

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

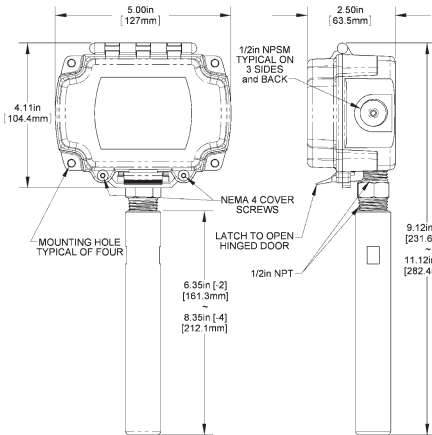


Fig 1: BB, 2" & 4" Buffer w/SS Threaded Fitting

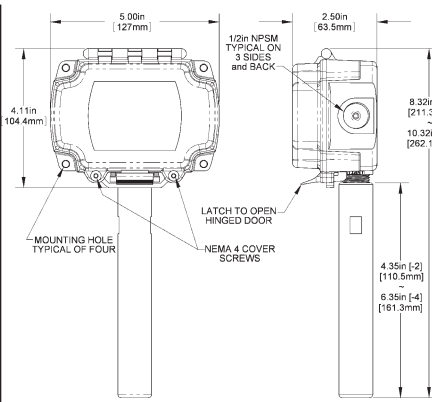


Fig 2: BB, 2" & 4" Buffer w/plastic Threaded Fitting

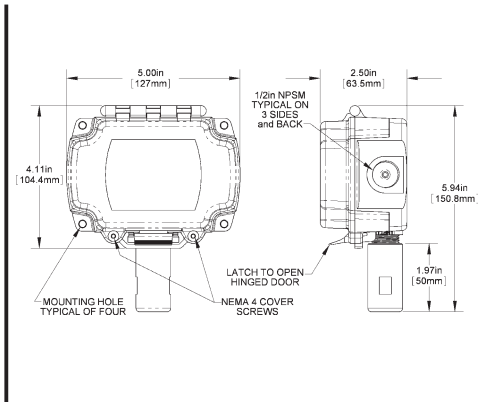


Fig 3: BB, 1" Buffer w/plastic Threaded Fitting

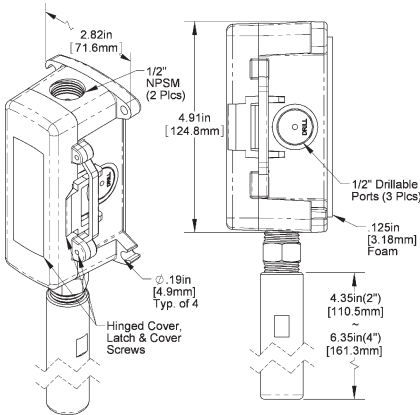


Fig 4: BB2, 2" & 4" Buffer w/SS Threaded Fitting

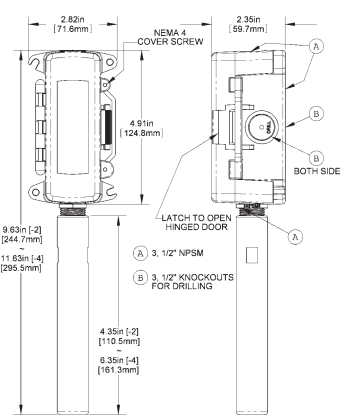


Fig 5: BB2, 2" & 4" Buffer w/Plastic Threaded Fitting

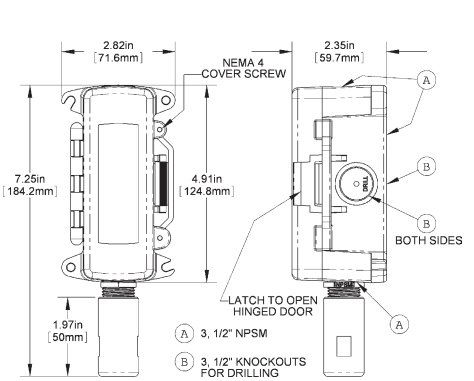


Fig 6: BB2, 1" Buffer w/plastic Threaded Fitting

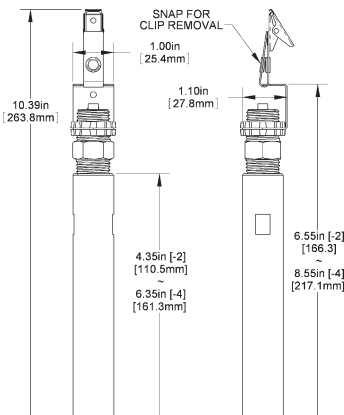


Fig 7: Hanging Bracket, 2" & 4" Buffer w/SS Threaded Fitting

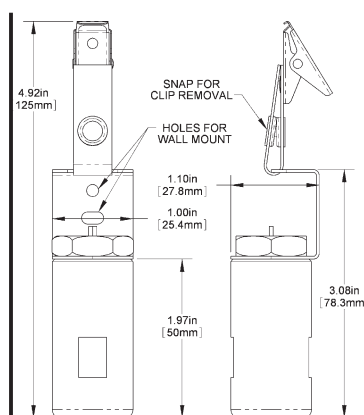


Fig 8: Hanging Bracket, 1" Buffer w/SS Threaded Fitting

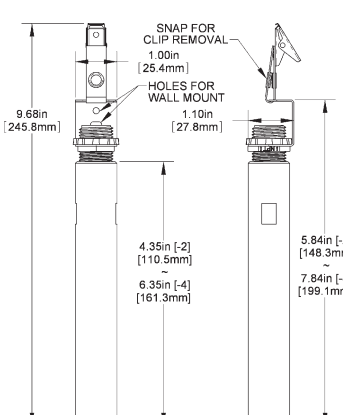


Fig 9: Hanging Bracket, 2" & 4" Buffer w/Plastic Threaded Fitting

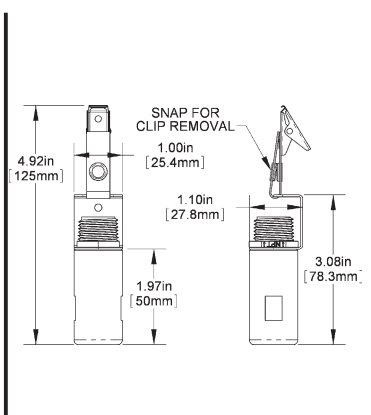


Fig 10: Hanging Bracket, 1" Buffer w/Plastic Threaded Fitting

Specifications subject to change without notice.



Thermbuffer Temperature Transmitters

BA/T#- TB Temperature Transmitter

Installation and Operation Instructions

20898_ins_Thermbuffer_Active

rev. 8/25/09

Assembly & Installation

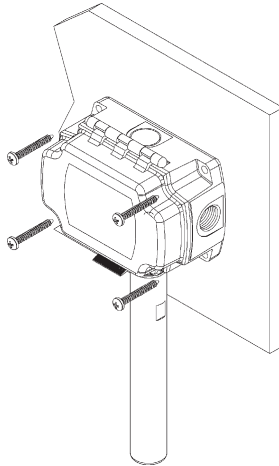


Fig 11: BB, 2" & 4" Installation
(Transmitter Mounted Internally)

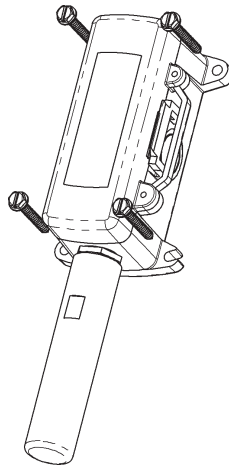


Fig 12: BB2, 2" & 4" Installation
(Transmitter Mounted Internally)

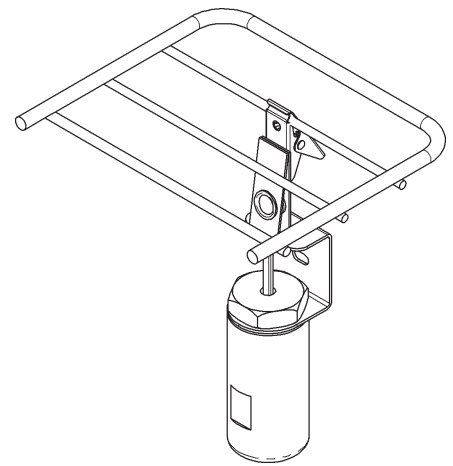


Fig 13: HB, Hanging Bracket 1" Installation
(Transmitter Mounted Externally)

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)

- 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 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 drill-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.

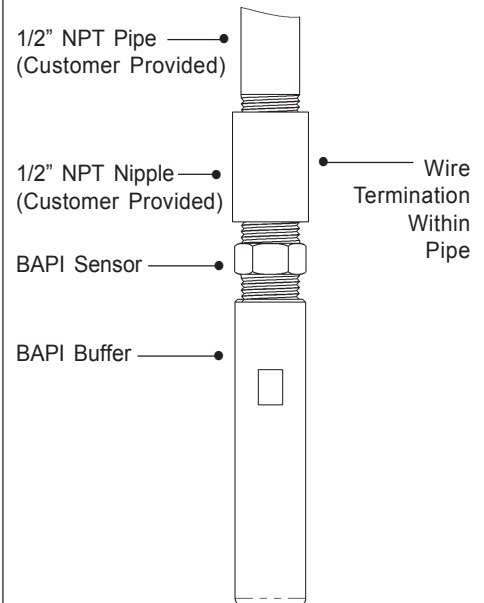


Fig 14: NB, Direct Pipe Buffer Mount Installation
(Transmitter Mounted Externally)

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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.

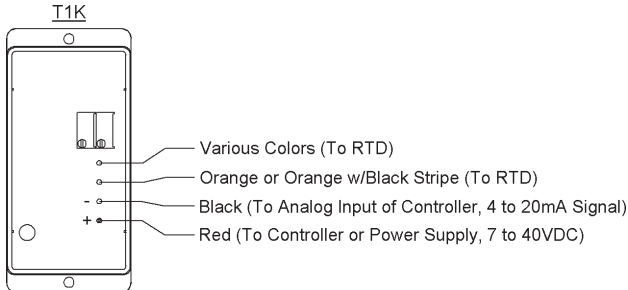


Fig 15: Typical RTD 4-20 mA Transmitter W/Flying Leads

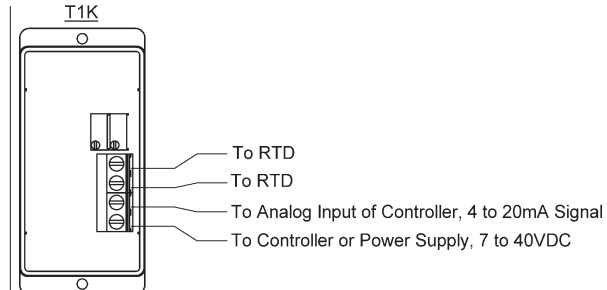


Fig 16: Typical RTD 4-20mA Transmitter W/Terminals

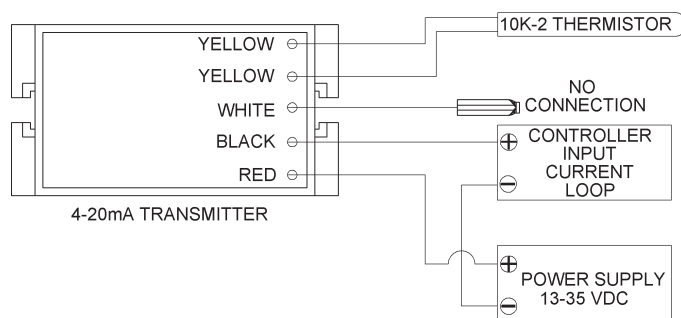


Fig 17: Typical Thermistor 4-20mA Transmitter

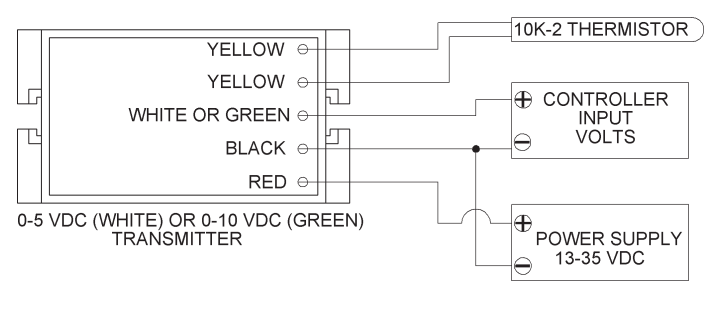


Fig 18: Typical Thermistor Voltage Transmitter

Diagnostics

Problems:

- Unit will not operate.

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 = Ammeter reading in mA

- The reading is incorrect in the controller.

Voltage Temperature Equation

$$T = T_{Low} + \frac{(V \times T_{Span})}{16}$$

- T = Temperature at sensor
- T_{Low} = Low temperature of span
- T_{High} = High temperature of span
- T_{Span} = T_{High} - T_{Low}
- 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 = Voltage reading in volts

Possible Solutions:

- Measure the power supply voltage by placing a voltmeter across the transmitter's (+) and (-) terminals. The voltage reading should be between 7 to 40 VDC.
- 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.
- 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 equation shown at left.
- For a voltage transmitter, measure the signal with a volt meter (Green to Black). The signal should read according to the voltage equation shown at left.

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Thermobuffer Temperature Transmitters

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Specifications

RTD Transmitter

Power Required	7 to 40VDC
Transmitter Output	4-20mA, 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. -328°F (-200°C), Max 900°F (482°C)
Accuracy	±0.065% of span
Linearity	±0.125% of span
Power Output Shift	±0.009% of span
RTD Sensor	2 wire Platinum, 385 curve
Transmitter Ambient	0 to 95% RH, Non-condensing -4 to 158°F, (-20° to 70°C)

Thermistor Transmitter

Power Required	8 to 35VDC
Transmitter Output	4-20mA, 800Ω@24VDC
	0-5/0-10VDC, 10KΩmin
Output wiring	2 and 3 wire, (See wiring detail)
Transmitter Limits	-50°F to 150°F, (-45°C to 65°C)
Accuracy	±0.1015°C, (0 to 65°C)
Linearity	±0.065°C, (0 to 65°C)
Resolution	Span/1024
Thermistor Sensor	10K-2 Thermistor, 10kΩ @77°F (25°C)
Transmitter Ambient	0 to 95% RH, Non-condensing 32° to 158°F, (0° to 70°C)

Sensor

Thermistor	Passive
RTD	NTC, 2 wire
Thermistor	PTC, 2 or 3 wire
Thermistor	Thermal resistor (NTC)

Thermistor

Temp. Output	Resistance
Accuracy (std)	±0.36°F, (±0.2°C)
Accuracy (Hi)	±0.18°F, (±0.1°C), [XP] option
Stability	< 0.036°F/Year, (<0.02°C/Year)
Heat dissipation	2.7 mW/°C
Temp. Drift	<0.02°C per year
Probe range	-40° to 221°F (-40° to 105°C)

RTD

	Resistance Temperature Device, (PTC) knockout
Platinum (PT)	100Ω and 1KΩ @0°C, 385 curve,
Platinum (PT)	1KΩ @0°C, 375 curve
PT Accuracy (Std)	0.12% @Ref, or ±0.55°F, (±0.3°C)
PT Accuracy (Hi)	0.06% Ref, or ±0.277°F (±0.15°C),
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)

Sensitivity

Thermistor	Go to bapihvac.com "Sensor Specs"
RTD (PT)	Non-linear
	3.85Ω/°C for 1KΩ RTD, @0°C
	0.385Ω/°C for 100Ω RTD, @0°C

Sensor Lead wire

Insulation

Probe

Probe Process Connection

- TB
- TBP

Probe Length

- 1"
- 2"
- 4"

Buffer Dimensions:

- 1" Buffer
- 2" Buffer
- 4" Buffer

Mounting

- Plastic Box
- Hanging Bracket

Enclosure Types

- No box
- BAPI-Box

BAPI-Box 2

Hanging Bracket

Enclosure ratings

- No box
- BAPI-Box
- BAPI-Box 2
- Hanging Bracket

Enclosure materials

- No box
- BAPI-Box
- BAPI-Box 2
- Hanging Bracket

Buffer Well Construction

- M-304
- MAL

Liquid Fill:

- 1" Buffer
- 2" Buffer
- 4" Buffer

Color:

- Box
- SS Buffer
- Aluminum Buffer

Ambient (Encl.)

- BB, BB2
- NB, w/TB sensor
- HB

Agency

22awg stranded
Etched Teflon, Plenum rated
304 Stainless Steel (SS), 0.25"OD

304 SS Double threaded ½" NPT
Plastic Double threaded ½" NPT,
& NPSM, 100°C max
Probe tip to thread start
0.75"
3.5"
5.5"

2.75"H x 1"Dia
5.1H x 1"Dia
7.1"H x 1"Dia

4 extension tabs (ears), 7/16" hole,
SS bracket w/ 1/8" holes or 3/8" clip

-NB, direct ½" NPT pipe mount
-BB, w/four ½" NPSM & one 1/2"
drillout
-BB2, w/three ½" NPSM & three 1/2"

-HB, Intended to hang from shelving

-NB, No rating
-BB, NEMA 4X, IP66
-BB2, NEMA 4X, IP66
-HB, No rating

-NP, See Buffer material
-BB, Polycarbonate, UL94V-0, UV rated
-BB2, Polycarbonate, UL94V-0, UV rated
-HB, 304 Satinless Steel bracket and clip

Machined 304 Stainless Steel, 0.7" core
Machined Aluminum, 0.7" core
Food Grade Glycol (Customer provided)
5 mL
20 mL
30 mL

Warm White (beige)
Polished Stainless Steel
Wire Brushed Aluminum
0 to 100% RH, Non-condensing
-40°F to 185°F, (-40° to 85°C)
-40°F to 212°F, (-40° to 100°C)
-40°F to 122°F, (-40° to 50°C)
RoHS, CE (Thermistors (10KΩ)
PT= DIN43760, IEC Pub 751-1983,
JIS C1604-1989

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