

NEWPORT

INFINITY



Operator's Manual



INFCDR
INFINITY™ CD
Differential
Temperature
Meter with RTD

PREFACE

Manual Objectives

This manual shows you how to set up and use the INFCDR (Infinity C differential RTD meter).

Standard Procedures:

- * Checking voltage jumpers, or changing voltage power
- * Mounting the panel
- * Selecting the input type
- * Selecting a decimal point position
- * Selecting reading configuration (Fahrenheit or Celsius)
- * Setting setpoint configuration
- * Setting setpoint deadbands
- * Entering temperature offset
- * Accessing the deviation mode
- * Selecting meter display

Optional Procedures:

- * Enabling/disabling analog output
- * Selecting analog output as current or voltage
- * Selecting analog output or proportional control
- * Routing analog output
- * Selecting proportional band
- * Using manual reset (offsetting setpoint errors)
- * Scaling analog output

Table A-1. Sections of the Manual

If you want to read about:		Refer to section
Unpacking and safety considerations	1	Introduction
Meter description and features; front-panel lock out	2	About the Meter
Main board power jumpers; panel mounting, sensor input, main power and analog and relay output	3	Getting Started
Procedures for: input type; decimal point; reading configuration: setpoint configuration; setpoint deadbands, output configuration (analog output); analog output routing; proportional band; manual reset, analog output scaling, temperature offset	4	Configuring the Meter
The deviation mode	5	Accessing the Deviation Mode
Two types of display reading modes	6	Selecting Meter Display
Proportional controller tuning	7	Tuning the Proportional Controller
Display messages	8	Display Messages
Meter menu/sub-menu messages	9 10	Menu Configuration Front-Panel Displays
Setpoint configuration messages	11	Setpoint Configuration
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Specification	12	Specifications
Defaults	13	Factory Preset Values

NOTES, WARNINGS and CAUTIONS

Information that is especially important to note is identified by three labels:

NOTE

* **WARNING**

* **CAUTION**

NOTE: provides you with information that is important to successfully setup and use the INFCDR.

CAUTION: tells you of circumstances or practices that can affect the meter's functionality.

WARNING: tells you of circumstances or practices that can lead to personal injury as well as damage to equipment.

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SECTION 1. INTRODUCTION

1.1 UNPACKING

Remove the Packing List and verify that all equipment has been received. If there are any questions about the shipment, contact the NEWPORT Customer Service Department at 1-800-NEWPORT (800-639-7678) or (714) 540-4914.

Upon receipt of shipment, inspect the container and equipment for any signs of damage. Take particular note of any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

Note: The carrier will not honor any claims unless all shipping material is saved for their examination. After examining and removing contents, save packing material and carton in the event reshipment is necessary.

Verify that you receive the following items in the shipping box:

QTY	DESCRIPTION
1	INFCDR meter with all applicable connectors attached.
1	INFCDR Owner's Manual
1	Set Mounting brackets

Note: If you ordered any of the available options (except the "BL" blank Lens option), they will be shipped in a separate container to avoid any damage to your indicator/controller.

1.2 SAFETY CONSIDERATIONS

- * The meter is protected in accordance with Class II of IEC 348 and VDE 0411

To provide safe operation, follow these guidelines:

- * The meter has no power-on switch, so it will be in operation as soon you apply power.
- * Do not expose your meter to rain or condensing moisture.
- * Do not operate your meter in flammable or explosive atmospheres.

SECTION 2. ABOUT THE METER

2.1 DESCRIPTION

The INFINITY C Differential RTD meter (INFCDR) is a value-packed indicator/controller. Four full digits allow for an accurate display of your temperature. Select from DIN (Alpha = .00385) or NIST (Alpha = .00392); 2, 3, or 4 wire RTD. Your meter may be a basic indicator or it may include analog output or dual relay output. Analog or dual relay output must be ordered at time of purchase. Analog output is fully scalable and may be configured as a proportional controller, or to follow your display. Dual 6 amp, form c relays control critical processes. A mechanical lockout has been included to guard against unauthorized changes.

2.2 FEATURES

Standard Features:

- * 4-digit 14-segment LED display
- * $\pm .5^{\circ}\text{C}$ accuracy
- * Automatic Decimal Adjustment
- * Nonvolatile memory
- * 115 or 230 Vac 50/60 Hz power supply
- * T1, T2, T1-T2 display

Optional Features:

- * Dual 6 amp, form C relay outputs
- * Scalable analog output
- * Analog out proportional control
- * Easy setup for proportional control
- * Front-panel deviation correction
- * Easy RTD error offset calibration

2.3 AVAILABLE ACCESSORIES

Table 2-1. Accessories and Add-Ons

FS	Special Calib/Config
SPC4	NEMA-4 Splash Proof Cover
SPC18	NEMA-4 Splash Proof Cover. NEW
TPIA	Trimplate panel adaptor. Adapts DIN1A/DIN2A cases to larger panel columns
RP18	19-in. Rack Panel for one (1) 1 B DIN instrument
RP28	19-in. Rack Panel for two (2) 1 B DIN instrument
RP38	19-in. Rack Panel for three (3) 1 B DIN instrument

2.4 FRONT OF THE METER

Figure 5-1 shows the location of each part of the front of the meter.

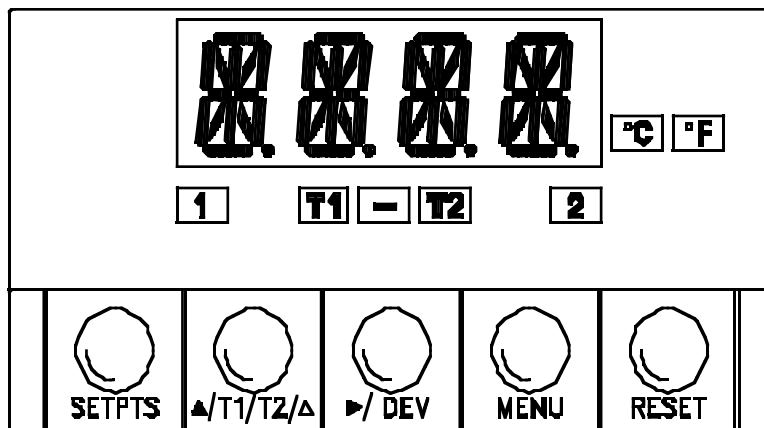


Figure 2-1. Front-Panel

METER DISPLAY:

Digital LED display- 1.9.9.9. or 9.9.9.9. 4-digit 14-segment, 0.54" high LED display with programmable decimal point.

These meter display windows light when appropriate:

°C	Celsius
°F	Fahrenheit
1	Setpoint 1 status
2	Setpoint 2 status
T1	T1 on display
T2	T2 on display
T1 - T2	T1 - T2 on display

2.4 FRONT OF THE METER (Continued)

METER BUTTONS

SETPTS BUTTON

In the run mode, this button will sequentially recall the previous setpoint settings. As necessary, use the **_T1/T2/** and **_DEV** buttons to alter these settings, then press the **SETPTS** button to store new values. Unless you press the **SETPTS**, **_ DEV**, or **_T1/T2/** button within 20 seconds the meter will scroll to Setpoint 2 and then to the run mode.

_T1/T2/ BUTTON

In the run mode, this button will scroll to show T1, T2 and T1 - T2.

In the configuration or setpoint modes, press this button to change the values of the flashing digit shown on the display and/or toggle between menu choices, such as **"R.1=F"** or **"R.1=C"**. When configuring your setpoint values, press the **_T1/T2/** button to advance the flashing digit's value from 0 to 9 by 1.

_DEV BUTTON

In the run mode press the **_DEV** button to show the deviation of reading from **Setpoint 1**.

In the configuration or setpoint modes, press this button to scroll to the next digit.

2.4 FRONT OF THE METER (Continued)

MENU BUTTON

Press the **MENU** button to terminate the current measuring process and enter you into the configuration mode.

In the configuration mode, press the **MENU** button to store changes in the non-volatile memory and then advance you to the next menu item. To lock the **MENU** button, **install S3E jumper**. Refer to Table 3-1 for more information about the S3 jumpers.

RESET BUTTON

In the run mode, press the **RESET** button to:

- * Reset the latched setpoints in the run mode. The meter will show "**SP.RS**" (Setpoint Reset).
- * Perform tuning for Proportional Control if the meter is setup to serve as a proportional controller (**0.3=P** refer to Section 4.8.3 - and Section 7). The meter will show "**TUNE**".

Also in the run mode, if you hard reset (press the **MENU** button followed by the **RESET** button) or power off/on the meter, it will show "**RST**", followed by "**D.RTD**".

In the **configuration** mode, press the **RESET** button once to review the previous menu. Press the **RESET** button twice to result in a hard reset and return you to the run mode.

In the **setpoint** mode, press the **RESET** button to go back to the run mode. The meter will show "**RUN**".

2.5 FRONT-PANEL BUTTON LOCK OUT

2.5.1 Push Button Lock Out

To lock the RESET, MENU and SETPTS buttons, verify that the S3-A jumper is installed and the S3-E jumper is not installed, then follow these steps:

In the run mode -

1. Press and hold down **RESET** button. The meter shows “**SP.RS**”. Do not release the **RESET** button.
2. Press the **MENU** button and hold **RESET** button down (3 - 5 seconds) until the meter shows “**LOCK**”.
3. Release both buttons.

To unlock the **RESET, MENU and SETPTS** buttons, follow these steps:

1. Press and hold down **RESET** button. The meter shows “**LOCK**”. Do not release the **RESET** button.
2. Press the **MENU** button and hold **RESET** button down (3 - 5 seconds) until the meter shows “**UN.LK**”.
3. Release both buttons.

2.5.2 Jumper Lock Out

To lock all front-panel buttons, remove the S3-A jumper (refer to Figure 3-2).

To lock the MENU button only, verify that the S3-B jumper is removed, then install the S3-A and S3-E jumpers (refer to Table 3-1).

2.6 BACK OF THE METER

Figure 2-2 shows the connectors on the back of the meter. Table 2-2 on the following page gives a brief description of each connector at the back of the meter.

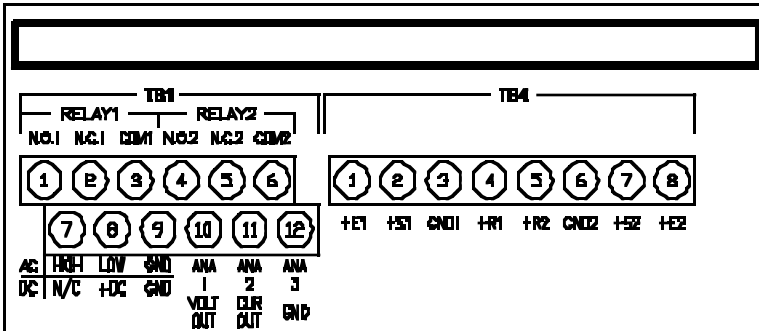


Figure 2-2. Connectors (ac Powered)

2.6 BACK OF THE METER (Continued)

Table 2-2. Connector Description

Connector	Description
TB1-1	Setpoint 1: Normally open (N.O.1) connection.
TB1-2	Setpoint 1: Normally closed (N.C.1) connection.
TB1-3	Setpoint 1: Common 1 connection
TB1-4	Setpoint 2: Normally open (N.O.2) connection.
TB1-5	Setpoint 2: Normally closed (N.C.2) connection.
TB1-6	Setpoint 2: Common 2 connection
TB1-7	ac High connection (No connection on dc powered units)
TB1-8	ac Low connection (+ Input on dc powered units)
TB1-9	ac Ground (dc power return on dc powered units)
TB1-10	Analog 1 voltage output
TB1-11	Analog 2 current output
TB1-12	Analog 3 ground
TB4-1	+ Excitation for input #1 (+E1)
TB4-2	+ Signal for input #1 (+S1)
TB4-3	Ground for input #1 (GND1)
TB4-4	+ Auxiliary for input #1 (+R1)
TB4-5	- Auxiliary for input #2 (+R2)
TB4-6	Ground for input #2 (GND2)
TB4-7	+ Signal for input #2 (+S2)
TB4-8	Excitation for input #2 (+E2)

2.7 DISASSEMBLY

You may need to open up the meter for one of the following reasons:

- * To check or change the 115 or 230 Vac power jumpers.
- * To install or remove jumpers on the main board.

To remove and access the main board, follow these steps:

1. Disconnect the main power from the meter.
2. Remove the back case cover.
3. Lift the back of the main board upwards and slide it out of the case.

SECTION 3. GETTING STARTED

The meter has no power-on switch, so it will be in operation as soon as you apply power.

3.1 RATING/PRODUCT LABEL

This label is located on top of the meter housing.

3.2 MAIN BOARD POWER JUMPERS (refer to Figures 3-1 & 3-2)

To check voltage jumpers, or to change from 115 V to 230 Vac:

1. Remove the main board from the case.
2. Locate the solder jumpers W1, W2, and W3 (located near the edge of the main board alongside the transformer - refer to Figure 3-1).
3. If your power requirement is **115 Vac**, solder jumpers **W1 and W3 should be wired, but jumper W2 should not**. If your power requirement is **230 Vac**, solder jumper **W2 should be wired, but jumpers W1 and W3 should not**.

Note: W4 jumper is not used.

3.2 MAIN BOARD POWER JUMPERS (Continued)

Figure 3-1 shows the location of solder jumpers W1 through W4.

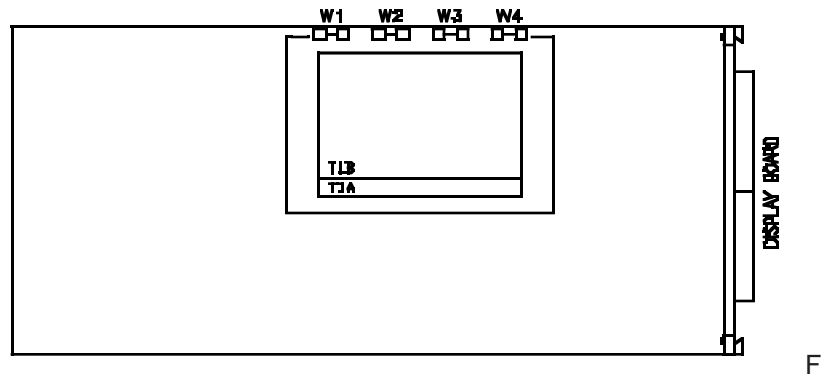


Figure 3-1. Main Board Jumpers (W1, W2, W3, W4)

Figure 3-2 shows the TB4 cover and the location of jumper positions on the main board.

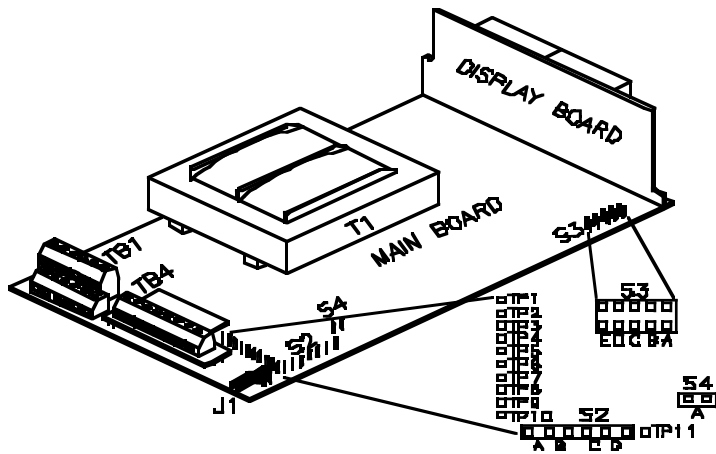


Figure 3-2. Main Board Jumper Positions

3.2 MAIN BOARD POWER JUMPERS (Continued)

S2 jumpers are for sensor break indications (refer to Figure 3-2):

- * S2A jumper is not used.
- * S2B jumper is for positive sensor break on input 1 (i.e. heating)
- * S2C jumper is for positive sensor break on input 2 (i.e. heating)
- * S2D jumper is not used.

S3 jumpers are used for the following (refer to Figure 3-2):

- * To enable or disable the front-panel push-buttons
- * To allow for an extremely low resistance load for analog output
- * To disable the **MENU** button
- * To perform calibration procedure

Test pins TP1 - TP11 are for testing purposes. Do not use these pins as reading errors may result.

Table 3-1. S3 Jumper Functions

JUMPER	DESCRIPTION
S3-A	Install to enable front-panel push buttons. Remove to disable all front-panel push-buttons
S3-B	Removed. Install for meter calibration.
S3-C	Normally removed. Install for analog voltage output when load has less than 1 K Ω impedance. Care should be taken when installing this jumper
S3-D	Removed. Not used.
S3-E	If installed without S3-B, the MENU button locks out (while in the run mode, pressing the MENU button results in the display showing "LOCK".)

Note: S4 jumper is not used.

3.3 MOUNTING THE METER

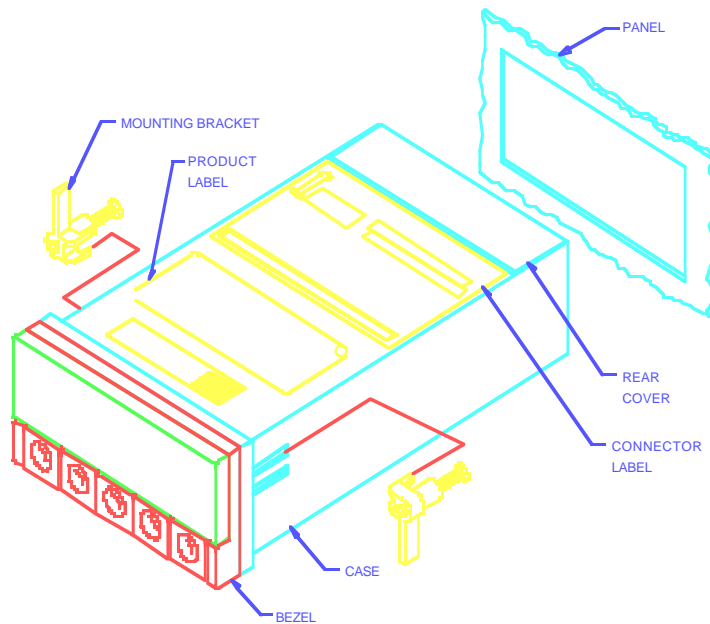


Figure 3-3. Meter - Exploded View

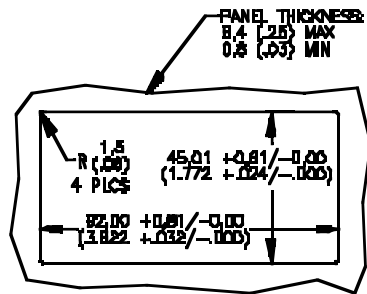


Figure 3-4. Panel Cut-Out

1. Cut a hole in your panel, as shown in Figure 3-3. For specific dimensions refer to Figure 3-4.
2. Insert the meter into the hole. Be sure the front bezel is flush to the panel.
3. Proceed to Section 3.4 to connect your sensor input and main power.

3.4 CONNECTING SENSOR INPUT

Figures 3-5 through 3-7 illustrate how to connect your power sensors.

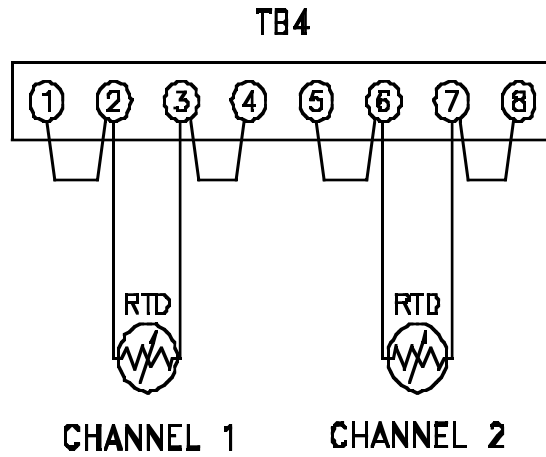


Figure 3-5. 2-Wire RTD Input Connection

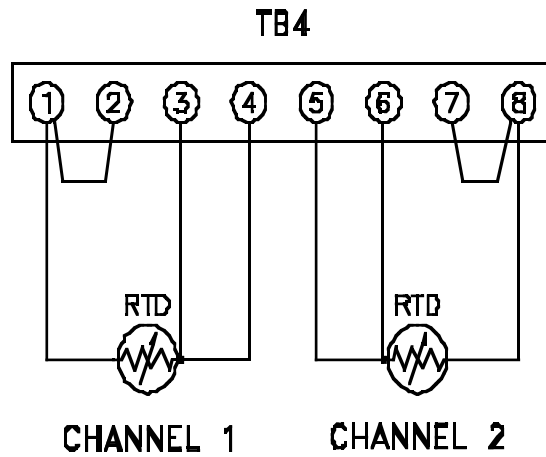


Figure 3-6. 3-Wire RTD Input Connection

Note: Install plastic cover after RTD connection.

3.4 CONNECTING SENSOR INPUT (Continued)

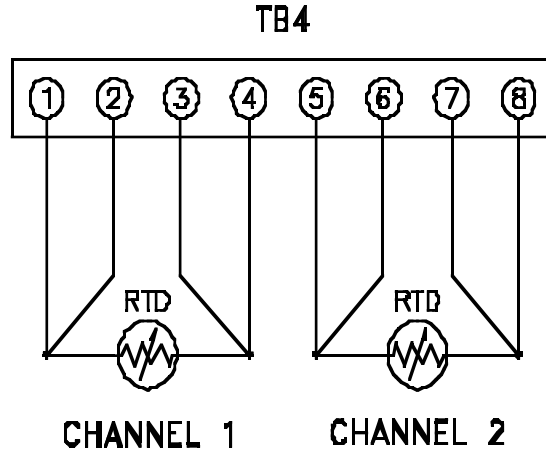


Figure 3-7. 4-Wire RTD Input Connection

3.5 CONNECTING MAIN POWER

Connect the ac main power connections as shown in Figure 3-8.

WARNING: Do not connect ac power to your meter until you have completed all input and output connections.
Failure to do so may result in injury!

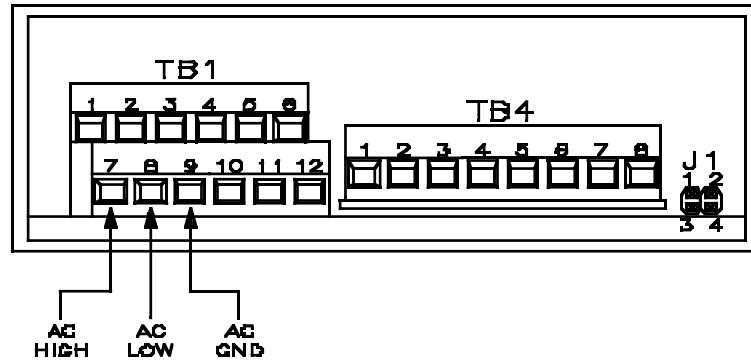


Figure 3-8. Main Power Connections (ac)

3.5 CONNECTING MAIN POWER (Continued)

Table 3-2 shows the wire color and respective terminal connections for both USA and Europe.

Table 3-2. ac Power Connections

Connect the dc main power connections as shown in Figure 3-9.

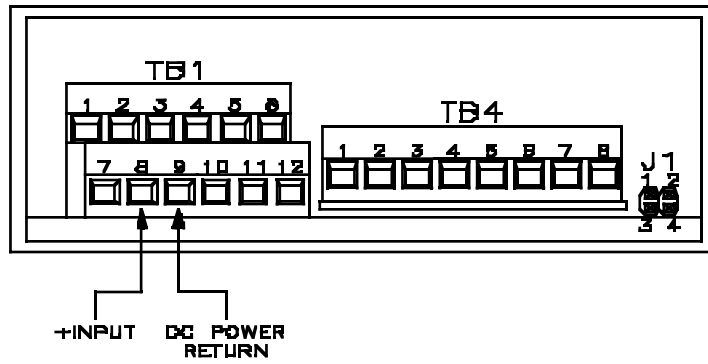


Figure 3-9. Main Power Connections (dc)

3.6 CONNECTING ANALOG AND RELAY OUTPUT

If you have purchased a meter with analog or dual relay output, refer to the following drawings for output connections.

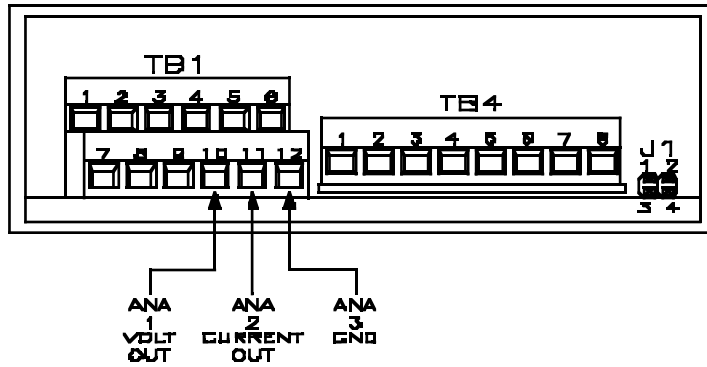


Figure 3-10. Analog Output Connections

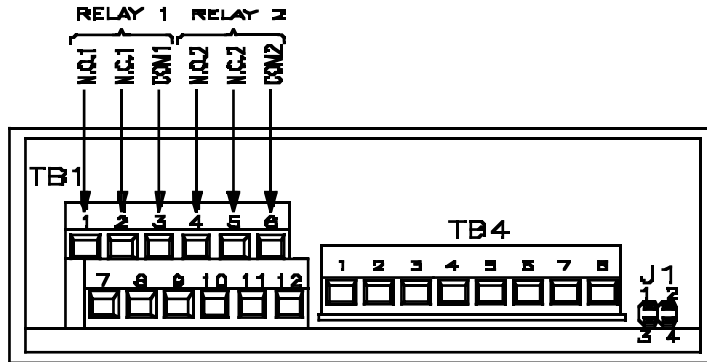


Figure 3-11. Relay Output Connections

SECTION 4. CONFIGURING THE METER

Refer to Table 9-1 for a summary list of menu configuration.

4.1 SELECTING THE INPUT TYPE (INPT)

To select your appropriate input type signal:

1. Press the **MENU** button. “**INPT**” appears.
2. Press the **_/DEV** button. One of the following input types flash (current setting):
 - * 385.2 (2-wire DIN RTD)
 - * **385.3 (3-wire DIN RTD)** (default)
 - * 385.4 (4-wire DIN RTD)
 - * 392.2 (2-wire NIST RTD)
 - * 392.3 (3-wire NIST RTD)
 - * 392.4 (4-wire NIST RTD)
3. Press the **_/T1/T2/** button to scroll through available choices.
4. Press the **MENU** button to store your choice. The meter momentarily shows “**STRD**”, followed by “**DEC.P**” (Decimal point).

4.2 SELECTING A DECIMAL POINT POSITION (DEC.P)

To select a decimal point display position:

1. Press the **MENU** button until “**DEC.P**” appears.

4.2 SELECTING A DECIMAL POINT POSITION (DEC.P) (Continued)

2. Press the **_/DEV** button. The meter shows one of the following:
 - * FFFF. (1 degree resolution)
 - * **FFF.F (.1 degree resolution)** (default)
3. Press the **_/T1/T2/** _ button to scroll between available choices.
4. Press the **MENU** button to store your choice. The meter momentarily shows “**STRD**”, followed by “**RD.CF**” (Reading Configuration).

Note 1: When you change the decimal position the meter adjusts setpoints, deadbands, proportional band, and manual reset values. These adjustments are made according to the new decimal point. If one or more of these values overflows, the meter flashes “**ER2**” when you store new decimal point position value.

Note 2: When you select .1 degree resolution (**FFF.F**), the meter automatically adjusts its decimal point to 1 degree if the value on the display exceeds 999.9, or becomes less than -199.9.

4.3 SELECTING READING CONFIGURATION (RD.CF)

To select if your meter shows in °F (Fahrenheit) or °C (Celsius):

1. Press the **MENU** button until “**RD.CF**” appears.
2. Press the **_/DEV** button. The meter shows one of the following:
 - * “**R.1=F**” (**°F**) (default)
 - * “**R.1=C**” (**°C**)
3. Press the **_/T1/T2/** _ button to toggle between available choices.

4.3 SELECTING READING CONFIGURATION (RD.CF) (Continued)

4. Press the **MENU** button to store your selection. The meter momentarily shows “**STRD**”, followed by “**S1.CF**” (Setpoint 1 Configuration).

4.4 SETTING SETPOINT 1 CONFIGURATION (S1.CF)

Setpoint 1 is not active unless your meter has dual relay output capabilities. The LED's will display whether the Setpoint 1 is active or not.

You may use Setpoint 1 Configuration (“**S1.CF**”) for the following:

- * To set the setpoint's active band above or below your chosen value
 - * To select whether the setpoint operation is latched or unlatched
 - * To assign Setpoint 1 to T1, T2 or T1 - T2
1. Press the **MENU** button until the meter shows “**S1.CF**”.
 2. Press the **_/DEV** button. The meter shows one of the following:
 - * “**S.1=A**” (**Active above the setpoint**) (default)
 - * “**S.1=B**” (Active below the setpoint)
 3. Press the **_/T1/T2/ _** button to toggle between available choices.
 4. Press the **_/DEV** button again. The meter shows one of the following:
 - * “**S.2=L**” (Setpoint 1 latched)
 - * “**S.2=U**” (**Setpoint 1 unlatched**) (default)

4.4 SETTING SETPOINT 1 CONFIGURATION (S1.CF) (Continued)

5. Press the **/T1/T2/** _ button to toggle between available choices.
6. Press the **/DEV** button. The meter shows one of the following:
 - * **"S.3=0"** (*Setpoint 1 assigned to T1 - T2*) (default)
 - * **"S.3=1"** (Setpoint 1 assigned to T1)
 - * **"S.3=2"** (Setpoint 1 assigned to T2)
7. Press the **/T1/T2/** _ button to scroll among the available choices.
8. Press the **MENU** button to store your choice(s). The meter momentarily shows **"STRD"**, followed by **"S2.CF"** (Setpoint 2 Configuration).

4.5 SETTING SETPOINT 2 CONFIGURATION (S2.CF)

Setpoint 2 is not active unless your meter has dual relay output capabilities. The LED's will display whether the Setpoint 2 is active or not.

You may use Setpoint 2 Configuration ("**S2.CF**") for the following:

- * To set the setpoint's active band above or below your chosen value
 - * To select whether the setpoint operation is latched or unlatched
 - * To assign Setpoint 2 to T1, T2 or T1 - T2
1. Press the **MENU** button until the meter shows **"S2.CF"**.
 2. Press the **/DEV** button. The meter shows one of the following:
 - * **"S.1=A"** (*Active above the setpoint*) (default)
 - * **"S.1=B"** (Active below the setpoint)

4.5 SETTING SETPOINT 2 CONFIGURATION (S2.CF) (Continued)

3. Press the **_T1/T2/** _ button to toggle between available choices.
4. Press the **_DEV** button again. The meter shows one of the following:
 - * **“S.2=L”** (Setpoint 1 latched)
 - * **“S.2=U” (Setpoint 1 unlatched)** (default)
5. Press the **_T1/T2/** _ button to toggle between available choices.
6. Press the **_DEV** button. The meter shows one of the following:
 - * **“S.3=0” (Setpoint 2 assigned to T1 - T2)** (default)
 - * **“S.3=1”** (Setpoint 2 assigned to T1)
 - * **“S.3=2”** (Setpoint 2 assigned to T2)
7. Press the **_T1/T2/** _ button to scroll among the available choices.
8. Press the **MENU** button to store your selection(s). The meter momentarily shows **“STRD”**, followed by **“S1.DB”** (Setpoint 1 Deadband).

4.6 SETTING THE SETPOINT 1 DEADBAND (S1.DB)

Deadband 1 is not active unless your meter has dual relay output capabilities. The LED's will display whether the Deadband 1 is active or not.

To set the deadband (hysteresis) of Setpoint 1. Default value is 0003.

1. Press the **MENU** button until the meter shows **“S1.DB”**.
2. Press the **_DEV** button. The meter shows the last stored number (0000 through 9999) with flashing 4th digit.
3. Press the **_T1/T2/** _ button to change the value of the flashing digit. If you continue to press the **_T1/T2/** _ button, the flashing digit's value continues to change.

4.6 SETTING THE SETPOINT 1 DEADBAND (S1.DB) (Continued)

4. Press the **_/DEV** button to scroll to the next digit.
5. Press the **MENU** button to store your selection. “**STRD**” momentarily shows, followed by “**S2.DB**” (Setpoint 2 Deadband)

4.7 SETTING THE SETPOINT 2 DEADBAND (S2.DB)

Deadband 2 is not active unless your meter has dual relay output capabilities. The LED's will display whether the Deadband 2 is active or not.

To set the deadband (hysteresis) of Setpoint 2. Default value is 0003.

1. Press the **MENU** button until the meter shows “**S2.DB**”.
2. Press the **_/DEV** button. The meter shows the last stored number (0000 through 9999) with flashing 4th digit.
3. Press the **_/T1/T2/** button to change the value of the flashing digit. If you continue to press the **_/T1/T2/** button, the flashing digit's value continues to change.
4. Press the **_/DEV** button to scroll to the next digit.
5. Press the **MENU** button to store your selection. The meter momentarily shows “**STRD**”, followed by Cold Junction Offset if you have a standard meter or “**OT.CF**” (Output Configuration) if you have analog output capabilities.

4.8 SELECTING OUTPUT CONFIGURATION (OT.CF)

Output Configuration is not active unless your meter has analog output capabilities. The menu will display whether analog output is present or not.

Use Output Configuration (“**OT.CF**”) to select the following:

- * To enable or disable the analog output
- * To determine if the analog output is current or voltage
- * To determine if the analog output is proportional to the display or to the error (the difference between reading and setpoint value)

4.8.1 Enabling or Disabling the Analog Output

To enable or disable the analog output, follow these steps:

1. Press the **MENU** button until the meter shows “**OT.CF**”.
2. Press the **_/DEV** button. The meter shows one of the following:
 - * “**O.1=D**” (Analog output disabled)
 - * “**O.1=E**” (**Analog output enabled**) (default)
3. Press the **_/T1/T2/ _** button to toggle between available choices.
4. Press the **_/DEV** button to select analog output as current/voltage **or** press the **MENU** button to store your selection. The meter momentarily shows “**STRD**”, followed by “**OT.SO**” (refer to Section 4.12) , **or** “**P.BND**” (refer to Section 4.10 - Proportional Band).

4.8.2 Selecting Analog Output as Current or Voltage

1. Press the **_/DEV** button. The meter shows one of the following:
 - * **"O.2=V"** (Analog output = voltage)
 - * **"O.2=C"** (**Analog output = current**) (default)
2. Press the **_/T1/T2/** _ button to toggle between available choices.
3. Press the **_/DEV** button to select analog signal output/
proportional control **or** press the **MENU** button to store your choice(s). The meter momentarily shows **"STRD"**, followed by **"OUT"**.

4.8.3 Selecting Analog Output or Proportional Control

To select if the meter is to transmit an analog signal out (equal to your display), or serve as a proportional controller:

1. Press the **_/DEV** button. The meter shows one of the following (default is 0.3=A):
 - * **"O.3=A"** (**Analog output is proportional to the display**)
 - * **"O.3=P"** (Analog output is proportional to the error =
display - Setpoint 1)
2. Press the **_/T1/T2/** _ button to toggle between available choices.
- 3a. If you select **O.3=A**, press the **MENU** button to store your selections. The meter momentarily shows **"STRD"**, followed by **"OUT"**.
- 3b. If you select **O.3=P**, press the **_/DEV** button. The meter shows one of the following:
 - * **"O.4=D"** (Proportional analog output is **DIRECT ACTING**)
 - * **"O.4=R"** (Proportional analog output is **REVERSE ACTING**).

4.8.3 Selecting Analog Output or Proportional Control (Continued)

4. Press the **_T1/T2/** _ button to toggle between available choices.
5. Press the **MENU** button to store your selections. The meter momentarily shows “**STRD**”, followed by “**OUT**”.

Additionally, if you select **O.2=V** (Analog output to be voltage), press the **_DEV** button. The meter shows one of the following:

- * “**O.5=F**” (Proportional 0-10 V analog output)
- * “**O.5=H**” (Proportional 0-5 V analog output).

6. Press the **_T1/T2/** _ button to toggle between available choices.
7. Press the **MENU** button to store your choices. The meter momentarily shows “**STRD**”, followed by “**OUT**” (Analog Output Routing).

4.9 ROUTING ANALOG OUTPUT (OUT)

Use Analog Output Routing (**OUT**) to choose which value (**T1**, **T2** or **T1 - T2**) to route to the Analog Output. The meter recognizes this value as the reading value.

1. Press the **_DEV** button. The meter flashes one of the following (current setting):

- * T1 Channel 1 Temperature Reading
- * T2 Channel 2 Temperature Reading
- * **T1 - T2 Differential Reading** (default)

2. Press the **_T1/T2/** _ button to scroll between available choices.

4.9 ROUTING ANALOG OUTPUT (OUT) (Continued)

- Press the **MENU** button to store your selection. The meter momentarily shows “**STRD**”, followed by “**P.BND**” (Proportional Band if **0.3=P**) or “**OT.S.O**” (Output Scale and Offset if **0.3=A**) **Note:** *Selected item will also be considered for the deviation value (refer to Section 5 - Deviation Mode).*

4.10 SELECTING PROPORTIONAL BAND (P.BND)

Proportional Band is not active unless your meter has analog output capabilities. The menu will display whether analog output is present or not. A proportional controller’s output is linearly proportional to the change of the error signal, whenever the signal is within 2 prescribed values (Proportional Band).

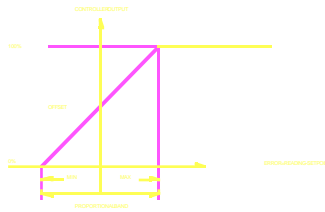


Figure 4-1. Proportional Band

There are three (3) points of interest on the proportional controller transfer curve. The first is the magnitude of the error signal that drives the controller to FULL ON (e.g. 20 mA out for 4-20 mA). The second is the magnitude of the error signal that drives the controller output to full off (e.g. 4 mA out on 4-20 mA). These two (2) points need not be equally spaced on either side of the zero error point. The third is the factor that determines where these two (2) points fall. This factor is called the “**Offset**” and it is the output value of the controller which causes zero error.

4.10 SELECTING PROPORTIONAL BAND (P.BND) (Continued)

If A is the controller gain then,

$$\text{Proportional Band} = \frac{\text{Max. out} - \text{Min. out}}{A}$$
$$\text{CONTROLLER OUT} = A * \text{ERROR} + \text{OFFSET}$$

To select the proportional band for your proportional controller.

1. Press the **MENU** button until the meter shows "**P.BND**".
2. Press the **_/DEV** button. The meter shows the last stored number (0000 through 9999) with flashing 4th digit.
3. Press the **_/T1/T2/** button to change the value of the flashing digit. If you continue to press the **_/T1/T2/** button, the flashing digit's value will continue to change.
4. Press the **_/DEV** button to scroll to the next digit.
5. Press the **MENU** button to store your selection. The meter momentarily shows "**STRD**", followed by "**M.RST**" (Manual Reset).

Note 1: The meter only shows "**P.BND**" only if you select analog output as proportional.

Note 2: If the meter is in 1 degree resolution and you select an odd value for the proportional band, your actual proportional band will be one minus the selected value. For example, if you select a proportional value of 25, the actual proportional band will be 2 X 12 which is 24.

4.11 USING MANUAL RESET (M.RST)

Manual Reset is not active unless your meter has analog output capabilities. The menu will display whether analog output is present or not. This feature allows you to offset the error that may occur within your setpoint. To determine the amount of error, you must compare your display value to the Setpoint 1 value. The difference between these two values will be the amount of error that you may want to enter into Manual Reset (**M.RST**).

1. Press the **MENU** button until the meter shows "**M.RST**".
2. Press the **_/DEV** button. The meter shows last stored number (-1999 through 9999) with flashing 4th digit.
3. Press the **_/T1/T2/** button to change the value of the flashing digit. If you continue to press the **_/T1/T2/** button, the flashing digit's value continues to change.
4. Press the **_/DEV** button to scroll to the next digit.
5. Press the **MENU** button to store your selection. The meter momentarily shows "**STRD**", followed also momentarily by "**RST**" (Reset). The meter then shows "**T1.OF**" (RTD Temperature Offset) (refer to Section 4.13).

Note: *The meter only shows "**M.RST**" if you select analog output as proportional.*

4.12 SCALING THE ANALOG OUTPUT (OUTPUT SCALE AND OFFSET - OT.S.O)

Output Scale and Offset (**OT.S.O.**) is not active unless your meter has analog output capabilities. The menu will display whether analog output is present or not. Output Scale and Offset (**OT.S.O.**) scales the analog output to be equal to the meter's display and/or any engineering units you require. You may scale the output for direct (4-20 mA, 0-10 V, etc) or reverse acting (20-4 mA, 10-0 V, etc).

Note: The meter only shows "**OT.S.O**" if you select analog output as a retransmission of temperature.

1. Press the **MENU** button until the meter shows "**OT.S.O**".
2. Press the **_/DEV** button. The meter shows "**RD 1**" (Read 1).
Note: This is your first point of display reading. Read 1 value is the low value.
3. Press the **_/DEV** button again. The meter shows the last stored number (-1999 through 9999) with flashing 4th digit.
4. Press the **_/T1/T2/ _** button to change the value of Read 1.
5. Press the **_/DEV** button to scroll to the next digit.
6. Press the **MENU** button to store your selection. The meter shows "**OUT.1**" (Output 1). **Note:** This starting analog signal corresponds to your Read 1 display.
7. Press the **_/DEV** button. The meter shows the selected output.
Note: If you select "**O.2=V**" for voltage, the maximum signal you may select is 10.00 for an 0-10 Vdc signal output. If you select "**O.2=C**" for current, the maximum signal you may select is 20.00 for a 0-20 or 4-20 mA dc signal output.

4.12 SCALING THE ANALOG OUTPUT (OUTPUT SCALE AND OFFSET - OT.S.O) (Continued)

8. Press the **_T1/T2/** _ button to enter the output 1 signal selection. If you continue to press the **_T1/T2/** _ button, the flashing digit's value continues to change.
9. Press the **_DEV** button to scroll to the next digit.
10. Press the **MENU** button to store your selection. The meter shows "**RD 2**" (Read 2). **Note:** *This is your second point of display reading. Read 2 is the high value.*
11. Press the **_DEV** button. The meter shows the last stored number (-1999 through 9999) with flashing 4th digit.
12. Press the **_T1/T2/** _ button to change the value of the flashing digit. If you continue to press the **_T1/T2/** _ button, the flashing digit's value continues to change.
13. Press the **_DEV** button to scroll to the next digit.
14. Press the **MENU** button to store your selection. The meter shows "**OUT.2**" (Output 2). **Note:** *This analog signal should correspond to your Read 2 display.*
15. Press the **_DEV** button. The meter shows the selected output. **Note:** *If you select "**O.2=V**" for voltage, the maximum signal you may select is 10.00 for an 0-10 Vdc signal output. If you select "**O.2=C**" for current, the maximum signal you may select is 20.00 for a 0-20 or 4-20 mA dc signal output.*

4.12 SCALING THE ANALOG OUTPUT (OUTPUT SCALE AND OFFSET - OT.S.O) (Continued)

16. Press the **_T1/T2/** button to change the value of the flashing digit. If you continue to press the **_T1/T2/** button, the flashing digit's value continues to change.
17. Press the **_DEV** button to scroll to the next digit.
18. Press the **MENU** button to store your selection. The meter momentarily shows "**STRD**" followed also momentarily by "**RST**" (Hard Reset). The meter then shows "**T1.OF**" (RTD Temperature Offset Error Correction for channel 1).

CAUTION: If the meter shows all flashing values on any item, the value has overflowed. Press the **_T1/T2/** button to start new values.

Example for Output Scale and Offset

You want to send 4 - 20 mA output for 0 to 450.0⁰ Fahrenheit. The meter has .1 degree resolution. Complete the following steps:

1. Press the **MENU** button until the meter shows "**OT.S.O**".
2. Press the **_DEV** button. The meter shows "**RD 1**" (Read 1).
3. Press the **_DEV** button again to show the existing value.

Example for Output Scale and Offset (Continued)

4. Change the value of Read 1 to 000.0 by pressing the **_T1/T2/** and **_DEV** buttons.
5. Press the **MENU** button to store your selection. The meter shows “**OUT.1**” (Output 1).
6. Press the **_DEV** button to show the existing value.
7. Change the value of Output 1 to 04.00 by pressing the **_T1/T2/** and **_DEV** buttons.
8. Press the **MENU** button to store your selection. The meter shows “**RD 2**” (Read 2).
9. Press the **_DEV** button to show the existing value.
10. Change the value of Read 2 to 450.0 by pressing the **_T1/T2/** and **_DEV** buttons.
11. Press the **MENU** button to store your selection. The meter shows “**OUT.2**” (Output 2).
12. Press the **_DEV** button to show the existing value.
13. Change the value of Output 2 to 20.00 by pressing the **_T1/T2/** and **_DEV** buttons.
14. Press the **MENU** button to store your selection. The meter shows “**T1.OF**” (Temperature Offset).

4.13 RTD TEMPERATURE OFFSET ERROR CORRECTION (T1.OF, T2.OF)

“**T1.OF**” and “**T2.OF**” enables you to compensate any temperature offset error due to the RTD transducer error for channel 1 and/or channel 2:

$$\text{Offset} = \text{Actual Temperature} - \text{Display Temperature}$$

You can calibrate for the offset at any temperature in the RTD range.

1. Press the **MENU** button until the meter shows “**T1.OF**”.
2. Press the **DEV** button. The meter shows previous channel 1 offset value with flashing 4th digit.
3. Press the **DEV** button again. The meter shows channel 1 reading temperature, with no digit flashing.
- 4a. If the value is correct, press the **MENU** button. The meter will show “**STRD**” and 0 value will be entered at offset.
- 4b. If the value is not correct, enter the actual temperature using the **/DEV** button to scroll from left to right through the digital display and the **/T1/T2/** button to change the value of the flashing digit. If you continue to press the **/T1/T2/** button, the flashing digit's value continues to change.
5. Press the **MENU** button to store value. The meter shows “**T2.OF**”.

4.13 RTD TEMPERATURE OFFSET ERROR CORRECTION (T1.OF, T2.OF) (Continued)

6. Press the **DEV** button. The meter shows previous channel 2 offset value with flashing 4th digit.
7. Press the **DEV** button again. The meter shows the channel 2 reading temperature, with no digit flashing.
- 8a. If the value is correct, press the **MENU** button. The meter will show "**STRD**" and 0 value will be entered at offset.
- 8b. If the value is not correct, enter the actual temperature using the **/DEV** button to scroll from left to right through the digital display and the **/T1/T2/** button to change the value of the flashing digit. If you continue to press the **/T1/T2/** button, the flashing digit's value continues to change.
9. Press the **MENU** button to store the value. The meter then resets ("**RST**") and returns to the run mode.

Note 1: The temperature unit is either Celsius or Fahrenheit and will always show at 0.1⁰ resolution and automatically change to 1⁰ if it is necessary.

Note 2: The Maximum/Minimum offset value is $\pm 10.0^0$ Celsius ($\pm 18.0^0$ Fahrenheit). If offset exceeds the limit, the meter flashes "**ER 3**" and previous offset is not changed.

SECTION 5. ACCESSING THE DEVIATION MODE (DEV)

The deviation value is the difference between the reading value and Setpoint 1. The reading value may be Channel 1 Temperature reading (T1), Channel 2 Temperature reading (T2), or the differential reading (T1 - T2). The reading value is specified by the “**OUT**” main menu item (refer to Section 4.9).

To access the deviation mode:

1. In the run mode, press the **_/DEV** button. The meter momentarily shows “**DEV**”, followed by the blinking deviation value.
2. If the meter is set up to transmit an analog signal out (“**0.3=A**” in Output Configuration sets up the meter to transmit an analog signal out), press the **RESET** button to exit the deviation mode and display “**RUN**”.

If the meter serves as a proportional controller (“**0.3=P**” in Output Configuration sets up the meter to serve as a proportional controller - refer to Section 7), press the **RESET** button to tune the proportional controller. The meter shows “**TUNE**”. “**TUNE**” is active if your meter has analog output capabilities.

SECTION 6. SELECTING METER DISPLAY

You may select one of two display reading modes:

- * Normal Reading
- * +/- OPN Reading

1. If you select a decimal point for .1 degree resolution, the meter shows every value with the .1 degree unless this value is overflowed. If the value is overflowed, the value's decimal point (only) automatically changes to read 1 degrees resolution.

2. Display reading is normal unless either T1 or T2 input goes outside the RTD range, or there is a sensor break. If either of these conditions occur, the meter shows +OPN or -OPN according to the input value (refer to Table 6-1).

Table 6-1. Truth Table for Display Values

T1	T2	T1 - T2
-Open	Normal	+Open
-Open	Normal	-Open
Normal	+Open	-Open
Normal	-Open	+Open
+Open	-Open	+Open
-Open	-Open	-Open
+Open	-Open	+Open
-Open	+Open	-Open

SECTION 6. SELECTING METER DISPLAY (Continued)

SECTION 7. TUNING THE PROPORTIONAL CONTROLLER

The Proportional Controller is not active unless your meter has analog output capabilities. The menu will display whether analog output is present or not. To tune the proportional controller, select proportional on Output Configuration 0.3=P (refer to Section 4.8.3) prior to tuning your controller. Include the meter in the process loop and turn on the meter. Allow enough time for the system to settle, then do the following:

1. Press the **_/DEV** button. The meter momentarily shows “**DEV**” followed by a blinking value. This is the deviation (error) between Reading and Setpoint 1 values. If zero shows there is no error and your controller is tuned. If a value other than zero shows, proceed with step 2.
2. Press the **RESET** button. The meter shows “**TUNE**”, tuning your controller and canceling any error. Once tuned, “**RST**” displays and meter returns to the run mode.
3. Allow enough time for process to settle. Press the **_/DEV** button. Verify that the blinking value is zero. If the blinking value is not zero, repeat step 2.

SECTION 8. DISPLAY MESSAGES

Table 8-1. Display Messages

Table 8-1. Display Messages

Message	Description
RST	Hard (power on) Reset
INPT	Input Type
DECP	Decimal Point
RD CF	Reading Configuration
S1 CF	Setpoint 1 Configuration
S2 CF	Setpoint 2 Configuration
S1 DB	Setpoint 1 Deadband
S2 DB	Setpoint 2 Deadband
OT CF	Output Configuration
OUT	Analog Output Rounding
P.BND	Proportional Band
M RST	Manual Reset
OPN	Sensor Breaker or Temperature Outside the Range
9999	Value overflow in Setpoint Menu Peak Deviation Routine
-1999	Value Overflow in Setpoint Menu Peak Deviation Routine
ERR	2 Coordinate Format Programming Error
OT.S0	Output Scale and Offset
T1.OF	Channel 1 RTD Offset
T2.OF	Channel 2 RTD Offset
SP.RS	Reset Setpoints
TUNE	Tuning Proportional Controller
SP1	Setpoint 1 Value
SP2	Setpoint 2 Value
T1	Channel 1 Temperature Reading
T2	Channel 2 Temperature Reading
T1 - T2	Differential Reading
ERR2	One or more the following items have overflowed because of decimal point change: Setpoint Values, Setpoint Deadbands, Proportional Bands or Manual Reset
ERR3	Temperature offset value is larger than the limit

SECTION 9. MENU CONFIGURATION

Not all menu items display on standard meters.
Table 9-1. Configuration Menu (Defaults in bold and italics)

Menu	Sub-menu	Description
INPT	385 2 385 3 385 4 392 2 392 3 392 4	INPUT TYPE 2-wire DIN RTD 3-wire DIN RTD 4-wire DIN RTD 2-wire NIST RTD 3-wire NIST RTD 4-wire NIST RTD
DEC.P	FFF.F FFF.F	DECIMAL POINT POSITION 1 degree resolution <i>.1 degree resolution</i>
RD.CF	R 1	READING CONFIGURATION Select unit of temperature C: Celsius F: Fahrenheit
S1.CF	S 1 S 2 S 1	SETPOINT 1 CONFIGURATION: A: Active above B: Active below C: Unlatched L: Latched 0: Assign to T1 - T2 1: Assign to T1 2: Assign to T2
S2.CF	S 1 S 2 S 3	SETPOINT 2 CONFIGURATION: A: Active above B: Active below C: Unlatched L: Latched 0: Assign to T1 - T2 1: Assign to T1 2: Assign to T2
S1.DB	XXXX through 9999	SETPOINT 1 DEADBAND Select from 0000 through 9999
S2.DB	0000 through 9999	SETPOINT 2 DEADBAND Select from 0000 through 9999

Menu	Sub-menu	Description
OT.CF		OUTPUT CONFIGURATION Analog Output.
	0.1	D Disabled E Enabled
	0.2	V Voltage analog out C Current analog out
	0.3	A Follows the display value P Proportional to Setpoint 1
	0.4	D Direct reading R Reverse acting
	0.5	F 0-10 V proportional H 0-5 V proportional
OUT	T1 T2 T1 - T2	T1 value on analog out and deviation T2 value on analog out and deviation T1 - T2 value on analog out and deviation
P.BND	0000 through 9999	PROPORTIONAL BAND Select from 0000 through 9999
M.RST	-1999 through 9999	MANUAL RESET Select from -1999 through 9999
OT.S.O	-1999 through 9999	OUTPUT SCALE AND OFFSET 2-coordinate format for scaling the analog output
T.L.O.F	1999 through 9999	CHANNEL 1 RTD OFFSET Select from -1999 through 9999 in °C or °F
T.L.O.F	-1999 through 9999	CHANNEL 2 RTD OFFSET Select from -1999 through 9999 in °C or °F

SECTION 10. FRONT-PANEL DISPLAYS

Table 10-1. Front-Panel Displays (Defaults in bold and italics)

MENU	MODE	ACT/RTN	Description
INPT	Show input choices	165.2 165.3 165.4 392.2 392.3 392.4	INPUT TYPE 2-wire DIN RTD 3-wire DIN RTD 4-wire DIN RTD 2-wire NIST RTD 3-wire NIST RTD 4-wire NIST RTD
DEC.P	Show input choices	FFFF FFFF	DECIMAL POINT
RD.CF	R.1	F C	READING CONFIGURATION Display in °F Display in °C
SLC.F	S.1 S.2 S.3	A H U L 0 1 2	SETPOINT 1 CONFIGURATION Active above Active below Unlatched Latched Assign to T1 - T2 Assign to T1 Assign to T2
S2.CF	S.1 S.2 S.3	A H U L 0 1 2	SETPOINT 2 CONFIGURATION Active above Active below Unlatched Latched Assign to T1 - T2 Assign to T1 Assign to T2
S1.DB	Scroll right one digit	Change the flashing digit's value	SETPOINT 1 DEADBAND Select from 0000 through 9999 (Factory preset is 0000)
S2.DB	Scroll right one digit	Change the flashing digit's value	SETPOINT 2 DEADBAND Select from 0000 through 9999 (Factory preset is 0000)

MENU	←/DEV	←/T1/T2 →	Description
PONB	Scroll right one digit	Change the flashing digit's value	PROPORTIONAL BAND Select from 0000 through 9999
M.RST	Scroll right one digit	Change the flashing digit's value	MANUAL RESET Select from 0000 through 9999
T1.OF	Show prior value entered. Scroll right one digit	Change the flashing digit's value	RTD TEMPERATURE OFFSET - CHANNEL 1
T2.OF	Show prior value entered. Scroll right one digit	Change the flashing digit's value	RTD TEMPERATURE OFFSET - CHANNEL 2

SECTION 10. FRONT-PANEL DISPLAYS (Continued)

Table 10-2. Run Mode Display

Display	←/DEV	←/T1/T2 →	RESET	Description
Run mode				LATCHED RESET Pressing the RESET button will reset your set points.

SECTION 11. SETPOINT CONFIGURATION DISPLAYS

Table 11-1. Setpoint Configuration Displays

MENU	←/DEV	←/T1/T2/Δ	Description
SP 1	Scroll right one digit	Change the flashing digit's value	SETPOINT 1 Select from -1000 through 9999
SP 2	Scroll right one digit	Change the flashing digit's value	SETPOINT 2 Select from -1000 through 9999

SECTION 12. SPECIFICATIONS

SIGNAL INPUT

RTD types:	DIN (.00385) type - 2, 3 or 4 wire NIST (.00392) type - 2, 3 or 4 wire
Isolation:	354 V peak per IEC spacing NMR- 60 dB CMR- 120 dB
Protection:	240 V rms maximum for voltage input ranges 200 mA for current input ranges
Display:	LED 14-segment, 13.8 mm (0.54")
Symbols:	8888

ANALOG TO DIGITAL

Technique:	Dual slope
Internal resolution:	15 bits
Read rate:	3/seconds for each channel
Polarity:	Automatic

ACCURACY AT

25°C:	_0.5°C
Stability:	Temperature 0.04°C/°C

SECTION 12. SPECIFICATIONS (Continued)

Lead Resistance for specified accuracy:

2-wire	Up to 55 milliohms per lead
3-wire	Up to 10 ohms per lead, balanced
4-wire	Up to 20 ohms total, unbalanced

Step response: 1 second to 99% of the final value

Warm up to rated accuracy: 30 minutes

ANALOG OUTPUT (If Applicable)

Signal type: Current or voltage

Signal level: Current: 10 V maximum compliance at 20 mA output
Voltage: 20 mA maximum for 0-10 V output

Function: May be assigned to a display range or proportional control output with Setpoint 1 when used as a control output.

Linearity: 0.2%

Step Response

Time: 2 seconds to 99% of the final value

ALARM

OUTPUTS
(If Applicable) 2 Form "C" on/off relays.
Configurable for latched and unlatched by software.
Maximum current: 6 AMPS
Maximum voltage: 250 Vac or
30 Vdc

SECTION 12. SPECIFICATIONS (Continued)

INPUT POWER INFORMATION

Voltage	ac:	115/230 V rms \pm 15%
		115/230 V rms \pm 10%
	dc:	9.5 to 32 Vdc
Frequency:		50-60 Hz
Power:		6 watts

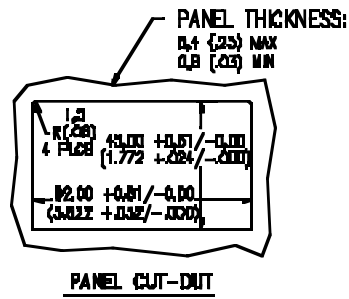
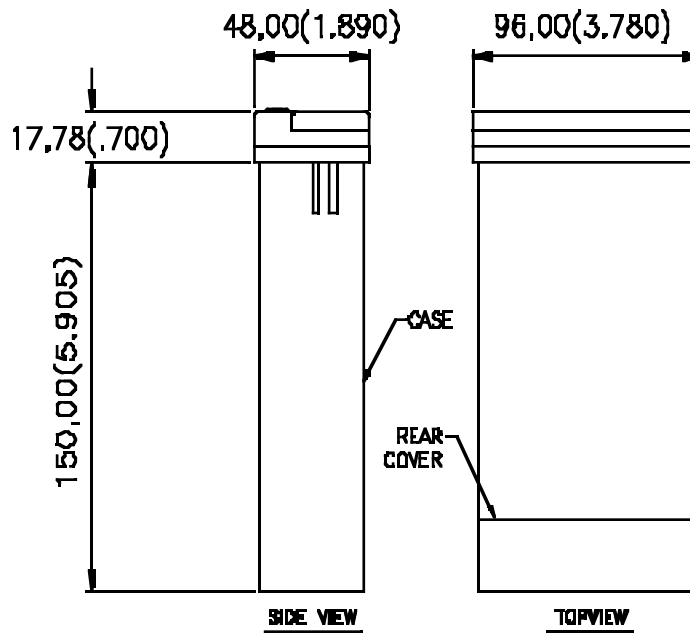
ENVIRONMENT

Operating temp:	0 to 50°C (115/230 V rms \pm 15%)
	0 to 60°C (115/230 V rms \pm 10%)
Storage temp:	-40 through 85°C
Relative humidity:	90% at 40°C (non-condensing)

MECHANICAL

Panel cutout:	1/8 DIN 3.62 x 1.8" (45 x 92mm)
Weight:	1.27 lb (574 g)
Case material:	Polycarbonate, 94 V-O UL rated

SECTION 12. SPECIFICATIONS (Continued)



NOTE: DIMENSIONS IN MILLIMETERS (INCHES)

Figure 12-1. Meter Dimensions

SECTION 13. FACTORY PRESET VALUES

Table 13-1. Factory Preset Values

Menu Item	Factory Preset Values
INPT	Input Type: 385 1 (5-wire DIN RTD)
DEC.P	Decimal Point Position: FFF F
RD.CF	Reading Configuration: R.1=F (shows Fahrenheit)
S1.CF	Setpoint 1 Configuration: S.1=A (Setpoint is relative above) S.2=U (Setpoint is unattached) S.3=0 (Setpoint 1 assigned to T1 - T2)
S2.CF	Setpoint 2 Configuration: S.1=A (Setpoint is relative above) S.2=U (Setpoint is unattached) S.3=0 (Setpoint 2 assigned to T1 - T2)
S1.DB	Setpoint 1 Deadband: 0003
S2.DB	Setpoint 2 Deadband: 0003
OT.CF	Output Configuration: O.1=E (Analog output is enabled) O.2=C (Analog output is current) O.3=A (Analog output follows the display value)
OLT	Analog Output Rounding: T1 - T2
OT.S.O	Output Scale and Offset: 0-1000 = 4-20 mA dc
T1.OF T2.OF	RTD for T1: 000 0 RTD for T2: 000 0
SP1	Setpoint 1 Value: 000.0
SP2	Setpoint 2 Value: 000.0

