



Room Temperature Transmitter in a BAPI-Stat 4 Enclosure (BA/TxK[aa to bb]-B4)

Installation & Operations

24909_ins_T1K-B4

rev. 01/02/19

Product Overview and Identification

The T1K Transmitter Room Unit comes in the BAPI-Stat 4 style enclosure. It measures the room temperature with a 1KΩ Platinum RTD and outputs a 4 to 20mA signal per the custom range selected at the time of the order.

It is available with setpoint, override, display, communication jack, field offset, field ranging and °F or °C display.

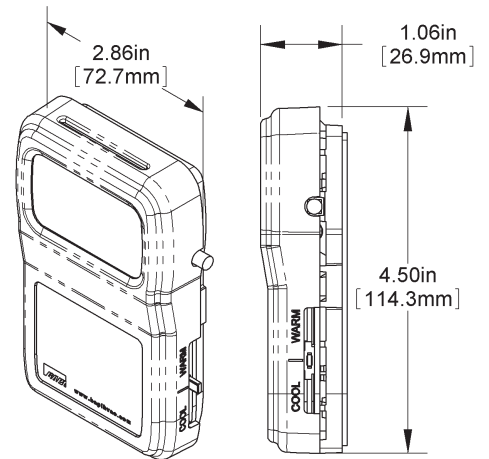


Fig. 1: BAPI-Stat 4 Room Transmitter with Optional Display, Slider Setpoint & Override

Mounting

Location: Avoid mounting on outside walls or in direct sunlight.

JUNCTION BOX, (J-Box)

1. Pull the wire through the wall and out of the junction box, leaving about 6" free.
2. Pull the wire through the hole in the base plate.
3. Secure the back plate to the box using the #6-32 x 1/2 inch mounting screws provided.
4. Screw the plate firmly to the wall so the foam backing is compressed about 50%.
5. Terminate the unit according to the guidelines in the Termination section.
6. Attach Cover by latching it to the top of the base, rotating the cover down and snapping it into place.
7. Secure the cover by backing out the lock-down screws using a 1/16" Allen wrench until it is flush with the bottom of the cover.

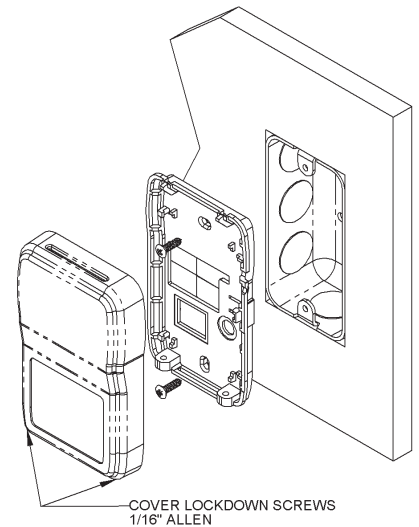


Fig. 2: Wall Mount with J-Box

DRYWALL MOUNTING

1. Place the base plate against the wall where you want to mount the sensor.
2. Using a pencil, mark out the two mounting holes and the area where the wires will come through the wall.
3. Drill two 3/16" holes in the center of each marked mounting hole. Insert a drywall anchor into each hole.
4. Drill one 1/2" hole in the middle of the marked wiring through hole area.
5. Pull the wire through the wall and out the 1/2" hole, leaving about six inches free. Pull the wire through the hole in the base plate.
6. Secure the base to the drywall anchors using the #6 x 1" mounting screws provided. Screw the plate firmly to the wall so the foam plate backing is compressed approximately 50%.
7. Terminate the unit according to the guidelines in the Termination section.
8. Attach cover by latching it to the top of the base, rotating the cover down and snapping it into place.
9. Secure the cover by backing out the lock-down screws using a 1/16" Allen wrench until it is flush with the sides of the cover.

Note: In any wall-mount application, the wall temperature and the temperature of the air within the wall cavity can cause erroneous readings. The mixing of room air and air from within the wall cavity can lead to condensation, erroneous readings and sensor failure. To prevent these conditions, BAPI recommends sealing the conduit leading to the junction box with fiberglass.

Specifications subject to change without notice.

Wiring & Termination

BAPI recommends using twisted pair of at least 22 AWG. 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 AC power wiring of NEC class 1, NEC class 2, NEC class 3 or with wiring used to supply highly inductive loads such as motors, contactors and relays. BAPI's tests show that fluctuating and inaccurate signal levels are possible when AC power wiring is present in the same conduit as the signal lines.

BAPI recommends wiring the product with power disconnected. Proper supply voltage, polarity, and wiring connections are important to a successful installation. Not observing these recommendations may damage the product and will void the warranty.

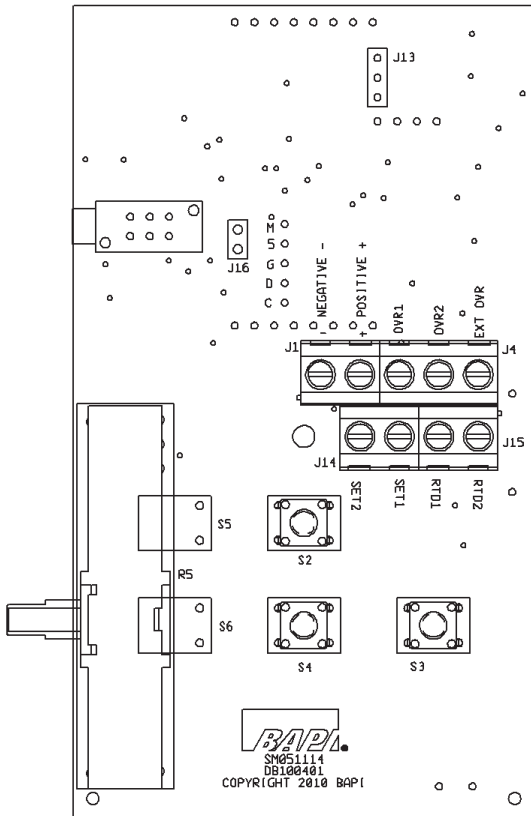


Fig. 3: Circuit Board Termination

- NEGATIVE -** Temperature Value, 4 to 20mA Loop
- POSITIVE +** Main Power, 7 to 30VDC
- OVR1** Override Contact (per order)
- OVR2** Override Contact Common, (*Common with SET2 for Common Ground [-CG] option)
- EXT OVR** BAPI-Man Icon, See Figs 4 & 5 (Connect to main power ground for occupied symbol)
- SET1** Setpoint Output, Resistive or 4 to 20mA Loop** (Per order)
- SET2** Setpoint Output Resistive Common (*Common with OVR2 for Common Ground [-CG] option) (No connection for 4 to 20mA setpoint option)
- RTD1** Remote RTD (per order), No board mounted RTD
- RTD2** Remote RTD (per order), No board mounted RTD

*The Common Ground (-CG) option connects OVR2 and SET2 terminals internally for resistive setpoint units only. The Differential Ground (-DF) option isolates OVR2 and SET2 to independent terminals.

**4 to 20mA Setpoints must be configured as Differential Ground (DF).



Fig. 4: BAPI-Man Unoccupied Symbol ("EXT OVR" Terminal Ungrounded)



Fig. 5: BAPI-Man Occupied Symbol ("EXT OVR" Terminal Grounded)

Optional Communication Jack Wiring

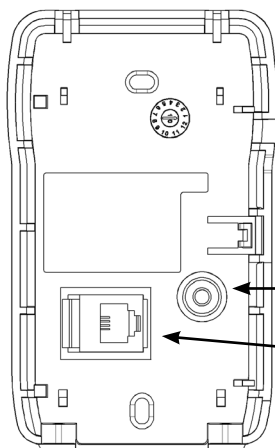
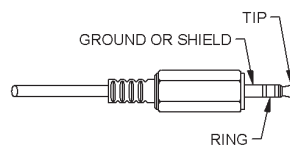


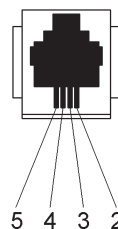
Fig. 6: Back Plate Comm. Jack Locations

Fig. 7: C35L Comm. Jack (3.5mm plug shown for clarity)



C35L Wiring	
	Wire Color
Ground	Black
Tip	White
Ring	Red

Fig. 8: C11/C22 Comm. Jack



C11L/C22L Wiring	
Comm Jack Pin	Wire Color
1	Not Connected
2	Black
3	Red
4	Yellow
5	Green
6	Not Connected

Display, Setpoint and Override Descriptions

BAPI-Stat 4S transmitter is available with an optional display, slider setpoint and override button (Fig 9).

NUMERICAL DISPLAY:

The default display shows current temperature. When the slider setpoint is moved, the setpoint will be displayed for 3 to 4 seconds. The unit can also be set up to display setpoint only or for setpoint lockout. (See “Optional Technicians Adjustments” section.)

ENGINEERING UNITS (°F OR °C):

The display can show the temperature in °F or °C. °F is the factory default.

SENSOR LOCATION:

This is for user reference only and has no affect on the sensor or reading. The four options are Inside, Outside, Remote or Blank (default).

BAPI-MAN ICON:

The BAPI-Man Icon shows the room’s status – Solid for Occupied, Hollow for “Unoccupied” (Fig. 10).

Note: The unit must receive a confirmation (ground) signal on the “EXT OVR” terminal for the BAPI-Man to remain visible on the screen. Pressing the Override button will light the BAPI-Man icon; however, if no confirmation signal is received, then the BAPI-Man will go blank (disappear) after 5 seconds.

Upon receiving a first confirmation (ground) signal on the “EXT OVR” terminal, the BAPI-Man will show occupied (Solid). The BAPI-Man will then show unoccupied (Hollow) whenever the confirmation signal is removed and occupied when the signal is returned. The only way to blank the BAPI-Man from the display at this point is to cycle power.

SLIDER SETPOINT:

When the slider is moved, the setpoint will be displayed for 3 to 4 seconds. Slide the setpoint up or down to the desired setpoint.

VERRIDE:

When the override button is pressed, the BAPI-Man will be displayed as “Solid” for 3-5 seconds (on display units) and the override output will shunt or short for 3 seconds depending on the override option selected.

- N Option = Momentary Temperature Sensor Shunt to < 15Ω
- P Option = Momentary Setpoint Shunt to <15Ω
- J Option = Momentary Override as a Separate Shorting Contact Output on OVR1 & OVR2

If the occupied input (EXT OVR) terminal is grounded, then the BAPI-Man will stay filled in, indicating an occupied state. If the input is open, then the BAPI-Man will revert to hollow, indicating unoccupied (or the icon will disappear completely if there has never been a ground on the EXT OVR terminal).

Optional Technicians Adjustments (The unit is set up in the factory per your order. Adjustments are not required.)

The unit is shipped ready to install per the order and does not requires any special setup or programming. The following Setup or Program Menu Changes are available if the installer decides to change the factory settings. The unit must have a display to make these adjustments. The menu selection buttons are on the back of the board as shown in Fig 12. The parameters available for field configuration are listed below on the next page.

ENTERING PROGRAM MODE AND MAKING CHANGES:

1. Remove cover and install the shunt jumper across the J16 pins (Figs 11 & 12).
2. Use the Up and Down buttons on the back of the circuit board (Fig 12) to advance to the parameter to adjust. (Moves up or down from page to page or from setting to setting.)
3. Use the “Enter” button on the back of the circuit board (Fig 12) to select the menu parameter. This selects the currently displayed menu or selects the new parameter and stores it into memory. You can adjust and quit (remove J16 jumper) any time during this procedure. Be sure to press the Enter button to store your selection or it will not be saved.

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Specifications subject to change without notice.

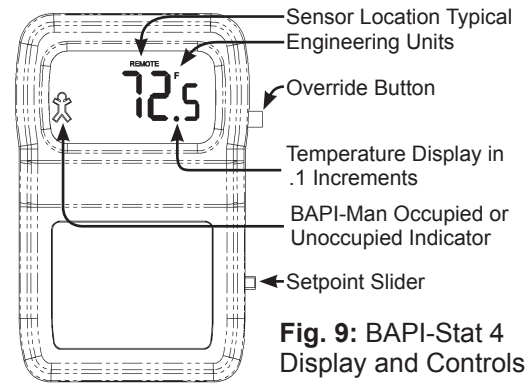


Fig. 9: BAPI-Stat 4 Display and Controls

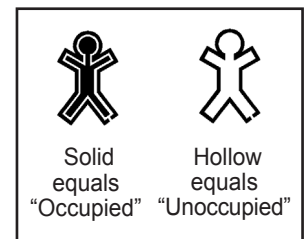


Fig. 10: BAPI-Man Icon

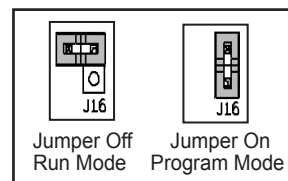


Fig. 11: J16 Program Jumper

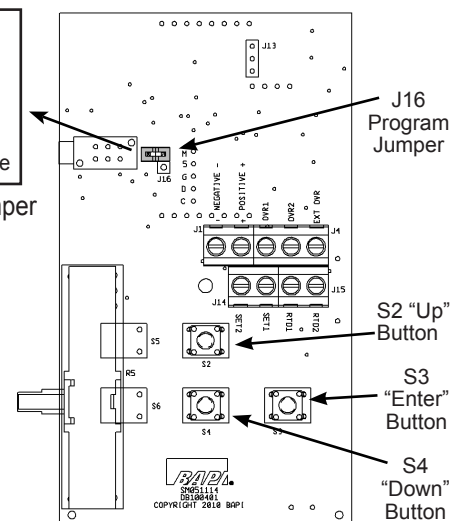


Fig. 12: Setup Button Location

Optional Technicians Adjustments continued...

PROGRAM MODE MENUS:

The Program Mode Menu consists of menu pages P00 through P14 for configuring the sensor.

Menu	Description and Action
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P00	Factory adjusted only. Do not change.
-----	---------------------------------------

P01	Factory adjusted only. Do not change.
-----	---------------------------------------

P02	°F or °C Display: Use the Up/Down buttons to select °C or °F. "0"= °C, "1"= °F
-----	---

P03	Location Icons on the Display (Fig 13): (Cycle with the UP/Down buttons then select)
-----	---

0 = "INSIDE" Icon at the top of the display. Typically means the sensor is installed away from the sensor display location, possibly in an adjacent clean room or operating room. Requires an External Sensor (-ES option)

1 = "OUTSIDE" Icon at the top of the display. Typically means the sensor is installed away from the sensor display location, possibly in an outside air or intake duct or an adjacent room. Requires an External Sensor (-ES option)

2 = "REMOTE" Icon at the top of the display. Typically means the sensor is installed away from the sensor display location. Requires an External Sensor (-ES option)

3 = BLANK, No icon at the top of the display (Default). Typically means the sensor is inside the display enclosure

P04	Display Configuration: (Cycle with the UP/Down buttons then select)
-----	--

0 = Room temperature value and setpoint value if the setpoint is changed (Default)

1 = Temperature Display Only. Room temperature is displayed at all times. No setpoint display.

2 = Setpoint Display Only. The setpoint is displayed at all times. No temperature display.

P05	Override Button Operation (normal per order): (Cycle with UP/Down buttons then select)
-----	---

0 = Independent contact at the OVR1 & OVR2 terminals.

1 = Contact is parallel with the temperature sensor. (Forces a 4mA output.)

2 = Contact is parallel with the setpoint. (Forces 0Ω or 4mA depending on setpoint order selection.)

3 = Contact is parallel with the temp sensor & setpoint. (Forces 0Ω or 4mA depending on output and part selection.)

P06	Temperature Offset: Changes the display and the output value (default is 0° offset)
-----	--

Use the Up/Down buttons to change the offset in .1°C or .18°F increments, +10 to -10 °F/°C maximum

P07	Temperature Max¹: Sets the maximum temperature for display and output (equals 20mA output)
-----	--

Use the Up/Down buttons to change the max temperature in .1°C or .18°F increments, +99 to -99°F/°C maximum

P08	Temperature Min¹: Sets the minimum temperature for display and output (equals 4mA output)
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Use the Up/Down buttons to change the min temperature in .1°C or .18°F increments, +99 to -99°F/°C maximum

P09	Factory adjusted only. Do not change.
-----	---------------------------------------

P10	Factory adjusted only. Do not change.
-----	---------------------------------------

P11	Setpoint Max^{1,2}: Sets the maximum setpoint for display and output (equals 20mA output)
-----	--

Use the Up/Down buttons to change the max setpoint in .1°C or .18°F increments, +99 to -99°F/°C maximum

P12	Setpoint Min^{1,2}: Sets the minimum setpoint for display and output (equals 4mA output)
-----	---

Use the Up/Down buttons to change the main setpoint in .1°C or .18°F increments, +99 to -99°F/°C maximum

P13	Factory adjusted only. Do not change.
-----	---------------------------------------

P14	Factory adjusted only. Do not change.
-----	---------------------------------------

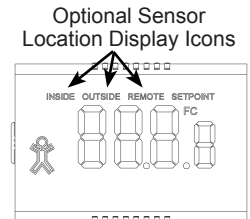


Fig. 13: Display Location Icons

¹There must be a minimum span of 10°F (6°C) between the maximum and minimum range values (reverse acting is allowed).

²This is for adjusting a 4 to 20mA setpoint output only and is only available on factory ordered 4 to 20mA setpoint operations. Resistance setpoint outputs are unaffected.



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Diagnosics

Possible Problems:

No display on the sensor

No temperature output or incorrect at the controller

Setpoint 4 to 20mA reading is incorrect

Setpoint resistance reading is incorrect

Override is not working correctly

Possible Solution:

- Check the sensor power terminals for 12 to 30VDC.

- Check the sensor power terminals for 12 to 30VDC
- Check wiring for proper termination and verify that the controller input is set up correctly in the Building Automation System.

- Measure the temperature transmitter current by putting an ammeter in series with the "Negative -" terminal. Use the "4 to 20mA Temperature Equation" (at right) to determine the calculated temperature at the sensor. Compare the calculated temperature to the actual temperature using an accurate reference. If the calculated and actual temperatures differ by more than 5%, call BAPI technical support.

4 to 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

- Do all the checks above for the setpoint output.

- Disconnect from the controller and measure the resistance with an ohm meter directly from the sensor. Check to see if the reading is within the range listed on the product label. If the reading is not within range, call BAPI technical support.
- Check wiring for proper termination

- For independent override contacts, disconnect terminals OVR1 & OVR2 from the controller and measure the resistance between the terminals. It should read less than 5Ω when the button is pushed. If the resistance doesn't read less than 5Ω, then call BAPI technical support.
- For override in parallel with the sensor, disconnect the unit from the controller and measure the resistance between the "Negative -" and "Positive +" terminals. It should read less than 5Ω when the button is pushed. If the resistance doesn't read less than 5Ω, then call BAPI technical support.
- For override in parallel with the setpoint, disconnect the unit from the controller and measure the resistance between the "SET1" and "SET2" terminals. It should read less than 5Ω when the button is pushed. If the resistance doesn't read less than 5Ω, then call BAPI technical support.

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Specifications

Power Supply:..... 12 to 30VDC recommended

Impedance:.....(Supply VDC - 7VDC) /
0.02A=Ohms

Transmitter Specs:

Output: 4 to 20mA, 850Ω@24VDC
Can be reverse acting

Span:Min. 10°F (6°C), Max 200°F
(111°C)

Zero:Min. -99°F (-73°C), Max 999°F
(537°C)

Resolution:.....Span / 4095

Accuracy:.....±0.065% of span

Non-Linearity:±0.125% of span

Sensor: Factory installed per order

Platinum (PT) 1KΩ @0°C, 385 curve or
100Ω @0°C, 385 curve

PT Accuracy (Std) ...Class B, 0.12% @Ref,
or ±0.55°F, (±0.3°C)

PT Accuracy (High)..Class A, 0.06% @Ref,
or ±0.285°F, (±0.158°C)

PT Stability±0.25°F, (±0.14°C)

PT Self Heating0.4 °C/mW @0°C

PT Sensitivity2.1Ω/°F for 1KΩ RTD @ 0°C
0.21Ω/°F for 100Ω RTD @ 0°C

Overall Accuracy:Transmitter & RTD
Range = 50 to 90°F (10 to
32.2°C)

Class B RTD±0.827°F (0.459°C) @70°F
(21.1°C)

Class A RTD±0.433°F (0.240°C) @70°F
(21.1°C)

Setup Options: (Display required)

Temp. Offset±100° (F/C) in .1° (F/C)
increments

Temp. Range-99 to 999° (F/C) in .1° (F/C)
increments

Setpoint Range 200° (F/C) in .1° (F/C)
increments

Display Option:Overall, 2"W x 1.1"H

LCD3.5 Digits @0.6"H

Occupied Indication .BAPI-Man Icon

Sensor Indication.....Select 1 of 4 sensor icons as desired
Blank, Inside, Outside, Remote

Display LimitsSensor display -99 to 999° (F/C)
0.1° (F/C) increments
Setpoint display span 200° (F/C)
Setpoints in 0.5° steps

Display Setup°F or °C
Temperature & Setpoint, Temperature
Only, or Setpoint Only

Options:.....Factory setup only per order

Setpoint (SP)Slidepot, Resistive or 4 to 20mA, output
DA or RA, Board supports a fixed offset
resistor

Override.....Independent closure or
Temperature or SP shunt/4mA
Contact rating = 300mA @30VDC, Silver
plated

Comm. Jack.....RJ11 (4 pin), RJ22 (4 pin) or 3.5mm (3 pin)

Remote sensorSame sensor type on order (purchased
separately)

Grounding TypeCommon Ground (-CG) for Setpoint and
Override
Differential Ground (-DF) for Setpoint and
Override

Room Mounting:Electrical Handy box or Dry wall holes

Enclosure Ratings:...UL 94 V-0, RoHS

Enclosure Material: ..ABS plastic with foam backing

Ambient:.....15°F to 130°F, (-9° to 54°C)
0 to 95% RH, Non-condensing

Agency:RTD, PT= DIN43760,
IEC Pub EN60 751, JIS C1604-1989

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