

### Overview and Identification

Thermobuffer Temperature Sensors in the BAPI-Box Crossover Enclosure are designed for temperature sensing in walk-in freezers or refrigerators. The buffers chambers are filled with customer-supplied food grade glycol to slow down the temperature response and track the temperature of the contents of the freezer or refrigerator rather than the air temperature. The unit is available in multiple thermistor's or RTD's as shown in the specifications.

The BAPI-Box Crossover enclosure has a hinged cover for easy termination and comes with an IP10 rating (or IP44 rating with a pierceable knockout plug installed in the open port).

**This instruction sheet is specific to temperature sensor unit with the BAPI-Box Crossover Enclosure. For all other units, please refer to instruction sheet "19817\_Ins\_thermo\_buffer.pdf" which is available on the BAPI website or by contacting BAPI.**

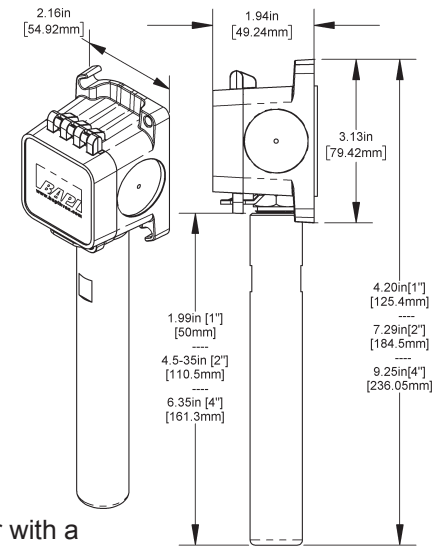


Fig. 1: Thermobuffer Sensor with a BAPI-Box Crossover Enclosure

### Assembly & Installation

1. Fill the buffer with the appropriate amount of customer-provided glycol to the amount as dictated by table 1.
2. Wrap the probe threads with Teflon tape with at least 4 wraps so a watertight seal is established. Insert the probe into the buffer and screw in for a secure water tight fit. Towel off excess fluid which may leak out during assembly and check for leaking. If the assembly leaks, a 15/16ths wrench may be used to snug up the probe to the buffer. More tape may also be needed. The use of food safe silicon may also be used.
3. Select a location on a wall or hanging from a wire rack near the contents you wish to monitor. Mount the Thermobuffer with the buffer facing down (Probe on top). Any other orientation may cause leaking.
4. BAPI recommends positioning BAPI-Box Crossover over the refrigerator wire way hole using the rear open port of the enclosure. Pull the wiring into the unit and terminate using sealant filled connectors. Best practice is to caulk the wiring hole after the wiring is installed. Secure with mounting screws and ensure that the foam backing compresses to about 50% of its thickness to make a gasket type seal against the surface.

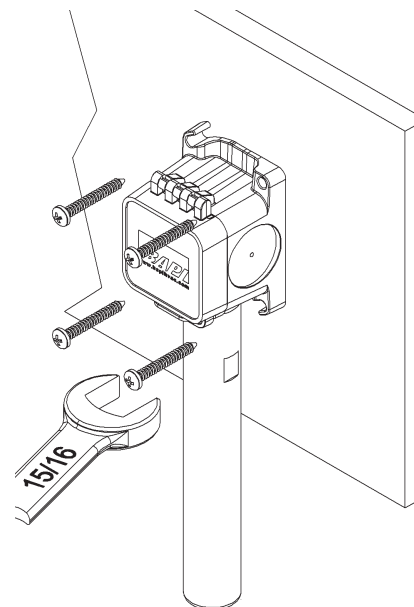


Fig 2: Thermobuffer in a BAPI-Box Crossover Installation

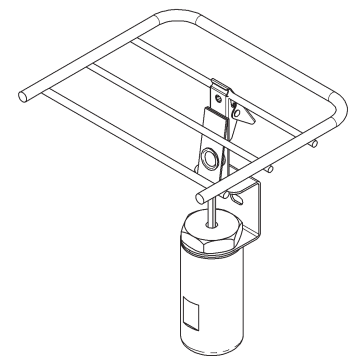


Fig 2: Hanging Bracket Rack Installation

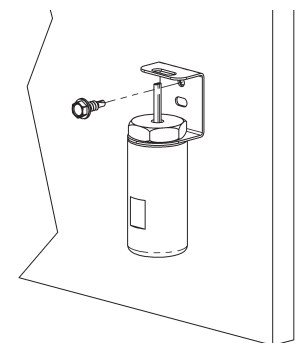


Fig 3: Hanging Bracket Wall Installation (Customer Provided Screws)

Buffer Size	Recommended Fluid Fill
1" Buffer	0.17 Fluid oz (5mL)
2" Buffer	0.67 Fluid oz (20mL)
4" Buffer	1.00 Fluid oz (30mL)

Specifications subject to change without notice.

### Wiring & Termination

BAPI recommends using twisted pair of at least 22AWG and sealant filled connectors for all wire connections. Larger gauge wire may be required for long runs. All wiring must comply with the National Electric Code (NEC) and local codes. Do NOT run this device's wiring in the same conduit as high or low voltage AC power wiring. BAPI's tests show that inaccurate signal levels are possible when AC power wiring is present in the same conduit as the sensor wires.

#### TERMINATION OF UNITS WITHOUT A TERMINAL STRIP OR TEST AND BALANCE SWITCH

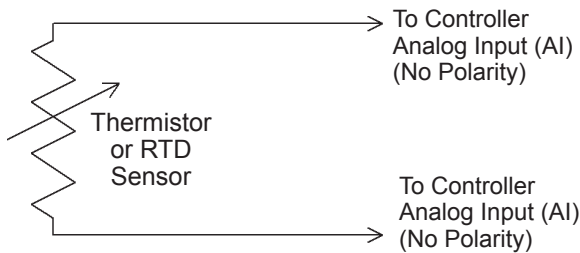


Fig. 8: 2-Wire Termination for Thermistor or RTDs

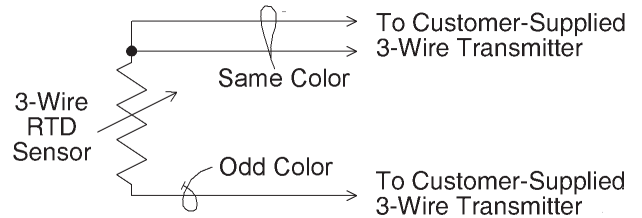


Fig. 9: 3-Wire Termination for RTDs

#### TERMINATION OF UNITS WITH A TERMINAL STRIP OR TEST AND BALANCE SWITCH

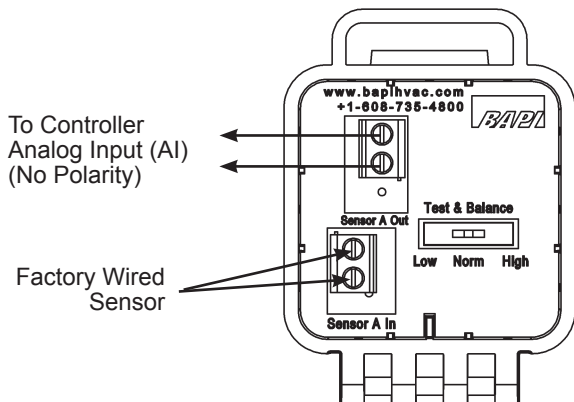


Fig. 7: Terminal Strip (-TS) or Test and Balance (TB) Option for 2 Wire Sensors

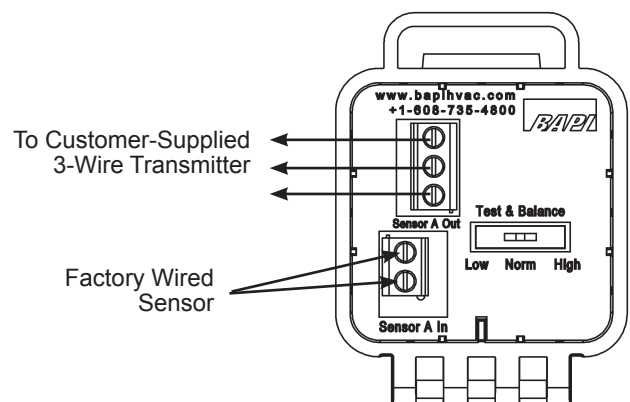


Fig. 8: Terminal Strip (-TS) or Test and Balance (TB) Option for 3 Wire Sensors

#### TEST AND BALANCE SWITCH:

For units with a Test and Balance Switch, the Norm position allows the real sensor at be monitored at "Sensor A Out". The High position forces the "Sensor A Out" to a very hot reading and the Low position forces "Sensor A Out" to a very cold reading (see Table at right).

Sensor Type	Low Temp (40° F) Resistance Value	High Temp (105° F) Resistance Value
1000Ω RTD	1.02KΩ (41.20°F)	1.15KΩ (101.5°F)
3000Ω Thermistor	7.87KΩ (39.8°F)	1.5KΩ (106.8°F)
10K-2 Thermistor	30.1KΩ (34.9°F)	4.75Ω (109.1°F)
10K-3 Thermistor	26.7KΩ (35.9°F)	5.11KΩ (108.4°F)
10K-3(11K) Thermistor	7.32KΩ (43.7°F)	3.65Ω (105.2°F)

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# Thermobuffer Temperature Sensors with a BAPI-Box Crossover Enclosure

Installation & Operations

37718\_ins\_thermobuffer\_passive\_bbx

rev. 06/16/20

## Diagnosics

### Possible Problems:

Controller reports higher or lower than actual temperature

### Possible Solutions:

- Confirm the input is set up correctly in the front end software
- Check wiring for proper termination & continuity. (shorted or open)
- For units with a Test & Balance Switch, verify that it is in the center position.
- Disconnect wires and measure the sensor resistance and verify that the sensor resistance is correct as compared to the temperature/resistance table for that sensor. The temperature/resistance tables are available on the BAPI website at [www.bapihvac.com](http://www.bapihvac.com) in the "Resource Library" under "Sensor Specs". If the measured resistance varies by more than 5% from the table, call BAPI technical support.

## Specifications

### Sensor: Passive

Thermistor ..... NTC, 2 Wire  
 RTD ..... PTC, 2 or 3 Wire

### Thermistor:

Temp. Output ..... Resistance  
 Accuracy (Std) .....  $\pm 0.36^{\circ}\text{F}$ , ( $\pm 0.2^{\circ}\text{C}$ )  
 Accuracy (High) .....  $\pm 0.18^{\circ}\text{F}$ , ( $\pm 0.1^{\circ}\text{C}$ )  
 Stability .....  $< 0.036^{\circ}\text{F}/\text{Year}$ , ( $< 0.02^{\circ}\text{C}/\text{Year}$ )  
 Heat dissipation .. 2.7 mW/ $^{\circ}\text{C}$   
 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 1K, 1K[375], 1K[A]

1K .....  $1\text{K}\Omega$  @ $0^{\circ}\text{C}$ ,  $3.85\Omega/^{\circ}\text{C}$  Curve  
 1K[375] .....  $1\text{K}\Omega$  @ $0^{\circ}\text{C}$ ,  $3.75\Omega/^{\circ}\text{C}$  Curve  
 1K[A] .....  $1\text{K}\Omega$  @ $0^{\circ}\text{C}$ ,  $3.85\Omega/^{\circ}\text{C}$  Curve,  
 High Accuracy RTD

Accuracy ..... 0.12% @Ref, or  $\pm 0.55^{\circ}\text{F}$ , ( $\pm 0.3^{\circ}\text{C}$ )  
 Accuracy 1K[A] ..... 0.06% @Ref, or  $\pm 0.277^{\circ}\text{F}$  ( $\pm 0.15^{\circ}\text{C}$ )  
 Range .....  $-40^{\circ}$  to  $221^{\circ}\text{F}$ , ( $-40$  to  $105^{\circ}\text{C}$ )

### RTD: Extreme Temperature Platinum 1K[1]

1K[1] .....  $1\text{K}\Omega$  @ $0^{\circ}\text{C}$ , 385 Curve  
 Range .....  $-328^{\circ}$  to  $32^{\circ}\text{F}$ , ( $-200$  to  $0^{\circ}\text{C}$ )

### RTD: Nickel 1K[NI]

1K[NI] .....  $1\text{K}\Omega$  @ $70^{\circ}\text{F}$ ,  $2.95\Omega/^{\circ}\text{F}$  JCI Curve  
 Range .....  $-40^{\circ}$  to  $221^{\circ}\text{F}$  ( $-40$  to  $105^{\circ}\text{C}$ )

### RTD: All RTDs

Stability .....  $\pm 0.25^{\circ}\text{F}$ , ( $\pm 0.14^{\circ}\text{C}$ )  
 Self Heating .....  $0.4^{\circ}\text{C}/\text{mW}$  @ $0^{\circ}\text{C}$

### Wire: 22 AWG Stranded, 2 or 3 Wires

### Insulation:

Etched Teflon or FEP Jacketed; PTFE for 1K[1]

### Wiring to Probe:

1K[1] Extreme Temp Probe - PTFE Jacketed Cable

Probe: 304 Stainless Steel (SS), 0.25" OD

### Probe Process Connection:

304 SS Double threaded  $\frac{1}{2}$ " NPT

### Probe Length: Probe tip to thread start

1" ..... 0.75"  
 2" ..... 3.5"  
 4" ..... 5.5"

### Buffer Chamber Dimensions:

1" Buffer ..... 2.75"H x 1"Dia  
 2" Buffer ..... 5.1"H x 1"Dia  
 4" Buffer ..... 7.1"H x 1"Dia

### Liquid Fill: Food Grade Glycol (Customer provided)

1" Buffer ..... 5 mL  
 2" Buffer ..... 20 mL  
 4" Buffer ..... 30 mL

### Buffer Chamber Construction:

M304 ..... Machined 304 Stainless Steel, 0.7" core  
 MAL ..... Machined Aluminum, 0.7" core

### Mounting:

BAPI-Boxes ..... 4 extension tabs (ears),  $\frac{7}{16}$ " hole  
 Hanging Bracket .. SS bracket w/  $\frac{1}{8}$ " holes or  $\frac{3}{8}$ " spring clip

### BAPI-Box Crossover Enclosure Ratings:

IP10, NEMA 1  
 IP44 with knockout plug installed in the open port

### BAPI-Box Crossover Enclosure Material:

UV-resistant polycarbonate & Nylon, UL94V-0

### Environmental Operating Range:

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

### Agency:

RoHS, CE  
 PT= DIN43760, IEC Pub 751-1983,  
 JIS C1604-1989

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