: Humidity Output** (Optional)

- H205....±2% Accuracy, Output of 0 to 5V.....\$80
- H210....±2% Accuracy, Output of 0 to 10V....\$80
- H212....±2% Accuracy, Output of 2 to 10V....\$80

### **#4: Temp Setpoint Display Range** (optional)

- A .....-3 to +3 .....\$6
- B .....-5 to +5 .....\$6
- C .....50 to 90 °F or 10 to 32 °C .....\$6
- D .....55 to 85 °F or 13 to 30 °C.....\$6
- E .....60 to 80 °F or 15 to 27 °C.....\$6
- F .....65 to 80 °F or 18 to 27 °C.....\$6

### **#5: Temp Setpoint Output Range** (optional)

- 00.....0 to 5 V
- 10.....0 to 10 V
- 60.....0 to 10 kΩ
- 80.....0 to 20 kΩ
- 81.....4.75 k to 24.75 kΩ
- 82.....6.19 k to 26.19 kΩ
- 84.....10 k to 30 kΩ

### **#6: Temp Setpoint Legend** (optional)

- L6.....Cool/Warm
- L0.....No Legend

### **#7: Temperature Sensor** (optional)

- 1375.....1K Platinum RTD (375 curve).....\$25
- 1.....1K Platinum RTD (385 curve).....\$25
- 18.....1.8K Thermistor.....\$18
- 3.....3K Thermistor .....\$18
- 102.....10K-2 Thermistor.....\$18
- 103.....10K-3 Thermistor.....\$18
- 10311....10K-3[11K] Thermistor.....\$18
- 20.....20K Thermistor .....\$18

### **#8: Occupant Override** (required)

- J.....Override as a Separate Output .....\$5
- N.....Override in Parallel (//) with Sensor....\$5
- P.....Override in Parallel (//) with Setpoint..\$5
- Z .....No Override

### **#9: Communication Jack** (optional)

- C35.....3.5 mm Phono Style Jack.....\$10

### **#10: Configuration**

(optional - Common Ground is default)

- DF.....Differential Ground

### **#11: VOC Level Indication** (required)

- LED.....3 Color LED on Logo Plate
- ARW ....Black Arrow on Display
- BNK .....No LED or Arrow

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options. Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

### Example Number:

BA/BS3 ( F ) - ( VOC05 ) - ( ) - ( F )( 80 )( L6 ) - ( 102 ) - ( N ) - ( ) - ( DF ) - ( ARW )

Actual Number (with parenthesis removed): BA/BS3F-VOC05-F80L6-102-N-DF-ARW

Description: BAPI-Stat 3, °F Display, 0 to 5V VOC Output, 65 to 80 Temp Setpoint Display Range, 0 to 20K Temp Setpoint Output Range, Cool/Warm Legend, 10K-2 Thermistor Temperature Sensor, No Override, No Comm. Jack, Differential Ground Configuration, Black Arrow on Display VOC Level Indication

List Price: \$35 (°F Display) + \$475 (VOC Unit) + \$6 (Temp Setpoint) +\$18 (Thermistor) = \$534 List

Your Number: BA/



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## Features & Options

- Corresponds to ASHRAE's CO<sub>2</sub>-Based DCV Algorithm
- Duct Aspiration Tube or Rough Service Ventilated BAPI-Box
- 0 to 5 VDC or 0 to 10 VDC Output

Humans respire Volatile Organic Compounds (VOCs) as well as CO<sub>2</sub>. The BAPI sensor measures these VOCs and indicates when a space is occupied just as well as a CO<sub>2</sub> sensor.

The advantage of the VOC sensor is that it measures air contaminants from other sources besides respiration, such as building materials, cleaners, perfumes and furniture and carpet off-gassing. Using this sensor for Demand Controlled Ventilation then is a way of achieving true indoor air quality, rather than just CO<sub>2</sub> dilution.

A further benefit is that it requires no additional work on your part. That's because the sensor converts the VOC reading to a CO<sub>2</sub> equivalent level. This lets you use ASHRAE's CO<sub>2</sub>-based VRP schedule to ventilate. (More information on the CO<sub>2</sub> equivalent output is available on our website or in the Application Notes at the end of this section.)

The Duct Sensor samples duct air using an aspiration tube, while the Rough Service unit features a ventilated BAPI-Box and is ideal for areas such as outdoor air plenums, equipment rooms, green houses and warehouses. The VOC level is indicated as "Good, Fair or Poor" by three discrete green, yellow and red LED's on the front of the unit. If the output reaches 2,000 PPM, the red LED will begin to flash because it has hit its maximum output.



VOC Duct Sensor



VOC Rough Service Sensor

## Specifications

### Power:

12 to 24 VDC, 50 mA Peak  
18 to 24 VAC, 1.5 VA Peak

### Analog Outputs:

0 to 5VDC or 0 to 10VDC, >10KΩ impedance  
VOC Contaminants: 0 to 2,000 PPM CO<sub>2</sub> Equivalent

### VOC Sensing Element:

Micro-machined Metal Oxide

### VOC Detection Range:

0 to 2,000 ppm CO<sub>2</sub> Equivalent

### Response Time:

Less Than 60 Seconds

### Start-Up Time:

15 minutes

### Operating Environment:

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

### Enclosure Rating:

Unventilated BAPI-Box: NEMA 4, IP66

### Enclosure Material:

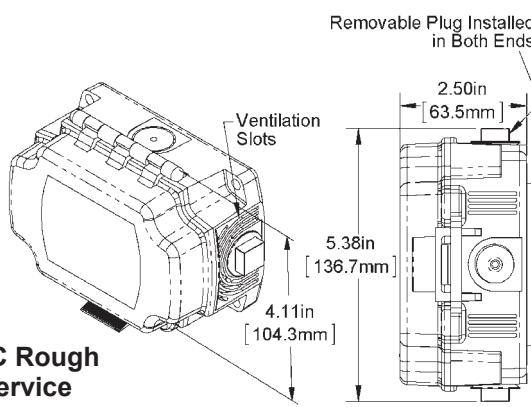
Polycarbonate, UL94 V-O

### Certifications:

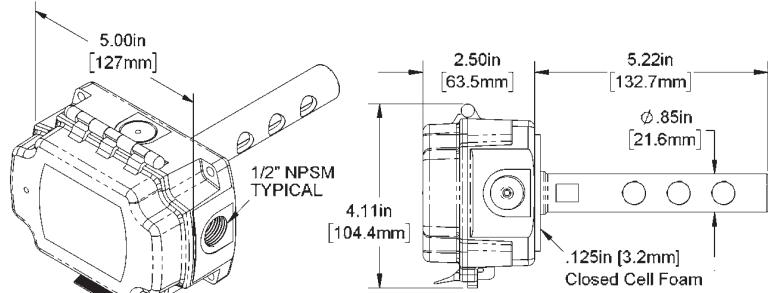
RoHS

### LED VOC/CO<sub>2</sub> Level Indicator:

Good, Green < 1,000 PPM  
Fair, Yellow = 1,000 to 1,500 PPM  
Poor, Red > 1,500 PPM



VOC Rough Service



VOC Duct Sensor





# VOC Duct and Rough Service Sensor

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Air Quality Sensors

Ordering Grids without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

## ***Ordering Information: Duct or Rough Service VOC Sensor***

<u>Part #</u>	<u>Description</u>	<u>List Price</u>
BA/VOC05-D-BB .....	Duct VOC Sensor, 0 to 5V Output .....	\$487
BA/VOC10-D-BB .....	Duct VOC Sensor, 0 to 10V Output .....	\$487
BA/VOC05-V-BB .....	Rough Service VOC Sensor, 0 to 5V Output .....	\$555
BA/VOC10-V-BB .....	Rough Service VOC Sensor, 0 to 10V Output .....	\$555



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## Features & Options

- New BAPI-Stat "Quantum Prime" Enclosure Style
- Automatic Barometric Pressure Compensation for Accurate Readings Regardless of Weather or Altitude
- Optional Temperature, Setpoint, Override and Humidity
- Models for Periodically Unoccupied or Continuously Occupied Areas

The BAPI CO<sub>2</sub> Sensor is an accurate and reliable way of incorporating demand controlled ventilation into a building's HVAC strategy. It measures the CO<sub>2</sub> in a range of 0 to 2,000 ppm with a field selectable output of 0 to 5 or 0 to 10 VDC.

The Single Channel unit has been optimized for periodically unoccupied areas and features automatic background calibration over a long time period to reduce drift. The Dual Channel "24/7" unit has been optimized for continuously occupied areas and features a three-point calibration process for enhanced stability, accuracy and reliability.

Barometric pressure changes from altitude or weather patterns can affect CO<sub>2</sub> sensors, even putting them outside of their specified accuracy. The BAPI unit has a built-in Barometric pressure sensor that continuously compensates the output for accurate readings despite the weather or altitude of the installation.

The BAPI-Stat "Quantum Prime" unit can be ordered as CO<sub>2</sub> alone, or as a combination temperature and humidity sensor. The CO<sub>2</sub> level is indicated as "Good, Fair or Poor" by three discrete green, yellow and red LED's on the front of the unit. The red LED will begin to flash when the unit exceeds 2,000ppm, indicating that fresh air needs to be brought in.



**BAPI-Stat "Quantum Prime" CO2 Sensor with Optional Temperature Setpoint and Occupancy Override**



## Specifications

### Power for 0 to 5 VDC Outputs:

9 to 35 VDC @ 240 mA (9 to 24 VDC recomm.)

### Power for 0 to 10 VDC Outputs:

15 to 35 VDC @ 240 mA (15 to 24 VDC recomm.)

### CO<sub>2</sub> Sensor:

Single Channel or Dual Channel Non-Dispersive Infrared (NDIR)

### Humidity Sensor:

Capacitive Polymer ±2% RH Accuracy

### Temperature Sensor:

Thermistor or RTD

### Operating Environment:

32 to 122°F (0 to 50°C) • 0 to 95%RH non-condensing

### Material:

ABS Plastic, Material Rated UL94V-O

### CO<sub>2</sub> Detection Range:

0 to 2,000 ppm

### Start-Up Time:

<2 Minutes

### Response Time:

<2 Minutes for 90% step change typical (after start-up)

### CO<sub>2</sub> Accuracy (Single Channel Units):

400 to 1,250 ppm: ±30ppm or 3% of reading, whichever is greater

1,250 to 2,000 ppm: ±5% of reading + 30ppm

### CO<sub>2</sub> Accuracy (Dual Channel "24/7" Units):

75ppm or 10% of reading (whichever is greater)

### CO<sub>2</sub> Drift Stability (Dual Channel "24/7" Units):

<5% of full scale over life of product.

**Mounting:** 2"x4" J-Box or drywall – screws provided

### LED CO<sub>2</sub> Level Indicator:

Good, Green < 1,000 PPM

Fair, Yellow = 1,000 to 1,500 PPM

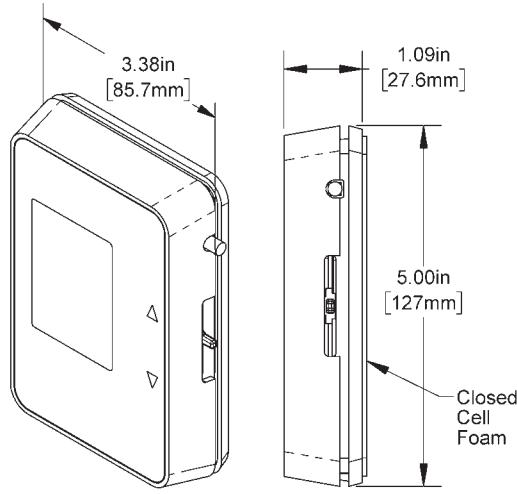
Poor, Red > 1,500 PPM

### Certifications:

RoHS

### Warranty Period:

5 Years





# CO<sub>2</sub> Room Sensor, BAPI-Stat “Quantum Prime”

Air Quality Sensors

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Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.

## **BAPI-Stat “Quantum Prime” CO<sub>2</sub> Sensor Option Selection Guide:**

BA/AQP( #1 ) - ( #2 ) - ( #3 ) - ( #4 ) - ( #5 ) - ( #6 )( #7 ) - ( #8 ) - ( #9 )

### **#1: Display Style** (required)

- F .....Unit with Display and °F indication ..... \$35
- C .....Unit with Display and °C indication..... \$35
- X .....Unit without Display

### **#2: CO<sub>2</sub> Output** (required)

- A .....Single Channel, 0 to 5V Output ..... \$475
- B .....Single Channel, 0 to 10V Output..... \$475
- C .....Dual Channel, 0 to 5V Output ..... \$505
- D .....Dual Channel, 0 to 10V Output ..... \$505

### **#3: Temperature Sensor** (required)

- A .....1K Platinum RTD (385 curve)..... \$25
- B .....10K-2 Thermistor..... \$18
- C .....10K-3 Thermistor..... \$18
- D .....10K-3[11K] Thermistor..... \$18
- E .....20K Thermistor..... \$18
- F .....1.8K Thermistor..... \$18
- G .....1K Ω Nickel RTD ..... \$35
- H .....3K Thermistor..... \$18
- X .....No Temperature Sensor

### **#4: Humidity Output** (required)

- A .....±2% Accuracy, Output of 0 to 5V..... \$80
- B .....±2% Accuracy, Output of 0 to 10V..... \$80
- X .....No Humidity Output

### **#5: Setpoint Adjustment** (required)

- 1.....Slider Setpoint Adjustment ..... \$6
- X .....No Setpoint Adjustment

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options.*

### **#6: Setpoint Display Range** (required)

- A .....-3 to +3
- B .....-5 to +5
- C .....50 to 90 °F or 10 to 32 °C
- D .....55 to 85 °F or 13 to 30 °C
- E .....60 to 80 °F or 15 to 27 °C
- F .....65 to 80 °F or 18 to 27 °C
- X .....No Setpoint Adjustment

### **#7: Setpoint Output Range** (required)

- 0.....0 to 5 V
- 10.....0 to 10 V
- 40.....0 to 1 k
- 60.....0 to 10 kΩ
- 80.....0 to 20 kΩ
- 81.....4.75 k to 24.75 kΩ
- 82.....6.19 k to 26.19 kΩ
- 84.....10 k to 30 kΩ
- X .....No Setpoint Adjustment

### **#8: Occupant Override** (required)

- J .....Override as a Separate Output ..... \$5
- N .....Override in Parallel (//) with Sensor..... \$5
- P .....Override in Parallel (//) with Setpoint..... \$5
- X .....No Override

### **#9: Optional Selections\*** (optional)

- A .....Differential Ground
- B .....Comm Jack C35..... \$10
- F .....Test and Balance Switch ..... \$7.50

\*When more than one is selected, put in alphabetical order. Additional options and descriptions can be found on pg. 14

### Example Number:

BA/AQP ( F ) - ( A ) - ( B ) - ( A )- ( 1 ) - ( F )( 80 ) - ( N )

Actual Number (with brackets removed): BA/AQPF-A-B-A-1-F80-N

Description: BAPI-Stat “Quantum Prime” CO<sub>2</sub> Sensor, °F Display, 0 to 5V Single Channel CO<sub>2</sub> Output, 10K-2 Thermistor Temperature Sensor, 0 to 5V Humidity Output, Slider Setpoint Adjustment, 65 to 80 Temp Setpoint Display Range, 0 to 20K Temp Setpoint Output Range, Override in Parallel with the temp sensor, No Additional Options

List Price: \$35 (°F Display) + \$475 (CO<sub>2</sub> Unit) + \$18 (Thermistor) + \$80 (Humidity) + \$6 (Setpoint) + \$5 (Override) = \$619 List

Your Number: BA/



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## Features & Options

- Automatic Barometric Pressure and Temperature Compensation
- Optimized for Periodically Unoccupied or Continuously Occupied Areas

The BAPI-Stat "Quantum" CO<sub>2</sub> Sensor is an accurate and reliable way of incorporating demand controlled ventilation into a building's HVAC strategy. It measures the CO<sub>2</sub> in ranges of 0 to 2,000, 0 to 5,000, 0 to 10,000 and 0 to 50,000 ppm with a field selectable output of 0 to 5 or 0 to 10 VDC.

The Single Channel unit has been optimized for periodically unoccupied areas and features automatic background calibration over a long time period to reduce drift. The Dual Channel "24/7" unit has been optimized for continuously occupied areas and features a three-point calibration process for enhanced stability, accuracy and reliability.

Air pressure changes from altitude or weather patterns can affect the output of CO<sub>2</sub> sensors, even putting them outside of their specified accuracy. The BAPI unit has a built-in barometric sensor that continuously compensates the output for accurate readings despite the weather or altitude of the installation.

For 0 to 2000 PPM units, the CO<sub>2</sub> level is indicated as "Good, Fair or Poor" by three discrete green, yellow and red LED's on the front of the unit. If it reaches the top of the PPM range, the red LED will begin to flash.



**CO<sub>2</sub> Sensor  
in the  
BAPI-Stat  
"Quantum"  
Enclosure**



## Specifications

### Power:

12 to 24 VDC, 240 mA  
18 to 24 VAC, 12 VA Peak

### CO<sub>2</sub> Sensing Elements:

Single Channel or Dual Channel Non-Dispersive Infrared (NDIR)

### Field Selectable Voltage Output:

0 to 5 or 0 to 10 VDC

### Termination:

3 Terminals, 16 to 22 AWG

### LED CO<sub>2</sub> Level Indicator (for 0 to 2,000 PPM units only):

### Operating Environment:

Good, Green < 1,000 PPM  
Fair, Yellow = 1,000 to 1,500 PPM  
Poor, Red > 1,500 PPM

### Certifications:

RoHS

### Mounting:

2"x4" J-Box or drywall – screws provided

### CO<sub>2</sub> Accuracy (Single Channel Units):

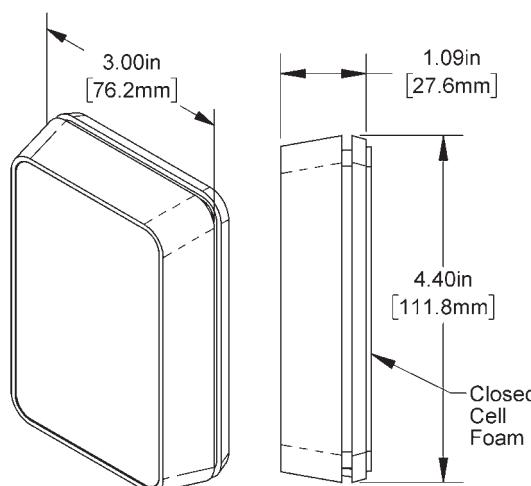
400 to 1,250 ppm: ±30ppm or 3% of reading,  
whichever is greater  
1,250 to 2,000 ppm: ±5% of reading + 30ppm

### CO<sub>2</sub> Accuracy (Dual Channel "24/7" Units):

75ppm or 10% of reading (whichever is greater)

### CO<sub>2</sub> Drift Stability (Dual Channel "24/7" Units):

<5% of full scale over life of product.





# CO<sub>2</sub> Room Sensor, BAPI-Stat "Quantum"

Air Quality Sensors

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Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

## Ordering Information: BAPI-Stat "Quantum" CO<sub>2</sub> Sensor

Part #	Description	List Price
BA/AQX-A.....	Single Channel for Periodically Unoccupied Areas, 0 to 5 V Output, 0 to 2,000 PPM Range	\$425
BA/AQX-B.....	Single Channel for Periodically Unoccupied Areas, 0 to 10 V Output, 0 to 2,000 PPM Range	\$425
BA/AQX-C.....	Dual Channel for Continuously Occupied Areas, 0 to 5 V Output, 0 to 2,000 PPM Range	\$455
BA/AQX-D.....	Dual Channel for Continuously Occupied Areas, 0 to 10 V Output, 0 to 2,000 PPM Range	\$455
BA/AQX-E.....	Dual Channel for Continuously Occupied Areas, 0 to 5 V Output, 0 to 5,000 PPM Range	Call
BA/AQX-F.....	Dual Channel for Continuously Occupied Areas, 0 to 10 V Output, 0 to 5,000 PPM Range	Call
BA/AQX-G.....	Dual Channel for Continuously Occupied Areas, 0 to 5 V Output, 0 to 10,000 PPM Range	Call
BA/AQX-H.....	Dual Channel for Continuously Occupied Areas, 0 to 10 V Output, 0 to 10,000 PPM Range	Call
BA/AQX-I.....	Dual Channel for Continuously Occupied Areas, 0 to 5 V Output, 0 to 50,000 PPM Range	Call
BA/AQX-J.....	Dual Channel for Continuously Occupied Areas, 0 to 10 V Output, 0 to 50,000 PPM Range	Call

Your Number: BA/

## Associated Products

### BAPI VC350A or VC350A-EZ VOLTAGE CONVERTERS

The CO<sub>2</sub> unit requires 240mA of current to operate correctly. If this is more current than can be provided by the controller power output, then the unit can be powered by a BAPI VC350A or VC350A-EZ Voltage Converter. See the Accessories section for more info.



VC350A-EZ Voltage  
Converter



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## Features & Options

- Automatic Barometric Pressure Compensation for Accurate Readings Regardless of Weather or Altitude
- Optional Temperature, Setpoint, Override and Humidity
- Models for Periodically Unoccupied or Continuously Occupied Areas

The BAPI CO<sub>2</sub> Sensor is an accurate and reliable way of incorporating demand controlled ventilation into a building's HVAC strategy. It measures the CO<sub>2</sub> in a range of 0 to 2,000 ppm with a field selectable output of 0 to 5 or 0 to 10 VDC.

The Single Channel (ACD) unit has been optimized for periodically unoccupied areas and features automatic background calibration over a long time period to reduce drift. The Dual Channel (DCD) "24/7" unit has been optimized for continuously occupied areas and features a three-point calibration process for enhanced stability, accuracy and reliability.

Barometric pressure changes from altitude or weather patterns can affect CO<sub>2</sub> sensors, even putting them outside of their specified accuracy. The BAPI unit has a built-in Barometric pressure sensor that continuously compensates the output for accurate readings despite the weather or altitude of the installation.

The unit can be ordered as CO<sub>2</sub> alone, or with optional temp, temp setpoint, override and humidity. Optional indication of CO<sub>2</sub> level as "Good, Fair or Poor" is available as a three-color LED or as an arrow on the display.



**CO<sub>2</sub> Sensors with Temp Setpoint and Override.**

## Specifications

### Power for 0 to 5 VDC Outputs:

9 to 35 VDC @ 240 mA (9 to 24 VDC recomm.)

### Power for 0 to 10 VDC Outputs:

15 to 35 VDC @ 240 mA (15 to 24 VDC recomm.)

### Sensing Elements:

ACD Unit CO<sub>2</sub>: Single Channel Non-Dispersive Infrared (NDIR)

DCD Unit CO<sub>2</sub>: Dual Channel Non-Dispersive Infrared (NDIR)

Humidity: Capacitive Polymer ±2% RH Accuracy

**Temperature Sensor:** Thermistor or RTD

### Operating Environment:

32 to 122°F (0 to 50°C)

0 to 95%RH non-condensing

**Material** ABS Plastic, Material Rated UL94V-O

**CO<sub>2</sub> Detection Range:** 0 to 2,000 ppm

**Start-Up Time:** <2 Minutes

### Response Time:

<2 Minutes for 90% step change typical (after start-up)

### CO<sub>2</sub> Accuracy (Single Channel ACD Units):

400 to 1,250 ppm: ±30ppm or 3% of reading, whichever is greater  
1,250 to 2,000 ppm: ±5% of reading + 30ppm

### CO<sub>2</sub> Accuracy (Dual Channel DCD "24/7" Units):

75ppm or 10% of reading (whichever is greater)

### CO<sub>2</sub> Drift Stability (Dual Channel DCD "24/7" Units):

<5% of full scale over life of product.

**Mounting:** 2"x4" J-Box or drywall  
— screws provided

### LED CO<sub>2</sub> Level Indicator:

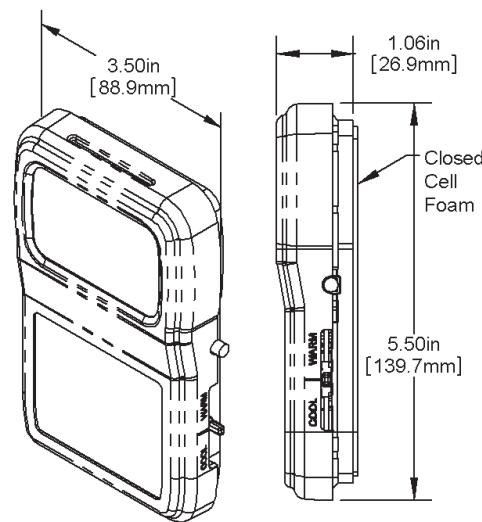
Good, Green < 1,000 PPM

Fair, Orange = 1,000 to 1,500 PPM

Poor, Red > 1,500 PPM

**Certifications:** RoHS

**Warranty Period:** 5 Years





# CO<sub>2</sub> Room Sensor, BAPI-Stat 3 Enclosure

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Air Quality Sensors

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Use the Option Selection Guide below to create your custom part number. Replace the number and parenthesis with the designator for each selection. Skip the designator and dashes for optional selections that are not required in your configuration.

## CO<sub>2</sub> BAPI-Stat 3 Room Sensor Option Selection Guide:

BA/BS3 ( #1 ) - ( #2 ) - ( #3 ) - ( #4 )( #5 ) - ( #6 ) - ( #7 ) - ( #8 ) - ( #9 ) - ( #10 )

### **#1: Display Style** (required)

- F .....Unit with Display and °F indication ...\$35
- C .....Unit with Display and °C indication...\$35
- X .....Unit without Display

### **#2: CO<sub>2</sub> Output** (required)

- ACD05..Single Channel, 0 to 5V Output ....\$475
- ACD10..Single Channel, 0 to 10V Output....\$475
- DCD05..Dual Channel, 0 to 5V Output .....\$505
- DCD10..Dual Channel, 0 to 10V Output .....\$505

### **#3: Humidity Output** (Optional)

- H205....±2% Accuracy, Output of 0 to 5V.....\$80
- H210 ....±2% Accuracy, Output of 0 to 10V....\$80
- H212 ....±2% Accuracy, Output of 2 to 10V....\$80

### **#4: Temp Setpoint Display Range** (optional)

- A .....-3 to +3 .....\$6
- B .....-5 to +5 .....\$6
- C .....50 to 90 °F or 10 to 32 °C .....\$6
- D .....55 to 85 °F or 13 to 30 °C.....\$6
- E .....60 to 80 °F or 15 to 27 °C.....\$6
- F .....65 to 80 °F or 18 to 27 °C.....\$6

### **#5: Temp Setpoint Output Range** (optional)

- 00.....0 to 5 V
- 10.....0 to 10 V
- 60.....0 to 10 kΩ
- 80.....0 to 20 kΩ
- 81.....4.75 k to 24.75 kΩ
- 82.....6.19 k to 26.19 kΩ
- 84.....10 k to 30 kΩ

### **#6: Temp Setpoint Legend** (optional)

- L6.....Cool/Warm
- L0.....No Legend

### **#7: Temperature Sensor** (optional)

- 1375.....1K Platinum RTD (375 curve).....\$25
- 1.....1K Platinum RTD (385 curve).....\$25
- 18.....1.8K Thermistor .....\$18
- 3.....3K Thermistor .....\$18
- 102.....10K-2 Thermistor .....\$18
- 103.....10K-3 Thermistor .....\$18
- 10311....10K-3[11K] Thermistor.....\$18
- 20.....20K Thermistor .....\$18

### **#8: Occupant Override** (required)

- J.....Override as a Separate Output .....\$5
- N.....Override in Parallel (//) with Sensor....\$5
- P.....Override in Parallel (//) with Setpoint..\$5
- Z .....No Override

### **#9: Communication Jack** (optional)

- C35.....3.5 mm Phono Style Jack.....\$10

### **#10: Configuration**

- (optional - Common Ground is default)
- DF.....Differential Ground

### **#11: CO<sub>2</sub> Level Indication** (required)

- LED.....3 Color LED on Logo Plate
- ARW ....Black Arrow on Display
- BNK .....No LED or Arrow

*Additional options are available for these units but not shown in this Selection Guide. Contact your BAPI representative for the complete list of options.*

#### Example Number:

BA/BS3 ( F ) - ( ACD05 ) - ( ) - ( F )( 80 )( L6 ) - ( 102 ) - ( N ) - ( ) - ( DF ) - ( ARW )

Actual Number (with parenthesis removed): BA/BS3F-ACD05-F80L6-102-N-DF-ARW

Description: BAPI-Stat 3, °F Display, 0 to 5V Single Channel CO<sub>2</sub> Output, 65 to 80 Temp Setpoint Display Range, 0 to 20K Temp Setpoint Output Range, Cool/Warm Legend, 10K-2 Thermistor Temperature Sensor, No Override, No Comm. Jack, Differential Ground Configuration, Black Arrow on Display CO<sub>2</sub> Level Indication

#### List Price:

\$35 (°F Display) + \$475 (Single Channel Unit) + \$6 (Temp Setpoint) + \$18 (Thermistor) = \$534 List

Your Number: BA/



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## Features & Options

- Automatic Barometric Pressure and Temperature Compensation
- Optimized for Periodically Unoccupied or Continuously Occupied Areas

The CO<sub>2</sub> Sensor in the BAPI-Stat 4 Enclosure is an accurate and reliable way of incorporating demand controlled ventilation into a building's HVAC strategy. It measures the CO<sub>2</sub> in ranges of 0 to 2,000, 0 to 5,000 and 0 to 50,000 ppm with a field selectable output of 0 to 5 or 0 to 10 VDC.

The Single Channel unit has been optimized for periodically unoccupied areas and features Automatic Background Calibration (ABC) over a long time period to reduce drift. The Dual Channel "24/7" unit has been optimized for continuously occupied areas and features a three-point calibration process for enhanced accuracy and reliability.

Air pressure changes from altitude or weather patterns can affect the output of CO<sub>2</sub> sensors, even putting them outside of their specified accuracy. The BAPI unit has a built-in barometric sensor that continuously compensates the output for accurate readings despite the weather or altitude of the installation.

For 0 to 2,000 ppm range units, CO<sub>2</sub> level indication of "Good, Fair or Poor" comes as a 3-color LED.



CO<sub>2</sub> Sensor in the  
BAPI-Stat 4 Enclosure

## Specifications

### Power:

12 to 24 VDC, 240 mA  
18 to 24 VAC, 12 VA Peak

### CO<sub>2</sub> Sensing Elements:

Single Channel: Non-Dispersive Infrared, ABC Algorithm  
Dual Channel: Non-Dispersive Infrared, 3-Point Calibration

### Field Selectable Voltage Output:

0 to 5 or 0 to 10 VDC

### Termination:

3 Terminals, 16 to 22 AWG

### Operating Environment:

32 to 122°F (0 to 50°C) • 0 to 95%RH non-condensing

### Enclosure Material:

ABS Plastic, Material Rated UL94V-O

### CO<sub>2</sub> Detection Range:

0 to 2,000, 0 to 5,000 and 0 to 50,000

### Start-Up Time:

<2 Minutes

### Response Time:

<2 Minutes for 90% step change typical (after start-up)

### Mounting:

2"x4" J-Box or drywall – screws provided

### CO<sub>2</sub> Accuracy, Single Channel (ABC) Units:

400 to 1,250 ppm: ±30ppm or 3% of reading,  
whichever is greater

1,250 to 2,000 ppm: ±5% of reading + 30ppm

### CO<sub>2</sub> Accuracy, Dual Channel "24/7" Units:

75ppm or 10% of reading (whichever is greater)

### CO<sub>2</sub> Drift Stability, Dual Channel "24/7" Units:

<5% of full scale over life of product.

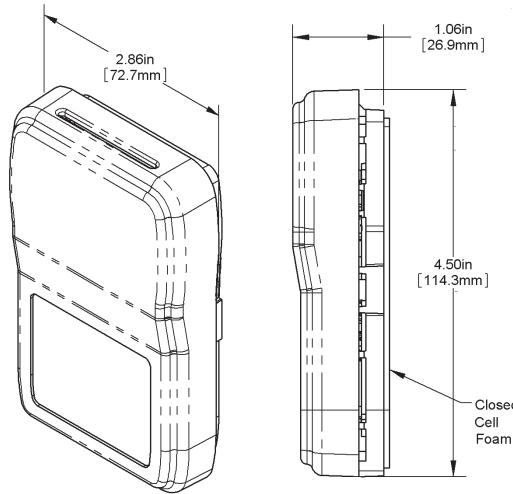
### Optional LED CO<sub>2</sub> Level Indicator:

Good, Green < 1,000 PPM  
Fair, Orange = 1,000 to 1,500 PPM  
Poor, Red > 1,500 PPM

(LED available for 0 to 2,000 ppm units only.)

### Certifications:

RoHS  
Warranty Period: 5 Years





# CO<sub>2</sub> Room Sensor, BAPI-Stat 4 Enclosure

D17

Air Quality Sensors

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

## Ordering Information

### SINGLE CHANNEL (ABC) UNITS FOR PERIODICALLY UNOCCUPIED AREAS LIST PRICE

#### **BA/BS4-ACD05**

Single Channel BAPI-Stat 4 CO<sub>2</sub> Room Sensor, 0 to 5V Output, 0 to 2,000 PPM Range .....\$425

#### **BA/BS4-ACD10**

Single Channel BAPI-Stat 4 CO<sub>2</sub> Room Sensor, 0 to 10V Output, 0 to 2,000 PPM Range .....\$425

### DUAL CHANNEL "24/7" UNITS FOR CONTINUOUSLY OCCUPIED AREAS LIST PRICE

#### **BA/BS4-DCD05**

Dual Channel "24/7" BAPI-Stat 4 CO<sub>2</sub> Room Sensor, 0 to 5V Output, 0 to 2,000 PPM Range.....\$455

#### **BA/BS4-DCD10**

Dual Channel "24/7" BAPI-Stat 4 CO<sub>2</sub> Room Sensor, 0 to 10V Output, 0 to 2,000 PPM Range.....\$455

#### **BA/BS4-DCD05-5K**

Dual Channel "24/7" BAPI-Stat 4 CO<sub>2</sub> Room Sensor, 0 to 5V Output, 0 to 5,000 PPM Range.....\$455

#### **BA/BS4-DCD10-5K**

Dual Channel "24/7" BAPI-Stat 4 CO<sub>2</sub> Room Sensor, 0 to 10V Output, 0 to 5,000 PPM Range.....\$455

#### **BA/BS4-DCD05-50K**

Dual Channel "24/7" BAPI-Stat 4 CO<sub>2</sub> Room Sensor, 0 to 5V Output, 0 to 50,000 PPM Range.....\$455

#### **BA/BS4-DCD10-50K**

Dual Channel "24/7" BAPI-Stat 4 CO<sub>2</sub> Room Sensor, 0 to 10V Output, 0 to 50,000 PPM Range.....\$455



## Associated Products

### **BAPI VC350A or VC350A-EZ VOLTAGE CONVERTERS**

The CO<sub>2</sub> unit requires 240mA of current to operate correctly. If this is more current than can be provided by the controller power output, then the unit can be powered by a BAPI VC350A or VC350A-EZ Voltage Converter. See the Accessories section for more info.



**VC350A-EZ  
Voltage Converter**



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Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: [sales@bapihvac.com](mailto:sales@bapihvac.com) • Web: [www.bapihvac.com](http://www.bapihvac.com)



## Features & Options

- Automatic Air Pressure and Temperature Compensation
- Optimized for Periodically or Continuously Occupied Areas

The BAPI CO<sub>2</sub> Duct Sensor is an accurate and reliable way of incorporating demand controlled ventilation. It measures CO<sub>2</sub> in ranges of 0 to 2,000, 0 to 5,000 and 0 to 50,000 ppm with a field selectable output of 0 to 5 or 0 to 10 VDC.

The Single Channel unit has been optimized for periodically unoccupied areas and features Automatic Background Calibration (ABC) over a long time period to reduce drift. The Dual Channel "24/7" unit has been optimized for continuously occupied areas and features a 3-point calibration process for enhanced accuracy and reliability.

Altitude and weather patterns can affect CO<sub>2</sub> sensors, even putting them outside of their specified accuracy. The BAPI unit has a built-in Barometric pressure sensor that continuously compensates the output for accurate readings despite the weather or altitude.

The Duct unit samples duct air using an aspiration tube. The Rough Service unit features a ventilated BAPI-Box and is ideal for areas such as outdoor air plenums, equipment rooms, green houses and warehouses. For 0 to 2,000 PPM units, the CO<sub>2</sub> level is indicated as "Good, Fair or Poor" by three LED's on the front of the unit. If it reaches the top of the PPM range, the red LED will begin to flash.



Duct Sensor



Rough Service Sensor

## Specifications

### Power:

12 to 24 VDC, 240 mA

18 to 24 VAC, 12 VA Peak

### Field Selectable Voltage Output:

0 to 5 or 0 to 10 VDC

### Termination:

3 Terminals, 16 to 22 AWG

### Operating Environment:

32 to 122°F (0 to 50°C)

0 to 95%RH non-condensing

### CO<sub>2</sub> Sensing Elements:

Single Channel: Non-Dispersive Infrared, ABC Algorithm

Dual Channel: Non-Dispersive Infrared, 3-Point Cal.

### Enclosure Rating:

Unventilated BAPI-Box: NEMA 4, IP66

### Encl. Material:

Polycarbonate, UL94 V-O

### CO<sub>2</sub> Detection PPM Range:

0 to 2,000, 0 to 5,000 and 0 to 50,000

### Start-Up Time:

<2 Minutes

### Response Time:

<2 Minutes for 90% step change typical (after start-up)

### LED CO<sub>2</sub> Level Indicator

(0 to 2,000 PPM units only):

Good, Green < 1,000 PPM

Fair, Yellow = 1,000 to 1,500 PPM

Poor, Red > 1,500 PPM

### CO<sub>2</sub> Drift Stability, "24/7" Units:

<5% of full scale over life of product.

### CO<sub>2</sub> Accuracy, "24/7" Units:

75ppm or 10% of reading (whichever is greater)

### CO<sub>2</sub> Accuracy, Single Channel (ABC) Units:

400 to 1,250 ppm: ±30ppm or 3% of reading, whichever is greater

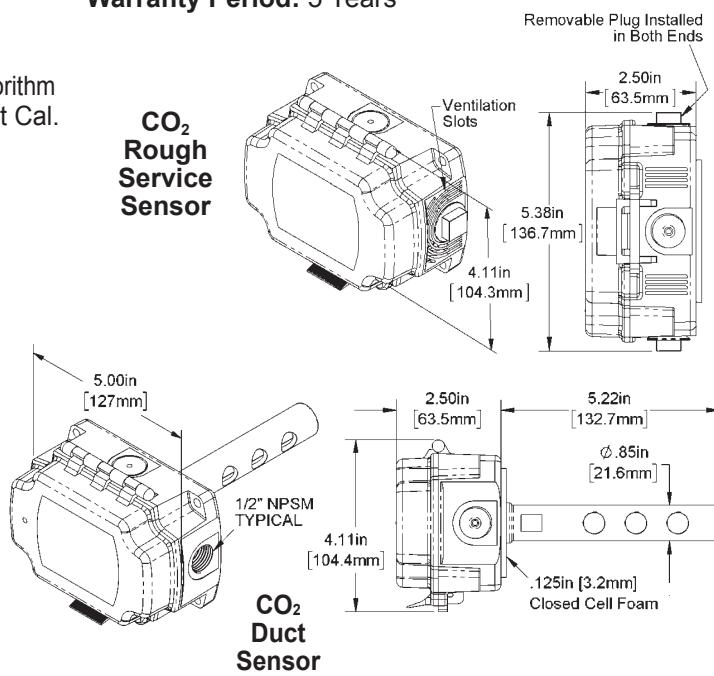
1,250 to 2,000 ppm: ±5% of reading + 30ppm

### Certifications:

RoHS

### Warranty Period:

5 Years





# CO<sub>2</sub> Duct and Rough Service Sensor

D19

Air Quality Sensors

Submittal sheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

## Ordering Information

<u>SINGLE CHANNEL (ABC) UNITS FOR PERIODICALLY UNOCCUPIED AREAS</u>	<u>LIST PRICE</u>
<b>BA/ACD05-D-BB</b> Single Channel CO <sub>2</sub> Duct Sensor, 0 to 5V Output, 0 to 2,000 PPM Range .....	\$470
<b>BA/ACD05-V-BB</b> Single Channel CO <sub>2</sub> Rough Service Sensor, 0 to 5V Output, 0 to 2,000 PPM Range .....	\$550
<b>BA/ACD10-D-BB</b> Single Channel CO <sub>2</sub> Duct Sensor, 0 to 10V Output, 0 to 2,000 PPM Range .....	\$470
<b>BA/ACD10-V-BB</b> Single Channel CO <sub>2</sub> Rough Service Sensor, 0 to 10V Output, 0 to 2,000 PPM Range .....	\$550
<u>DUAL CHANNEL "24/7" UNITS FOR CONTINUOUSLY OCCUPIED AREAS</u>	<u>LIST PRICE</u>
<b>BA/DCD05-D-BB</b> Dual Channel "24/7" CO <sub>2</sub> Duct Sensor, 0 to 5V Output, 0 to 2,000 PPM Range.....	\$500
<b>BA/DCD05-V-BB</b> Dual Channel "24/7" CO <sub>2</sub> Rough Service Sensor, 0 to 5V Output, 0 to 2,000 PPM Range .....	\$580
<b>BA/DCD10-D-BB</b> Dual Channel "24/7" CO <sub>2</sub> Duct Sensor, 0 to 10V Output, 0 to 2,000 PPM Range.....	\$500
<b>BA/DCD10-V-BB</b> Dual Channel "24/7" CO <sub>2</sub> Rough Service Sensor, 0 to 10V Output, 0 to 2,000 PPM Range .....	\$580
<b>BA/DCD05-5K-D-BB</b> Dual Channel "24/7" CO <sub>2</sub> Duct Sensor, 0 to 5V Output, 0 to 5,000 PPM Range.....	\$500
<b>BA/DCD05-5K-V-BB</b> Dual Channel "24/7" CO <sub>2</sub> Rough Service Sensor, 0 to 5V Output, 0 to 5,000 PPM Range .....	\$580
<b>BA/DCD10-5K-D-BB</b> Dual Channel "24/7" CO <sub>2</sub> Duct Sensor, 0 to 10V Output, 0 to 5,000 PPM Range.....	\$500
<b>BA/DCD10-5K-V-BB</b> Dual Channel "24/7" CO <sub>2</sub> Rough Service Sensor, 0 to 10V Output, 0 to 5,000 PPM Range .....	\$580
<b>BA/DCD10-50K-D-BB</b> Dual Channel "24/7" CO <sub>2</sub> Duct Sensor, 0 to 10V Output, 0 to 50,000 PPM Range.....	\$500
<b>BA/DCD10-50K-V-BB</b> Dual Channel "24/7" CO <sub>2</sub> Rough Service Sensor, 0 to 10V Output, 0 to 50,000 PPM Range .....	\$580

## Associated Products

### BAPI VC350A or VC350A-EZ VOLTAGE CONVERTERS

The CO<sub>2</sub> unit requires 240mA of current to operate correctly. If this is more current than can be provided by the controller power output, then the unit can be powered by a BAPI VC350A or VC350A-EZ Voltage Converter. See the Accessories section for more info.



VC350A-EZ  
Voltage Converter



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Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: [sales@bapihvac.com](mailto:sales@bapihvac.com) • Web: [www.bapihvac.com](http://www.bapihvac.com)



## Features & Options

- 0 to 40 ppm CO Measurement Range
- 30 ppm CO Relay Trip Level with Audible Alarm
- Field Selectable 0 to 5V, 0 to 10V or 4 to 20 mA Output
- BAPI-Stat 4 Enclosure with LED Status Indication

The BAPI Carbon Monoxide Room Sensor features a BAPI-Stat 4 Style Enclosure with Green/Red Status LED. It has a 0 to 40 ppm CO measurement range with a 30 ppm relay/audible alarm trip level. The relay is field selectable for normally closed or normally open, and the CO output level is field selectable for 0 to 5V, 0 to 10V or 4 to 20mA.

The Green/Red LED indicates unit status of Normal, Alarm, Trouble/Service or Test. The side pushbutton places the unit into Test status to verify audible alarm and LED operation. The sensing element has a typical life of 7 years.



**CO Room Sensor in a  
BAPI-Stat 4 Style Enclosure**

<b>ORDERING INFORMATION</b>	<b>List Price</b>
-----------------------------	-------------------

Part Number: BA/CO-B4 ..... \$335

## Specifications

**Power Supply:** 24 VAC/VDC, 1.0 VA Max

**Audible Alarm:** 75 dB at 10 feet

**Relay Output:** Form "C", 0.1A , 30VDC, Jumper selectable for Normally Closed or Normally Open

**CO Measurement Range:** 0 to 40 ppm

**Relay/Alarm Trip Level:** 30 ppm CO

**Jumper Selectable Analog Output:** 0 to 5VDC, 0 to 10VDC or 4 to 20mA

**CO Sensor Technology:** Electrochemical

**LED Behavior:**

Normal Status

Green LED illuminated, Red LED flashes every 30 seconds indicating that the alarm is powered

Alarm Status

Green LED extinguished, flashing Red LED and audible alarm

Trouble/Service Status

Green LED illuminated, Red LED flashes twice and horn "beeps" once every 30 seconds

Test Status

Green LED illuminated, one chirp, then Red LED flashes 4 to 5 times followed by 2 alarm signals

**Operating/Storage Temp:**

40 to 100°F (4.4 to 37.8°C); 15 to 95% RH

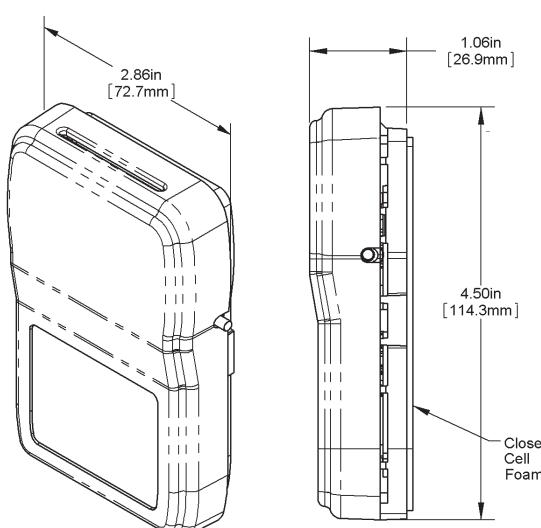
**Sensor Life:** 7 years typical

**Response Time:** 15 seconds typical

**Sensor Overload Level:** 5,000 ppm CO

**Agency:** CE, RoHS

**Warranty:** 5 years



**BAPI-Stat 4 Style Enclosure**





CE

Rev. 03/19/18

# CO Duct & Rough Service Sensor

D21

Air Quality Sensors

## Features & Options

- Field Replaceable Electrochemical Sensor with Self-Test
- Field Selectable Ranges and Outputs
- Large Display and Two Independent Alarm Contacts

BAPI's Carbon Monoxide Sensor offers enhanced electrochemical sensing with outstanding accuracy at low concentrations. The Duct unit samples duct air using an aspiration tube. The Rough Service unit features a ventilated BAPI-Box and is ideal for parking ramps, equipment rooms and warehouses.

The sensor has field selectable CO ranges of 0 to 100, 0 to 200, 0 to 300 and 0 to 500 ppm. It also has field selectable outputs of 0 to 5, 1 to 5, 0 to 10, 2 to 10 VDC and 3-wire 4 to 20 mA output. The large LCD is backlit for 10 seconds after any button push.

Two independent SPDT alarm contacts switch at field selectable CO concentrations of 25, 35, 50, 100 and 200 ppm. An alarm timer can hold the output relays on for one to ten minutes after the CO level has fallen below 80% of setpoint. This allows additional fan run time to be sure that the CO has been purged.

The field replaceable sensor element lasts approximately 7 years and is self tested daily.



Rough Service (top) and  
Duct CO Sensors

## Part #      Description

## List Price

BA/CO-V-BB ... Rough Service Carbon Monoxide Sensor .....	\$900
BA/CO-D-BB ... Duct Mount Carbon Monoxide Sensor .....	\$832
BA/COS..... Factory Calibrated Replacement CO Module.....	\$250

## Specifications

### Power:

18 to 28 VAC, 7.2 VA Max  
18 to 40 VDC, 180 mA Max

### Field Selectable Ranges:

0 to 100, 0 to 200, 0 to 300 & 0 to 500 ppm

### Alarm Relays:

2 Independent, Dry SPDT (Form C)  
2 Amps at 24 VAC/DC, Resistive  
140 VA Inrush, 48 VA Holding at 24 VAC

### Field Wiring Terminals:

Pluggable Screw Terminals, 14 to 24 AWG

### Response Time:

<80 seconds from 10% to 90% of range

### Alarm Relay Setpoints:

25, 35, 50, 100 or 200 ppm

### Alarm Timer:

0, 1, 5 & 10 minutes

### Sensor Element Life:

7 Years Typical

### Field Selectable Outputs:

3-wire 4 to 20 mA  
0 to 5, 1 to 5, 0 to 10, 2 to 10 VDC

### Certifications:

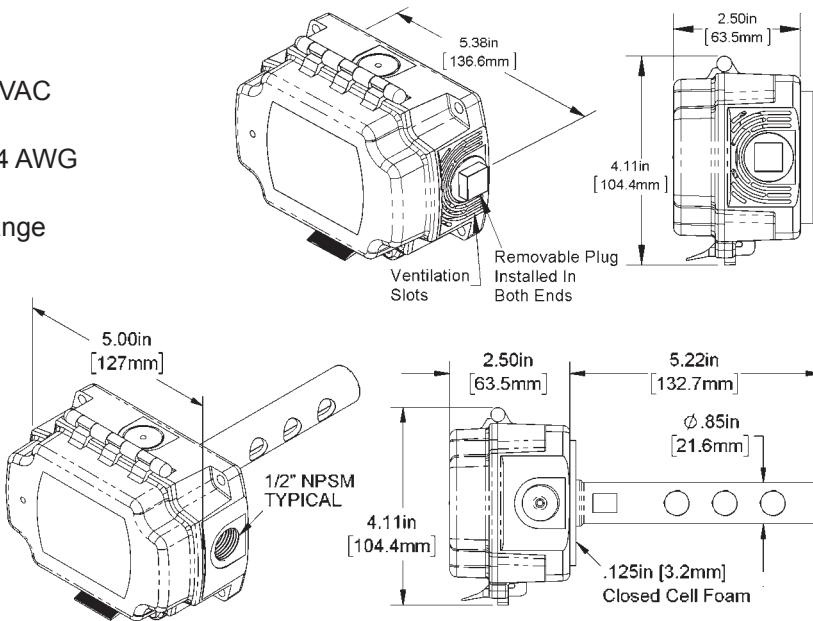
RoHS and CE

### Accuracy:

<200ppm = ±3% FS, 32 to 122°F (0 to 50°C)  
201 to 500 ppm = ±5% FS, 50 to 122°F (10 to 50°C)

### Environmental Operation Range

14 to 122°F (-10 to 50°C) • 5 to 95%RH Noncondensing



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## Features & Options

- Field Replaceable Electrochemical Sensor
- Two Independent Alarm Contacts
- Field Selectable NO<sub>2</sub> Ranges and Outputs

BAPI's Nitrogen Dioxide Rough Service Sensor offers enhanced electrochemical sensing with outstanding accuracy at low concentrations. The Duct unit samples duct air using an aspiration tube. The Rough Service unit features a ventilated BAPI-Box and is ideal for parking ramps, equipment rooms and warehouses.

The sensor has field selectable NO<sub>2</sub> ranges of 0 to 2.5, 0 to 5, 0 to 7.5 and 0 to 10 ppm. It also has field selectable outputs of 0 to 5, 1 to 5, 0 to 10 and 2 to 10 VDC as well as a 3-wire 4 to 20 mA output. The LCD is backlight for 10 seconds after a button push.

Two independent SPDT alarm contacts switch at 5 field selectable NO<sub>2</sub> concentrations from 1 to 10 ppm. A status LED is green when the NO<sub>2</sub> is below the lowest relay setpoint. The LED turns red when an alarm relay is on. An alarm timer holds the output relays on for a fixed time after the NO<sub>2</sub> level has fallen below 80% of setpoint. This allows additional fan time to be sure that the NO<sub>2</sub> has been purged. Field selectable times of 0, 1, 5 and 10 minutes are provided.

The sensor element is tested daily for proper operation. When the sensor element reaches its end of life, both relays turn on, the output is set to maximum and the status LED is yellow. Sensor elements last approximately 7 years and the sensor module is field replaceable.



Rough Service (top) and  
Duct NO<sub>2</sub> Sensors

Part #	Description	List Price
BA/NO2-V-BB	Rough Service NO <sub>2</sub> Sensor, Ventilated BAPI-Box	\$1,170
BA/NO2-D-BB	Duct NO <sub>2</sub> Sensor, BAPI-Box Enclosure	\$1,100
BA/NO2S	Factory Calibrated Replacement NO <sub>2</sub> Module	\$570

## Specifications

### Power

18 to 28 VAC, 7.2 VA Max  
18 to 40 VDC, 180 mA Max

### Field Selectable Ranges

0 to 2.5 ppm • 0 to 5.0 ppm  
0 to 7.5 ppm • 0 to 10.0 ppm

### Accuracy:

±5.0% of full scale

### Alarm Relays

2 Independent, Dry SPDT (Form C)  
2 Amps at 24 VAC/DC, Resistive  
140 VA Inrush, 48 VA Holding at 24 VAC

### Field Wiring Terminals

Pluggable Screw Terminals, 14 to 24 AWG

### Response Time:

<80 seconds from 10% to 90% of range

### Alarm Relay Setpoints

1.0, 2.5, 5.0, 7.5 or 10 ppm

### Alarm Timer:

0, 1, 5 & 10 minutes

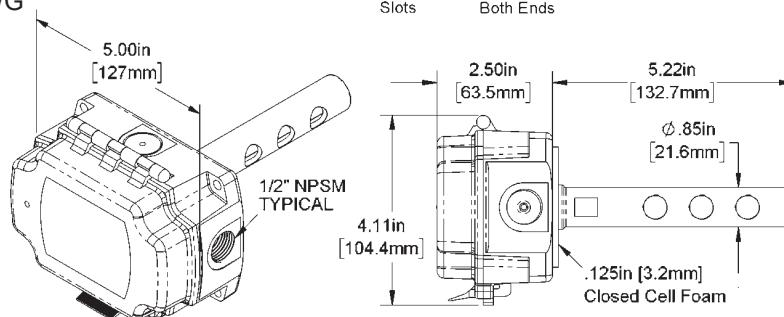
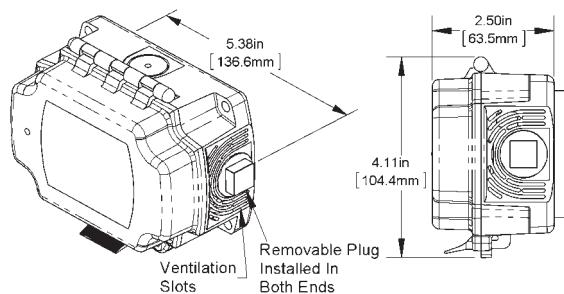
### Field Selectable Analog Outputs

3-wire 4 to 20 mA  
0 to 5 VDC, 1 to 5 VDC  
0 to 10 VDC, 2 to 10 VDC

### Environmental Operation Range

14 to 122°F (-10 to 50°C) • 5 to 95% RH Noncondensing

Lifetime: 7 Years Typical





Rev. 05/01/18

# Refrigerant Leak Detector

D23

Air Quality Sensors

## Features & Options

- Measures All Modern Refrigerants
- Measures Leaks and Spills
- Voltage Output
- Cost Effective

The BAPI Refrigerant Leak Detector measures the amount of R404A, R410A, R22 and/or R134A present. The Leak Detector measures leaks and spills; it is not intended for critical ppm measurements. Voltage trip levels for R22, R404A R410A or R134 leaks and spills are shown in the table. The sensor is temperature compensated for an accurate and reliable measurement.



**Refrigerant Leak Detector  
in a BAPI-Box Enclosure**

## Ordering Information

<u>Part Number</u>	<u>Description</u>	<u>List Price</u>
BA/RLD.....	Refrigerant Leak Detector in a BAPI-Box Enclosure .....	\$465

## Specifications

### Power:

9 to 40 VDC at 120mA max  
19 to 32 VAC at 5 VA

**Output Impedance:** 680 Ohms

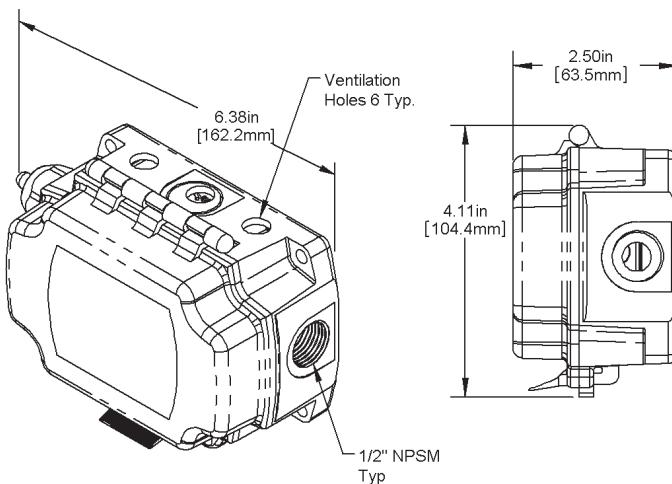
**Output Voltage:** 4.8V max

### Ambient Temperature:

0 to 70° C (32 to 140° F)

### Output Voltage for Specific Refrigerants:

Refrigerant	Voltage Trip Level
R22	2.5 VDC @ 500 ppm
R404A	4.5 VDC @ 500 ppm
R410A	2.5 VDC @ 500 ppm
R134A	1.8 VDC @ 500 ppm





## Features & Options

- Calibrates and Verifies Proper Operation of All BAPI CO<sub>2</sub> Room and Duct Sensors

BAPI's CO<sub>2</sub> Sensor Calibration Kit verifies the proper operation and calibrates all of BAPI's room and duct CO<sub>2</sub> sensors.

Two calibration gas concentrations are required to perform a complete calibration\*. Purchase the single point gas at a CO<sub>2</sub> concentration of 400 to 800 ppm, and the span gas at 1,000 to 1,200 ppm. Only one regulator is required because it can be swapped between gas cylinders.

BAPI's CO<sub>2</sub> Sensor Calibration Kit consists of the following:

- A software CD containing the test software and cable drivers
- A communications cable that connects a computer to the BAPI CO<sub>2</sub> sensor
- A funnel used as a gas shroud
- A length of tubing to connect the funnel to the test gases
- Rubber bands to secure the funnel to the BAPI CO<sub>2</sub> sensor
- Shunt jumpers to place the BAPI CO<sub>2</sub> sensor into test mode

\*Note: A single point gas may not be required. If the ambient CO<sub>2</sub> concentration is known, stays stable at ±10 ppm for at least 10 minutes and is in the range of 350 to 800 ppm, you may perform the single point accuracy check and calibration without any test gas.

<u>Part Number</u>	<u>Description</u>	<u>List Price</u>
BA/CO2-KIT.....	CO <sub>2</sub> Sensor Calibration Kit.....	\$155
BA/CO2-KIT-C..	CO <sub>2</sub> Sensor Cal. Kit with Case .....	\$600
BA/CO2-C.....	Empty Case with Foam Cutouts.....	\$455



CO<sub>2</sub> Sensor Calibration Kit



CO<sub>2</sub> Sensor Calibration Kit  
with Optional Case (shown  
with customer supplied  
gas cylinders)

## VOC Sensor Verification Kit

Rev. 12/20/16

### Overview

The VOC Sensor Verification Kit allows a known VOC sample to be generated and applied to a BAPI room or duct VOC sensor. The sample tests the dynamic range of the sensor to see if the sensor element is working correctly.

The kit consists of a plastic bottle and a 60mL syringe and a comprehensive set of instructions. The customer has to supply 70% minimum Isopropyl Alcohol.

<u>Part Number</u>	<u>Description</u>	<u>List Price</u>
BA/VOC-KIT .....	VOC Sensor Verification Kit .....	\$18



VOC Sensor Verification Kit



# BAPI VOC Sensor Offers an Alternative to CO<sub>2</sub> for Demand Controlled Ventilation

Most system designers use CO<sub>2</sub> sensors to indicate room occupancy as part of their Demand Controlled Ventilation (DCV) setup. One drawback with this method is that it ignores the harmful contaminants that may be present in the air even when the CO<sub>2</sub> levels are low.

BAPI's VOC Sensor offers the best of both worlds. It allows for ventilation based on occupancy as well as air contaminants -- and doesn't require any more work than using a CO<sub>2</sub> sensor.

The BAPI unit does this by measuring Volatile Organic Compounds (VOCs) then outputting a signal that corresponds to a CO<sub>2</sub> level of 0-2,000 ppm. This means system designers can use their existing CO<sub>2</sub>-based DCV occupancy algorithms while monitoring both occupancy and VOCs.

One of the keys to the BAPI sensor is the fact that VOCs are as good an indicator of space occupancy as CO<sub>2</sub>. That's because a large share of VOCs in an indoor space are generated by humans from our breath, sweat and skin or from colognes and perfumes, etc. (See Table 1.)

Extensive research was conducted on human occupancy, VOC levels and CO<sub>2</sub> levels in 1,500 offices, schools and homes to determine the relationship between these three factors. The research identified a complex correlation algorithm between VOCs and CO<sub>2</sub>, and this algorithm was used to create the output of the VOC sensor. The accuracy of this output as compared to CO<sub>2</sub> levels is shown in the chart at right.

The chart shows that the VOC sensor tracks occupancy and that the output has a high correlation to the CO<sub>2</sub> level. The chart also shows that the sensor indicates when additional VOCs or air contaminants are present from cooking or other activities.



## Sensors for HVAC/R

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More information on the BAPI VOC Sensor including a White Paper and Video are available on our website at [www.bapihvac.com](http://www.bapihvac.com)



Table 1 – Typical Indoor Contaminants (VOCs) and Their Source

Contamination Source	Emission Source	VOC
Human Being	Breath	Acetone, Ethanol, Isoprene, CO <sub>2</sub>
	Skin Respiration & Perspiration	Nonanal, Decanal, alpha-Pinene
	Flatulence	Methane, Hydrogen,
	Cosmetics	Limonene, Eucalyptol
Consumer Products	Household Supplies	Alcohols, Esters, Limonene
Office Equipment	Printers, Copiers, Computers	Benzene, Styrene, Phenole
Combustion	Engines, Appliances, Smoke	Unburnt Hydrocarbons, CO, CO <sub>2</sub>
Building Materials	Paints, Adhesives, Carpets	Formaldehyde, Alkanes, Alcohols, Aldehydes, Ketones
Furniture	Poly Vinyl Chloride (PVC)	Toluene, Xylene, Decane

## Indicating Occupancy with VOCs

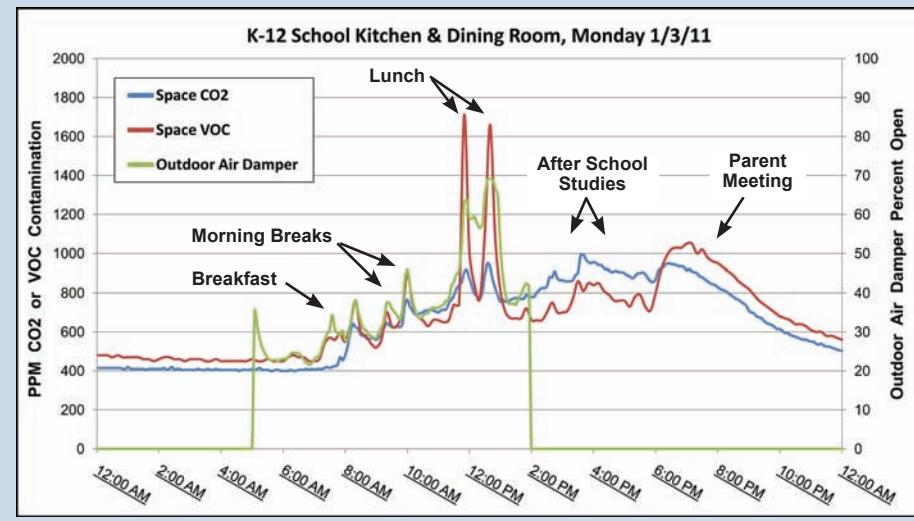
This chart was taken in a kitchen and dining area of a public school in Wisconsin. This is a true multi-purpose area with breakfast, snacks, lunch, and after school studies in the day, and athletic practices, exercise classes and meetings at night.

The open percentage of the outdoor air damper is controlled by the VOC sensor output through a PID control loop from 5 am to 2 pm when the space is considered "occupied". The outside air damper is closed during the unoccupied period, and ventilation is accomplished by diffusion from the adjacent hallways.

At 7 am, the VOC sensor picks up the breakfast cooking aromas and activities. The CO<sub>2</sub> sensor climbs a short time later as the students arrive to eat. The VOC sensor has slightly higher readings than the CO<sub>2</sub> sensor during breakfast and the morning breaks because the VOCs from the food are added to the VOCs generated by the people. This is also seen at lunch as cooking of the sausage pizza generated lots of VOCs which are added to the VOCs from the students and staff. The BAPI sensor will allow these additional VOCs to be ventilated away while the CO<sub>2</sub> sensor will not.

At 2:30 pm, students arrive for "After School Studies" so the VOCs and CO<sub>2</sub> rise a little during this period. There is a community meeting at 6 pm. Notice how the VOCs track slightly below the CO<sub>2</sub> during the "After School Study" period when it is mostly kids in the room. Then the VOCs track slightly above the CO<sub>2</sub> during the community meeting period when it is mostly adults in the room. This is because adults use more perfumes and colognes than kids, and therefore generate more VOCs than kids.

Whether it's kids or adults in the room, and whether they're studying or eating, the chart proves that the VOC sensor output directly correlates to occupancy in the room and can easily be set up for Demand Controlled Ventilation.





## Overview

This paper will prove that the BAPI's Volatile Organic Compound (VOC) sensor is an accurate and reliable way of incorporating Demand-Controlled Ventilation (DCV) into a building's HVAC strategy. It will also show that the VOC sensor is as good an indicator of space occupancy as a CO<sub>2</sub> sensor while also measuring other air contaminants which affect human comfort and health. The paper will also describe how the VOC sensor output corresponds to the CO<sub>2</sub> level in the space so that system designers can use their existing CO<sub>2</sub>-based DCV occupancy algorithms. Finally, it will detail how proper ventilation from the VOC sensor improves occupant comfort, health and productivity, and saves money for building owners.

## CO<sub>2</sub> and Demand-Controlled Ventilation

Until now, Indoor Air Quality (IAQ) has been defined as proper temperature, humidity and CO<sub>2</sub> levels. According to tenants however, offensive odors, smoke, carpet off-gassing and other VOCs have just as much or more impact on human comfort, productivity and health.

Then why is IAQ so closely linked to CO<sub>2</sub>? This is due to one interpretation of The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standard 62.1. This standard establishes minimum ventilation rates for proper IAQ, allowing for DCV which saves on heating and cooling costs by bringing in outside air only as it is needed. Standard 62.1 has two procedures for establishing the ventilation rates — one based on IAQ and contaminants and the other based on occupancy. The occupancy procedure, formally called the Ventilation Rate Procedure or VRP, is used most often due to its straightforward math, and the vast majority of system designers who choose VRP also choose CO<sub>2</sub> sensors to determine the occupancy of the space.

The main drawback with this method of DCV is that it ignores the offensive odors, air contaminants and VOCs that may be present even when the CO<sub>2</sub> levels are low<sup>1</sup>.

As stated earlier, Standard 62.1 has two procedures, one based on occupancy and the other based on IAQ and air contaminants. The difficulty with the IAQ procedure is that HVAC system designers must use subjective criteria, such as whether the air quality is acceptable to 80% or more of the building's occupants. System designers are not comfortable dealing with these subjective perception-based criteria, so most choose the CO<sub>2</sub> occupancy method, even though it ignores other air contaminants.

BAPI's VOC sensor offers the best of both worlds. It allows for ventilation based on occupancy as well as air contaminants. The BAPI unit does this because it has been optimized for DCV. Using a calibration algorithm, the sensor value is converted to an output with a high correlation to a CO<sub>2</sub> level. This lets you use Ashrae's more popular and straight forward occupancy-based VRP schedule.

More information on this correlated CO<sub>2</sub> output is included in the next section, but let's start with the VOCs themselves.

## What are VOCs and Where Do They Come From?

**Table 1 Typical Indoor Contaminants (VOCs) and Their Source**

Contamination Source	Emission Source	VOC
Human Being	Breath	Acetone, Ethanol, Isoprene, CO <sub>2</sub>
	Skin Respiration & Perspiration	Nonanal, Decanal, alpha-Pinene
	Flatulence	Methane, Hydrogen,
	Cosmetics	Limonene, Eucalyptol
Consumer Products	Household Supplies	Alcohols, Esters, Limonene
Office Equipment	Printers, Copiers, Computers	Benzene, Styrene, Phonole
Combustion	Engines, Appliances, Smoke	Unburnt Hydrocarbons, CO, CO <sub>2</sub>
Building Materials	Paints, Adhesives, Solvents, Carpets	Formaldehyde, Alkanes, Alcohols, Aldehydes, Ketones, Siloxanes
Furniture	Poly Vinyl Chloride (PVC)	Toluene, Xylene, Decane





## What are VOC's and Where Do They Come From? continued....

VOCs are chemicals that contain carbon and can be emitted as gases at room temperature. Table 1 shows some typical indoor contaminants and their sources. VOCs evaporate from substances, such as cleaning products, adhesives, paints, dry-cleaning fluids and wood preservatives. VOCs are also emitted from humans and animals in their breath, sweat and directly from their skin. In fact, the majority of VOCs in an indoor space are generated by humans. The BAPI sensor is able to measure these VOCs, and that is why the sensor is as good an indicator of occupancy as a CO<sub>2</sub> sensor.

## Space Occupancy — VOC Sensing versus CO<sub>2</sub> Sensing

Extensive research was conducted on VOCs and CO<sub>2</sub> in 1,500 offices, schools and homes to determine the correlation between CO<sub>2</sub> levels and VOC levels. This research was used to create correlated CO<sub>2</sub> output for the BAPI VOC sensor. The accuracy of this output as compared to CO<sub>2</sub> levels is shown in the following seven charts.

These charts were taken Jan. 3-9, 2011, in a Kitchen and Dining area of a public school in Wisconsin. This location is a true multi-purpose area. It is used for breakfast, morning snacks, lunch, and after school studies during the day, and athletic practices, exercise classes and occasional meetings in the evenings.

The VOC and CO<sub>2</sub> sensors are located next to each other in the dining room near the kitchen entrance. The open percentage of the outdoor air damper for this area is controlled by the VOC sensor output through a PID control loop from 5 am to 2 pm on weekdays when the space is considered "occupied". The outside air damper is closed during the unoccupied period, and ventilation is accomplished by diffusion from the adjacent hallways.

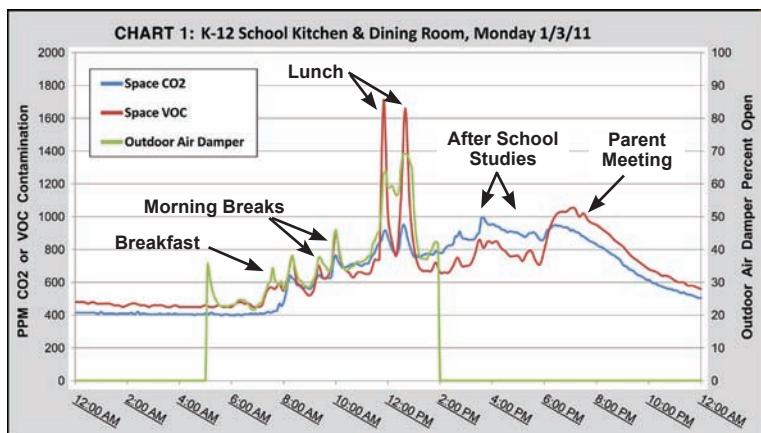
The following charts show the output of the VOC Sensor and CO<sub>2</sub> Sensor and the Outside Air Damper position during a typical week from Monday through Sunday. These charts show that the output of the VOC sensor has a high correlation to CO<sub>2</sub> levels and is reliable, predictable and repeatable.

### Chart 1, Monday:

The area goes into occupied mode at 5 am and the outdoor air damper -- the green line -- begins to track the output of the VOC sensor -- the red line. At 7 am, the VOC sensor picks up the breakfast cooking aromas and activities. The CO<sub>2</sub> sensor climbs a short time later as the students arrive to eat. The VOC sensor has slightly higher readings than the CO<sub>2</sub> sensor during breakfast and the morning breaks because the VOCs from the food are added to the VOCs generated by the people. This is also seen at lunch as cooking of the sausage pizza generated lots of VOCs which are added to the VOCs from the students and staff. Additional fresh air is brought in to dilute the VOCs during the lunch period.

The outdoor air damper is closed at 2 pm but the room is still in use for "After School Studies" so the VOCs and CO<sub>2</sub> rise a little during this period from 2:30 to 5 pm.

Interestingly there is a community meeting in the dining room at 6 pm, and the audience is mostly adults. Notice how the VOCs track slightly below the CO<sub>2</sub> during the "After School Study" period when it is mostly kids in the room. Then the two switch and the VOCs track slightly above the CO<sub>2</sub> during the community meeting period when it is mostly adults in the room. That's because adults use more perfumes and colognes than kids, and therefore generate more VOCs than kids.

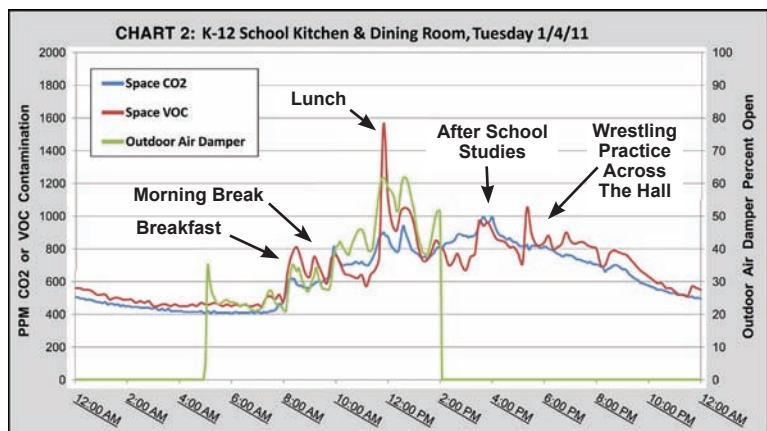


Whether it's kids or adults in the room, and whether they're studying or eating, the chart shows that the VOC sensor output directly correlates to occupancy in the area. The chart also shows that using the VOC sensor to control the outdoor air damper results in appropriate ventilation for the space.



# Using the BAPI VOC Sensor for Demand Controlled Ventilation

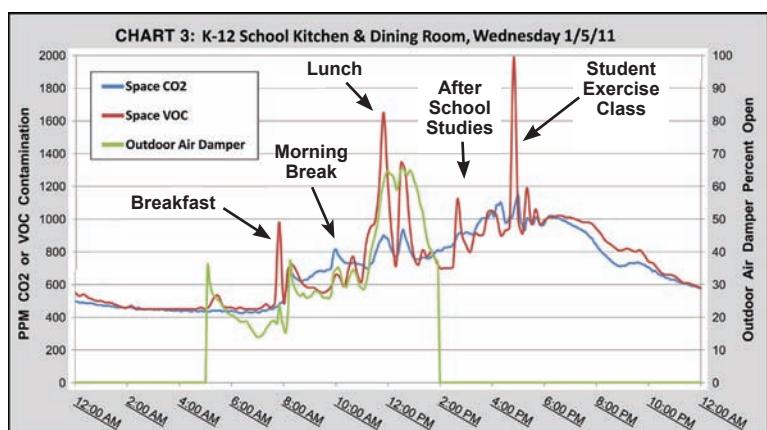
Rev. 11/16/12



## Chart 2, Tuesday:

The area again goes into occupied mode at 5 am and there are increases in VOCs and CO<sub>2</sub> during breakfast, morning break, lunch and after school studies.

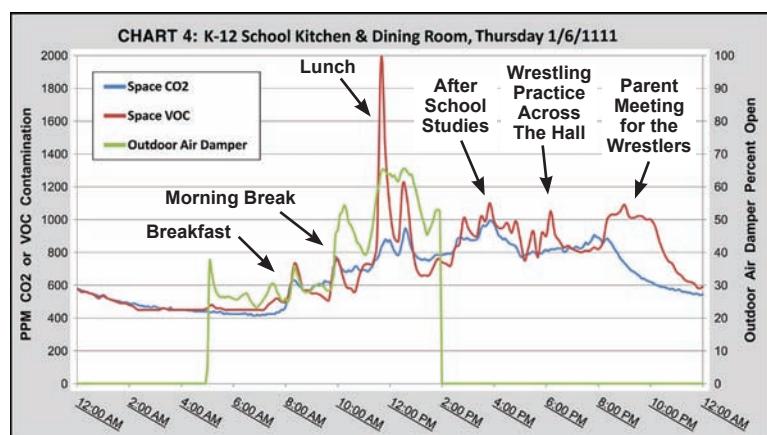
There is a small spike in VOCs at about 5:45 due to Pee Wee wrestling practice which takes place in a performance area just across the hall from 6 to 8 pm. The dining room is used as a rest area for parents and as a place for the wrestlers to store their gym bags during practice, which accounts for the increase in VOCs at that time.



## Chart 3, Wednesday:

The daytime portion of Wednesday is similar to Monday and Tuesday with increases in VOCs and CO<sub>2</sub> during breakfast, midmorning break and after school studies, and spikes in VOCs due to cooking at lunch.

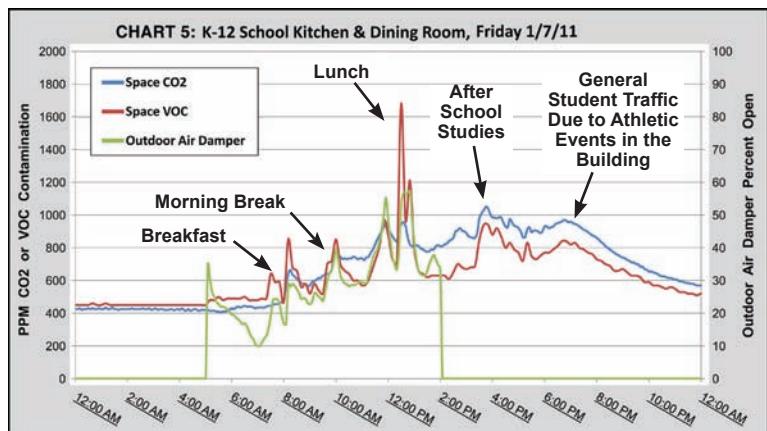
There is a large spike in VOCs at about 4:45 pm due to a general exercise class for students. People generate more VOCs when they're exercising, and the students also brought in gym bags and put on exercise clothing which added to the VOCs at that time.



## Chart 4, Thursday:

The daytime portion of Thursday is similar to the rest of the week with increases in VOCs and CO<sub>2</sub> during breakfast, midmorning break and after school studies, and spikes in VOCs due to cooking at lunch.

There is an increase in VOCs at 6 pm (similar to Tuesday) due to the Pee Wee wrestling practice in the performance area across the hall. There is another increase in VOCs at 8 to 10 pm due to a parents meeting for the wrestlers in the dining area at that time.



## Chart 5, Friday:

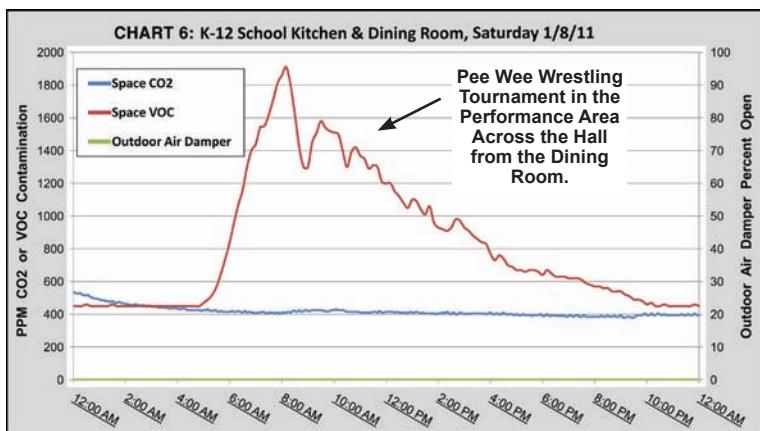
The daytime portion of Friday is similar to the rest of the week with increases in VOCs and CO<sub>2</sub> during breakfast, midmorning break and after school studies, and spikes in VOCs due to cooking at lunch.

There is an increase in VOCs from 6:15 to 7:30 pm in the dining room area due to student traffic in the area from an athletic event in another part of the school building.



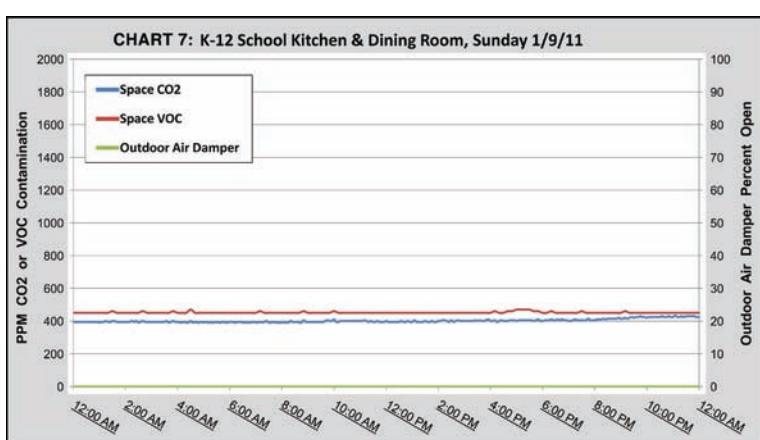


# Using the BAPI VOC Sensor for Demand Controlled Ventilation

**Chart 6, Saturday:**

The space is considered unoccupied on Saturday so the Outdoor Air Damper is off.

However, VOCs are being generated in the dining room from about 6 am to noon due to a Pee Wee Wrestling Tournament in the performance center across the hall. Wrestlers store their gym bags and other belongings in the dining area during the tournament, which accounts for the VOCs during that time. A CO<sub>2</sub> sensor would not ventilate away these VOCs and odors.

**Chart 7, Sunday:**

Sunday is the only day with no activity in the kitchen and dining area or the surrounding spaces, so there is only background levels of VOCs and CO<sub>2</sub>.

## The True Meaning of Air Quality

VOCs are known to cause eye, nose and throat irritations, headache, drowsiness, dizziness, nausea, difficulty concentrating and fatigue; all summarized under the term SBS (Sick Building Syndrome). The importance of detecting the presence of VOCs in indoor air goes beyond these immediate health concerns. People judge the quality of the air not just by how it feels (temperature and humidity), but also by how it smells. Unfortunately, offensive odors in offices, kitchens, gymnasiums and restrooms have no impact on CO<sub>2</sub> levels. A tuna fish sandwich left in a desk drawer over a weekend may not be life threatening, but may smell like it by Monday.

These obnoxious odors reduce everyone's productivity until the odor is eliminated. In retail settings, customers may leave and never come back. Even small amounts can have a very immediate effect. A single person entering or passing through a space may deteriorate the air quality due to heavy amounts of aftershave lotion, cologne, perfume, hand soap, laundry detergent residue, fabric softeners or residual cigarette smoke.

In these cases a CO<sub>2</sub> sensor will not correct the problem. For instance, a Circuit Court Judge in Tennessee was plagued by migraine headaches causing him to suspend proceedings until his headaches went away. A VOC sensor installed in the courtroom discovered that the Judge's headaches were caused by support staff's cosmetics. Proper ventilation reduced the VOCs to acceptable levels and the judge's migraines stopped.

In another example, a plastic injection molding company's staff was plagued by persistent minor upper respiratory ailments. A VOC sensor was installed and the customer thought it was faulty because the output stayed at maximum no matter how much outdoor air was admitted to the building. Subsequent troubleshooting revealed that a recently installed molding machine had its exhaust vented into the building's fresh air intake duct by mistake. Within two weeks of rerouting the exhaust, all occupant respiratory symptoms disappeared. A CO<sub>2</sub> sensor would not have sensed the contaminant from the molding machine.





## The Financial Benefits of Appropriate Ventilation

One of the arguments used against VOC sensors is that because they sense odors and contaminants along with occupancy, that the building will be over-ventilated and therefore wastes energy. According to ASHRAE Standard 62.1 however, VOC sensors allow the building to be appropriately ventilated, not over-ventilated, and this appropriate ventilation will save building owners and tenants money in the long run<sup>2</sup>.

The Building Owners and Management Association (BOMA) stated in a 1999 report that typical building operating costs are 83.3% personnel salaries, 13.5% rent, 2.1% repair and maintenance and 1.2% total energy costs (Heat, Air Conditioning, Lighting, Business Equipment Power, Water Heating, etc). Clearly, the cost of employees is by far the greatest expense to the tenant or owner/employer.

"It has now been shown beyond reasonable doubt that poor indoor air quality in buildings can decrease productivity as much as six to nine percent," stated Professor David Wyon of the Technical University of Denmark's International Centre for Indoor Environment and Energy.

Numerous domestic and international studies support Wyon, showing that appropriate ventilation leads to increased worker productivity, increased worker accuracy, higher morale, less absenteeism and lower health insurance costs from fewer and less costly claims. For a tiny increase in total operating costs to ensure appropriate ventilation, owners/occupants can experience significant increases in employee productivity and significant decreases in employee expenses.

Because complaints about comfort are the number one reason tenants choose to leave a space, assuring indoor air quality with appropriate ventilation means that building owners will lose less tenants. They may even be able to increase rents by showing increased tenant productivity and comfort.

Please call a BAPI representative at +1-608-735-4800 for more information on how a VOC sensor can enhance your next DDC installation.

## References

1. J Murphy, B Bradley 2005 "CO<sub>2</sub>-Based Demand-Controlled Ventilation with ASHRAE Standard 62.1-4004" Trane Engineers Newsletter Vol. 34 No. 5
2. O Seppanen, W Fisk, P Wargocki Winter 2007 "Indoor Environment, Productivity in Offices" ASHRAE IAQ Applications Vol. 8 No. 1

### Other References of Interest

3. United States Environmental Protection Agency 2009 "Ventilation and Air Quality in Offices"
4. ASHRAE 2009 "Thermal and air quality acceptability in buildings that reduce energy by reducing minimum airflow from overhead diffusers." Research Project 1515-TRP
5. United States Environmental Protection Agency 2008 "Indoor Air Facts No. 4, Sick Building Syndrome"
6. ASHRAE 2007 Standard 62.1-2007 Ventilation for Acceptable Indoor Air Quality
7. C Acevedo, E Sanchez, J Reyes, M Young November 13, 2007 "Volatile Organic Compounds Produced by Human Skin Cells" Biological Research Vol. 40 No. 3
8. D Stanke Winter 2007 "The IAQ Procedure in Standard 62.1-2004" ASHRAE IAQ Applications Vol. 8 No. 1
9. D. P. Wyon 2004 "The effects of indoor air quality on performance and productivity" Indoor Air Vol. 14 No. 7
10. O Seppanen, W Fisk 2003 "A conceptual model to estimate cost effectiveness of the indoor environment improvements". Proceedings of the Healthy Buildings 2003 Conference, December 7-11, 2003, Singapore. Volume 3, pp. 368-374.
11. R Djukanovic, P Wargocki, & PO Fanger 2002 "Cost-Benefit Analysis of Improved Air Quality in an Office Building" Proceedings: Indoor Air 2002
12. P Wargocki Fall 2002 "Making the Case for IAQ" ASHRAE IAQ Applications Vol. 3 No. 4
13. S Hansen 1997 "Economical consequences of poor indoor air quality and its relation to the total building operation costs." EuroFM/IFMA Conference & Exhibition.
14. M Phillips, J Greenberg & J Awad 1994; 47 "Metabolic and Environmental Origins of Volatile organic compounds in breath." Journal of Clinical Pathology
15. Iowa Energy Center June 2009 "Product Testing Report, Wall Mounted Carbon Dioxide (CO<sub>2</sub>) Transmitters"
16. W Fisk 2008 "A Pilot Study of the Accuracy of CO<sub>2</sub> Sensors in Commercial Buildings" Lawrence Berkeley National Laboratory Paper LBNL'260E





# Calibration Methods for Single and Dual Channel CO<sub>2</sub> Sensors

Carbon Dioxide (CO<sub>2</sub>) in air is normally measured in Parts Per Million (ppm). At 1,000 ppm CO<sub>2</sub>, one million air molecules would contain a mixture of 999,000 air molecules and 1,000 CO<sub>2</sub> molecules. The most common CO<sub>2</sub> sensors are known by the engineering term Non-Dispersive Infrared, or NDIR. An NDIR CO<sub>2</sub> sensor shines infrared light through a gas sample in a sample chamber (see Figure 1). Sensitive photo-detectors measure the intensity of the infrared light after it passes through the gas sample. CO<sub>2</sub> molecules are opaque to 4.26 micron infrared light while the rest of the air molecules are not. So the intensity of the infrared light is diminished proportionally to the number of CO<sub>2</sub> molecules that are present. Measuring the resultant light intensity measures the number of CO<sub>2</sub> molecules present.



**Figure 1:** Single Channel CO<sub>2</sub> Sensor

## Sensor Drift

The most common light source for NDIR sensors is an incandescent light bulb. In these bulbs, an electric current passes through a metal filament and heats it until it starts to glow. The glowing filament is extremely hot and some of the metal atoms boil off the filament and fly around inside the bulb. Most of these atoms re-adhere to the filament when the power is turned off, but some move far enough away from the filament that they condense onto the glass envelope. Over time, this thin metal coating slightly reduces the amount of light emitted by the bulb. This reduction is perceived by the sensor as an increase in CO<sub>2</sub> concentration. Also, when the metal atoms condense back onto the filament, they can slowly shift the spectrum of the emitted light which can affect the perceived infrared light intensity and CO<sub>2</sub> concentration.



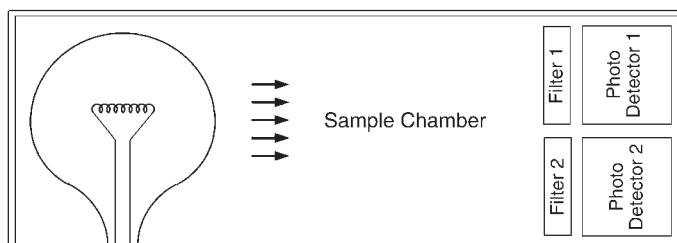
## Automatic Background Calibration

One way to compensate for sensor drift is through automatic background calibration. Outdoor levels of CO<sub>2</sub> are generally around 400 ppm. Since people are the main source of CO<sub>2</sub> inside a building, when a building is unoccupied for 4 to 8 hours the CO<sub>2</sub> levels tend to drop to the outside level. Automatic background calibration uses the sensor's on-board microprocessor to remember the lowest CO<sub>2</sub> concentration that occurs every 24 hours. The sensor assumes this low point is the outside CO<sub>2</sub> level. The sensor is also smart enough to discount periodic elevated readings that occur if a space is occupied for 24 hours a day over a few days. Once the sensor has collected 14 days worth of low CO<sub>2</sub> concentration periods, it performs a statistical analysis to see if there has been any small changes in the background levels readings that could be attributable to sensor drift. If the analysis concludes there is drift, a small correction factor is made to the sensor calibration to adjust for this change. This automatic calibration requires that at least three of the last 14 days have space CO<sub>2</sub> levels that reach 400 ppm for an hour or more.

## Reference Channel Calibration

Another way to compensate for sensor drift is through a dual channel design. In this setup, one photo-detector and filter is used for CO<sub>2</sub> measurement and works the same as in a single channel design. The second photo-detector and filter is a reference and uses a wavelength that is not affected by air molecules. About once a day, the sensor takes a reading using the reference channel. Any change in this reference measurement indicates a change in the optics of the sensor which can lead to drift. The sensor then automatically corrects the CO<sub>2</sub> measurement from the first channel to prevent the drift.

While the reference channel corrects for changes over time, a field calibration will immediately restore the highest level of accuracy. BAPI recommends a 5-year calibration interval for the average office environment.



**Figure 2:** Dual Channel CO<sub>2</sub> Sensor





Depending on the source of the information, 5,000 to 10,000 unique Volatile Organic Compounds (VOCs) exist. BAPI's VOC sensor reacts to all of them.

VOCs are chemicals that contain carbon and have boiling points below 100°C. Most can be vapors at room temperature. In their liquid form many VOCs can contaminate ground water.

Families of VOCs detected are:

- CO, CH<sub>4</sub>, LPG
- Alcohols
- Ketones. Ketones are solvents. The best known are Acetone and Methyl Ethyl Ketone or MEK.
- Organic Acids. Common organic acids are Lactic acid, Acetic acid, Formic acid, Citric acid and Oxalic acid
- Amines. Amines are derivatives of ammonia.  
Wikipedia lists 175 compounds as amines, <http://en.wikipedia.org/wiki/Category:Amines>
- Aliphatic Hydrocarbons. Aliphatic hydrocarbons are flammable hydrocarbons with little or no odor. Examples are hexane, paraffin, methane and acetylene.
- Aromatic Hydrocarbons. Aromatic hydrocarbons are flammable hydrocarbons with a discernable odor. Examples are benzene, furan, pyridine, toluene, asphaltene and picric acid.

A list of some of the most common VOCs and their sources follows.

<u>VOC</u>	<u>Source</u>
1-hexene.....	Human metabolism
1-isocyanobutane .....	Coatings
1,1,1-trichloroethane.....	Ink, Paint, Photo-resist, Photographic film
1,4-dioxane.....	Spot removers
2-bromopentane .....	Prescription drugs
(2-methylcyclohexyl) propanedinitrile ...	Human metabolism
2,2-dimethylbutane .....	Human metabolism
2,3,3-trimethylpentane .....	Human metabolism
2,3-dimethylpentane .....	Human metabolism
2,3,4-trimethylpentane .....	Human metabolism
3-methylhexane .....	Human metabolism
3,4-dimethyl-1-pentene .....	Human metabolism
4-methyl-1-pentene .....	Human metabolism
5-methyl-1-hexene.....	Human metabolism
6-methyl-1-heptanol.....	Human metabolism
Acetaldehyde .....	Disinfectants, Adhesives, Coatings, Plastics, Lubricants, Ripening of fruit
Acetic acid esters .....	Surface cleaners
Acetone .....	Polyester resins, Vinyl, Adhesives, Human metabolism
bis-(1,1-dimethylethyl)nitroxide.....	Human metabolism
Benzene .....	Plastics, Building materials, Furniture, Office equipment
Butoxyethanol.....	Surface cleaners
Butyl acetate.....	Surface cleaners
C6 - C10 substituted alkanes .....	Cleaners, Polishers
Carbon Monoxide .....	Automobile exhaust, Fuel based heating, Cooking appliances, Smoking
Decanal .....	Artificial flavors, Perfume, Human metabolism
Dichlorobenzene.....	Deodorizers





# Common Volatile Organic Compounds Detected by BAPI's VOC Sensor

D33

A list of some of the most common VOCs and their sources follows, continued from previous page...

<u>VOC</u>	<u>Source</u>
Dipropylene glycol .....	Surface cleaners
Ethanol .....	Disinfectants, Human metabolism
Ethyl Alcohol.....	Cosmetics, Cleaners, Disinfectants, Detergents, Paints, Human Metabolism
Eucalyptol .....	Cosmetics, Artificial flavors, Insecticides
Formaldehyde.....	Biocides, Disinfectants
Heptane .....	Human metabolism
Hydrocarbons .....	Waxes, Polishes
Isobutane.....	Aerosol cleaners
Isobutene.....	Aerosol cleaners
Isoprene.....	Synthetic rubber, Human metabolism
Limonene.....	Cosmetics, Cleaners, Artificial flavors, Prescription drugs
Methane.....	Natural gas, Human metabolism
Methoxyethanol .....	Surface cleaners
Methoxyethoxyethanol.....	Surface cleaners
Methylcyclohexane .....	Human metabolism
Methylethylketone.....	Adhesives, coatings, Plastics, Lubricants
Methyl methacrylate .....	Hard surface cleaners
Naphthalene .....	Disinfectants, Repellants
Nonanal .....	Artificial flavors, Perfume, Human metabolism
Organic Chloramines.....	Combination of general and pool cleaning chemicals and human metabolism
Pentane .....	Polystyrene foam, Refrigerants
Phenol .....	Plastics, Cosmetics, Disinfectants
Pinene .....	Perfume, Human metabolism
Propane .....	Fuel based heating, Cooking appliances, Cleaners
Siloxanes .....	Waxes, Polishes
Tetrachloroethene .....	Dry cleaning
Tetrachloroethylene .....	Spot cleaners
Toluene .....	Paints, Coatings, Cleaners, Detergents, Smoking, Polyurethane lacquers
Trichloromethane.....	Human metabolism
r (1-methylethyl)cyclopropane .....	Adhesives, Coatings, Plastics, Lubricants
Xylene.....	Plastics, Synthetic Rubber, Polyester clothing





Carbon Dioxide (CO<sub>2</sub>) in air is normally measured in Parts Per Million (ppm). At 1,000 ppm CO<sub>2</sub>, a volume of air containing one million air molecules would contain a mixture of 999,000 air molecules and 1,000 CO<sub>2</sub> molecules.

The volume of air necessary to contain one million air molecules is affected by air temperature and air pressure, also called Barometric Pressure. As the pressure decreases, the volume needed to contain one million air molecules increases. The opposite is true of temperature. As the temperature decreases, the volume of air needed to contain one million molecules decreases. Although the volume of air is affected by temperature and pressure, the concentration of CO<sub>2</sub> is not affected. If you started with 1,000 ppm of CO<sub>2</sub>, then you finish with 1,000 ppm of CO<sub>2</sub> despite the changes in the air volume.

The most common CO<sub>2</sub> sensors are known by the engineering term Non-Dispersive InfraRed, or NDIR. An NDIR CO<sub>2</sub> sensor shines infrared light through a gas sample in a sample chamber. Sensitive photo-detectors measure the intensity of the infrared light after it passes through the gas sample. CO<sub>2</sub> molecules are opaque to 4.26 micron infrared light while the rest of the air molecules are not. So the intensity of the infrared light is diminished proportionally to the number of CO<sub>2</sub> molecules that are present. Measuring the resultant light intensity measures the number of CO<sub>2</sub> molecules present.

The size of the NDIR sampling chamber is fixed and is open to the atmosphere so that air can move in and out. As explained above, the number of air molecules in a given volume is affected by temperature and air pressure but not the concentration of CO<sub>2</sub>. At low pressures or high temperatures, there will be fewer air molecules in the sample chamber, so there will also be fewer CO<sub>2</sub> molecules, even though the ppm of CO<sub>2</sub> hasn't changed. Fewer CO<sub>2</sub> molecules "fools" the sensor into thinking that the CO<sub>2</sub> concentration is lower than it really is. At high pressures or low temperatures, there are more air molecules in the sample chamber and more CO<sub>2</sub> molecules, even though the CO<sub>2</sub> concentration hasn't changed. More CO<sub>2</sub> molecules "fools" the sensor into thinking that the CO<sub>2</sub> concentration is higher than it really is. Therefore a CO<sub>2</sub> sensor calibration will only be accurate at one temperature and one air pressure.

## Calculating Temperature and Barometric Pressure Effects on CO<sub>2</sub> Measurement

The following formula derived from the Ideal Gas Law relates changes in air volume to temperature, pressure and the number of molecules present:

$$\text{ppm CO}_2 \text{ corrected} = \text{ppm CO}_2 \text{ measured} * ((T_{\text{measured}} * p_{\text{ref}}) / (p_{\text{measured}} * T_{\text{ref}}))$$

- **p<sub>measured</sub>** = Current pressure, in the same units as reference pressure (not corrected to sea level)

- **T<sub>ref</sub>** = reference temperature, usually 25°C, 77°F, converted to absolute (298.15 for °C, 536.67 for °F)

- **T<sub>measured</sub>** = Current absolute temperature, °C + 273.15, °F +459.67

- **p<sub>ref</sub>** = reference Barometric Pressure, usually sea level, 29.92 in Hg, 760 mm Hg, 1013.207 hPa or 14.6959 psi

Table 1: CO <sub>2</sub> Measurement Change With Temperature					
Temp. in °F	CO <sub>2</sub> Measured in PPM	Temp. in °F	CO <sub>2</sub> Measured in PPM	Temp. in °F	CO <sub>2</sub> Measured in PPM
32	1092	60	1033	85	985
35	1085	65	1023	90	976
40	1074	70	1013	95	968
45	1063	75	1004	100	959
50	1053	77	1000	105	950
55	1043	80	994	110	942

**Table 1** uses the Ideal Gas Law formula above to show how the uncompensated CO<sub>2</sub> measurement would change with temperatures from 32 °F to 110 °F. Initial conditions are 1,000 ppm CO<sub>2</sub>, 77°F and sea level Barometric Pressure. As seen in Table 1, the CO<sub>2</sub> concentration varies by 150 ppm.

Barometric Pressure is directly affected by altitude, and **Table 2** uses the Ideal Gas Law formula to show how the uncompensated CO<sub>2</sub> measurement would change with altitudes of -1,000 to 10,000 feet. Initial conditions are 77°F and 1,000 ppm CO<sub>2</sub> at sea level. As seen in Table 2, the CO<sub>2</sub> concentration varies by 349 ppm.

Altitude in Feet	Barometric Pressure in inches Hg	CO <sub>2</sub> Measured in PPM
-1000	31.02	1037
0	29.92	1000
1000	28.85	964
2000	27.82	930
3000	26.82	896
4000	25.84	864
5000	24.9	832
6000	23.98	801
7000	23.09	772
8000	22.23	743
9000	21.39	715
10000	20.58	688





## Weather Effects on Barometric Pressure and CO<sub>2</sub> Measurement

Heat entering our atmosphere creates weather patterns, and these patterns affect the Barometric Pressure by forming high pressure systems and low pressure systems. Fast moving storms can dramatically change the atmospheric pressure and effective altitude in only a few minutes.

About 15 miles from BAPI's headquarters is an internet enabled weather station on the Mississippi River bluffs above the small town of DeSoto. Looking at historical data from that weather station from 2003 to 2011, the highest pressure, the lowest pressure and the biggest one-day pressure swing are shown in Table 3.

If the actual CO<sub>2</sub> level was 1,000 ppm at sea level, then Table 3 shows what the measured CO<sub>2</sub> concentration would be in DeSoto on those days. From January 15, 2005 until October 26, 2010, weather patterns alone changed the CO<sub>2</sub> measurement by 75 ppm, which is the entire accuracy specification for a typical NDIR CO<sub>2</sub> sensor.

On the single day of January 18, 2005, weather patterns changed the CO<sub>2</sub> measurement by 35 ppm, which is almost 50% of the specified accuracy specification of a typical NDIR CO<sub>2</sub> sensor.

**Table 3: CO<sub>2</sub> Measurement Change with Weather Patterns**

Date	Barometric Pressure in inches Hg	Measured CO <sub>2</sub> in PPM
1/18/2005	30.71	1026
1/18/2005	29.64	991
1/15/2005	30.78	1029
10/26/2010	28.53	954

## The Combined Effect of Temperature and Barometric Pressure on CO<sub>2</sub> Measurement

Temperature and Barometric Pressure affect CO<sub>2</sub> measurement individually as well as in combination. **Table 4** shows the measured CO<sub>2</sub> concentration for the range of Barometric Pressures recorded in DeSoto from 2005 to 2010 along with temperatures from 50 to 90°F.

If the actual CO<sub>2</sub> concentration was 1,000 ppm at 77°F and sea level, the measured CO<sub>2</sub> concentration would vary by 161 ppm across the various temperature and Barometric Pressure ranges. That variance is more than the specified accuracy of the NDIR CO<sub>2</sub> sensor.

**Table 4: CO<sub>2</sub> Measurement Change with Temperature and Barometric Pressure Combined**

Temperature in °F	Barometric Pressure in Inches Hg						
	28.5	29	29.5	29.92	30	30.5	31
50	1003	1021	1038	1053	1056	1073	1091
55	993	1011	1028	1043	1046	1063	1080
60	984	1001	1018	1033	1035	1053	1070
65	974	991	1009	1023	1026	1043	1060
70	965	982	999	1013	1016	1033	1050
75	956	973	990	1004	1006	1023	1040
77	953	969	986	1000	1003	1019	1036
80	947	964	980	994	997	1014	1030
85	939	955	971	985	988	1004	1021
90	930	946	963	976	979	995	1012

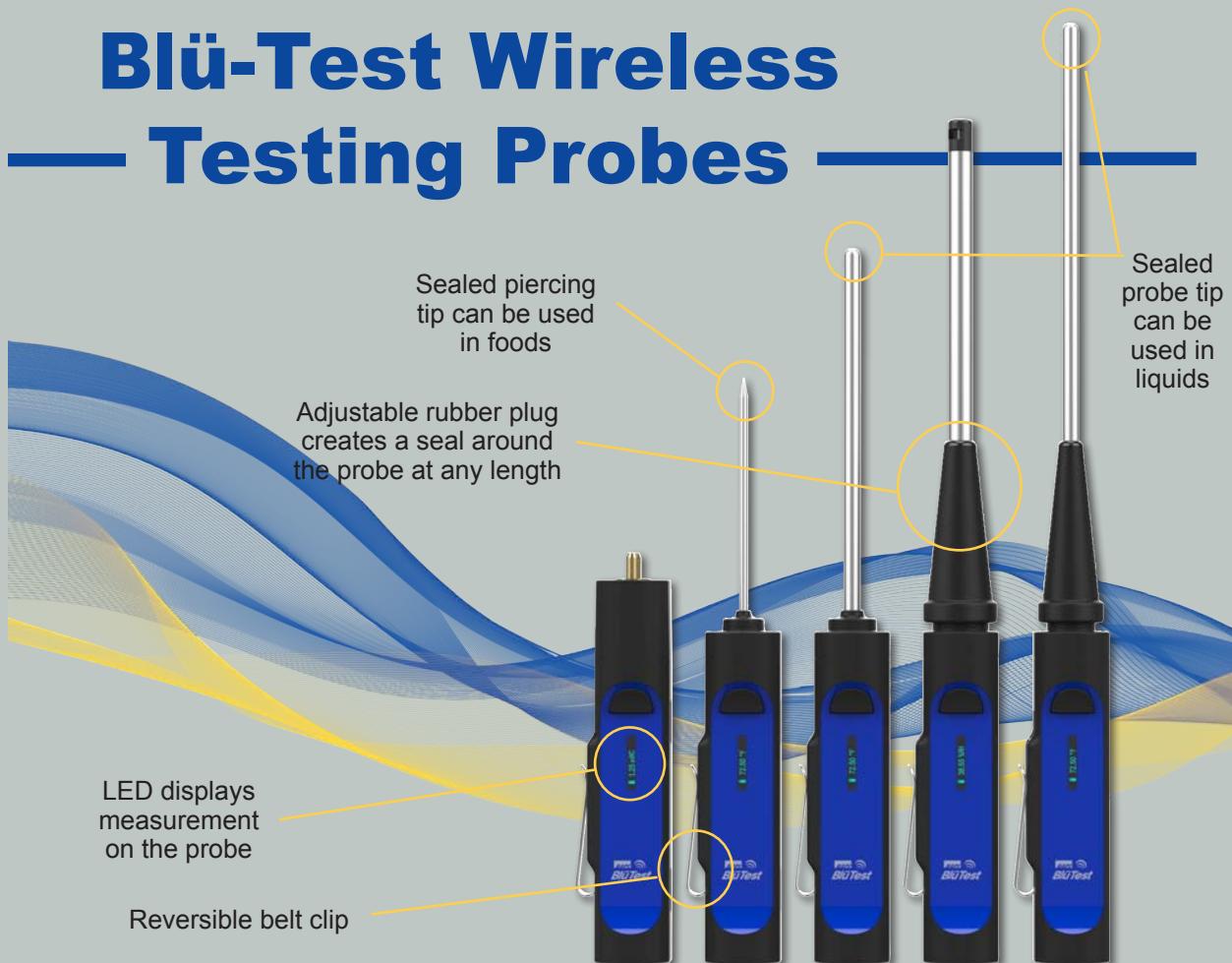
## Dynamic CO<sub>2</sub> Measurement Compensation

Due to the constantly changing nature of Barometric Pressure and temperature and their effect on CO<sub>2</sub> measurement, the only way to get an accurate CO<sub>2</sub> measurement with an NDIR sensor is through temperature and Barometric Pressure compensation. That's why all BAPI CO<sub>2</sub> sensors have a built in Barometric Pressure sensor and temperature sensor.

Every eight seconds the BAPI sensor takes a CO<sub>2</sub> reading then compensates that value based on the current temperature and Barometric Pressure. That's one reason why BAPI's CO<sub>2</sub> sensors are the most accurate in the HVAC/R industry. There is also no need for an HVAC technician to spend valuable time manually entering the altitude value for the location into each and every sensor when it is installed. This makes the BAPI CO<sub>2</sub> sensor one of the easiest to install, saving time and money.



# Blü-Test Wireless Testing Probes



- Communicates via Bluetooth® with your Android™ or iOS Smart Phone or Tablet
- Temperature, Humidity and Differential Pressure Sensors
- Rechargeable Lithium Battery via Micro-USB
- Connect Up to 6 Sensors at a Time
- LED on the Probe Displays Readings

The Blü-Test is a suite of handheld testing probes that interface via Bluetooth® wireless technology to the user's enabled Android™ or iOS Smart Phone or Tablet. Each probe comes with a National Institute of Standards and Technology (NIST) traceable certificate of calibration.

Blü-Test is very simple to use. Just start up the app on your smart phone or tablet and touch-select the probe to sync Bluetooth communication. The sensor logs the data and then uploads it to the app automatically when your device is in range. You can view measurements in real-time on the gauge view or a trending graph. You can then email the data or upload it to cloud storage.





<b>Blü-Test Probes</b>  pg E2	<b>Power Supplies and Voltage Converters</b>		
<b>Water Leak Detector</b>  pg E10	<b>VC350A-EZ 350mA Voltage Converter</b>  pg E4	<b>VC350A 350mA Voltage Converter</b>  pg E5	<b>PDM - Power Distribution Module</b>  pg E6
	<b>VC2000 Voltage Conv.</b>  pg E7	<b>PS17 &amp; PS17CB Power Supplies</b>  pg E8	
<b>BAPI-Guard</b>  pg E12	<b>FPB - Flexible Probe Bracket</b>  pg E13	<b>PMPB5 - Pulse Meter Pulse Buffer</b>  pg E14	<b>TS1 &amp; TS2 - Transient Suppressors</b>  pg E14
<b>BAPI Screwdriver and Allen Wrench</b>  pg E15	<b>Clean Cut Tool for BAPI-Boxes</b>  pg E16	<b>Trim Rings for the BAPI-Stat 4</b>  pg E17	<b>Adaptor Plates for Retrofit Installations</b>  pg E18
<b>Custom Logo Plates</b>  pg E20	<b>Light Level Sensor</b>  pg E21	<b>RJ22 Comm. Jack Adaptor</b>  <b>Security Screws &amp; Spanner Bit</b>  pg E22	<b>Replacement Keys, Foambacks &amp; Humidity filters</b>  pg E23
<b>Sealant Filled Connectors</b>  pg E24	<b>Pierceable Knockout Plugs</b>  pg E25	<b>Replacement Batteries</b>  pg E26	<b>Weather Shade for Outdoor Air Sensors</b>  pg E27





## Features & Options

- Handheld Bluetooth Probes with Local OLED Display
- Connect Up to 6 Probes at Once
- Temperature, Humidity and Differential Pressure Units
- Communicates with Android or iOS Smart Phone or Tablet Automatically

Blü-Test is a suite of handheld testing probes that interface via Bluetooth to the user's enabled Android or iOS Smart Phone or Tablet. Each probe comes with a National Institute of Standards and Technology (NIST) traceable certificate of calibration.

Blü-Test is simple to use. Just start up the app on your smart phone or tablet and touch-select the probe to sync Bluetooth communication. Multiple points can be logged, graphed or emailed. The logs are saved on the probe and the app and can be emailed for easy insertion into commissioning reports. Measurements are also shown on the handheld probe's local OLED display for convenience.



**Blü-Test App Screen**

Blü-Test can take readings and store the data in its internal memory when the smart phone or tablet is out of range. The data is then uploaded to the app when the phone or tablet is back in range.



**Blü-Test Suite of Testing Probes**

(Units on the right shown with included removable Duct Cone for sealing the hole when measuring in a duct.)

## Blü-Test Base and Probe Specifications

**Power:** 3.7V, 2,600 mAh Rechargeable Battery (charging cable included)

### Environmental Range:

Unit's Base .....	-22 to 158°F (-30 to 70°C)
Temperature Probes .....	-40 to 185°F (-40 to 85°C)
%RH Probe.....	5 to 95% Non-condensing
Differential Pressure Probe ...	-4 to 158°F (-20 to 70°C)

### Measurement Range:

Temperature .....	-40 to 185°F (-40 to 85°C)
%RH .....	20 to 80% Non-condensing
Differential Pressure .....	Low Range: -1 to +1" WC (-250 to +250 Pascal) Standard Range: -5 to +5" WC (-1,250 to +1,250 Pascal)

### Typical Accuracy:

Temperature .....	±0.54°F@77°F (±0.3°C@25°C)
%RH .....	±2%RH@77°F (25°C)
Differential Pressure.....	Low Range: ±0.25% of FS Span, -1 to +1" WC (-250 to +250 Pascal) Standard Range: ±0.25% of FS Span, -5 to +5" WC (-1,250 to +1,250 Pascal)

**Specific Accuracy:** ..... See the provided NIST certificate

**Communication:** ..... Bluetooth Class 2 v4.2

**Data Transfer:** ..... Updates to display every 10 seconds

**Agency:** ..... RoHS, CE, NIST traceable certificate

**FCC ID:** ..... Contains FCC ID 2AA9B04





## Ordering Information

### Part Number    Description

- BA/BT-TP** ..... Blü-Test Temperature, 4" length piercing, 1/8" diameter (10.2 cm x .32 cm)  
**BA/BT-TA** ..... Blü-Test Temperature, 6" length, 1/4" diameter (15.3 cm x .64 cm)  
**BA/BT-TB** ..... Blü-Test Temperature Probe, 9.5" length, 1/4" diameter (24.2 cm x .64 cm)  
**BA/BT-TH** ..... Blü-Test Temp/Humidity Probe, 8" length, 3/8" diameter (20.3 cm x .95 cm)  
**BA/BT-DPLR**... Blü-Test Differential Pressure, Low Range, -1 to +1" WC (-250 to +250 Pascals)  
**BA/BT-DPSR**... Blü-Test Differential Pressure, Standard Range, -5 to +5" WC (-1,250 to +1,250 Pascals)

**See end of Section E for list pricing.**

## Blü-Test App Specifications

**Application Program:** \*Android OS 4.4 (SDK19) or Apple iOS 9 or higher required

**Display:** Display on probe or device

Measured Data ..... Temp. (°F/°C), Temp. & %RH or Differential Pressure (inches WC or Pascals)

Time Stamp ..... Date and 24 hour time

Location ..... Uses location of smart phone or tablet

Save ..... Saves current data, time & location

Log ..... Show trend data on screen

Email ..... Sends data log to any email address

Note: A user supplied Android or iOS device is required to monitor logged data.





## Overview

- DIN Rail, Snaptrack or Surface Mount
- Compact & Cost-Effective 350 mA Unit
- Self-resetting Thermal Fuse
- Operation & Fault LED Indicators
- Fixed or Adjustable Outputs
- Output Protected Against Overload and Accidental Shorting

BAPI's 350A-EZ is a cost-effective way of converting 24 VAC or VDC to 5, 12, 15 or 24 VDC for use on peripheral devices that require DC voltage. The converter is available with a 350 mA output. The revolutionary mounting system allows for 2.75" snaptrack, DIN rail or surface mounting.

Although most BAPI room units can run on 24 VAC power, converting to DC power eliminates the AC power "noise" which can affect the room sensor readings. BAPI's tests show that fluctuating and inaccurate signal levels are possible when AC power wiring is present in the same cable as the signal lines. To minimize the AC voltage noise, the DC converter must be mounted as close to the controller as physically possible. Do not mount the converter at the sensor end of the wire, the AC will still couple into the sensor signal if you do. All fixed outputs of 5, 10, 12 or 15 VDC are adjustable ±10%. The adjustable model (-ADJ) has an output of 5 to 24 VDC.



**VC350A EZ  
mounted on DIN Rail**

## Ordering Information

<u>Part Number</u>	<u>Description</u>
BA/VC350A-EZ-5.....	5 VDC Output at 350 mA
BA/VC350A-EZ-10.....	10 VDC Output at 350 mA
BA/VC350A-EZ-12.....	12 VDC Output at 350 mA
BA/VC350A-EZ-15.....	15 VDC Output at 350 mA
BA/VC350A-EZ-ADJ.....	5 to 24 VDC Adjustable Output at 350 mA

*See end of  
Section E for  
list pricing.*

## Specifications

**Output Voltage:** 5 to 24 VDC @ 350 mA

**Recommended Input Voltage:** 18 to 28 VAC, 24 VDC (15 VA)

**Input Voltage Limits:**

<u>Model of Unit</u>	<u>Minimum (VAC/VDC)</u>	<u>Maximum (VAC/VDC)</u>	<u>Input Current@ Min Input Volts (AC/DC)</u>
5V	5.0/9.0	28.0/35.0	5.2 VA/305 mA
10V	10.0/14.7	28.0/35.0	8.3 VA/315 mA
12V	12.0/16.9	28.0/35.0	9.5 VA/318 mA
15V	15.0/20.5	28.0/35.0	11.2 VA/320 mA
ADJ (24V)	24.0/31.0*	28.0/35.0	16.7 VA/325 mA

\*Depends on output voltage

**Environmental Operation Range:**

0 to 95% RH non-condensing

-40 to 149°F (-40 to 65°C) 350 mA @ any output voltage

-40 to 158°F (-40 to 70°C) 350 mA @ 5 VDC

330 mA @ 10 VDC

280 mA @ 12 VDC

224 mA @ 15 VDC

140 mA @ 24 VDC

**Environmental Storage Range:**

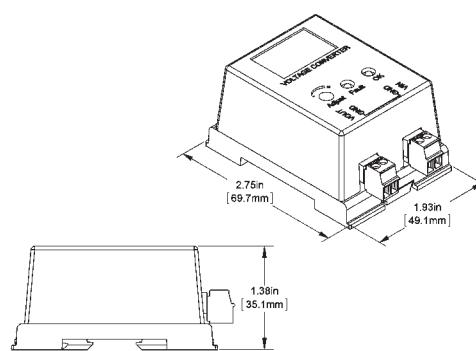
-40 to 176°F (-40 to 80°C)

**Wiring:** 4 wires, 16 to 22 gauge

**Rectification:** Half-Wave Rectified

**Grounding:**

AC & DC Ground are Common



Note: The VC350A-EZ is a Class 2 circuit when it is powered from a UL Class 2 power supply.



Building Automation Products, Inc. • 750 North Royal Avenue, Gays Mills, WI 54631 USA

Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: sales@bapihvac.com • Web: www.bapihvac.com



## Overview

- Compact & Cost-Effective 350 mA Unit
- Ruggedized Circuitry and Self-resetting Thermal Fuse
- Operation & Fault LED Indicators
- Fixed or Adjustable Outputs
- Output Protected Against Overload and Accidental Short Circuit

BAPI's VC350A is a cost-effective way of converting 24 VAC or VDC to 5, 12, 15 or 24 VDC for use on peripheral devices that require DC voltage.

The converter is available with a 350 mA output. The converter is very compact and designed to fit into standard 2.75" snaptrack.

Although most BAPI room units can run on 24 VAC power, converting to DC power eliminates the AC power "noise" which can affect the room sensor readings. BAPI's tests show that fluctuating and inaccurate signal levels are possible when AC power wiring is present in the same cable as the signal lines. To minimize the AC voltage noise, the DC converter must be mounted as close to the controller as physically possible. Do not mount the converter at the sensor end of the wire, the AC will still couple into the sensor signal if you do. All fixed outputs of 5, 10, 12 or 15 VDC are adjustable ± 10%. The adjustable model (-ADJ) has an output of 5 to 24 VDC.

### Part Number      Description

<b>BA/VC350A-5</b> .....	5 VDC at 350 mA
<b>BA/VC350A-10</b> .....	10 VDC at 350 mA
<b>BA/VC350A-12</b> .....	12 VDC at 350 mA
<b>BA/VC350A-15</b> .....	15 VDC at 350 mA
<b>BA/VC350A-ADJ</b> ....	5-24 VDC (adj.) at 350 mA

Note: Add **-TRK** to the end of the part number (**BA/VC350A-5-TRK**) to include a 1.25" length of 2.75" snaptrack

*See end of Section E for list pricing.*

## Specifications

**Output Voltage:** 5 to 24 VDC @ 350 mA

**Recommended Input Voltage:** 18 to 28 VAC, 24 VDC (15 VA)

### Input Voltage Limits:

Model of Unit	Minimum (VAC/VDC)	Maximum (VAC/VDC)	Input Current@ Min Input Volts (AC/DC)
5V	5.0/9.0	28.0/35.0	5.2 VA/305 mA
10V	10.0/14.7	28.0/35.0	8.3 VA/315 mA
12V	12.0/16.9	28.0/35.0	9.5 VA/318 mA
15V	15.0/20.5	28.0/35.0	11.2 VA/320 mA
ADJ (24V)	24.0/31.0*	28.0/35.0	16.7 VA/325 mA

\*Depends on output voltage

### Environmental Operation Range:

0 to 95% RH non-condensing

-40 to 149°F (-40 to 65°C) 350 mA @ any output voltage

-40 to 158°F (-40 to 70°C) 350 mA @ 5 VDC,

330 mA @ 10 VDC,

280 mA @ 12 VDC,

224 mA @ 15 VDC,

140 mA @ 24 VDC

### Environmental Storage Range:

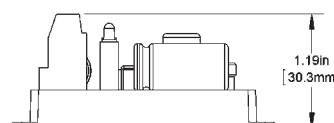
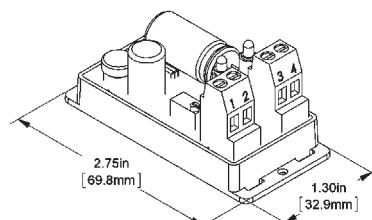
-40 to 176°F (-40 to 80°C)

**Wiring:** 4 wires, 16 to 22 gauge

**Rectification:** Half-Wave Rectified

### Grounding:

AC & DC Ground are Common



Note: The VC350A is a Class 2 circuit when it is powered from a UL Class 2 power supply.





## Features & Options

- 3 or 5 Circuit Power Distribution
- Expandable by Cascading Additional PDM's
- 12 to 30V AC/DC operation
- Master Power Switch w/ 10 Amp Breaker
- Individual Circuit Power Switches
- Individual 3 Amp Circuit Protection
- Power and Fault LED's



PDM - Power Distribution Module  
BA/PDM-5-B

The PDM - Power Distribution Module is a low voltage (12 to 30V AC/DC) power distribution module designed to take a single power source and distribute that power to multiple circuits. It comes in 3 or 5 circuit models which can be linked together to achieve multiple circuits with a minimum of panel space.

A common module On/Off switch and 10 amp breaker powers the distributed circuits. Each circuit has an individual On/Off switch and individual field connection terminals. The PDM has individual circuit protection with either a 3 amp fuse or 3 amp breaker with an individual power LED and fault LED per circuit.

### Part Number      Description

BA/PDM-5-B .....	Five circuit Power Distribution Module, w/ breaker
BA/PDM-3-B .....	Three circuit Power Distribution Module, w/ breaker
BA/PDM-5-F .....	Five circuit Power Distribution Module, w/fuse
BA/PDM-3-F .....	Three circuit Power Distribution Module, w/fuse

*See end of Section E for list pricing.*

## Specifications

**Supply Voltage:** 12 to 30V AC/DC 10 amps max

**Circuit Distribution:** .....3 or 5 circuits

### **Circuit Protection:**

- Master Breaker.....10 amp, push to reset
- Individual Fused ...3 amp, slow blow 20mm fuse
- Individual Breaker.3 amp, push to reset

### **Visual Indicators:**

- Power .....Green LED, master & individual
- Fault.....Red LED, master & individual

### **On/Off Switching:**

- Master.....Common rocker switch
- Circuit .....Individual rocker switch

**Connection:** Plug in terminal strip,  
Cage clamp, 28-12 AWG

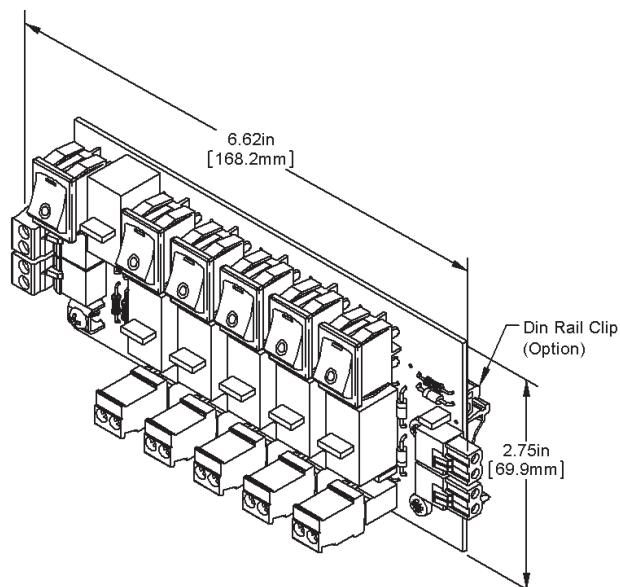
**Dimension:** 6.62" L x 2.75" W x 2" H  
(16.9cm L x 7cm W x 5cm H)

**Mounting:** 2.75" snaptrack,  
Module to module close connection

**Ambient:** -40 to 158°F (-40 to 70°C)

**Warranty:** 5 years

**Weight:** 0.3lb (0.13kg)





## Features & Options

- Compact and Cost-Effective
- Regulated and Adjustable 1.2 VDC to 24 VDC Output
- Output Protected Against Overload and Accidental Short Circuit

BAPI's VC2000 Voltage Converters are accurate, rugged and reliable power sources designed for commercial energy management applications.

The 2 Amp Voltage Converter accepts a 24 VAC input which can be field adjusted to a regulated output of 1.2 VDC to 24 VDC (factory set for 24 VDC). The input can be field configured for full or half wave rectification. The unit includes an output fuse to protect against overload and short circuits, a power indication LED, and is available with or without a backplate on the steel mounting bracket. Self-resetting or cartridge fuses may be specified at the time of order.



**VC2000 with backplate and cartridge fuse**

## Ordering Information

Part Number	Description
BA/VC2A-F	Converter without backplate, cartridge fuse
BA/VC2A-P	Converter without backplate, self-resetting fuse
BA/VC2B-F	Converter with backplate, cartridge fuse
BA/VC2B-P	Converter with backplate, self-resetting fuse

*See end of Section E for list pricing.*

## Specifications

**Input Voltage Range:** 24 VAC (100 VA)

**Fuse Protection:** 4 Amp, output side

**Output Voltage Range:** 1.2 VDC to 24 VDC

**Maximum Output Current:** 2.0 Amps

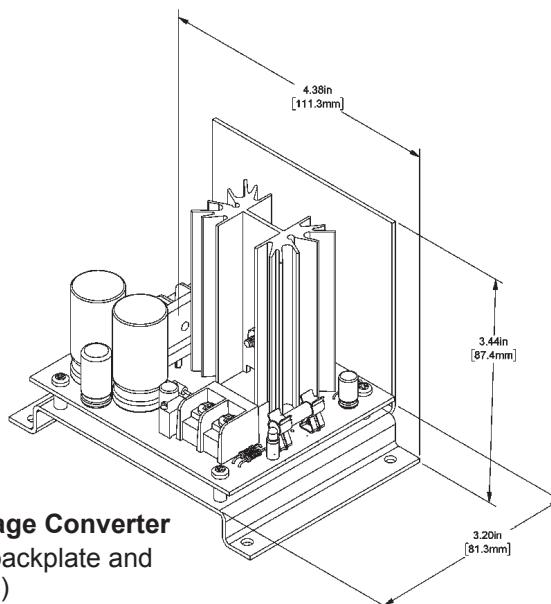
**Operating Range:** -40 to 158°F (-40 to 70°C)

**Rectification:** Field Selectable as Full or Half Wave

**Wiring:** 16 to 22 AWG

Note: The VC2000 is a Class 2 circuit when it is powered from a UL Class 2 power supply.

**VC2000 Voltage Converter**  
(shown with backplate and cartridge fuse)



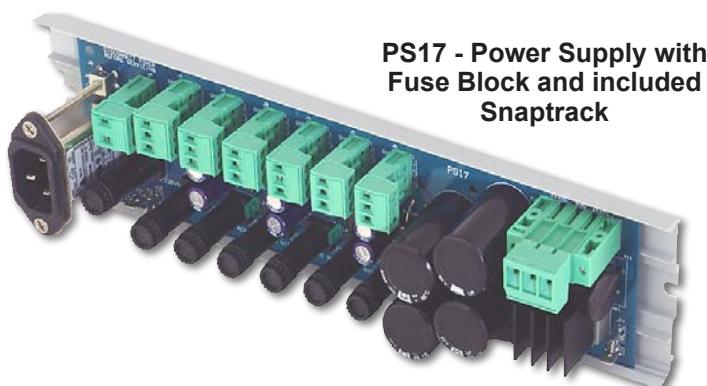


## Overview

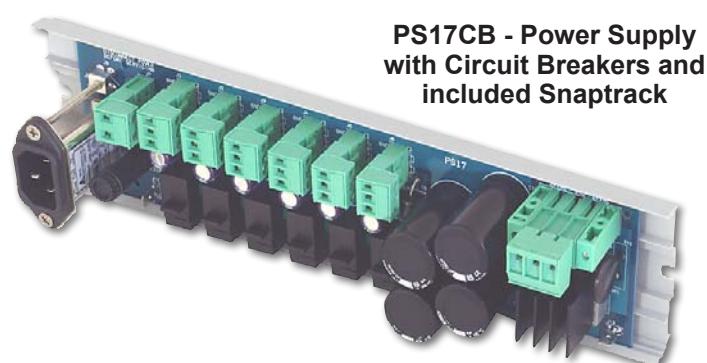
The PS17 and PS17CB Power Supplies provide up to six 33 VDC, 3 Amp power supplies each. The PS17 features a 3 Amp fuse on each output while the PS17CB features a 3.15 Amp circuit breaker on each output. Each output has a green LED, which lights to show normal power.

Both power supplies use a 120 VAC to 24 VAC transformer with a rating of 75VA to 400 VA depending upon current consumption. Total your current consumption and pick the appropriate transformer from the table at right.

The PS17CB provides a transient line filter for the 120 VAC input to the transformer. Screw terminals on the PS17CB allow convenient termination of the input and output of the transformer. Plug a standard computer power cord into a duplex outlet and then into the line filter to power the PS17CB. A green LED lights when 120 VAC is applied and the circuit breaker is not tripped. Comes with an 12.5" piece of 2.75" Snaptrack.



**PS17 - Power Supply with  
Fuse Block and included  
Snaptrack**



**PS17CB - Power Supply  
with Circuit Breakers and  
included Snaptrack**



**18" Power  
Cord**

## Specifications

### PS17 & PS17CB Input Power

120 VAC at 0.7 to 3.5 Amps depending on transformer selected. Standard IEC Line Filter

### PS17 & PS17CB Output

Nominal 33 VDC.

Four Outputs rated at 2.25 Amps -  
3 Amp Fuse or 3.15 Amp Circuit Breaker  
(Typically for controllers)

Ambient Temperature:  
-40 to 60° C (-40 to 140° F)

Two Outputs rated at 3 Amps -  
4 Amp Circuit Breaker or Fuse  
Circuit Breakers are all push-to-reset style

### Power Cord Specs

**Input:** 125 VAC at 10 Amps Max.

**Wire:** 3 Wire, 18 AWG

**Ratings:** NEMA 5-15P, UL817, CSA22.2

## TRANSFORMER TABLE

Total Current Consumption	Transformer Power
1.875 amps or less .....	.75 VA
2.500 amps or less .....	100 VA
3.750 amps or less .....	150 VA
5.000 amps or less .....	200 VA
6.250 amps or less .....	250 VA
7.500 amps or less .....	300 VA
12.00 amps or less .....	400 VA

Note: The customer supplies the power transformer.





# PS17 & PS17CB - Power Supplies

E-

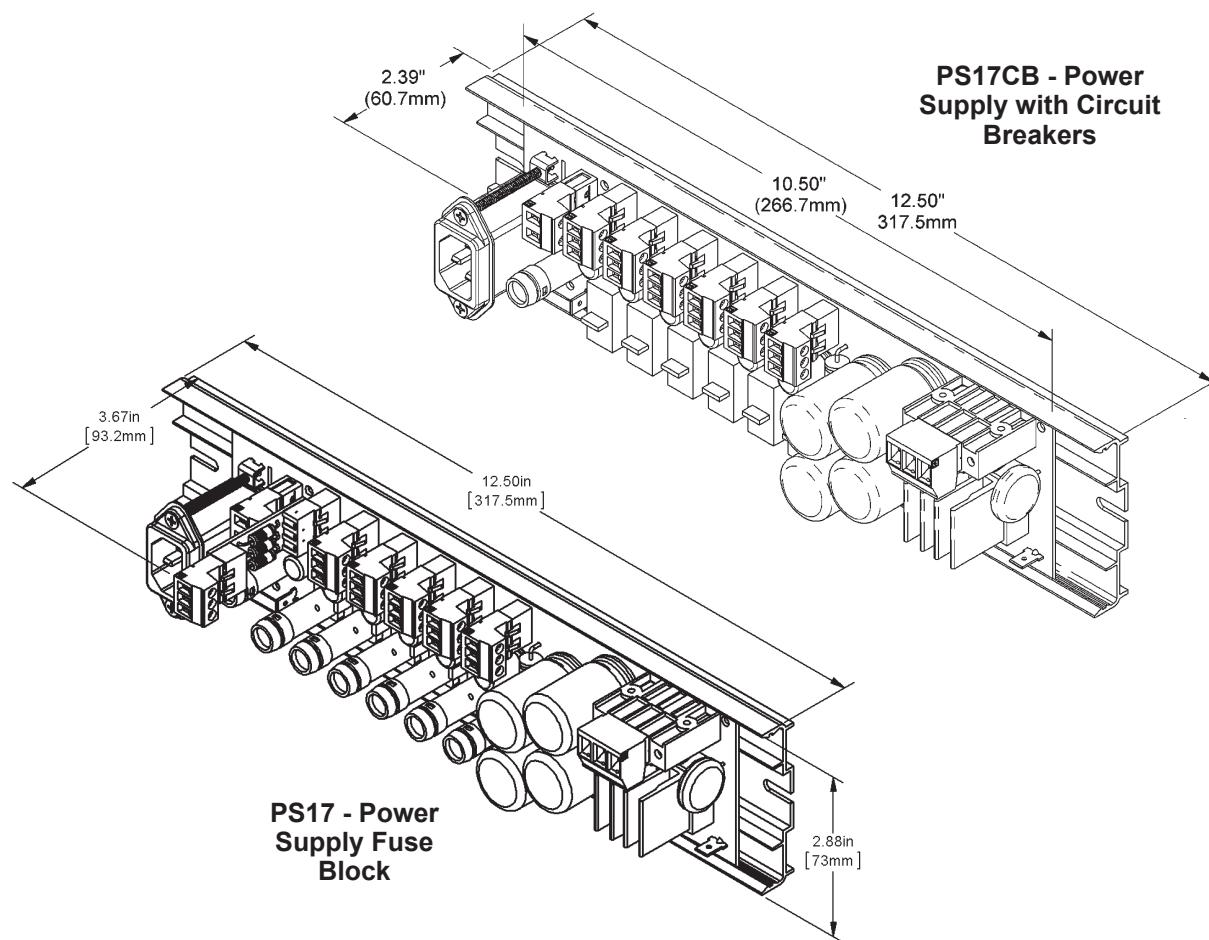
Accessories for HVAC/R

## Ordering Information

Part Number	Description
BA/PS17	PS17 Power Supply with Fuse Block
BA/PS17CB	PS17 Power Supply with Circuit Breakers
BA/PWR-CORD-18"	18" Power Cord for PS17 Power Supply
BA/PWR-CORD-36"	36" Power Cord for PS17 Power Supply

See end of Section E for list pricing.

## Dimensions





## Features & Options

- Detection Within 5 Seconds with Local LED Alarm Indication
- 5 Amp or 0.5 Amp Relays @ 30VAC/DC
- One Piece, Rope or Remote Sensor Design
- NEMA 4 Enclosure

The Water Leak Detector is designed to sense the presence of water and alert a central monitoring system of the potentially destructive situation. Upon water detection, the alarm relays change state, and a local red LED illuminates. The transmitter can be set for latching or non-latching alarm, and normally energized or normally de-energized operation.

**Detector with  
Remote Sensor**



**Detector with  
Attached Sensor**



**Detector with  
Rope Sensor**

## Specifications

### Power:

24VAC/VDC +/- 10%

5 Amp Relays: 4 Watt/ 4 VA max

0.5 Amp Relays: 2 Watt/ 2 VA max (not intended to switch a load)

### Wiring:

Flex Connector or Liquid Tight Fitting

Relays.....Up to 6 wires for Alarm Contacts

Transmitter .....2 wires for Power

### Sensor:

Attached .....SS probe w/ adjustable depth screw from 0.063 to 0.84"

Remote .....Sensor w/ adjustable depth from 0.062 to 0.5", Mounts to pan with industrial adhesive tape or 0.172" mounting holes

Rope .....Long Line Wire Sensor, Plenum Rated.

Detects 1/8" of water over the full length.

### Alarm Contacts :

LDT1:..... One SPST, 0.5A relay output, 10W max.

LDT2:..... Two SPST, 0.5A relay outputs, 10W max.

LDT3: ..... One SPDT, 5A relay output

LDT4:..... Two SPDT, 5A relay outputs

### Indication:

1 Green Power LED, 1 Red Alarm LED

### Reset Action:

If latching, local pushbutton or power interrupt

### Termination:

Terminal Strip, 12 to 24 AWG

### Latching and Supervised Relay Options:

Latching ..... Relay stays in alarm until manually reset or power is cycled

Non-Latching .. Relay automatically resets after water is removed (default)

Unsupervised.. Relay energizes on water detection

Supervised..... Relay de-energizes on water detection (default)

Note: Relay de-energizes on loss of power

### Enclosure Ratings:

Remote Sensor.. Submersible, with FEP plenum-rated, waterproof cable

Detector ..... BAPI-Box, NEMA 4 Polycarbonate Enclosure

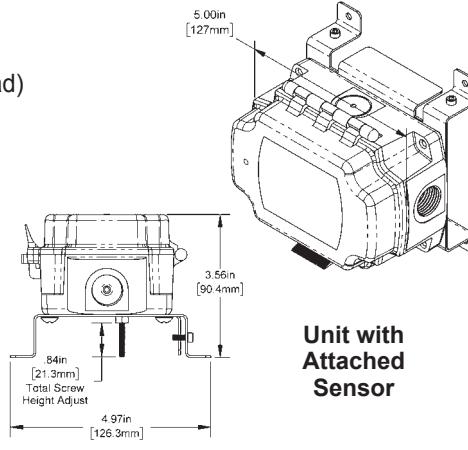
### Ambient:

Remote Sensor.... -40 to 185°F (-40 to 85°C), 0 to 100%RH, Condensing

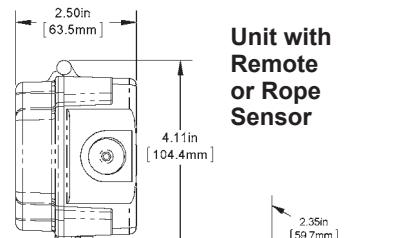
Rope Sensor..... 32 to 167°F (0 to 75°C), 0 to 95%RH, Non-condensing

Detector (BB)..... -40 to 185°F (-40 to 85°C), 0 to 95%RH, Non-condensing

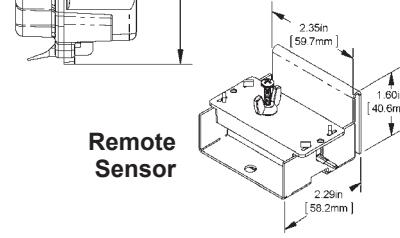
**Agency:** RoHS, UL94V-0 , UV-rated in Enclosure



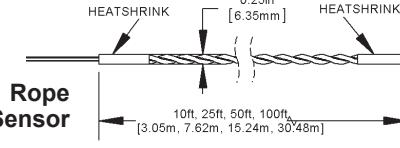
**Unit with  
Attached  
Sensor**



**Unit with  
Remote  
or Rope  
Sensor**



**Remote  
Sensor**



**Rope  
Sensor**





# Water Leak Detector

Accessories for HVAC/R

E1%

Submittal datasheets without List Prices are available on our website at [www.bapihvac.com](http://www.bapihvac.com)

## Water Leak Detector Option Selection Guide

BA/ (#1) - (#2) - (#3)

### **#1: Leak Detector Transmitter (required)**

	<u>List Price</u>
LDT1.....	\$114
LDT2.....	\$124
LDT3.....	\$120
LDT4.....	\$130

### **#2: Probe Sensor (required)**

PS.....	\$32
RS5.....	\$36
RS10.....	\$41
RS25.....	\$56
RR10.....	\$174
RR25.....	\$423
RR50.....	\$839
RR100.....	\$1,671

### **#3: Enclosure and Fitting Options (required)**

BB.....	\$12
BB-LTF.....	\$22
BB-GFF.....	\$13

*Submittal sheets without List Prices can be downloaded from our website at [www.bapihvac.com](http://www.bapihvac.com)*

**Example Number:** BA/ (**LDT1**) - (**RR10**) - (**BB**)

**Actual Number (with parenthesis removed):** BA/LDT1-RR10-BB

**Description:** Detector with one 0.5A contact, 10' Remote Rope Sensor and BAPI-Box Enclosure

**List Price:** \$114 (One contact 0.5A) + \$174 (10' Rope Sensor) + \$12 (BAPI-Box) = \$300 List Price

**Your Number:** BA/

## Replacement Remote Spot or Remote Rope Sensors

For use as updates to existing systems or built-in (-PS) probe Sensors

<u>Sensor Type</u>	<u>List Price</u>
BA/RS5.....	\$36
BA/RS10.....	\$41
BA/RS25.....	\$56
BA/RR10.....	\$174
BA/RR25.....	\$423
BA/RR50.....	\$839
BA/RR100.....	\$1,671

**Your Number:** BA/





## Features & Options

- Prevents Tampering, Damage and Unauthorized Adjustment
- Exceptional Airflow for Proper Thermostat Operation
- Made from Thick, Durable Polycarbonate
- Key Lock Protected
- Low Profile Design with Two Sizes to Fit Most Thermostats
- Horizontal or Vertical Mounting with Hardware Included

The BAPI-Guard prevents tampering, physical damage and unauthorized adjustment of thermostats. The attractive design is available in two sizes to fit most thermostats. It is made of thick, durable polycarbonate and features exceptional airflow, key lock protection, horizontal or vertical mounting and easy installation with hardware included.

### PART NUMBERS

- BA/BG** ..... Larger BAPI-Guard Thermostat Protector  
**BA/BG2** ..... Smaller BAPI-Guard 2 Thermostat Protector  
**BA/KEY16187** .. Replacement Key for BAPI-Guard & BAPI-Guard 2

*See end of Section E for list pricing.*



**BAPI-Guard 2 Mounted Over a BAPI-Stat "Quantum" Sensor**

## Specifications

**Material:** Polycarbonate

**Material Rating:** UL 94, V-0

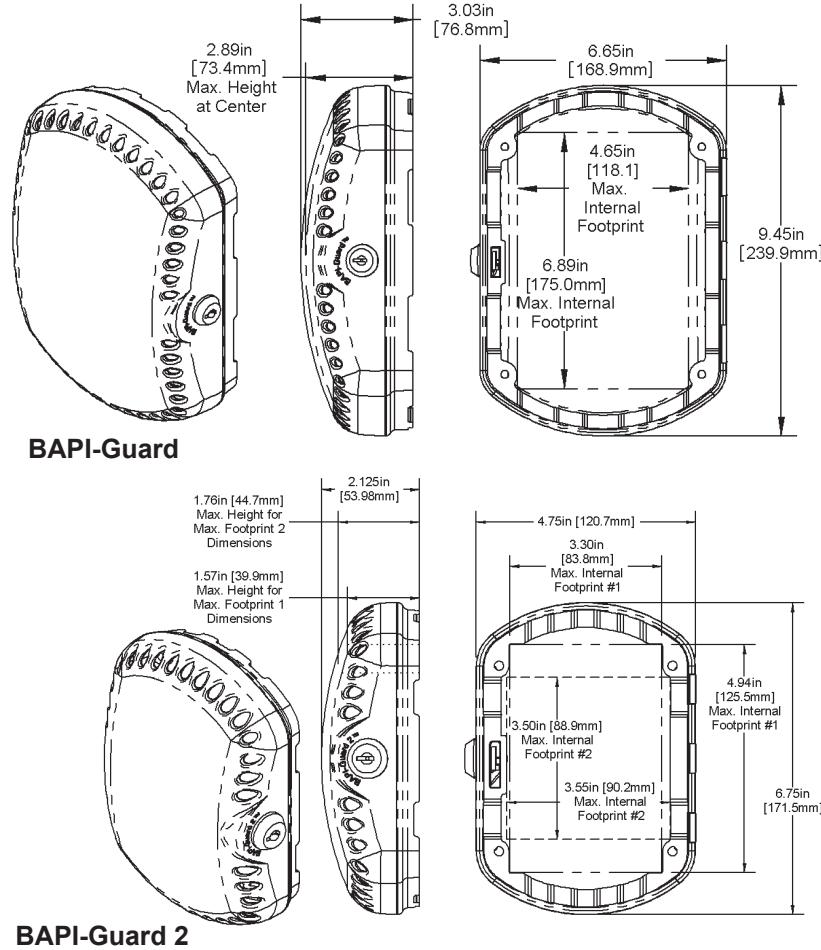
### The BAPI-Guard fits these common thermostats

BAPI-Stat "Quantum Prime"  
Honeywell T7300, T7350,  
T7560, T7770 and  
T7790 Series  
Johnson Controls Metastat

### The BAPI-Guard 2 fits these common thermostats

Delta Style Enclosure  
BAPI-Stat "Quantum"  
Automated Logic RS Series  
York Zone Sensor  
Invensys MN series

If you have a question about whether the BAPI-Guard or BAPI-Guard 2 will fit a specific thermostat, please call BAPI.





Rev. 12/20/16

# FPB - Flexible Probe Bracket

E1'

Accessories for HVAC/R

## Features & Options

- Makes mounting of averaging sensors quick and easy
- Eliminates risk of kinking and damaging the probe
- Scored break off for 1/4" rigid probe mounting
- Nylon material limits heat/cold conduction to the probe

The Flexible Probe Bracket (FPB) is used to mount averaging sensors, low limit thermostats, or liquid fill thermostats in duct applications for probe diameters from 1/8", 1/4" and 3/8".

The bracket is used to reverse the direction of the flexible probe with a smooth arc to eliminate the risk of kinking the sensor and damaging the probe.

A fixed 1/4" probe may also be mounted as part of the bracket design using the scored break-off. The FPB is made out of tough UL94V Nylon which limits heat/cold conduction to the probe and has multiple mounting holes to make mounting quick and easy.

## ORDERING INFORMATION

### Part Number      Description

**BA/FPB-50** ..... 50 Flexible Probe Brackets

**BA/FPB-100** ..... 100 Flexible Probe Brackets

**BA/FPB-500** ..... 500 Flexible Probe Brackets

*See end of Section E for list pricing.*

## Specifications

**Material:** Nylon

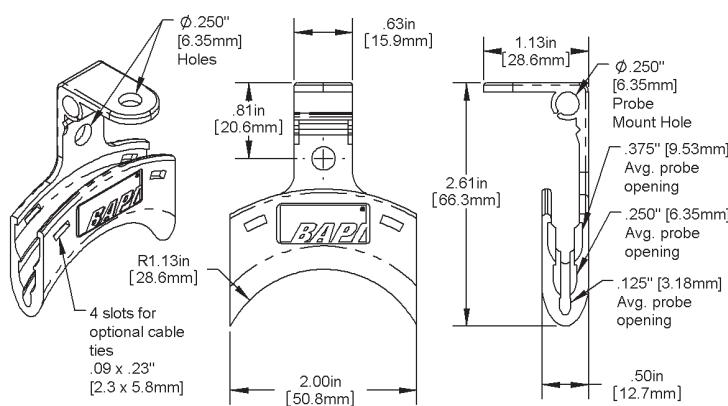
**Rating:** UL94V-2 (plenum rated), RoHS Compliant

**Mounting:** Two 1/4" holes, on the top and side.

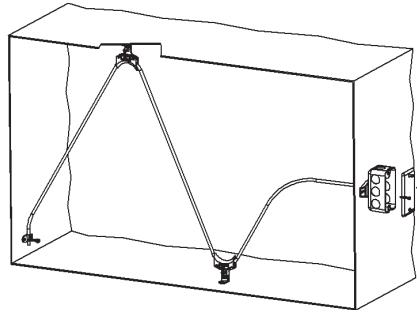
**Probe Size:** 1/8", 1/4", and 3/8" flexible probes  
1/4" rigid probe holder, w/break off score

**Bracket Arc:** 1.125" radius

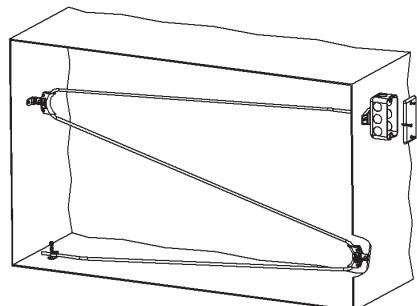
**Operational Temp:** -22 to 167°F, (-30 to 75°C)



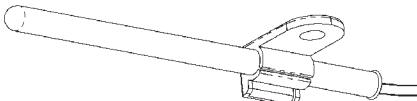
FPB - Flexible Probe Bracket



Vertical Mounting of the Averaging Sensor



Horizontal Mounting of the Averaging Sensor



1/4" Rigid Probe Mounting (using scored break off)





## Overview

Many electrical, water or gas meters provide a pulse output with each pulse representing a specific quantity of the media being measured. These pulse outputs often need to be electrically isolated from the controller's input by a buffer. The PMPB5 provides that buffer by receiving the pulses from the meter and recreating them as dry contact closures. An LED lights whenever the buffer contacts are closed. The PMPB5 fits standard 2.75" snaptrack.

<u>Part Number</u>	<u>Description</u>
--------------------	--------------------

**BA/PMPB5** ..... Pulse Meter Pulse Buffer

**BA/PMPB5-TRK** ..... Pulse Meter Pulse Buffer w/ 1.25" piece of 2.75" Snaptrack

*See end of Section E for list pricing.*



PMPB5 mounted in  
the optional 2.75"  
snaptrack

## Specifications

Power ..... 24VAC 50/60HZ @ 25mA (0.6VA)

Contact rating ..... 1A @ 24VAC maximum, 1mA @ 5VDC minimum)

Contact repetition rate ..... 2 seconds per pulse maximum

## TS1 & TS2 - Transient Suppressor

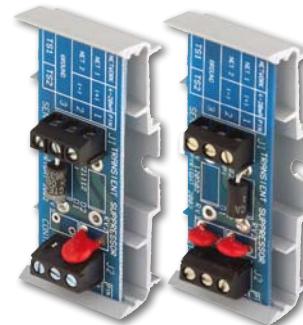
Rev. 12/20/10

## Overview

HVAC control systems can be subjected to electrical transients (temporary excess voltage) from various sources. Damage to control systems can occur if static electricity, lightning or contactors produce transients of sufficient magnitude and duration to overwhelm the protection built into the control system components. The TS1 and TS2 can significantly increase the transient protection and reduce the possibility of damage to the control system. Both modules fit in standard 2.75" snaptrack

The TS1 is specifically designed for network communications between control system components. The TS1 clamps voltages to 10 VAC or  $\pm 14$  VDC Line to ground and 7.5 VDC line to line. *Please Note: The added capacitance of the TS1 may be unsuitable for some combinations of communications line length and high speed data. For best operation you may have to reduce line lengths and add data repeaters.*

The TS2 is designed to protect 4 to 20 mA current loops. The TS2 clamps the signal return line to 5 volts above ground and 1 volt below ground. The voltage supply line is clamped to  $\pm 39$  VDC Line to ground.



TS1 & TS2 - Transient  
Suppressors with optional  
2.75" snaptrack

<u>Part Number</u>	<u>Description</u>
--------------------	--------------------

**BA/TS1** ..... Transient Suppressor (voltage)

**BA/TS2** ..... Transient Suppressor (current)

**BA/TS1-TRK** ..... Transient Suppressor (voltage) with 1.25" piece of 2.75" Snaptrack

**BA/TS2-TRK** ..... Transient Suppressor (current) with 1.25" piece of 2.75" Snaptrack

*See end of Section E for list pricing.*

## Specifications

TS1 Clamping Voltage..... 10 VAC or  $\pm 14$  VDC Line to Ground,  $\pm 7.5$  VDC Line to Line

TS2 Clamping Voltage..... 5 VDC Above Ground, Signal Return Line

1 VDC Below Ground, Signal Return Line

$\pm 39$  VDC Line to Ground, Power Supply Line





## Features & Options

- Small Flathead Screwdriver for Terminal Block screws
- 1/16" Allen Wrench for Cover Locking Screws
- Works on Delta, PreCon, Powers and all BAPI-Stat Room Unit Enclosures

BAPI Screwdriver & Allen Wrench Combinations are especially useful for installing BAPI Room Units.

The small, flathead screwdriver can be used to turn the screws on the circuit board terminal block while the 1/16" Allen wrench is used for the locking screws on the removable cover (See figures below).

One 6" screwdriver (BA/116) is included with every 25 room units ordered. This model is not designed for prolonged use. The 6.75" model (BA/116W) is designed for prolonged use.



**BAPI 6.75" Screwdriver & Allen Wrench Combination (top) and the 6" Screwdriver & Allen Wrench Combination (bottom)**

## ORDERING INFORMATION

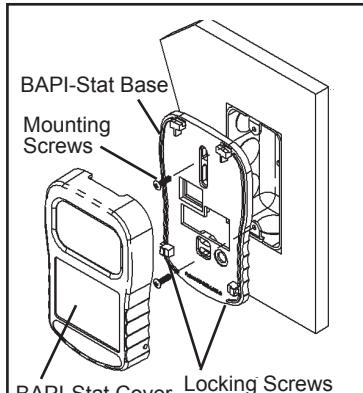
**Part Number:** BA/116W - BAPI 6.75" Screwdriver & Allen Wrench Combination

**Part Number:** BA/116 - BAPI 6" Screwdriver & Allen Wrench Combination

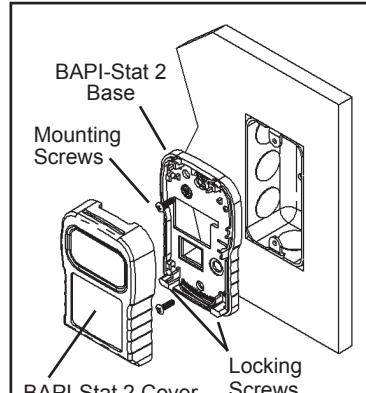
*See end of Section E for list pricing.*

## Allen Wrench Locking Screw Locations for BAPI Room Units

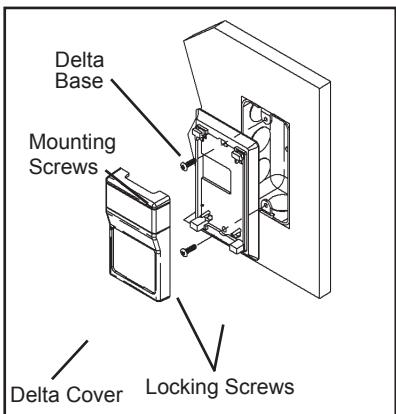
The figures below show the location of the locking screws on 5 of BAPI's room unit enclosures. The BAPI Screwdriver can be used with all of them. Simply snap the cover in place and turn the locking screws counterclockwise with the allen wrench, backing them out to lock the cover in place.



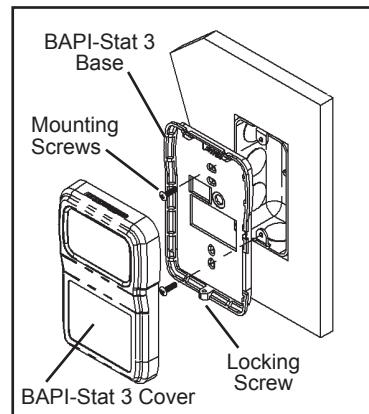
**BAPI-Stat Style Enclosure**



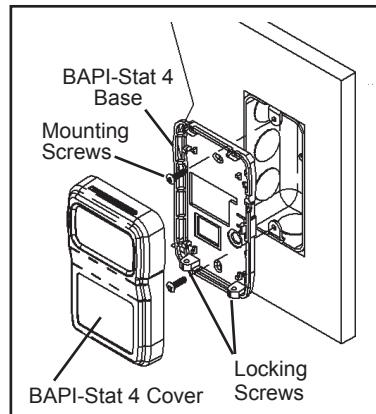
**BAPI-Stat 2 Style Enclosure**



**Delta Style Enclosure**



**BAPI-Stat 3 Style Enclosure**



**BAPI-Stat 4 Style Enclosure**





## Features & Options

- Quick, Easy and Professional Looking Knockouts for the BAPI-Box, and BAPI-Box 2 Enclosures
- One Step Cutting Bit
- Standard Hex Drill Bit Shaft
- Quick Disconnect Shaft
- Built in Rim Stop Prevents Damage to Internal Components
- Stainless Steel Construction
- Comes with Blade Sheath

The Clean-Cut hole cutter is designed to cut out the plastic plugs in the  $\frac{1}{2}$ " NPSM threaded ports of the BAPI-Box and BAPI-Box 2 polycarbonate enclosures. This tools make removing the plastic plug fast and easy and produce a professional-looking .65" diameter hole.

A built-in stop prevents the tool from pushing through and possibly damaging sensitive electronics within the box, so there's no need to remove the items to drill the hole. The Stainless Steel construction keeps its edge and lasts for over 1,000 operations in both directions. The tool can be sharpened with a hand grinder or file and comes with a protective sheath to protect the blades and user.



**Clean-Cut Tool**

## ORDERING INFORMATION

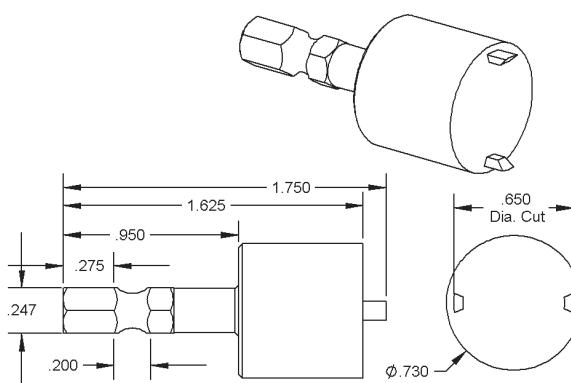
### BA/CLN-CUT-50

Clean-Cut -  $\frac{1}{2}$ " threaded knockout cutting tool for BAPI-Box and BAPI-Box 2

**See end of Section E for list pricing.**

## Specifications

- Material** ..... 316 Stainless Steel  
**Rim Stop** ..... 0.04" (1mm), in from edge  
**Shaft Stem** ..... 0.95" (24.1mm) long with quick disconnect shaft  
**Drill Chuck** ..... Quarter inch Hex  
**Sharpening** ..... Hand grinder or file (As needed)  
**Weight:** ..... 0.11lb (50.0g)  
**Outer Diameter** ..... Smooth 0.73" (18.5mm)  
**Cutting Blades** ..... 0.125" (3.175mm) long, 0.05" (1.27mm) wide  
**Hole Cut** ..... 0.65" (16.51mm)





Rev. 09/16/15

# BAPI-Stat 4 Trim Ring

Accessories for HVAC/R

E1+

## Overview

The BAPI-Stat 4 Trim Ring provides a professionally finished appearance for the BAPI-Stat 4 Room Enclosures. If you are using back boxes, the trim ring covers any wall imperfections between the back box and the wall.

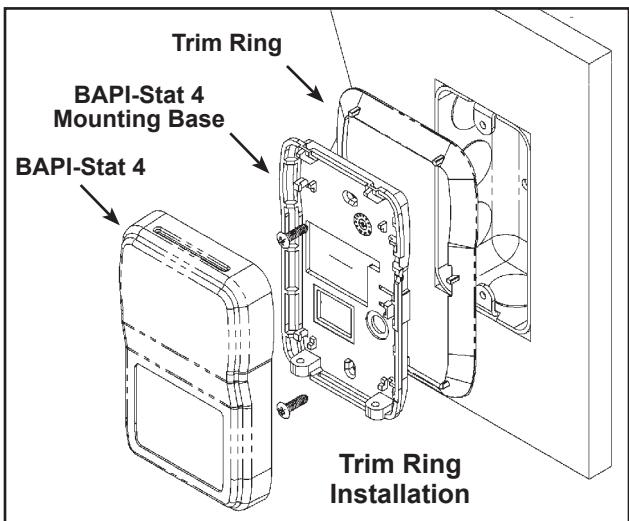
To install, place the trim ring on the wall, nest the BAPI Stat 4 mounting base into the ring and attach everything to the wall with the BAPI-Stat 4 mounting screws. The BS4 trim ring only adds 0.07 inches (1.7 mm) to the depth of the BAPI Stat 4.

## ORDERING INFORMATION

**BA/BS4-TR ...BAPI-Stat 4 Trim Ring** *See end of Sect. E for list pricing.*



**BAPI-Stat 4 Trim Ring**



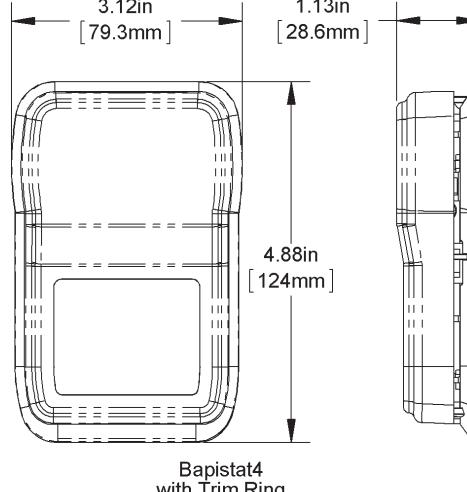
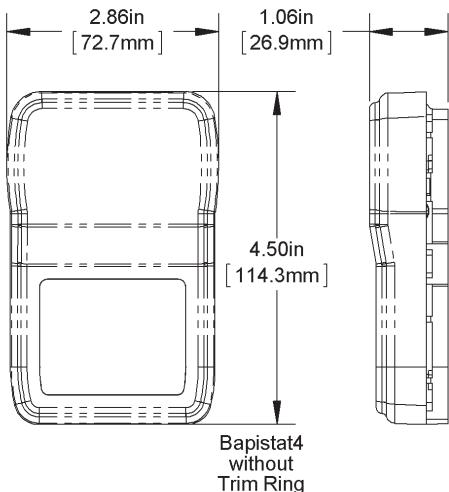
**BAPI-Stat 4 Unit with and without Trim Ring**

## Specifications

**Material:** ABS plastic, Flame-retardant, UL 94, V-0

**Temperature:** 32 to 122°F (0 to 50°C)

**Humidity:** 0 to 95%, non-condensing



Building Automation Products, Inc. • 750 North Royal Avenue, Gays Mills, WI 54631 USA  
Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: sales@bapihvac.com • Web: www.bapihvac.com



## Features & Options

BAPI Adaptor Plates are designed to cover wall imperfections when installing wall sensors or thermostats. They are made in three different sizes and five different colors to match the sensor. The Adaptor Plates can be painted or wall papered in place if architecturally required.

### PART NUMBERS

- BA/ADP-525-7-BW .....Adaptor Plate, 5.25 x 7" Bright White
- BA/ADP-525-7-WMW .....Adaptor Plate, 5.25 x 7" Warm White
- BA/ADP-525-7-OFW .....Adaptor Plate, 5.25 x 7" Off White
- BA/ADP-525-7-CPW .....Adaptor Plate, 5.25 x 7" Copla White
- BA/ADP-525-7-CDW .....Adaptor Plate, 5.25 x 7" Cloud White
  
- BA/ADP-53-53-BW .....Adaptor Plate, 5.3 x 5.3" Bright White
- BA/ADP-53-53-WMW .....Adaptor Plate, 5.3 x 5.3" Warm White
- BA/ADP-53-53-OFW .....Adaptor Plate, 5.3 x 5.3" Off White
- BA/ADP-53-53-CPW .....Adaptor Plate, 5.3 x 5.3" Copla White
- BA/ADP-53-53-CDW .....Adaptor Plate, 5.3 x 5.3" Cloud White
  
- BA/ADP-37-55-BW .....Adaptor Plate, 3.75 x 5.5" Bright White
- BA/ADP-37-55-WMW .....Adaptor Plate, 3.75 x 5.5" Warm White
- BA/ADP-37-55-OFW .....Adaptor Plate, 3.75 x 5.5" Off White
- BA/ADP-37-55-CPW .....Adaptor Plate, 3.75 x 5.5" Copla White
- BA/ADP-37-55-CDW .....Adaptor Plate, 3.75 x 5.5" Cloud White
  
- BA/ADP-37-55-BW .....Adaptor Plate (Europe), 3.75 x 5.5" Bright White
- BA/ADP-37-55-WMW-UK ....Adaptor Plate (Europe), 3.75 x 5.5" Warm White
- BA/ADP-37-55-OFW-UK ....Adaptor Plate (Europe), 3.75 x 5.5" Off White
- BA/ADP-37-55-CPW-UK ....Adaptor Plate (Europe), 3.75 x 5.5" Copla White
- BA/ADP-37-55-CDW-UK ....Adaptor Plate (Europe), 3.75 x 5.5" Cloud White

BA/ADP-525-7-WMW

BA/ADP-53-53-WMW

BA/ADP-37-55-WMW

BA/ADP-37-55-WMW-UK

**See end of Section E for list pricing.**

## Color Reference





# Adaptor Plates for Retrofits

E%

Accessories for HVAC/R

## Specifications

**Material:** ABS plastic, Flame-retardant, UL 94, V-0

**Application:** Horizontal or Vertical

**Mounting:** Drywall, US back box or European back box

### Color Match

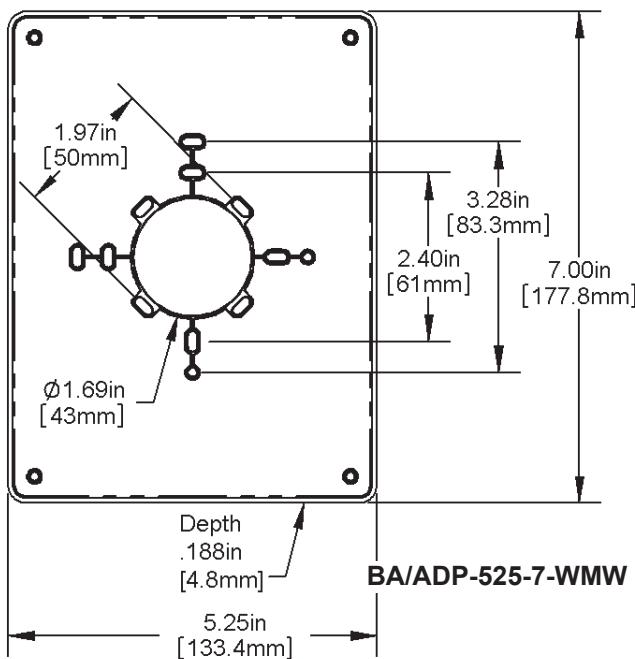
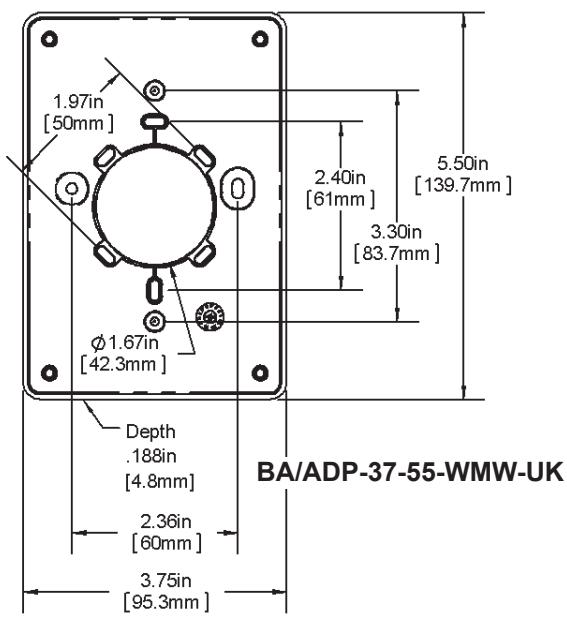
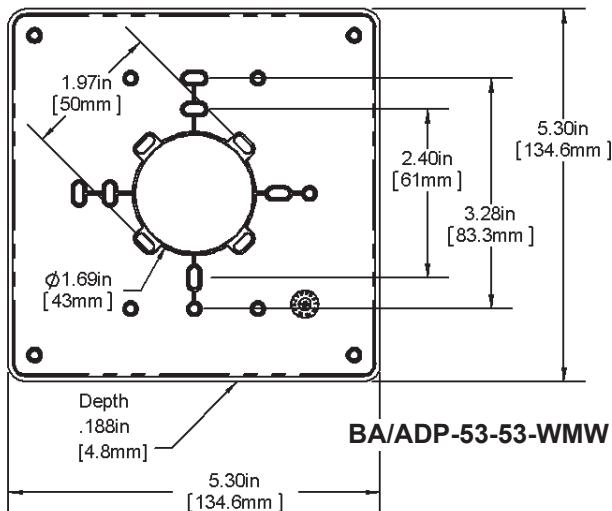
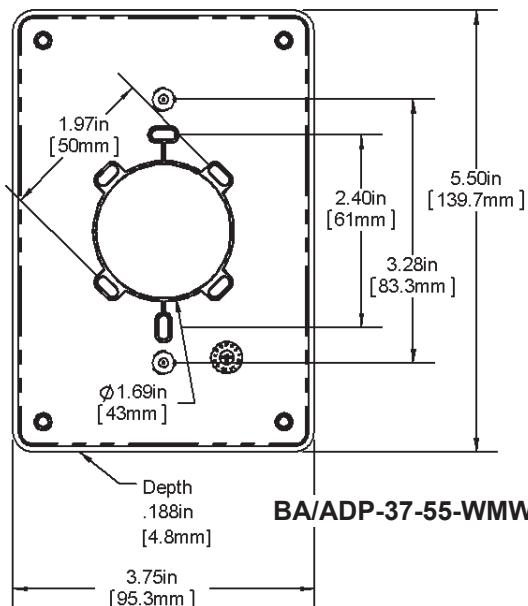
BW, Bright White ..... BAPI-Stat "Quantum" and "Quantum Prime" Room Units (Approx. Pantone Bright White)

WMW, Warm White..... Delta, BAPI-Stat 4, EU, BAPI-Box (Approximately Pantone Warm Gray 2)

OFW, Off White ..... BAPI-Stat 3 (Approximately Pantone Warm Gray 1)

CPW, Copla White.... Delta, BAPI-Stat 4 (Approximately Pantone Cool Gray 2)

CDW, Cloud White.... Delta, BAPI-Stat 4 (Approximately Pantone Cool Gray 1)





## Overview

If you'd like to personalize the look of your temperature, humidity or pressure sensor, BAPI's Delta Style and BAPI-Stat Style Room Enclosures, as well as the BAPI-Box Enclosures, are available with your company's individual logo printed on the front.

To create the custom logo plate, you will need to provide BAPI with a digital version of your logo, preferably in Adobe Illustrator or another vector-based program format. You will also need to provide your company's Pantone® (PMS) colors if you desire a color match.

Lead time and logo plate costs vary with the style of enclosure, the number of colors and the quantity of logo plates ordered.

**Call BAPI for pricing information and lead times on Custom Logo Plates.**



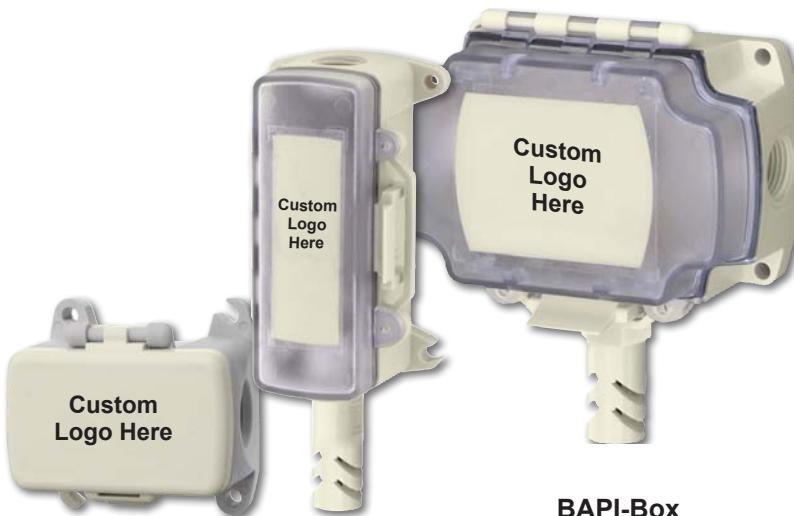
Delta Style Enclosure



BAPI-Stat 4 Style Enclosure



BAPI-Stat 3 Style Enclosure



BAPI-Box 4

BAPI-Box 2





Rev. 04/03/17

# Outdoor Light Level Sensor

E2%

Accessories for HVAC/R

## Features & Options

- Available with Foot Candle or Lux Ranges
- Extremely Sensitive, Even in Dim Lighting (<10 Foot Candle or 108 Lux)
- Multiple Factory Selectable Light Level Ranges
- Rugged and Watertight Enclosure

The BAPI Outdoor Light Level Sensor conserves energy by allowing lights to be shut off when the ambient light level exceeds a specified level. The sensor can also help ensure safety by allowing lights to be turned on when the ambient light falls below a specified level.

The unit comes in a rugged and watertight UV-inhibited polycarbonate enclosure with an IP66, NEMA 4 rating. The light level range is available as Foot Candle and Lux with 0 to 5V, 0 to 10V or 4 to 20 mA output. Custom ranges are also available.



Light Level Sensor

## Ordering Information

### **BA/LLV-05-LX[0 TO 2000]**

Sensor w/ 0 to 5V Output, 0 to 2,000 Lux Range

### **BA/LLV-10-LX[0 TO 2000]**

Sensor w/ 0 to 10V Output, 0 to 2,000 Lux Range

### **BA/LLV-20-LX[0 TO 2000]**

Sensor w/ 4 to 20mA Output, 0 to 2,000 Lux Range

### **BA/LLV-05-FC[0 TO 875]**

Sensor w/ 0 to 5V Output, 0 to 875 Foot Candle Range

### **BA/LLV-10-FC[0 TO 875]**

Sensor w/ 0 to 10V Output, 0 to 875 Foot Candle Range

### **BA/LLV-20-FC[0 TO 875]**

Sensor with 4 to 20mA Output, 0 to 875 Foot Candle Range

Note: Custom light level ranges are available in Foot Candle or Lux.  
Contact BAPI for more info.

Note: 1 Foot Candle = 10.76 Lux • 1 Lux = 0.0929 Foot Candles

**See end of Section E for list pricing.**



Sensor mounted in a parking lot facing north

## Specifications

### **Power Supply:**

10 to 35 VDC, 22mA max (for 0 to 5 VDC or 4 to 20 mA Outputs)

15 to 35 VDC, 6 mA max (for 0 to 10 VDC Output)

12 to 27 VAC, 0.53 VA max (for 0 to 5 VDC Output)

15 to 27 VAC, 0.14 VA max (for 0 to 10 VDC Output)

### **Factory Selectable Outputs:**

0 to 5V, 0 to 10V and 4 to 20 mA

**Accuracy:** 10 Lux ±10% of reading.

### **Environmental Operation Range:**

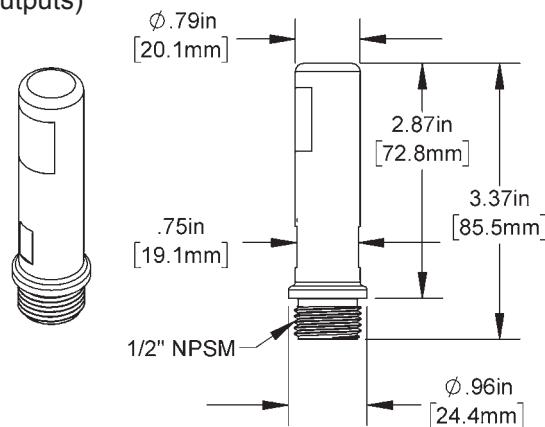
Temperature -40 to 185°F (-40 to 85°C)

Humidity: 0 to 100%, non-condensing

**Enclosure Material:** UV-Inhibited Polycarbonate

**Material Rating:** UL94V-0

**Enclosure Rating:** IP66, NEMA 4





## Overview

Some automation providers use the smaller RJ22 (telephone handset connector) instead of the RJ11 (telephone wall connector) for their in-the-zone network communications devices. The BAPI RJ22 Communications Adapter converts the standard RJ11 jack used in BAPI sensors to the smaller RJ22 dimensions.

### ORDERING INFORMATION

Part Number	Description
BA/RJ22 .....	Communications Adaptor
BA/RJ22L .....	Communications Connector

*See end of Section E for list pricing.*

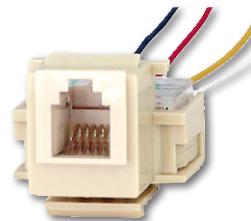


RJ22  
Communications  
Adaptor



RJ11 Connector

RJ22L Connector  
(RJ11 with RJ22  
Adaptor)



## Spanner Security Screws & Spanner Bit

## Overview

Spanner Security Screws add an extra level of protection for Wall Plate Units. The Security Screws and associated Spanner Bit are available for any Stainless Steel Wall Plate Unit.

### ORDERING INFORMATION

Part Number	Description
BA/SP632x1 .....	Spanner Security Screws, 6-32x1" (box 50)
BA/SPBIT .....	Spanner Bit for Spanner Security Screws

*See end of Section E for list pricing.*



Spanner Security Screws



Spanner Bit

## Hex Head & Pan Head Screws

## Overview

These 1.5" stainless steel #10 screws are used to attach the BAPI-Box or BAPI-Guards to the wall. The Pan Head Screws are used for drywall, sheet metal or wood surfaces. The Hex Head Concrete Screws are used for concrete walls. The screws are sold in packs of 100.

### ORDERING INFORMATION

Part #: BA/Screw-Pan-1.5x10-SS-100	1.5" Stainless Steel #10 Pan Head Screw, Pack of 100
Part #: BA/Screw-Hex-Concrete-1.5x10-SS-100	1.5" Stainless Steel #10 Hex Head Concrete Screw, Pack of 100

*See end of Section E for list pricing.*



Pan Head Screws



Hex Head Screws





Rev. 01/12/16

# Replacement Keys, Insulator & Filter

Accessories for HVAC/R

E2'

## Replacement Keys

### Description

Replacement keys are available for Wall Plate temperature sensors with Keyswitch Occupant Override, and the BAPI-Guard and BAPI-Guard 2 thermostat protectors.

#### PART NUMBER    Description

**BA/KEY12718** ..... Key for Wall Plate with Keyswitch Override (pg. A40-43)

**BA/KEY16187** ..... Replacement Key for BAPI-Guard and BAPI-Guard 2 (pg. E8)

*See end of Section E for list pricing.*



Replacement  
Key

## BAPI Foamback Insulator

### Description

Made of medical grade, closed cell foam, the Foamback Insulator ensures that room sensors are reading the temperature of the room, not the temperature of the wall. They also guard against condensation from mixing of room air and wall air around the room unit. The foamback features an adhesive backing and is available in a thickness of .25" or .125".

#### PART NUMBERS

**BA/FOAMBACK** ..... White Foamback Insulator  
(2.6" wide, 4.4" high, .25" thick)

**BA/FOAMBACK-ROOM** ..... White Foamback  
(2.6" wide, 4.4" high, .125" thick)



Foamback  
Insulator

Note: Several BAPI products come standard with foambacks including wall plates and duct units.

*See end of Section E for list pricing.*

## Replacement Humidity Filter

### Description

#### Replacement Filter for Duct and Outside Air Humidity Sensors

The 80 micron sintered stainless steel filter protects the sensor from contamination while allowing airflow.

**PART NUMBER:** **BA/HDOFS3** - Stainless Steel Replacement Humidity Filter



Stainless Steel  
Humidity Filter

*See end of Section E for list pricing.*





## Features & Options

- Creates a Weatherproof Wire Connection
- Crimp-On & Twist-On Styles Available

BAPI's Sealant Filled Connectors (SFC) contain a moisture-excluding sealant which encapsulates the electrical connection protecting it from moisture and oxidation. This encapsulation also reduces the potential for fire, electrocution and flashover. BAPI offers two types of SFCs: a Twist-On and a Crimp-On. The Crimp-On (SFC3000) is used for factory terminations, while the Twist-On SFC2000 is used for field terminations.

The SFC2000 accepts two 22 AWG wires or one 22 AWG and one 16 or 18 AWG wire. It has a voltage rating of 300 volts and a temperature not to exceed 221°F (105°C), and it is not UL listed.

The SFC3000 accepts two wires of 19 to 26 AWG. It has a voltage rating of 50 volts with an operating temperature of -40 to 285°F (-40 to 140°C), and it is compliant to RoHS 2011/65/EU. It is not UL listed.



**Twist-On SFC2000**



**Crimp-On SFC3000**

### PART NUMBER      DESCRIPTION

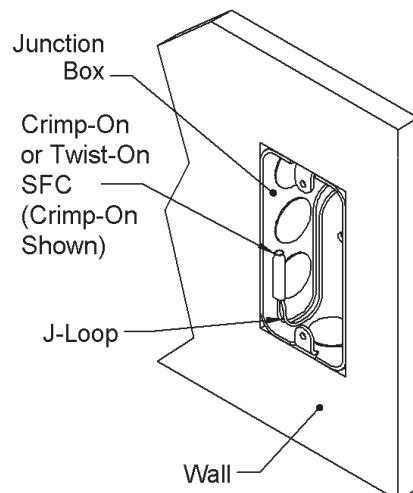
<b>BA/SFC2000-100</b>	..... 100 Twist-On Style SFCs
<b>BA/SFC2000-500</b>	..... 500 Twist-On Style SFCs
<b>BA/SFC2000-1000</b>	... 1,000 Twist-On Style SFCs
<b>BA/SFC3000-100</b>	..... 100 Crimp-On Style SFCs
<b>BA/SFC3000-500</b>	..... 500 Crimp-On Style SFCs
<b>BA/SFC3000-1000</b>	... 1,000 Crimp-On Style SFCs

*See end of Section E for list pricing.*

## J-Loop Termination Technique

Incorporating a "J-Loop" (also known as a drip loop) into all terminations adds an additional layer of protection against moisture and oxidation by directing moisture away from the connection.

The idea is to place the wire junction as high as possible and form a "J" with the leadwires. The bottom of this "J" should be below the junction point. Any moisture that collects on the leadwires is pulled downward by gravity to the bottom of this loop and away from the junction.





# Pierceable Knockout Plugs for Enclosure Ports

**E25**

Rev. 06/20/18

**Accessories for HVAC/R**

## Features & Options

- Quick and Easy to Install and Forms an Excellent Cable Seal
- Pierceable Center Membrane for Simple Cable Insertion
- Works in Non-Threaded Ports of the BAPI-Box and Junction Box Enclosures
- Works in Panels with a Metal Thickness of .118" or Smaller

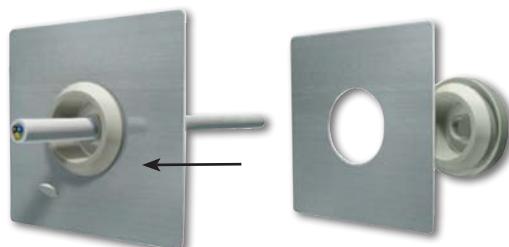
Pierceable Knockout Plugs are available for the open port in the BAPI-Box Crossover and BAPI-Box 4 Enclosure, as well as the non-threaded ports in the BAPI-Box, BAPI-Box 2 and Junction Box and enclosures. The plugs will also work in panels with a metal thickness of 0.118" or smaller.

The plugs are made of TPE (Thermoplastic Elastomer) and feature a pierceable center membrane for easy wire insertion. When used with the proper diameter cable, the plugs form an excellent cable seal after piercing.

When installed in the open port of the BAPI-Box 4 Enclosure, the Pierceable Knockout Plug increases the enclosure rating from IP10 to IP44. When installed in the open port of the BAPI-Box Crossover enclosure, the Pierceable Knockout Plug increases the enclosure rating from IP10 to IP44.



Top and bottom view of a  
Pierceable Knockout Plug



Pierceable Knockout Plug  
installation and wire insertion.



Pierceable Knockout  
Plug installed in a J-Box  
(top) and in the open  
port of a BAPI-Box  
Crossover Enclosure  
(left).



## Ordering Information

### Part Number

### Description

**BA/PKP-100**.....Pierceable Knockout Plugs for Enclosure Ports, pack of 100.

**See end of Section E for list pricing.**

## Specifications

**Material:** UV-Resistant TPE (Thermoplastic Elastomer)

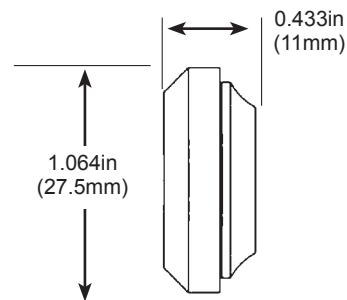
**Temperature Operating Range:** -58°F to 257°F (-50°C to 125°C)

**Protection Rating:** IP67

**Pierceable Center Membrane Hole Size:** 0.807" (20.5mm)

**Cable Diameter Range:** 0.236" to 0.512" (6 to 13mm)

**Panel Thickness:** 0.02" to 0.118" (0.5 to 3mm)



Building Automation Products, Inc. • 750 North Royal Avenue, Gays Mills, WI 54631 USA  
Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: sales@bapihvac.com • Web: www.bapihvac.com



## Features & Options

### **BA/LI3620**

The BA/LI3620 Lithium Ion AA battery is the ideal replacement for all BAPI wireless room and non-room transmitters (except the Wireless Food Probe). Each transmitter takes two batteries, giving the unit a battery life of 8 years.



**BA/LI3620**

(for all BAPI Wireless Transmitters except the Wireless Food Probe)

### **BA/BAT-5AA-HIT**

The BA/BAT-5AA-HIT High Temperature Lithium ½AA battery is the ideal replacement for the BAPI Wireless Food Probe transmitter. Each probe takes one battery, giving the unit a battery life of 4 years.



**BA/BAT-5AA-HIT**

(for Wireless Food Probe)

## Ordering Information

<u>Part Number</u>	<u>Description</u>
<b>BA/LI3620</b> .....	Lithium Ion AA Battery, 3.6V, for all BAPI Wireless Transmitters except the Wireless Food Probe
<b>BA/BAT-5AA-HIT</b> .....	Lithium ½AA Battery, 3.6V, for the BAPI Wireless Food Probe Transmitter

**See end of Section E for list pricing.**

## Specifications

### BA/LI3620 Battery

**Type & Size:** Lithium Ion, AA

**Nominal Voltage:** 3.6V

**Nominal Capacity:** 2.25 Ah @2mA, to 2V

**Operation Temp:**

-76 to 185°F (-60 to 85°C)

0 to 95 %RH Non-Condensing

**Agency:** RoHS

### BA/BAT-5AA-HIT Battery

**Type & Size:** Lithium (High Temp), ½AA

**Nominal Voltage:** 3.6V

**Nominal Capacity:** 0.9 Ah @ 1mA, to 2V

**Operating Temp:**

-67 to 257°F (-55 to 125°C)

0 to 95 %RH Non-Condensing

**Agency:** RoHS





Rev. 09/01/17

# Weather Shade

Accessories for HVAC/R

E2+

## Features & Options

- Improves the Accuracy of BAPI Outside Air Sensors by Blocking Solar Heat Gain
- Simple and Sturdy Mounting Method

External temperature, humidity and air quality sensors can be affected by solar heat gain. The BAPI Weather Shade effectively blocks the solar heat gain, improving the accuracy of the sensor.

The shape of the cone and spacing from the wall creates a chimney which draws radiant heat from solar gain away from the sensor. The "domed" top also prevents bird nesting while the smooth surface minimizes hosting of insects.

The Weather Shade is constructed of solar stabilized plastic to ensure a long, corrosion-free life. The material also has a high reflectivity rating (87%) and low emissivity rating (0.90) to minimize the radiant heat created from solar gain. Besides blocking solar heat gain, the shade also protects the probe filter from precipitation and grit, extending the life of the filter.

The Weather Shade offers the easiest assembly available on the market. It mounts quickly and securely to the BAPI-Box, BAPI-Box 2 and BAPI EU enclosures using capped tubes that thread into the enclosures. The pre-assembled Weather Shade Kit includes a shade and din rail bracket, two capped mount tubes, one adjustable clamp and one adjustable clamp with retention plate.



**Weather Shade, front and back view.**

(Back view is shown mounted to a BAPI outside air humidity sensor.)



## Ordering Information

### Part Number      Description

BAWSK .....	Weather Shade Kit. (Includes a pre-assembled shade and din rail bracket, two capped mount tubes, one adjustable clamp and one adjustable clamp with retention plate.)
-------------	--

*See end of Section E for list pricing.*

## Specifications

### Shade Material:

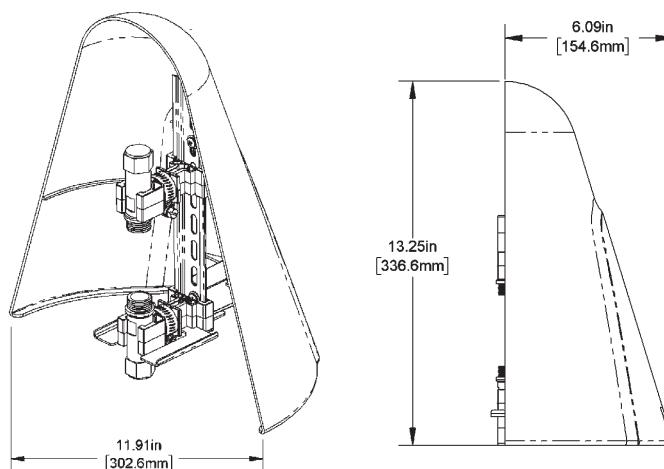
UV-stabilized Polycarbonate

### Shade Material Ratings:

Flammability: UL 94

Reflectivity: 87%

Emissivity: 0.90



Building Automation Products, Inc. • 750 North Royal Avenue, Gays Mills, WI 54631 USA  
Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: sales@bapihvac.com • Web: www.bapihvac.com

# **BAPI-Guard**

## **Thermostat Protector**



BAPI-Guard  
installed over  
a BAPI-Stat  
“Quantum”  
room sensor

- Prevents Tampering, Damage and Unauthorized Adjustment
- Exceptional Airflow for Proper Thermostat Operation
- Made from Thick, Durable Polycarbonate with Key Lock Protection
- Low Profile Design with Two Sizes to Fit Most Thermostats
- Horizontal or Vertical Mounting with Hardware Included

The BAPI-Guard prevents tampering, physical damage and unauthorized adjustment of thermostats. The attractive design is available in two sizes to fit most thermostats. It is made of thick, durable polycarbonate and features exceptional airflow, key lock protection, horizontal or vertical mounting and easy installation with hardware included.



Pg	Part Number	Description	List Price
<b>BLÜ-TEST BLUETOOTH TEMP/HUMIDITY PROBE</b>			
E2	<b>BA/BT-TP</b>	Blü-Test Temperature Probe, 4" length piercing, 1/8" dia (10.2 cm x .32 cm)..	\$600
	<b>BA/BT-TA</b>	Blü-Test Temperature Probe, 6" length, 1/4" diameter (15.3 cm x .64 cm).....	\$600
	<b>BA/BT-TB</b>	Blü-Test Temperature Probe, 9.5" length, 1/4" diameter (24.2 cm x .64 cm)...	\$600
	<b>BA/BT-TH</b>	Blü-Test Temp/Humidity Probe, 8" length, 3/8" diameter (20.3 cm x .95 cm) ..	\$675
	<b>BA/BT-DPLR</b>	Blü-Test Pressure Probe, Low Range, -1 to +1" WC (-250 to +250 Pascals)..	\$800
	<b>BA/BT-DPSR</b>	Blü-Test Pressure Probe, Standard Range, -5 to +5" WC (-1,250 to +1,250 Pascals). \$800	
<b>350mA "EZ" VOLTAGE CONVERTERS</b>			
E4	<b>BA/VC350A-EZ-5</b>	5 VDC at 350 mA EZ Voltage Converter .....	\$33
	<b>BA/VC350A-EZ-10</b>	10 VDC at 350 mA EZ Voltage Converter .....	\$33
	<b>BA/VC350A-EZ-12</b>	12 VDC at 350 mA EZ Voltage Converter .....	\$33
	<b>BA/VC350A-EZ-15</b>	15 VDC at 350 mA EZ Voltage Converter .....	\$33
	<b>BA/VC350A-EZ-ADJ</b>	5 to 24 VDC (adj.) at 350 mA EZ Voltage Converter .....	\$33
<b>350mA SNAPTRACK MOUNTABLE VOLTAGE CONVERTERS</b>			
E5	<b>BA/VC350A-5</b>	5 VDC at 350 mA Voltage Converter .....	\$25
	<b>BA/VC350A-10</b>	10 VDC at 350 mA Voltage Converter .....	\$25
	<b>BA/VC350A-12</b>	12 VDC at 350 mA Voltage Converter .....	\$25
	<b>BA/VC350A-15</b>	15 VDC at 350 mA Voltage Converter .....	\$25
	<b>BA/VC350A-ADJ</b>	5 to 24 VDC (adj.) at 350 mA Voltage Converter .....	\$25
	<b>BA/VC350A-5-TRK</b>	5 VDC at 350 mA with a 1.25" wide piece of 2.75" snaptrack .....	\$30
	<b>BA/VC350A-10-TRK</b>	10 VDC at 350 mA with a 1.25" wide piece of 2.75" snaptrack .....	\$30
	<b>BA/VC350A-12-TRK</b>	12 VDC at 350 mA with a 1.25" wide piece of 2.75" snaptrack .....	\$30
	<b>BA/VC350A-15-TRK</b>	15 VDC at 350 mA with a 1.25" wide piece of 2.75" snaptrack .....	\$30
	<b>BA/VC350A-ADJ-TRK</b>	5-24 VDC (adj.) at 350 mA with a 1.25" wide piece of 2.75" snaptrack .....	\$30
<b>PDM - POWER DISTRIBUTION MODULE</b>			
E6	<b>BA/PDM-5-B</b>	Five circuit Power Distribution Module, w/ breaker .....	\$364
	<b>BA/PDM-3-B</b>	Three circuit Power Distribution Module, w/ breaker .....	\$277
	<b>BA/PDM-5-F</b>	Five circuit Power Distribution Module, w/fuse .....	\$218
	<b>BA/PDM-3-F</b>	Three circuit Power Distribution Module, w/fuse .....	\$182
	<b>BA/PDM-5-B-DIN</b>	Five circuit Power Distribution Module, w/ breaker, DIN mount.....	\$364
	<b>BA/PDM-3-B-DIN</b>	Three circuit Power Distribution Module, w/ breaker, DIN mount.....	\$277
	<b>BA/PDM-5-F-DIN</b>	Five circuit Power Distribution Module, w/fuse, DIN mount.....	\$218
	<b>BA/PDM-3-F-DIN</b>	Three circuit Power Distribution Module, w/fuse, DIN mount .....	\$182
<b>VC2000 VOLTAGE CONVERTER</b>			
E7	<b>BA/VC2A-F</b>	Converter without backplate, cartridge fuse .....	\$120
	<b>BA/VC2A-P</b>	Converter without backplate, self-resetting fuse .....	\$120
	<b>BA/VC2B-F</b>	Converter with backplate, cartridge fuse .....	\$120
	<b>BA/VC2B-P</b>	Converter with backplate, self-resetting fuse.....	\$120



Gray shaded items follow the Buy and Resale Multiplier.





Pg	Part Number	Description	List Price
<b>PS17 &amp; PS17CB - POWER SUPPLIES</b>			
E8	BA/PS17	Power Supply Fuse Block	\$303
	BA/PS17CB	Power Supply w/ Circuit Breakers	\$353
	BA/PWR-CORD-18"	18" Power Cord	\$5.25
	BA/PWR-CORD-36"	36" Power Cord	\$5.25
<b>WATER LEAK DETECTOR</b>			
E10	BA/LDTx	Water Leak Detector	See Datasheet
<b>BAPI-GUARD THERMOSTAT PROTECTOR</b>			
E12	BA/BG	Larger BAPI-Guard Thermostat Protector	\$45
	BA/BG2	Smaller BAPI-Guard 2 Thermostat Protector	\$35
	BA/KEY16187	Replacement Key for BAPI-Guard and BAPI-Guard 2 (*Net Price, no multiplier)	..\$2*
<b>FPB - FLEXIBLE PROBE BRACKETS</b>			
E13	BA/FPB-50	50 Flexible Probe Brackets	\$157
	BA/FPB-100	100 Flexible Probe Brackets	\$314
	BA/FPB-500	500 Flexible Probe Brackets	\$1,443
<b>PMPB5 - PULSE METER PULSE BUFFER</b>			
E14	BA/PMPB5	Pulse Meter Pulse Buffer	\$27.50
	BA/PMPB5-TRK	Pulse Meter Pulse Buffer with a 1.25" wide piece of 2.75" snaptrack	\$32.50
<b>TS1 &amp; TS2 - TRANSIENT SUPPRESSORS</b>			
E14	BA/TS1	Transient Suppressor (voltage)	\$7.50
	BA/TS2	Transient Suppressor (current)	\$7.50
	BA/TS1-TRK	Transient Suppressor (voltage) with a 1.25" wide piece of 2.75" snaptrack.	\$12.50
	BA/TS2-TRK	Transient Suppressor (current) with a 1.25" wide piece of 2.75" snaptrack.	\$12.50
<b>SCREWDRIVER AND ALLEN WRENCH COMBINATION</b>			
E15	BA/116W	BAPI 6.75" Screwdriver & Allen Wrench Combination	\$20
	BA/116	BAPI 6" Screwdriver & Allen Wrench Combination	\$5
<b>CLEAN-CUT TOOL</b>			
E16	BA/CLN-CUT-50	Clean-Cut - ½" threaded knockout cutting tool for the BAPI-Box & BAPI-Box 2 ..	\$100
<b>BAPI-STAT 4 TRIM RING</b>			
E17	BA/BS4-TR	BAPI-Stat 4 Trim Ring	\$4.00

Gray shaded items follow the Buy and Resale Multiplier.





Pg	Part Number	Description	List Price
<b>ADAPTOR PLATES</b>			
E18	BA/ADP-525-7-WMW	Adaptor Plate, 5.25 x 7" Warm White	\$18
	BA/ADP-525-7-OFW	Adaptor Plate, 5.25 x 7" Off White	\$18
	BA/ADP-525-7-CPW	Adaptor Plate, 5.25 x 7" Copla White	\$21
	BA/ADP-525-7-CDW	Adaptor Plate, 5.25 x 7" Cloud White	\$21
	BA/ADP-53-53-WMW	Adaptor Plate, 5.3 x 5.3" Warm White	\$18
	BA/ADP-53-53-OFW	Adaptor Plate, 5.3 x 5.3" Off White	\$18
	BA/ADP-53-53-CPW	Adaptor Plate, 5.3 x 5.3" Copla White	\$21
	BA/ADP-53-53-CDW	Adaptor Plate, 5.3 x 5.3" Cloud White	\$21
	BA/ADP-37-55-WMW	Adaptor Plate, 3.75 x 5.5" Warm White	\$18
	BA/ADP-37-55-OFW	Adaptor Plate, 3.75 x 5.5" Off White	\$18
	BA/ADP-37-55-CPW	Adaptor Plate, 3.75 x 5.5" Copla White	\$21
	BA/ADP-37-55-CDW	Adaptor Plate, 3.75 x 5.5" Cloud White	\$21
	BA/ADP-37-55-WMW-UK	Adaptor Plate (Europe), 3.75 x 5.5" Warm White	\$18
	BA/ADP-37-55-OFW-UK	Adaptor Plate (Europe), 3.75 x 5.5" Off White	\$18
	BA/ADP-37-55-CPW-UK	Adaptor Plate (Europe), 3.75 x 5.5" Copla White	\$21
	BA/ADP-37-55-CDW-UK	Adaptor Plate (Europe), 3.75 x 5.5" Cloud White	\$21
<b>CUSTOM LOGO PLATES</b>			
E20	XX	Custom Logo Plates for Room Sensors and Enclosures	Call for Pricing
<b>LIGHT LEVEL SENSOR</b>			
E21	BA/LLV-05-LX[0 TO 2000]	Sensor with 0 to 5V Output, 0 to 2,000 Lux Range	\$275
	BA/LLV-10-LX[0 TO 2000]	Sensor with 0 to 10V Output, 0 to 2,000 Lux Range	\$275
	BA/LLV-20-LX[0 TO 2000]	Sensor with 4 to 20mA Output, 0 to 2,000 Lux Range	\$275
	BA/LLV-05-FC[0 TO 875]	Sensor with 0 to 5V Output, 0 to 875 Foot Candle Range	\$275
	BA/LLV-10-FC[0 TO 875]	Sensor with 0 to 10V Output, 0 to 875 Foot Candle Range	\$275
	BA/LLV-20-FC[0 TO 875]	Sensor with 4 to 20mA Output, 0 to 875 Foot Candle Range	\$275
<b>RJ22 COMMUNICATIONS ADAPTOR</b>			
E22	BA/RJ22	Communications Adaptor	\$8
	BA/RJ22L	Communications Connector	\$25
<b>SPANNER SECURITY SCREWS AND BIT</b>			
E22	BA/SP632x1	Spanner Security Screws, 6-32x1" (box 50)	\$40.00
	BA/SPBIT	Spanner Bit for Spanner Security Screws	\$6.50
<b>HEX HEAD SCREWS &amp; PAN HEAD SCREWS</b>			
E22	BA/Screw-Pan-1.5x10-SS-100	1.5" Stainless Steel #10 Pan Head Screw, Pack of 100	\$12
	BA/Screw-Hex-Concrete-1.5x10-SS-100	1.5" Stainless Steel #10 Hex Head Concrete Screw, Pack of 100	\$12

Gray shaded items follow the Buy and Resale Multiplier.





Pg	Part Number	Description	List Price
<b>REPLACEMENT KEYS</b>			
E23	BA/KEY12718	Key for Wall Plate with Keypad Override (A26)	\$2.00
	BA/KEY16185	Key for Wall Plate with Keypad & Light Sensor (A30)	\$4.30
	BA/KEY16187	Replacement Key for BAPI-Guard and BAPI-Guard 2 (E6)	\$2.00
<b>FOAMBACK INSULATOR</b>			
E23	BA/FOAMBACK	White Foambac Insulator (2.6" wide, 4.4" high, .25" thick)	\$1
	BA/FOAMBACK-ROOM	White Foambac (2.6" wide, 4.4" high, .125" thick)	\$1
<b>REPLACEMENT HUMIDITY FILTER AND CAP</b>			
E23	BA/HDOFS3	Stainless Steel Humidity Filter for Duct or Outside Air Units	\$30
<b>SEALANT FILLED CONNECTORS</b>			
E24	BA/SFC2000-100	100 Twist-On Style SFCs	\$120
	BA/SFC2000-500	500 Twist-On Style SFCs	\$600
	BA/SFC2000-1000	1,000 Twist-On Style SFCs	\$1200
	BA/SFC3000-100	100 Crimp-On SFC3000 Style SFCs	\$20
	BA/SFC3000-500	500 Crimp-On SFC3000 Style SFCs	\$100
	BA/SFC3000-1000	1,000 Crimp-On SFC3000 Style SFCs	\$200
<b>PIERCEABLE KNOCKOUT PLUGS FOR ENCLOSURE PORTS</b>			
E25	BA/PKP-100	Pierceable Knockout Plugs for Enclosure Ports, pack of 100	\$55
<b>REPLACEMENT BATTERIES</b>			
E26	BA/LI3620	Replacement Battery for Transmitters (except the Food Probe)	\$3 Net
	BA/BAT-5AA-HIT	Replacement Battery for the Wireless Food Probe	\$6 Met
<b>WEATHER SHADE</b>			
E27	BA/WSK	Weather Shade Kit	\$150

Gray shaded items follow the Buy and Resale Multiplier.





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F1

## 900 MHz Wireless System

BAPI-Stat "Quantum" Temp Sensor  pg F2	BAPI-Stat "Quantum" Temp/Humidity Sensor  pg F4	Duct Temperature Sensor  pg F6
Duct Humidity or Combo Sensor  pg F8	Immersion Temp Sensor  pg F10	Remote Probe Temp Sensor  pg F12
Outside Air Temp Sensor  pg F14	Outside Air Temp and Humidity Sensor  pg F16	Thermobuffer Temp Sensor  pg F18
Wireless Food Probes  pg F20	BAPI-Stat "Quantum Slim" Temp Sensor  pg F22	BAPI-Stat "Quantum Slim" Temp/ Humidity Sensor  pg F24
900 MHz Gateway  pg F26	Replacement Batteries  pg F27	Field Verifier Kit  pg F28





## Features & Options

- BAPI-Stat "Quantum" Unit with Up to 275 Foot In-Building Range\*
- Optional Temperature Setpoint and Occupant Override
- Approximate 5 Year Battery Life with 5 Minute Transmit Rate
- Battery Power or Wired Power
- Unit is Capable of Storing All Data in Memory Until it Receives a Successful Reception Signal from the Gateway So No Data is Lost During a Communication Interruption
- Gateway Provides Data to the BAS Via Multiple Communication Options (TCP/IP, JSON, BACnet IP)

The BAPI-Stat "Quantum" 900 MHz Sensor measures the room temperature and transmits the data via 900MHz RF to a Gateway up to 275 feet away. It is available with optional setpoint and override.

The unit has an estimated battery life of 5 years with the default transmit rate of once every 5 minutes\*\* for battery powered units. The unit can also be ordered with wired power rather than battery power. The transmitted temperature is picked up by a Gateway and supplied directly to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP).

The unit is capable of storing all data in memory until it receives a successful reception signal from the Gateway, so that no data is lost during a communication interruption. Transmissions can also be triggered by a temperature change with a user-adjustable threshold. The 900 MHz signal is "frequency agile" for maximum reliability.



**Sensor with optional Setpoint & Override**

## Specifications

**Power for Battery Powered Units:** Two 3.6V Lith. batteries, 2,600 mAH, ~5 year battery life\*\*

**Power for Wired Power Units:** 9 to 30 VDC, 50 mA max • 15 to 28 VAC, 50 mA max

**Temperature Accuracy:**

±0.36°F (±0.2°C) from built in thermistor

**Transmitted Temperature Range:**

-40 to 185°F (-40 to 85°C)

**Transmission Distance:** Up to 275 feet\*

**Environmental Operation Range:**

Temp: 32 to 140°F (0 to 60°C)

Humidity: 5% to 95% RH non-condensing

**Enclosure Material & Rating:**

ABS Plastic, UL94 V-0

**Frequency:**

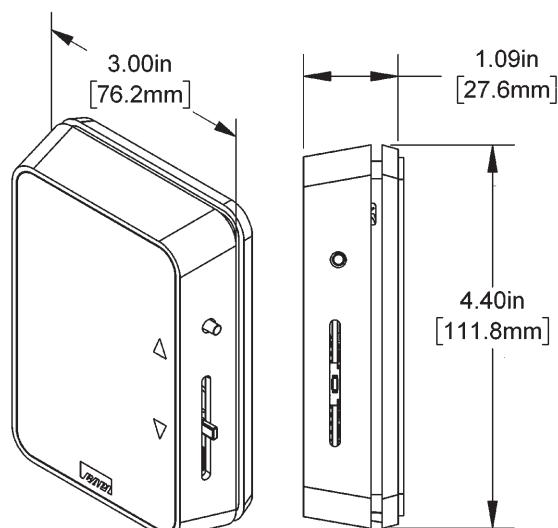
900 MHz (4 Channel, 7 MHz Spacing)

**Transmission Interval:**

5 minute default, user adjustable

**Transmit Power:** 0 dBm default, +5 dBm max

**Receiver Sensitivity:** -101 dBm



\*Actual in-building transmission distances will vary depending upon building construction, transmission power setting and other factors.

\*\*Actual battery life will vary depending upon transmission interval setting and transmission power setting.





# BAPI-Stat “Quantum” Temperature Sensor

900 MHz Wireless System

F3

## Ordering Information

**BA/WT900-Q**..... BAPI-Stat “Quantum” Temp Sensor, Battery Power

**BA/WT900-Q-PWR** ..... BAPI-Stat “Quantum” Temp Sensor, Wired Power

**BA/WT900-S-Q** ..... BAPI-Stat “Quantum” Temp Sensor w/ Temp Setpoint, Battery Power

**BA/WT900-S-Q-PWR** .. BAPI-Stat “Quantum” Temp Sensor w/ Temp Setpoint, Wired Power

**BA/WT900-O-Q** ..... BAPI-Stat “Quantum” Temp Sensor w/ Override, Battery Power

**BA/WT900-O-Q-PWR** . BAPI-Stat “Quantum” Temp Sensor w/ Override, Wired Power

**BA/WT900-SO-Q** ..... BAPI-Stat “Quantum” Temp Sensor w/ Setpoint & Override, Battery Power

**BA/WT900-SO-Q-PWR**. BAPI-Stat “Quantum” Temp Sensor w/ Setpoint & Override, Wired Power

**BA/LI3620** ..... 3.6V Lithium Battery

**See end of Section F for list pricing.**

## 900 MHz Gateway

The Gateway receives the data from sensors up to 275 feet away, and provides the data to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP). The Gateway also sends a confirmation signal to each sensor upon a successful reception of data, allowing the sensor to release the data that it has stored in memory so that no data is lost during a communication interruption.





## Features & Options

- Quantum Series Sensor with Up to 275 Foot In-Building Range\*
- Optional Temperature Setpoint and Occupant Override
- Approximate 5 Year Battery Life with 5 Minute Transmit Rate
- Battery Power or Wired Power
- Unit is Capable of Storing All Data in Memory Until it Receives a Successful Reception Signal from the Gateway So No Data is Lost During a Communication Interruption
- Gateway Provides Data to the BAS via Multiple Communication Options (TCP/IP, JSON, BACnet IP)

The BAPI-Stat "Quantum" Sensor measures the temp and humidity and transmits the data via 900 MHz RF to a Gateway up to 275 feet away. It is available with optional temp setpoint and override.

The unit has an estimated battery life of 5 years with the default transmit rate of once every 5 minutes\*\* for battery powered units. The unit can also be ordered with wired power rather than battery power. The transmitted values are picked up by a Gateway and supplied directly to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP).

The unit is capable of storing all data in memory until it receives a successful reception signal from the Gateway, so that no data is lost during a communication interruption. Transmissions can also be triggered by a temperature change with a user-adjustable threshold. The 900 MHz signal is "frequency agile" for maximum reliability.



**Sensor with optional Setpoint & Override**

## Specifications

**Power for Battery Powered Units:** Two 3.6V Lith. batteries, 2,600 mAH, ~5 year battery life\*\*

**Power for Wired Power Units:** 9 to 30 VDC, 50 mA max • 15 to 28 VAC, 50 mA max

### Sensing Elements:

Temperature - Semiconductor Band Gap,  
±0.3°C (±0.54°F) @ 20 to 40°C (68 to 104°F)

Humidity - Capacitive Polymer,  
±2%RH @ 25°C (77°F), 20 to 80%RH

**Transmitted Temp Range:** -40 to 185°F (-40 to 85°C)

**Transmission Distance:** Up to 275 feet\*

### Environmental Operation Range:

Temp: 32 to 140°F (0 to 60°C)

Humidity: 5% to 95% RH non-condensing

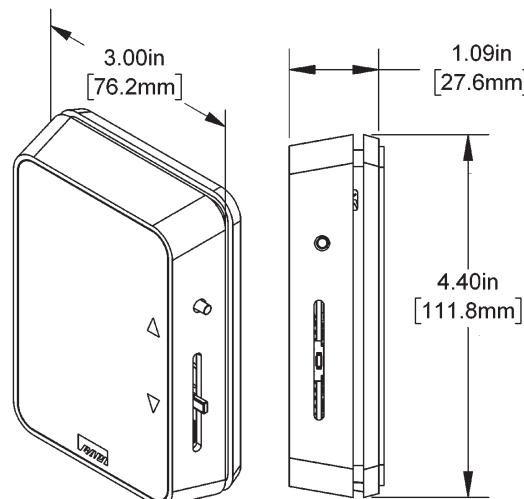
**Enclosure Material & Rating:** ABS Plastic, UL94 V-0

**Frequency:** 900 MHz (4 Channel, 7 MHz Spacing)

**Transmission Interval:** 5 minute default, user adjustable

**Transmit Power:** 0 dBm default, +5 dBm max

**Receiver Sensitivity:** -101 dBm



\*Actual in-building transmission distances will vary depending upon building construction, transmission power setting and other factors.

\*\*Actual battery life will vary depending upon transmission interval setting and transmission power setting.





# BAPI-Stat “Quantum” Temp/Humidity Sensor

900 MHz Wireless System

F5

## Ordering Information

### **BA/WTH900-Q**

BAPI-Stat “Quantum” Temp/Humidity Sensor, Battery Power

### **BA/WTH900-Q-PWR**

BAPI-Stat “Quantum” Temp/Humidity Sensor, Wired Power

### **BA/WTH900-S-Q**

BAPI-Stat “Quantum” Temp/Humidity Sensor w/ Temp Setpoint, Battery Power

### **BA/WTH900-S-Q-PWR**

BAPI-Stat “Quantum” Temp/Humidity Sensor w/ Temp Setpoint, Wired Power

### **BA/WTH900-O-Q**

BAPI-Stat “Quantum” Temp/Humidity Sensor w/ Override, Battery Power

### **BA/WTH900-O-Q-PWR**

BAPI-Stat “Quantum” Temp/Humidity Sensor w/ Override, Wired Power

### **BA/WTH900-SO-Q**

BAPI-Stat “Quantum” Temp/Humidity Sensor w/ Temp Setpoint & Override, Battery Power

### **BA/WTH900-SO-Q-PWR**

BAPI-Stat “Quantum” Temp/Humidity Sensor w/ Temp Setpoint & Override, Wired Power

**BA/LI3620** ..... 3.6V Lithium Battery

**See end of Section F for list pricing.**



## 900 MHz Gateway

The Gateway receives the data from sensors up to 275 feet away, and provides the data to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP). The Gateway also sends a confirmation signal to each sensor upon a successful reception of data, allowing the sensor to release the data that it has stored in memory so that no data is lost during a communication interruption.





## Features & Options

- Up to 275 Foot In-Building Range\*
- User-Adjustable Transmission Rate, Approximate 5 Year Battery Life with 5 Minute Transmit Rate
- Unit is Capable of Storing All Data in Memory Until it Receives a Successful Reception Signal from the Gateway So No Data is Lost During a Communication Interruption
- Gateway Provides Data to the BAS Via Multiple Communication Options (TCP/IP, JSON, BACnet IP)



**Wireless Duct Temperature Sensor**

BAPI's Wireless Duct Temperature 900 MHz Sensor features a rugged IP66-rated BAPI-Box enclosure and stainless steel probe with standard probe lengths from 4" to 18".

The unit has an estimated battery life of 5 years with the default transmit rate of once every 5 minutes.\*\* The transmitted temperature and Barometric pressure is picked up by a Gateway and supplied directly to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP).

The unit is capable of storing all data in memory until it receives a successful reception signal from the Gateway, so that no data is lost during a communication interruption. Transmissions can also be triggered by a temperature change with a user-adjustable threshold. The 900 MHz signal is "frequency agile" for maximum reliability.

## Specifications

**Power:** Two 3.6V Lithium batteries, 2,600 mAH, ~5 year battery life\*\*

**Temperature Sensor Accuracy:**

$\pm 0.45^\circ\text{F}$  ( $\pm 0.25^\circ\text{C}$ ), 32 to 158°F (0 to 70°C)

**Barometric Pressure Sensor Accuracy:**

$\pm 2 \text{ mbar}$  @ 25°C (0.40" H<sub>2</sub>O)

**Transmitted Temp Range:** -40 to 185°F (-40 to 85°C)

**Transmission Distance:** Up to 275 feet\*

**Environmental Operation Range:**

Temp: -40 to 185°F (-40 to 85°C)

Humidity: 0% to 100% RH, non-condensing

**Enclosure Rating, Material and Material Rating:**

IP66, UV-Resistant Polycarbonate, UL94 V-0

**Frequency:**

900 MHz (4 Channel, 7 MHz Spacing)

**Transmission Interval:**

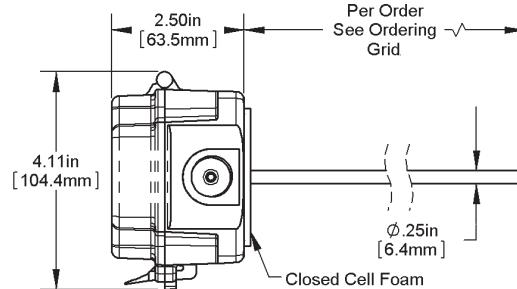
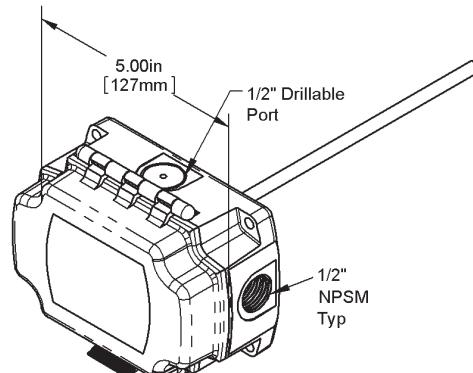
5 minute default, user adjustable

**Transmit Power:**

0 dBm default, +5 dBm max

**Receiver Sensitivity:**

-101 dBm



\*Actual in-building transmission distances will vary depending upon building construction, transmission power setting and other factors.

\*\*Actual battery life will vary depending upon transmission interval setting and transmission power setting.





# Duct Temperature Sensor

900 MHz Wireless System

F7

## Ordering Information

- BA/WT900-D-4-BB** ..... Duct Temperature Transmitter, 4" Probe Length
- BA/WT900-D-8-BB** ..... Duct Temperature Transmitter, 8" Probe Length
- BA/WT900-D-12-BB** ..... Duct Temperature Transmitter, 12" Probe Length
- BA/WT900-D-18-BB** ..... Duct Temperature Transmitter, 18" Probe Length
- BA/LI3620** ..... 3.6V Lithium Battery

*Custom probe lengths available.*

**See end of Section F for list pricing.**

## 900 MHz Gateway

The Gateway receives the data from sensors up to 275 feet away, and provides the data to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP). The Gateway also sends a confirmation signal to each sensor upon a successful reception of data, allowing the sensor to release the data that it has stored in memory so that no data is lost during a communication interruption.



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Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: sales@bapihvac.com • Web: www.bapihvac.com



## Features & Options

- Up to 275 Foot In-Building Range\*
- User-Adjustable Transmission Rate, Approximate 5 Year Battery Life with 5 Minute Transmit Rate
- Unit is Capable of Storing All Data in Memory Until it Receives a Successful Reception Signal from the Gateway So No Data is Lost During a Communication Interruption
- Gateway Provides Data to the BAS Via Multiple Communication Options (TCP/IP, JSON, BACnet IP)

BAPI's Wireless Duct Temperature and Humidity 900 MHz Sensor features a rugged IP66-rated BAPI-Box enclosure. The unit has an estimated battery life of 5 years with the default transmit rate of once every 5 minutes.\*\* The transmitted temp, humidity and Barometric pressure is picked up by a Gateway and supplied directly to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP).

The unit is capable of storing all data in memory until it receives a successful reception signal from the Gateway, so that no data is lost during a communication interruption. Transmissions can also be triggered by a temperature change with a user-adjustable threshold. The 900 MHz signal is "frequency agile" for maximum reliability.



**Wireless Duct Temperature and Humidity Sensor**

## Specifications

**Power:** Two 3.6V Lithium batteries, 2,600 mAH, ~5 year battery life\*\*

**Temperature Sensor:** Semiconductor Band Gap,  $\pm 0.3^\circ\text{C}$  ( $\pm 0.54^\circ\text{F}$ ) @ 20 to  $40^\circ\text{C}$  (68 to  $104^\circ\text{F}$ )

**Humidity Sensor:** Capacitive Polymer,  $\pm 2\%$ RH @  $25^\circ\text{C}$  (77°F), 20 to 80%RH

**Barometric Pressure Sensor:**  
MEMS Technology,  $\pm 2$  mbar @  $25^\circ\text{C}$  (0.40" H<sub>2</sub>O)

**Transmitted Temperature Range:**  
-40 to  $185^\circ\text{F}$  (-40 to  $85^\circ\text{C}$ )

**Transmission Distance:** Up to 275 feet\*

**Environmental Operation Range:**

Temp: -40 to  $185^\circ\text{F}$  (-40 to  $85^\circ\text{C}$ )

Humidity: 0% to 100% RH, non-condensing

**Enclosure Rating, Material and Material Rating:**  
IP66, UV-Resistant Polycarbonate, UL94 V-0

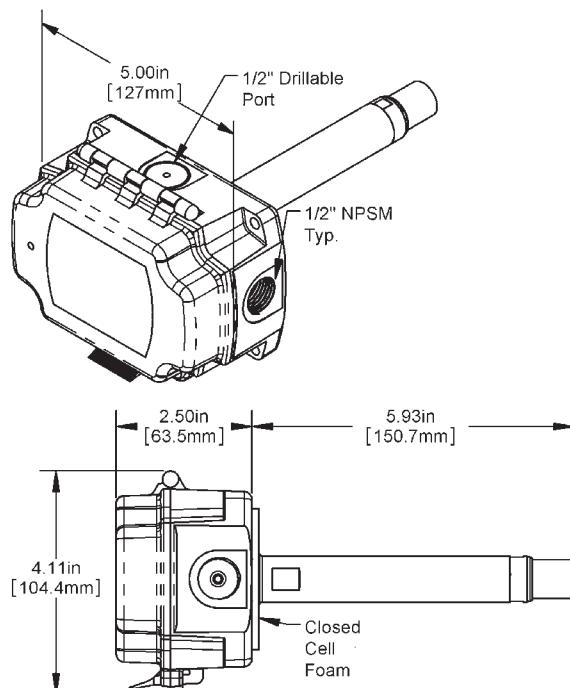
**Frequency:** 900 MHz (4 Channel, 7 MHz Spacing)

**Transmission Interval:**

5 minute default, user adjustable

**Transmit Power:** 0 dBm default, +5 dBm max

**Receiver Sensitivity:** -101 dBm



\*Actual in-building transmission distances will vary depending upon building construction, transmission power setting and other factors.

\*\*Actual battery life will vary depending upon transmission interval setting and transmission power setting.





# Duct Temp/Humidity Sensor

900 MHz Wireless System

F9

## Ordering Information

**BA/WTH900-D-BB** ... Wireless Duct Temp. & Humidity Sensor, 5" Probe Length

**BA/LI3620** ..... 3.6V Lithium Battery

*See end of Section F for list pricing.*

## 900 MHz Gateway

The Gateway receives the data from sensors up to 275 feet away, and provides the data to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP). The Gateway also sends a confirmation signal to each sensor upon a successful reception of data, allowing the sensor to release the data that it has stored in memory so that no data is lost during a communication interruption.



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## Features & Options

- Up to 275 Foot In-Building Range\*
- User-Adjustable Transmission Rate, Approximate 5 Year Battery Life with 5 Minute Transmit Rate
- Unit is Capable of Storing All Data in Memory Until it Receives a Successful Reception Signal from the Gateway So No Data is Lost During a Communication Interruption
- Gateway Provides Data to the BAS Via Multiple Communication Options (TCP/IP, JSON, BACnet IP)



**Wireless Immersion Temperature Sensor**

BAPI's Wireless Immersion Temperature 900 MHz Sensor features a rugged IP66-rated BAPI-Box enclosure with 2", 4" and 8" probe lengths.

The unit has an estimated battery life of 5 years with the default transmit rate of once every 5 minutes.\*\* The transmitted temperature and Barometric pressure is picked up by a Gateway and supplied directly to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP).

The unit is capable of storing all data in memory until it receives a successful reception signal from the Gateway, so that no data is lost during a communication interruption. Transmissions can also be triggered by a temperature change with a user-adjustable threshold. The 900 MHz signal is "frequency agile" for maximum reliability.

## Specifications

**Power:** Two 3.6V Lithium batteries, 2,600 mAH, ~5 year battery life\*\*

**Temperature Sensor Accuracy:**

±0.45°F (±0.25°C), 32 to 158°F (0 to 70°C)

**Barometric Pressure Sensor Accuracy:**

±2 mbar @ 25°C (0.40" H<sub>2</sub>O)

**Transmitted Temp Range:** -40 to 185°F (-40 to 85°C)

**Transmission Distance:** Up to 275 feet\*

**Environmental Operation Range:**

Temp: -40 to 185°F (-40 to 85°C)

Humidity: 0% to 100% RH, non-condensing

**Enclosure Rating, Material and Material Rating:**

IP66, UV-Resistant Polycarbonate, UL94 V-0

**Frequency:**

900 MHz (4 Channel, 7 MHz Spacing)

**Transmission Interval:**

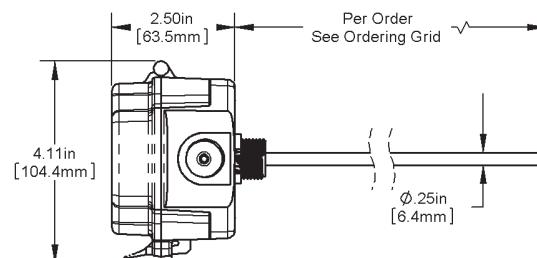
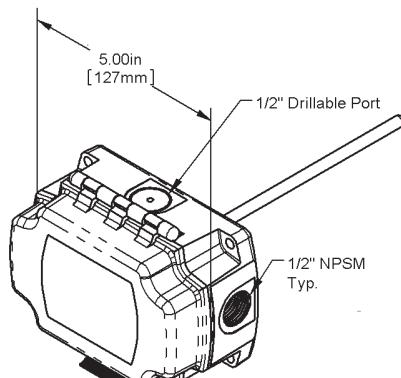
5 minute default, user adjustable

**Transmit Power:**

0 dBm default, +5 dBm max

**Receiver Sensitivity:**

-101 dBm



\*Actual in-building transmission distances will vary depending upon building construction, transmission power setting and other factors.

\*\*Actual battery life will vary depending upon transmission interval setting and transmission power setting.





# Immersion Temperature Sensor

900 MHz Wireless System

F11

## Ordering Information

**BA/WT900-I-2-BB** ....Immersion Temperature Sensor 1/4" dia. SS Probe, 2" Length

**BA/WT900-I-4-BB** ....Immersion Temperature Sensor, 1/4" dia. SS Probe, 4" Length

**BA/WT900-I-8-BB** ....Immersion Temperature Sensor, 1/4" dia. SS Probe, 8" Length

**BA/LI3620** .....Lithium Battery

*Custom probe lengths are available. Call BAPI for more information.*

**See end of Section F for list pricing.**

## 900 MHz Gateway

The Gateway receives the data from sensors up to 275 feet away, and provides the data to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP). The Gateway also sends a confirmation signal to each sensor upon a successful reception of data, allowing the sensor to release the data that it has stored in memory so that no data is lost during a communication interruption.



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## Features & Options

- Up to 275 Foot In-Building Range\*
- User-Adjustable Transmission Rate, Approximate 5 Year Battery Life with 5 Minute Transmit Rate
- Unit is Capable of Storing All Data in Memory Until it Receives a Successful Reception Signal from the Gateway So No Data is Lost During a Communication Interruption
- Gateway Provides Data to the BAS Via Multiple Communication Options (TCP/IP, JSON, BACnet IP)

BAPI's Wireless Remote Temperature 900 MHz Sensor features a 1.75" long SS probe with either Plenum-Rated Cable or FEP-Jacketed Cable and a watertight BAPI-Box Enclosure. Standard lead lengths are 5', 10', 15', 20' and 25'.

The unit has an estimated battery life of 5 years with the default transmit rate of once every 5 minutes.\*\* The transmitted temperature and Barometric pressure is picked up by a Gateway and supplied directly to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP).

The unit is capable of storing all data in memory until it receives a successful reception signal from the Gateway, so that no data is lost during a communication interruption. Transmissions can also be triggered by a temperature change with a user-adjustable threshold. The 900 MHz signal is "frequency agile" for maximum reliability.



**Wireless Remote Probe Sensor**

## Specifications



**Power:** Two 3.6V Lithium batteries, 2,600 mAH, ~5 year battery life\*\*

**Temperature Sensor Accuracy:**

±0.45°F (±0.25°C), 32 to 158°F (0 to 70°C)

**Barometric Pressure Sensor Accuracy:**

±2 mbar @ 25°C (0.40" H<sub>2</sub>O)

**Transmitted Temp Range:**

-40 to 185°F (-40 to 85°C)

**Transmission Distance:** Up to 275 feet\*

**Environmental Operation Range:**

Temp: -40 to 185°F (-40 to 85°C)

Humidity: 0% to 100% RH, non-condensing

**Enclosure Rating, Material and Material Rating:**

IP66, UV-Resistant Polycarbonate, UL94 V-0

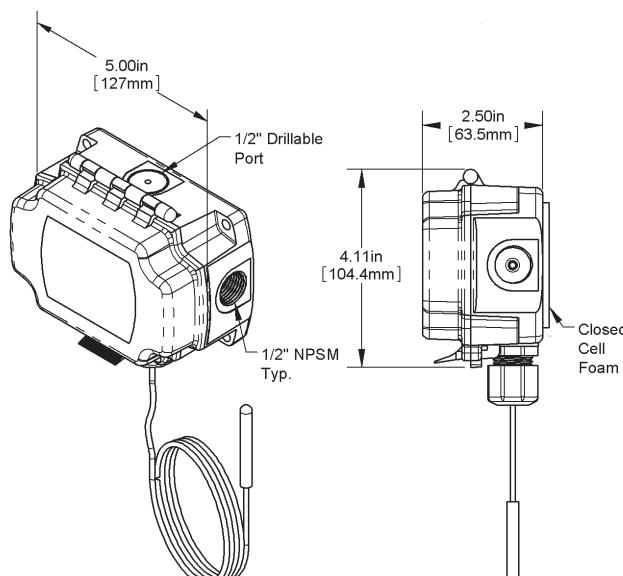
**Frequency:** 900 MHz (4 Channel, 7 MHz Spacing)

**Transmission Interval:**

5 minute default, user adjustable

**Transmit Power:** 0 dBm default, +5 dBm max

**Receiver Sensitivity:** -101 dBm



\*Actual in-building transmission distances will vary depending upon building construction, transmission power setting and other factors.

\*\*Actual battery life will vary depending upon transmission interval setting and transmission power setting.





### Ordering Information

- BA/WT900-RPP-5-BB**..... Unit with Plenum-Rated Cable, 5' Leads
- BA/WT900-RPP-10-BB**..... Unit with Plenum-Rated Cable, 10' Leads
- BA/WT900-RPP-15-BB**..... Unit with Plenum-Rated Cable, 15' Leads
- BA/WT900-RPP-20-BB**..... Unit with Plenum-Rated Cable, 20' Leads
- BA/WT900-RPP-25-BB**..... Unit with Plenum-Rated Cable, 25' Leads
- BA/WT900-RPFEP-5-BB**..... Unit with FEP-Jacketed Cable, 5' Leads
- BA/WT900-RPFEP-10-BB**..... Unit with FEP-Jacketed Cable, 10' Leads
- BA/WT900-RPFEP-15-BB**..... Unit with FEP-Jacketed Cable, 15' Leads
- BA/WT900-RPFEP-20-BB**..... Unit with FEP-Jacketed Cable, 20' Leads
- BA/WT900-RPFEP-25-BB**..... Unit w/ FEP-Jacketed Cable, 25' Leads

*See end of Section F for list pricing.*

### 900 MHz Gateway

The Gateway receives the data from sensors up to 275 feet away, and provides the data to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP). The Gateway also sends a confirmation signal to each sensor upon a successful reception of data, allowing the sensor to release the data that it has stored in memory so that no data is lost during a communication interruption.





## Features & Options

- Up to 275 Foot In-Building Range\*
- Barometric Pressure and Optional Light Level Sensing
- User-Adjustable Transmission Rate, Approximate 5 Year Battery Life with 5 Minute Transmit Rate
- Unit is Capable of Storing All Data in Memory Until it Receives a Successful Reception Signal from the Gateway
- Gateway Provides Data to the BAS Via Multiple Communication Options (TCP/IP, JSON, BACnet IP)

BAPI's Wireless Outside Air Temperature 900 MHz Sensor features a UV-resistant plastic shield that keeps the sensor out of the sunlight and allows for excellent air circulation. It comes in a rugged IP66-rated BAPI-Box enclosure with Barometric pressure and optional light level sensing.

The unit has an estimated battery life of 5 years with the default transmit rate of once every 5 minutes.\*\* The transmitted values are picked up by a Gateway and supplied directly to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP).

The unit is capable of storing all data in memory until it receives a successful reception signal from the Gateway, so that no data is lost during a communication interruption. Transmissions can also be triggered by a temperature change with a user-adjustable threshold. The 900 MHz signal is "frequency agile" for maximum reliability.



**Wireless Outside Air Temperature Sensor**

## Specifications

**Power:** Two 3.6V Lith. batteries, 2,600 mAH, ~5 year battery life\*\*

**Temp Accuracy:**  $\pm 0.45^\circ\text{F}$  ( $\pm 0.25^\circ\text{C}$ ), 32 to 158°F (0 to 70°C)

**Temperature Transmission Range:** -40 to 185°F (-40 to 85°C)

**Barometric Pressure Sensor Accuracy:**

$\pm 2 \text{ mbar}$  @  $25^\circ\text{C}$  (0.40" H<sub>2</sub>O)

**Barometric Pressure Operational Range:** 30 to 120 Kpa

**Light Level Sensing Accuracy:** 10 Lux + 10% of reading.

**Light Level Sensing Range:** 0 to 64,000 lux

**Transmission Distance:** Up to 275 feet\*

**Frequency:** 900 MHz (4 Channel, 7 MHz Spacing)

**Transmission Interval:** 5 minute default, user adjustable

**Transmit Power:** 0 dBm default, +5 dBm max

**Receiver Sensitivity:** -101 dBm

**Enclosure Rating, Material and Material Rating:**

IP66, UV-Resistant Polycarbonate, UL94 V-0

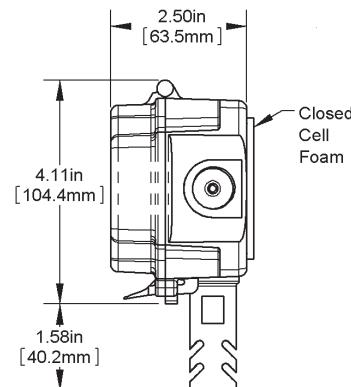
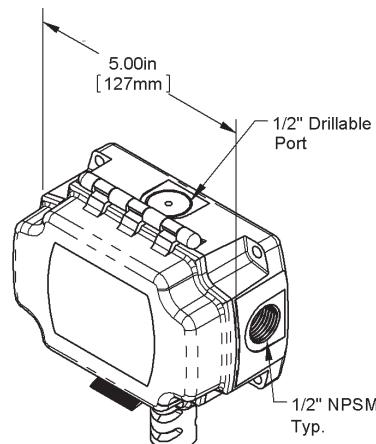
**Environmental Operation Range:**

Temp: -40 to 185°F (-40 to 85°C)

Humidity: 0 to 100% RH

\*Actual in-building transmission distances will vary depending upon building construction, transmission power setting and other factors.

\*\*Actual battery life will vary depending upon transmission interval setting and transmission power setting.





# Outside Air Temperature Sensor

900 MHz Wireless System

F15

## Ordering Information

PART #	DESCRIPTION
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**BA/WT900-O-BB:** ..... Outside Air Temperature and Barometric Pressure Sensor

**BA/WT900-LL-O-BB:**..... Outside Air Temperature, Light Level and Barometric Pressure Sensor

**BA/LI3620:**..... 3.6V Lithium Battery

*See end of Section F for list pricing.*

## 900 MHz Gateway

The Gateway receives the data from one or more sensors up to 275 feet away, and provides the data to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP). The Gateway also sends a confirmation signal to each sensor upon a successful reception of data, allowing the sensor to release the data that it has stored in memory so that no data is lost during a communication interruption.





## Features & Options

- Up to 275 Foot In-Building Range\*
- Barometric Pressure and Optional Light Level Sensing
- User-Adjustable Transmission Rate, Approximate 5 Year Battery Life with 5 Minute Transmit Rate
- Unit is Capable of Storing All Data in Memory Until it Receives a Successful Reception Signal from the Gateway So No Data is Lost During a Communication Interruption
- Gateway Provides Data to the BAS Via Multiple Communication Options (TCP/IP, JSON, BACnet IP)

BAPI's Wireless Outside Air Temp/Humidity 900 MHz Sensor features a UV-resistant plastic shield and stainless steel replaceable filter. It comes in a IP66-rated BAPI-Box enclosure with Barometric pressure and optional light level sensing.

The unit has an estimated battery life of 5 years with the default transmit rate of once every 5 minutes.\*\* The transmitted data is picked up by a Gateway and supplied directly to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP). The unit is capable of storing all data in memory until it receives a successful reception signal from the Gateway, so that no data is lost during a communication interruption. Transmissions can also be triggered by a temperature change with a user-adjustable threshold. The 900 MHz signal is "frequency agile" for maximum reliability.

## Specifications

**Power:** Two 3.6V Lith. batteries, 2,600 mAH, ~5 year battery life\*\*

**Temperature Sensor:** Semiconductor Band Gap,  $\pm 0.3^\circ\text{C}$  ( $\pm 0.54^\circ\text{F}$ ) @ 20 to  $40^\circ\text{C}$  (68 to  $104^\circ\text{F}$ )

**Temperature Transmission Range:** -40 to  $185^\circ\text{F}$  (-40 to  $85^\circ\text{C}$ )

**Humidity Sensor:** Capacitive Polymer,  $\pm 2\%$ RH @  $25^\circ\text{C}$  (77°F), 20 to 80%RH

**Humidity Transmission Range:** 0 to 100%RH

**Barometric Pressure Sensor:** MEMS Technology,  $\pm 2$  mbar @  $25^\circ\text{C}$  (0.40" H<sub>2</sub>O)

**Barometric Pressure Operational Range:** 30 to 120 Kpa

**Light Level Sensing Accuracy:** 10 Lux + 10% of reading.

**Light Level Sensing Range:** 0 to 64,000 lux

**Transmission Distance:** Up to 275 feet\*

**Frequency:** 900 MHz (4 Channels, 7 MHz Spacing)

**Transmission Interval:** 5 minute default, user adjustable

**Transmit Power:** 0 dBm default, +5 dBm max

**Receiver Sensitivity:** -101 dBm

**Enclosure Rating, Material and Material Rating:**  
IP66, UV-Resistant Polycarbonate, UL94 V-0

**Environmental Operation Range:**

Temp: -40 to  $185^\circ\text{F}$  (-40 to  $85^\circ\text{C}$ )

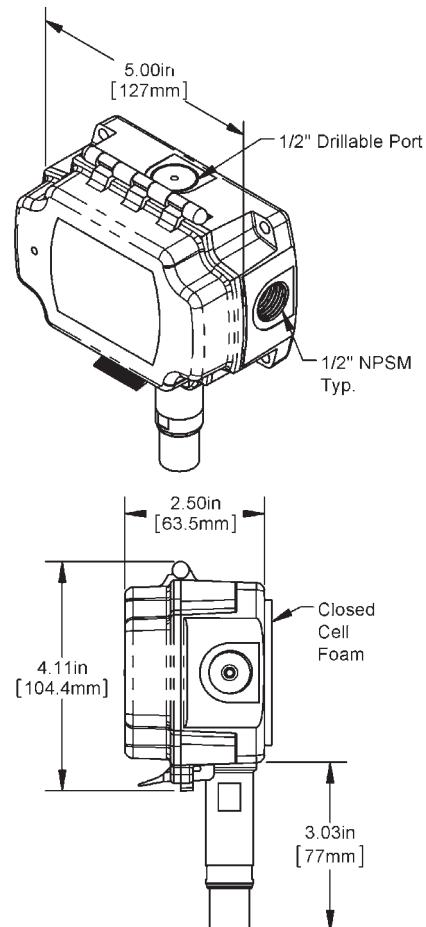
Humidity: 0 to 100% RH

\*Actual in-building transmission distances will vary depending upon building construction, transmission power setting and other factors.

\*\*Actual battery life will vary depending upon transmission interval setting and transmission power setting.



Wireless Outside Air Temp and Humidity Sensor





# Outside Air Temp/Humidity Sensor

900 MHz Wireless System

F17

## Ordering Information

### **BA/WTH900-O-BB:**

Outside Air Temp/Humidity and Barometric Pressure Sensor

### **BA/WTH900-LL-O-BB:**

Outside Air Temp/Humidity, Light Level and Barometric Pressure Sensor

**BA/LI3620:** ..... 3.6V Lithium Battery

*See end of Section F for list pricing.*

## 900 MHz Gateway

The Gateway receives the data from one or more sensors up to 275 feet away, and provides the data to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP). The Gateway also sends a confirmation signal to each sensor upon a successful reception of data, allowing the sensor to release the data that it has stored in memory so that no data is lost during a communication interruption.





## Features & Options

- Reduces Temperature "Spikes" from Opening the Freezer Door
- Up to 275 Foot In-Building Range\*
- User-Adjustable Transmission Rate, Approximate 5 Year Battery Life with 5 Minute Transmit Rate
- Contains 4 BACnet Objects: Temp, Barometric Pressure, Battery Life and Signal Strength
- Gateway Provides Data to the BAS Via Multiple Communication Options (TCP/IP, JSON, BACnet IP)

The Wireless Thermobuffer 900 MHz Sensor is designed for walk-in freezers and coolers. It features a watertight BAPI-Box enclosure with a 2" or 4" buffer chamber or 1" hanging bracket which is filled with customer-provided food grade glycol. This allows the unit to track the temperature of the contents, rather than the air.



**Unit with Attached Buffer Chamber and Hanging Bracket**

The unit has an estimated battery life of 5 years with the default transmit rate of once every 5 minutes.\*\* The transmitted values are picked up by a gateway and supplied directly to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP). The sensor is capable of storing all data in memory until it receives a successful reception signal from the gateway, so that no data is lost during a communication interruption. The 900 MHz signal is "frequency agile".

## Specifications

**Power:** Two 3.6V Lithium batteries, 2,600 mAH, ~5 year battery life\*\*

**Temperature Accuracy:**

From 32 to 158°F (0 to 70°C):  $\pm 0.45^{\circ}\text{F}$  ( $\pm 0.25^{\circ}\text{C}$ )

From -40 to 32°F (-40 to 0°C):  $\pm 1.0^{\circ}\text{F}$  ( $\pm 0.55^{\circ}\text{C}$ )

**Temperature Transmission Range:**

-40°F to 185°F (-40°C to 85°C)

**Barometric Pressure Sensor Accuracy:**

$\pm 2$  mbar @ 25°C (0.40" H<sub>2</sub>O)

**Transmission Distance:** Up to 275 feet\*

**Frequency:**

900 MHz (4 Channels, 7 MHz Spacing)

**Transmission Interval:**

5 minute default, user adjustable

**Transmit Power:** 0 dBm default, +5 dBm max

**Receiver Sensitivity:** -101 dBm

**Environmental Operation Range:**

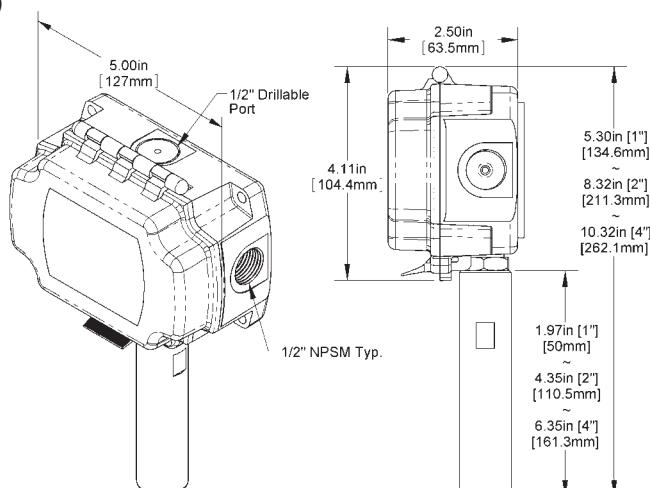
Temp: -22°F to 158°F (-30°C to 70°C)

Humidity: 0% to 100% RH, Non-condensing

**Encl. Material, Encl. Rating and Material Rating:**

UV-Resistant Polycarbonate, NEMA 4, IP66 UL94 V-0

**Buffer Chamber:** 1", 2" or 4", 304 Stainless Steel



*Note: Unit requires food grade glycol antifreeze for proper operation.*

\*Actual in-building transmission distances will vary depending upon building construction, transmission power setting and other factors.

\*\*Actual battery life will vary depending upon transmission interval setting and transmission power setting.





# Thermobuffer Freezer Temperature Sensor

**900 MHz Wireless System**

**F19**

## **Ordering Information**

### **BA/WT900-TB-M304-2-BB**

Thermobuffer, 304 SS Chamber, 2" Buffer Chamber

### **BA/WT900-TB-M304-4-BB**

Thermobuffer, 304 SS Chamber, 4" Buffer Chamber

### **BA/WT900-TB-M304-1-HB-5-BB**

Thermobuffer, 1" 304 SS Hanging Bracket w/ 5' FEP-Jacketed Cable

### **BA/WT900-TB-M304-1-HB-10-BB**

Thermobuffer, 1" 304 SS Hanging Bracket w/ 10' FEP-Jacketed Cable

### **BA/LI3620:**

3.6V Lithium Battery

**See end of Section F for list pricing.**

## **900 MHz Gateway**

The Gateway receives the data from one or more sensors up to 275 feet away, and provides the data to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP). The Gateway also sends a confirmation signal to each sensor upon a successful reception of data, allowing the sensor to release the data that it has stored in memory so that no data is lost during a communication interruption.





## Features & Options

- Up to 175 Foot In-Building Range\*
- Fully Field Adjustable Transmit Rate
- Waterproof Construction for Food Service Use
- NSF Certified with Food and Dishwasher Safe Materials
- Many Additional Applications Besides Food

BAPI's Wireless 900 MHz Food Probes remain in the food trays to measure and transmit the temperature to a receiver up to 175 feet away. The transmitted temperature is picked up by a gateway and supplied directly to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP).

The food probes eliminate the need for an employee to hand record the temperatures with a thermometer for HACCP compliance. Bin clips are available to fit most food bins. The probe is designed for dishwasher or hand washing.

Because the probes are designed for wet, dusty or dirty environments, there are many additional applications including cooling towers, evaporative coolers, steam humidifiers, dusty or wet conveyer systems, aggregate washers and vaulted ceiling suspension.



## Specifications

**Supply Power:** One 3.6V Lithium 1/2 AA Battery, 900 mAH

**Battery life:** One year @ default 5 minute transmit interval\*\*

**Measurement Range:** -20° to 110°C (-4° to 230°F)

**Accuracy:** ±0.25°C (±0.5°F) from -20° to 70°C  
±0.5°C (±1°F) from 70° to 110°C

### Environmental Operating Range:

Probe Only: -40° to 110°C (-40° to 230°F)

Entire Unit: -15° to 85°C (5° to 185°F)

Washing Spike Temp: TBD (up to 100°C)

Humidity: 0 to 100% RH Condensing

**Case Material:** Food Safe Plastic

**Probe Material:** 304 SS, 1/8" dia.

**Frequency:** 900 MHz (4 Channels, 7 MHz Spacing)

**Transmit Power:** 0 dBm default, +5 dBm max

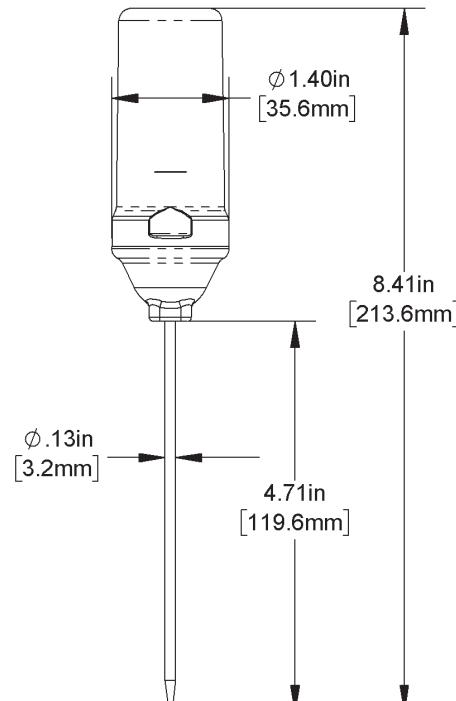
**Receiver Sensitivity:** -101 dBm

**Transmitter Interval:** Field Adjustable (5 min default)

**Transmission Range:** Up to 175 feet\*

**Cleaning:** Dishwasher or Sanitizing Wipe

**Agency:** RoHS & NSF Certified



\*Actual in-building transmission distances will vary depending upon building construction, transmission power setting and other factors.

\*\*Actual battery life will vary depending upon transmission interval setting and transmission power setting.





# Wireless Food Temperature Probe

900 MHz Wireless System

F21

## Ordering Information

**BA/WFP900-PT**..... Wireless Food Probe

Other probe options available upon request.

*See end of Section F for list pricing.*

## 900 MHz Gateway

The Gateway receives the data from one or more sensors up to 275 feet away, and provides the data to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP). The Gateway also sends a confirmation signal to each sensor upon a successful reception of data, allowing the sensor to release the data that it has stored in memory so that no data is lost during a communication interruption.





## Features & Options

- Up to 275 Foot In-Building Range\*
- Built in or Remote Temperature Sensor
- User-Adjustable Transmission Rate, Approximate 5 Year Battery Life with 5 Minute Transmit Rate
- Unit is Capable of Storing All Data in Memory Until it Receives a Successful Reception Signal from the Gateway So No Data is Lost During a Communication Interruption
- Gateway Provides Data to the BAS Via Multiple Communication Options (TCP/IP, JSON, BACnet IP)

The BAPI-Stat "Quantum Slim" Wireless Temperature 900 MHz Sensor is designed to monitor temperature inside refrigerator and freezer cases. The unit mounts on the outside of freezer units and can be mounted either inside or outside of refrigerator units. It is available with an internal or an external sensor.

The external sensor's cable can easily fit between the door seal or through hole without affecting appliance efficiency. The temperature is then transmitted to the receiver with a measurement range of -40 to 185°F (-40 to 85°C). The unit has an estimated battery life of 5 years with the default transmit rate of once every 5 minutes\*\* for battery powered units. The unit can also be ordered with wired power rather than battery power.

The transmitted temperature is picked up by a Gateway and supplied directly to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP). The sensor is capable of storing all data in memory until it receives a successful reception signal from the Gateway, so that no data is lost during a communication interruption. Transmissions can also be triggered by a temperature change with a user-adjustable threshold. The 900 MHz signal is "frequency agile" for maximum reliability.



**BAPI-Stat  
"Quantum  
Slim" with  
Remote  
Probe  
Sensor**

## Specifications

### Power for Battery Powered Units:

Two 3.6V Lithium batteries, 2,600 mAH,  
~5 year life with 5 min transmission interval\*\*

### Power for Wired Power Units:

9 to 30 VDC; 50 mA max • 15 to 28 VAC; 50 mA max

### LED:

Transmit LED Inside Cover

### Sensor:

Thermistor, 10K-2  
Internal: Located at Bottom of Case  
External: 1.75" SS Sensor with FEP Cable  
1" Thermobuffer with FEP Cable

### Temp Measurement Range:

-40 to 185°F (-40 to 85°C)

### Accuracy:

±0.5°F (±0.28°C) from -40 to 185°F (-40 to 85°C)

### Environmental:

-22 to 122°F (-30 to 50°C),  
0 to 95% RH non-condensing

### Case Material & Material Rating:

ABS Plastic, UL94 V-0

### Transmitter Mounting:

Keyhole Screw Mounts (Screws not included)

### Ext. Probe Material:

304 Stainless Steel

### Sensor Mounting:

Remote Probe: Plastic Holder (BA/FPB)  
Thermobuffer: Hanging Rack Clip (Included)

### Frequency:

900 MHz (4 Ch., 7 MHz Spacing)

### Transmit Power:

0 dBm default, +5 dBm max

### Receiver Sensitivity:

-101 dBm

### Transmitter Interval:

Factory selectable from 10 seconds to 10

minutes in 5 second intervals (5 minute default)

### Transmission Distance:

Up to 275 Feet\*

### Agency:

RoHS

\*Actual in-building transmission distances will vary depending upon building construction, transmission power setting and other factors.

\*\*Actual battery life will vary depending upon transmission interval setting and transmission power setting.





# BAPI-Stat "Quantum Slim" Sensor

900 MHz Wireless System

F23

## Ordering Information

- BA/WT900-QSL-IS..... "Quantum Slim" with Internal Temp Sensor, Battery Power  
BA/WT900-QSL-IS-PWR ..... "Quantum Slim" with Internal Temp Sensor, Wired Power  
BA/WT900-QSL-RFEP5 ..... "Quantum Slim" w/ Remote Probe & 5' FEP-Jacketed Cable, Battery Power  
BA/WT900-QSL-RFEP5-PWR..... "Quantum Slim" w/ Remote Probe & 5' FEP-Jacketed Cable, Wired Power  
BA/WT900-QSL-RFEP10 ..... "Quantum Slim" w/ Remote Probe & 10' FEP-Jacketed Cable, Battery Power  
BA/WT900-QSL-RFEP10-PWR.... "Quantum Slim" w/ Remote Probe & 10' FEP-Jacketed Cable, Wired Power  
BA/WT900-QSL-X..... "Slim" without Sensor (sensor is ordered separately), Battery Power  
BA/WT900-QSL-X-PWR ..... "Slim" without Sensor (sensor is ordered separately), Wired Power  
BA/WT900-QSL-TB-FEP5 ..... "Slim" w/ 1" Thermobuffer & 5' FEP-Jacketed Cable, Battery Power  
BA/WT900-QSL-TB-FEP5-PWR ... "Slim" w/ 1" Thermobuffer & 5' FEP-Jacketed Cable, Wired Power  
BA/WT900-QSL-TB-FEP10 ..... "Slim" w/ 1" Thermobuffer & 10' FEP-Jacketed Cable, Battery Power  
BA/WT900-QSL-TB-FEP10-PWR . "Slim" w/ 1" Thermobuffer & 10' FEP-Jacketed Cable, Wired Power  
  
BA/LI3620: ..... 3.6V Lithium Battery

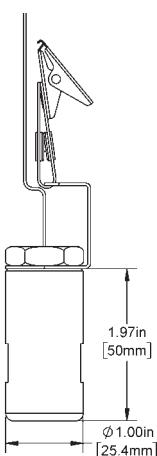
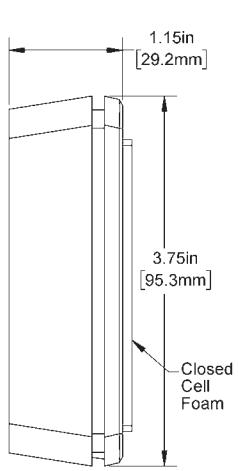
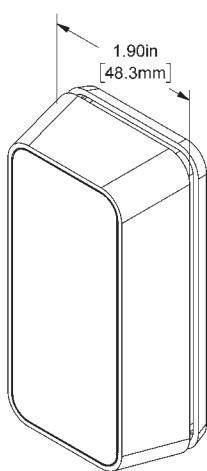
**See end of Section F for list pricing.**

## 900 MHz Gateway

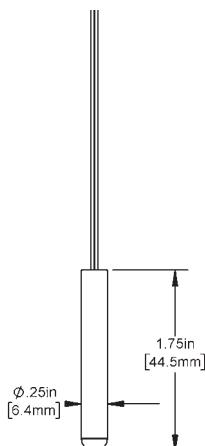
The Gateway receives the data from one or more sensors up to 275 feet away, and provides the data to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP). The Gateway also sends a confirmation signal to each sensor upon a successful reception of data, allowing the sensor to release the data that it has stored in memory so that no data is lost during a communication interruption.



## Dimensions



External Hanging Thermobuffer Sensor



External Remote Probe Sensor

BAPI-Stat "Quantum Slim"





## Features & Options

- Up to 275 Foot In-Building Range\*
- Built in Temperature & Humidity Sensor
- User-Adjustable Transmission Rate, Approximate 5 Year Battery Life with 5 Minute Transmit Rate
- Unit is Capable of Storing All Data in Memory Until it Receives a Successful Reception Signal from the Gateway So No Data is Lost During a Communication Interruption
- Gateway Provides Data to the BAS Via Multiple Communication Options (TCP/IP, JSON, BACnet IP)

The BAPI-Stat "Quantum Slim" Wireless Temp/Humidity 900 MHz sensor features a sleek, low profile room enclosure.

The temperature and humidity values are transmitted to the receiver with a measurement range of -40 to 185°F (-40 to 85°C). The unit has an estimated battery life of 5 years with the default transmit rate of once every 5 minutes\*\* for battery powered units. The unit can also be ordered with wired power rather than battery power.

The transmitted temperature is picked up by a Gateway and supplied directly to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP). The sensor is capable of storing all data in memory until it receives a successful reception signal from the Gateway, so that no data is lost during a communication interruption. Transmissions can also be triggered by a temperature change with a user-adjustable threshold. The 900 MHz signal is "frequency agile" for maximum reliability.



**BAPI-Stat  
"Quantum Slim"**

## Specifications

### Power for Battery Powered Units:

Two 3.6V Lithium batteries, 2,600 mAH,  
~5 year life with 5 min transmission interval\*\*

### Power for Wired Power Units:

9 to 30 VDC; 50 mA max  
15 to 28 VAC; 50 mA max

**Temperature Sensor:** Semiconductor Band Gap,  
 $\pm 0.54^{\circ}\text{F}$  ( $\pm 0.3^{\circ}\text{C}$ ) @ 20 to 40°C (68 to 104°F)

### Temp Measurement Range:

-40 to 185°F (-40 to 85°C)

**Humidity Sensor:** Capacitive Polymer,  
 $\pm 2\%$ RH @ 25°C (77°F), 20 to 80%RH

### Transmitter Environmental:

-22 to 122°F (-30 to 50°C),  
0 to 95% RH non-condensing

### Case Material & Material Rating:

ABS Plastic, UL94 V-0

**Frequency:** 900 MHz (4 Ch., 7 MHz Spacing)

### Mounting:

Keyhole Screw Mounts (Screws not included)

**Transmit Power:** 0 dBm default, +5 dBm max

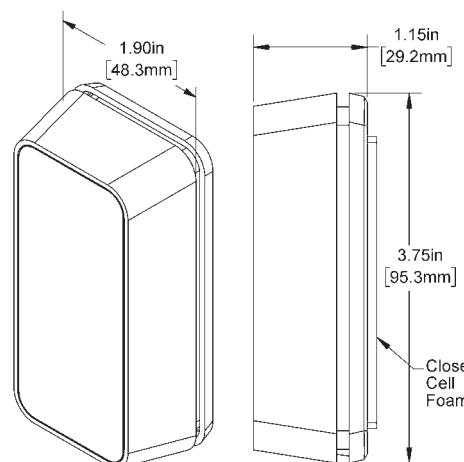
**Receiver Sensitivity:** -101 dBm

### Transmitter Interval:

Field selectable from 30 seconds to one day in defined intervals (5 minute default)

**Transmission Distance:** Up to 275 Feet\*

**Agency:** RoHS



\*Actual in-building transmission distances will vary depending upon building construction, transmission power setting and other factors.

\*\*Actual battery life will vary depending upon transmission interval setting and transmission power setting.





# BAPI-Stat "Quantum Slim" Temp/Humidity Sensor

**900 MHz Wireless System**

**F25**

## **Ordering Information**

**BA/WTH900-QSL-IS** ..... "Quantum Slim" with Internal Temp/Humidity Sensor, Battery Power

**BA/WTH900-QSL-IS-PWR** ..... "Quantum Slim" with Internal Temp/Humidity Sensor, Wired Power

**See end of Section F for list pricing.**

## **900 MHz Gateway**

The Gateway receives the data from one or more sensors up to 275 feet away, and provides the data to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP). The Gateway also sends a confirmation signal to each sensor upon a successful reception of data, allowing the sensor to release the data that it has stored in memory so that no data is lost during a communication interruption.





## Features & Options

- Multiple communication options including TCP/IP, JSON & BACnet IP
- Each Gateway supports up to 200 BACnet objects and 50 Sensors\*\* that can be configured remotely via the Gateway
- Gateway sends a confirmation signal to each sensor upon a successful reception of data, allowing sensors to release the data they have stored in memory so no data is lost during a signal interruption
- Shows sensor readings, battery and signal levels via web page
- Direct access to SQL database

The 900 MHz Gateway receives the data from one or more sensors up to 275 feet\* away, and provides the data to the BAS via multiple communication options (TCP/IP, JSON, BACnet IP). Each Gateway supports up to 200 BACnet objects. Sensor devices can be configured remotely via the Gateway.

The Gateway sends a confirmation signal to each sensor upon a successful reception of data, allowing the sensor to transmit the data it has stored in memory, so no data is lost during a communication interruption.



**900 MHz Gateway**

**BA/GTW900-IP .. 900 MHz Gateway for BAPI 900 MHz Wireless System**

**See end of Section F for list pricing.**

## Specifications

**Supply Power:** 5 Volts @ 2.4 Amps, Micro-USB Plug (included)

**Cable:** 5' Ethernet cable with standard RJ45 connectors at each end (included)

**Communication Ports:**

RJ45 Ethernet:..... TCP/IP used for WEB Browser interface, Built in HTML webpage server, DHCP or static IP addressing

USB (4):..... Future growth

**Capacity/Unit:** Up to 200 BACnet objects

**Antenna:** Thread-on Whip Antenna, 900 MHz, 3.0 dBi, 6.6" Long

**Ambient:** 32 to 150°F (0 to 70°C), 0 to 95% RH non-condensing

**Typical Indoor Sensor to Receiver Reception Distance:** Up to 300 feet

**Frequency:** 900 MHz (4 Channels, 7 MHz Spacing)

**Transmit Power:** -5 dBm

**Receiver Sensitivity:** -101 dBm

**Security:** 128 bit AES encryption of wireless data. Configuration settings and device readings are user/password protected.

**Mounting:** Wall or surface mount

**Default Address:**

IP: DHCP or Static Configured Net Mask: 255.255.255.0 Port: 1000 (user configurable)

\*Actual in-building transmission distances will vary depending upon building construction, transmission power setting and other factors.

\*\*Gateway supports up to 200 BACnet objects and 50 Sensors at 5 minute transmission interval. BAPI recommends a maximum of 25 sensors at a 30 second transmission interval.





# Replacement Batteries for Wireless Sensors

F2+

Rev. 11/30/17

900 MHz Wireless System

## Features & Options

### BA/LI3620

The BA/LI3620 Lithium Ion AA battery is the ideal replacement for all BAPI wireless 418 MHz transmitters and 900 MHz sensors (except the Wireless Food Probe). Each unit takes two batteries.



BA/LI3620

(for all BAPI Wireless Sensors except the Wireless Food Probe)

### BA/BAT-5AA-HIT

The BA/BAT-5AA-HIT High Temperature Lithium ½AA battery is the ideal replacement for the BAPI wireless 418 MHz Food Probe transmitter and 900 MHz Food Probe Sensor. Each unit takes one battery.



BA/BAT-5AA-HIT  
(for Wireless Food Probe)

## Ordering Information

### Part Number      Description

**BA/LI3620** ..... Lithium Ion AA Battery, 3.6V, for all BAPI 418 MHz Transmitters and 900 MHz Sensors except the Wireless Food Probe

**BA/BAT-5AA-HIT** .... Lithium ½AA Battery, 3.6V, for the BAPI Wireless 418 MHz Food Probe Transmitter and 900 MHz Food Probe Sensor



*See end of Section F for list pricing.*

## Specifications

### BA/LI3620 Battery

**Type & Size:** Lithium Ion, AA

**Nominal Voltage:** 3.6V

**Nominal Capacity:** 2.6 Ah @2mA, to 2V

**Operation Temp:**

-76 to 185°F (-60 to 85°C)

0 to 95 %RH Non-Condensing

**Agency:** RoHS

### BA/BAT-5AA-HIT Battery

**Type & Size:** Lithium (High Temp), ½AA

**Nominal Voltage:** 3.6V

**Nominal Capacity:** 0.9 Ah @ 1mA, to 2V

**Operating Temp:**

-67 to 257°F (-55 to 125°C)

0 to 95 %RH Non-Condensing

**Agency:** RoHS





## Features & Options

The 900 MHz Field Verifier Kit is designed to measure how far the BAPI Wireless 900 MHz signal will travel in a specific installation. Location of sensors and Gateways can be identified with a single site visit prior to submitting on a project.

The kit includes three sensors, a Gateway receiver and a wireless router so you can connect the Gateway wirelessly to a laptop computer. The kit also includes a spectrum analyzer to check the RF background noise on the frequency channels used by the BAPI system. The Gateway software provides a dBm signal strength value for the sensors so that ideal locations for the sensors can be identified.

The 900 MHz Field Verifier is available as 30 day loaner kit and includes a carrying case.



**900 MHz Field Verifier Kit**

## Ordering Information

**BA/FV900-KIT-LOAN.....900 MHz Field Verifier Kit**

**See end of Section F for list pricing.**

## Specifications

### GATEWAY

**Supply Power:** 5 Volts @ 2.4 Amps, Micro-USB Plug (included)

**Cable:** 5' Ethernet cable (included)

**Capacity/Unit:** Up to 200 BACnet objects

**Ambient:** 32 to 150°F (0 to 70°C), 0 to 95%RH non-condensing

**Typical Indoor Communication Distance:** Up to 275 feet\*

**Frequency:** 900 MHz (4 Channels, 7 MHz Spacing)

**Transmit Power:** -5 dBm

**Receiver Sensitivity:** -101 dBm

### SENSORS

**Power:** Two 3.6V Lithium batteries, 2,600 mAH (One 3.6V Lithium batteries for Food Probe)

**Temp Measurement Range - BAPI-Slim & BAPI-Stat Quantum:** -40 to 185°F (-40 to 85°C)

**Temp Measurement Range - Food Probe:** -20° to 110°C (-4° to 230°F)

**Environmental Op. Range - BAPI-Slim & BAPI-Stat Quantum:**

32 to 140°F (0 to 60°C), 5% to 95% RH non-condensing

**Environmental Operating Range - Food Probe:**

-15° to 85°C (5° to 185°F), 0 to 100% RH Condensing

**Frequency:** 900 MHz (4 Ch., 7 MHz Spacing)

**Transmit Power:** 0 dBm default, +5 dBm max

**Receiver Sensitivity:** -101 dBm

**Transmission Interval:** 5 minute default, user adjustable

**Transmission Distance - BAPI-Slim & BAPI-Stat Quantum:** Up to 275 Feet\*

**Transmission Distance - Food Probe:** Up to 175 feet\*

\*Actual in-building transmission distances will vary depending upon building construction, transmission power setting and other factors.





Page	Part Number	Description	List Price
<b>WIRELESS ROOM SENSORS</b>			
F2	<b>BA/WT900-Q</b>	BAPI-Stat "Quantum" Temp Sensor, Battery Power .....	\$500
	<b>BA/WT900-Q-PWR</b>	BAPI-Stat "Quantum" Temp Sensor, Wired Power .....	\$555
	<b>BA/WT900-S-Q</b>	BAPI-Stat "Quantum" Temp Sensor w/ Setpoint, Battery Power.....	\$506
	<b>BA/WT900-S-Q-PWR</b>	BAPI-Stat "Quantum" Temp Sensor w/ Setpoint, Wired Power.....	\$561
	<b>BA/WT900-O-Q</b>	BAPI-Stat "Quantum" Temp Sensor w/ Override, Battery Power \$505	
	<b>BA/WT900-O-Q-PWR</b>	BAPI-Stat "Quantum" Temp Sensor w/ Override, Wired Power .	\$560
	<b>BA/WT900-SO-Q</b>	"Quantum" Temp Sensor w/ Setpoint & Override, Battery Power... \$511	
	<b>BA/WT900-SO-Q-PWR</b>	"Quantum" Temp Sensor w/ Setpoint & Override, Wired Power.....	\$566
F4	<b>BA/WTH900-Q</b>	BAPI-Stat "Quantum" Temp/Humidity Sensor, Battery Power ....	\$585
	<b>BA/WTH900-Q-PWR</b>	BAPI-Stat "Quantum" Temp/Humidity Sensor, Wired Power .....	\$640
	<b>BA/WTH900-S-Q</b>	"Quantum" Temp/Humidity Sensor w/ Setpoint, Battery Power..	\$591
	<b>BA/WTH900-S-Q-PWR</b>	"Quantum" Temp/Humidity Sensor w/ Setpoint, Wired Power....	\$646
	<b>BA/WTH900-O-Q</b>	"Quantum" Temp/Humidity Sensor w/ Override, Battery Power .....	\$590
	<b>BA/WTH900-O-Q-PWR</b>	"Quantum" Temp/Humidity Sensor w/ Override, Battery Power .....	\$645
	<b>BA/WTH900-SO-Q</b>	"Quantum" Temp/Humidity Sensor w/ Setpoint & Override, Battery Power .	\$596
	<b>BA/WTH900-SO-Q</b>	"Quantum" Temp/Humidity Sensor w/ Setpoint & Override, Battery Power .	\$651
	<b>BA/LI3620</b>	Lithium Ion Battery, 3.6 Volt (for Wireless Sensors) .....	\$3 Net
<b>WIRELESS DUCT SENSORS</b>			
F6	<b>BA/WT900-D-4-BB</b>	Wireless Duct Temperature Sensor, 4" Probe Length .....	\$525
	<b>BA/WT900-D-8-BB</b>	Wireless Duct Temperature Sensor, 8" Probe Length .....	\$525
	<b>BA/WT900-D-12-BB</b>	Wireless Duct Temperature Sensor, 12" Probe Length .....	\$525
	<b>BA/WT900-D-18-BB</b>	Wireless Duct Temperature Sensor, 18" Probe Length .....	\$525
	<b>BA/WT900-D-XX*-BB</b>	Wireless Duct Temp. Sensor, Custom Probe Length .....	Call
F8	<b>BA/WTH900-D-BB</b>	Wireless Duct Temperature and Humidity Sensor.....	\$610
	<b>BA/LI3620</b>	Lithium Ion Battery, 3.6 Volt (for Wireless Sensors) .....	\$3 Net
*The "XX" represents a custom length of 1/4" dia. probe. Please call BAPI for availability and pricing.			
<b>WIRELESS IMMERSION SENSORS</b>			
F10	<b>BA/WT900-I-2-BB</b>	Wireless Immersion Temp. Sensor, 2" Probe Length .....	\$525
	<b>BA/WT900-I-4-BB</b>	Wireless Immersion Temp. Sensor, 4" Probe Length .....	\$525
	<b>BA/WT900-I-8-BB</b>	Wireless Immersion Temp. Sensor, 8" Probe Length .....	\$525
	<b>BA/LI3620</b>	Lithium Ion Battery, 3.6 Volt (for Wireless Sensors) .....	\$3 Net
<b>WIRELESS REMOTE PROBE SENSORS</b>			
F12	<b>BA/WT900-RPP-5-BB</b>	Remote Probe with Plenum Rated Cable - 5' Leads .....	\$537
	<b>BA/WT900-RPP-10-BB</b>	Remote Probe with Plenum Rated Cable - 10' Leads .....	\$539
	<b>BA/WT900-RPP-15-BB</b>	Remote Probe with Plenum Rated Cable - 15' Leads .....	\$541
	<b>BA/WT900-RPP-20-BB</b>	Remote Probe with Plenum Rated Cable - 20' Leads .....	\$543
	<b>BA/WT900-RPP-25-BB</b>	Remote Probe with Plenum Rated Cable - 25' Leads .....	\$545
	<b>BA/WT900-RPFEPE-5-BB</b>	Remote Probe with FEP Jacketed Cable - 5' Leads.....	\$540
	<b>BA/WT900-RPFEPE-10-BB</b>	Remote Probe with FEP Jacketed Cable - 10' Leads.....	\$545
	<b>BA/WT900-RPFEPE-15-BB</b>	Remote Probe with FEP Jacketed Cable - 15' Leads.....	\$550
	<b>BA/WT900-RPFEPE-20-BB</b>	Remote Probe with FEP Jacketed Cable - 20' Leads.....	\$555
	<b>BA/WT900-RPFEPE-25-BB</b>	Remote Probe with FEP Jacketed Cable - 25' Leads.....	\$560
	<b>BA/LI3620</b>	Lithium Ion Battery, 3.6 Volt (for Wireless Sensors) .....	\$3 Net





Page	Part Number	Description	List Price
<b>WIRELESS OUTSIDE AIR SENSORS</b>			
F14 .....	<b>BA/WT900-O-BB</b>	Outside Air Temp and Barometric Pressure Sensor.....	\$525
	<b>BA/WT900-LL-O-BB:</b>	... Outside Air Temp, Light Level and Barometric Pressure Sensor	\$560
F16	<b>BA/WTH900-O-BB</b>	Outside Air Temp/Humidity and Barometric Pressure Sensor....	\$610
	<b>BA/WTH900-LL-O-BB:</b>	. Outside Air Temp/Humidity, Light Level & Barometric Press. Sensor	\$645
	<b>BA/LI3620</b>	Lithium Ion Battery, 3.6 Volt (for Wireless Sensors) .....	\$3 Net
<b>THERMOBUFFER</b>			
F18.....	<b>BA/WT900-TB-M304-2-BB</b>	Wireless Thermobuffer, 304 SS Chamber, 2" SS Buffer Chamber .....	\$575
	<b>BA/WT900-TB-M304-4-BB</b>	Wireless Thermobuffer, 304 SS Chamber, 4" SS Buffer Chamber .....	\$575
	<b>BA/WT900-TB-M304-1-HB-5-BB</b>	Thermobuffer, 1" Hanging Bracket with 5' FEP-Jacketed Cable .....	\$587
	<b>BA/WT900-TB-M304-1-HB-10-BB</b>	Thermobuffer, 1" Hanging Bracket with 10' FEP-Jacketed Cable .....	\$592
	<b>BA/LI3620</b>	Replacement Battery for Sensors (except Food Probe), Lithium Ion 3.6V AA.....	\$3 Net
<b>WIRELESS FOOD PROBES</b>			
F20	<b>BA/WFP900-PT</b>	Wireless Food Probe.....	\$400
<b>"QUANTUM SLIM" WIRELESS TEMPERATURE SENSOR</b>			
F22	<b>BA/WT900-QSL-IS</b>	"Quantum Slim" with Internal Temperature Sensor, Battery Power.....	\$500
	<b>BA/WT900-QSL-IS-PWR</b>	"Quantum Slim" with Internal Temperature Sensor, Wired Power.....	\$555
	<b>BA/WT900-QSL-RFEP5</b>	"Quantum Slim" w/ Remote Probe Sensor & 5' FEP-Jacketed Cable, Battery Power .....	\$503
	<b>BA/WT900-QSL-RFEP5-PWR</b>	"Quantum Slim" w/ Remote Probe Sensor & 5' FEP-Jacketed Cable, Wired Power .....	\$558
	<b>BA/WT900-QSL-RFEP10</b>	"Quantum Slim" w/ Remote Probe Sensor & 10' FEP-Jacketed Cable, Battery Power ...	\$506
	<b>BA/WT900-QSL-RFEP10-PWR</b>	"Quantum Slim" w/ Remote Probe Sensor & 10' FEP-Jacketed Cable, Wired Power .....	\$561
	<b>BA/WT900-QSL-X</b>	"Quantum Slim" without Sensor (sensor is ordered separately), Battery Power.....	\$500
	<b>BA/WT900-QSL-X-PWR</b>	"Quantum Slim" without Sensor (sensor is ordered separately), Wired Power.....	\$555
	<b>BA/WT900-QSL-TB-FEP5</b>	"Quantum Slim" w/ 1" Thermobuffer & 5' FEP-Jacketed Cable, Battery Power .....	\$610
	<b>BA/WT900-QSL-TB-FEP5-PWR</b>	"Quantum Slim" w/ 1" Thermobuffer & 5' FEP-Jacketed Cable, Wired Power .....	\$665





# Wireless List Pricing - 900 MHz System

**900 MHz Wireless System**

**F31**

Page	Part Number	Description	List Price
	<b>BA/WT900-QSL-TB-FEP10</b>	"Quantum Slim" w/ 1" Thermobuffer & 10' FEP-Jacketed Cable, Battery Power .....	\$615
	<b>BA/WT900-QSL-TB-FEP10-PWR</b>	"Quantum Slim" w/ 1" Thermobuffer & 10' FEP-Jacketed Cable, Wired Power .....	\$670
	<b>BA/LI3620</b>	Lithium Ion Battery, 3.6 Volt (for Wireless Sensors).....	\$3 Net
<b>"QUANTUM SLIM" WIRELESS TEMP/HUMIDITY SENSOR</b>			
F24	<b>BA/WTH900-QSL-IS</b>	"Quantum Slim" with Internal Temp/Humidity Sensor, Battery Power .....	\$585
	<b>BA/WTH900-QSL-IS-PWR</b>	"Quantum Slim" with Internal Temp/Humidity Sensor, Wired Power .....	\$640
	<b>BA/LI3620</b>	Lithium Ion Battery, 3.6 Volt (for Wireless Sensors).....	\$3 Net
<b>900 MHz GATEWAY</b>			
F26	<b>BA/GTW900-IP</b>	900 MHz Gateway for Wireless Sensors .....	\$850
<b>REPLACEMENT BATTERIES</b>			
F27	<b>BA/LI3620</b>	Replacement Battery for Sensors (except Food Probe), Lithium Ion 3.6V, AA .....	\$3 Net
	<b>BA/BAT-5AA-HIT</b>	Replacement Battery for the Wireless Food Probe, Lithium 3.6V, ½AA, High Temp ....	\$6 Net
<b>FIELD VERIFIER KIT</b>			
F28	<b>BA/FV900-KIT-LOAN</b>	900MHz Field Verifier Kit .....	\$3,000*

\*Note: A separate PO is required for the loaner unit and only loaner units may appear on the PO. After one month, you will be expected to pay the invoice for the loaner units that are not returned. An RMA will be issued at the time of the loan so that the loaner unit can be returned expeditiously. You will receive 100% credit less shipping and handling charges if the unit is returned in working order within 30 Days from product ship date.



Gray shaded items follow the Buy and Resale Multiplier.



Building Automation Products, Inc. • 750 North Royal Avenue, Gays Mills, WI 54631 USA  
Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: sales@bapihvac.com • Web: www.bapihvac.com

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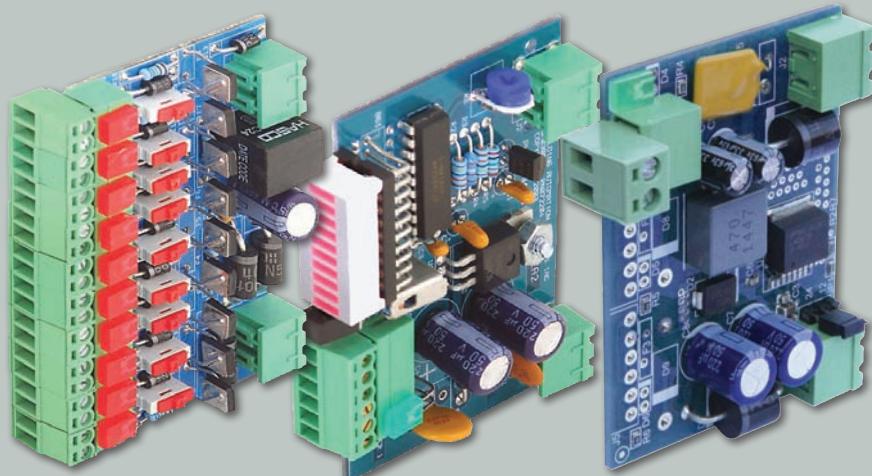
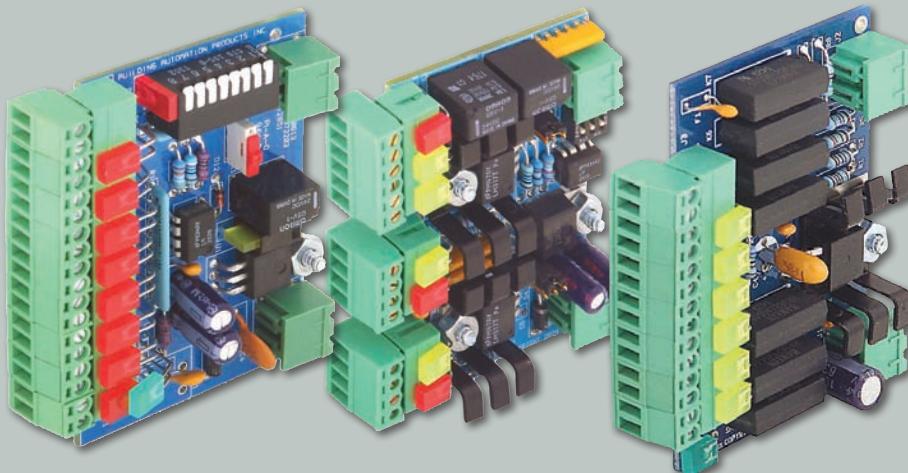
## ETA Product Line Overview

BAPI's Electronic Technician Assistant (ETA) products are a uniform line of interface and communication devices that complement a DDC installation. They consolidate many of the components being used at present and provide a more complete picture of the system than a laptop computer alone.

The ETA devices simplify wiring and troubleshooting by providing a pluggable screw terminal for each and every wire in the system, making it easy to break the system into sections to quickly isolate a problem. The devices cut down on control panel clutter because they plug into specially designed backplanes which

distribute power through the mounting connectors, greatly reducing the number of wires in the panel.

The ETA devices are also a practical and inexpensive way to pick up feedback signals which are currently ignored in many systems, such as non-critical alarm points or actuator feedback signals. Having convenient LED display of these signals at the control panel, or summarizing multiple feedback signals into a single input to the controller, provides a more complete picture, helping the facilities manager and technicians keep the system performing at its optimum level.





<b>DS8 - Discrete Summary Module .....</b>	pg. G4
Summarizes up to 8 alarm points and sends out a single signal to the controller when the number of alarms reaches a user-defined threshold.	
<b>EA1 - 2 Position Actuator Interface .....</b>	pg. G5
Simplifies the wiring and troubleshooting of Belimo® style 2-position actuators with auxiliary switch position feedback.	
<b>EA2 - Modulating Actuator Interface .....</b>	pg. G6
Simplifies the wiring and troubleshooting of Belimo® style actuators with voltage feedback.	
<b>OAM - Output Adjust Module .....</b>	pg. G7
Works with an EA2 module to let you stroke an actuator to any position without additional equipment.	
<b>CDSP - CO<sub>2</sub> Sensor Power Supply .....</b>	pg. G8
Provides 24VDC power and terminations for up to three CO <sub>2</sub> sensors.	
<b>CDSP2 - CO<sub>2</sub> Sensor Power Supply .....</b>	pg. G9
Provides 12 or 24VDC power and terminations for up to two CO <sub>2</sub> sensors.	
<b>SQ4 - Four-Step Sequencer .....</b>	pg. G10
Simplifies proportional control by sequencing multiple on-off devices based on a single analog output from the controller.	
<b>3312VC &amp; 3324VC - Voltage Converters .....</b>	pg. G11
Converts the 33 VDC output from the PS17 Power Supply into the 12 or 24 VDC required by some ETA modules.	
<b>R49 - Relay Interface, 9 Output .....</b>	pg. G12
Conserves critical controller space by turning on or off up to 9 relays using only one controller output.	
<b>DS6R - Dry Switch Monitor .....</b>	pg. G13
Monitors six dry switch closure devices and provides one resistive output to the controller.	
<b>PMPB5, TS1 &amp; TS2 Modules .....</b>	pg. G14
<b>PMPB5</b> - Provides electrical isolation between the controller and the pulse output from electrical, water & gas meters.	
<b>TS1 &amp; TS2</b> - Protects HVAC control systems from electrical transients from various sources.	
<b>TURB - Terminal Unit Relay Board .....</b>	pg. G15
Allows convenient interconnection between a Controller and a DX unit thermostat terminal block.	
<b>Backplanes .....</b>	pg. G16
The Backplane and Vertical Backplane provide mounting and power for the ETA modules.	
<b>TRK Snaptrack &amp; PAN 16 Panduit .....</b>	pg. G18
Provides easy mounting and wire guides for the ETA devices.	
<b>PS17 &amp; PS17CB - Power Supplies .....</b>	pg. G19
Provides up to six 33 VDC power supplies to operate ETA modules or other devices.	
<b>COMBLK, COMBLK2 &amp; TB18 .....</b>	pg. G20
Small circuit board terminal blocks that simplify the termination.	
<b>COMSRG - Comm. Surge Protector .....</b>	pg. G21
The transient protection on the controller terminals is often inadequate. The COMSRG provides the extra protection to prevent damage.	



<b>RPTR - RS-485 Repeater and Repeater Kit</b> .....	pg. G22
Standard RS-485 communications are limited to 32 unit loads and 4,000 feet. Each R PTR Module or Kit allows an additional 32 unit loads or 4,000 feet.	
<b>FOX - RS-485 Fiber Optic Transceiver and Transceiver Kit</b> .....	pg. G24
Converts RS-485 data from the controller to a fiber optic signal for transmission to other buildings, then converts it back again.	
<b>SOX - RS-485 Fiber Optic Transceiver</b> .....	pg. G26
Converts RS-485 data on a single-mode fiber cable to a fiber optic signal for transmission to other buildings, then converts it back again.	
<b>PLCON1 &amp; 2 - PremierLink Connectors</b> .....	pg. G27
of Carrier PremierLink rooftop controllers. The modules slip onto terminals on the controller and provide labeled, pluggable screw terminals.	
<b>RBP - Comm. Repeater Backplane</b> .....	pg. G28
RBP - Distributes power and communications for up to four FOX and R PTR modules.	
<b>RBP Power Bridge &amp; Extender</b> .....	pg. G29
Power Bridge - Bridges power and breaks out the communication lines.	
Extender - Raises the connections for easy access	
<b>TUCOM - Term. Unit Comm. Block</b> .....	pg. G31
The TUCOM adds 3 pluggable terminals to the Carrier Comfort System controller.	
<b>BELCON - Mating Pair Belimo Connectors</b> .....	pg. G31
The BELCON allows a 4-pole pluggable connection between a peripheral and controller.	
<b>AVI - Air Valve Interface &amp; Adaptor</b> .....	pg. G32
Connects jack-screw style VAV floating point actuators with mechanical end switches to DDC controllers. The Adaptor connects a VAV actuator cable when the factory connector is missing.	
<b>IRM4 - Interposing Relay Module</b> .....	pg. G34
Four independent channels that convert a relay output to a contact output or a voltage output.	
<b>LRCA - Link Router Comm. Adapter</b> .....	pg. G35
Adds an RJ jack to a Carrier i-Vu Link/Router.	
<b>PSOCL - Power Supply Current Limiter</b> .....	pg. G35
Buffers the output of the BAPI PS17 Power Supply when powering the Carrier i-Vu Link/Router.	
<b>UCRB - Universal Controller Relay Board</b> .....	pg. G36
Interconnects a controller's digital outputs to any device that requires a conventional thermostat input.	
<b>SS-AC - Selector Switch/Alarm Counter</b> .....	pg. G37
Monitors a multitude of 4-position selector switches to regulate the speed of VFD fans.	
<b>SD2 - Status Display, Dual 7 Segment</b> .....	pg. G38
Displays a program error code with a manual reset switch to route a reset signal to a controller.	
<b>PE4 - Pulse Extender</b> .....	pg. G40
Takes the input pulse to the board and extends the output down the channel to a controller or monitor.	
<b>Steel Enclosures and Accessories</b> .....	pg. G41
Steel enclosures in three sizes, Backplates & Cable Guides, designed to accommodate all ETA devices.	



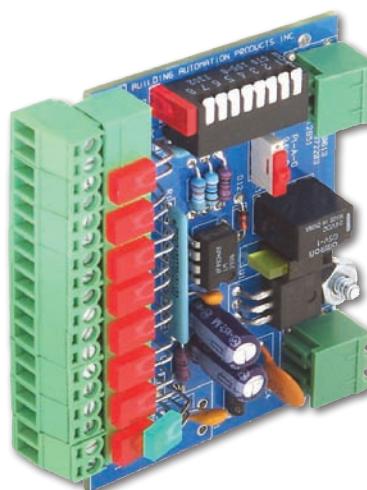
## Overview

The number of discrete switch closure inputs required in an HVAC system often exceeds the number of hardware inputs available (or justifiable) on the controller. Summarizing multiple discrete points into a single system input is an easy and effective solution. The DS8 module accepts up to eight dry contacts and provides a single dry contact signal to the controller when the number of monitored points reaches a user-defined threshold.

The DS8 is great for grouping alarms which you will want to distinguish in the field, but don't need to distinguish on the central computer. Examples include dirty filter alarms, condensate float switches, VFD faults, moisture monitors, door switches, etc. A technician can glance at the DS8 and quickly determine which filter to change; which drain to check or which VFD to inspect.

The DS8 plugs into the BP4 or BP8 backplane and accepts up to eight independent dry switch contacts on easy-to-use connectors at the front of the module. Each input has an LED to indicate when the contact is closed. An eight-position DIP switch allows the user to set the alarm threshold. The output is also user switchable to a NO or NC dry contact.

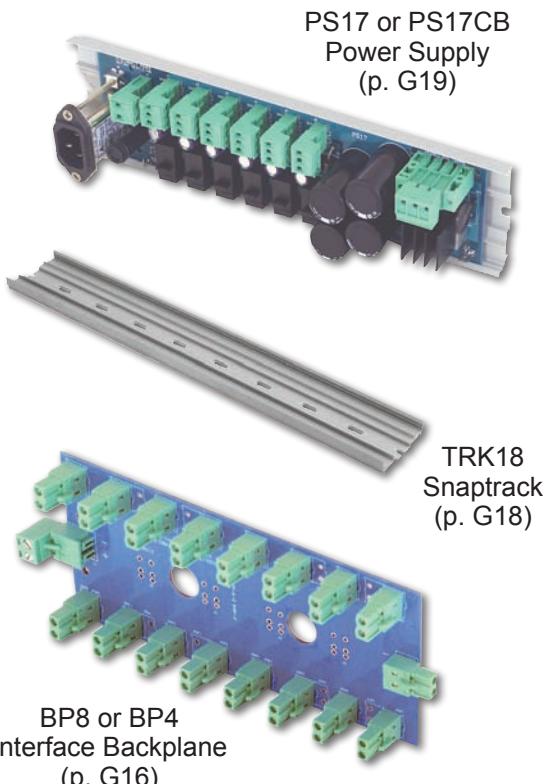
The DS8 can also be used to monitor multiple auxilliary contacts when multiple discrete points are controlled using a R49. Typical applications include lighting controls and small fan controls.



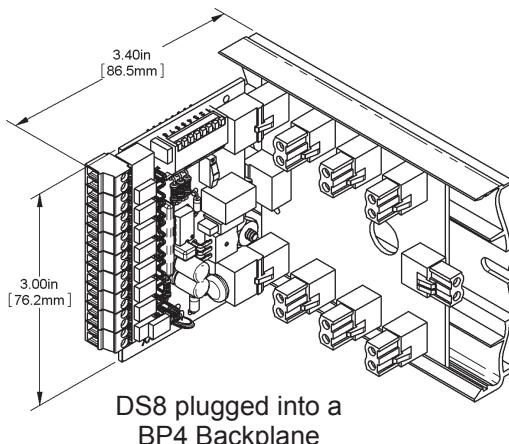
**DS8 - Discrete Summary Module**

<u>Part Number</u>	<u>Description</u>	
BA/DS8	Discrete Summary Module, 8 Input	<i>See end of Section G for list pricing.</i>

## Associated Products



## Specifications



**Power Voltage:** 24 to 35 VDC  
22 to 26 VAC

**Power Current:** 35 mA max. (1.2VA max)

**Switch Voltage:** 24 VDC

**Switch Current:** 2.4 mA

**Output:** Dry relay contacts  
NEC Class 2 circuits only

**Output Current:** 1 mA to 1 Amp





Rev. 10/16/12

# EA1 - Two Position Actuator Interface

G5

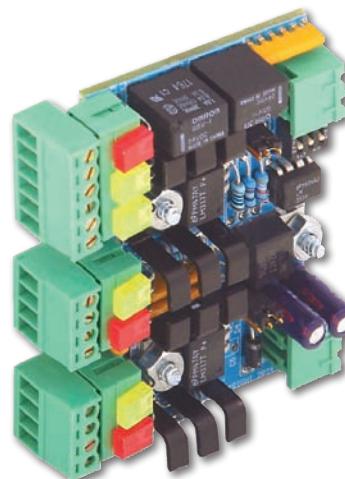
ETA Line

## Overview

The EA1 simplifies the wiring and troubleshooting of "Belimo®" style two-position actuators with end switch position feedback. Each EA1 module can control two actuators from a single controller output and provide a summary dry contact status when a user-selectable number of end switches close (1,2, or more). The actuators can move together or in opposite directions based on jumper settings on the module. An additional end switch input allows multiple EA1s to be cascaded together.

The connectors on the front of the EA1 module are readily accessible and make terminations quick and easy for the controller, actuators and actuator end switches. The red and amber LEDs on the EA1 indicate when power is being supplied to the actuators and when they have reached their end states. These LEDs tell the technician the state of the controller output, when power is being sent to the actuators and if the actuator end switch is closed.

The EA1 plugs into a BP4 or BP8 backplane. A green LED on the EA1 indicates when power is present.



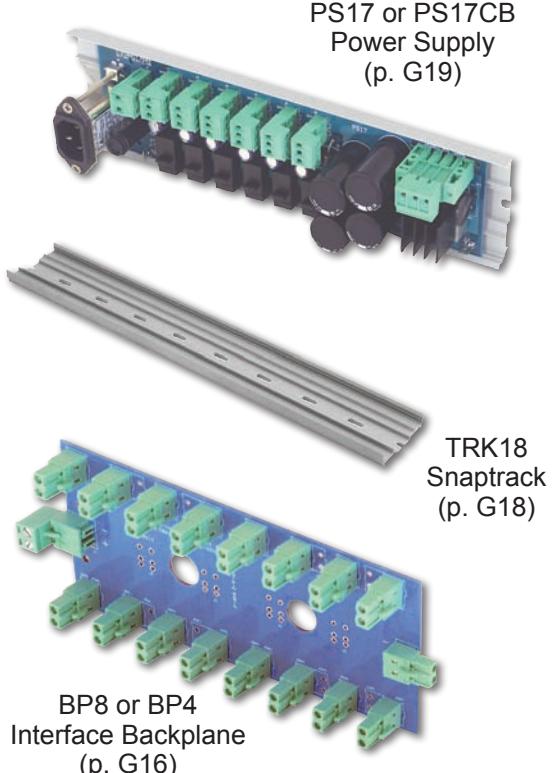
**EA1 - Two Position Actuator Interface**

<u>Part Number</u>	<u>Description</u>
BA/EA1	2 Position Actuator Interface

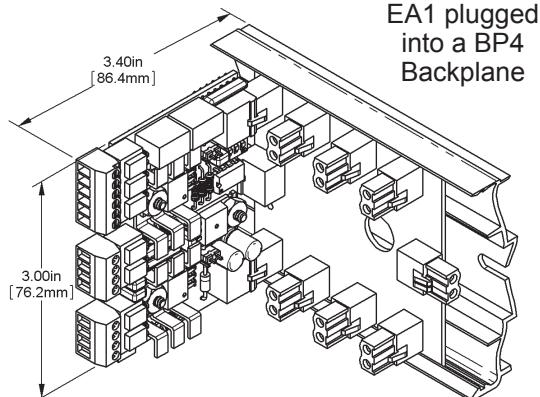
*See end of Section G for list pricing.*

Belimo® is a trademark of Belimo Aircontrols (USA) Inc. registered in the United States and other countries.

## Associated Products



## Specifications



EA1 plugged into a BP4 Backplane

**Power Voltage:** 26 to 36 VDC

**Power Current:** 50 mA max. plus actuators (1.7 VA max plus actuator)

**Actuator Control Voltage:**  
0 or 24 VDC @ 7mA max

**Actuator Power Voltage:** 24 VDC

**Actuator Power Current:**  
2 output of 250 mA max.  
(12 Watts total)





## Overview

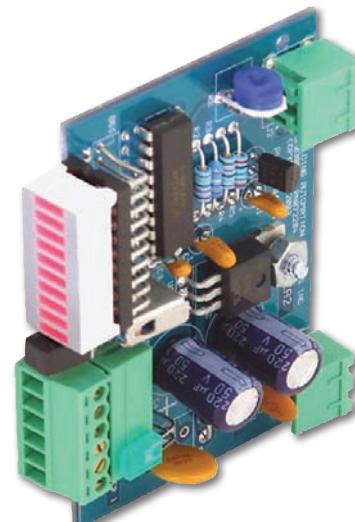
The EA2 simplifies the wiring and troubleshooting of "Belimo®" style modulating actuators with voltage feedback, saving time and money every time you install or check an actuator. The connector plug on the front of the EA2 module makes terminations quick and easy for the controller and the actuator. The four actuator wires and the controller's output signal terminate on the connector plug. The EA2 provides regulated and fused power for the actuator from the backplane.

The EA2 module is an excellent troubleshooting tool because the technician does not need to gain physical access to the actuator to determine if the actuator is in the correct position. The EA2 display shows the actuator position based on the actuator's feedback signal. An easy push of a button on the EA2 and the display shows the position which the controller is requesting. Troubleshooting is a simple comparison of the two. If they don't match, you have a problem; the actuator is either stuck, manually overridden, not terminated properly or dead.

The EA2 plugs into a BP4 or BP8 backplane. A green LED on the EA2 indicates when power is present.

<u>Part Number</u>	<u>Description</u>
BA/EA2 .....	Modulating Acuator Interface

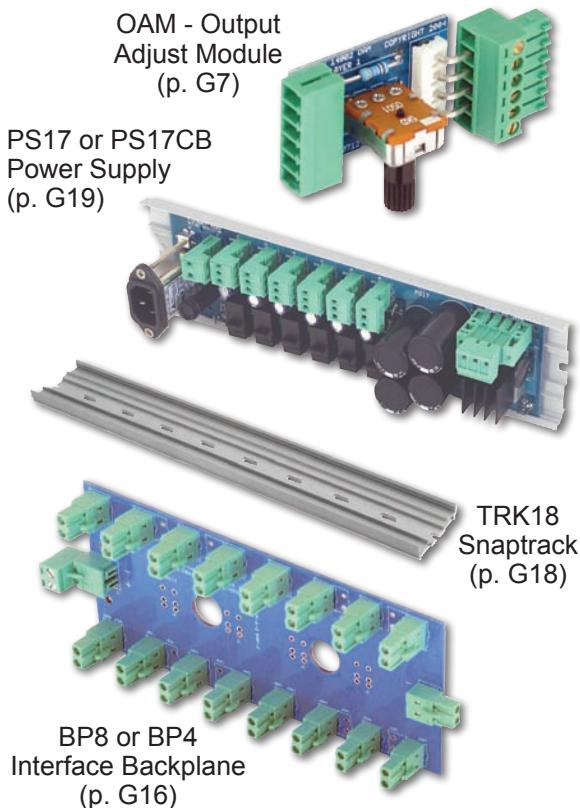
*See end of Section G for list pricing.*



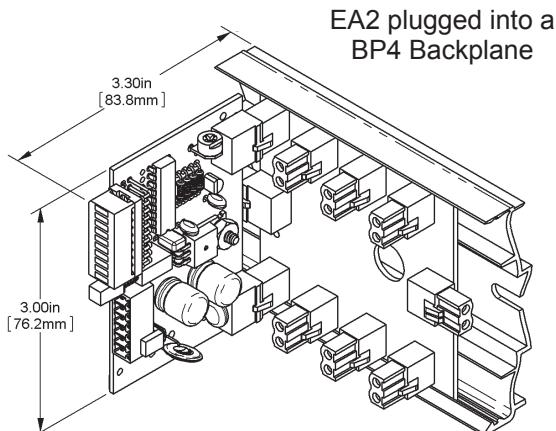
**EA2 - Modulating  
Actuator Interface**

Belimo® is a trademark of Belimo Aircontrols (USA) Inc. registered in the United States and other countries.

## Associated Products



## Specifications



**Power Voltage:** 26 to 35 VDC  
20 to 26 VAC

**Power Current:** 50 mA max. plus actuators  
(1.7 VA max plus actuator)

**Actuator Control Voltage:** 2 to 10 VDC

**Actuator Power Voltage:** 24 VDC

**Actuator Power Current:**  
500 mA max (12 Watts total)



Rev. 10/16/12

# OAM - Output Adjust Module

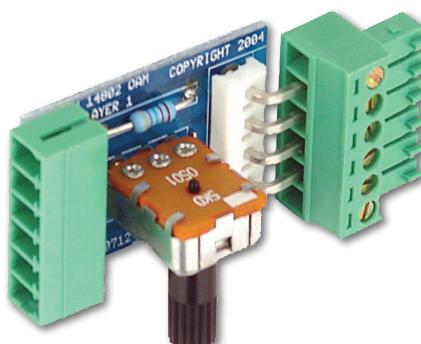
G7

ETA Line

## Overview

Many times, it is necessary to move an actuator throughout its entire range of motion to troubleshoot the mechanical linkage. In DDC systems, this procedure may require a laptop computer, communications interface and special software. Then you have to know which controller to interface with, that controller's individual address and which output connects to the actuator you need to troubleshoot. Now the battery is going dead on your laptop and there is nowhere to plug in the charger.

There is a better way. If you use the EA2 module (p.G6) to drive your modulating actuators, the OAM (Output Adjust Module) accessory allows you to stroke your actuator to any position without any additional equipment. Simply plug the actuator cable into the OAM and then plug the OAM into the EA2. Turning the knob on the OAM allows you to set the actuator's position anywhere in its range. Push the button on the EA2 to see your commanded position, release the button to see the actuator's position.



**OAM - Output  
Adjust Module**

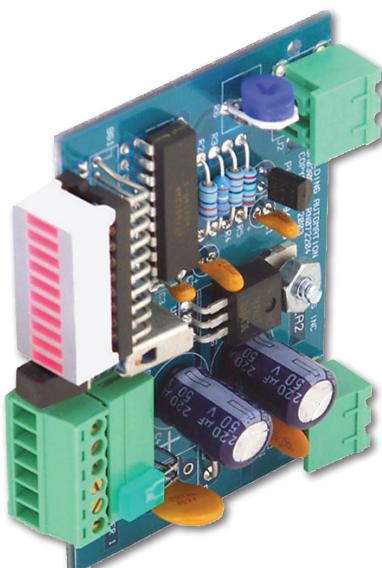
### Part Number

### Description

BA/OAM .....Output Adjust Module

*See end of Section G for list pricing.*

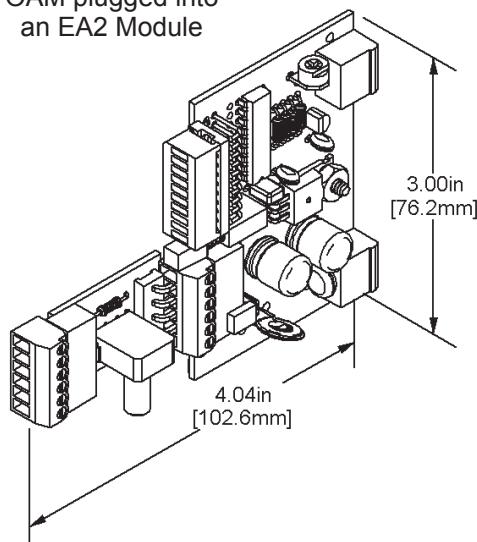
## Associated Products



**EA2 - Modulating  
Actuator Interface  
(p. G6)**

## Specifications

OAM plugged into  
an EA2 Module



**Input Voltage:** 24VDC

**Output Power Voltage:** 0 to 10 VDC nominal

**Output Power Current:** 2 mA





## Overview

Many facilities use Carbon Dioxide ( $\text{CO}_2$ ) sensors for demand-controlled ventilation. Although BAPI makes  $\text{CO}_2$  sensors that can run on AC or DC power, other  $\text{CO}_2$  sensors typically require 24 VDC to operate and additional terminations to land the wiring. The extra power supplies, wiring and terminations can clutter up the control panel or the control room.

The BAPI CDSP module removes the clutter and the wiring hassles by providing the power and terminations for up to three  $\text{CO}_2$  sensors. Additional CDSP modules can be mounted neatly in the associated backplane to accommodate an unlimited number of  $\text{CO}_2$  sensors throughout the facility.

The CDSP module plugs into a BP4 or BP8 backplane. Three green LEDs indicate when power is present to the  $\text{CO}_2$  sensors. Another green LED indicates when power is present to the CDSP module. The CDSP can be used to power virtually any four-wire sensor requiring 24 VDC.



**CDSP - Carbon Dioxide Sensor Power Supply**

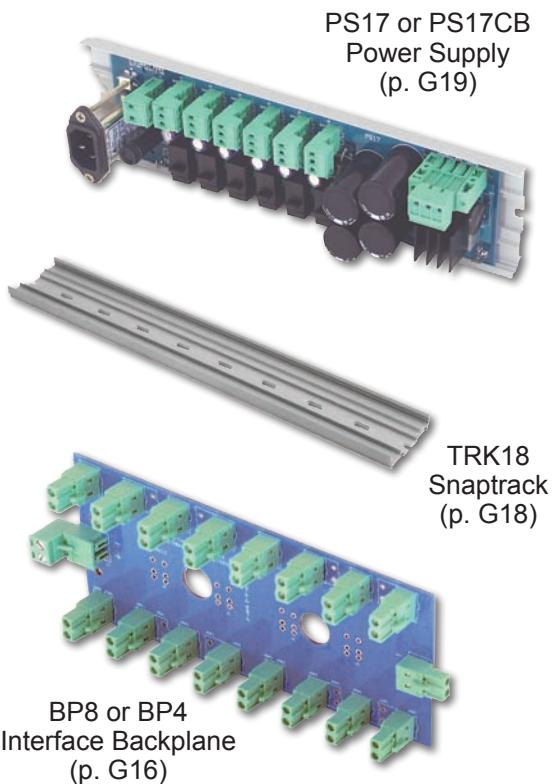
### Part Number

### Description

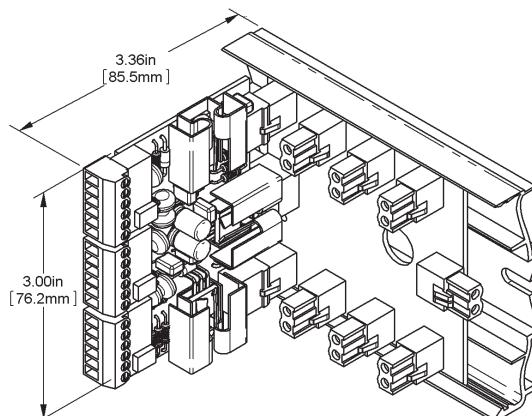
BA/CDSP .....Carbon Dioxide Sensor Power Supply

*See end of Section G for list pricing.*

## Associated Products



## Specifications



CDSP plugged into a BP4 Backplane

**Input Voltage:** 26 to 36 VDC

**Input Current:** 350 mA max. (12 VA max.)

**Output Voltage:** 24 VDC

**Output Current:** 75 mA on each output  
(225 mA total)





# CDSP2 - Carbon Dioxide Sensor Power Supply

G9

Rev. 09/01/15

ETA Line

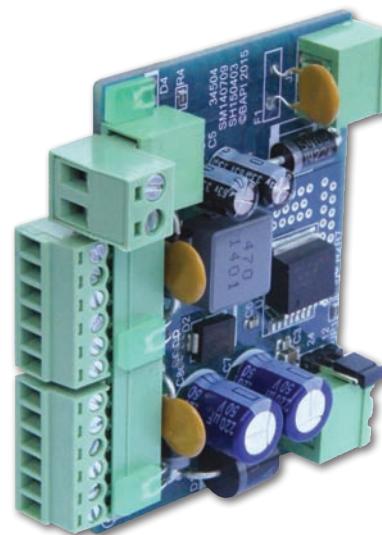
## Overview

Many facilities use Carbon Dioxide ( $\text{CO}_2$ ) sensors for demand-controlled ventilation. Although BAPI makes  $\text{CO}_2$  sensors that can run on AC or DC power, other  $\text{CO}_2$  sensors typically require 12 or 24 VDC to operate and additional terminations to land the wiring. The extra power supplies, wiring and terminations can clutter up the control panel or the control room.

The BAPI CDSP2 module removes the clutter and the wiring hassles by providing the power and terminations for two  $\text{CO}_2$  sensors. Additional CDSP modules can be mounted neatly in the associated backplane to accommodate an unlimited number of  $\text{CO}_2$  sensors throughout the facility. The 12 or 24 VDC output power of the module is field selectable via a jumper on the circuit board.

The CDSP2 plugs into the BP4 or BP8 Backplane. The CDSP2 receives power from the backplane which is powered by a BAPI PS17 - Power Supply or other power supply.

Three green Output Power LEDs light whenever power is present at the output terminals.



**CDSP2 - Carbon Dioxide Sensor Power Supply**

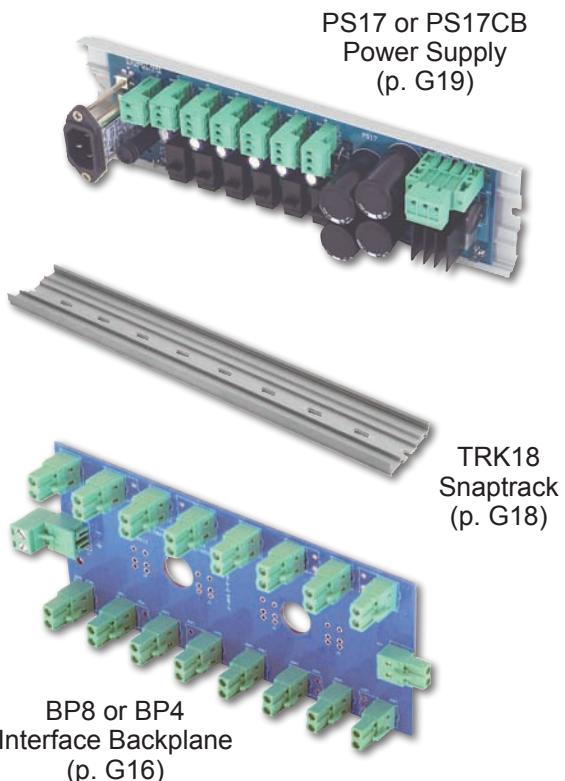
### Part Number

### Description

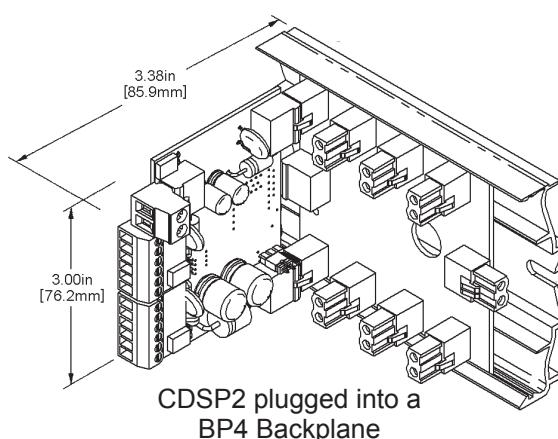
**BA/CDSP2** .....Carbon Dioxide Sensor Power Supply

*See end of Section G for list pricing.*

## Associated Products



## Specifications



CDSP2 plugged into a BP4 Backplane

### Input Voltage

28 to 36 VDC for 24VDC Output (default)

16 to 36 VDC for 12 VDC Output

(Power is supplied by a PS17 - Power Supply or other customer provided power supply)

**Input Current:** 1.45A max (12VA max )

**Output Voltage:** 12 or 24VDC

**Output Current:** 0.5A on each output  
1.5A total



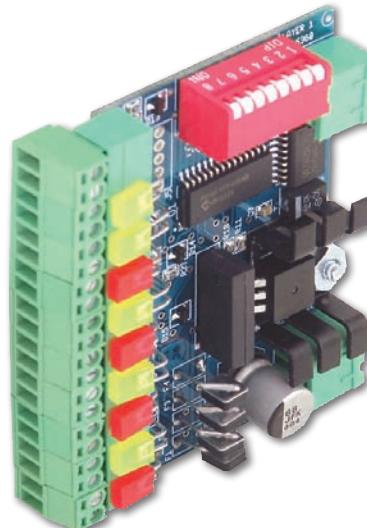


## Overview

The high cost of energy today makes proportional control of HVAC systems a necessity, not a luxury. With proportional control you use only the energy needed to get the job done.

Proportional control is easy for water valves and air dampers, but more complex and cost prohibitive for electric heat units, fans and refrigeration systems. The SQ4 module simplifies the job by sequencing multiple on-off devices based on a single analog output from the controller. Now items such as cooling towers with multiple two-speed fans, staged electric heat units and multi-compressor chillers can be controlled to provide the utmost efficiency and consistency for the load at hand – all at a reasonable price.

Each SQ4 module provides four NO/NC output relays that trigger at four fixed voltages across the 0-5 or 0-10 control voltage range. Two SQ4 modules can be cascaded to provide eight independent output stages. When closed, each output relay provides 24 VDC at 120 mA. In addition, sequencer modules are available that provide a rotational sequence as well as contact monitoring and alarm output.



**SQ4RA - Four-Step Sequence Module**

### Part Number

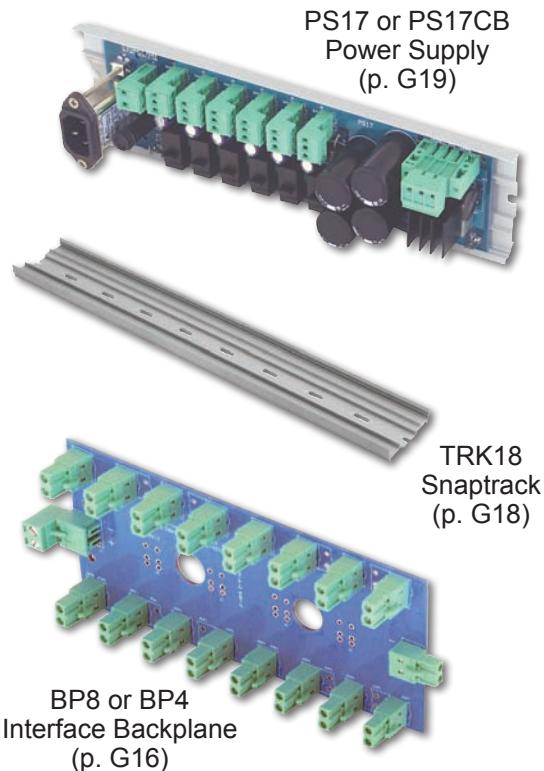
- BA/SQ4** ..... 4-Step Sequence Module  
**BA/SQ4-R** ..... 4-Step Sequence Module (Rotational)

### Part Number

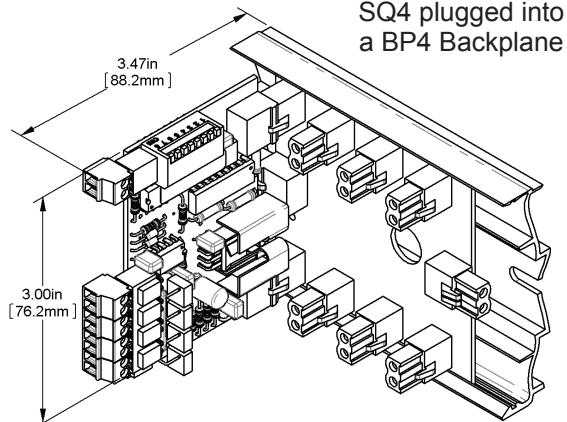
- BA/SQ4-A** ..... 4-Step Sequence Module (with Alarm)  
**BA/SQ4-RA** ..... 4-Step Sequence Module (Rotational with Alarm)

*See end of Section G for list pricing.*

## Associated Products



## Specifications



**Power Voltage:** 26 to 36 VDC

**Power Current:** 50 mA max. plus output (1.7 VA max plus output )

**Input Control Voltage:**  
0 to 5 or 0 to 10 VDC

**Output Power Voltage:**  
Nominal 24 VDC (23 to 32 VDC)

**Output Power Current:**  
4 outputs of 120 mA max.  
(12 Watts total)



# 3312VC & 3324VC - Voltage Converters

G11

Rev. 09/01/15

ETA Line

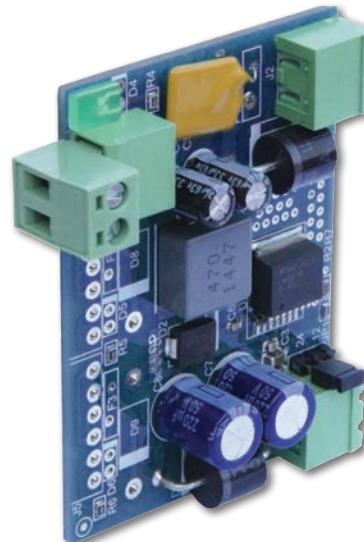
## Overview

Some of BAPI's ETA products require regulated power of 12 or 24 VDC, including the FOX - RS-485 Fiber Optic Transceiver and the R PTR - RS-485 Repeater. The 3312VC and 3324VC Voltage Converters can provide the 12 or 24 VDC regulated voltage required by the other ETA units. The 12 or 24 VDC output is field selectable via a jumper on the circuit board.

The 3312VC and 3324VC can be mounted in two ways. In the first method, the units plug vertically into a BP4 or BP8 Backplane like a standard interface device. The voltage converter receives its supply power from the Backplane which is supplied by a PS17 - 33VDC Power Supply or other power supply.

The 3312VC and 3324VC can also be mounted in snaptrack. The unit is then powered with a two-wire connection from the PS17 - 33VDC Power Supply or other power supply.

If the 3312VC is powering a FOX or R PTR module, the 12 VDC output from the 3312VC is sent to a RBP - Communications Repeater Backplane or SRBP - Single Repeater Backplane. The Repeater Backplane then provides power, communications and mounting for the FOX and R PTR modules.



3324VC - Voltage Converter

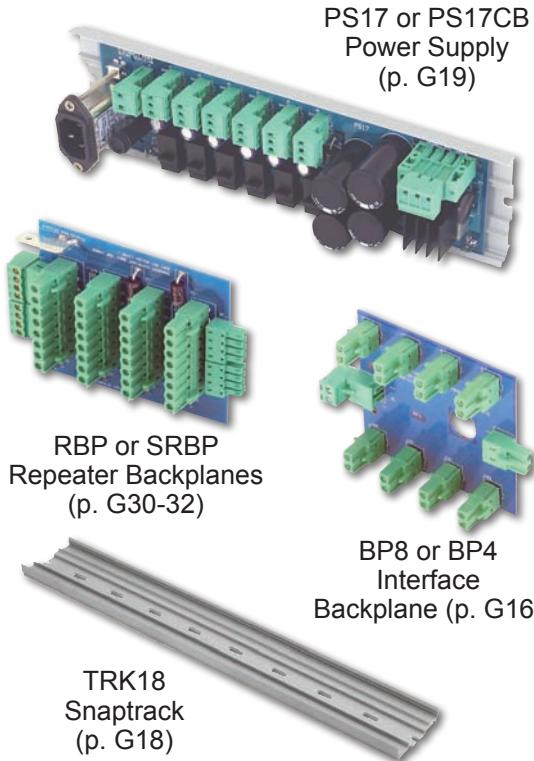
## Part Number      Description

**BA/3312VC** ..... Voltage Converter (12VDC Output)

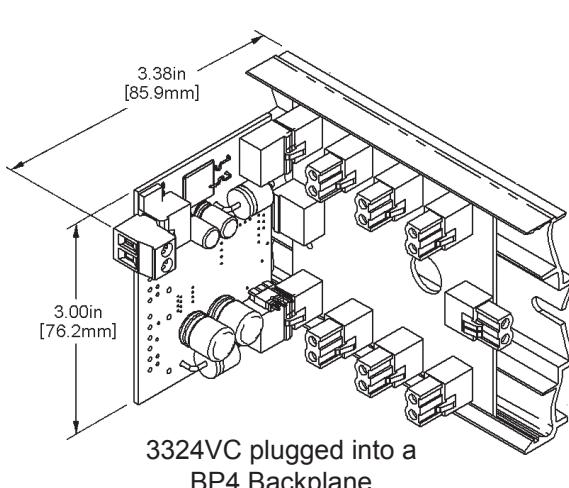
**BA/3324VC** ..... Voltage Converter (24VDC Output)

*See end of Section G for list pricing.*

## Associated Products



## Specifications



### Input Voltage:

16 to 36 VDC for 12 VDC Output (BA/3312VC)  
28 to 36 VDC for 24 VDC Output (BA/3324VC)

**Input Current:** 1.4A Max at 28 VDC

**Output Voltage:** 12 or 24 VDC  $\pm$  0.25 VDC

**Output Current:** 1.5 Amp Max (30VA max)





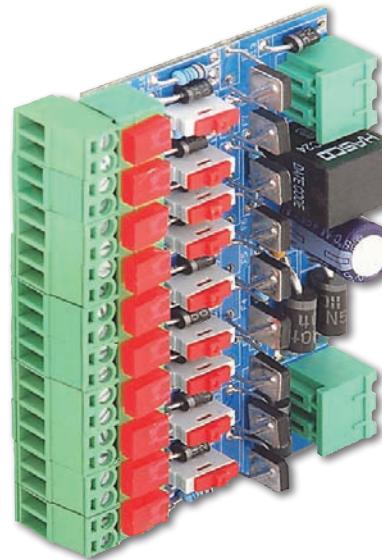
## Overview

It is often necessary to perform several tasks simultaneously in an HVAC system – for example, turn on an auxiliary supply fan, turn on an exhaust fan, open purge dampers and close return dampers. Rather than tying up four I/O spots on the controller to perform these tasks, the BAPI R49 conserves critical controller space by turning on or off up to nine relays using only one controller output.

Each output on the R49 module has a polarity switch so that some loads may be turned off while others are turned on as the input changes state.

Each R49 output supplies a nominal 24 VDC at 120 mA allowing it to control most common relays or small contactors. Each output has a red LED to indicate when power is present.

The R49 plugs into a BP2, BP4 or BP8 Backplane. A green LED indicates that power is present to the module.

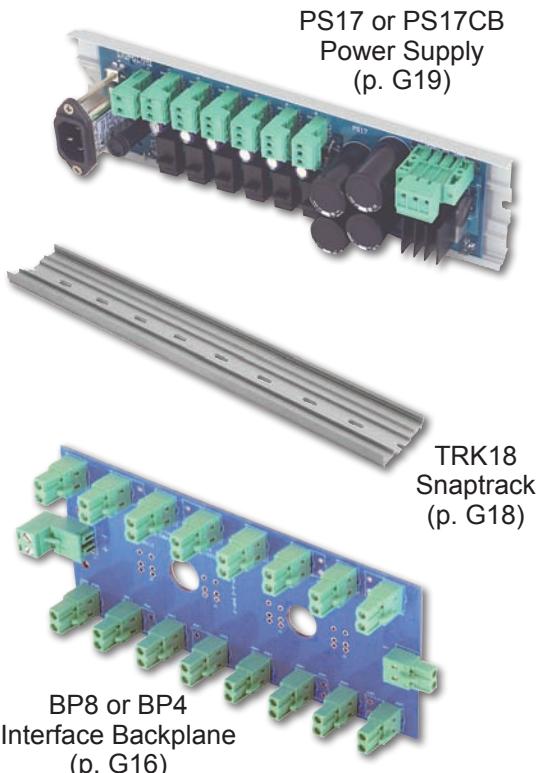


**R49 - Relay Interface**

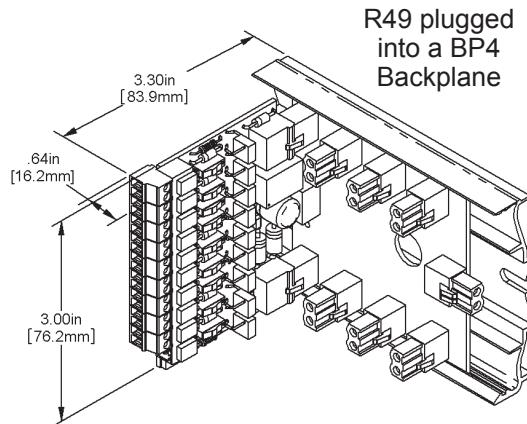
<u>Part Number</u>	<u>Description</u>
BA/R49	Relay Interface Module, 9 Output

*See end of Section G for list pricing.*

## Associated Products



## Specifications



**Power Voltage:** 26 to 36 VDC

**Power Current:** 50 mA max. plus relays  
(1.7 VA max. plus relays)

**Input Control Voltage:**  
0 or 24 VDC @ 7 mA max.

**Output Power Voltage:**  
Nominal 24 VDC (23 to 32 VDC)

**Output Power Current:**  
9 outputs of 120 mA max.  
(26 Watts total)



Rev. 10/16/12

# DS6R - Dry Switch Monitor

G13

ETA Line

## Overview

The DS6R module monitors six dry switch closure devices and provides one resistive output to the controller.

Each switch closure subtracts a precise resistance from the output so a simple subtraction algorithm at the controller decodes which switches are set. Each switch terminates on an independent plug on the front of the DS6R module and an LED associated with each input indicates switch closure for simple troubleshooting.

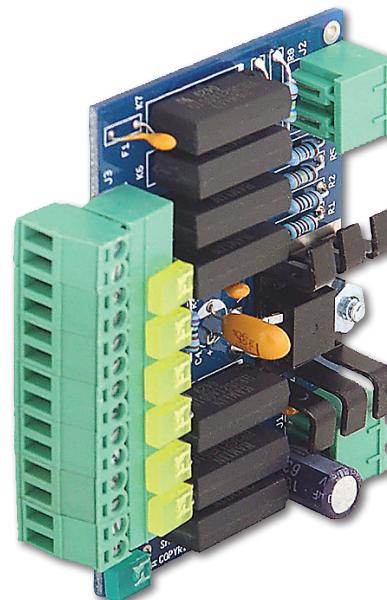
The DS6R plugs into the BP2, BP4 or BP8 backplane.

### Part Number      Description

**BA/DS6R**.....Dry Switch Monitor, 30K Output

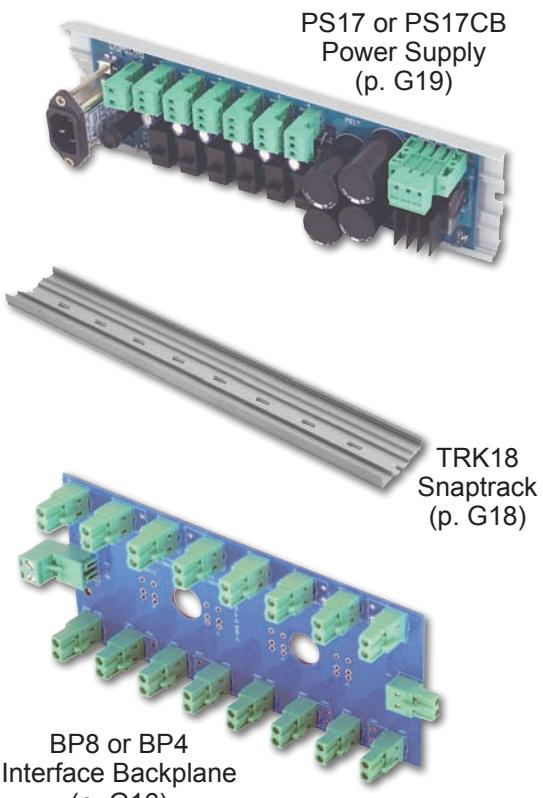
**BA/DS6R-10K**.....Dry Switch Monitor, 10K Output

*See end of Section G for list pricing.*

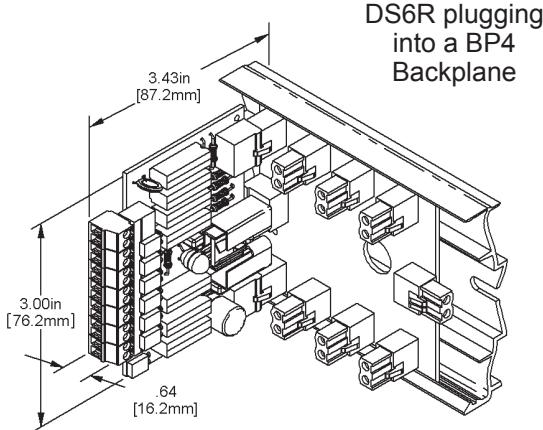


**DS6R - Dry Switch Monitor**

## Associated Products



## Specifications



**Power Voltage:** 10 to 42 VDC  
20 to 26 VAC

**Power Current:** 70 mA maximum  
(2.4 VA maximum)

**Switch Voltage:** 7 VDC

**Switch Current:** 10mA

### Output Resistance:

DS6R ..... 29.505KΩ - All Switches Open  
DS6R-10K .. 9.806KΩ - All Switches Open

(Full output resistance tables are available in the installation and operation instructions)





## Overview

Many electrical, water or gas meters provide a pulse output with each pulse representing a specific quantity of the media being measured. These pulse outputs often need to be electrically isolated from the controller's input by a buffer. The PMPB5 provides that buffer by receiving the pulses from the meter and recreating them as dry contact closures. An LED lights whenever the buffer contacts are closed. The PMPB5 fits standard 2.75" snaptrack.

### Part Number

**BA/PMPB5** .....Pulse Meter Pulse Buffer

*See end of Section G for list pricing.*



PMPB5 mounted  
in the optional  
2.75" snaptrack

## Specifications

Power ..... 24VAC 50/60HZ @ 25mA (0.6VA)  
Contact rating ..... 1A @ 24VAC maximum, 1mA @ 5VDC minimum  
Contact repetition rate ..... 2 seconds per pulse maximum

## TS1 & TS2 - Transient Suppressor

## Overview

HVAC control systems can be subjected to electrical transients (temporary excess voltage) from various sources. Damage to control systems can occur if static electricity, lightning or contactors produce transients of sufficient magnitude and duration to overwhelm the protection built into the control system components. The TS1 and TS2 can significantly increase the transient protection and reduce the possibility of damage to the control system. Both modules fit in standard 2.75" snaptrack

The TS1 is specifically designed for network communications between control system components. The TS1 clamps voltages to 10 VAC or  $\pm 14$  VDC Line to ground and 7.5 VDC line to line. *Please Note: The added capacitance of the TS1 may be unsuitable for some combinations of communications line length and high speed data. For best operation you may have to reduce line lengths and add data repeaters.*

The TS2 is designed to protect 4 to 20 mA current loops. The TS2 clamps the signal return line to 5 volts above ground and 1 volt below ground. The voltage supply line is clamped to  $\pm 39$  VDC Line to ground.

### Part Number

**BA/TS1** .....Transient Suppressor (voltage)  
**BA/TS2** .....Transient Suppressor (current)

*See end of Section G for list pricing.*



TS1 & TS2 - Transient  
Suppressors mounted  
in the optional 2.75"  
snaptrack

## Specifications

TS1 Clamping Voltage..... 10 VAC or  $\pm 14$  VDC Line to Ground,  $\pm 7.5$  VDC Line to Line

TS2 Clamping Voltage..... 5 VDC Above Ground, Signal Return Line  
1 VDC Below Ground, Signal Return Line  
 $\pm 39$  VDC Line to Ground, Power Supply Line





Rev. 10/16/12

# TURB - Terminal Unit Relay Board

G15

ETA Line

## Overview

Today's energy costs are forcing older buildings to be retrofitted with Building Management Systems - keeping the occupied spaces comfortable while reducing the overall energy use. The TURB - Terminal Unit Relay Board is an interface board that allows convenient interconnection between a Digital Controller and a DX unit's conventional thermostat terminal block. The TURB eliminates the wiring mess and provides a neat professional look that simplifies maintenance to eliminate costly callbacks.

The TURB provides an easily pluggable interface between the modules and provides fused power to the controller from the "R" terminal of the DX unit. Dry-contact pilot duty relays interface between the Digital Controller and the conventional thermostat inputs of the DX unit.

The TURB also provides a "mini communications block" with surge protection to provide a clean and easily pluggable connection to the controller. All this is packaged on a board that mounts in a 2.75" snaptrack in one orientation, or a 3.25" snaptrack in the other orientation, depending on how you want to install the module.

For your convenience, BAPI offers the TURB with an optional 4" piece of 2.75" snaptrack.

### Part Number      Description

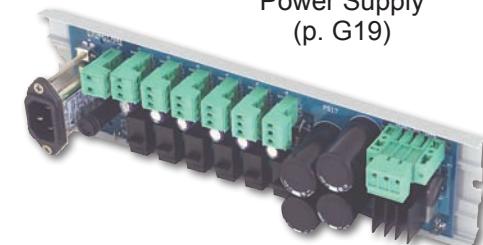
**BA/TURB** ..... Terminal Unit Relay Board

**BA/TURB-TRK..** Terminal Unit Relay Board with 4" piece of 2.75" snaptrack

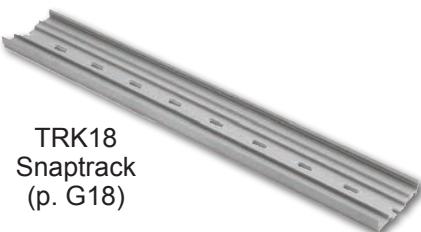
*See end of Section G for list pricing.*

## Associated Products

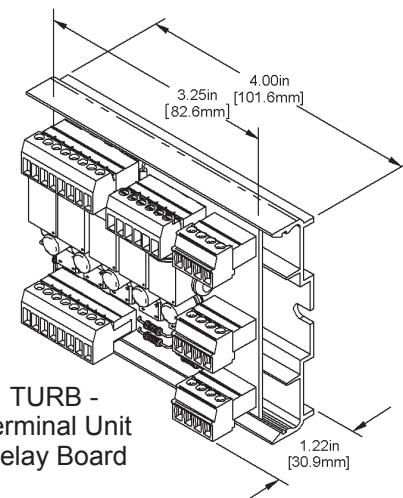
PS17 or PS17CB  
Power Supply  
(p. G19)



TRK18  
Snaptrack  
(p. G18)



## Specifications



**Relay Input Power:** 24 VAC @ 10mA each

**Relay Output Contacts:**

2 Amps @ 24 VAC, 24 VDC

**Communications Clamping Voltage:**

7.5 V positive, 1 V negative





## Overview

The BP2, BP4 and BP8 Backplanes provide a convenient way to mount and power the BAPI ETA interface devices which helps cut down on control panel and control room clutter. All three backplanes fit standard 2.75" snaptrack.

Connectors on the face of each Backplane plug into mating connectors on the ETA modules. The BP8 Backplane accommodates eight ETA interface modules while the BP4 Backplane accommodates four modules and the BP2 accommodates two modules.

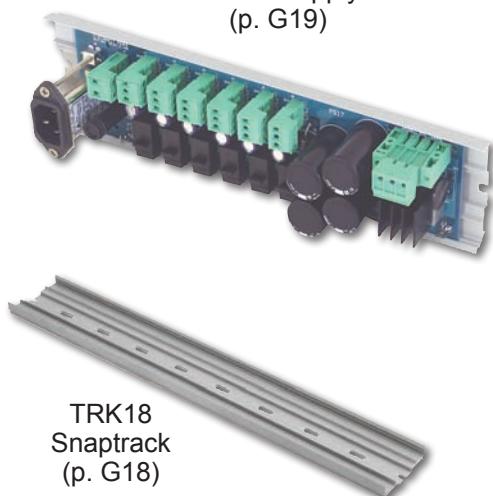
For large control systems, the Backplanes receive power from a PS17 or PS17CB Power Supply. The Backplanes can be plugged together using the end connectors to build large systems. For small control systems, the Backplanes can receive power from BAPI's VC100 or VC350 voltage converters (in Accessories section).

<u>Part Number</u>	<u>Description</u>
BA/BP2	2-Position Interface Backplane
BA/BP4	4-Position Interface Backplane
BA/BP8	8-Position Interface Backplane

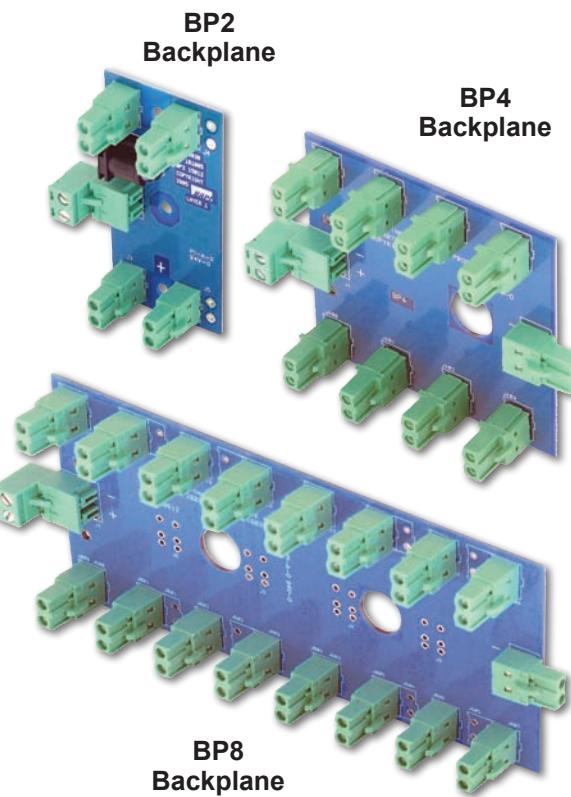
*See end of Section G for list pricing.*

## Associated Products

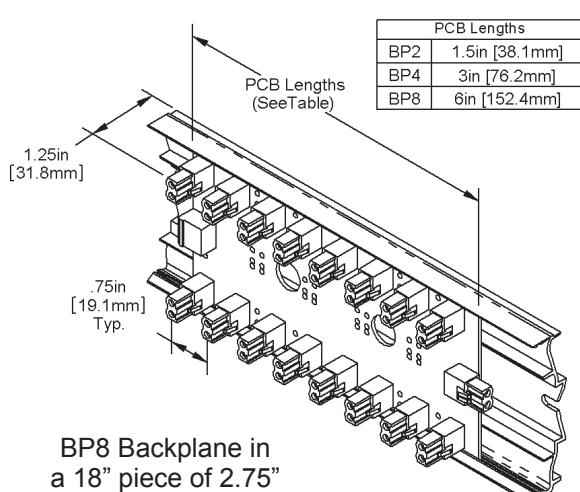
PS17 or PS17CB  
Power Supply  
(p. G19)



TRK18  
Snaptrack  
(p. G18)



## Specifications



BP8 Backplane in  
a 18" piece of 2.75"  
snaptrack (BA/TRK18)

**Power Voltage:** 0 to 40 VDC or VAC

**Power Current:** 4 Amp max.





Rev. 10/16/12

# BP4V - Vertical Backplane & BR - Bridge

ETA Line

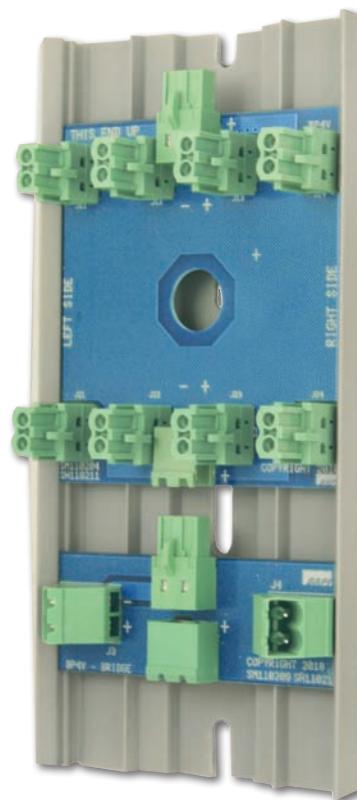
G17

## Overview

The BP4V - Vertical Backplane was designed to add additional ETA boards into a congested panel. The Vertical Backplane allows the use of small vertical spaces that may go unused. Each Vertical Backplane accommodates four ETA modules.

If there is enough space for more than one Vertical Backplane, they should be connected together with a BR - Bridge. The Bridge provides clearance from one Vertical Backplane to the other for easy insertion of the ETA modules.

For large control systems, the Vertical Backplane receives power from a PS17 or PS17CB Power Supply (See page G17 of this section). For small control systems, the Vertical Backplane can receive power from BAPI's VC350 voltage converters (See the Accessories Sections for more info on the VC350 voltage converters).



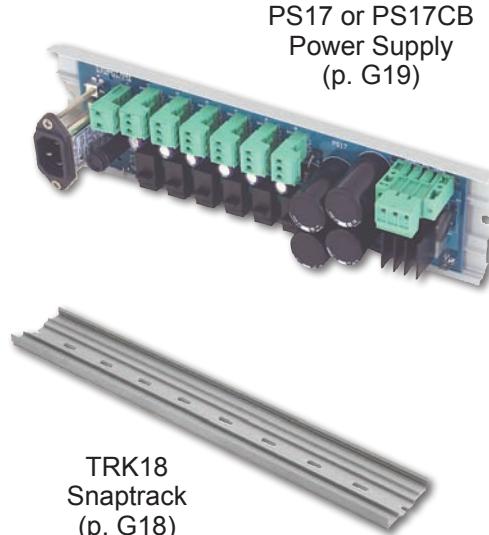
### Part Number

- BA/BP4-V** .....Vertical Backplane  
**BA/BP-BR** .....Bridge (to connect Vertical Backplanes)

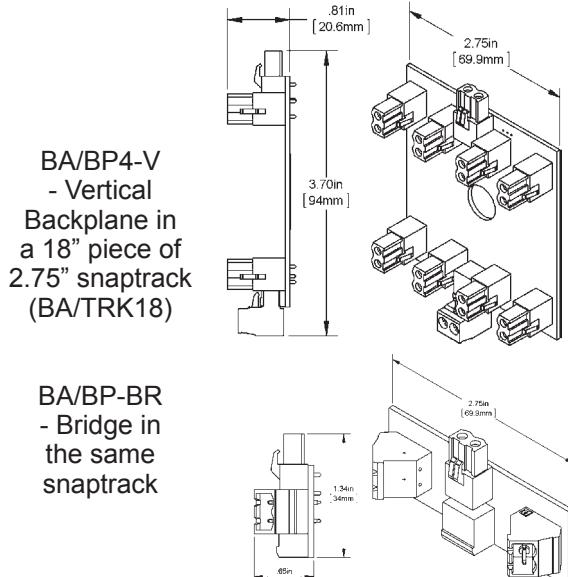
*See end of Section G for list pricing.*

**BA/BP4-V - Vertical Backplane and a BA/BP-BR - Bridge in a 2.75" wide piece of snaptrack (sold separately)**

## Associated Products



## Specifications



**Power Voltage:** 12 to 36 VDC, 18 to 32 VAC

**Power Current:** 4 Amp max.





## Overview

All good projects need to start out with a proper foundation and BAPI's ETA modules are no exception. The TRK - Snaptrack provides a sturdy, secure and easy mounting method for the ETA line. The standard 2.75" snaptrack is cut to a several convenient lengths for the ETA enclosures.

The snaptrack cradles the ETA interface and communications backplanes and the terminal blocks, holding them firmly in place so you can build neat, accurate and cost effective control panels.

### Part Number    Description

BA/TRK01 .....	TR2 Snaptrack, 1.25" length
BA/TRK02 .....	TR2 Snaptrack, 2" length
BA/TRK04 .....	TR2 Snaptrack, 4" length
BA/TRK08 .....	TR2 Snaptrack, 8" length



**TRK18 -  
2.75" snaptrack  
18", 8" and 4" shown**

### Part Number    Description

BA/TRK12 .....	TR2 Snaptrack, 12" length
BA/TRK18 .....	TR2 Snaptrack, 18" length
BA/TRK48 .....	TR2 Snaptrack, 48" length

*See end of Section G for list pricing.*

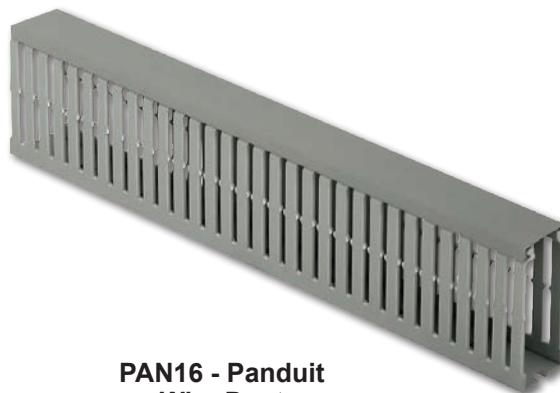
## PAN16 - Panduit 1x3x16" Wire Duct

### ETA Line

## Overview

BAPI's PAN16 - Panduit wire duct screws to the enclosure back plate using pre-punched holes in the back plate.

The PAN16 guides the wire to the ETA device keeping clutter out of the control panel.



**PAN16 - Panduit  
Wire Duct**

### Part Number    Description

BA/PAN16 .....	Panduit 1x3x16" Wire Duct
----------------	---------------------------

*See end of Section G for list pricing.*





# PS17 & PS17CB - Power Supplies

**G19**

**ETA Line**

Rev. 11/24/15

## Overview

The PS17CB Power Supply with Circuit Breakers provides up to six 33 VDC power supplies with circuit breakers to operate any of the BAPI ETA modules except the FOX & RPTR RS-485 communication modules. Each PS17CB output has a green LED, which lights to show normal power. Both power supplies fit standard 2.75" snaptrack

The PS17CB uses a 120 VAC to 24 VAC transformer with a rating of 75VA to 400 VA depending upon current consumption. Total your current consumption and pick the appropriate transformer from the table below.

The PS17CB provides a transient line filter for the 120 VAC input to the transformer. Screw terminals on the PS17CB allow convenient termination of the input and output of the transformer. Plug a standard computer power cord into a duplex outlet and then into the line filter to power the PS17CB. A green LED lights when 120 VAC is applied and the circuit breaker is not tripped.

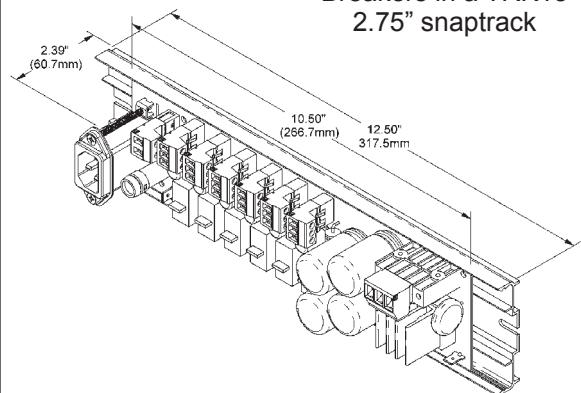
### Part Number      Description

- BA/PS17** .....Power Supply Fuse Block  
**BA/PS17CB** .....Power Supply w/ Circuit Breakers

*See end of Section G for list pricing.*

## Specifications

PS17CB - Power Supply with Circuit Breakers in a TRK18 2.75" snaptrack



### Input Power

120 VAC at 0.7 to 3.5 Amps depending on transformer selected. Standard IEC Line Filter

### Output

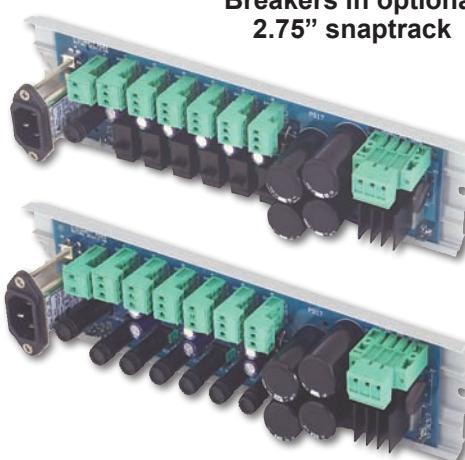
Nominal 33 VDC.

Four Outputs rated at 2.25 Amps (3.15 Amp Circuit Breaker) (Typically for controllers)

Two Outputs rated at 3 Amps (4 Amp Circuit Breaker) (Typically for ETA devices)

Circuit Breakers are all push to reset style

**PS17CB - Power Supply with Circuit Breakers in optional 2.75" snaptrack**



**PS17 - Power Supply Fuse Block in optional 2.75" snaptrack**

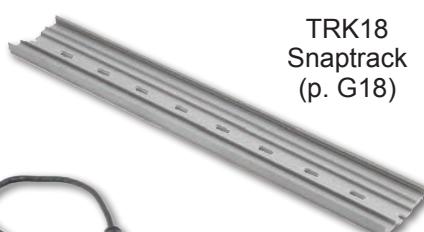
Total Current Consumption	Transformer Power
---------------------------	-------------------

1.875 amps or less .....	75 VA
2.500 amps or less .....	100 VA
3.750 amps or less .....	150 VA
5.000 amps or less .....	200 VA
6.250 amps or less .....	250 VA
7.500 amps or less .....	300 VA
12.00 amps or less .....	400 VA

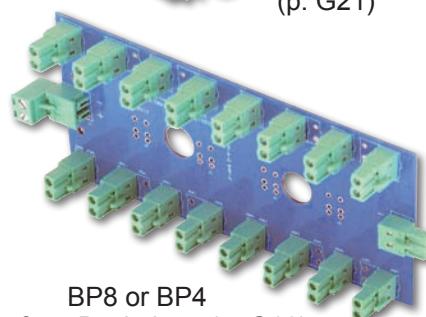
Note: The customer supplies the power transformer.

## Associated Products

TRK18 Snaptrack (p. G18)



Power Cord (p. G21)



BP8 or BP4 Interface Backplane (p. G16)



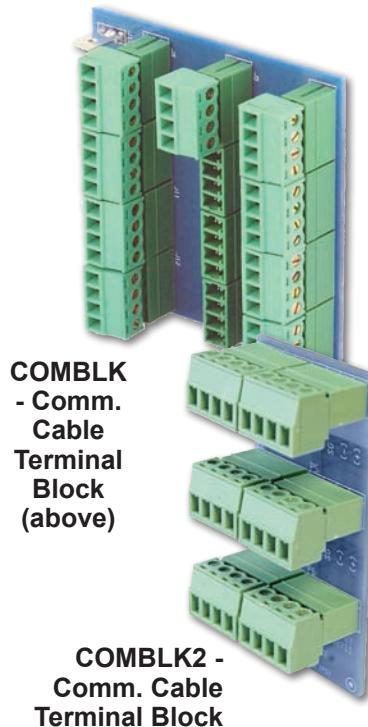


## Overview

The COMBLK and COMBLK2 Communication Terminal Blocks simplify the task of terminating communications wiring.

The COMBLK contains four independent circuits and the COMBLK2 contains two independent circuits. Each independent circuit includes three connectors - one for bus in, one for bus out and a third for wiring to the controller. Either COMBLK allows each bus to be quickly isolated and tested in each direction to simplifying the troubleshooting. A common ground connector provides a convenient means of grounding all shield drain wires. Also, both COMBLKs accommodate the COMSRG surge suppressor, which plugs directly inline between the COMBLK and the communications bus segment.

Either COMBLK is suitable for RS-485, Modbus, Echelon® or virtually any other communications standard that talks over two or three wires. The small size of the COMBLK2 makes it ideal for installing within VFD enclosures, power meter cabinets, etc. where Modbus or other protocol communication must be connected to a remote communicating device. Both COMBLKs fit into industry standard 2.75" snaptrack.



<u>Part Number</u>	<u>Description</u>
--------------------	--------------------

- BA/COMBLK**.....Communications Cable Terminal Block (NEC Class 2 Circuits, 4 Amp max.)  
**BA/COMBLK2**.....Communications Cable Terminal Block (NEC Class 2 Circuits, 4 Amp max.)

*See end of Section G for list pricing.*

## TB18 - Pluggable Terminal Block



## Overview

The TB18 - Pluggable Terminal Block is a small circuit board designed to simplify the task of wire termination. The TB18 is easier to apply and troubleshoot than a bunch of wires under a large wire nut or the typical barrier strip.

The TB18 board fits into the ETA line TRK Snaptrack or any other industry standard 2.75" snaptrack, and provides a straight through connection for nine pairs of wire on individual plugs.

<u>Part Number</u>	<u>Description</u>
--------------------	--------------------

- BA/TB18**.....Pluggable Terminal Block (NEC Class 2 Circuits, 4 Amp max.)  
**BA/TB18C**.....Pluggable Terminal Block (NEC Class 2 Circuits, 4 Amp max.)  
   All odd numbered terminals are common  
**BA/TB18C2**.....Pluggable Terminal Block (NEC Class 2 Circuits, 4 Amp max.)  
   All odd numbered terminals are common and all even  
   numbered terminals are common



**TB18**  
Pluggable  
Terminal Block

*See end of Section G for list pricing.*





Rev. 10/16/12

# COMSRG - Comm. Surge Protector

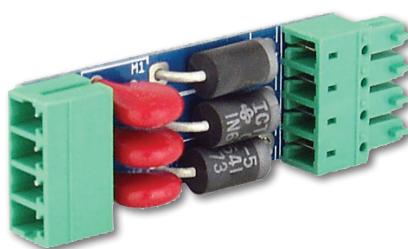
G2%

ETA Line

## Overview

In some applications, the transient protection on the communications terminals of DDC controllers is inadequate. Examples are roof mounted air handlers, pad mounted air conditioners or chillers – or anything attached to the building's HVAC system but outside the building envelope.

BAPI's COMSRG provides the extra muscle necessary to prevent damage. The COMSRG plugs between the communications network and any of the COMBLK, RPTR or TUCOM.



**COMSRG**  
- Communication Surge  
Protector

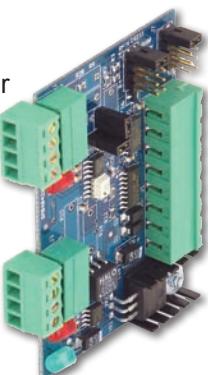
## Part Number      Description

**BA/COMSRG** ..... Communications Surge Protector

*See end of Section G for list pricing.*

## Associated Products

RPTR  
RS-485 Repeater  
(p. G24)



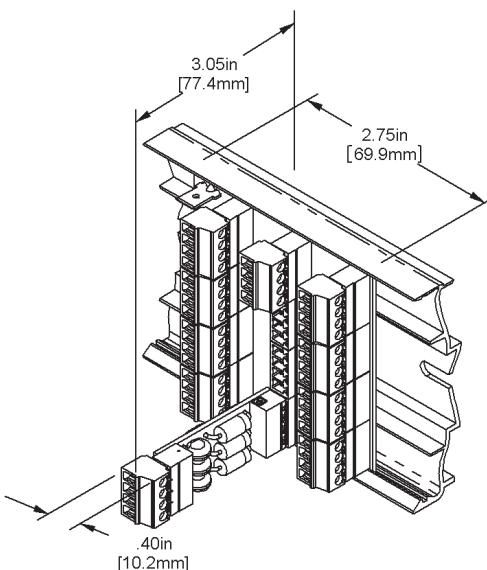
TUCOM - Terminal  
Unit Comm. Block  
(p. G33)



COMBLK  
Comm. Cable  
Terminal Block  
(p. G22)

## Specifications

COMSRG module plugged into a COMBLK  
Communications Cable Terminal Block



**Clamp Voltage:** 6 VDC

**Clamp Power:** 1.5 Joules





## Overview

RS-485 is the most common communications standard for DDC controllers; however, it is limited to 32 unit loads and 4,000 feet. Extending the network beyond 32 unit loads or 4,000 feet requires repeaters.

BAPI's RS-485 repeater (RPTR) connects two RS-485 segments together. Data from one segment repeats to the other segment and vice versa. Each Rptr module allows an additional 32 unit loads or 4,000 feet. The Rptr may be installed directly into the snaptrack to form a simple stand alone bus extender as described above.

The Rptr module also plugs into the communications repeater backplane (RBP). Additional Rptr modules plugged into the backplane will form a star network, allowing multiple segments to connect to the same point. Each repeater card consumes one unit load for the primary RS-485 network and one unit load for the repeated network.

A green power LED indicates that 12 VDC is present to the module. A red LED at each RS-485 network connector flashes when data is transmitted or received.



**Rptr - RS-485 Repeater**

### Part Number      Description

**BA/Rptr**..... RS-485 Repeater

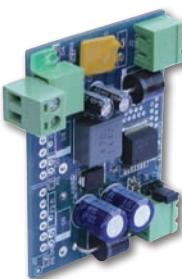
**BA/Rptr-KIT**..... RS-485 Repeater Communication Kit (see page G25)

*includes one RS-485 Repeater (Rptr) Module, a 350 mA voltage converter (VC350A), a Single Repeater Backplane (SRBP) and a 4" piece of 2.75" snaptrack*

*See end of Section G for list pricing.*

## Associated Products

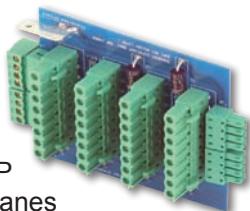
3312VC Voltage Converter  
(p. G11)



TRK18 Snaptrack  
(p. G18)

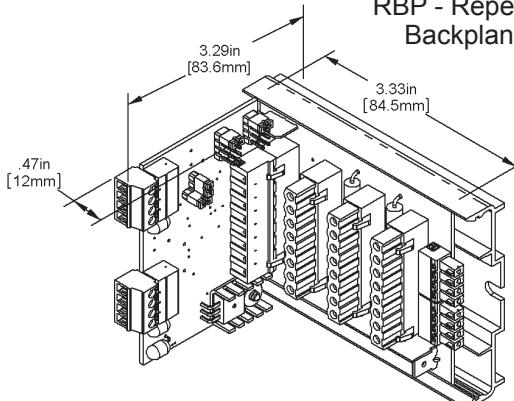


RBP or SRBP Repeater Backplanes  
(p. G30-32)



## Specifications

Rptr module plugged into a RBP - Repeater Backplane



**Power Voltage:** 11 to 13 VDC

**Power Current:** 250 mA max. (3 VA max.)

**Communications rates:**  
9.6K, 19.2K and 38.4K Baud

**Network Load:** 1 unit load

**Network Length:** 4,000 ft (1.2 Km)



# RS-485 Repeater Communication Kit

**G2'**

**ETA Line**

Rev. 10/16/12

## Overview

RS-485 is the most common communications standard for DDC controllers; however, it is limited to 32 unit loads and 4,000 feet. Extending the network beyond 32 unit loads or 4,000 feet requires repeaters.

The RS-485 Repeater Communication Kit provides all the functions for one repeater and remote RS-485 network, plus it comes in a self-contained, easy-to-apply and cost effective assembly. The kit also aids in troubleshooting because LEDs indicate when power is applied and communications are present.

The RS-485 Repeater Communication Kit includes:

- One RS-485 Repeater (RPTR) module which connects two RS-485 segments together. Data from one segment repeats to the other segment and vice versa. Each RPTR module allows an additional 32 unit loads and 4,000 feet;
- A 350 mA voltage converter (VC350) to provide the higher current necessary for flawless communications;
- A Single Repeater Back Plane (SRBP) to mount the RPTR module and provide pluggable connectors for power and three RS-485 cables;
- A four inch long piece of 2.75" snaptrack to easily mount the entire assembly.



**RS-485 Repeater Communication Kit**  
*(includes one RS-485 Repeater Module, a 350 mA voltage converter, a Single Repeater Backplane and a 4" piece of 2.75" snaptrack)*

## Ordering Information

<u>Part Number</u>	<u>Description</u>
<b>BA/RPTR-KIT</b>	RS-485 Repeater Communication Kit includes one RS-485 Repeater (RPTR) Module, a 350 mA voltage converter (VC350A), a Single Repeater Backplane (SRBP) and a 4" piece of 2.75" snaptrack

*See end of Section G for list pricing.*

## Specifications

**Input Voltage:** 18 to 30 VAC, 15 to 28 VDC

**Input Current Max:** 760mA (18.25 VA)

**Environmental Operation Range:**

0 to 50°C (32 to 122°F)  
0 to 95%RH Non-Condensing

**Rectification:** Half-Wave Rectified

**Grounding:** AC and DC Ground are common

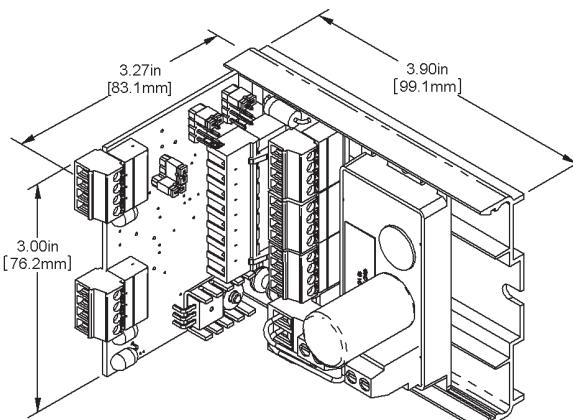
**Communication Rates:**

9.6K, 19.2K and 38.4K Baud

**Network Load:**

1 unit load on each RS-485 bus

**RS-485 Network Length:** 4,000ft (1.2Km)



**RS-485 Repeater Communication Kit**





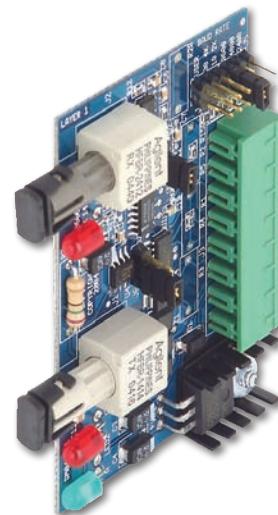
## Overview

BAPI recommends fiber optic cable for HVAC communications networks that travel between buildings.

The FOX - Fiber Optic Transceiver converts the RS-485 data from the copper network to a fiber optic signal for transmission to other buildings. A FOX in the other building converts the fiber optic signal back into RS-485 for the remote copper network.

The FOX module accepts the multi-mode fiber cable on standard ST connectors. The copper RS-485 connection is made on the 8-pole plug along with the power and ground connections. The FOX also plugs into the communications repeater backplane (RBP). Each FOX module consumes one unit load on the RS-485 bus.

A green power LED indicates that 12 VDC is present to the module. A red LED at each fiber cable connection flashes when data is transmitted or received.



**FOX - RS-485 Fiber Optic Transceiver**

### Part Number      Description

**BA/FOX** ..... RS-485 Fiber Optic Transceiver

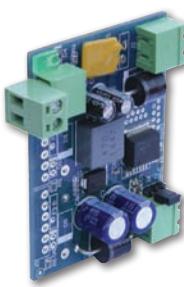
**BA/FOX-KIT** ..... FOX Communication Kit (see page G25)

*includes one Fiber Optic Transceiver (FOX) Module, a 350 mA voltage converter (VC350A), a Single Repeater Backplane (SRBP) and a 4" piece of 2.75" snaptrack*

*See end of Section G for list pricing.*

## Associated Products

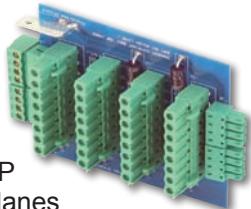
3312VC Voltage Converter  
(p. G11)



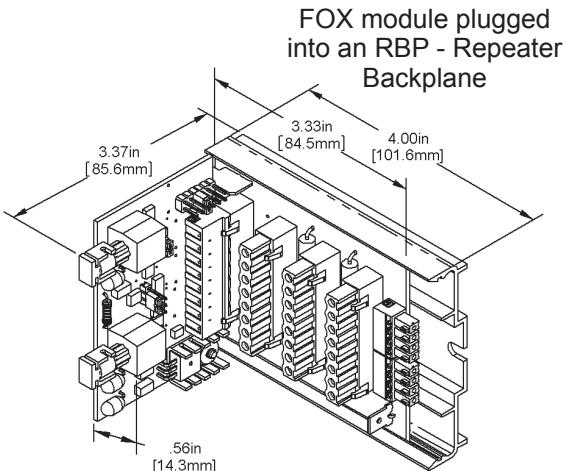
TRK18 Snaptrack  
(p. G18)



RBP or SRBP Repeater Backplanes  
(p. G30-32)



## Specifications



**Power Voltage:** 11 to 13 VDC

**Power Current:** 250 mA max. (3 VA max.)

**Communications rates:**

2.4K, 4.8K, 9.6K, 19.2K and 38.4K Baud

**Network Load:** 1 unit load (RS-485 side)

**Optical Network Length:**

10,500 ft (3,200 meters)  
(max. attenuation of 4 dB/Km)

**RS-485 Network Length:** 4,000 ft (1.2Km)





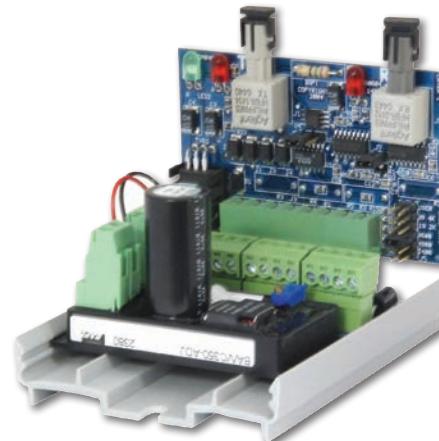
## Overview

BAPI recommends fiber optic cable for HVAC communications networks that travel between buildings.

The FOX Communication Kit provides all the functions for one fiber optic and remote RS-485 network, plus it comes in a self-contained, easy-to-apply and cost effective assembly. The kit also aids in troubleshooting because LEDs indicate when power is applied and communications are present.

The FOX Communications Kit includes:

- One Fiber Optic Transceiver (FOX) module which converts RS-485 data to a fiber optic signal or converts a fiber optic signal to RS-485 data;
- A 350 mA voltage converter (VC350) to provide the higher current necessary for flawless communications;
- A Single Repeater Back Plane (SRBP) to mount the FOX module and provide pluggable connectors for power and three RS-485 cables;
- A four inch long piece of 2.75" snaptrack to easily mount the entire assembly.



**FOX Communication Kit**

(includes one Fiber Optic Transceiver Module, a 350 mA voltage converter, a Single Repeater Backplane and a 4" piece of 2.75" snaptrack)

## Ordering Information

<u>Part Number</u>	<u>Description</u>
--------------------	--------------------

**BA/FOX-KIT** ..... FOX Communication Kit

includes one Fiber Optic Transceiver (FOX) Module, a 350 mA voltage converter (VC350A), a Single Repeater Backplane (SRBP) and a 4" piece of 2.75" snaptrack

*See end of Section G for list pricing.*

## Specifications

**Input Voltage:** 18 to 30 VAC, 15 to 28 VDC

**Input Current Max:** 760mA (18.25 VA)

**Environmental operation Range:**

0 to 50°C (32 to 122°F)  
0 to 95 %RH Non-Condensing

**Rectification:** Half-Wave Rectified

**Grounding:** AC and DC Ground are common

**Communication Rates:**

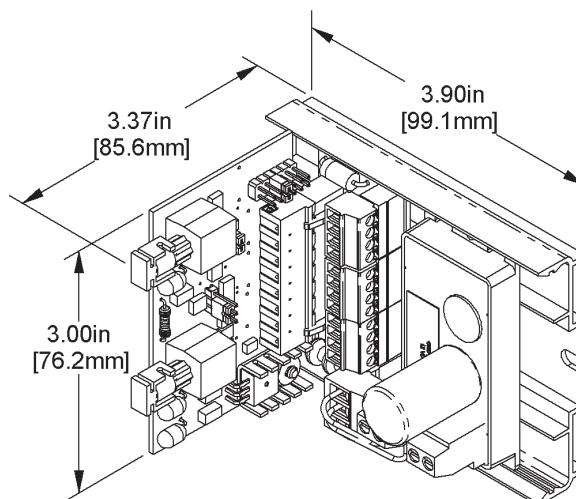
2.4K, 4.8K, 9.6K, 19.2K and 33.4K Baud

**Network Load:** 1 unit load (RS-485 side)

**Optical Network Length:**

10,500 Ft (3,200 meters)  
(Maximum attenuation of 4db/Km)

**RS-485 Network Length:** 4,000ft (1.2Km)



**FOX Communication Kit**





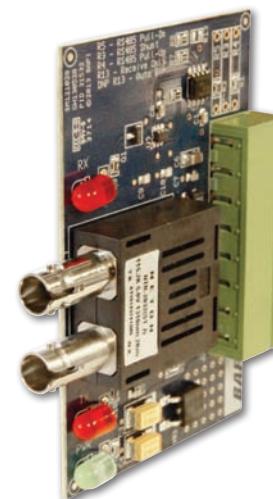
## Overview

BAPI recommends fiber optic cable for HVAC communications networks that travel between buildings.

The SOX - Fiber Optic Transceiver converts the RS-485 data from the copper network to a fiber optic signal for transmission to other buildings. A SOX in the other building converts the fiber optic signal back into RS-485 for the remote copper network.

The SOX module accepts single-mode fiber cable on standard ST connectors. The copper RS-485 connection is made on the 8-pole plug along with the power and ground connections. The SOX also plugs into the communications repeater backplane (RBP).

A green power LED indicates that 12 VDC is present to the module. A red LED at each fiber cable connection flashes when data is transmitted or received.



**SOX - RS-485 Fiber Optic Transceiver**

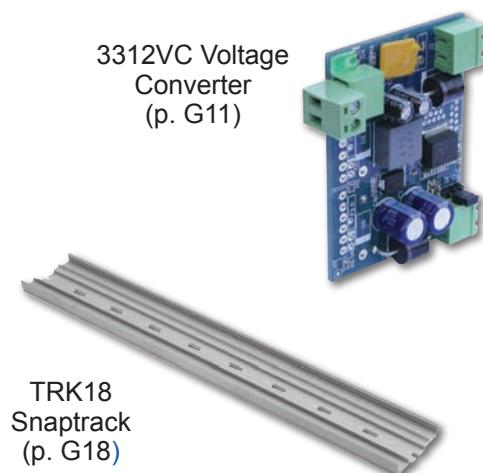
## Ordering Information

<u>Part Number</u>	<u>Description</u>
--------------------	--------------------

**BA/SOX**.....RS-485 Fiber Optic Transceiver (for single-mode fiber cable)

*See end of Section G for list pricing.*

## Associated Products

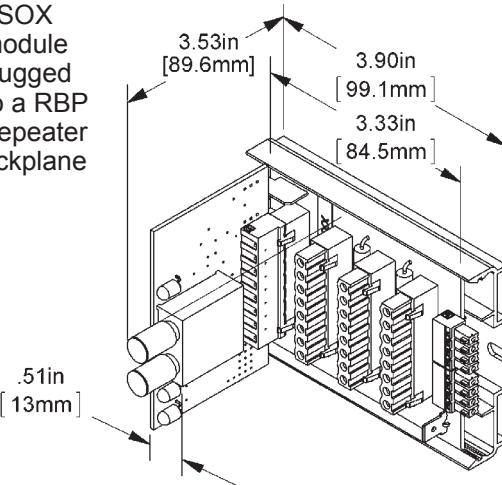


TRK18  
Snaptrack  
(p. G18)

RBP or SRBP  
Repeater Backplanes  
(p. G30-32)

## Specifications

SOX module plugged into a RBP - Repeater Backplane



**Power Voltage:** 7 to 18 VDC

**Power Current:** 50 mA max.

**Communications Rates:**  
1200 to 115.2K Auto Baud

**Optical Network Length:**  
65,600 ft (20,000 meters)

**RS-485 Network Length:** 4,000 ft (1.2Km)



# PLCON1 & 2 - PremierLink™ Connectors

G2+

Rev. 10/16/12

ETA Line

## Overview

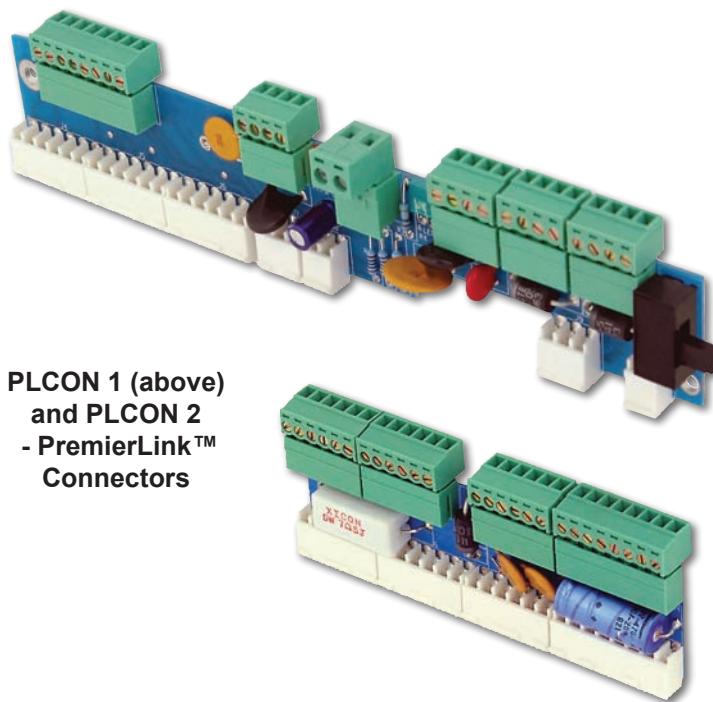
The PLCON modules are designed to simplify the field wiring of Carrier® PremierLink™ direct digital controllers. The modules provide an additional layer of protection for the controller, as well as a power ON/OFF switch and indicator light for future troubleshooting or controller resetting.

Field wiring is easier because the PLCON modules eliminate the need for special tools or hard-to-find connectors. All wires terminate in labeled, pluggable screw terminals on the PLCON so the only tools that a technician needs are a wire stripper and a small screwdriver.

The PLCON1 slips onto the power, communications, analog output and digital output connectors on the PremierLink™ controller. It includes a power ON/OFF switch, a power pilot light, a self-resetting 1.6 amp fuse and an MOV for an additional layer of protection against power surges.

The three communications connectors simplify system wiring and additional transient protection on the PLCON1 ensures reliable communications in the most challenging environments. A four-conductor plug on the PLCON1 provides power and feedback for the economizer actuator while the eight-pole connector provides termination for the relay outputs. A second transformer can be used to power the relay outputs by simply cutting a jumper wire on the PLCON1.

The PLCON2 module slips onto the analog and digital input connectors on the PremierLink™ controller. The PLCON2 provides a pluggable screw terminal for every input connection as well as a self-resetting 0.9 amp fuse for each air quality sensor.



**PLCON 1 (above)  
and PLCON 2  
- PremierLink™  
Connectors**

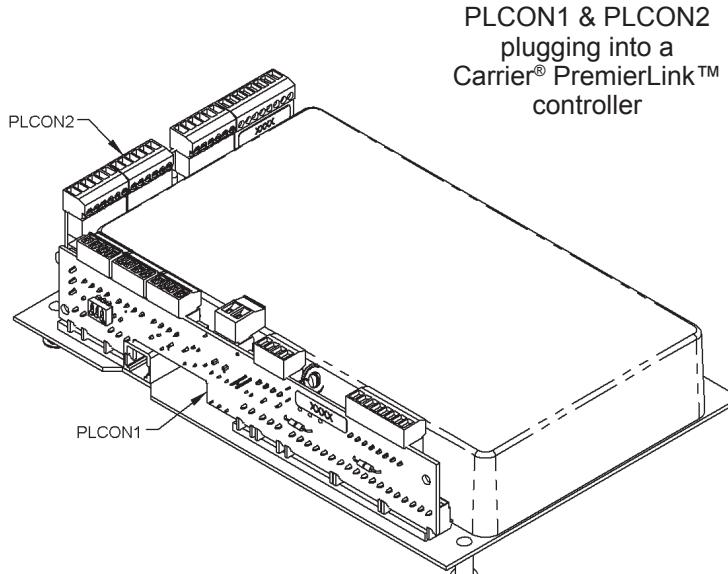
### Part Number

**BA/PLCON1**.....PremierLink™ Connector 1

**BA/PLCON2**.....PremierLink™ Connector 2

*See end of Section G for list pricing.*

## Specifications



**PLCON1 & PLCON2  
plugging into a  
Carrier® PremierLink™  
controller**

**Input Voltage:** 24 VAC

Carrier® is a trademark of Carrier Corporation, Registered in the United States and other countries.

**Input Current:** 4 Amp max.



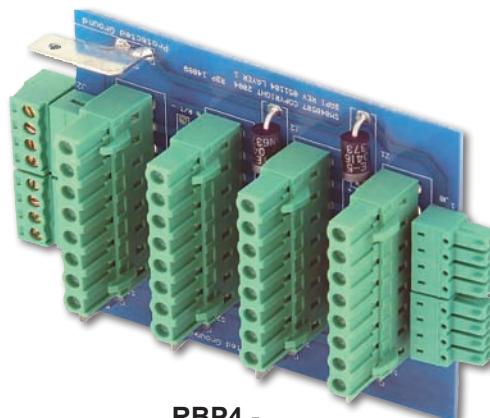


## Overview

The RBP - Communications Repeater Backplane fits into 2.75" snaptrack (TRK18) and provides power, communications and convenient mounting for the RPTR, FOX and SOX modules.

Connectors on the face of the RBP plug into mating connectors on the RPTR, FOX and SOX. The RPTR, FOX and SOX share data across the RBP backplane which provides transient protection for the communications network. Several RBP backplanes can be plugged together to share data through the backplane end connectors, allowing all the RPTR, FOX and SOX to form a large communications hub.

The RBP backplane receives 12 VDC power from a 3312VC voltage converter.



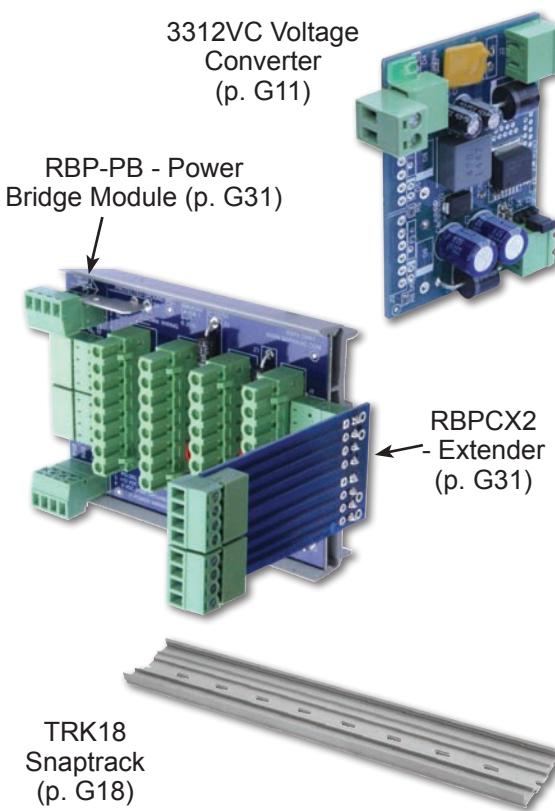
**RBP4 -  
Communications  
Repeater Backplane**

### Part Number      Description

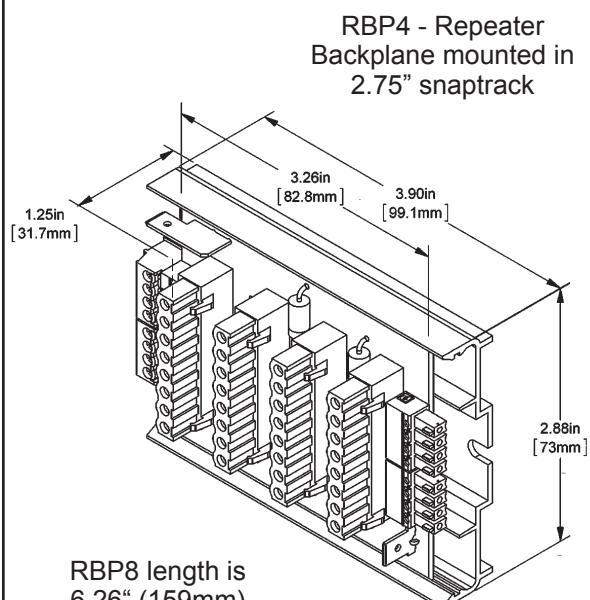
<b>BA/RBP4</b> .....	Communications Repeater Backplane, 4 Rows
<b>BA/RBP4-TRK</b> .....	Communications Repeater Backplane with 4" piece of 2.75" snaptrack
<b>BA/RBP8</b> .....	Communications Repeater Backplane, 8 Rows
<b>BA/RBP8-TRK</b> .....	Communications Repeater Backplane with 4" piece of 2.75" snaptrack

*See end of Section G for list pricing.*

## Associated Products



## Specifications



**Power Voltage:** 11 to 13 VDC  
**Power Current:** 4 Amp max.





# RBP-PB - Repeater Backplane Power Bridge

**G&F**

Rev. 12/16/15

**ETA Line**

## Overview

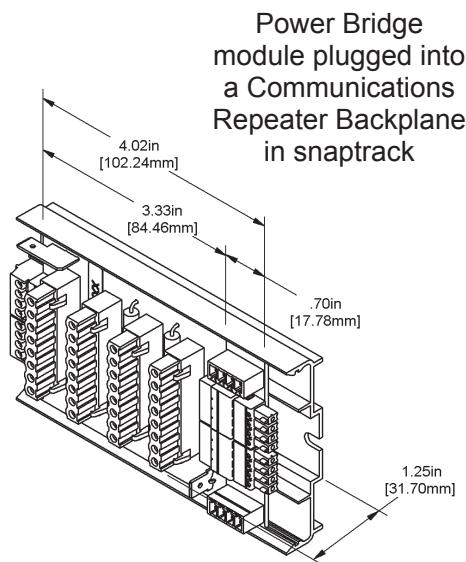
The Repeater Backplane Power Bridge (RBP-PB) is used between Communication Repeater Backplane (RBP) modules to bridge the power and break out the 485 communications lines to another node. The Power Bridge snaps into the same snaptrack as the Backplanes it bridges.

This allows simplified power wiring of a multi-protocol communications hub such as the Carrier Comfort Network and Modbus. The upper plug connects to the bus on the right; the lower plug connects to the bus on the left.



**Fig. 1:**  
Power Bridge  
(RBP-PB)

## Specifications



**Power Voltage:** 12 VDC

**Power Current:** 4 Amp Maximum

## Part Number    Description

BA/RBP-PB    Repeater Backplane Power Bridge

*See end of Section G for list pricing.*



# RBPCX, RBPCX2 - Extenders

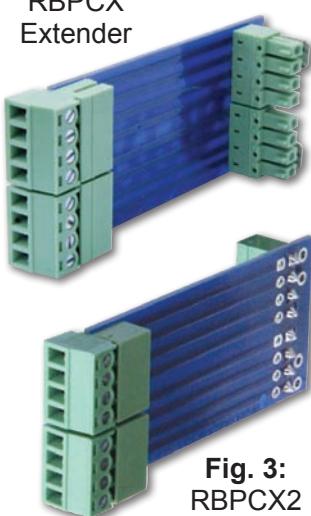
**ETA Line**

## Overview

In some congested panels it is difficult to reach the connectors on the ends of the RBP - Repeater Backplanes.

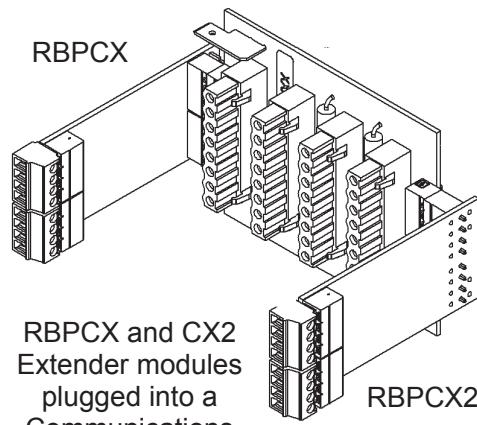
The RBPCX and RBPCX2 - Repeater Backplane Extenders bring the connectors out from deep in the panel to the level of the ETA modules that are upplgged into the Repeater Backplane where they are easy to access.

**Fig. 2:**  
RBPCX  
Extender



**Fig. 3:**  
RBPCX2  
Extender

## Specifications



RBPCX and CX2 Extender modules plugged into a Communications Repeater Backplane in snaptrack

**Power Voltage:** 12 VDC

**Power Current:** 4 Amp Maximum

## Part Number    Description

BA/RBPCX    Left Side Repeater Backplane Extender  
BA/RBPCX2    Right Side Repeater Backplane Extender



Building Automation Products, Inc. • 750 North Royal Avenue, Gays Mills, WI 54631 USA

Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: sales@bapihvac.com • Web: www.bapihvac.com



## Overview

Many times you need to place only one communications repeater at a specific point in a communications network. A four-position Communications Repeater Backplane (RBP) and it's associated power supplies is clearly overkill. The BAPI SRBP - Single Repeater Back Plane teamed with a BAPI VC350 voltage converter (in Accessories section) and a FOX or RPTR module provides a convenient single repeater solution.

The SRBP fits into the standard 2.75" snaptrack. Pluggable connectors on the face of the SRBP allow quick and easy connections for power and RS-485 communications buses. One FOX module or RPTR module plug into a mating connector.

The SRBP receives 12VDC power from either a 3312VC or a BAPI VC350 voltage converter (shown in the Accessories, Sec. E).

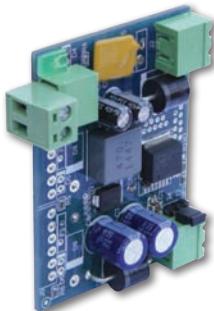


<u>Part Number</u>	<u>Description</u>
BA/SRBP .....	Single Repeater Backplane
BA/SRBP-TRK.....	Single Repeater Backplane with 4" piece of 2.75" snaptrack

*See end of Section G for list pricing.*

## Associated Products

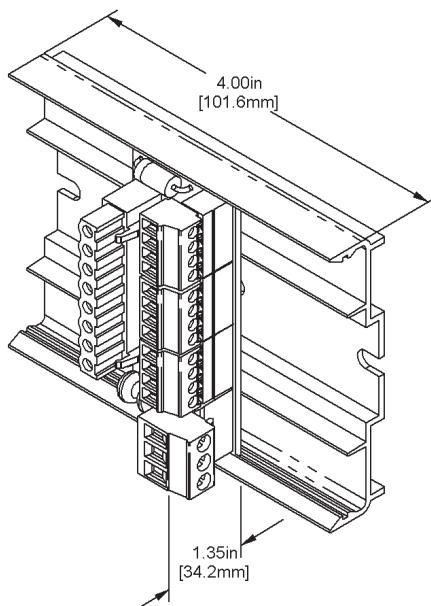
3312VC Voltage Converter  
(p. G11)



TRK18  
Snaptrack  
(p. G18)

## Specifications

SRBP - Single Repeater Backplane mounted in the optional 2.75" snaptrack



**Power Voltage:** 12 VDC

**Power Current:** 4 Amp max.





Rev. 10/16/12

# BELCON - Mating Pair Belimo® Connectors

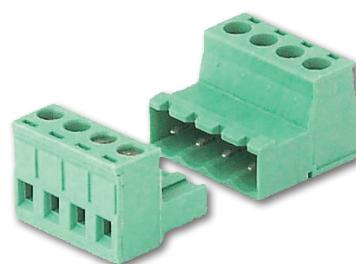
G3%

ETA Line

## Overview

Many HVAC peripherals come with a short pigtail wire for connecting to the rest of your system. Running wire from your control panel to the peripheral and connecting them together is your headache. Most of the time it's twist the wires together and apply wire nuts. Later, when you need to disconnect the peripheral for troubleshooting, the inconvenient wire nuts get lost and the loose wires short out ruining the controller.

BAPI's BELCON connector pair allows a four-pole pluggable connection between your peripheral and the control wiring. You can quickly disconnect any peripheral without fear of wires shorting together or to any conductive surface.



**BELCON**  
Mating Pair of  
Belimo® Connectors

Belimo® is a trademark of Belimo Aircontrols (USA) Inc. registered in the United States and other countries.

### Part Number      Description

**BA/BELCON** .....Mating Pair of Belimo® Connectors  
(NEC Class 2 Circuits, 4 Amp max.)

*See end of Section G for list pricing.*

# TUCOM - Terminal Unit Comm. Block

ETA Line

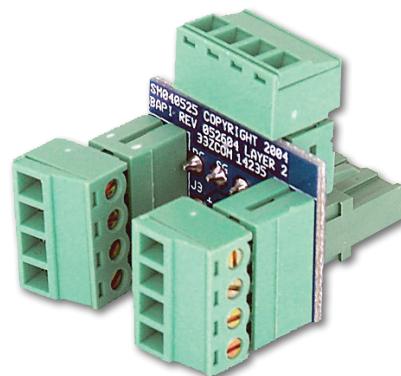


## Overview

The TUCOM is a specific purpose connector which adds pluggable screw terminals for the Carrier® Comfort System zone controller.

The Carrier® zone controller only provides one communications plug, whereas you often need to terminate three cables on it. The TUCOM plugs into the zone controller's communications port and expands it into three pluggable screw terminals. Now you have one set of terminals for each wire in the network (communications in, communications out and zone sensor)

The TUCOM will accept the COMSRG (p.G23) for surge protection in extreme environments.



**TUCOM - Terminal Unit Communications Block**

### Part Number      Description

**BA/TUCOM** .....Terminal Unit Communications Block  
(NEC Class 2 Circuits, 4 Amp max.)

*See end of Section G for list pricing.*

Carrier® is a trademark of Carrier Corporation, Registered in the United States and other countries.





## Overview

The Air Valve Interface (AVI) connects long-running jack-screw style Variable Air Volume (VAV) floating point actuators with mechanical end switches to DDC controllers. The unit has two input signal modes;

### PULSE

The DDC controller's 24 VAC actuator drive power pulses are timed, the timing is multiplied by the AVI's Gain Filter potentiometer setting and appropriately long 24 VAC power pulses are sent from the AVI to the air valve actuator.

### ANALOG

A 0 to 10 VDC proportional control voltage is turned into 24 VAC power pulses to position the actuator accordingly, fully closed (0 VDC) to fully open (10 VDC). The Gain Filter potentiometer sets a hysteresis dead band for the input voltage to prevent motor wear due to controller hunting or noisy signal.

Additionally, the AVI provides;

- Self resetting 3-Ampere fuse
- Fused 24 VAC output to power auxiliary equipment (VAV Box Controller).
- 0 to 10 VDC proportional output that indicates damper position.
- Manual air valve actuator stroke time training switch, used to calibrate the damper position proportional output voltage.
- Duty cycle protection to prevent actuator motor failure.



**AVI Module**

## Ordering Information

<u>Part Number</u>	<u>Description</u>
BA/AVI.....	Air Valve Interface
BA/AVI-TRK .....	Air Valve Interface with 4" piece of 2.75" snaptrack

*See end of Section G for list pricing.*

## Specifications

### ELECTRICAL

	<u>MIN</u>	<u>TYP</u>	<u>MAX</u>
Input Voltage, (J3, S1, J7)	18.0VAC	24VAC	32VAC Note: AC voltage ONLY
Input Voltage, (J5-IN 0-10V)	0VDC	-	10VDC
Output Voltage, (J4, J5-24)	Input voltage fused at 3 Amps		
Output Voltage, (J7 OUT DMPPPOS)	0VDC	-	10VDC
Output Current, (J7 OUT DMPPPOS)	0VDC	-	±10mA (short circuit limited)
Current Draw, Dependent on load			3A @ 24VAC
Triac Current, (J1-open, J1-close)	250mA	350mA	500mA
Power, Dependent on loads			96VA

### ENVIRONMENTAL

Temperature – Operating: -20 to 70 °C

Temperature – Storage: -40 to 85 °C

Humidity: 0 to 95% RH, Non-condensing

### MECHANICAL

#### Screw Terminals:

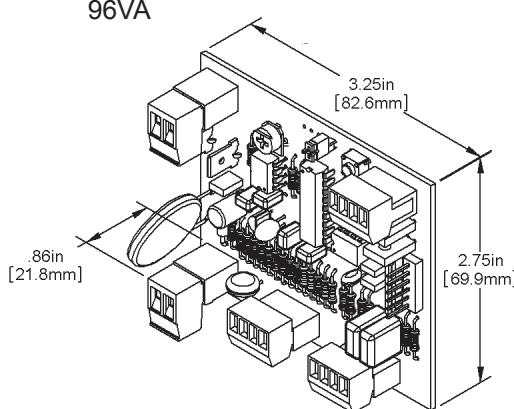
(J3, J4, J5, J6, J7), 28-16 AWG / 0.5-1.5mm

Enclosure: None

Mounting: 2.75" or 3.25" Snaptrack – not included

PCB: FR4, 94V0, 2.75" x 3.25" x 1.25"

Agencies: RoHS





# AVI-ADAPT - Air Valve Interface Adapter

**G3'**

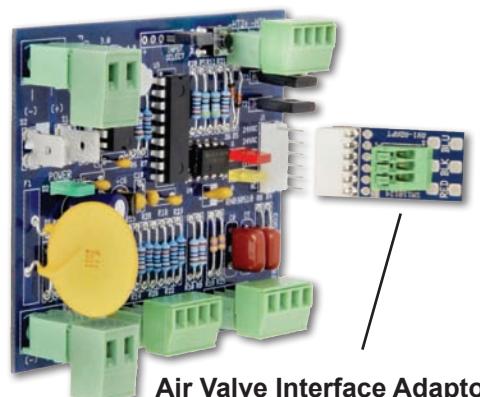
Rev. 10/16/12

**ETA Line**

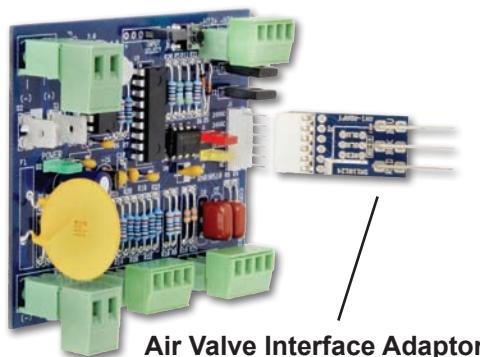
## Overview

The AVI-ADAPT - Air Valve Interface Adapters are used to connect a VAV actuator cable to an AVI - Air Valve Interface (pg. G31) when the factory installed connector is missing from the actuator cable.

The Air Valve Interface Adaptors are a press fit on the output connector of the Air Valve Interface module. One adaptor has a toggle type connector for the actuator cable while the other adaptor has 1/4" quick connects for the actuator cable.



**Air Valve Interface Adaptor with toggle connector and the associated connector on the Air Valve Interface Module**



**Air Valve Interface Adaptor with 1/4" Quick Connects and the associated connector on the Air Valve Interface Module**

## Ordering Information

### Part Number and Description

#### **BA/AVI-ADAPT**

Air Valve Interface Adapter with toggle connector

#### **BA/AVI-ADAPT-QC**

Air Valve Interface Adapter with 1/4" Quick Connects

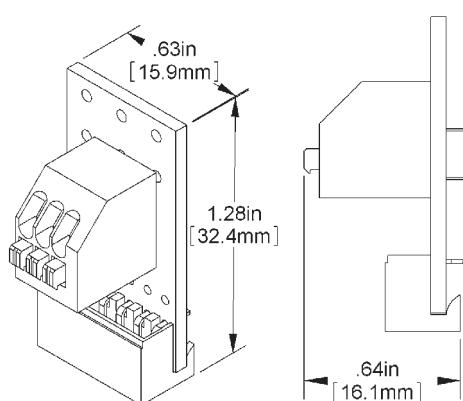
*See end of Section G for list pricing.*

## Specifications

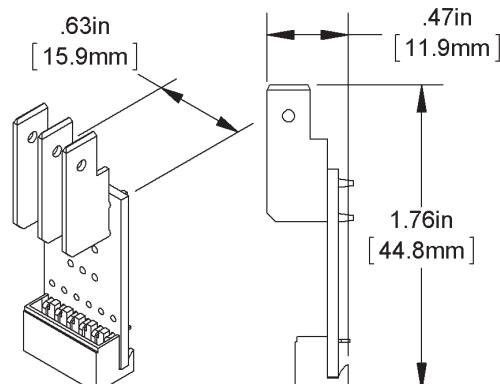
**Wire Size:** 20 to 26 Gauge

**Voltage:** NEC Class 2

**Current:** 500 mA Max



**BA/AVI-ADAPT**



**BA/AVI-ADAPT-QC**



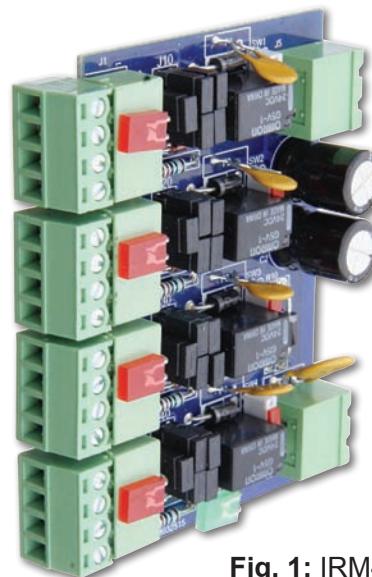


## Overview

The IRM4 - Interposing Relay Module has four independent channels that convert a relay output to a contact output or a voltage output. The relay output is energized by either an external power source or power sourced on the IRM4 Module. Jumpers are used to set the mode for each individual channel and the I/O for each channel via 4-pole 3.5mm connectors.

The unit is mounted in a BP2, BP4, BP8 or BP4V Backplane with power provided by the Backplane. The Backplane is typically powered by a PS17, PS18 or PS19 Power Supply.

Each relay on the IRM4 Module has a 24VDC coil switching Form C contacts. A SPDT switch allows for configurable output contacts for each output. LEDs provide power status of the unit as well as the state of each individual channel.



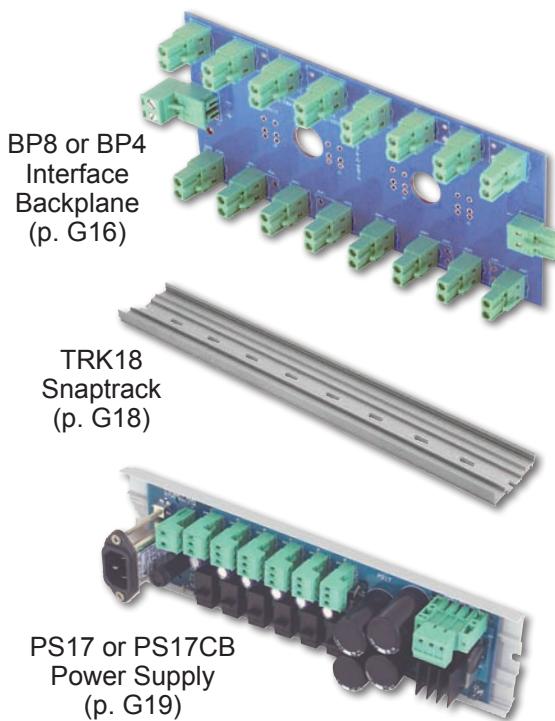
**Fig. 1:** IRM4  
Interposing  
Relay Module

## Ordering Information

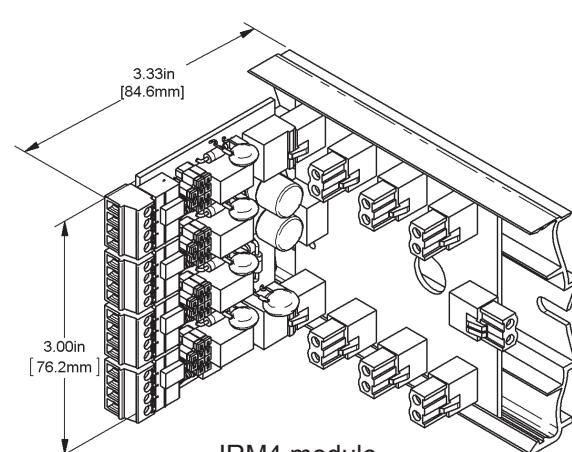
<u>Part Number</u>	<u>Description</u>
BA/IRM4 .....	IRM4 - Interposing Relay Module

*See end of Section G for list pricing.*

## Associated Products



## Specifications



IRM4 module  
plugged into a  
BP4 Backplane

**Power Voltage:** 26 to 30VDC

**Power Current:** 1 Amp Max



## Overview

### LRCA Module

The Link Router Communications Adapter (LRCA) adds an RJ jack for computer access to a Carrier® i-Vu Link/Router.

### PSOCL Module

The Power Supply Output Current Limiter (PSOCL) is used to buffer the output of the BAPI PS17, PS18 or PS19 Power Supplies when used to power the Carrier® i-Vu Link/Router. BAPI recommends that only one Link/Router be powered from each PSOCL. Do not power any other load through the PSOCL.



LRCA Module



PSOCL Module

## Ordering Information

<u>Part Number</u>	<u>Description</u>
BA/LRCA .....	Link Router Communications Adapter
BA/PSOCL .....	Power Supply Output Current Limiter

*See end of Section G for list pricing.*

## Specifications

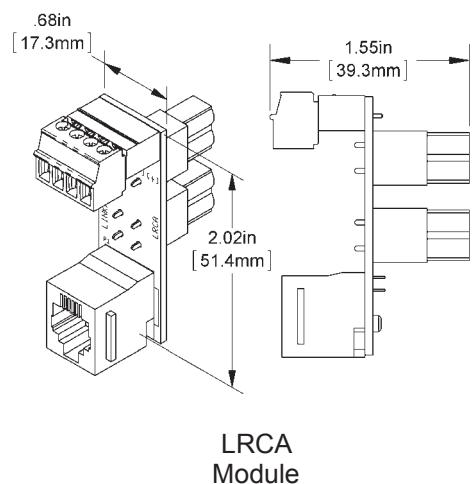
### LRCA Specifications

#### Connectors:

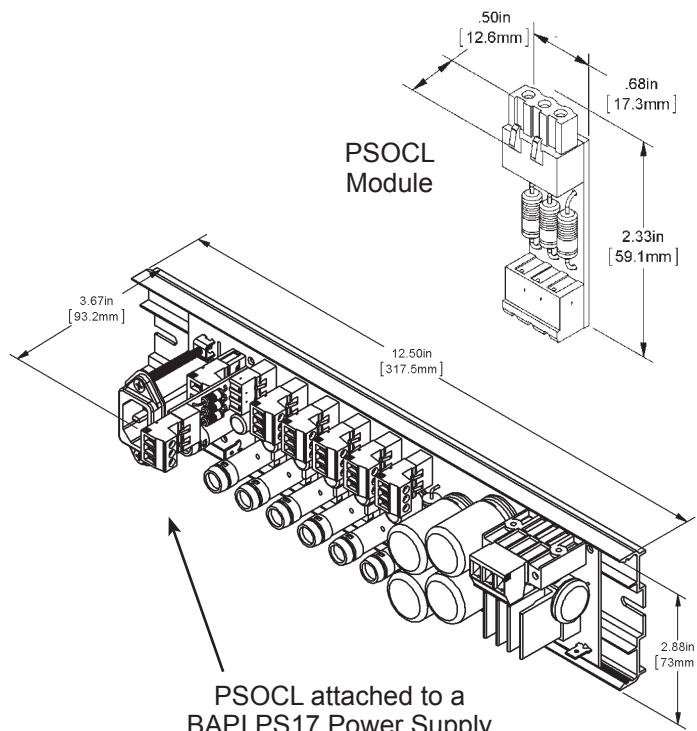
Screw terminals, 16 to 22 AWG

#### Computer:

RJ11 Communications Jack



LRCA Module



PSOCL attached to a BAPI PS17 Power Supply





## Overview

The Universal Controller Relay Board (UCRB2) is used to interconnect a DDC controller's digital outputs to any device that requires a conventional thermostat input.

There are five inputs that control five relays. The first relay's output (1/G) is an interlock for the other four, outputs 2, 3, 4 or 5 will not change state until output 1/G is on. The UCRB2 fits into 2.75" snaptrack.



**UCRB2 Module**

## Ordering Information

<u>Part Number</u>	<u>Description</u>
BA/UCRB2	Universal Controller Relay Board

*See end of Section G for list pricing.*

## Specifications

### Input Voltage

23 to 26 VDC (1/G, 2, 3, 4 & 5)

### Input Current

1/G	22 mA @ 24 VDC
2, 3, 4 & 5	6.25 mA @ 24 VDC

### Output Current

1/G	8A @ 24 VAC
2, 3, 4 & 5	0.8A @ 24 VAC

### Temperature

Operating	-40°F to 158°F (-40°C to 70°C)
Storage	-40°F to 158°F (-40°C to 70°C)

### Humidity

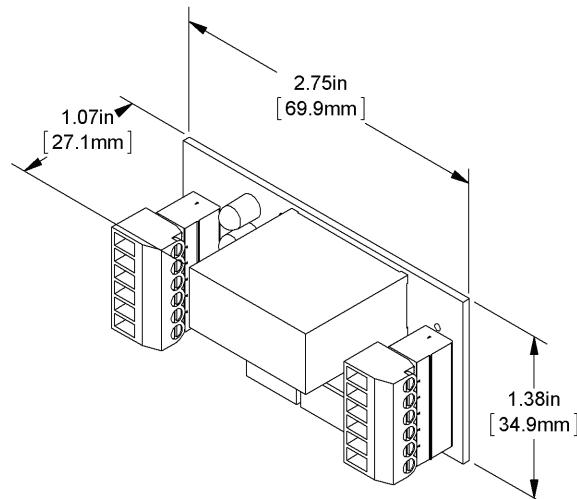
0 to 95% RH noncondensing

### Screw Terminals

16 to 28 AWG (1.29 mm to 0.32 mm)

### PCB

FR4 94V0





# SS-AC Selector Switch/Alarm Counter 8

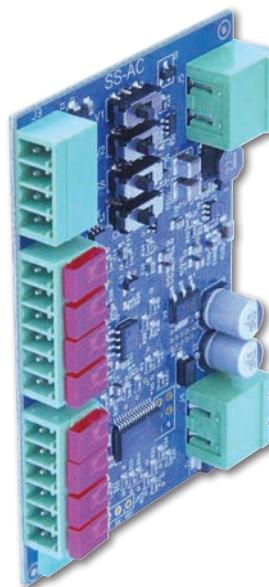
G3+

Rev. 11/12/15

ETA Line

## Overview

The SS-AC Selector Switch/Alarm Counter will monitor up to 8 dry contacts and output one or two voltage or mA signals. The output signals are based on the highest contact when the module is in Selector Mode, or the number of closed contacts with the module is in Counter Mode.



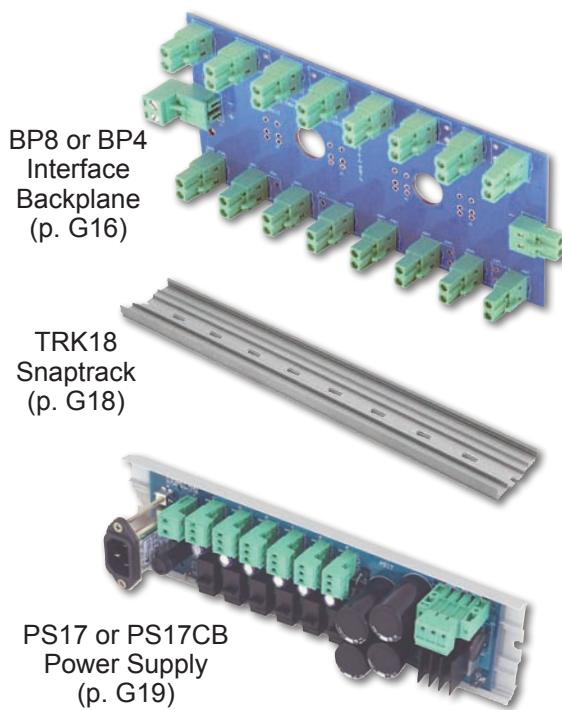
**Fig. 1:**  
SS-AC Selector Switch/Alarm Counter Module

## Ordering Information

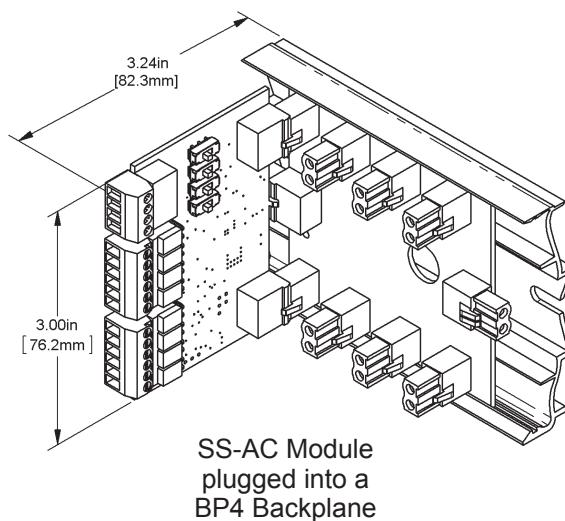
<u>Part Number</u>	<u>Description</u>
BA/SS-AC .....	Selector Switch/Alarm Counter

*See end of Section G for list pricing.*

## Associated Products



## Specifications



**Power Voltage:** 0 to 40 VAC or VDC  
**Power Current:** 50mA Maximum



Building Automation Products, Inc. • 750 North Royal Avenue, Gays Mills, WI 54631 USA  
Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: sales@bapihvac.com • Web: www.bapihvac.com



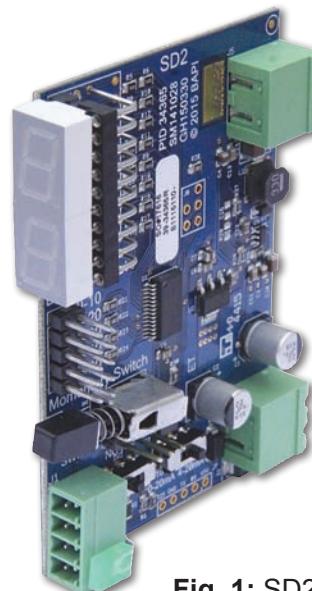
## Overview

The SD2 is an ETA module that is used to indicate a program error code which requires a manual reset. The module includes a manual reset switch that can be pressed to route a reset signal to a controller.

The polarity of the reset switch can be set to Normally Open (NO) or Normally Closed (NC) operation via the jumper on J2. When the reset switch is pressed, Terminals #3 and #4 of J1 are either connected or disconnected. Two 7-segment displays are available at the edge of the module, denoting where the input signal is within the range.

The SD module receives an input signal from a controller, and then displays a number from 0 to 10 up to 0 to 50, depending on the jumper position of J3. It can accept a current input of either 0 to 20mA or 4 to 20mA or a voltage input of 0 to 10V or 2 to 10V.

The unit is typically mounted in a BP2, BP4, BP8 or BP4V Backplane with power provided by the Backplane; however, the unit can be powered directly with an alternate DC supply. The green LED indicates that power is available to the module.



**Fig. 1:** SD2 Status Display Module

## Ordering Information

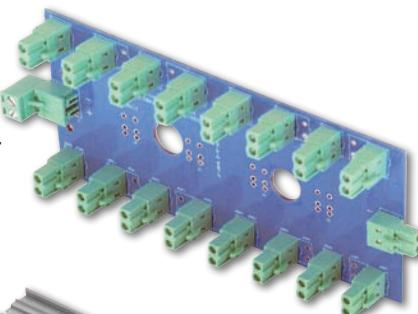
### BA/SD2

Status Display w/ Dual 7-Segment Display

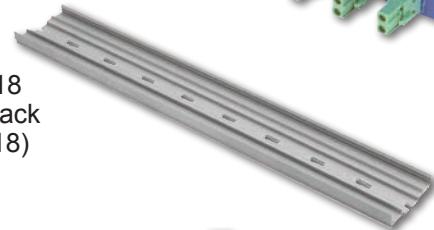
*See end of Section G for list pricing.*

## Associated Products

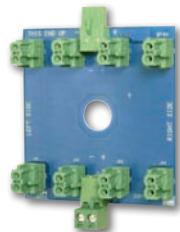
BP8 or BP4 Interface Backplane (p. G16)



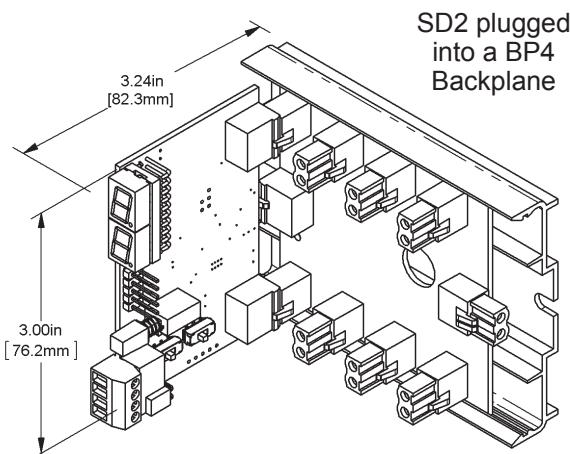
TRK18 Snaptrack (p. G18)



BP4V Vertical Backplane (p. G17)



## Specifications



- Power Supply:** MCP2456 switching regulator. Supplies 12V which is then dropped down by linear regulator MCP1703 to 5V for the on-board circuitry, and acts as the reference for the ADC.
- Microprocessor:** PIC16F1938 utilizing on-board ADC, LCD driver, UART, ISP and GPIO.
- Dual 7-segment display:** LTS-1802

**Power Voltage:** 16 to 35VDC

**Power Current:** 50mA Max



Rev. 11/12/15

# PE4 - Pulse Extender

G' -

ETA Line

## Overview

The PE4 takes the input pulse to the board and extends the output to a controller or monitor. The pulse can be extended two different ways and then split or divided.

### Extender Option 1:

Extends the pulse to 100ms

### Extender Option 2:

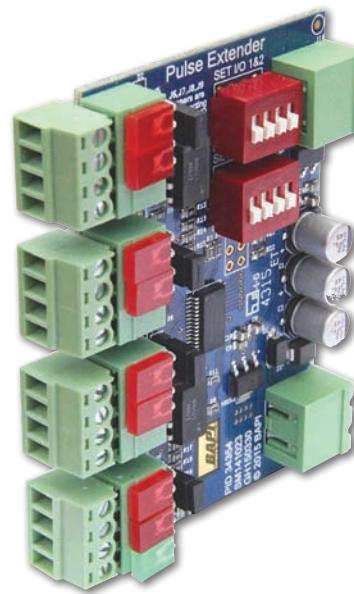
Extends the pulse to 10s

### Split:

Take one input and then produce two isolated output pulses.

### Divider:

Takes the input pulse and divides it by 2, 4, 8 or 16 to create an output pulse with lower frequency.



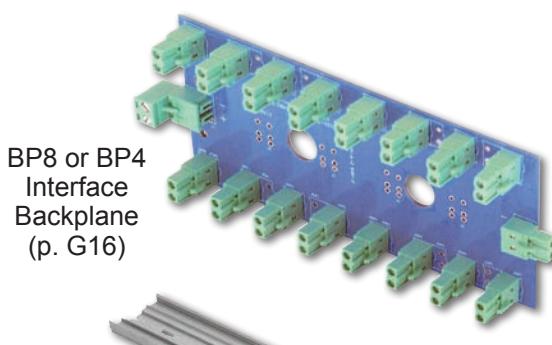
**Fig. 1:**  
PE4 - Pulse Extender

## Ordering Information

Part Number	Description
BA/PE4.....	Pulse Extender

*See end of Section G for list pricing.*

## Associated Products

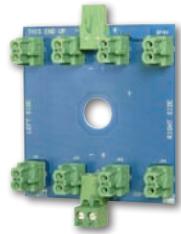


BP8 or BP4  
Interface  
Backplane  
(p. G16)

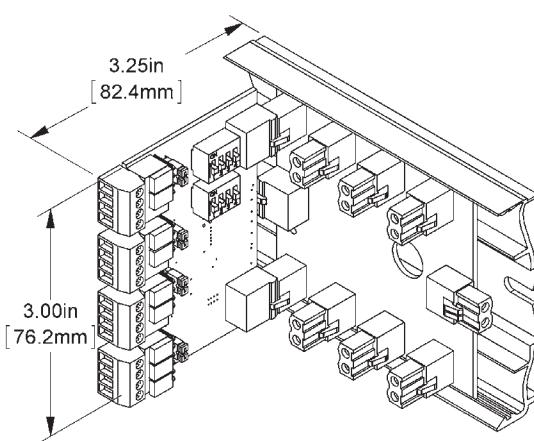


TRK18  
Snaptrack  
(p. G18)

BP4V  
Vertical  
Backplane  
(p. G17)



## Specifications



PE4 - Pulse Extender  
plugged into a BP4  
Backplane

**Power Voltage:** 26 to 36V  
**Power Current:** 125mA Max.



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## Overview

BAPI makes a NEMA 1 and NEMA 4X 14-gauge painted steel enclosure in the 44"x20"x8" size. The NEMA 1 model weighs approximately 90 pounds, while the NEMA 4X watertight model features a door seal with latches and weighs approximately 95 pounds.

Two permanent dividers provide a wireway for input and output conduit connections at the top of the enclosure and a high voltage compartment at the bottom of the enclosure for the power supply.

Flipping the enclosure 180 degrees accommodates left and right hand door openings. No knockouts are provided; drill and punch where you need conduit openings.

Each NEMA 1 and NEMA 4X models come with a Large Backplate (BP185X285), a Small Backplate (BP6X185) and two Bracket Cable Guides (BCG).

<u>Part Number</u>	<u>Description</u>
<b>BA/44208N1S</b> .....	NEMA 1X Steel Enclosure, 44"x20"x8"
<b>BA/44208N4XS</b> .....	NEMA 4X Steel Enclosure, 44"x20"x8"



**44208N1S - NEMA  
1 Steel Enclosure  
44"x20"x8"**

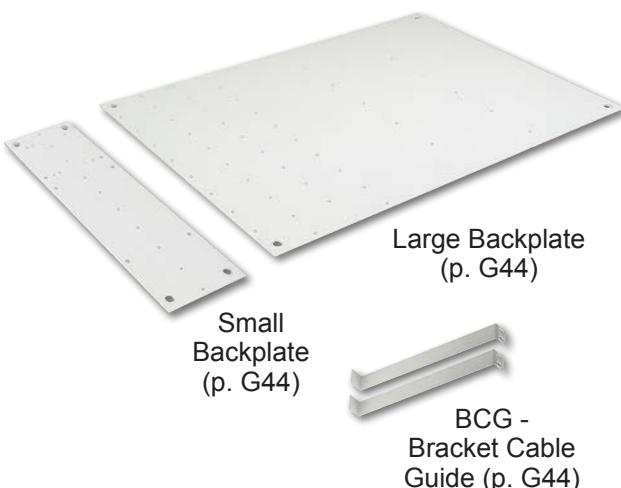
## Associated Products

### Enclosure Backplates and Bracket Cable Guides

The appropriate size backplate(s) and two Bracket Cable Guides are included with each BAPI enclosure.

The Backplates are made of 12-gauge painted steel and pierced with a hole pattern that accommodates the various components which will be installed in the enclosure including snaptrack, panduit wire duct, bracket cable guides, transformers and DDC controllers.

More information on the Backplates and Bracket Cable Guides is found on page G44.



Large Backplate  
(p. G44)

Small  
Backplate  
(p. G44)

BCG -  
Bracket Cable  
Guide (p. G44)





Rev. 06/08/17

# 20x20x8 Steel Enclosure

G4%

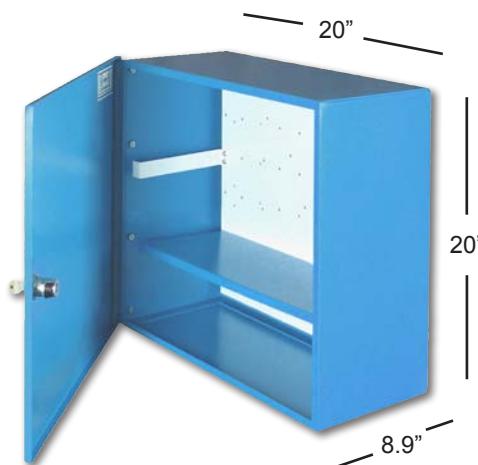
ETA Line

## Overview

The BAPI 20208N1S is a NEMA 1, 14-gauge painted steel enclosure that weighs approximately 47 pounds. One field-installed divider provides a high voltage compartment in the enclosure to isolate a power supply.

Flipping the enclosure 180 degrees accommodates left and right hand door openings. Mount the enclosure by drilling holes in the back to fit your application. No knockouts are provided; drill and punch where you need conduit openings.

Each BAPI 20208N1S comes with a backplate and two Bracket Cable Guides (BCG).



<u>Part Number</u>	<u>Description</u>
BA/20208N1S .....	Steel Enclosure, 20x20x8

**20208N1S - Painted  
Steel Enclosure  
20x20x8**

*See end of Section G for list pricing.*

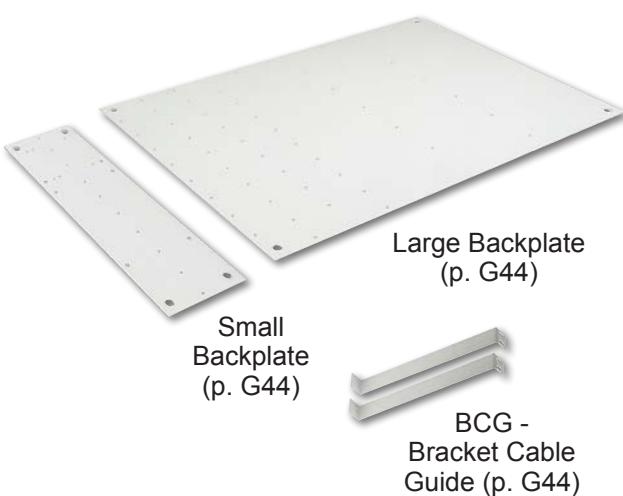
## Associated Products

### Enclosure Backplates and Bracket Cable Guides

The appropriate size backplate(s) and two Bracket Cable Guides are included with each BAPI enclosure.

The Backplates are made of 12-gauge painted steel and pierced with a hole pattern that accommodates the various components which will be installed in the enclosure including snaptrack, panduit wire duct, bracket cable guides, transformers and DDC controllers.

More information on the Backplates and Bracket Cable Guides is found on page G44.

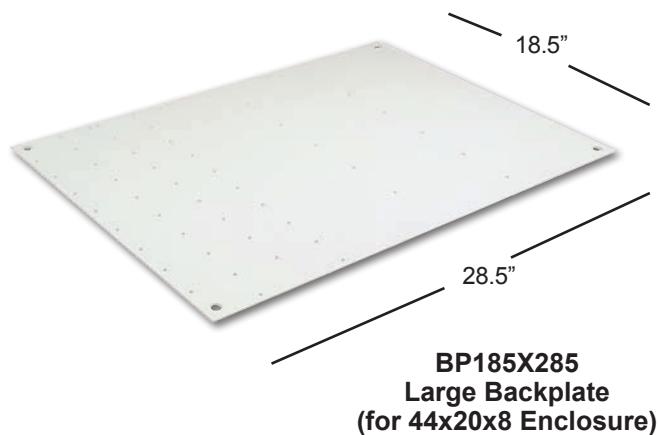




## Overview

The BP185x285 - Large Backplate is made of 12-gauge painted steel and pierced with a hole pattern that accommodates the BAPI TRK18, PAN16 and the Carrier® Comfort Controller 1600 and 6400.

The Large Backplate mounts to the enclosure with four threaded studs welded to the back of the enclosure.



### Part Number    Description

**BA/BP185X285**.Large Backplate (for 44x20x8 Encl.)

*See end of Section G for list pricing.*

Carrier® is a trademark of Carrier Corporation, Registered in the United States and other countries.

## BP6X185 - Small Backplate

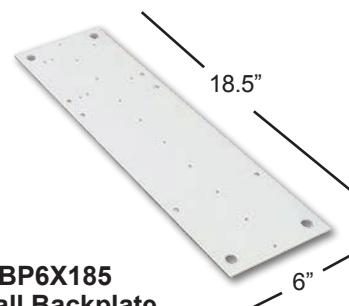
ETA Line



## Overview

The BP6x185 - Small Backplate is made of 12-gauge painted steel and pierced with a hole pattern that accommodates the BAPI TRK18 and power transformers.

The Small Backplate mounts to the enclosure with four threaded studs welded to the back of the enclosure.



### Part Number    Description

**BA/BP6X185** .....Small Backplate

*See end of Section G for list pricing.*

## BCG - Bracket Cable Guide

ETA Line



## Overview

The BCG - Bracket Cable Guide screws to the edge of the enclosure backplate. The non-pierced ear is placed against the enclosure's lip forming a wire holding loop with the enclosure side. The 14-gauge BCG will hold all but the largest wire. The BCG measures 7" long by .79" high.



### Part Number    Description

**BA/BCG** .....Bracket Cable Guide (Set of 2)

*See end of Section G for list pricing.*





<b>Page</b>	<b>Part Number</b>	<b>Description</b>	<b>List Price</b>
G4 .....	<b>BA/DS8</b>	Discrete Summary Module, 8 Input.....	\$95.00
G5 .....	<b>BA/EA1</b>	2 Position Actuator Interface .....	\$105.00
G6 .....	<b>BA/EA2</b>	Modulating Acuator Interface .....	\$87.00
G7 .....	<b>BA/OAM</b>	Output Adjust Module.....	\$23.00
G8 .....	<b>BA/CDSP</b>	Carbon Dioxide Sensor Power Supply.....	\$60.00
G9 .....	<b>BA/CDSP2</b>	Carbon Dioxide Sensor Power Supply.....	\$130.00
G10.....	<b>BA/SQ4</b>	4-Step Sequence Module.....	\$105.00
G10.....	<b>BA/SQ4-R</b>	4-Step Sequence Module (Rotational).....	\$105.00
G10.....	<b>BA/SQ4-A</b>	4-Step Sequence Module (with Alarm).....	\$280.00
G10.....	<b>BA/SQ4-RA</b>	4-Step Sequence Module (Rotational with Alarm) .....	\$280.00
G11.....	<b>BA/3312VC</b>	Voltage Converter (33VDC to 12VDC).....	\$120.00
G11.....	<b>BA/3324VC</b>	Voltage Converter (33VDC to 24VDC).....	\$120.00
G12.....	<b>BA/R49</b>	Relay Interface Module, 9 Output .....	\$125.00
G13.....	<b>BA/DS6R</b>	Dry Switch Monitor, 30K Output.....	\$95.00
G13.....	<b>BA/DS6R-10K</b>	Dry Switch Monitor, 10K Output.....	\$95.00
G14.....	<b>BA/PMPB5</b>	Pulse Meter Pulse Buffer .....	\$27.50
G14.....	<b>BA/TS1</b>	Transient Suppressor (voltage).....	\$7.50
G14.....	<b>BA/TS2</b>	Transient Suppressor (current) .....	\$7.50
G15.....	<b>BA/TURB</b>	Terminal Unit Relay Board .....	\$57.00
G15.....	<b>BA/TURB-TRK</b>	TURB with 4" piece of 2.75" snaptrack .....	\$65.00
G16.....	<b>BA/BP2</b>	2-Position Interface Backplane .....	\$30.00
G16.....	<b>BA/BP4</b>	4-Position Interface Backplane .....	\$40.00
G16.....	<b>BA/BP8</b>	8-Position Interface Backplane .....	\$65.00
G17.....	<b>BA/BP4-V</b>	Vertical Backplane.....	\$40.00
G17.....	<b>BA/BP-BR</b>	Bridge (to connect Vertical Backplanes) .....	\$22.00
G18.....	<b>BA/TRK01</b>	TR2 Snaptrack, 1.25" length .....	\$5.00
G18.....	<b>BA/TRK02</b>	TR2 Snaptrack, 2" length .....	\$6.00
G18.....	<b>BA/TRK04</b>	TR2 Snaptrack, 4" length .....	\$8.00
G18.....	<b>BA/TRK08</b>	TR2 Snaptrack, 8" length .....	\$10.00
G18.....	<b>BA/TRK12</b>	TR2 Snaptrack, 12" length .....	\$12.00
G18.....	<b>BA/TRK18</b>	TR2 Snaptrack, 18" length .....	\$14.00
G18.....	<b>BA/TRK48</b>	TR2 Snaptrack, 48" length .....	\$40.00

Gray shaded items follow the Buy and Resale Multiplier.





Page	Part Number	Description	List Price
G18.....	<b>BA/PAN16</b>	Panduit 1x3x16" Wire Duct .....	\$39.00
G19.....	<b>BA/PS17</b>	Power Supply Fuse Block .....	\$303.00
G19.....	<b>BA/PS17CB</b>	Power Supply with Circuit Breakers .....	\$353.00
G20.....	<b>BA/COMBLK</b>	Communications Cable Terminal Block.....	\$65.00
G20.....	<b>BA/COMBLK2</b>	Communications Cable Terminal Block.....	\$53.00
G20.....	<b>BA/TB18</b>	Pluggable Terminal Block.....	\$55.00
G20.....	<b>BA/TB18C</b>	Pluggable Terminal Block (odds common).....	\$90.00
G20.....	<b>BA/TB18C2</b>	Pluggable Terminal Block (odds common, evens common) .	\$125.00
G21.....	<b>BA/COMSRG</b>	Communications Surge Protector .....	\$55.00
G22.....	<b>BA/RPTR</b>	RS-485 Repeater .....	\$215.00
G23.....	<b>BA/RPTR-KIT</b>	RS-485 Repeater Communication Kit.....	\$335.00
G24.....	<b>BA/FOX</b>	RS-485 Fiber Optic Transceiver.....	\$340.00
G25.....	<b>BA/FOX-KIT</b>	FOX Communication Kit.....	\$460.00
G26.....	<b>BA/SOX</b>	RS-485 Fiber Optic Transceiver (for single-mode fiber cable).	\$315.00
G27.....	<b>BA/PLCON1</b>	PremierLink™ Connector 1.....	\$105.00
G27.....	<b>BA/PLCON2</b>	PremierLink™ Connector 2.....	\$90.00
G28.....	<b>BA/RBP4</b>	Communications Repeater Backplane, 4 rows .....	\$90.00
G28.....	<b>BA/RBP4-TRK</b>	RBP4 with 4" piece of 2.75" snaptrack.....	\$98.00
G28.....	<b>BA/RBP8</b>	Communications Repeater Backplane, 8 row .....	\$145.00
G28.....	<b>BA/RBP8-TRK</b>	RBP with 8" piece of 2.75" snaptrack.....	\$155.00
G29.....	<b>BA/RBP-PB</b>	Power Bridge for Comm. Repeater Backplane .....	\$62.00
G29.....	<b>BA/RBPCX</b>	Left Side Extender for Comm. Repeater Backplane .....	\$55.00
G29.....	<b>BA/RBPCX2</b>	Right Side Extender for Comm. Repeater Backplane.....	\$55.00
G30.....	<b>BA/SRBP</b>	Single Repeater Backplane.....	\$50.00
G30.....	<b>BA/SRBP-TRK</b>	SRBP with 2" piece of 2.75" snaptrack .....	\$56.00
G31.....	<b>BA/TUCOM</b>	Terminal Unit Communications Block.....	\$22.00
G31.....	<b>BA/BELCON</b>	Mating Pair of Belimo® Connectors .....	\$12.00
G32.....	<b>BA/AVI</b>	Air Valve Interface .....	\$150.00
G33.....	<b>BA/AVI-TRK</b>	Air Valve Interface with 4" piece of 2.75" Snaptrack .....	\$158.00
G33.....	<b>BA/AVI-ADAPT</b>	Air Valve Interface Adapter with toggle connector.....	\$14.00
G33.....	<b>BA/AVI-ADAPT-QC</b>	Air Valve Interface Adapter with 1/4" Quick Connects.....	\$18.00

Gray shaded items follow the Buy and Resale Multiplier.





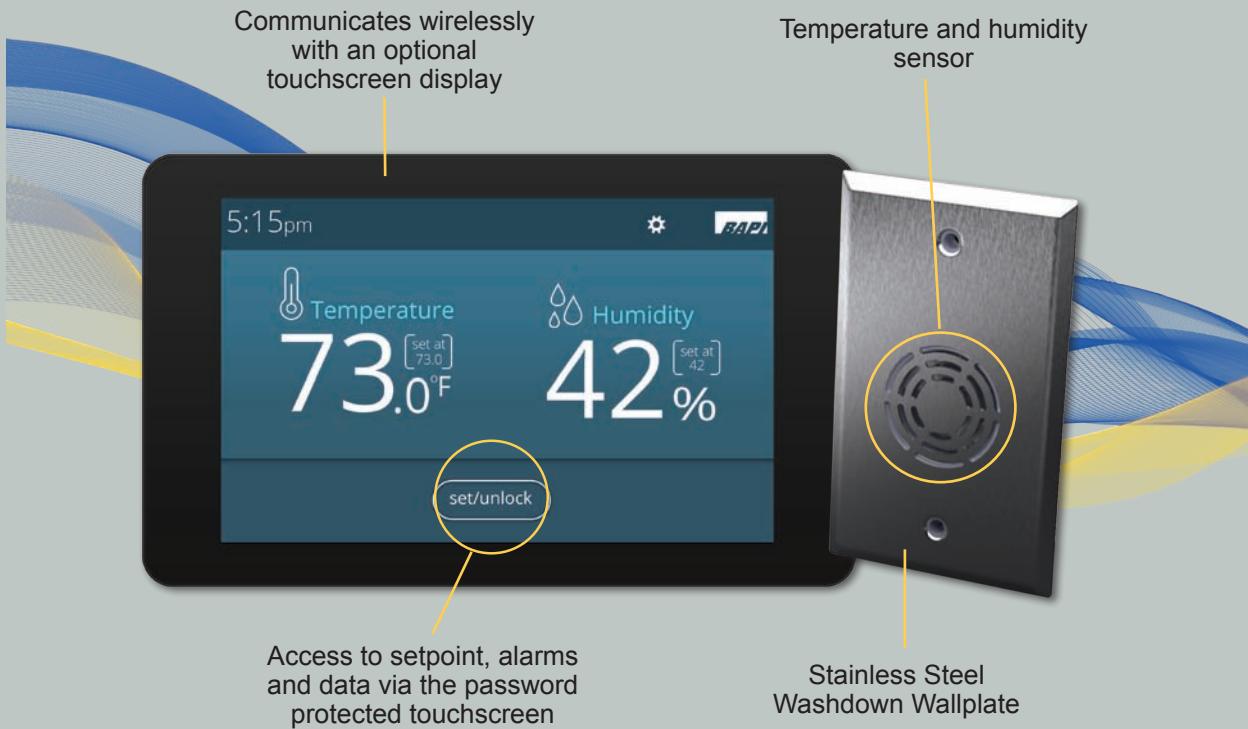
Page	Part Number	Description	List Price
G35.....	<b>BA/IRM4</b>	Interposing Relay Module .....	\$153.00
G35.....	<b>BA/LRCA</b>	Link Router Communications Adapter.....	\$31.75
G35.....	<b>BA/PSOCL</b>	Power Supply Output Current Limiter .....	\$32.15
G36.....	<b>BA/UCRB2</b>	Universal Controller Relay Board.....	\$100.00
G37.....	<b>BA/SS-AC</b>	Selector Switch/Alarm Counter .....	\$225.00
G38.....	<b>BA/SD2</b>	Status Display, Dual 7 Segment Display.....	\$295.00
G39.....	<b>BA/PE4</b>	Pulse Extender.....	\$180.00
G40.....	<b>BA/44208N1S</b>	Steel Enclosure, 44x20x8 .....	Call for Pricing
G40.....	<b>BA/44208N4XS</b>	Painted Steel Encl., 44x20x8 .....	Call for Pricing
G41.....	<b>BA/20208N1S</b>	Steel Enclosure, 20x20x8 .....	Call for Pricing
G42.....	<b>BA/BP185X285</b>	Large Backplate (for 44x20x8 Encl.) .....	\$80.00
G42.....	<b>BA/BP6X185</b>	Small Backplate .....	\$35.00
G42.....	<b>BA/BCG</b>	Bracket Cable Guide (Set of 2) .....	\$16.00

Gray shaded items follow the Buy and Resale Multiplier.



# Vivarium Washdown Wall Plate

## — Temp/Humidity Sensor —



- Flush Mount Stainless Steel Wall Plate for Washdown Applications
- Temperature and Humidity Combination Sensor
- Optional Remote Display for Temp and Humidity Setpoint Adjustment and Alarms
- 30 Day Data Logging

The Vivarium Wall Plate features a flush mount stainless steel wall plate with splash guard for washdown applications. It is available as a humidity sensor alone or as a temperature/humidity combination sensor.

The optional Remote Display allows for temperature and humidity setpoint adjustment, room monitoring, data logging and alarm notification.



## Temperature, Humidity & Pressure Sensor Overview

There are many facilities and locations today that rely on temperature, pressure and humidity sensors and transmitters to provide a stable, secure environment, such as hospitals, clean rooms and data centers. The sensor or transmitter itself can make or break the system, therefore they must be dependable, accurate and 100% compatible with the building control system. More demanding environments, advances in technology, and changing customer needs keep the industry striving for new and improved sensors and transmitters. As the industry continues to change, BAPI will be at the forefront providing high performance solutions for real world applications.

BAPI offers a wide range of temperature, humidity and pressure sensors and transmitters in all of our room, duct, immersion and outside air units so that they are 100% compatible with the facility's control system.

## Temperature Sensors & Transmitters

### **THERMISTORS - pages H2 - H8**

Thermistors are thermally sensitive resistors known for exhibiting a large change in resistance with only a small change in temperature. A thermistor's change in resistance is non-linear. It follows a pre-defined curve which is provided by the thermistor manufacturer.

### **RTDs - pages H9 - H12**

RTDs (Resistance Temperature Detectors) are thermally sensitive resistive elements that exhibit a small change in resistance per degree of temperature change. RTDs are especially recognized for excellent linearity throughout their temperature range with a high degree of accuracy and repeatability.

### **TEMPERATURE TRANSMITTERS - pages H13 - H14**

Temperature transmitters incorporate a 10KΩ thermistor or a 1KΩ platinum RTD and an amplifier. These devices provide an accurate and predictable 4 to 20mA output over a specified temperature range. They are specifically designed for temperature sensing and transmission over long distances without degradation of the 4 to 20mA signal.

## Humidity Transmitters & Pressure Sensors

### **HUMIDITY TRANSMITTERS - pages H15 - H16**

Humidity transmitters provide a high accuracy 4 to 20mA, 0 to 5V or 0 to 10V humidity measurement. Accuracies of 2% or 3% Relative Humidity (RH) are available. BAPI room units are protected by a molded housing with an integral filter, while duct and outside air units come with a removable 80 micron sintered stainless steel filter. The sensor is unaffected by volatile organic compounds (VOC's) or surface contamination.

### **PRESSURE SENSORS - pages H17**

The heart of every BAPI Pressure Sensor is a micro-machined, single-crystal silicon, piezoresistive pressure sensor that changes resistance as a function of applied pressure. Each sensor is fabricated using the same integrated circuit technology used to make millions of cell phones, game machines and personal computers. Since silicon strain gauges have high output levels in relation to the pressure applied, the pressure levels in the BAPI diaphragm can be lower than in other non-silicon strain gauges. This means a more accurate measurement of lower pressure levels.

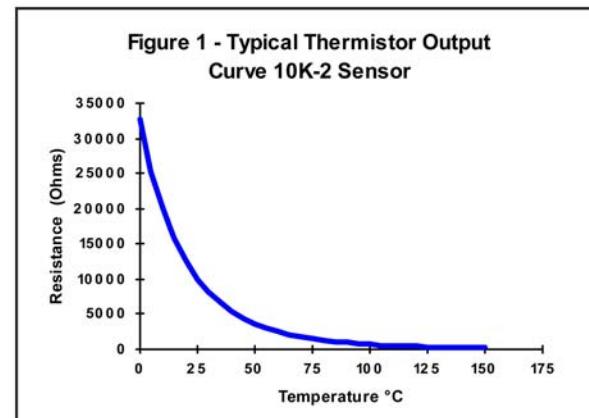


## Thermistor Description

BAPI Thermistors are thermally sensitive resistors known for exhibiting a large change in resistance with only a small change in temperature. It is important to note that a thermistor's change in resistance is non-linear. It follows a pre-defined curve which is provided by the thermistor manufacturer. An example of a thermistor output curve can be seen in **Figure 1**.

Thermistors are manufactured to follow a specific curve with a high degree of accuracy. All BAPI thermistors have a standard accuracy of  $\pm 0.2$  °C throughout the commercial temperature range of 0 to 70 °C. BAPI also has available a higher accuracy sensor for meeting tougher specs. The extra precision [XP] line has an initial accuracy of  $\pm 0.1$  °C throughout the commercial temperature range of 0 to 70 °C. Please call for availability and pricing on [XP] line thermistors. Both accuracy levels allow BAPI thermistors to be interchanged without the extra expense of offsetting the controller.

\* All Passive Thermistors 10K Ω and smaller are CE compliant.



## Thermistor Specifications

### DEFINITION OF SPECIFICATION TERMS

**Interchangeability Tolerance (Accuracy):**  
The maximum amount that thermistors following the same curve will differ from each other.

**Dissipation Constant:**  
The power needed to raise the thermistor's body temperature by 1°C. At the heart of all BAPI thermistor products is a sensor with a 2.7 mW/C dissipation constant to ensure that self-heating stays at an absolute minimum.

**Stability (drift):**  
The amount that the resistance characteristics of a thermistor will change. BAPI uses only the highest quality, "pre-aged" thermistors with very small drift values. Over a ten year span, BAPI thermistors will not change more than 0.1°C.

**Operating Range:**  
The operating range shown is for the thermistor only. The mounting package may further limit the operating range and is described on each mounting type specification. The thermal time constant will also be affected based on the added mass of the stainless steel probe and moisture protection encapsulation.

**Thermal Time Constant**  
Bare sensors are typically measured and specified in still air and are timed at the statistical 63.2% of the step temperature change. A stirred liquid test will typically result in a much faster response time and is also timed at 63.2% of the step temperature change. The time constant is always the same whatever the temperature step change may be.

### Thermistor Specifications

**Interchangeability Tolerance (Accuracy):**  
Standard Sensor:  $\pm 0.2$  °C (0 to 70 °C)  
High Accuracy [XP] Sensor:  $\pm 0.1$  °C (0 to 70 °C)

**Dissipation Constant:** 2.7 mW/C

**Stability (drift):** Less than 0.02 °C / year

**Thermal Time Constant:** 5 seconds (bead in still air)  
.5 seconds (stirred liquid)

Sensor Type	Reference Resistance	Operating Range
1.8K	1.8 KΩ @ 25 °C	-55 to 150 °C
2.2K	2.2 KΩ @ 25 °C	-55 to 150 °C
3K**	3 KΩ @ 25 °C	-55 to 150 °C
3.3K	3.3 KΩ @ 25 °C	-55 to 150 °C
10K-2**	10 KΩ @ 25 °C	-55 to 150 °C
10K-3**	10 KΩ @ 25 °C	-55 to 150 °C
10K-3(11K)**	5.2 KΩ @ 25 °C	-55 to 150 °C
20K**	20 KΩ @ 25 °C	-55 to 150 °C
47K	47 KΩ @ 25 °C	-55 to 150 °C
50K	50 KΩ @ 25 °C	-80 to 150 °C
100K**	100 KΩ @ 25 °C	-55 to 150 °C

Other Thermistors are available. Contact BAPI for availability and specifications of additional thermistors.

\*\*Available as an [XP] high accuracy sensor.  
Minimum quantities and long lead times may apply.  
10K-2[XP] and 10K-3[XP] thermistors are typically stocked items





Rev. 10/16/12

# 1.8K Thermistor Output Table

BAPI Sensor Specifications

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## 1.8K Thermistor Output Table

°F	°C	Ohms
-39	-39.44	34389
-37	-38.33	32336
-35	-37.22	30419
-33	-36.11	28628
-31	-35.00	26955
-29	-33.89	25390
-27	-32.78	23927
-25	-31.67	22557
-23	-30.56	21275
-21	-29.44	20064
-19	-28.33	18939
-17	-27.22	17885
-15	-26.11	16896
-13	-25.00	15969
-11	-23.89	15098
-9	-22.78	14281
-7	-21.67	13512
-5	-20.56	12791
-3	-19.44	12106
-1	-18.33	11468
1	-17.22	10868
3	-16.11	10303
5	-15.00	9771
7	-13.89	9270
9	-12.78	8798
11	-11.67	8352
13	-10.56	7933
15	-9.44	7533
17	-8.33	7159
19	-7.22	6807
21	-6.11	6473
23	-5.00	6159
25	-3.89	5861
27	-2.78	5580
29	-1.67	5314
31	-0.56	5062
33	0.56	4822
35	1.67	4596

°F	°C	Ohms
37	2.78	4383
39	3.89	4180
41	5.00	3989
43	6.11	3807
45	7.22	3635
47	8.33	3471
49	9.44	3316
51	10.56	3167
53	11.67	3028
55	12.78	2895
57	13.89	2769
59	15.00	2649
61	16.11	2535
63	17.22	2426
65	18.33	2323
67	19.44	2225
69	20.56	2131
71	21.67	2042
73	22.78	1957
75	23.89	1877
77	25.00	1800
79	26.11	1727
81	27.22	1657
83	28.33	1590
85	29.44	1527
87	30.56	1466
89	31.67	1408
91	32.78	1353
93	33.89	1300
95	35.00	1250
97	36.11	1201
99	37.22	1155
101	38.33	1111
103	39.44	1069
105	40.56	1029
107	41.67	990
109	42.78	954
111	43.89	918

°F	°C	Ohms
113	45.00	885
115	46.11	852
117	47.22	822
119	48.33	792
121	49.44	763
123	50.56	736
125	51.67	710
127	52.78	685
129	53.89	661
131	55.00	638
133	56.11	616
135	57.22	595
137	58.33	574
139	59.44	555
141	60.56	536
143	61.67	518
145	62.78	500
147	63.89	484
149	65.00	468
151	66.11	452
153	67.22	438
155	68.33	423
157	69.44	410
159	70.56	396
161	71.67	384
163	72.78	372
165	73.89	360
167	75.00	349
169	76.11	338
171	77.22	327
173	78.33	317
175	79.44	307
177	80.56	298
179	81.67	289
181	82.78	280
183	83.89	272
185	85.00	264
187	86.11	256

\* All Passive Thermistors 10K Ω and smaller are CE compliant.

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## 3K Thermistor Output Table

°F	°C	Ohms
-39	-39.44	96941
-37	-38.33	90108
-35	-37.22	83804
-33	-36.11	77983
-31	-35.00	72607
-29	-33.89	67637
-27	-32.78	63041
-25	-31.67	58789
-23	-30.56	54851
-21	-29.44	51173
-19	-28.33	47795
-17	-27.22	44663
-15	-26.11	41756
-13	-25.00	39059
-11	-23.89	36553
-9	-22.78	34225
-7	-21.67	32061
-5	-20.56	30047
-3	-19.44	28157
-1	-18.33	26414
1	-17.22	24790
3	-16.11	23277
5	-15.00	21865
7	-13.89	20549
9	-12.78	19320
11	-11.67	18173
13	-10.56	17101
15	-9.44	16091
17	-8.33	15155
19	-7.22	14280
21	-6.11	13461
23	-5.00	12694
25	-3.89	11975
27	-2.78	11302
29	-1.67	10671
31	-0.56	10079
33	0.56	9519
35	1.67	8999

°F	°C	Ohms
37	2.78	8510
39	3.89	8050
41	5.00	7619
43	6.11	7213
45	7.22	6831
47	8.33	6472
49	9.44	6134
51	10.56	5813
53	11.67	5513
55	12.78	5231
57	13.89	4965
59	15.00	4714
61	16.11	4478
63	17.22	4254
65	18.33	4043
67	19.44	3844
69	20.56	3655
71	21.67	3477
73	22.78	3309
75	23.89	3150
77	25.00	3000
79	26.11	2858
81	27.22	2723
83	28.33	2596
85	29.44	2475
87	30.56	2360
89	31.67	2252
91	32.78	2149
93	33.89	2051
95	35.00	1959
97	36.11	1871
99	37.22	1788
101	38.33	1709
103	39.44	1634
105	40.56	1562
107	41.67	1494
109	42.78	1430
111	43.89	1368

°F	°C	Ohms
113	45.00	1310
115	46.11	1255
117	47.22	1202
119	48.33	1151
121	49.44	1104
123	50.56	1058
125	51.67	1014
127	52.78	973
129	53.89	933
131	55.00	895
133	56.11	860
135	57.22	825
137	58.33	793
139	59.44	761
141	60.56	731
143	61.67	703
145	62.78	676
147	63.89	650
149	65.00	625
151	66.11	601
153	67.22	578
155	68.33	556
157	69.44	536
159	70.56	516
161	71.67	496
163	72.78	478
165	73.89	461
167	75.00	444
169	76.11	428
171	77.22	413
173	78.33	398
175	79.44	384
177	80.56	370
179	81.67	357
181	82.78	345
183	83.89	333
185	85.00	321
187	86.11	310

\* All Passive Thermistors 10K Ω and smaller are CE compliant.





Rev. 10/16/12

# 10K-2 Thermistor Output Table

**BAPI Sensor Specifications**

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## 10K-2 Thermistor Output Table

°F	°C	Ohms
-39	-39.44	323839
-37	-38.33	300974
-35	-37.22	279880
-33	-36.11	260410
-31	-35.00	242427
-29	-33.89	225809
-27	-32.78	210443
-25	-31.67	196227
-23	-30.56	183068
-21	-29.44	170775
-19	-28.33	159488
-17	-27.22	149024
-15	-26.11	139316
-13	-25.00	130306
-11	-23.89	121939
-9	-22.78	114165
-7	-21.67	106939
-5	-20.56	100218
-3	-19.44	93909
-1	-18.33	88090
1	-17.22	82670
3	-16.11	77620
5	-15.00	72911
7	-13.89	68518
9	-12.78	64419
11	-11.67	60592
13	-10.56	57017
15	-9.44	53647
17	-8.33	50526
19	-7.22	47606
21	-6.11	44874
23	-5.00	42317
25	-3.89	39921
27	-2.78	37676
29	-1.67	35573
31	-0.56	33599
33	0.56	31732
35	1.67	29996

°F	°C	Ohms
37	2.78	28365
39	3.89	26834
41	5.00	25395
43	6.11	24042
45	7.22	22770
47	8.33	21573
49	9.44	20446
51	10.56	19376
53	11.67	18378
55	12.78	17437
57	13.89	16550
59	15.00	15714
61	16.11	14925
63	17.22	14180
65	18.33	13478
67	19.44	12814
69	20.56	12182
71	21.67	11590
73	22.78	11030
75	23.89	10501
77	25.00	10000
79	26.11	9526
81	27.22	9078
83	28.33	8653
85	29.44	8251
87	30.56	7866
89	31.67	7505
91	32.78	7163
93	33.89	6838
95	35.00	6530
97	36.11	6238
99	37.22	5960
101	38.33	5697
103	39.44	5447
105	40.56	5207
107	41.67	4981
109	42.78	4766
111	43.89	4561

°F	°C	Ohms
113	45.00	4367
115	46.11	4182
117	47.22	4006
119	48.33	3838
121	49.44	3679
123	50.56	3525
125	51.67	3380
127	52.78	3242
129	53.89	3111
131	55.00	2985
133	56.11	2865
135	57.22	2751
137	58.33	2642
139	59.44	2538
141	60.56	2438
143	61.67	2343
145	62.78	2252
147	63.89	2165
149	65.00	2082
151	66.11	2003
153	67.22	1927
155	68.33	1855
157	69.44	1785
159	70.56	1718
161	71.67	1655
163	72.78	1594
165	73.89	1536
167	75.00	1480
169	76.11	1427
171	77.22	1375
173	78.33	1326
175	79.44	1279
177	80.56	1234
179	81.67	1190
181	82.78	1149
183	83.89	1109
185	85.00	1070
187	86.11	1034

\* All Passive Thermistors 10K Ω and smaller are CE compliant.



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## 10K-3 Thermistor Output Table

°F	°C	Ohms
-39	-39.44	232032
-37	-38.33	217394
-35	-37.22	203774
-33	-36.11	191093
-31	-35.00	179281
-29	-33.89	168275
-27	-32.78	158013
-25	-31.67	148442
-23	-30.56	139511
-21	-29.44	131100
-19	-28.33	123317
-17	-27.22	116045
-15	-26.11	109247
-13	-25.00	102889
-11	-23.89	96941
-9	-22.78	91374
-7	-21.67	86160
-5	-20.56	81276
-3	-19.44	76659
-1	-18.33	72371
1	-17.22	68348
3	-16.11	64574
5	-15.00	61031
7	-13.89	57703
9	-12.78	54578
11	-11.67	51641
13	-10.56	48879
15	-9.44	46259
17	-8.33	43817
19	-7.22	41519
21	-6.11	39354
23	-5.00	37316
25	-3.89	35395
27	-2.78	33585
29	-1.67	31878
31	-0.56	30267
33	0.56	28735
35	1.67	27302

°F	°C	Ohms
37	2.78	25948
39	3.89	24670
41	5.00	23462
43	6.11	22320
45	7.22	21241
47	8.33	20220
49	9.44	19254
51	10.56	18332
53	11.67	17467
55	12.78	16648
57	13.89	15872
59	15.00	15136
61	16.11	14439
63	17.22	13778
65	18.33	13151
67	19.44	12556
69	20.56	11987
71	21.67	11451
73	22.78	10942
75	23.89	10459
77	25.00	10000
79	26.11	9564
81	27.22	9149
83	28.33	8754
85	29.44	8379
87	30.56	8019
89	31.67	7679
91	32.78	7355
93	33.89	7047
95	35.00	6754
97	36.11	6474
99	37.22	6208
101	38.33	5954
103	39.44	5712
105	40.56	5479
107	41.67	5258
109	42.78	5048
111	43.89	4847

°F	°C	Ohms
113	45.00	4656
115	46.11	4473
117	47.22	4298
119	48.33	4131
121	49.44	3971
123	50.56	3817
125	51.67	3671
127	52.78	3532
129	53.89	3398
131	55.00	3271
133	56.11	3149
135	57.22	3032
137	58.33	2920
139	59.44	2812
141	60.56	2709
143	61.67	2610
145	62.78	2516
147	63.89	2425
149	65.00	2339
151	66.11	2256
153	67.22	2176
155	68.33	2099
157	69.44	2026
159	70.56	1955
161	71.67	1887
163	72.78	1822
165	73.89	1760
167	75.00	1700
169	76.11	1642
171	77.22	1587
173	78.33	1534
175	79.44	1483
177	80.56	1433
179	81.67	1386
181	82.78	1341
183	83.89	1297
185	85.00	1255
187	86.11	1214

\* All Passive Thermistors 10K Ω and smaller are CE compliant.





Rev. 10/16/12

# 10K-3 (11K) Thermistor Output Table

BAPI Sensor Specifications

H7

## 10K-3 (11K) Thermistor Output Table

°F	°C	Ohms
-39	-39.44	10502
-37	-38.33	10470
-35	-37.22	10437
-33	-36.11	10401
-31	-35.00	10364
-29	-33.89	10325
-27	-32.78	10284
-25	-31.67	10241
-23	-30.56	10196
-21	-29.44	10148
-19	-28.33	10099
-17	-27.22	10048
-15	-26.11	9994
-13	-25.00	9938
-11	-23.89	9879
-9	-22.78	9818
-7	-21.67	9755
-5	-20.56	9689
-3	-19.44	9620
-1	-18.33	9549
1	-17.22	9475
3	-16.11	9399
5	-15.00	9320
7	-13.89	9239
9	-12.78	9155
11	-11.67	9068
13	-10.56	8979
15	-9.44	8887
17	-8.33	8793
19	-7.22	8696
21	-6.11	8597
23	-5.00	8496
25	-3.89	8392
27	-2.78	8286
29	-1.67	8178
31	-0.56	8068
33	0.56	7955
35	1.67	7841

°F	°C	Ohms
37	2.78	7725
39	3.89	7608
41	5.00	7489
43	6.11	7369
45	7.22	7247
47	8.33	7124
49	9.44	7001
51	10.56	6875
53	11.67	6749
55	12.78	6623
57	13.89	6497
59	15.00	6370
61	16.11	6244
63	17.22	6117
65	18.33	5990
67	19.44	5863
69	20.56	5736
71	21.67	5611
73	22.78	5486
75	23.89	5361
77	25.00	5238
79	26.11	5116
81	27.22	4995
83	28.33	4875
85	29.44	4756
87	30.56	4638
89	31.67	4522
91	32.78	4408
93	33.89	4295
95	35.00	4185
97	36.11	4076
99	37.22	3968
101	38.33	3863
103	39.44	3760
105	40.56	3657
107	41.67	3558
109	42.78	3460
111	43.89	3365

°F	°C	Ohms
113	45.00	3271
115	46.11	3180
117	47.22	3090
119	48.33	3003
121	49.44	2918
123	50.56	2834
125	51.67	2753
127	52.78	2673
129	53.89	2596
131	55.00	2521
133	56.11	2448
135	57.22	2377
137	58.33	2307
139	59.44	2240
141	60.56	2173
143	61.67	2110
145	62.78	2048
147	63.89	1987
149	65.00	1929
151	66.11	1872
153	67.22	1817
155	68.33	1763
157	69.44	1711
159	70.56	1660
161	71.67	1611
163	72.78	1563
165	73.89	1517
167	75.00	1472
169	76.11	1429
171	77.22	1387
173	78.33	1346
175	79.44	1307
177	80.56	1268
179	81.67	1231
181	82.78	1195
183	83.89	1160
185	85.00	1126
187	86.11	1094

\* All Passive Thermistors 10K Ω and smaller are CE compliant.

Building Automation Products, Inc. • 750 North Royal Avenue, Gays Mills, WI 54631 USA  
Tel: +1-608-735-4800 • Fax: +1-608-735-4804 • Email: sales@bapihvac.com • Web: www.bapihvac.com



## 20K Thermistor Output Table

°F	°C	Ohms
-39	-39.44	776470
-37	-38.33	719538
-35	-37.22	667144
-33	-36.11	618900
-31	-35.00	574453
-29	-33.89	533481
-27	-32.78	495691
-25	-31.67	460818
-23	-30.56	428619
-21	-29.44	398615
-19	-28.33	371140
-17	-27.22	345732
-15	-26.11	322223
-13	-25.00	300459
-11	-23.89	280301
-9	-22.78	261622
-7	-21.67	244304
-5	-20.56	228239
-3	-19.44	213201
-1	-18.33	199368
1	-17.22	186518
3	-16.11	174575
5	-15.00	163471
7	-13.89	153140
9	-12.78	143526
11	-11.67	134575
13	-10.56	126236
15	-9.44	118397
17	-8.33	111156
19	-7.22	104402
21	-6.11	98099
23	-5.00	92214
25	-3.89	86719
27	-2.78	81583
29	-1.67	76783
31	-0.56	72294
33	0.56	68057
35	1.67	64129

°F	°C	Ohms
37	2.78	60451
39	3.89	57005
41	5.00	53777
43	6.11	50750
45	7.22	47912
47	8.33	45249
49	9.44	42750
51	10.56	40383
53	11.67	38180
55	12.78	36111
57	13.89	34165
59	15.00	32336
61	16.11	30615
63	17.22	28996
65	18.33	27472
67	19.44	26037
69	20.56	24674
71	21.67	23400
73	22.78	22200
75	23.89	21068
77	25.00	20001
79	26.11	18994
81	27.22	18043
83	28.33	17145
85	29.44	16297
87	30.56	15488
89	31.67	14731
91	32.78	14016
93	33.89	13339
95	35.00	12699
97	36.11	12092
99	37.22	11519
101	38.33	10975
103	39.44	10461
105	40.56	9969
107	41.67	9507
109	42.78	9069
111	43.89	8654

°F	°C	Ohms
113	45.00	8260
115	46.11	7886
117	47.22	7531
119	48.33	7194
121	49.44	6874
123	50.56	6567
125	51.67	6278
127	52.78	6004
129	53.89	5742
131	55.00	5494
133	56.11	5258
135	57.22	5033
137	58.33	4819
139	59.44	4616
141	60.56	4420
143	61.67	4235
145	62.78	4059
147	63.89	3892
149	65.00	3732
151	66.11	3579
153	67.22	3434
155	68.33	3295
157	69.44	3163
159	70.56	3035
161	71.67	2914
163	72.78	2799
165	73.89	2689
167	75.00	2584
169	76.11	2484
171	77.22	2388
173	78.33	2296
175	79.44	2208
177	80.56	2123
179	81.67	2043
181	82.78	1966
183	83.89	1892
185	85.00	1822
187	86.11	1754



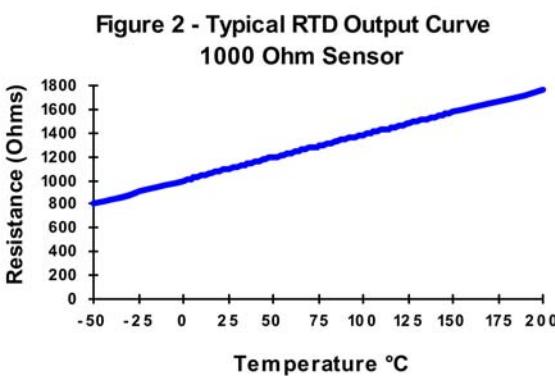


## RTD Description

BAPI RTDs (Resistance Temperature Detectors) are thermally sensitive resistive elements that exhibit a small change in resistance per degree of temperature change. RTDs are especially recognized for excellent linearity throughout their temperature range with a high degree of accuracy and repeatability. An example of an RTD output curve can be seen in **Figure 2**.

RTDs supplied in BAPI products feature a standard interchangeability tolerance of  $\pm 0.3^{\circ}\text{C}$  measured at  $0^{\circ}\text{C}$ . Higher accuracy sensors are also available. The Class A line [A] has an interchangeability tolerance of  $\pm 0.15^{\circ}\text{C}$  measured at  $0^{\circ}\text{C}$ . Please call for availability and pricing on Class A RTDs. Whether standard or Class A, BAPI RTDs have such a high accuracy that they can be interchanged without the expense of offsetting the controller.

Most RTD sensing elements can be packaged to withstand an extremely broad temperature range (-200 to  $600^{\circ}\text{C}$ ). For most purposes, the standard operating range should be sufficient, but we also have RTDs with a higher or lower operating temperature range. BAPI offers 1 k $\Omega$  Platinum RTDs with the ranges shown in the table at right.



## Standard & Extreme Temperature Ranges for the 1 k $\Omega$ Platinum RTD

Range	$^{\circ}\text{C}$	$^{\circ}\text{F}$
Standard	-60 to 150	-76 to 302
Low Temp [1]	-200 to 0	-328 to 32
High Temp [2]	100 to 210	212 to 410
Very High Temp [3]	200 to 600	392 to 1,112

When ordering a sensor with an "extreme" temperature range, include the number in brackets [ ] after the sensor type. Ex: **BA/1K[2]** is a 1 k $\Omega$  RTD with an operating range of 100 to  $210^{\circ}\text{C}$ .

## RTD Specifications

### Definition of Specification Terms

#### Tolerance of Resistance (Accuracy)

The maximum amount any RTD will differ from the standard resistance curve.

#### Stability (drift)

The amount that the resistance characteristics of a RTD will change over time under certain conditions.

#### Operating Range

The operating range shown is for the RTD sensor only. The mounting package may further limit the operating range and is described on each mounting type specification.

## RTD Specifications

### Tolerance of Resistance (Accuracy):

Single Point Standard:	0.12% at $0^{\circ}\text{C}$
Single Point Class A:	0.06% at $0^{\circ}\text{C}$
Averaging Standard:	0.2% at $0^{\circ}\text{C}$

### Tolerance in $^{\circ}\text{C}$ :

Single Point Standard:	$\pm(0.3 + 0.005T)$ ; T= Temp in $^{\circ}\text{C}$
Single Point Class A:	$\pm(0.15 + 0.002T)$ ; T= Temp in $^{\circ}\text{C}$
Averaging Standard:	$\pm(0.5 + 0.005(T-25))$ ; T= Temp in $^{\circ}\text{C}$

### Stability (drift):

$0.14^{\circ}\text{C}$  with 6,000 continuous hours at  $400^{\circ}\text{C}$

### Sensitivity:

1k $\Omega$ :  $3.85\Omega/^{\circ}\text{C}$  ( $2.14\Omega/^{\circ}\text{F}$ )

### Self Heating (1K RTD only):

$0.4^{\circ}\text{C}/\text{mW}$  at  $0^{\circ}\text{C}$

### Standardization:

DIN 43760-1980, IEC Pub 751-1983, JIS C1604-1989

Sensor Type	Reference Resistance	Temp. Coefficient	Operating Range
BA/1K[375]*	1 k $\Omega$ @ $0^{\circ}\text{C}$	3.75 $\Omega/^{\circ}\text{C}$	-60 to 150 $^{\circ}\text{C}$
BA/1K[Ni]	1 k $\Omega$ @ $21^{\circ}\text{C}$	5.68 $\Omega/^{\circ}\text{C}$	-60 to 200 $^{\circ}\text{C}$
BA/1K*	1 k $\Omega$ @ $0^{\circ}\text{C}$	3.85 $\Omega/^{\circ}\text{C}$	-60 to 150 $^{\circ}\text{C}$
BA/2K	2 k $\Omega$ @ $20^{\circ}\text{C}$	8 $\Omega/^{\circ}\text{C}$	-60 to 150 $^{\circ}\text{C}$

\*Available as an [A] high accuracy sensor.

Example: BA/1K[A]-I-2" (high accuracy immersion sensor)





## 1K (375) Platinum RTD Output Table

°F	°C	Ohms
-40	-40.00	846.64
-38	-38.89	850.92
-36	-37.78	855.20
-34	-36.67	859.48
-32	-35.56	863.76
-30	-34.44	868.07
-28	-33.33	872.34
-26	-32.22	876.62
-24	-31.11	880.89
-22	-30.00	885.16
-20	-28.89	889.43
-18	-27.78	893.69
-16	-26.67	897.96
-14	-25.56	902.22
-12	-24.44	906.52
-10	-23.33	910.79
-8	-22.22	915.04
-6	-21.11	919.30
-4	-20.00	923.56
-2	-18.89	927.81
0	-17.78	932.07
2	-16.67	936.32
4	-15.56	940.57
6	-14.44	944.86
8	-13.33	949.11
10	-12.22	953.35
12	-11.11	957.60
14	-10.00	961.84
16	-8.89	966.08
18	-7.78	970.32
20	-6.67	974.56
22	-5.56	978.80
24	-4.44	983.07
26	-3.33	987.31
28	-2.22	991.54
30	-1.11	995.77
32	0.00	1,000.00
34	1.11	1,004.23

°F	°C	Ohms
36	2.22	1,008.46
38	3.33	1,012.68
40	4.44	1,016.90
42	5.56	1,021.16
44	6.67	1,025.39
46	7.78	1,029.61
48	8.89	1,033.82
50	10.00	1,038.04
52	11.11	1,042.25
54	12.22	1,046.47
56	13.33	1,050.68
58	14.44	1,054.89
60	15.56	1,059.14
62	16.67	1,063.35
64	17.78	1,067.55
66	18.89	1,071.76
68	20.00	1,075.96
70	21.11	1,080.16
72	22.22	1,084.36
74	23.33	1,088.56
76	24.44	1,092.76
78	25.56	1,096.99
80	26.67	1,101.18
82	27.78	1,105.38
84	28.89	1,109.57
86	30.00	1,113.76
88	31.11	1,117.95
90	32.22	1,122.13
92	33.33	1,126.32
94	34.44	1,130.50
96	35.56	1,134.72
98	36.67	1,138.90
100	37.78	1,143.08
102	38.89	1,147.26
104	40.00	1,151.44
106	41.11	1,155.61
108	42.22	1,159.79
110	43.33	1,163.96

°F	°C	Ohms
112	44.44	1,168.13
114	45.56	1,172.33
116	46.67	1,176.50
118	47.78	1,180.67
120	48.89	1,184.83
122	50.00	1,189.00
124	51.11	1,193.16
126	52.22	1,197.32
128	53.33	1,201.48
130	54.44	1,205.63
132	55.56	1,209.83
134	56.67	1,213.98
136	57.78	1,218.13
138	58.89	1,222.28
140	60.00	1,226.43
142	61.11	1,230.58
144	62.22	1,234.73
146	63.33	1,238.87
148	64.44	1,243.02
150	65.56	1,247.20
152	66.67	1,251.34
154	67.78	1,255.48
156	68.89	1,259.61
158	70.00	1,263.75
160	71.11	1,267.89
162	72.22	1,272.02
164	73.33	1,276.15
166	74.44	1,280.28
168	75.56	1,284.45
170	76.67	1,288.57
172	77.78	1,292.70
174	78.89	1,296.82
176	80.00	1,300.95
178	81.11	1,305.07
180	82.22	1,309.19
182	83.33	1,313.31
184	84.44	1,317.42
186	85.56	1,321.58





## 1K (Ni) Nickel RTD Output Table

°F	°C	Ohms
-40	-40.00	699.28
-38	-38.89	704.37
-36	-37.78	709.47
-34	-36.67	714.58
-32	-35.56	719.70
-30	-34.44	724.84
-28	-33.33	729.98
-26	-32.22	735.14
-24	-31.11	740.31
-22	-30.00	745.49
-20	-28.89	750.68
-18	-27.78	755.89
-16	-26.67	761.11
-14	-25.56	766.35
-12	-24.44	771.60
-10	-23.33	776.86
-8	-22.22	782.14
-6	-21.11	787.44
-4	-20.00	792.75
-2	-18.89	798.07
0	-17.78	803.41
2	-16.67	808.76
4	-15.56	814.13
6	-14.44	819.52
8	-13.33	824.92
10	-12.22	830.34
12	-11.11	835.77
14	-10.00	841.22
16	-8.89	846.69
18	-7.78	852.17
20	-6.67	857.66
22	-5.56	863.18
24	-4.44	868.71
26	-3.33	874.25
28	-2.22	879.81
30	-1.11	885.39
32	0.00	890.98
34	1.11	896.59

°F	°C	Ohms
36	2.22	902.21
38	3.33	907.85
40	4.44	913.51
42	5.56	919.18
44	6.67	924.87
46	7.78	930.57
48	8.89	936.29
50	10.00	942.02
52	11.11	947.77
54	12.22	953.53
56	13.33	959.31
58	14.44	965.11
60	15.56	970.92
62	16.67	976.74
64	17.78	982.59
66	18.89	988.44
68	20.00	994.31
70	21.11	1000.20
72	22.22	1006.10
74	23.33	1012.02
76	24.44	1017.95
78	25.56	1023.89
80	26.67	1029.86
82	27.78	1035.83
84	28.89	1041.82
86	30.00	1047.83
88	31.11	1053.85
90	32.22	1059.89
92	33.33	1065.94
94	34.44	1072.00
96	35.56	1078.08
98	36.67	1084.18
100	37.78	1090.29
102	38.89	1096.42
104	40.00	1102.56
106	41.11	1108.71
108	42.22	1114.89
110	43.33	1121.07

°F	°C	Ohms
112	44.44	1127.27
114	45.56	1133.49
116	46.67	1139.72
118	47.78	1145.97
120	48.89	1152.24
122	50.00	1158.52
124	51.11	1164.81
126	52.22	1171.12
128	53.33	1177.45
130	54.44	1183.79
132	55.56	1190.15
134	56.67	1196.53
136	57.78	1202.92
138	58.89	1209.33
140	60.00	1215.75
142	61.11	1222.19
144	62.22	1228.65
146	63.33	1235.12
148	64.44	1241.62
150	65.56	1248.13
152	66.67	1254.65
154	67.78	1261.20
156	68.89	1267.76
158	70.00	1274.34
160	71.11	1280.93
162	72.22	1287.55
164	73.33	1294.18
166	74.44	1300.83
168	75.56	1307.50
170	76.67	1314.19
172	77.78	1320.89
174	78.89	1327.62
176	80.00	1334.36
178	81.11	1341.12
180	82.22	1347.90
182	83.33	1354.70
184	84.44	1361.52
186	85.56	1368.36





## 1KΩ Platinum RTD Output Table

°F	°C	Ohms
-40.00	-40.00	842.75
-38.00	-38.89	847.14
-36.00	-37.78	851.53
-34.00	-36.67	855.91
-32.00	-35.56	860.30
-30.00	-34.44	864.72
-28.00	-33.33	869.10
-26.00	-32.22	873.48
-24.00	-31.11	877.86
-22.00	-30.00	882.24
-20.00	-28.89	886.61
-18.00	-27.78	890.99
-16.00	-26.67	895.36
-14.00	-25.56	899.73
-12.00	-24.44	904.14
-10.00	-23.33	908.51
-8.00	-22.22	912.88
-6.00	-21.11	917.24
-4.00	-20.00	921.61
-2.00	-18.89	925.97
0.00	-17.78	930.33
2.00	-16.67	934.69
4.00	-15.56	939.05
6.00	-14.44	943.45
8.00	-13.33	947.80
10.00	-12.22	952.16
12.00	-11.11	956.51
14.00	-10.00	960.86
16.00	-8.89	965.21
18.00	-7.78	969.56
20.00	-6.67	973.91
22.00	-5.56	978.25
24.00	-4.44	982.64
26.00	-3.33	986.98
28.00	-2.22	991.32
30.00	-1.11	995.66
32.00	0.00	1000.00
34.00	1.11	1004.34

°F	°C	Ohms
36.00	2.22	1008.67
38.00	3.33	1013.01
40.00	4.44	1017.34
42.00	5.56	1021.71
44.00	6.67	1026.04
46.00	7.78	1030.37
48.00	8.89	1034.70
50.00	10.00	1039.02
52.00	11.11	1043.35
54.00	12.22	1047.67
56.00	13.33	1051.99
58.00	14.44	1056.31
60.00	15.56	1060.67
62.00	16.67	1064.99
64.00	17.78	1069.30
66.00	18.89	1073.62
68.00	20.00	1077.93
70.00	21.11	1082.24
72.00	22.22	1086.55
74.00	23.33	1090.86
76.00	24.44	1095.17
78.00	25.56	1099.51
80.00	26.67	1103.81
82.00	27.78	1108.12
84.00	28.89	1112.42
86.00	30.00	1116.72
88.00	31.11	1121.02
90.00	32.22	1125.31
92.00	33.33	1129.61
94.00	34.44	1133.90
96.00	35.56	1138.24
98.00	36.67	1142.53
100.00	37.78	1146.82
102.00	38.89	1151.11
104.00	40.00	1155.39
106.00	41.11	1159.68
108.00	42.22	1163.96
110.00	43.33	1168.25

°F	°C	Ohms
112.00	44.44	1172.53
114.00	45.56	1176.85
116.00	46.67	1181.12
118.00	47.78	1185.40
120.00	48.89	1189.68
122.00	50.00	1193.95
124.00	51.11	1198.22
126.00	52.22	1202.49
128.00	53.33	1206.76
130.00	54.44	1211.03
132.00	55.56	1215.34
134.00	56.67	1219.60
136.00	57.78	1223.87
138.00	58.89	1228.13
140.00	60.00	1232.39
142.00	61.11	1236.65
144.00	62.22	1240.91
146.00	63.33	1245.17
148.00	64.44	1249.42
150.00	65.56	1253.72
152.00	66.67	1257.97
154.00	67.78	1262.22
156.00	68.89	1266.47
158.00	70.00	1270.72
160.00	71.11	1274.97
162.00	72.22	1279.21
164.00	73.33	1283.46
166.00	74.44	1287.70
168.00	75.56	1291.98
170.00	76.67	1296.22
172.00	77.78	1300.46
174.00	78.89	1304.69
176.00	80.00	1308.93
178.00	81.11	1313.16
180.00	82.22	1317.40
182.00	83.33	1321.63
184.00	84.44	1325.86
186.00	85.56	1330.12





# Temperature Transmitter Overview

H13

Rev. 02/14/17

**BAPI Sensor Specifications**

## Temperature Transmitter Description

BAPI temperature transmitters incorporate a 10KΩ thermistor or a 1KΩ RTD and a transducer. These devices provide an accurate two-wire, 4 to 20mA output over a specified range. They are specifically designed for temperature sensing and transmission over long distances without degradation of the 4 to 20mA signal. The thermistor transmitter also comes in a 0 to 5 VDC or 0 to 10 VDC output.

The thermistor transmitter is microprocessor based and does not allow or require field calibration. The thermistor transmitter is first programmed for the specified range, and after connecting to the transducer, the output is verified at one temperature.

The RTD transmitters are first calibrated with simulated RTD resistances for the specified range. Then an RTD is connected to the transmitter and the output is verified at one temperature. RTD transmitters have non-interacting zero and span potentiometers that are used for factory adjustments.

BAPI offers a variety of standard and custom transmitter ranges. Additionally, BAPI can provide matched 1K RTD-based units. Matched units utilize the tight tolerance of Class A RTDs to improve overall accuracy. The matched unit is tested in an environmental chamber against an NIST traceable reference thermometer. Each matched pair is provided with a "Certificate of Calibration" which lists the tested and calculated offset values, and identifies the equipment, products and people involved in the calibration process. The overall accuracy of the matched pair now becomes a function of the transmitter linearity, RTD linearity and reference thermometer uncertainty.

Matched errors are

$$\pm((\text{Span} * \text{Linearity Error}) + (\text{Reference Thermometer uncertainty}))$$

Where Linearity Error =

$$\text{Square Root}((\text{Transmitter Linearity})^2 + (\text{RTD Linearity})^2) = \text{Square Root}((0.125\%)^2 + (0.2\%)^2) = 0.234\%$$

### Examples:

BA/T1K(-30 to 130F)

$$\text{Span} = 130 - (-30) = 160$$

$$\text{Matched error} = \pm((160 * 0.234\%) + (0.05\text{°F})) = \pm 0.42\text{°F}$$

BA/T1K(45 to 95F)

$$\text{Span} = 95 - 45 = 50$$

$$\text{Matched error} = \pm((50 * 0.234\%) + (0.05\text{°F})) = \pm 0.17\text{°F}$$

These accuracies are for the entire range of the sensor, although the accuracies in the midband of the sensor will be tighter than those near the endpoints of the specified range. Other matching and/or certification options may be available, please contact your BAPI representative for details.

BAPI temperature transmitters come in a ruggedized package for all non-room configurations where moisture or condensation may be a problem. Due to the extremely low moisture absorption properties of the potting material, a ruggedized transmitter will remain operational even if temporarily immersed in water.

## Specifications

### T10K Transmitter

**Sensor:** 10KΩ Thermistor

**Output:** 4 to 20 mA, 0 to 5 V, or 0 to 10 V

**Supply Voltage:**

10 to 35 VDC (0-5 VDC or 4-20 mA Outputs)

15 to 35 VDC (0-10 VDC Output)

12 to 24 VAC (0-5 VDC Outputs)

15 to 24 VAC (0-10 VDC Output)

**Maximum Loop Resistance:**

700Ω at 24 VDC (4 to 20 mA Output)

**Impedance:** >10K ohms (Voltage Output)

**Calibration Range:** -40 to 85°C (-40 to 185°F)

**Accuracy:** ±1.015°C (0 to 65°C)

**Linearity:** ±0.065°C (0 to 65°C)

**Temperature Resolution:** Span/1024

**Operating Temperature:**

Transmitter: 0 to 70°C

Sensor: -65 to 105°C (standard)

-40 to 155°C (available)

### T1K Transmitters

**Sensor:** 1KΩ Platinum RTD

**Supply Voltage:** 7 to 40 VDC

**Output:** 4 to 20 mA

**Max. Loop Resistance:** 850Ω at 24VDC

**Span:** Min 16.6°C (30°F), Max 555°C (1000°F)

**Zero:** Min -100°C (-148°F), Max 482°C (900°F)

**Field Adjustments:** (Unit is factory calibrated, field adjustment will void calibration warranty)

Zero: +/- 10% • Span: +/- 10%

**Accuracy:** ±0.065% of Span (8 & 16mA outputs)

**Linearity:** ±0.125% of Span

**Operational Humidity:**

0 to 95%, non-condensing

0 to 100%, condensing for short intervals

**Output Current limits:**

Less than 1mA and 22.35 ± 0.15 mA

**Power Output Shift:**

±0.009% of Span 7 to 40VDC

**Connections:** Four 22-gauge etched Teflon leads or terminal blocks

**Operating Temperature:**

Transmitter: -20 to 70°C

Sensor: -65 to 105°C (standard)

-200 to 600°C (available)





## 0-100 °F Temp. Transmitter Output Table

°F	°C	mA	5V	10V
0	-17.78	4.000	1.00	2.00
1	-17.22	4.160	1.04	2.08
2	-16.67	4.320	1.08	2.16
3	-16.11	4.480	1.12	2.24
4	-15.56	4.640	1.16	2.32
5	-15.00	4.800	1.20	2.40
6	-14.44	4.960	1.24	2.48
7	-13.89	5.120	1.28	2.56
8	-13.33	5.280	1.32	2.64
9	-12.78	5.440	1.36	2.72
10	-12.22	5.600	1.40	2.80
11	-11.67	5.760	1.44	2.88
12	-11.11	5.920	1.48	2.96
13	-10.56	6.080	1.52	3.04
14	-10.00	6.240	1.56	3.12
15	-9.44	6.400	1.60	3.20
16	-8.89	6.560	1.64	3.28
17	-8.33	6.720	1.68	3.36
18	-7.78	6.880	1.72	3.44
19	-7.22	7.040	1.76	3.52
20	-6.67	7.200	1.80	3.60
21	-6.11	7.360	1.84	3.68
22	-5.56	7.520	1.88	3.76
23	-5.00	7.680	1.92	3.84
24	-4.44	7.840	1.96	3.92
25	-3.89	8.000	2.00	4.00
26	-3.33	8.160	2.04	4.08
27	-2.78	8.320	2.08	4.16
28	-2.22	8.480	2.12	4.24
29	-1.67	8.640	2.16	4.32
30	-1.11	8.800	2.20	4.40
31	-0.56	8.960	2.24	4.48
32	0.00	9.120	2.28	4.56
33	0.56	9.280	2.32	4.64
34	1.11	9.440	2.36	4.72
35	1.67	9.600	2.40	4.80
36	2.22	9.760	2.44	4.88
37	2.78	9.920	2.48	4.96
38	3.33	10.080	2.52	5.04
39	3.89	10.240	2.56	5.12
40	4.44	10.400	2.60	5.20
41	5.00	10.560	2.64	5.28
42	5.56	10.720	2.68	5.36
43	6.11	10.880	2.72	5.44
44	6.67	11.040	2.76	5.52
45	7.22	11.200	2.80	5.60
46	7.78	11.360	2.84	5.68
47	8.33	11.520	2.88	5.76
48	8.89	11.680	2.92	5.84
49	9.44	11.840	2.96	5.92

°F	°C	mA	5V	10V
50	10.00	12.000	3.00	6.00
51	10.56	12.160	3.04	6.08
52	11.11	12.320	3.08	6.16
53	11.67	12.480	3.12	6.24
54	12.22	12.640	3.16	6.32
55	12.78	12.800	3.20	6.40
56	13.33	12.960	3.24	6.48
57	13.89	13.120	3.28	6.56
58	14.44	13.280	3.32	6.64
59	15.00	13.440	3.36	6.72
60	15.56	13.600	3.40	6.80
61	16.11	13.760	3.44	6.88
62	16.67	13.920	3.48	6.96
63	17.22	14.080	3.52	7.04
64	17.78	14.240	3.56	7.12
65	18.33	14.400	3.60	7.20
66	18.89	14.560	3.64	7.28
67	19.44	14.720	3.68	7.36
68	20.00	14.880	3.72	7.44
69	20.56	15.040	3.76	7.52
70	21.11	15.200	3.80	7.60
71	21.67	15.360	3.84	7.68
72	22.22	15.520	3.88	7.76
73	22.78	15.680	3.92	7.84
74	23.33	15.840	3.96	7.92
75	23.89	16.000	4.00	8.00
76	24.44	16.160	4.04	8.08
77	25.00	16.320	4.08	8.16
78	25.56	16.480	4.12	8.24
79	26.11	16.640	4.16	8.32
80	26.67	16.800	4.20	8.40
81	27.22	16.960	4.24	8.48
82	27.78	17.120	4.28	8.56
83	28.33	17.280	4.32	8.64
84	28.89	17.440	4.36	8.72
85	29.44	17.600	4.40	8.80
86	30.00	17.760	4.44	8.88
87	30.56	17.920	4.48	8.96
88	31.11	18.080	4.52	9.04
89	31.67	18.240	4.56	9.12
90	32.22	18.400	4.60	9.20
91	32.78	18.560	4.64	9.28
92	33.33	18.720	4.68	9.36
93	33.89	18.880	4.72	9.44
94	34.44	19.040	4.76	9.52
95	35.00	19.200	4.80	9.60
96	35.56	19.360	4.84	9.68
97	36.11	19.520	4.88	9.76
98	36.67	19.680	4.92	9.84
99	37.22	19.840	4.96	9.92
100	37.78	20.000	5.00	10.00



## Humidity Transmitter Description

BAPI humidity transmitters provide a high accuracy 4 to 20mA, 0 to 5V or 0 to 10V humidity measurement. Accuracies of 2% or 3% RH are available. Duct and outside air units come with a removable sintered stainless steel filter. On duct and outside air units, the filter may be cleaned with warm, distilled water.

These units are microprocessor based and do not require any field calibration.

For all non-room configurations, BAPI humidity transmitters come standard in a ruggedized package. Ruggedized transmitters are suitable for locations where moisture or condensation may be a problem. The potting material used to ruggedize the transmitters has a high thermal conductivity to eliminate circuit overheating and a low thermal expansion to minimize the stress on the circuit components. Due to the extremely low moisture absorption properties of the epoxy, a ruggedized transmitter will remain operational even if temporarily immersed in water.

Many tests and studies have been conducted on the sensor incorporated into these humidity transmitters to assure that they provide long-term accuracy and durability. For applications requiring even higher

accuracy, however, certified units are available which have been tested and offset against an NIST traceable reference. Please call for details or with specific requirements.

### General Specifications

**Output Ranges:**

4 to 20 mA, 0 to 5 V, or 0 to 10 V

**Power:**

10 to 35 VDC (0 to 5 VDC or 4 to 20 mA outputs)

15 to 35 VDC (0 to 10 VDC Output)

12 to 27 VAC (0 to 5 VDC Output)

15 to 27 VAC (0 to 10 VDC Output)

**Power Consumption:**

22 mA max. DC (0 to 5 VDC or 4 to 20 mA Outputs)

6 mA max. DC (0 to 10 VDC Output)

0.53 VA max. AC (0 to 5 VDC or 4 to 20 mA Outputs)

0.14 VA max. AC (0 to 10 VDC Output)

**Sensing Element:**

Capacitive type humidity sensor

**Operating RH Range:**

0 to 100 %RH (non-condensing)

**Operating Temperature Range:**

Room: 0 to 70°C (32 to 158°F)

Duct & Outside: -20 to 70°C (-4 to 158°F)

**Accuracy Range:** from 10 to 90% RH at 25°C**Response Time:** 8 seconds in moving air  
for a 63% step**Drift:** <0.5%RH per year



## Humidity Transmitter Output Table

%RH	5V	10V	mA
0	0.00	0.00	4.000
1	0.05	0.10	4.160
2	0.10	0.20	4.320
3	0.15	0.30	4.480
4	0.20	0.40	4.640
5	0.25	0.50	4.800
6	0.30	0.60	4.960
7	0.35	0.70	5.120
8	0.40	0.80	5.280
9	0.45	0.90	5.440
10	0.50	1.00	5.600
11	0.55	1.10	5.760
12	0.60	1.20	5.920
13	0.65	1.30	6.080
14	0.70	1.40	6.240
15	0.75	1.50	6.400
16	0.80	1.60	6.560
17	0.85	1.70	6.720
18	0.90	1.80	6.880
19	0.95	1.90	7.040
20	1.00	2.00	7.200
21	1.05	2.10	7.360
22	1.10	2.20	7.520
23	1.15	2.30	7.680
24	1.20	2.40	7.840
25	1.25	2.50	8.000
26	1.30	2.60	8.160
27	1.35	2.70	8.320
28	1.40	2.80	8.480
29	1.45	2.90	8.640
30	1.50	3.00	8.800
31	1.55	3.10	8.960
32	1.60	3.20	9.120
33	1.65	3.30	9.280
34	1.70	3.40	9.440
35	1.75	3.50	9.600
36	1.80	3.60	9.760
37	1.85	3.70	9.920
38	1.90	3.80	10.080
39	1.95	3.90	10.240
40	2.00	4.00	10.400
41	2.05	4.10	10.560
42	2.10	4.20	10.720
43	2.15	4.30	10.880
44	2.20	4.40	11.040
45	2.25	4.50	11.200
46	2.30	4.60	11.360
47	2.35	4.70	11.520
48	2.40	4.80	11.680
49	2.45	4.90	11.840

%RH	5V	10V	mA
50	2.50	5.00	12.000
51	2.55	5.10	12.160
52	2.60	5.20	12.320
53	2.65	5.30	12.480
54	2.70	5.40	12.640
55	2.75	5.50	12.800
56	2.80	5.60	12.960
57	2.85	5.70	13.120
58	2.90	5.80	13.280
59	2.95	5.90	13.440
60	3.00	6.00	13.600
61	3.05	6.10	13.760
62	3.10	6.20	13.920
63	3.15	6.30	14.080
64	3.20	6.40	14.240
65	3.25	6.50	14.400
66	3.30	6.60	14.560
67	3.35	6.70	14.720
68	3.40	6.80	14.880
69	3.45	6.90	15.040
70	3.50	7.00	15.200
71	3.55	7.10	15.360
72	3.60	7.20	15.520
73	3.65	7.30	15.680
74	3.70	7.40	15.840
75	3.75	7.50	16.000
76	3.80	7.60	16.160
77	3.85	7.70	16.320
78	3.90	7.80	16.480
79	3.95	7.90	16.640
80	4.00	8.00	16.800
81	4.05	8.10	16.960
82	4.10	8.20	17.120
83	4.15	8.30	17.280
84	4.20	8.40	17.440
85	4.25	8.50	17.600
86	4.30	8.60	17.760
87	4.35	8.70	17.920
88	4.40	8.80	18.080
89	4.45	8.90	18.240
90	4.50	9.00	18.400
91	4.55	9.10	18.560
92	4.60	9.20	18.720
93	4.65	9.30	18.880
94	4.70	9.40	19.040
95	4.75	9.50	19.200
96	4.80	9.60	19.360
97	4.85	9.70	19.520
98	4.90	9.80	19.680
99	4.95	9.90	19.840
100	5.00	10.00	20.000



## Pressure Sensor Description

The focal point of any sensor is the sensing element itself, and BAPI has gone to great lengths to produce one of the best sensors on the market today. The heart of every BAPI unit is a micro-machined, single-crystal silicon, pressure sensor. Each sensor is fabricated using the same integrated circuit technology used to make millions of cell phones, game machines and personal computers. To control and maintain the quality of these sensors, BAPI is involved in all phases of production from design to use.

Silicon does bring with it one undesired trait—thermal sensitivity. The traditional method of compensating for this thermal sensitivity is an external circuit with discreet resistors, some of which have their own temperature dependencies, introducing more error. BAPI uses a different, unique approach. We employ a custom compensation ASIC (Application Specific Integrated Circuit) that uses digital compensation while maintaining an analog signal path, producing a sensor that is precise and interchangeable. The result is a pressure sensor that offers the ultimate in high accuracy, while preserving the fast response and smooth output inherent to silicon sensors.

Because of the innovative sensor and digital temperature compensation circuit, we are able to produce a highly accurate and stable product. This accuracy is verified during final calibration at our factory using a pressure-controlled source accurate to 0.00015 inch of water and traceable to NIST standards.

### Specifications

#### **Output Ranges:**

4 to 20 mA, 0 to 5 V or 0 to 10V

#### **Power:**

7 to 45 VDC (4-20 mA output)

7 to 45 VDC or 7 to 32 VAC (0-5 VDC output)

13 to 45 VDC or 13 to 32 VAC (0-10 VDC output)

#### **Power Consumption:**

4.9 mA max DC at 0-5 VDC or 0-10 VDC Output

0.12 VA max AC at 0-5 VDC or 0-10 VDC Output

20 mA max, DC only at 4-20 mA Output

### **Pressure Ranges**

#### Inches W.C.

Low Range Unidirectional

0 to 0.10", 0 to 0.25", 0 to 0.50", 0 to 0.75", 0 to 1.00"

Low Range Bi-directional

±0.10", ±0.25", ±0.50", ±0.75", ±1.00"

Standard Range Unidirectional

0 to 1.00", 0 to 2.00", 0 to 2.50", 0 to 3.00", 0 to 5.00"

Standard Range Bi-directional

±1.00", ±2.00", ±2.50", ±3.00", ±5.00"

High Range Unidirectional

0 to 5", 0 to 10", 0 to 15", 0 to 25", 0 to 30"

#### Pascals

Low Range Unidirectional

0 to 30, 0 to 50, 0 to 100, 0 to 175, 0 to 250

Low Range Bi-directional

±30, ±50, ±100, ±175, ±250

Standard Range Unidirectional

0 to 250, 0 to 300, 0 to 500, 0 to 1,000, 0 to 1,250

Standard Range Bi-directional

±250, ±300, ±500, ±1,000, ±1,250

High Range Unidirectional

0 to 1,250, 0 to 2,500, 0 to 4,000, 0 to 6,000, 0 to 7,400

### **Accuracy at 72°F (22.2°C)**

#### Low Range

±0.5% of W.C. ranges 0 to 0.1", 0 to 0.25", ±0.1" and ±0.25"

±0.5% of Pa ranges 0 to 30, 0 to 50, ±30 and ±50 Pa

±0.25% of range all other ranges

#### Standard and High Range

±0.25% of range

### **Temperature Limits**

Storage: -40°F to 203°F (-40°C to 95°C)

Operational: 32°F to 140°F (0°C to 95°C)

Compensated: 50°F to 104°F (10°C to 40°C)

### **Operating RH Range:**

0 to 95% non-condensing

### **Media:**

Non-Ionic, Non-Corrosive, Clean, Dry Gasses



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## Additional Application Notes Available at [www.bapihvac.com](http://www.bapihvac.com)

In addition to the Application Notes available in this catalog, BAPI also has many Application Notes available online at our website at [www.bapihvac.com](http://www.bapihvac.com). Below is a list of some of the Application Notes available online:

### **Ground Loops**

Understanding Grounds Loops and Avoiding Ground Loops

### **Current Loops**

4 to 20 mA Configurations  
Understanding 4 to 20 mA Current Loops  
Designing 4 to 20 mA Current Loops

### **Other Application Notes**

Understanding Full Wave and Half Wave Power Supplies  
Determining Air Flow in Cubic Feet per Minute (CFM)  
Understanding Noise from AC Power  
Thermobuffer Temperature Sensing





## Setpoint Output Ranges for BAPI Room Sensors

		BAPI Room Sensors										Units With or Without Display				
		Units Without Display					Units With Display									
	Designator	Output Range	Span	Delta Style	"Quantum" without Display	R <sub>P</sub> S	R <sub>PS</sub>	Decora	"Quantum" Pushbutton Setpoint & BAPI Stat 4M	"Quantum" Slider Setpoint & BAPI Stat 4S	X-Combo**	T1K Room Trans	"Quantum Prime" and BAPI-Stat 3* Temp or Humidity Units	"Quantum Prime" and BAPI-Stat 4* with Humidity or Dew Point	"Quantum Prime" VOC or CO <sub>2</sub> Units	BAPI-Com
Volts	00	0 to 5 V	5 Volts	X	X	X	X	X	X	X	X	X	X	X	X	
	01	1 to 5 V	4 Volts	X	X	X	X	X	X	X	X	X	X	X	X	
	02	3.7 to 8.6 V	2.85 Volts	X	X	X	X	X	X	X	X	X	X	X	X	
	03	5 to 10 V	5 Volts	X	X	X	X	X	X	X	X	X	X	X	X	
	04	4.2 to 12 V	3.8 Volts	X	X	X	X	X	X	X	X	X	X	X	X	
	07	2.773 to 0.43 V	2.343 Volts	X	X	X	X	X	X	X	X	X	X	X	X	
	10	0 to 10 V	10 Volts	X	X	X	X	X	X	X	X	X	X	X	X	
	11	2 to 10 V	8 Volts	X	X	X	X	X	X	X	X	X	X	X	X	
	16	4-20 mA	16 mA													
	20	889 to 1111 Ω	778 Ω													
<1kΩ Span	21	792 to 208 Ω	584 Ω													
	22	695 to 305 Ω	390 Ω													
	23	674 to 274 Ω	400 Ω	X	X	X	X	X	X	X	X	X	X	X	X	
	24	597 to 305 Ω	292 Ω	X	X	X	X	X	X	X	X	X	X	X	X	
	25	800 to 1200	400 Ω	X	X	X	X	X	X	X	X	X	X	X	X	
	26	909 to 1309	400 Ω	X	X	X	X	X	X	X	X	X	X	X	X	
	27	1800 to 2200	400 Ω	X	X	X	X	X	X	X	X	X	X	X	X	
	28	865 to 1286	400 Ω	X	X	X	X	X	X	X	X	X	X	X	X	
	29	700 to 300	400 Ω	X	X	X	X	X	X	X	X	X	X	X	X	
	40	0 to 1 kΩ	1 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
1kΩ Span	41	500 to 1500 Ω	1 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	42	2 to 3 kΩ	1 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	43	249 to 1249 Ω	1 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	44	10 to 11 kΩ	1 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	45	12.5k-11.5k Ω	1 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	46	1K to 0.0	1 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	47	182 to 1182 Ω	1 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	48	0 to 2 kΩ	2 kΩ													
	55	0 to 1.5 kΩ	2 kΩ													
	50	0 to 5 kΩ	5 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
5kΩ Span	51	7.87k to 2.87kΩ	5 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	52	10.0k to 15.0kΩ	5 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	53	2.5k to 7.5kΩ	5 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	54	1K to 6kΩ	5 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	60	0 to 10 kΩ	10 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	61	15k to 5 kΩ	10 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	62	957 to 1422 Ω	8.16 kΩ													
	63	1 to 11 kΩ	10 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	64	200 to 102 kΩ	10 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	65	10.4k to 4000	10 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
10kΩ Span	66	10 kΩ to 0	10 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	67	5k to 15 kΩ	10 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	68	9628 to 806 Ω	10 kΩ <sup>1</sup>	X	X	X	X	X	X	X	X	X	X	X	X	
	69	10.6k to 6000 Ω	9.62 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	70	0 to 20 kΩ	20 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	71	4.75 to 24.75 kΩ	20 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	72	6.19 to 26.19 kΩ	20 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	73	7.87 to 27.87 kΩ	20 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	74	10 to 30 kΩ	20 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	75	24.75 to 47.5 kΩ	20 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
100kΩ	90	0 to 100 kΩ	100 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	
	91	25k to 75 kΩ	50 kΩ	X	X	X	X	X	X	X	X	X	X	X	X	

\*Setpoint range must be within displayed temperature range

\*\*X10 Option

\*\*\*The X-Combo unit uses a unique set of designators for the ranges, not the designators listed on this page. See the X-Combo ordering grid for the designators.

Only available with pushbutton style setpoint sensors.

†The resolution is 4Ω per step with 250 steps.

Note: RUP options 60, 61 and 62 are not available for large display spans. Contact your BAPI representative for additional information.

## Setpoint Display Ranges for BAPI Room Sensors



Rev. 07/15/13

# Setpoint Display & Mode Control Ranges

**BAPI Application Notes**

I3

Designator	Setpoint Display Range**		Humidity	Generic	R4P	R4PS	"Quantum" Decora & BAPI-Stat 4	X-Combo*	T1K Room Trans	"Quantum Prime" or BAPI-Stat 3* VOC & CO2	BAPI-Stat 3* VOC & CO2	BAPI-Com**	
	°F	°C											
A			-3 to +3	x	x	x	x	x	x	x	x	x	
B			-5 to +5	x	x	x	x	x	x	x	x	x	
C	50 to 90°F	10 to 32°C		x	x	x	x	x	x	x	x	x	
D	55 to 85°F	13 to 30°C		x	x	x	x	x	x	x	x	x	
E	60 to 80°F	15 to 27°C		x	x	x	x	x	x	x	x	x	
F	65 to 80°F	18 to 27°C		x	x	x	x	x	x	x	x	x	
G	45 to 96°F	7 to 35°C		x	x	x	x	x	x	x	x	x	
H	-20 to 120°F	-29 to 49°C		x	x	x	x	x	x	x	x	x	
J	68 to 78°F	20 to 26°C		x	x	x	x	x	x	x	x	x	
K	65 to 95°F	18 to 35°C		x	x	x	x	x	x	x	x	x	
L	70 to 74°F	21 to 23°C		x	x	x	x	x	x	x	x	x	
M		0 to 100%RH		x	x	x	x	x	x	x	x	x	
N		35 to 70%RH		x	x	x	x	x	x	x	x	x	
P		-2 to +2		x	x	x	x	x	x	x	x	x	
X	40 to 80°F	4 to 27°C		x	x	x	x	x	x	x	x	x	
AA	60 to 85°F	15 to 30°C		x	x	x	x	x	x	x	x	x	
BB	54 to 90°F	12 to 32°C		x	x	x	x	x	x	x	x	x	
CC	41 to 85°F	5 to 30°C		x	x	x	x	x	x	x	x	x	
DD	32 to 100°F	0 to 38°C		x	x	x	x	x	x	x	x	x	
EE	67 to 77°F	19 to 25°C		x	x	x	x	x	x	x	x	x	
FF		-10 to +10		x	x	x	x	x	x	x	x	x	
GG	0 to 100°F	-18 to 38°C		x	x	x	x	x	x	x	x	x	
JJ	40 to 90°F	4 to 32°C		x	x	x	x	x	x	x	x	x	
KK	32 to 185°F	0 to 85°C		x	x	x	x	x	x	x	x	x	
MM	-40 to 140°F	-40 to 60°C		x	x	x	x	x	x	x	x	x	
NN	69 to 75°F	21 to 24°C		x	x	x	x	x	x	x	x	x	
PP		-4 to +4		x	x	x	x	x	x	x	x	x	
QQ	55 to 95°F	13 to 35°C		x	x	x	x	x	x	x	x	x	
RR	32 to 212°F	0 to 100°C		x	x	x	x	x	x	x	x	x	
SS	25 to 50°F	-4 to 10°C		x	x	x	x	x	x	x	x	x	
	Maximum Temperature Display Range ->			32 to 110°F	32 to 110°F	32 to 110°F	32 to 99°F	32 to 158°F	-147 to 999°F	-40 to 185°F	-40 to 140°F	-40 to 60°C	
				0 to 43°C	0 to 43°C	0 to 43°C	0 to 60°C	0 to 70°C	-95 to 999°C	-95 to 85°C	-40 to 140°F	-40 to 60°C	
	An "x" in the box indicates that the output range is available for that room unit.												

\*Setpoint range must be within displayed temperature range

\*\*Range describes the Output Module Range as well as the Display Range if used with the BAPI-Com.

### Resistance Output Values for Units with Fan Speed Control

Designator	Fan Speed Control Selection and Resistance Output Value					Room Sensor Models
	OFF	AUTO	LO	MED	HI	
XLD	5k	10k	15k	20k	25k	RuPM, BAPI-Stat 2 & 4
X01	4.89k	2.33k	10.93k	13.24k	16.33k	RuPM, BAPI-Stat 2 & 4
X02	2k	4k	6k	8k	10k	RuPM, BAPI-Stat 2 & 4
X03	5k	10k				RuPM, BAPI-Stat 2 & 4
X05	4.89k	2.33k				RuPM, BAPI-Stat 2 & 4
X06	6.5k		8.8k	10.5k	12k	BAPIStat 2 & 4 Only
X07	5k				15k	BAPIStat 2 & 4 Only
X08	12.886k	11.86k			13.86k	RuPM, BAPI-Stat 2 & 4

### Resistance Output Values for Units with Heat/Cool and On/Auto Fan Control

Designator	Mode Control Selection and Resistance Output Value					Room Sensor Models
	Heat/Auto	Off/Auto	Cool/Auto	Heat/On	Off/On	
HOF	5k	10k	15k	20k	25k	30k
H01	0k	2k	4k	6k	8k	10k
H02	5k	10k				BAPIStat 2 & 4 Only

### Resistance Output Values for Units 2 & 4 Units with Heat/Cool and Off/Auto Control

Designator	Mode Control Selection and Resistance Output Value					Room Sensor Models
	Heat	Cool	Auto	Off	On	
H02	5k	10k	15k	20k	25k	BAPIStat 2 & 4 Only



Below is a complete list of the “Optional Selections” available for the BAPI-Stat “Quantum” and “Quantum Prime” room units.

BAPI-Stat “Quantum” Available Options								
Designator	Option Description	Temperature Only, No Display Unit	Temperature Only, Pushbutton Setpoint and Display Unit	Temperature Only, Slider Setpoint and Display Unit	Temp/Humidity, Wipedown, Keypad and Display Unit	Temp/Humidity, Slider Setpoint Unit	CO2 or VOC Only Unit	Temp/Humidity, CO2 or VOC “Quantum Prime” Unit
A	Differential Ground	X	X	X	X	X		X
B	Comm Jack C35	X	X	X	X	X		X
C	Comm Jack C11		X	X	X	X		
D	Comm Jack C22		X	X	X	X		
E	5 Volt power		X	X				
F	Test & Balance	X	X	X	X	X		X
G	XLD Fan Speed		X					
H	X01 Fan Speed		X					
I	X02 Fan Speed		X					
J	X06 Fan Speed		X					
K	HCF Fan Speed		X					
L	H01 Fan Speed		X					
M	LED Override Indicator	X						

### ADDITIONAL DESCRIPTIONS

**Comm Jack C35:** 3.5mm Phono Style Jack with Leads Attached

**Comm Jack C11:** RJ11 (4 pin) Style Jack with Leads Attached

**Comm Jack C22:** RJ22 (4 pin) Style Jack with Leads Attached

**5 Volt Power:** Unit can operate on 5 VDC power (0 to 5V or resistive outputs only)

**Test & Balance:** Three-Position Switch - “Low” & “High” values vary, “Normal” is live sensor value

**XLD Fan Speed:** Pushbutton Fan Speed Adjustment [Off (5K), Auto (10K), Lo (15K), Med (20K), Hi (25K)] with LCD Indication

**X01 Fan Speed:** Pushbutton Fan Speed Adjustment [Off (4.89K), Auto (2.33K), Lo (10.63K), Med (13.24K), Hi (16.33K)] with LCD Indication

**X02 Fan Speed:** Pushbutton Fan Speed Adjustment [Off (2K), Auto (4K), Lo (6K), Med (8K), Hi (10K)] with LCD Indication

**X06 Fan Speed:** Pushbutton Fan Speed Adjustment [Off (6.5K), Lo (8.5K), Med (10.5K), Hi (12K)] with LCD Indication

**HCF Fan Speed:** Pushbutton Mode [Heat/Auto (5K), Off/Auto (10K), Cool/Auto (15K), Heat/On (20K), Off/On (25K), Cool/On (30K)] with LCD Indication

**H01 Fan Speed:** Pushbutton Mode [Heat/Auto (0Ω), Off/Auto (2K), Cool/Auto (4K), Heat/On (6K), Off/On (8K), Cool/On (10K)] with LCD Indication





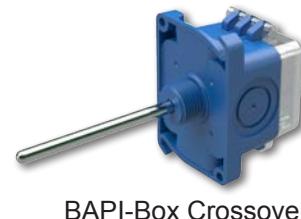
BAPI offers six enclosure styles for our non-room sensors. These enclosure include the BAPI-Box Crossover, Junction Box, the Weatherproof Enclosure (or “Bell Box”), and the BAPI-Box, BAPI-Box 2 and BAPI-Box 4.

#### **BAPI-Box Crossover**

The BAPI-Box Crossover is made of UV-resistant polycarbonate and carries an IP10 rating. It is IP44 with a pierceable knockout plug installed in the open port.

**IP10:** Protected against solid foreign objects greater than 50mm diameter

**IP44:** Protected against solid foreign objects greater than 1mm diameter and protected against splashing water.



BAPI-Box Crossover

#### **Junction Box**

The Junction Box is made of galvanized steel with an IP20 and NEMA 1 rating.

**NEMA 1:** Constructed for indoor use to provide a degree of protection against falling dirt.

**IP20:** Protected against solid objects greater than 12.5mm diameter



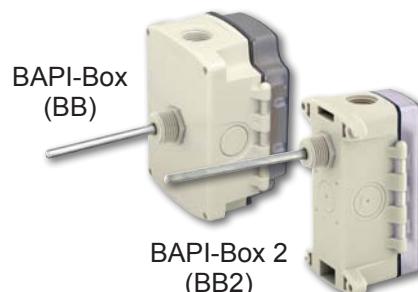
Junction Box (JB)

#### **BAPI-Box and BAPI-Box 2 Enclosures**

The BAPI-Box and BAPI-Box 2 are made of polycarbonate and carry an IP66 and NEMA 4 rating.

**IP66:** Dust tight & protected against powerful water jets from any direction.

**NEMA 4:** Constructed for indoor or outdoor use to provide a degree protection against falling dirt, rain, sleet, snow, windblown dust, splashing water, hose-directed water; and that will be undamaged by the external formation of ice.



BAPI-Box (BB)  
BAPI-Box 2 (BB2)

#### **BAPI-Box 4 Enclosure**

The BAPI-Box 4 is made of nylon and plastic and carries an IP10 rating or IP44 with the Pierceable Knockout Plug installed. It is half the size of the BAPI-Box 2 with a hinged (but not gasketed) cover.

**IP10:** Protected against solid foreign objects greater than 50mm diameter

**IP44:** Protected against solid foreign objects greater than 1mm diameter and protected against splashing water.



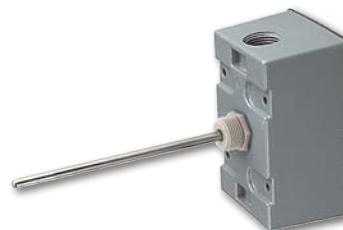
BAPI-Box 4 (BB4)

#### **Weatherproof Enclosure (“Bell Box”)**

The Weatherproof Enclosure is made of cast aluminum and carries a NEMA 3R rating.

**NEMA 3R:** Constructed for indoor or outdoor use to provide a degree of protection against falling dirt, rain, sleet, snow; and that will be undamaged by the external formation of ice.

**IP24:** Protected against solid foreign objects greater than 12.5mm diameter, and protected against splashing water.



Weatherproof (WP)

Note: The Weatherproof Enclosure is not watertight. If this enclosure will be subjected to driving rain, sprinkler systems or jets of water, then it may need a 3/16" weep hole drilled in the lowest horizontal face of the box.

Note: For more information about NEMA and IEC enclosure ratings see BAPI's application notes [NEMA Enclosure Ratings](#) and [IEC Enclosure Ratings](#).



The IEC (International Electrotechnical Commission) is an international committee that develops and publishes its recommendations for standardising international wiring devices and products. Ingress Protection (IP) is the grades of protection against external solids contacting the conductors of a wiring device and against the penetration of liquids into the wiring device.

The IP designation consists of the letters IP followed by two numerals. The first characteristic numeral indicates the degree of protection provided by the enclosure with respect to persons and solid foreign objects entering the enclosure. The second characteristic numeral indicates the degree of protection provided by the enclosure with respect to the harmful ingress of water. The degrees of protection are listed below:

**1st IP# Degree of protection against access to hazardous parts and ingress of solid objects**

- 0** No protection
- 1** Protected against solid foreign objects greater than 50mm diameter
- 2** Protected against solid foreign objects greater than 12.5mm diameter
- 3** Protected against solid foreign objects greater than 2.5mm diameter
- 4** Protected against solid foreign objects greater than 1.0mm diameter
- 5** Dust Protected
- 6** Dust tight

**2nd IP# Degree of protection against the ingress of water**

- 0** No protection
- 1** Protected against vertically falling water drops
- 2** Protected against vertically falling water drops when enclosure tilted up 15°
- 3** Protected against spraying water
- 4** Protected against splashing water
- 5** Protected against water jets
- 6** Protected against powerful jets from any direction
- 7** Protected against the effects of total water immersion up to 1M
- 8** Protected against the effects of total water immersion beyond 1M

Therefore an IP66 rated enclosure is “dust tight and protected against powerful jets of water from any direction.”

If you have any questions about BAPI enclosures please call your BAPI representative.

Reference: IEC Publication 60529 - Classification of Degrees of Protection Provided by Enclosures





The National Electrical Manufacturers Association (**NEMA**) Standards Publication No. 250 defines 13 different enclosure “types” for non-hazardous locations. These NEMA types define the applications and the environmental conditions that enclosures are designed to protect against when properly installed.

**Type 1:** Enclosures constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment, and to provide a degree of protection against falling dirt.

**Type 2:** Enclosures constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment, to provide a degree of protection against falling dirt, and to provide a degree of protection against dripping and light splashing of liquids.

**Type 3:** Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, snow, and windblown dust; and that will be undamaged by the external formation of ice on the enclosure.

**Type 3R:** Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, snow; and that will be undamaged by the external formation of ice on the enclosure.

**Type 3S:** Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, snow, and windblown dust; and in which the external mechanism(s) remain operable when ice laden.

**Type 4:** Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, snow, windblown dust, splashing water, and hose-directed water; and that will be undamaged by the external formation of ice on the enclosure.

**Type 4X:** Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, snow, windblown dust, splashing water, hose-directed water; and corrosion; and that will be undamaged by the external formation of ice on the enclosure.

**Type 5:** Enclosures constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt; against settling airborne dust, lint and fiber flyings; and to provide a degree of protection against dripping and light splashing of liquids.

**Type 6:** Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt; against hose directed water and the entry of water during occasional temporary submersion at a limited depth; and that will be undamaged by the external formation of ice on the enclosure.

**Type 6P:** Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt; against hose directed water and the entry of water during prolonged submersion at a limited depth; and that will be undamaged by the external formation of ice on the enclosure.

**Type 12:** Enclosures constructed (without knockouts) for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt; against circulating dust, lint and fiber flyings; and against dripping and light splashing of liquids.

**Type 12K:** Enclosures constructed (with knockouts) for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt; against circulating dust, lint, fiber flyings; and against dripping and light splashing of liquids.

**Type 13:** Enclosures constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt; against circulating dust, lint and fiber flyings; and against spraying splashing, and seepage of water, oil and noncorrosive coolants. If you have any questions about BAPI enclosures or NEMA ratings, please call your BAPI representative.

Reference: NEMA Standard 250-1997, “Enclosures for Electrical Equipment (1000 Volts Maximum)”

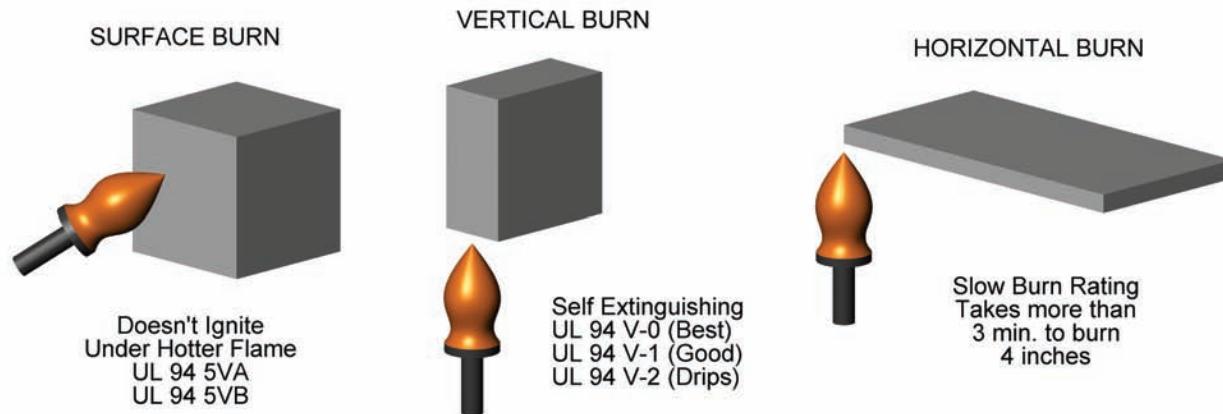




All of BAPI's indoor sensor bodies and transmitter enclosures are made from UL94, V-0 rated plastics.

UL94 serves as a preliminary indication of a plastic's acceptability for use as part of a device or appliance with respect to its flammability. It is not intended to reflect the hazards of a material under actual fire conditions.

The 94HB test describes the Horizontal Burn method. Methods 94V and 94VTM are used for Vertical Burn, a more stringent test than 94HB. The 94-5V test is for enclosures for products that are not easily moved or are attached to a conduit system. The 94HBF and HF are used for nonstructural foam materials.



UL 94 Flammability Rating Summary	
5VA Surface Burn	Burning stops within 60 seconds after five applications of five seconds each of a flame (larger than that used in Vertical Burn testing) to a test bar. Test specimens MAY NOT have a burn-through (no hole). This is the highest (most flame retardant) UL94 rating.
5VB Surface Burn	Burning stops within 60 seconds after five applications of five seconds each of a flame (larger than that used in Vertical Burn testing) to a test bar. Test specimens MAY HAVE a burn-through (a hole).
V-0 Vertical Burn	Burning stops within 10 seconds after two applications of ten seconds each of a flame to a test bar. NO flaming drips are allowed.
V-1 Vertical Burn	Burning stops within 60 seconds after two applications of ten seconds each of a flame to a test bar. NO flaming drips are allowed.
V-2 Vertical Burn	Burning stops within 60 seconds after two applications of ten seconds each of a flame to a test bar. Flaming drips ARE allowed.
H-B Horizontal Burn	Slow horizontal burning on a 3mm thick specimen with a burning rate is less than 3"/min or stops burning before the 5" mark. H-B rated materials are considered "self-extinguishing". This is the lowest (least flame retardant) UL94 rating.

If you have any questions about BAPI enclosures please call your BAPI representative.





## Why Use DC Power Instead of AC Power on a Sensor?

Most modern HVAC control systems have 24 VAC available, and most of BAPI's products can run on 24 VAC, yet BAPI recommends powering them with DC voltage. Why?

Twisted wire cables have high wire-to-wire capacitance. Capacitors totally block DC voltage, but allow a little bit of AC voltages to couple from wire to wire. A portion of the 50 Hz or 60 Hz, 24 VAC running through one pair of wires in a multi-wire cable will combine with the normal signals on all the other wires in the cable. The Laws of physics mandate that this will happen no matter whose sensor is used.

The AC noise coupled into a sensor signal in a multi-wire cable may cause the controller to think that the measured parameter is changing back and forth rapidly. The controller may drive the mechanical equipment into an oscillation that overdrives the actuators and causes the mechanical equipment to wear out prematurely. For example, in a room at 72°F, BAPI's tests show that for a nominal 25-foot sensor wire length, the 60Hz noise in a multi-wire cable can change a 10K thermistor's temperature measurement from 69.4°F to 74.7°F. The controller thinks that the zone temperature is fluctuating by 5°F and drives the output actuators more than necessary.

There are two ways to avoid this situation. The first way is to convert the AC power to DC power with a voltage converter (such as BAPI's VC350A or VC350A-EZ) at the controller end of the cable. If you power the sensor with DC voltage, then there is no AC noise within the multi-wire cable to influence the temperature reading. But remember, the DC converter has to be mounted at the controller end of the wire, not at the sensor end, otherwise there will still be AC power within the multi-wire cable.

If you choose to power the sensor with 24 VAC, then the second way to avoid the AC noise is to run the AC power in a separate, shielded cable with the shield connected to a good building ground at the controller end. In this situation, the capacitance from the 24 VAC wires to the sensor's signal wires is so low it is effectively ZERO. No AC voltage combines with your sensor's signal, but you must run two separate cables.

Either of these methods will prevent the AC noise from influencing the sensor's signal, but BAPI recommends converting the AC power to DC power because we feel it is easier and more economical to install a low cost voltage converter rather than making two cable runs.

If you need further information about this topic, request the application note [Understanding Noise from AC Power](#) from your BAPI representative or download it from our website at [bapihvac.com](http://bapihvac.com).





Recently BAPI changed its certification form to match the requirements of the National Institute of Standards and Technology data reporting standard.

<b>BAPI</b>	<b>CERTIFICATE OF CALIBRATION</b>				
Customer	Your Company Name		Order #	Your Order #	CalDate
Serial #	BCC146	BA/T1KM[-40 TO 120F]-O-WP			2/17/2006
Certificate #	BCEC1226	Cal. Procedure	T1KCalibration.pdf	Calibrated By	5/18/2006
					Tim VanBlarcom

The first section (shown above) indicates the product being certified, the customer and the order number.

Environmental Conditions			
Humidity %RH	38	Temperature °F	71.6

The second section (shown above) records the relative humidity, temperature and atmospheric pressure of the test laboratory.

Calibration Standards		
BAPI ID#	Description	Uncertainty
BAPI0016	SPRT	.02°C
BAPI0015	Digital Thermometer	.02°C
BAPI0116	Digital Multimeter	.001%

The third section (shown above) is an inventory of the equipment used to perform the certification. Uncertainty is the tolerance of the instrument's measurement as determined during its last calibration at a NIST certified calibration center.

The fourth section (shown above) details the certification results. The column labeled Test defines the test procedure or procedures that were used to certify the product. The column labeled Units defines the units of measure used for the test. The three test conditions for this certification were 0°F, 40°F and 80°F.



The column labeled Reference is the actual test condition as measured by the Calibration Standards referenced in the inventory described above. For the test shown, the test condition at 0°F was actually -0.2°F, we achieved 40°F and 80°F was actually 80.6°F. The next column labeled Uncertainty is the tolerance of Calibration standards used to measure the test condition temperature.

The column labeled As Found is the transmitters output before any corrections are made to the transmitter. If the output is a 4 to 20mA current loop, the output is changed to the units of the parameter being measured, in this case Fahrenheit temperature. The next column labeled Difference is the difference or offset of the As Found to the Reference.

The column labeled As Left is the transmitters output after any corrections are made to the transmitter. This is how the equipment is sent to you. If the output is a 4 to 20mA current loop, the output is changed to the units of the parameter being measured, in this case Fahrenheit temperature. The next column labeled Difference is the difference or offset of the As Left to the Reference. This last Difference column is the offset you should use in your controller to correct the temperature.

**This notification serves to certify that the unit described above has been inspected and tested in accordance with specifications published by Building Automation Products Inc.**

**The accuracy and calibration of this instrument are traceable through reference standards that are compared, at planned intervals, to national standards maintained by the National Institute of Standards and Technology (NIST), by comparison to natural physical constants.**

**The measurement standards which support this calibration are calibrated on a schedule to maintain the required accuracy level.**

**For recalibration and recertification of this unit or for other testing or calibration services contact:**



**Building Automation Products, Inc.  
750 North Royal Avenue  
Gays Mills, WI 54631**

**Phone (608) 735-4800  
Fax (608) 735-4804**

The last section (shown above) notifies you that all instruments used to certify the equipment are properly calibrated and traceable to NIST.

Additional information on specific Temperature, Pressure and Humidity Certification documents is found on the following three pages.

If you have any questions about the certification documents, please contact your BAPI representative.





Shown below is an NIST Traceable Certificate of Calibration for a recent T1K order.

Each transmitter is calibrated for its range using precision resistors. A Class A RTD is given a unique serial number and attached to the transmitter. The RTD is subjected to each temperature certification point and the temperature transmitter's output is recorded at each point. BAPI normally tests at 25%, 50% and 75% of temperature span. BAPI will test at any temperature that you specify. BAPI can generate and certify temperatures between -50°C and 150°C.

If you require the temperature transmitter to be certified at more than the three standard temperatures, please contact your BAPI representative for pricing. If you have any questions about the certification document, please contact your BAPI representative.





BAPI measures and records the output of every ZPS pressure transmitter at several points before we send them to our customers. For calibration, BAPI has a digital pressure controller that produces pressures accurate to  $\pm 0.0011$  inches of water. When a customer requests an NIST Traceable Certificate of Calibration, the data for that specific sensor is collected from our calibration database. Because the data is kept in our calibration database, customers may request certifications at any time. Please provide the transmitter serial number for ease of retrieval. The figure below is actual data from an order. If you have any questions about the certification documents, please contact your BAPI representative.

CERTIFICATE OF CALIBRATION							
Customer Serial # Certificate #	Your Company Name BCC146 BCEC1226	Order # ZPS-20-SR07-NT-250-FMK	Your Order # Cal Procedure	CalDate 5/18/2006	CalDue 5/18/2006	Calibrated By Tim VanBlarcom	
Environmental Conditions							
Humidity %RH 38		Temperature °F 71.6		Pressure 1016 Pascals			
Calibration Standards							
BAPI ID#	Description	Uncertainty					
BAPI0002	Digital Pressure Controller	0.0011" h <sub>2</sub> o					
BAPI0119	Digital Multimeter	.001%					
BAPI0018	Power supply	1%					
Results							
Test	Units	Reference	Uncertainty	As Found	Difference	As Left	Difference
0 To .10	in W.C.	.070	.001%	.0697	-.0003	.0697	-.0003
-0.10 to 0.10	in W.C.	.070	.001%	.0698	-.0002	.0698	-.0002
-0.25 to 0.25	in W.C.	.070	.001%	.0704	.0004	.0704	.0004
0 to 0.25	in W.C.	.070	.001%	.0709	.0009	.0709	.0009
0 to 1.00	in W.C.	.50	.001%	.5007	.0007	.5007	.0007
-1.00 to 1.00	in W.C.	.50	.001%	.5011	.0011	.5011	.0011
-2.5 to 2.5	in W.C.	2.00	.001%	2.0115	.0115	2.0115	.0115
0 to 2.50	in W.C.	2.00	.001%	2.0070	.007	2.0070	.007
0 to 5.00	in W.C.	2.00	.001%	2.0065	.0065	2.0065	.0065
-5.00 to 5.00	in W.C.	2.00	.001%	2.0220	.022	2.0220	.022
Notes							
<p>This notification serves to certify that the unit described above has been inspected and tested in accordance with specifications published by Building Automation Products Inc.</p> <p>The accuracy and calibration of this instrument are traceable through reference standards that are compared, at planned intervals, to national standards maintained by the National Institute of Standards and Technology (NIST), by comparison to natural physical constants.</p> <p>The measurement standards which support this calibration are calibrated on a schedule to maintain the required accuracy level.</p>							
For recalibration and recertification of this unit or for other testing or calibration services contact:							
<b>BAPI</b>				Building Automation Products, Inc. 750 North Royal Avenue Gays Mills, WI 54631	Phone (608) 735-4800 Fax (608) 735-4804		





BAPI's standard product accuracy is either  $\pm 3.0\%$  or  $\pm 2.0\%$  relative humidity. BAPI can provide an NIST Traceable Certificate of Calibration for each transmitter that corrects each sensor and transmitter assembly to  $\pm 1\%$  relative humidity as shown in the figure below. Each certified sensor/transmitter pair has a unique certification and BAPI retains certification data for future reference.

Each sensor is placed into a precision humidity chamber that can hold a relative humidity condition to within  $\pm 0.5\%$ RH. An independent instrument, with an annual NIST calibration accurate to  $\pm 0.5\%$ RH, samples the inside of the chamber to verify the humidity reading. The humidity transmitter's output is recorded at each humidity certification point. BAPI normally tests at 25%, 50% and 75% relative humidity at one customer specified temperature. BAPI will test at any relative humidity and temperature that you specify. BAPI's humidity chamber has temperature test limits of 0 to 70°C and humidity test limits of 15%RH to 95%RH.

If you require the humidity reading to be certified at more than one temperature, please contact your BAPI representative for pricing. Please allow additional lead time when ordering certified units. If you have any questions about the certification documents, please contact your BAPI representative.

CERTIFICATE OF CALIBRATION						
Customer Serial # Certificate #	Your Company Name BA/H200-D-EU	Order # CalDue	Your Order # 5/18/2006	CalDate	2/17/2006	
BCC146 BCEC1226		Cal. Procedure	HumidityCalibration.pdf	Calibrated By	Tim VanBlarcom	
Environmental Conditions						
Humidity %RH 38		Temperature °F 77		Pressure 1016 Pascals		
Calibration Standards						
BAPI ID#	Description	Uncertainty				
BAPI0003	Humidity Chamber	1%RH				
BAPI0004	Humidity Reference	.5%RH				
BAPI0116	Digital Multimeter	.001%				
BAPI0016	SPRT	.02°C				
BAPI0015	Digital Thermometer	.02°C				
Results						
Test	Units	Reference	Uncertainty	As Found	Difference	As Left
20	%RH	20	.5	18.83	-1.17	18.83
50	%RH	50	.5	49.72	-.28	49.72
80	%RH	80	.5	80.72	.72	80.72
Notes						
<p>This notification serves to certify that the unit described above has been inspected and tested in accordance with specifications published by Building Automation Products Inc.</p> <p>The accuracy and calibration of this instrument are traceable through reference standards that are compared, at planned intervals, to national standards maintained by the National Institute of Standards and Technology (NIST), by comparison to natural physical constants.</p> <p>The measurement standards which support this calibration are calibrated on a schedule to maintain the required accuracy level.</p>						
For recalibration and recertification of this unit or for other testing or calibration services contact:						
		Building Automation Products, Inc. 750 North Royal Avenue Gays Mills, WI 54631		Phone (608) 735-4800 Fax (608) 735-4804		





Building Automation Products, Inc. (BAPI), a leading manufacturer of HVAC/R control system sensors and peripherals, is committed to environmentally responsible manufacturing practices. BAPI has been working since early 2005 to remove environmentally harmful materials from our products and we support the European Union's RoHS directive, which restricts the use of certain hazardous substances, such as lead and mercury, in electrical and electronic equipment.

Even though many manufacturers of HVAC/R monitoring and control equipment are claiming exemption from RoHS compliance, BAPI is developing its new products and revising current products to comply with the RoHS directive. In fact, the majority of BAPI products were RoHS compliant as of March 2006.

### **European Union's RoHS Directive**

RoHS is the shorthand for the European Union's legislation, Reduction of Hazardous Substances in Electronics Manufacturing. The RoHS directive places restrictions on the use of six hazardous substances in electrical and electronic equipment. These substances are lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, and polybrominated diphenyl ethers.

The intent of RoHS is to reduce the amount of these hazardous substances which enter the waste stream where they can impact soils and groundwater. In general, the RoHS directive is aimed at consumer-level finished electronic products that have relatively short life spans and enter the waste stream at high rates. The directive does not target electrical and electronic equipment that is permanently mounted in a fixed installation inside a building, such as HVAC/R control system equipment. Such items have very long lives and are not disposed of in quantities that significantly impact the concentration of hazardous substances in the community waste stream. Therefore, many manufacturers of such equipment have claimed exemption from the RoHS directive. BAPI, however, has chosen to comply with the RoHS directive because of our commitment to environmentally responsible manufacturing practices.





Below is a list of Pressure Sensor Terms and their definitions:

- 1. Burst pressure**  
Maximum pressure that may be applied to the sensor without rupture. No physical damage is allowed to the sensor, but it may need factory recalibration as it may strain the sensors internal mounting. BAPI's ZPS burst pressure is 10psi. To date, no ZPS unit has required factory recalibration when subjected to these pressures.
- 2. Proof pressure**  
Maximum pressure that may be applied without changing the transducer performance beyond specified tolerances. BAPI's ZPS proof pressure is 5psi.
- 3. Bidirectional**  
Takes the specified range and turns it into plus or minus of that range. The output signal is at the center of the range at zero pressure. The procedure used to turn the ZPS into a bidirectional unit is in the ZPS Installation and Operation document 13086\_ins\_zps\_display.pdf available through your friendly BAPI representative.
- 4. Auto Zero**  
Field calibration of the zero pressure output. The procedure used to auto zero the ZPS is in the ZPS Installation and Operation document 13086\_ins\_zps\_display.pdf available through your friendly BAPI representative.
- 5. Range**  
Specified endpoint pressures
- 6. Span**  
Arithmetic difference between two pressure endpoints
- 7. Sensitivity**  
Ratio of output signal change to a corresponding input pressure change
- 8. Pressure**  
Force per unit area
- 9. Velocity**  
Displacement per unit time
- 10. Absolute Pressure**  
Pressure measured relative to a perfect vacuum
- 11. Differential Pressure**  
Pressure difference measured between two pressure sources
- 12. Gauge Pressure**  
Differential pressure between the local ambient pressure and another pressure source
- 13. Static pressure**  
Pressure on the walls of a vessel at right angle to any flow. Static pressure is usually measured with a static pressure probe. ZPS/ACC07 or ZPS/ACC08
- 14. Velocity pressure**  
Pressure caused by the momentum of moving air Velocity pressure is usually measured with a pitot tube assembly. ZPS/ACC11 or ZPS/ACC12
- 15. Total pressure**  
Arithmetic sum of static pressure and velocity pressure. Total pressure is usually measured with a total pressure tube.

If you have any additional questions, please contact your BAPI representative.





## Recommended wire lengths for various power loads

When an electric current flows through a wire there is a drop in voltage due to the resistance of the wire. The voltage drop is found from Ohm's Law:  $E=IR$ , or **Voltage Drop = Wire Resistance x Amps of Current**.

The wire length recommendations below represent a 10% voltage drop in a 24 VAC or VDC circuit for various wire gauges and maximum currents. The voltage drop is linear, therefore cutting the wire length in half would result in a 5% voltage drop rather than a 10% voltage drop. The currents in the two tables represent the various models of power supplies and voltage converters available from BAPI.

Wire length recommendations in Table 1 are based on a wire temperature of 70 °F. If the wire is run in a portion of the building where temperatures can increase to 140 °F, such as an unventilated attic, then decrease the recommended wire length by 5%, as shown in Table 2.

The minimum wire gauge is determined by the maximum worst-case load. When in doubt, use the next larger size wire. All wiring must comply with the National Electric Code (NEC) and local codes.

**Table 1:** Recommended wire lengths at 70 °F and below (10% maximum drop in voltage)

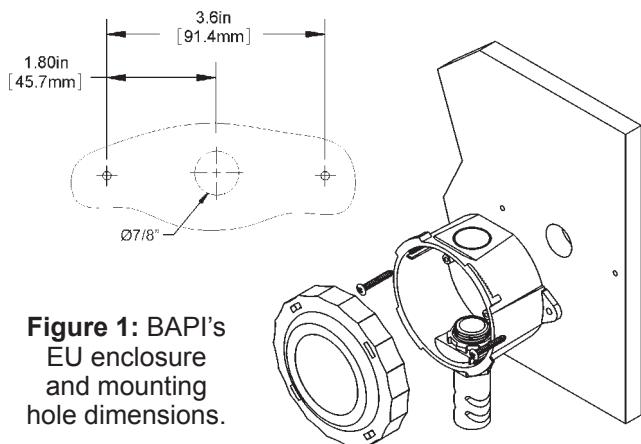
Wire gauge	Ω/1000 ft (305 M) @ 70°F	Distance @ 75 mA	Distance @ 100 mA	Distance @ 350 mA	Distance @ 1.5 Amp	Distance @ 3 Amps
22	16.8	1905 ft (581 M)	1429 ft (435 M)	408 ft (124 M)	95 ft (29 M)	48 ft (15 M)
20	10.5	3048 ft (929 M)	2286 ft (697 M)	653 ft (199 M)	152 ft (46 M)	76 ft (23 M)
18	6.6	4848 ft (1478 M)	3636 ft (1109 M)	1039 ft (317 M)	242 ft (74 M)	121 ft (37 M)
16	4.2	7619 ft (2322 M)	5714 ft (1742 M)	1633 ft (498 M)	381 ft (116 M)	190 ft (58 M)

**Table 2:** Recommended wire lengths above 70 °F (10% maximum drop in voltage)

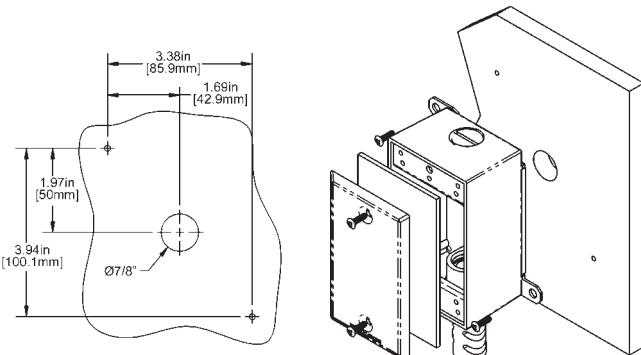
Wire gauge	Ω/1000 ft (305 M) @ 70°F	Distance @ 75 mA	Distance @ 100 mA	Distance @ 350 mA	Distance @ 1.5 Amp	Distance @ 3 Amps
22	16.8	1810 ft (522 M)	1357 ft (414 M)	388 ft (118 M)	90 ft (27 M)	45 ft (14 M)
20	10.5	2895 ft (882 M)	2171 ft (662 M)	620 ft (189 M)	145 ft (44 M)	72 ft (22 M)
18	6.6	4606 ft (1404 M)	3455 ft (1053 M)	987 ft (301 M)	230 ft (70 M)	115 ft (35 M)
16	4.2	7238 ft (2206 M)	5429 ft (1655 M)	1551 ft (473 M)	362 ft (110 M)	181 ft (55 M)

If you have any additional questions, please contact your BAPI representative.

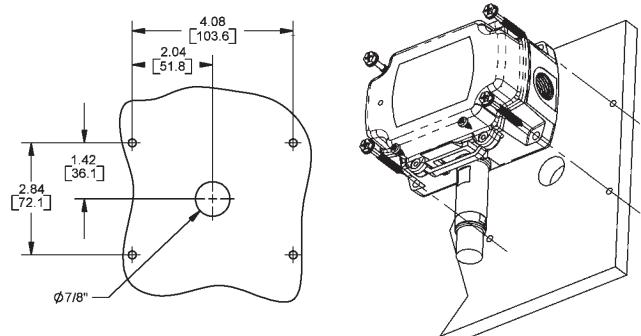




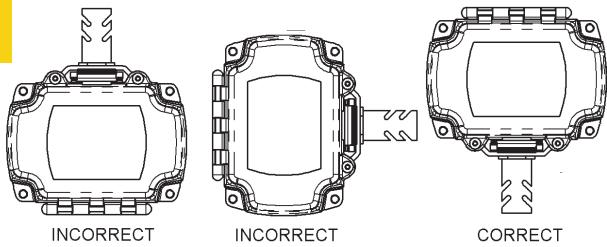
**Figure 1:** BAPI's EU enclosure and mounting hole dimensions.



**Figure 2:** BAPI's WP enclosure and mounting hole dimensions.



**Figure 3:** The BAPI-Box enclosure and mounting hole dimensions.



**Figure 4:** Proper orientation of the BAPI-Box enclosure.

### Proper Procedure for Mounting BAPI Outdoor Sensors

The physical placement of BAPI outdoor temperature and humidity sensors depends on its application.

If the outside air is being used for economizing, the sensor should be placed close to the economizer damper without being in the air draft. If the economizer damper is on the roof, the sensor should be on the roof. If the economizer damper comes through the building wall, the sensor should be on the wall. If you want meteorological data, showing building occupants the outdoor weather conditions, mount the sensor on the side of building.

Place the sensor in a location where it does not receive direct sunlight because this can affect humidity readings. BAPI's tests show that humidity readings can be affected by as much as 30% RH when the sensor is in direct sunlight. In far northern or southern latitudes, be aware that at sunrise or sunset the sun can illuminate all sides of a building.

Drill the mounting holes as shown in the sensor's installation instructions. The best practice is to mount the unit with the sensor probes pointing down at a minimum of four feet above the ground or roof. Four feet isolates the sensor from any water puddles that would cause erroneous readings.

Water is the enemy of building materials and electrical connections. Carefully seal everything to get a good watertight seal. Be sure to seal the box plugs, conduit and conduit fittings.

Attach the sensor with the mounting hardware provided. **DO NOT** drill through the back of weatherproof boxes. Holes destroy the integrity of the box and may void the warranty.

Route the wires into the box and terminate with sealant filled connectors. BAPI's sealant filled connectors (BA/SFC1000 - Crimp-On Style or BA/SFC2000 - Twist-On Style) prevent water from attacking the connection, thereby preventing costly callbacks. The best practice is to seal the wiring hole after the wires are installed.

If you need any help mounting BAPI products or have any additional questions, please call your BAPI representative.

### References

<http://weather.gov/om/coop/standards.htm>

*The State Climatologist* (1985) Publication of the American Association of State Climatologists: Heights and Exposure Standards for Sensors on Automated Weather Stations, v. 9, No. 4 October, 1985.

EPA (1987). On-Site Meteorological Program Guidance for Regulatory Modeling Applications, EPA-450/4-87-013. Office of Air Quality Planning and Standards, Research Triangle Parks, North Carolina 27711.

WMO (1983). Guide to Meteorological Instruments and Methods of Observation. World Meteorological Organization No. 8, 5th edition, Geneva Switzerland.



When thermowells are too big to fit into small pipes, you can still measure water temperature by strapping a small, wired temperature probe to the pipe. BAPI recommends using the remote probe with FEP jacketed cable because of its moisture resistance and because of the higher temperatures encountered in this application.

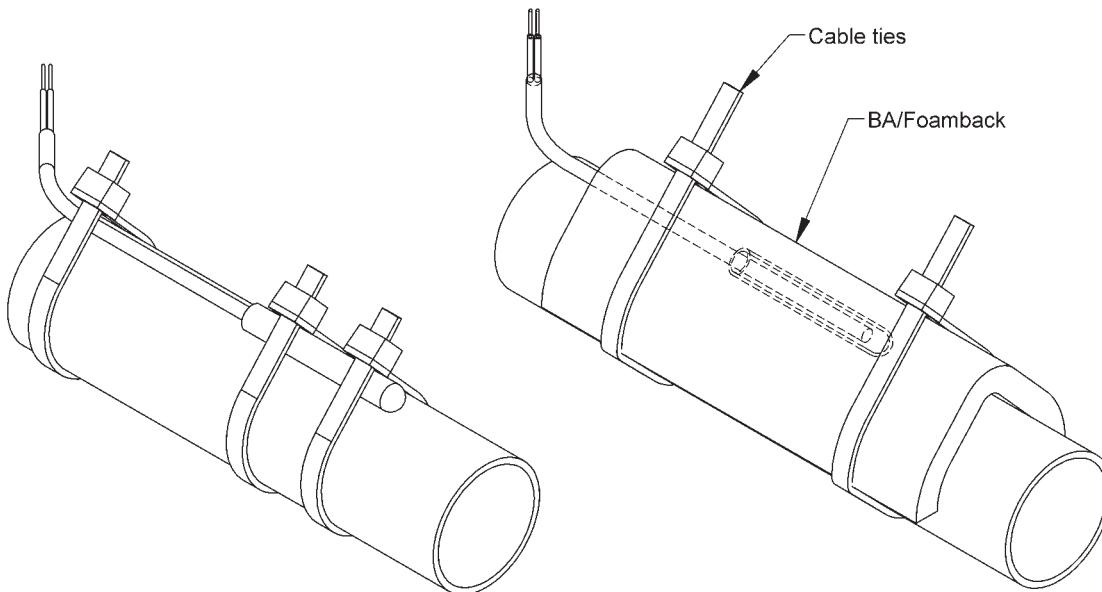
There are two ways to mount the sensor to the pipe.

Figure 1 shows the probe strapped to the pipe with cable ties. Hose clamps may be used too.

Make sure the probe is securely touching the pipe before clipping the ends off the cable ties. Secure the sensor lead to the pipe for strain relief. Wrap insulation a minimum of 1/2 inch thick around the probe and 4 inches to either side of it. Polyester quilt batting, purchased at a craft store, makes a good insulation that won't make your skin itch. Preformed, molded rubber or fiberglass pipe insulation works well too. Spray foam insulation is another alternative. Any standard insulation material may be used. If necessary, protect the insulation with an over-wrap of tape.

Using BAPI's Foamback Insulator (as shown in Figure 2 below) is another easy way to mount and insulate the probe. The Foamback Insulator is made from medical grade, closed cell foam, insuring that the probe is reading the pipe temperature, not the room temperature.

Clean and dry the pipe. Peel off the protective cover from the foamback's adhesive side and stick the probe to the adhesive. Stick the foamback/probe assembly to the pipe. Add cable ties or hose clamps to ensure that the sensor always stays attached to the pipe, avoiding costly callbacks.



**Figure 1:** Remote probe with FEP jacketed cable strapped directly to pipe.

**Figure 2:** Remote probe with FEP jacketed cable applied beneath a FOAMBACK insulator.

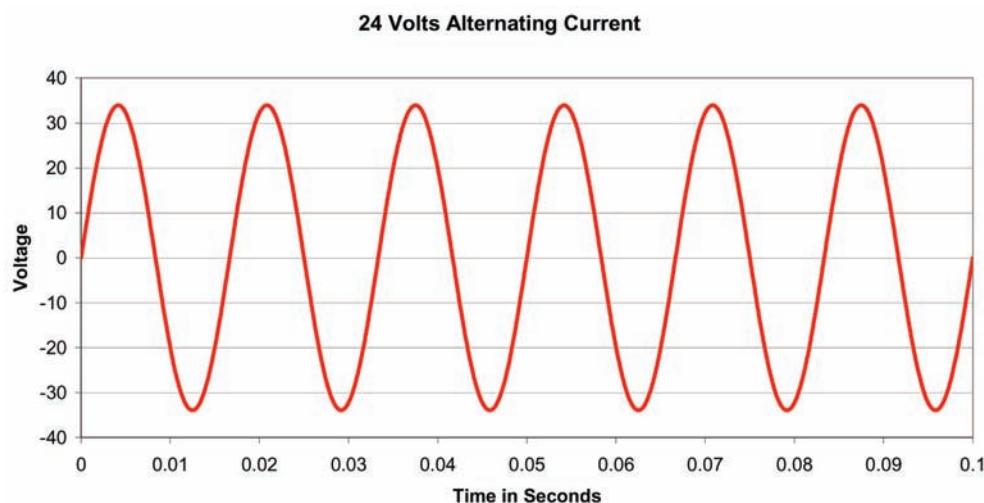
Note: 1.25 inch diameter pipe shown, this technique may be used for any diameter pipe.





## 24 VAC

If you were to connect an oscilloscope to the output of a 24 VAC transformer, you would see the waveform below.



The voltage starts at zero, climbs to a peak, returns to zero, falls to a negative peak and returns to zero; sixty times a second for 60Hz and 50 times a second for 50Hz.

## HALF-WAVE POWER SUPPLY

Half-wave power supplies only take power from the AC line during the positive half of the AC waveform. Most controllers use half-wave power supplies.

BAPI's VC350A EZ and VC350A are half-wave power supplies. Half-wave power supplies may be powered from the same transformer that powers the controller if the controller has a half-wave power supply and the capacity of the transformer is not exceeded.

Transformers used in half-wave power supplies have one of their output leads connected to ground. When powering multiple half-wave power supplies from one transformer, be sure to check for proper transformer connections.

Since only half of the incoming AC is used, half-wave power supplies in 24 VAC systems can only source approximately 1.5 amps of DC maximum.

## FULL-WAVE POWER SUPPLY

Full-wave power supplies take power during both halves of the AC waveform.

BAPI's PS17 and PS17CB are full-wave power supplies. The VC2700-STM and VC3000 are available as full-wave or half-wave (specified at time of order).

Transformers used in full-wave power supplies cannot have either of their output leads connected to ground. DO NOT try to power half-wave power supplies and full-wave power supplies from the same transformer. If you do, you will short out the transformer.

Half-wave and full-wave power supplies can coexist in the same control system but they must be powered by separate transformers.

Since both halves of the incoming AC are used, full-wave power supplies in 24 VAC systems can source approximately 3 amps of DC maximum.

If you need more information, please call your BAPI representative and ask for Application Note [Understanding Full or Half Wave Power Supplies](#) or find it online at [www.bapihvac.com](http://www.bapihvac.com).





Building Automation Products, Inc. (BAPI) sells its products under the following terms and conditions. Any different or additional terms must be specifically agreed to in writing prior to any sale.

## ***Ordering***

To place an order, contact an authorized BAPI distributor or contact BAPI directly by phone or email. You can also order products from our website/webstore at [www.bapihvac.com](http://www.bapihvac.com). There is no minimum order amount.

### **Please be sure the purchase order contains the following information:**

- Purchase Order number
- Bill and Ship to address
- Customer name, contact person & telephone number
- Quantity & unit price
- Part number
- Desired ship date
- Desired ship method\*

\*Available selection of carrier is dependent on shipping location and stated service preference.

Upon receipt of your order, BAPI will email a confirmation of the order, including current pricing, estimated ship date and assigned Order Number. Please refer to this order number in further communications regarding this order. The confirmation will be emailed to the contact person noted on the order or to a predetermined contact specified when the customer account was created.

### **INTERNATIONAL ORDERS**

International shipments may be subject to additional handling, export documentation and shipping charges, as well as any appropriate duties, taxes or fees. If you deal through a Customs Broker, please provide BAPI with the Broker's name, address, telephone number and a copy of their import documents so we may process your order as quickly as possible. Terms of payment are prepaid in US dollars by Electronic Funds Transfer to our bank or your bank check in US dollars unless an "Open Account" has been established. See Payment Terms in this section for more information.

### **DELIVERY**

Promises of delivery from stock are subject to prior sale. Delivery dates are not guaranteed, but are estimated on the basis of BAPI's immediate receipt of all needed information supplied by the customer. We will, in good faith, attempt to meet estimated delivery dates, but BAPI does not accept responsibility for delays resulting from circumstances beyond our reasonable control.

***Continued on next page...***





### ***Ordering continued...***

#### **BACK ORDERS**

BAPI ships complete orders whenever possible to keep freight charges to a minimum. In the event that an order cannot be completely filled as scheduled, BAPI will contact the customer with information regarding the delay and advise a new ship date whenever possible. At that time a customer may elect to accept a partial shipment. Back orders will be shipped as soon as possible.

#### **FREIGHT**

Customer is responsible for all shipping charges billed on each invoice. Any discrepancies in shipments must be brought to the attention of our Sales Department within ten (10) working days of receipt of shipment. Deductions from remittances will not be allowed unless authorized by BAPI in writing. Please notify BAPI of Goods Damaged in Transit within 5 business days of receipt. Also, take photos upon receipt for proper case documentation.. DO NOT return the shipment to BAPI.

### ***Free Ground Shipping Terms & Conditions***

BAPI offers free ground shipping on orders being shipped within the contiguous United States. Orders requiring expedition – as well as orders to Hawaii, Alaska, Guam and Puerto Rico – will have shipping added to the invoice. BAPI will not third party bill or bill recipient bill a customer's shipping account for a domestic shipment. International customers shipping to a freight forwarder within the contiguous United States will receive free ground shipping and have any expedited costs added to their invoice. Residential customers qualify for BAPI's free shipping program. Customers may request one of three preferred carriers, including UPS, Fed Ex and SpeeDee. Customers who provide invalid addresses will have charges added to their invoice. Expedited shipping charges will coincide with the UPS world ship rate, which is less than published rate. International customers whose product ships directly to their location may request to have shipping costs billed to their respective shipping account. BAPI's free shipping program is subject to change without notice.

### ***Payment Terms***

#### **NEW ACCOUNTS**

Payment terms are prepaid unless an open account is established. A credit application must be submitted for open account consideration. (Please allow up to two weeks for credit approval.)

#### **OPEN ACCOUNTS**

Terms are Net 30 days for open accounts.

- To ensure proper credit to your account, the invoice number must appear on your check stub
- Accounts with balances beyond 60 days from the invoice date will be subject to credit hold until the account is brought within 45 days from the invoice date.

In the event that it becomes necessary for BAPI to take legal action to enforce the provisions of this agreement or to obtain redress for the breach of any provision hereof, the buyer shall pay the costs of such action, including reasonable attorney fees. All legal proceedings that arise in any way related to this agreement shall be conducted in a court of competent jurisdiction in Crawford County, Wisconsin.





## Pricing

Price of goods sold is that in effect at the time of sale. Contact BAPI Sales for current pricing and discount information. All prices are subject to change without notice and exclude any taxes, shipping and handling charges. BAPI will be pleased to furnish written quotations by email or mail upon request. Quoted prices and conditions are valid until the expiration date on the formal written quote.

## Returns

Only new and unused products are considered for credit. All returns must have BAPI Return Material Authorization (RMA) number. Debit memos will not be accepted without written authorization and an RMA number. Returns resulting from errors by BAPI will not be subject to a restock fee. Any items specified as Non-Cancellable/Non-Returnable (NCNR) are not returnable for credit. Restock fees will be applied as follows:

- Stock items returned within 30 days from the original ship date will not be subject to a restock fee.
- Stock items returned 31 to 180 days from the ship date will be subject to a 25% restock fee.
- Non-stock items are subject to 20% restock fee if returned within 30 days from the original ship date.
- Non-stock items returned 31 to 180 days from shipment will be subject to a 25% restock fee.
- No items will be accepted for return after 180 days.

## Warranty

BAPI warrants its products to be free from defects in materials and workmanship, subject to the following terms and conditions. Without charge, BAPI will repair or replace products found to be defective in materials or workmanship within the warranty period and also issue a labor credit\* for the time required to repair or replace them with BAPI products; provided that:

1. The product has not been subjected to abuse, neglect, accident, incorrect wiring, improper installation or servicing, or used in violation of instructions furnished by BAPI;
2. The product has not been repaired or altered by anyone except BAPI or its authorized service agencies;
3. The serial number or date code has not been removed, defaced, or otherwise changed;
4. Examination discloses, in the judgment of BAPI, the defect in materials or workmanship which developed under normal installation, use and service;
5. BAPI is notified in advance and the product is returned with a valid RMA number, transportation prepaid.

Unless otherwise specified or agreed to in writing signed by a BAPI officer, BAPI products shall be warranted for five years from the date of sale with clauses a through e above still applicable. In addition, there is a lifetime limited warranty on all single point non-room temperature sensors.

**Continued on next page...**





## ***Warranty continued...***

BAPI will pay the freight for all units being returned to the customer where a defect was found. In the case that no defect was found with the units received, or the defect was determined to be caused by customer error or abuse, the customer will be responsible for the payment of the shipping charge to return the units. The customer will need to supply a FED-Ex or UPS account number for shipping charges if units are to be returned. Purchase orders will not be accepted for return shipping. In cases where units are repairable but not covered under BAPI's warranty, customers may elect to have BAPI repair the unit at a rate of \$60 per hour.

The foregoing warranty is in lieu of all warranties, express, implied or statutory, including but not limited to, any implied warranty of merchantability for a particular purpose. BAPI's liability for breach of warranty is limited to repair or replacement. If the goods cannot be replaced, warranty is limited to a refund of the purchase price. In no instance shall BAPI be liable for incidental or consequential damages arising from a breach of warranty or from the use or installation of its products. Under no circumstance does BAPI agree to pay for labor or other related expenses associated with the troubleshooting and/or repair of our product without prior specific written authorization.

No representative or person is authorized to give any warranty other than as set out above or to assume for BAPI any other liability in connection with the sale of its products.

This warranty is limited to the original customer only. It cannot be transferred or assigned to third parties unless the intent to transfer to a third party is expressly indicated in a purchase order and/or warranty processing arrangements have been agreed upon in writing by BAPI.

### \*Labor Credit

Warranty labor credits are issued in the form of a product credit and cover the direct hard labor costs to repair or replace the product only. Requests for labor credits must include a written invoice describing the labor performed and the billed labor rate. Under no circumstances does BAPI agree to pay for labor associated with the repair or replacement of our products without prior specific written authorization. BAPI reserves the right to refute or refuse labor credit warranty claims that do not meet the specified terms and conditions.

## ***Design and Specifications***

BAPI reserves the right to make changes in the design, specifications, and/or support documentation of any product as technological advances or necessity requires without notification. Please contact BAPI for updated product information.

Information in our descriptive literature is based on product specifications that are current at the time of publication. Product specifications, designs and descriptive literature are subject to change as improvements are introduced. Although we announce changes as they occur, we cannot guarantee notification to every customer. BAPI warrants delivered product to conform to the most current specifications, designs and descriptive literature.

## ***Custom Products***

In many cases, BAPI products can be modified to meet your custom requirements. Additional charges and longer lead times may apply. Contact your salesperson for a quote on your special requirements.





# Certificates of Accuracy & Calibration

J5

Rev. 05/28/15

## NIST Traceable Certificates of Accuracy & Calibration

BAPI offers NIST Traceable Certificates of Accuracy & Calibration for its temperature, humidity and pressure products.

<u>Part Number</u>	<u>Net Price</u>
<b>CERT-HUM-AMBIENT</b>	<b>\$20.00</b>
	NIST Traceable Certification of Accuracy for Humidity at Ambient – Price includes one point.
<b>CERT-HUM-SPEC</b>	<b>\$50.00</b>
	NIST Traceable Certification of Calibration for Humidity at Specific Points (Customer Specified) – Price includes one, two or three humidity points at one temperature.
<b>CERT-TEMP-AMBIENT</b>	<b>\$20.00</b>
	NIST Traceable Certification of Accuracy for Temperature Sensor at Ambient – Price includes one point.
<b>CERT-TEMP-SPEC</b>	<b>\$50.00</b>
	NIST Traceable Certification of Calibration for Temperature Sensor at Specific Points (Customer Specified) – Price includes one, two or three points.
<b>CERT-PRESS-SR</b>	<b>No Additional Charge</b>
	NIST Traceable Certification of Accuracy for Pressure – All Standard Ranges verified at one point.
<b>CERT-PRESS-SPECIFIC</b>	<b>\$50.00</b>
	NIST Traceable Certification of Calibration for Pressure at Specific Points (Customer Specified) – Price includes one, two or three points.
<b>CAL-420CO-AMBIENT</b>	<b>\$50.00</b>
	Calibration of BAPI's Carbon Monoxide Sensor (BA/420CO) at ambient temperature.
<b>BA/BTP-RECERTIFY</b>	<b>\$100.00</b>
	Blü-Test Probe Recertification with NIST Traceable Certificate of Calibration and Battery

All prices are **NET**. Multipliers do not apply to certificate pricing. For information on special requests and pricing on Certificates with more than three points, please call your BAPI Key Account Specialist.



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