

Overview

The BA/T#-TB is for measuring the temperature in walk-in-freezers or refrigerators with a wall or hanging bracket sensor. The buffers are made in different lengths and are made to be filled with food grade glycol to slow down the temperature response to more closely simulate the contents of the freezer or refrigerator. The BA/T#-TB transmitter is available in common temperature ranges and 2-wire, 4-20mA or voltage signaling as shown in the specifications. The mounting enclosure styles come in NEMA 4 plastic or hanging bracket with the buffers available in stainless steel or aluminum to fit any application.

Identification

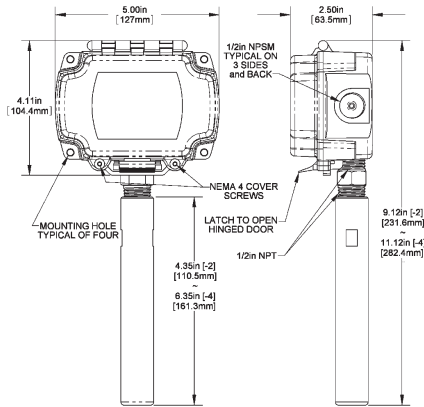


Fig 1: 2" & 4" Thermbuffer in a BAPI-Box (BB) Enclosure

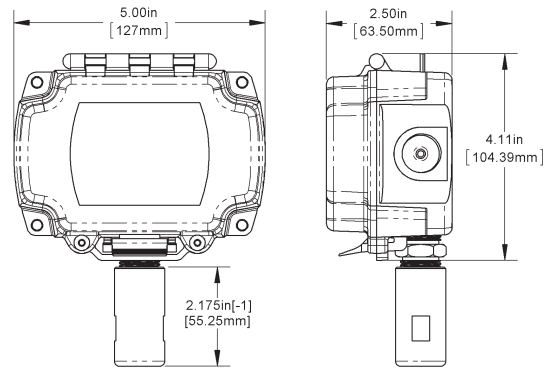


Fig 2: 1" Thermbuffer in a BAPI-Box (BB) Enclosure with Plastic Threaded Fitting

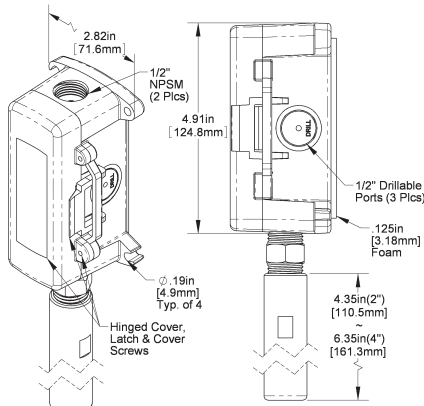


Fig 3: 2" & 4" Thermbuffer in a BAPI-Box 2 (BB2) Enclosure

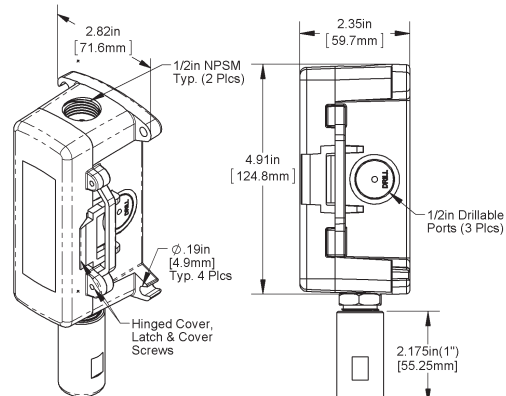


Fig 4: 1" Thermbuffer in a BAPI-Box 2 (BB2) Enclosure with Plastic Threaded Fitting

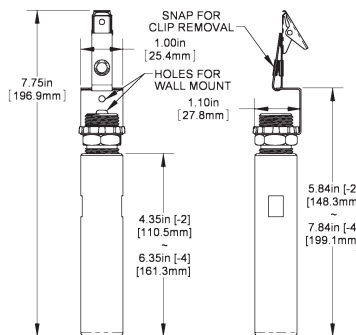


Fig 5: 2" & 4" Hanging Bracket Thermbuffer (Transmitter is ordered and mounted separately.)

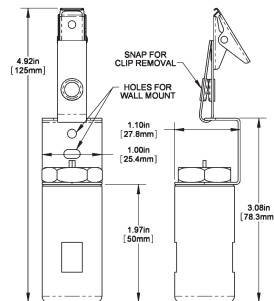


Fig 6: 1" Hanging Bracket Thermbuffer (Transmitter is ordered and mounted separately.)

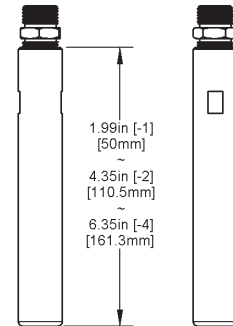


Fig 7: No Box (NB) Thermbuffer (Transmitter is ordered and mounted separately.)

Specifications subject to change without notice.

Assembly & Installation

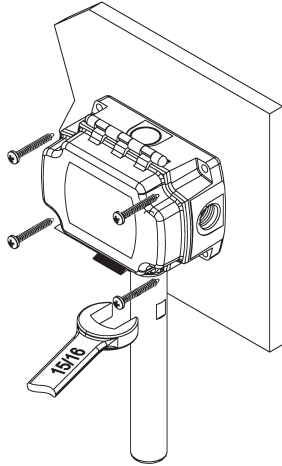


Fig 8: 2" & 4" Thermbuffer in a BAPI-Box (BB) Enclosure Installation

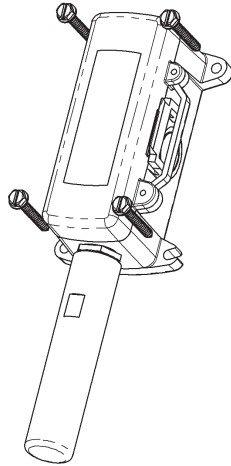


Fig 9: 2" & 4" Thermbuffer in a BAPI-Box 2 (BB2) Enclosure Installation

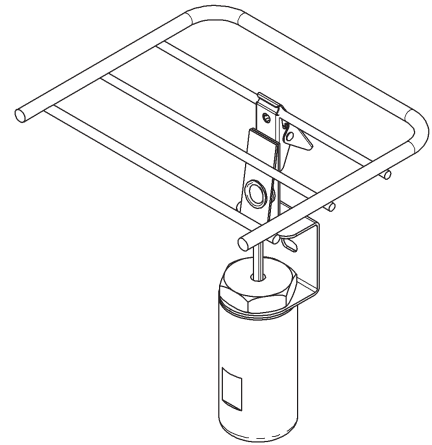


Fig 10: 1" Hanging Bracket Rack Installation

- 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 water tight seal is established.
- 3 Insert the probe into the buffer and screw in for a secure water tight fit.
- 4 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.
- 5 Select a location on a wall or hanging from a wire rack near the contents you wish to monitor.
- 6 Mount the Thermo Buffer with the buffer facing down (Probe on top). Any other orientation is not recommended due to leaking concerns.
- 7 We recommend BAPI Box surface mounting be positioned over the refrigerator wire way hole using the rear BAPI Box knock out. 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.

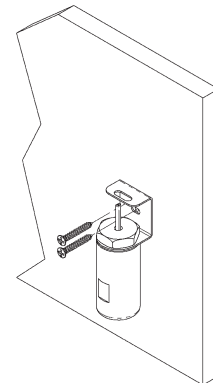


Fig 11: 1" Hanging Bracket Wall Installation (Transmitter Mounted Externally)
Note: Customer Provided Screws

Table 1:	
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)

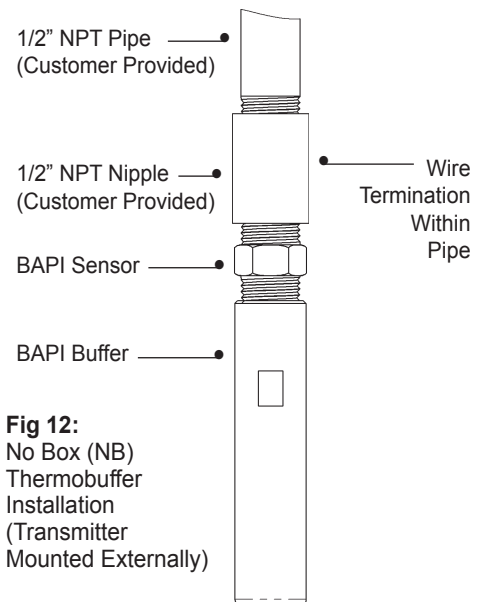


Fig 12: No Box (NB) Thermbuffer Installation (Transmitter Mounted Externally)

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.

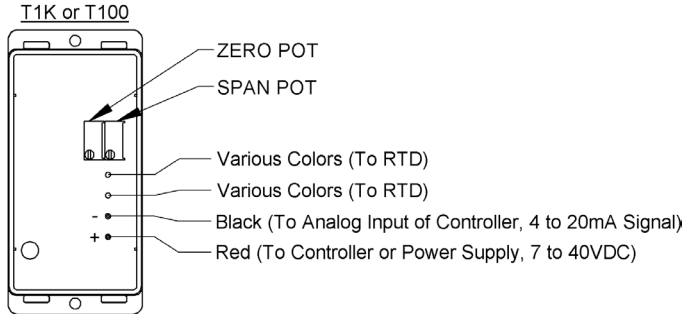


Fig. 13: Typical RTD 4 to 20 mA Transmitter with Flying Leads

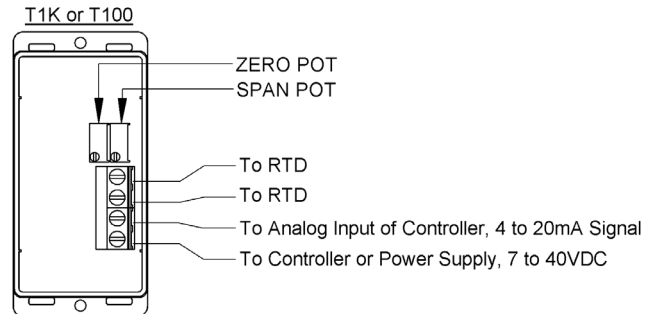


Fig. 14: Typical RTD 4 to 20mA Transmitter with Terminals

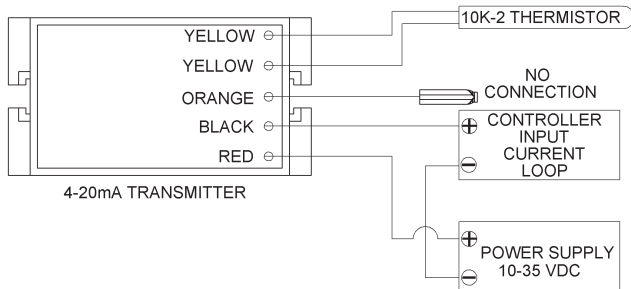


Fig. 15: Typical Thermistor 4 to 20mA Transmitter

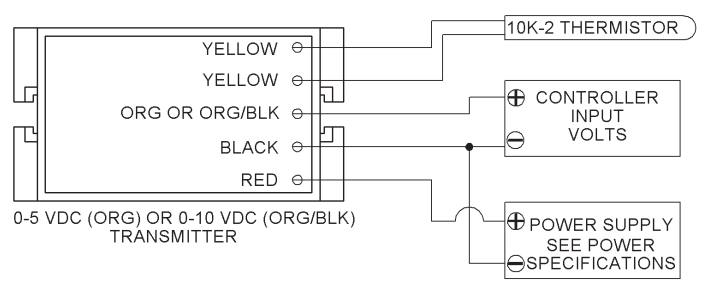


Fig. 16: Typical Thermistor Voltage Transmitter

Diagnostics

Problems:

- Unit will not operate.

Possible Solutions:

- Measure the power supply voltage by placing a voltmeter across the transmitter's (+) and (-) terminal. Make sure that it matches the drawings above and power requirements in the specifications.
- Check if the RTD wires are physically open or shorted together and are terminated to the transmitter.
- 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 with an ohmmeter. Compare the temperature sensor's resistance to the appropriate temperature sensor table on the BAPI web site.

- The reading is incorrect in the controller.

- Determine if the input is set up correctly in the controllers and BAS software.

- For a 4-20mA current transmitter measure the transmitter current by placing an ammeter in series with the controller input. The current should read according to the "4-20mA Temperature Equation" shown below.

- For a voltage transmitter, measure the signal with a volt meter (Orange or Orange/Black to Black). The signal should read according to the "Voltage Temperature Equation" shown below.

Voltage Temperature Equation

$$T = T_{Low} + \frac{(V \times T_{Span})}{V_{Span}}$$

T	= Temperature at sensor
T _{Low}	= Low temperature of span
T _{High}	= High temperature of span
T _{Span}	= T _{High} - T _{Low}
V _{Low}	= Low transmitter voltage usually=(0, 1 or 2v)
V _{High}	= High transmitter voltage usually=(5 or 10v)
V _{Span}	= V _{High} - V _{Low}
V	= Signal reading in volts

4-20mA Temperature Equation

$$T = T_{Low} + \frac{(A - 4) \times (T_{Span})}{16}$$

T	= Temperature at sensor
T _{Low}	= Low temperature of span
T _{High}	= High temperature of span
T _{Span}	= T _{High} - T _{Low}
A	= Signal reading in mA

Specifications subject to change without notice.



Thermobuffer Temperature Transmitters

BA/T#- TB Temperature Transmitter

Installation and Operation Instructions

20898_ins_Thermobuffer_Active

rev. 06/29/15

Specifications

RTD Transmitter

Power Required: 7 to 40VDC
 Transmitter Output: 4 to 20mA, 850Ω@24VDC
 Output Wiring: 2 wire loop
 Output Limits: <1mA (short), <22.35mA (open)
 Span: Min. 30°F (17°C), Max 1000°F, (555°C)
 Zero: Min. -148°F (-100°C), Max 900°F (482°C)
 Zero & Span Adjust: 10% of span
 Accuracy: ±0.065% of span
 Linearity: ±0.125% of span
 Power Output Shift: ±0.009% of span
 RTD Sensor: 2 wire Platinum (Pt), 385 curve
 Transmitter Ambient -4 to 158°F(-20 to 70°C)
 0 to 95% RH, Non-condensing

Thermistor Transmitter

Supply Voltage:
 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 24 VAC (0 to 5 VDC Outputs)
 15 to 24 VAC (0 to 10 VDC Output)
 Transmitter Output: 4 to 20mA, 700Ω@24VDC
 0 to 5 & 0 to 10VDC, 10KΩ min
 Output Wiring: 2 & 3 wire (See wiring detail on pg. 3)
 Transmitter Limits: -40 to 185°F, (-40 to 85°C)
 Accuracy: ±1.015°C, from (0 to 65°C)
 Linearity: ±0.065°C, from (0 to 65°C)
 Resolution: Span/1024
 Thermistor Sensor: 10K-2 Thermistor, 10KΩ @77°F
 Transmitter Ambient: 32 to 158°F, (0° to 70°C)
 0 to 95% RH, Noncondensing

Thermistor: 10K-2, Thermal Resistor (Bare Sensor)
 Accuracy (Std): ±0.36°F, (±0.2°C)
 Accuracy (High): ±0.18°F, (±0.1°C), [XP] option
 Stability: < 0.036°F/Year, (<0.02°C/Year)
 Heat Dissipation: 2.7 mW/°C
 Probe Range: -40° to 221°F (-40° to 105°C)
 Wire Colors:
 Standard: Yellow/Yellow (no polarity)
 High Acc. [XP]: Yellow/Yellow (no polarity)

RTD: Resistance Temp Device (Bare Sensor)
 Platinum (Pt): 100Ω and 1KΩ @0°C, 385 curve,
 Pt Accuracy (Std): 0.12% @Ref, or ±0.55°F, (±0.3°C)
 Pt Accuracy (High): 0.06% @Ref, or ±0.277°F,
 (±0.15°C), [A]option
 Pt Stability: ±0.25°F, (±0.14°C)
 Pt Self Heating: 0.4 °C/mW @0°C
 Pt Probe Range: -40° to 221°F, (-40 to 105°C)
 Wire Colors:
 General color code (other colors possible)
 1KΩ, Class B Orange/Orange (no polarity)
 1KΩ, Class A Orange/White (no polarity)
 100Ω, Class B Red/Red (no polarity)
 100Ω, Class A Red/Red-w/black stripe (no polarity)

Sensitivity: Approximate @ 32°F (0°C)
 Thermistor: Non-linear (See www.bapihvac.com, click "Sensor Specs")
 RTD (Pt): 3.85Ω/°C for 1KΩ RTD
 0.385Ω/°C for 100Ω RTD

Lead Wire: 22awg stranded
Insulation: Etched Teflon, Plenum rated
Probe: 304 Stainless Steel (SS), 0.25" OD

Probe Process Connection:
 -TB 304 SS Double threaded ½" 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

Mounting:
 Plastic Box 4 extension tabs (ears), 7/16" hole,
 Hanging Bracket SS bracket with 1/8" holes or 3/8" spring clip

Enclosure Types:
 No Box -NB, intended for direct ½" NPT pipe mount
 BAPI-Box: -BB, w/ four ½" NPSM & one ½" drill-out
 BAPI-Box 2: -BB2, w/ three ½" NPSM & three ½" drill-outs
 Hanging Bracket -HB, Intended to hang from shelving

Enclosure Ratings:
 No Box -NB, No Rating
 BAPI-Box -BB, NEMA 4, IP66
 BAPI-Box 2 -BB2, NEMA 4, IP66
 Hanging Bracket -HB, No rating

Enclosure Materials:
 BAPI-Box -BB, Polycarbonate, UL94V-0, UV rated
 BAPI-Box 2 -BB2, Polycarbonate, UL94V-0, UV rated
 Hanging Bracket -HB, 304 Satinless Steel bracket and clip

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

Color:
 BAPI-Boxes Warm White (beige)
 SS Buffer Polished Stainless Steel
 Aluminum Buffer Wire Brushed Aluminum

Ambient (Enclosure): 0 to 100% RH, Non-condensing
 BAPI-Box -BB, -40 to 185°F (-40 to 85°C)
 BAPI-Box & BAPI -BB2, -40 to 185°F (-40 to 85°C)
 NB, w/ TB sensor -NB, -40 to 212°F (-40 to 100°C)
 Hanging Bracket -HB, -40 to 122°F (-40 to 50°C)

Agency: RoHS,
 Pt= DIN43760, IEC Pub 751-1983,
 JIS C1604-1989

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