

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.

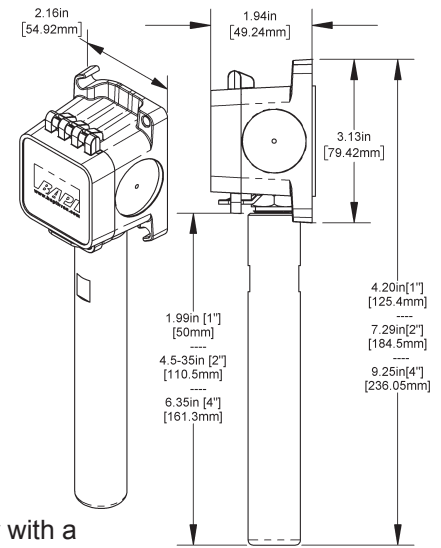


Fig. 1: Thermobuffer Sensor with a BAPI-Box Crossover Enclosure

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.

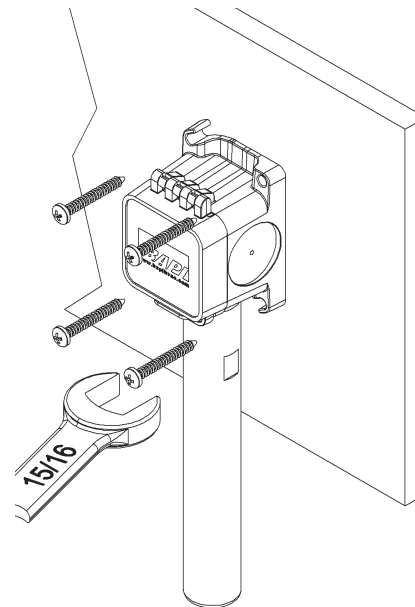


Fig 2: Thermobuffer in a BAPI-Box Crossover Installation

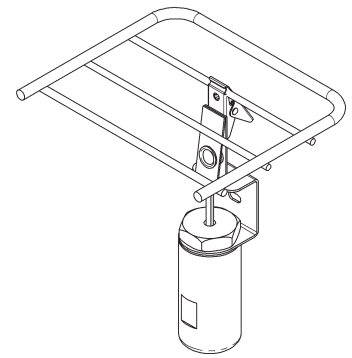


Fig 2: Hanging Bracket Rack Installation

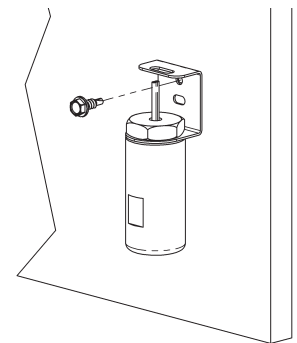


Fig 3: Hanging Bracket Wall Installation (Customer Provided Screws)

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

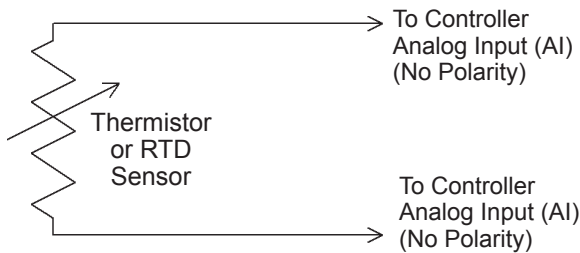


Fig. 8: 2-Wire Termination for Thermistor or RTDs

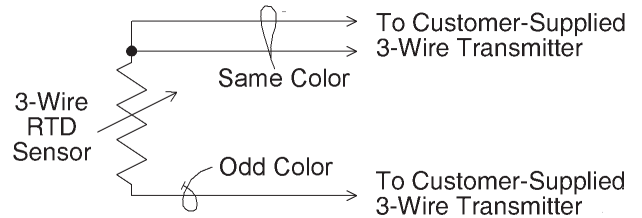


Fig. 9: 3-Wire Termination for RTDs

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

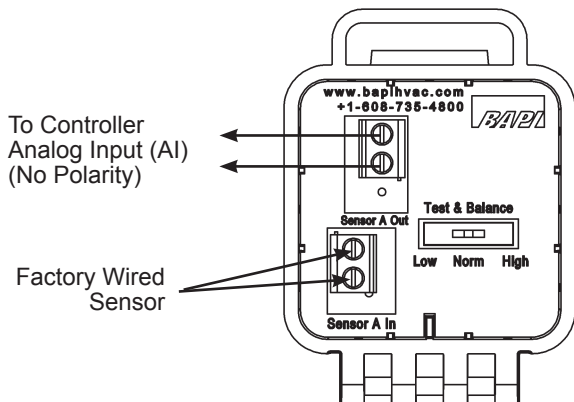


Fig. 7: Terminal Strip (-TS) or Test and Balance (TB) Option for 2 Wire Sensors

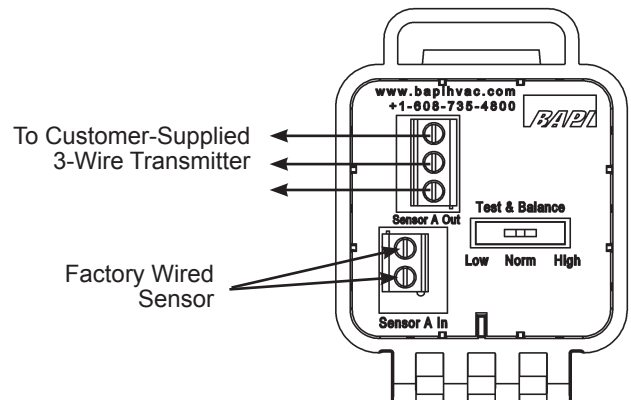


Fig. 8: Terminal Strip (-TS) or Test and Balance (TB) Option for 3 Wire Sensors

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)

Specifications subject to change without notice.



Diagnositics

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.
- Measure the physical temperature at the temperature sensor's location using an accurate temperature standard. Disconnect the temperature sensor wires and measure the temperature sensor's resistance across the sensor output pins with an ohmmeter. Compare the temperature sensor's resistance to the appropriate temperature sensor table on the BAPI website. If the measured resistance is different from the temperature table by more than 5% call BAPI technical support. Find BAPI's website at www.bapihvac.com; click on "Resource Library" and "Sensor Specs" then click on the type of sensor you have.

Specifications

Sensor: Passive

Thermistor NTC, 2 wire
 RTD PTC, 2 or 3 wire

Thermistor: Thermal resistor

Temp. Output Resistance
 Accuracy (Std) $\pm 0.36^{\circ}\text{F}$, ($\pm 0.2^{\circ}\text{C}$)
 Accuracy (High) $\pm 0.18^{\circ}\text{F}$, ($\pm 0.1^{\circ}\text{C}$), [XP] option
 Stability $< 0.036^{\circ}\text{F}/\text{Year}$, ($< 0.02^{\circ}\text{C}/\text{Year}$)
 Heat Dissipation $2.7 \text{ mW}/^{\circ}\text{C}$
 Temp. Drift $< 0.02^{\circ}\text{C}$ per year
 Probe Range -40° to 221°F (-40° to 105°C)

RTD: Resistance Temperature Device

Platinum (Pt) 100Ω or $1\text{K}\Omega$ @ 0°C , 385 curve,
 Platinum (Pt) $1\text{K}\Omega$ @ 0°C , 375 curve
 Pt Accuracy (Std) 0.12% @Ref, or $\pm 0.55^{\circ}\text{F}$, ($\pm 0.3^{\circ}\text{C}$)
 Pt Accuracy (High) ... 0.06% @Ref, or $\pm 0.277^{\circ}\text{F}$
 ($\pm 0.15^{\circ}\text{C}$), [A]option

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°C
 Pt Probe Range -40° to 221°F , (-40 to 105°C)
 Nickel (Ni) 1000Ω @ 70°F , JCI curve
 Ni Probe range -40° to 221°F (-40 to 105°C)

Sensitivity: Approximate @ 32°F (0°C)

Thermistor Non-linear
 See bapihvac.com "Sensor Specs"
 $1\text{K}\Omega$ RTD (Pt) $3.85\Omega/^{\circ}\text{C}$
 Nickel (Ni) $2.95\Omega/^{\circ}\text{F}$ for the JCI RTD

Lead Wire: 22awg stranded

Insulation: Etched Teflon, Plenum rated

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

Buffer Chamber Construction:

M-304 Machined 304 Stainless Steel, $0.7"$ core
 MAL Machined Aluminum, $0.7"$ core

Liquid Fill: Food Grade Glycol (Customer provided)

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

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°F (-40 to 85°C)
 0 to 100% RH, Non-condensing

Agency:

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

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