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# User's Guide




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# DP26-RTD
## Differential Temperature Meter with RTD

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# PREFACE

## Manual Objectives

This manual shows you how to set up and use the 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




For first-time users: Refer to the QuickStart Manual for basic operation and set-up instructions.

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<br>10 | Menu Configuration<br>Front-Panel Displays |
| Setpoint configuration messages | 11 | Setpoint Configuration Displays |
| Specifications<br>Defaults | 12<br>13 | Specifications<br>Factory Preset Values |

# NOTES, WARNINGS and CAUTIONS

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

- **NOTE**
- **WARNING**
- **CAUTION**
- **IMPORTANT**




**NOTE:** provides you with information that is important to successfully setup and use the Programmable Digital Meter.



**CAUTION or WARNING:** tells you about the risk of electric shock.



**CAUTION, WARNING or IMPORTANT:** tells you of circumstances or practices that can effect the meter's functionality and must refer to accompanying documents.




**TIP:** Provides you helpful hints.

# Table of Contents

**Section** **Page**


1. INTRODUCTION . . . . . 1
   - 1.1 UNPACKING . . . . . 1
   - 1.2 SAFETY CONSIDERATIONS . . . . . 2

2. ABOUT THE METER . . . . . 3
   - 2.1 DESCRIPTION . . . . . 3
   - 2.2 STANDARD FEATURES . . . . . 3
   - 2.3 AVAILABLE ACCESSORIES . . . . . 4
   - 2.4 FRONT OF THE METER . . . . . 5
   - 2.5 FRONT-PANEL BUTTON LOCK OUT . . . . . 8
     - 2.5.1 Push Button Lock Out . . . . . 8
     - 2.5.2 Jumper Lock Out . . . . . 8
   - 2.6 BACK OF THE METER . . . . . 9
   - 2.7 DISASSEMBLY . . . . . 11

3. GETTING STARTED . . . . . 12
   - 3.1 RATING/PRODUCT LABEL . . . . . 12
   - 3.2 MAIN BOARD POWER JUMPERS . . . . . 12
   - 3.3 MOUNTING THE METER . . . . . 15
   - 3.4 CONNECTING SENSOR INPUT . . . . . 16
   - 3.5 CONNECTING MAIN POWER . . . . . 17
   - 3.6 CONNECTING ANALOG AND RELAY OUTPUT CONNECTIONS . . 19

4. CONFIGURING THE METER . . . . . 20
   - 4.1 SELECTING THE INPUT TYPE (INPT) . . . . . 20
   - 4.2 SELECTING DECIMAL POINT POSITION (DEC.P) . . . . . 20
   - 4.3 SELECTING READING CONFIGURATION ("RD.CF") . . . . . 21
   - 4.4 SETTING SETPOINT 1 CONFIGURATION (S1.CF) . . . . . 22
   - 4.5 SETTING SETPOINT 2 CONFIGURATION (S2.CF) . . . . . 23
   - 4.6 SETTING SETPOINT 1 DEADBAND (S1.DB) . . . . . 24
   - 4.7 SETTING SETPOINT 2 DEADBAND (S2.DB) . . . . . 25

**Section** **Page**


4.8 SELECTING OUTPUT CONFIGURATION (OT.CF) . . . . . .26
4.8.1 Enabling or Disabling The Analog Output . . . . . .26
4.8.2 Selecting Analog Output as Current or Voltage . . . . . .27
4.8.3 Selecting Analog Output or Proportional Control . . . . . .27
4.9 ROUTING ANALOG OUTPUT (OUT) . . . . . .29
4.10 SELECTING PROPORTIONAL BAND (P.BND) . . . . . .29
4.11 USING MANUAL RESET (M.RST) . . . . . .31
4.12 SCALING THE ANALOG OUTPUT (OT.S.O) . . . . . .32
4.13 RTD TEMPERATURE OFFSET ERROR CORRECTION . . . . . .36

5. ACCESSING THE DEVIATION MODE . . . . . .38

6. SELECTING METER DISPLAY . . . . . .39

7. TUNING THE PROPORTIONAL CONTROLLER . . . . . .41

8. DISPLAY MESSAGES . . . . . .42

9. MENU CONFIGURATION . . . . . .43

10. FRONT PANEL DISPLAYS . . . . . 45

11. SETPOINT CONFIGURATION DISPLAYS . . . . . .48

12. SPECIFICATIONS . . . . . .49

13. FACTORY PRESET VALUES . . . . . .53

14. APPROVALS . . . . . 54

# List of Figures

## Figure


Figure 2-1. Front-Panel . . . . . .5
Figure 2-3. Connector Label (AC-Powered and DC-Powered Detail) . . . . . .9
Figure 3-1. Main Board Power Jumpers (W1, W2, W3) . . . . . .12
Figure 3-2. Main Board Jumper Positions . . . . . .13
Figure 3-3. Upper Option Board Installation . . . . . .13
Figure 3-4. Meter - Exploded View . . . . . .15
Figure 3-5. Panel Cut-Out . . . . . .15
Figure 3-6. 2-Wire RTD Input Connection . . . . . .16
Figure 3-7. 3-Wire RTD Input Connection . . . . . .16
Figure 3-8. 4-Wire RTD Input connection . . . . . .16
Figure 3-9. Main Power Connections - AC Powered Unit . . . . . .17
Figure 3-10. Main Power Connections - DC Powered Unit . . . . . .18
Figure 3-11. Relay Output Connections . . . . . .18
Figure 3-12. Analog Output Connections. . . . . .19
Figure 3-13. Isolated Analog Output Connections. . . . . .19
Figure 4-1 Proportional Band . . . . . .29
Figure 12-1. Meter Dimensions . . . . . .53


# List of Tables

## Table


Table A-1. Sections of the Manual . . . . . .ii
Table 2-1. Accessories and Add-Ons . . . . . .4
Table 2-2. Connector Description . . . . . .10
Table 3-1. S3 Jumper Functions . . . . . .14
Table 3-2. Main Power Connections - AC Powered Unit . . . . . .18
Table 6-1. Truth Table for Display Values . . . . . .39
Table 8-1. Display Messages . . . . . .42
Table 9-1. Configuration Menu . . . . . .43
Table 10-1. Front Panel Displays . . . . . .45
Table 10-2 Run Mode Displays . . . . . .48
Table 11-1. Setpoint Configuration Displays . . . . . .49
Table 13-1. Factory Preset Values . . . . . .54

# 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, use the phone numbers listed on the back cover to contact the Customer Service Department nearest you.

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.




*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 | Meter with all applicable connectors attached. |
| 1 | Owner's Manual |
| 1 | Set Mounting brackets |
| 1 | QuickStart Manual |




*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.*

# SECTION 1.2 SAFETY CONSIDERATIONS



This device is marked with the **international caution symbol**. It is **important to read** this manual before installing or commissioning this device as it contains important information relating to **Safety and EMC** (Electromagnetic Compatibility).

This instrument is a **panel mount** device protected in accordance with EN 61010-1:2001, electrical safety requirements for electrical equipment for measurement, control and laboratory. Installation of this instrument should be done by qualified personnel. In order to ensure safe operation, the following instructions should be followed.



This instrument has **no power-on switch**. An external **switch or circuit-breaker** shall be included in the building installation as a disconnecting device. It shall be marked to indicate this function, and it shall be in close proximity to the equipment within easy reach of the operator. The switch or circuit-breaker shall not interrupt the Protective Conductor (Earth wire), and it shall meet the relevant requirements of IEC 947–1 and IEC 947-3 (International Electrotechnical Commission). The switch shall not be incorporated in the main supply cord.



Furthermore, to provide protection against **excessive energy** being drawn from the main supply in case of a fault in the equipment, an **overcurrent** protection device shall be installed.




- Do not exceed voltage rating on the label located on the top of the instrument housing.
- Always disconnect power before changing signal and power connections.
- Do not use this instrument on a work bench without its case for safety reasons.
- Do not operate this instrument in flammable or explosive atmospheres.
- Do not expose this instrument to rain or moisture.
- Unit mounting should allow for adequate ventilation to ensure instrument does not exceed operating temperature rating.
- Use electrical wires with adequate size to handle mechanical strain and power requirements. Install without exposing bare wire outside the connector to minimize electrical shock hazards.

**EMC Considerations**

- Whenever EMC is an issue, always use shielded cables.
- Never run signal and power wires in the same conduit.
- Use signal wire connections with twisted-pair cables.
- Install Ferrite Bead(s) on signal wires close to the instrument if EMC problems persist.

**Failure to follow all instructions and warnings may result in injury!**

# SECTION 2. ABOUT THE METER

## 2.1 DESCRIPTION

The Differential RTD meter is a value packed indicator/controller. Four full digits accurately display 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 5 amp, form C relays control critical processes. Front panel peak detection and memory is also standard. A mechanical lockout has been included to guard against unauthorized changes.

## 2.2 STANDARD FEATURES

The following is a list of features:

* 4-digit, 14 segment LED Display
* NEMA 4/Type 4 Front Bezel
* ±0.5° C accuracy
* Automatic Decimal Adjustment
* Non-volatile memory
* 115 or 230 V ac 50/60 Hz power supply or 10-32 Vdc or 26-56 Vdc
* T1, T2, T1-T2 display

The following is a list of optional features

* Dual 5 amps, 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

**Add-On Options**

| | |
|---|---|
| FS | Special Calibration/Configuration |
| SPC4 | NEMA-4 Splash Proof Cover |
| SPC18 | NEMA-4 Splash Proof Cover, NEW |

**Accessories**

| | |
|---|---|
| TP1A | Trimplate panel adaptor.<br>Adapts DIN1A/DIN2A cases to larger panel cutouts |
| RP18 | 19-In. Rack Panel for one (1) 1/8 DIN instrument |
| RP28 | 19-In. Rack Panel for two (2) 1/8 DIN instrument |
| RP38 | 19-In. Rack Panel for three (3) 1/8 DIN instrument |

## 2.4 FRONT OF THE METER

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

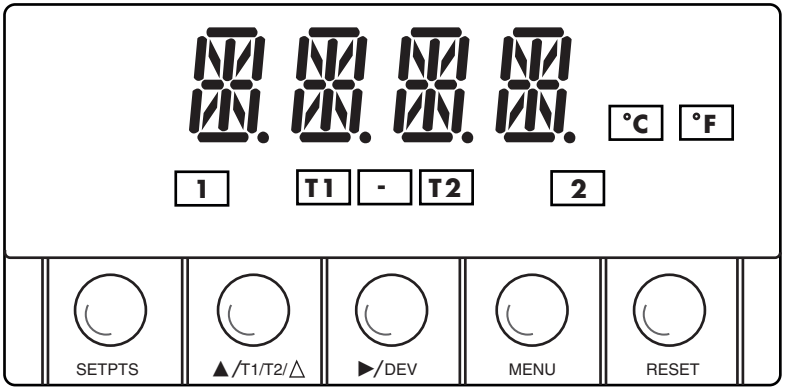



**Figure 2-1 Front Panel**

**Digital LED Display:** -1.9.9.9. or 9.9.9.9. 4-digit, 14 segment, 13.8 mm (0.54") high LED display with programmable decimal point.

These meter display windows light when appropriate:

| | | |
|---|---|---|
| **1** | **-** | Setpoint 1 status |
| **2** | - | Setpoint 2 status |
| **C** | - | °C unit indicator |
| **F** | - | °F unit indicator |
| **T1** | **-** | T1 on display |
| **T2** | **-** | T2 on display |
| **T1-T2** | **-** | T1-T2 on display |

5 Pushbuttons for programming the meter.

## 2.4 FRONT OF THE METER (Continued)

## METER BUTTONS

**SETPTS** Button

In the run mode, press this button to sequentially recall the previous setpoint settings. After using the **▲/T1/T2▲** and **►/DEV** buttons to alter these settings as desired, press the **SETPTS** button to store these new values.

Unless you press the **SETPTS, ▲/T1/T2▲** or **►/DEV** button within 20 seconds to store your input, the meter will scroll to setpoint 2 the return to the run mode.

*If the dual relay option is not installed or if the "L.3=1" on the "LK.CF" menu, pressing the **SETPTS** button will display the meter's firmware version.*

---

**▲/T1/T2▲** Button

In the run mode, pressing the **▲/T1/T2▲** button will scroll to show T1, T2, and T1-T2.

During the configuration mode or Setpoint modes, use the **▲/T1/T2▲** 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 increment the flashing digit from 0 to 9 by 1's.

---

**►/DEV** Button

In the run mode press the **►/DEV** button to display the deviation of reading from Setpoint 1.

In the configuration or setpoint modes, press the **►/DEV** button to scroll to the next digit.

## 2.4 FRONT OF THE METER (Continued)

**MENU** Button

In the run mode, 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. The display 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 or power off/on the meter, it shows "**RST**" followed by "**D.RTD**".

In the configuration mode, press the **RESET** button once to review the previous menu. Pressing the **RESET** button twice results in a hard reset and returns you to the run mode.

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

## 2.5 FRONT PANEL LOCKOUT

### 2.5.1 PUSH BUTTON LOCKOUT

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 the **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 the **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 LOCKOUT

**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 connector label mounted at the top of the meter housing. Table 2-2 gives a brief description of each connector at the back of the meter.

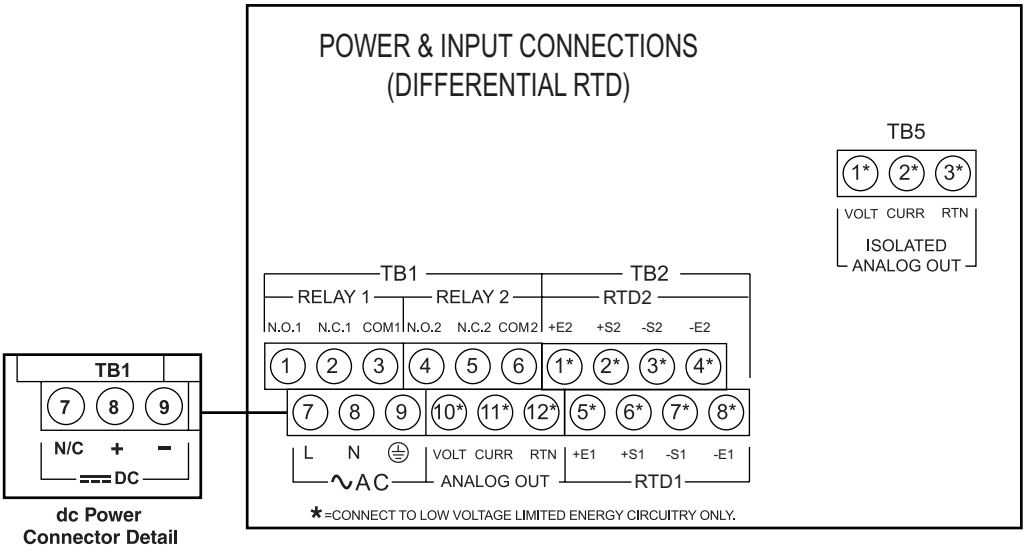



**Figure 2-2 Connector label (ac Powered and dc Powered detail)**

## 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 (COM1) 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 (COM2) connection |
| TB1-7 | ac line connection (no connections on dc-powered units) |
| TB1-8 | ac neutral connection (+ Input on dc-powered units) |
| TB1-9 | ac Earth ground (-dc-power return on dc-powered units) |
| TB1-10 | Analog 1 voltage output |
| TB1-11 | Analog 2 current output |
| TB1-12 | Analog 3 return |
| TB2-1 | +E2: Positive excitation for input #2 |
| TB2-2 | +S2: Positive signal input for input #2 |
| TB2-3 | -S2: Negative signal input for input #2 |
| TB2-4 | -E2: Negative excitation for input #2 |
| TB2-5 | +E1: Positive excitation for input #1 |
| TB2-6 | +S1: Positive signal input for input #1 |
| TB2-7 | -S1: Negative signal input for input #1 |
| TB2-8 | -E1: Negative excitation for input #1 |
| TB5-1 | Isolated Analog Voltage Output |
| TB5-2 | Isolated Analog Current Output |
| TB5-3 | Isolated Analog Output Return |

## 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.




*Disconnect the power supply before proceeding.*

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

- Disconnect the main power from the meter.
- Remove the back case cover.
- Lift the back of the main board upwards and let it slide out of the case.

# SECTION 3. GETTING STARTED

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

If you power off/on the meter, or perform a hard reset (press the **RESET** button twice), the meter shows "**RST**", followed by "**D.RTD**".

## 3.1 RATING/PRODUCT LABEL

This label is located on top of the meter housing (Refer to Figure 3-3).

## 3.2 MAIN BOARD POWER JUMPERS

**Important:** If you want to change the Factory preset jumpers, do the following steps; otherwise go to section 3.3.

**Warning:** Disconnect the power from the unit before proceeding. This device must only be reconfigured by a specially trained electrician with corresponding qualifications. Failure to follow all instructions and warnings may result in injury!

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

1. Remove the main board from the case. Refer to Section 2.7.
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 V ac, solder jumpers W1 and W3 should be wired, but jumper W2 should not.** If your power requirement is **230 V ac, solder jumper W2 should be wired, but jumpers W1 and W3 should not.**

Figure 3-1 shows the location of solder jumpers W1 through W3 on the main board.

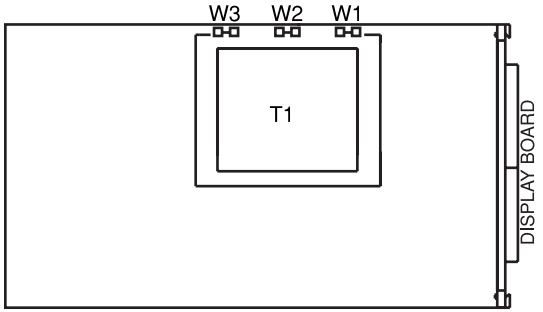



**Figure 3.1 Main Board Power Jumpers**

## 3.2 MAIN BOARD POWER JUMPERS (Continued)

Figure 3-2 shows the main board jumpers.

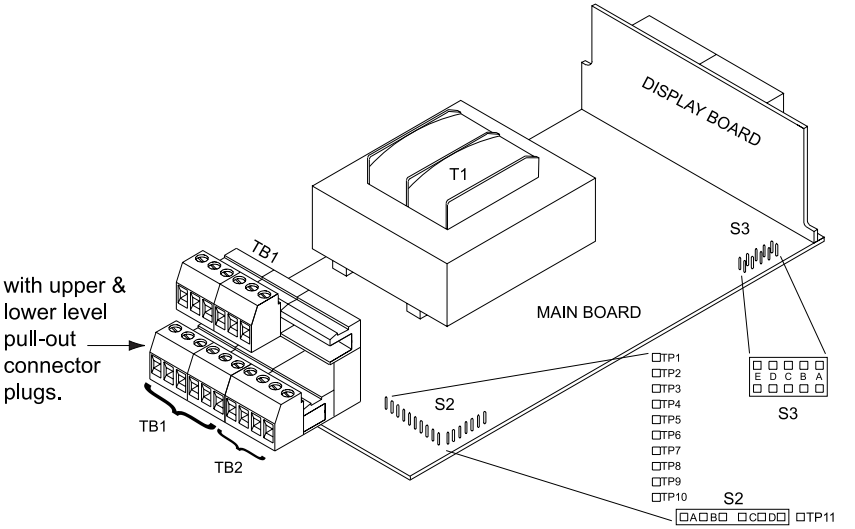



**Figure 3.2 Main Board Jumper Positions**

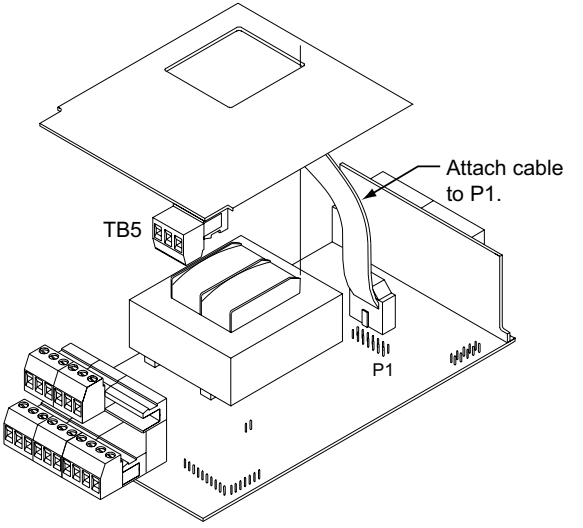



**Figure 3.3 Upper Option Board Installation**

## 3.2 MAIN BOARD POWER JUMPERS (Continued)

S2 jumpers are for sensor break indications:

* 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 is not used

S3 jumpers are used for the following (refer to Table 3-1):

* 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 as reading errors may result.

**Table 3-1 S3 Jumper Functions**

| Jumper | Description |
|---|---|
| S3-A | Install to enable front panel push-buttons.<br>Remove to disable all front panel push-buttons |
| S3-B | Removed. Install for factory calibration only. |
| S3-C | Normally removed. Install for analog voltage output when load is less than 1 Kohm 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.<br>While in run mode, if you press the **MENU** button, the display shows “LOCK". |

## 3.3 MOUNTING THE METER

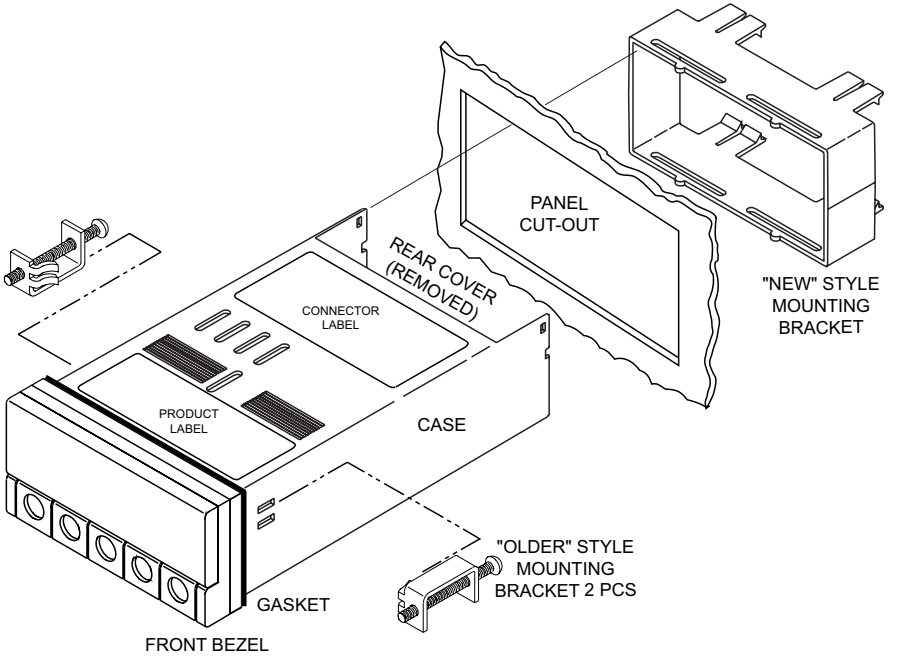
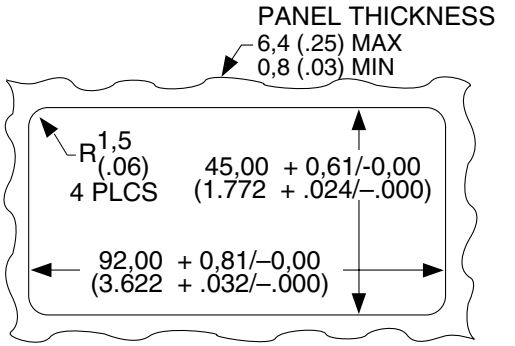



**Figure 3-3 Meter - Exploded View**

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 gasket is flush to the panel.
3. Slide on mounting bracket to secure.
4. Proceed to Section 3.4 to connect your sensor input and main power.




NOTE: Dimensions in Millimeters (Inches)

**Figure 3-4 Panel Cut-Out**

### 3.4 CONNECTING SENSOR INPUT

Figure 3-5 through 3-7 illustrate how to connect you power sensors.

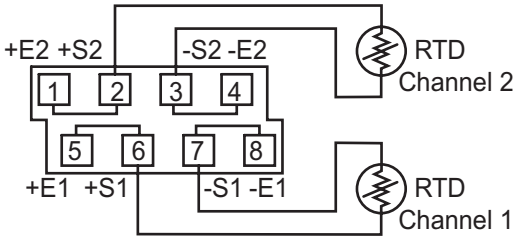



**Figure 3-5 2-Wire RTD Input Connection**

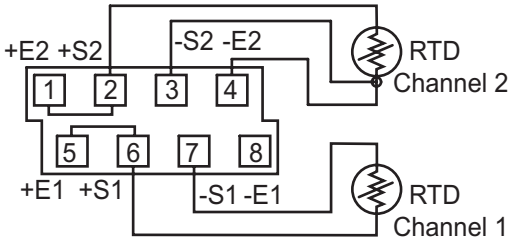



**Figure 3-6 3-Wire RTD Input Connection**

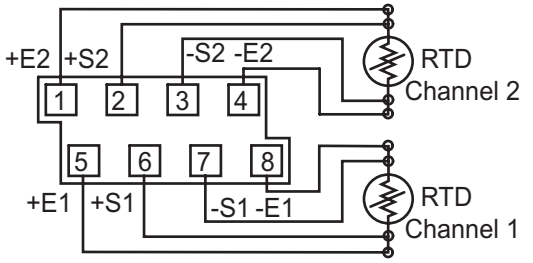



**Figure 3-7 4-Wire RTD Input Connection**

Note: Install rear plastic cover after RTD 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 device until you have completed all input and output connections. This device must only be installed by a specially trained electrician with corresponding qualifications. Failure to follow all instructions and warnings may result in injury!

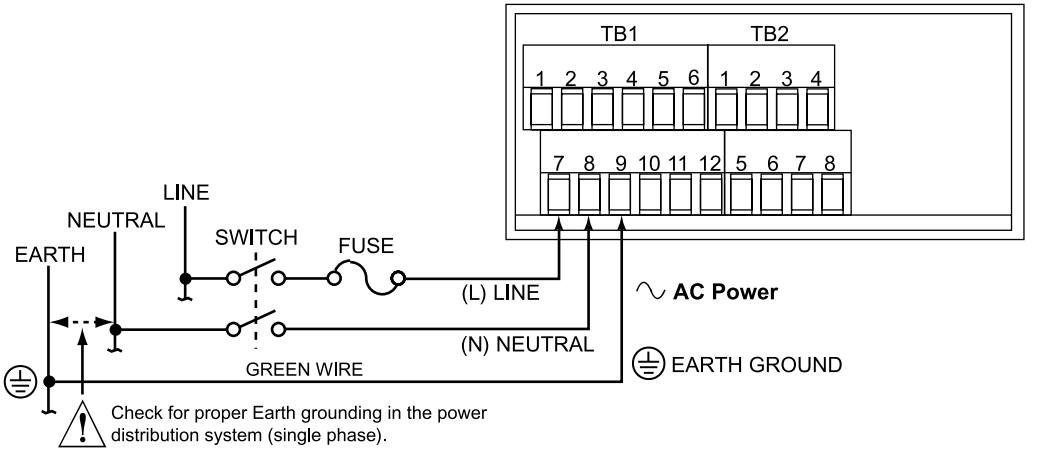



**Figure 3-8 Main Power Connections (ac powered unit)**

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

**Table 3-2 Main Power Connections (ac powered unit)**

| | | WIRE COLORS | |
|---|---|---|---|
| **TB1** | **AC POWER** | **EUROPE** | **USA** |
| 7 | ∿ ac Line | Brown | Black |
| 8 | ∿ ac Neutral | Blue | White |
| 9 | ∿ ac Earth | Green/Yellow | Green |

## 3.5 CONNECTING MAIN POWER (Continued)

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

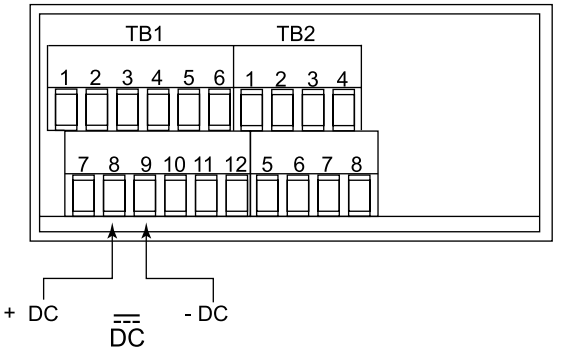



**Figure 3-9 Main Power Connections (dc powered unit)**

## 3.6 ANALOG AND RELAY OUTPUT CONNECTIONS

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

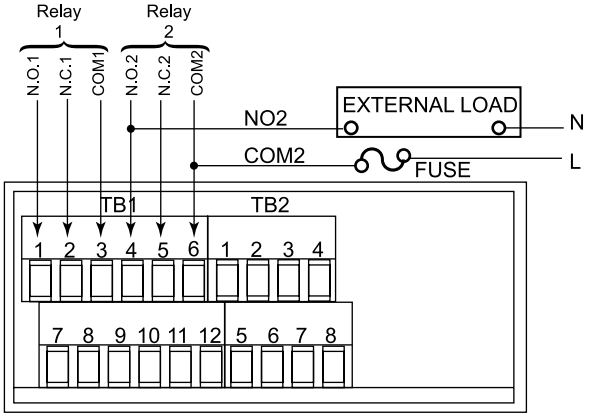



**Figure 3-10 Relay Output Connections**

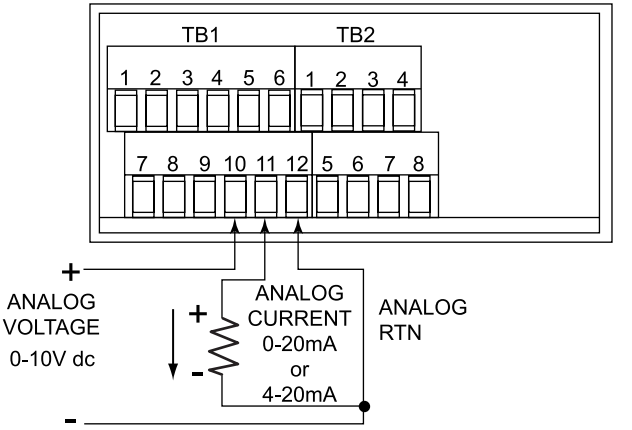



**Figure 3-11 Analog Output Connections**

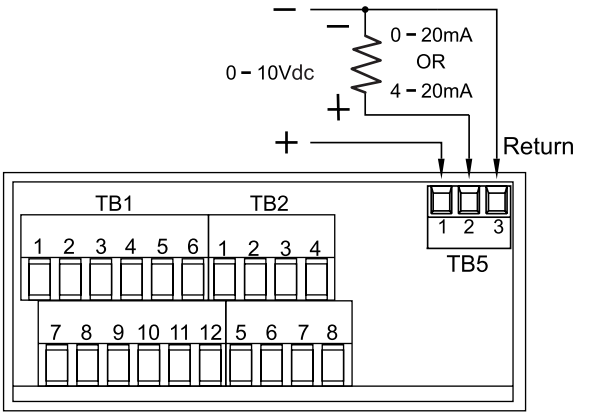



**Figure 3-12 Isolated Analog Output Connections**

# 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)

3. 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).

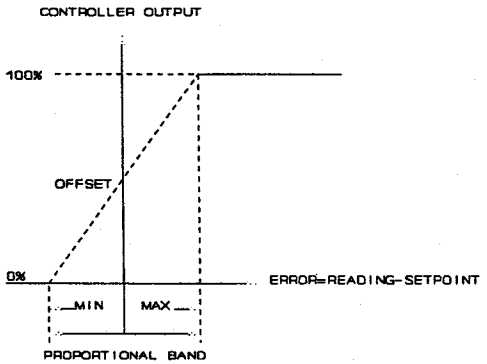



Figure 4-1. Proportional Band

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,**

$$\text{Proportional Band} = \frac{\text{Max. out - Min. out}}{A}$$

**CONTROLLER OUT = A * ERROR + 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.*

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 450.0° 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:

**Offset = Actual Temperature - 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 than resets (**"RST"**) and returns to the run mode.

***Note 1:*** *The temperature unit is either Celsius or Fahrenheit and will always show at 0.1° resolution and automatically change to 1° if it is necessary.*

***Note 2:*** *The Maximum/Minimum offset value is 10.0 ° Celsius ( 18.0 ° 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 |

When +OPEN or -OPEN appears, T1, T2 or T1- T2 related alarms ignore their deadband and acts as follows:

| Display | Active Above Alarm | Active Below Alarm |
|---|---|---|
| +OPN | On | Not Effective |
| -OPN | Not Effective | On |

# 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

| Message | Description |
|---|---|
| RST | Hard (power on) Reset |
| INPT | Input Type |
| DEC.P | 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 Routings |
| P.BND | Proportional Band |
| M.RST | Manual Reset |
| OPN | Sensor Breaker or Temperature Outside the Range |
| 9999 | Value overflow in Setpoint/Menu Peak Deviation Routines |
| -1999 | Value Overflow in Setpoint/Menu Peak Deviation Routine |
| ER1 | 2 Coordinate Format Programming Error |
| OT.SO | 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 |
| ER2 | One or more the following items have overflowed because of decimal point change: Setpoint Values, Setpoint Deadbands, Proportional Bands or Manual Reset. |
| ER3 | 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** | | **INPUT TYPE** |
| | 385.2 | 2-wire DIN RTD |
| | ***385.3*** | ***3-wire DIN RTD*** |
| | 385.4 | 4-wire DIN RTD |
| | 392.2 | 2-wire NIST RTD |
| | 392.3 | 3-wire NIST RTD |
| | 392.4 | 4-wire NIST RTD |
| **DEC.P** | | **DECIMAL POINT POSITION** |
| | FFFF. | 1 degree resolution |
| | ***FFF.F*** | ***.1 degree resolution*** |
| **RD.CF** | | **READING CONFIGURATION** |
| | | Select unit of temperature: |
| | R.1 | C: Celsius |
| | | ***F: Fahrenheit*** |
| **S1.CF** | | **SETPOINT 1 CONFIGURATION:** |
| | S.1 | ***A: Active above*** |
| | | B: Active below |
| | S.2 | ***U: Unlatched*** |
| | | L: Latched |
| | S.3 | ***0: Assign to T1 - T2*** |
| | | 1: Assign to T1 |
| | | 2: Assign to T2 |
| **S2.CF** | | **SETPOINT 2 CONFIGURATION:** |
| | S.1 | ***A: Active above*** |
| | | B: Active below |
| | S.2 | ***U: Unlatched*** |
| | | L: Latched |
| | S.3 | ***0: Assign to T1 - T2*** |
| | | 1: Assign to T1 |
| | | 2: Assign to T2 |
| **S1.DB** | | **SETPOINT 1 DEADBAND** |
| | 0000 through 9999 | Select from 0000 through 9999 |
| **S2.DB** | | **SETPOINT 2 DEADBAND** |
| | 0000 through 9999 | Select from 0000 through 9999 |

| Menu | Sub-menu | Description |
|---|---|---|
| **OT.CF** | | **OUTPUT CONFIGURATION**<br>Analog Output: |
| | 0.1 | D: Disabled<br>***E: Enabled*** |
| | 0.2 | V: Voltage analog out<br>***C: Current analog out*** |
| | 0.3 | ***A: Follows the display value***<br>P: Proportional to Setpoint 1 |
| | 0.4 | D: Direct reading<br>R: Reverse acting |
| | 0.5 | F: 0-10 V proportional<br>H: 0-5 V proportional |
| **OUT** | T1<br>T2<br>***T1 - T2*** | T1 value on analog out and deviation<br>T2 value on analog out and deviation<br>***T1 - T2 value on analog out and deviation*** |
| **P.BND** | 0000 through 9999 | **PROPORTIONAL BAND**<br>Select from 0000 through 9999 |
| **M.RST** | -1999 through 9999 | **MANUAL RESET**<br>Select from -1999 through 9999 |
| **OT.S.O** | -1999 through 9999 | **OUTPUT SCALE AND OFFSET**<br>2-coordinate format for scaling the analog output |
| **T1.OF** | -1999 through 9999 | **CHANNEL 1 RTD OFFSET**<br>Select from -1999 through 9999 in °C or °F. |
| **T2.OF** | -1999 through 9999 | **CHANNEL 2 RTD OFFSET**<br>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 | ▸/DEV | ▴/T1/T2/▴ | Description |
|---|---|---|---|
| **INPT** | Show input choices | 385.2<br>***385.3***<br>385.4<br>392.2<br>392.3<br>392.4 | **INPUT TYPE**<br>2-wire DIN RTD<br>***3-wire DIN RTD***<br>4-wire DIN RTD<br>2-wire NIST RTD<br>3-wire NIST RTD<br>4-wire NIST RTD |
| **DEC.P** | Show input choices | FFFF.<br>***FFF.F*** | **DECIMAL POINT** |
| **RD.CF** | **R.1** | ***F***<br>C | **READING CONFIGURATION**<br>***Display in °F***<br>Display in °C |
| **S1.CF** | **S.1**<br><br>**S.2**<br><br>**S.3** | ***A***<br>B<br><br>***U***<br>L<br><br>***0***<br>1<br>2 | **SETPOINT 1 CONFIGURATION**<br>***Active above***<br>Active below<br><br>***Unlatched***<br>Latched<br><br>***Assign to T1 - T2***<br>Assign to T1<br>Assign to T2 |
| **S2.CF** | **S.1**<br><br>**S.2**<br><br>**S.3** | ***A***<br>B<br><br>***U***<br>L<br><br>***0***<br>1<br>2 | **SETPOINT 2 CONFIGURATION**<br>***Active above***<br>Active below<br><br>***Unlatched***<br>Latched<br><br>***Assign to T1 - T2***<br>Assign to T1<br>Assign to T2 |
| **S1.DB** | Scroll right one digit | Change the flashing digit's value | **SETPOINT 1 DEADBAND**<br>Select from 0000 through 9999. (Factory preset is 0003) |
| **S2.DB** | Scroll right one digit | Change the flashing digit's value | **SETPOINT 2 DEADBAND**<br>Select from 0000 through 9999. (Factory preset is 0003) |

| MENU | ▸/DEV | ▴/T1/T2/ ▴ | Description |
|---|---|---|---|
| OT.CF | | | **OUTPUT CONFIGURATION** |
| | 0.1 | D | Disable analog output |
| | | ***E*** | ***Enable analog output*** |
| | 0.2 | V | Analog output = voltage |
| | | ***C*** | ***Analog output = current*** |
| | 0.3 | ***A*** | ***Regular analog output*** |
| | | P | Proportional analog output |
| | 0.4 | D | Proportional analog output is direct acting |
| | | R | Proportional analog output is reverse acting |
| | O.5 | F | Analog output is 0-10 Vdc |
| | | H | Analog output is 0-5 Vdc |
| ***Notes:*** ** If you select 0.2 = V, you may select your analog output to be 0-10 V or 0-5 V by accessing sub-menu **0.5**.*<br>** If you select 0.3 = 0, you have access to Output Scale and Offset.*<br>** If you select 0.3 = P, you may select your proportional output analog to be direct or reverse acting (i.e. 4-20 or 20-4).* | | | |
| **OT.S.O** | Show **RD 1** and prior value entered. | | **OUTPUT SCALE AND OFFSET** |
| Enter new value and show **OUT1** | Scroll right one digit. | Change the flashing digit's value. | |
| Enter new value and show **RD 2** | Show prior value entered. | | |
| | Scroll right one digit. | Change the flashing digit's value. | |
| Enter new value and show **OUT2** | Show prior value entered. | | |
| | Scroll right one digit. | Change the flashing digit's value. | |

**Table 10-1 Front-Panel Displays (continued)**

| MENU | ▶/DEV | ▲/T1/T2/▲ | DESCRIPTION |
|---|---|---|---|
| **P.BND** | Scroll right one digit | Changes the value of the flashing digit | Proportional Band select from 0000 through 9999 |
| **M.RST** | Scroll right one digit | Changes the value of the flashing digit | Manual Reset select from 0000 through 9999 |
| **T1.OF** | Shows prior value entered. Scroll right one digit | Changes the value of the flashing digit | RTD Temperature Offset Channel 1 |
| **T2.OF** | Shows prior value entered. Scroll right one digit | Changes the value of the flashing digit | RTD Temperature Offset Channel 2 |

**Table 10-2 Run Mode Display**

| DISPLAY | ▶/DEV | ▲/T1/T2/▲ | RESET | DESCRIPTION |
|---|---|---|---|---|
| Run Mode | | | | **LATCHED RESET**<br><br>Press **RESET** button to reset your setpoints. |

# SECTION 11. SETPOINT CONFIGURATION DISPLAYS

**Table 11-1 Setpoints Configuration Displays**

| MENU | ▶/DEV | ▲/T1/T2/▲ | DESCRIPTION |
|---|---|---|---|
| **SP 1**<br>Setpoint 1 | Press to scroll to the next digitto the right | Press to change the value of the flashing digit | SETPOINT 1<br><br>Select from -1999 through 9999 |
| **SP 2**<br>Setpoint 2 | Scroll right one digit | Press to change the value of the flashing digit | SETPOINT 2<br><br>Select from -1999 through 9999 |

# SECTION 12. SPECIFICATIONS

## SIGNAL INPUT

| | |
|---|---|
| RTD types: | DIN (0.00385) type 2,3, or 4 wire |
| | NIST (0.00392) type 2,3, or 4 wire |
| Lead Resistance for Specified Accuracy: | |
| | 2 Wire Up to 55 milliohm/lead<br>3 Wire Up to 10 ohms/lead balanced<br>4 Wire Up to 20 ohms/total unbalanced |
| Isolation: | Dielectric strength to 2500V transient per 3mm spacing based on EN 61010 for 260Vrms or dc working voltage |
| Noise Rejection: | Normal Mode Rejection (NMR) = 60dB<br>Common Mode Rejection (CMR) = 120dB |
| Protection: | 240 V rms max for voltage input ranges |
| | 200 mA for current input ranges |
| Standard Display: | 4-digit, 14-segment LED, 13.8 mm (0.54”) |
| Symbol: | 8.8.8.8. (-1.9.9.9. ~ 9.9.9.9.) |

## ANALOG TO DIGITAL

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

## ACCURACY AT 25°C

| | |
|---|---|
| Accuracy: | ±0.50°C after 30 minute warm-up |
| Temperature Stability: | 0.04°C/°C |
| Step response: | 1 second to 99% of the final value |

## INPUT POWER INFORMATION:

| | |
|---|---|
| ∿ AC units | 115/230 V~(AC) ±10%, 50/60 Hz<br>7 W max, power consumption (Non-Isolated Analog Output)<br>8 W max, power consumption (Isolated Analog Output) |
| DC units | 10-32 Vdc<br>6 W max, power consumption (Non-Isolated Analog Output)<br>7 W max, power consumption (Isolated Analog Output) |

External Fuse Required:

| IEC 127-2/III | |
|---|---|
| Power | Fuse |
| 115 V | 125 mA @ 250 (T) |
| 230 V | 63 mA @ 250 (T) |
| UL 248-14 (Listed Fuse) | |
| Power | Fuse |
| 115 V | 175 mA @ 250 V Slow-Blow |
| 230 V | 80 mA @ 250 V Slow-Blow |

## ENVIRONMENT

| | |
|---|---|
| Operating temperature: | 0 to 50°C (32° to 122°F) |
| Storage temperature: | -40° to 85°C (-40° to 185°F) |
| Relative humidity: | 90% at 40°C (non-condensing) |

## MECHANICAL

| | |
|---|---|
| Panel cutout: | 1/8 DIN 3.62 x 1.78" (92 x 45 mm) |
| Weight: | 1.27 lb (574 g) |
| Case material: | Polycarbonate, 94 V-O UL rated |

## ANALOG OUTPUT (if applicable)

| | |
|---|---|
| Signal type: | Current or voltage |
| Signal level: | Current: 10 V max compliance at 20 mA output<br>Voltage: 20 mA max 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% |
| Load Regulation: | 1.1% |
| Line Regulation: | 0.02% /V ac |
| Step Response Time: | 2 - 3 seconds to 99% of the final value |

## ALARM OUTPUTS (if applicable)

2 Form "C" on/off relays. Configurable for latched and unlatched by software.

| | |
|---|---|
| Max current: | 5 AMPS, resistive load. |
| Max voltage: | 250 V ac or 30 V dc |

## ISOLATED ANALOG OUTPUT (TB5, if applicable)

Same as non-isolated analog output except isolated to 1000 Vdc.

| | |
|---|---|
| Signal Type: | Current or voltage |
| Signal Level: | Current: 10 V max compliance at 20 mA output<br>Voltage: 20 mA max 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 - 3 seconds to 99% of the final value |

Only one analog output is available on each unit and it must be factory installed.

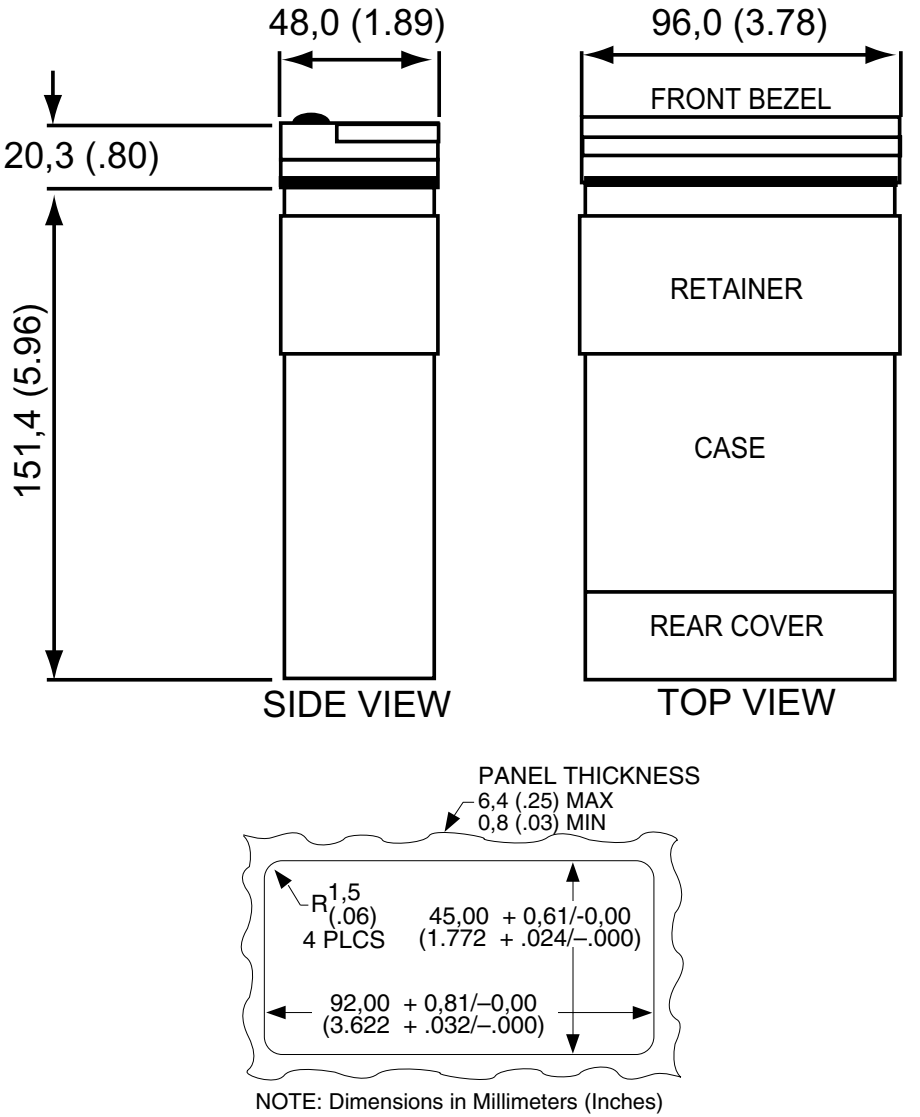



**Figure 12-1 Meter Dimensions**

# SECTION 13. FACTORY PRESET VALUES

**Table 13-1 Factory Preset Values**

| MENU ITEM | FACTORY PRESET VALUES |
|---|---|
| INPT | Input Type: 385.3 (3 wire DIN RTD) |
| DEC.P | Decimal Point Position: FFF.F |
| RD.CF | Reading Configuration:<br>R.1=F (Fahrenheit) |
| S1.CF | Setpoint 1 Configuration:<br>S.1=A (Setpoint is active above)<br>S.2=U (Setpoint is unlatched)<br>S.3=0 (Setpoint 1 is assigned to T1-T2) |
| S2.CF | Setpoint 2 Configuration:<br>S.1=A (Setpoint is active above)<br>S.2=U (Setpoint is unlatched)<br>S.3=0 (Setpoint 2 is assigned to T1-T2) |
| S1.DB | Setpoint 1 Deadband: .0003 |
| S2.DB | Setpoint 2 Deadband: .0003 |
| OT.CF | Output Configuration:<br>O.1=E (Analog output is enabled)<br>O.2=C (Analog output is current)<br>O.3=A (Analog output follows the display value) |
| OUT | Analog Output Routing: T1 - T2 |
| OT.S.O | Output Scale and Offset:<br>0-1000 = 4-20 mA dc |
| T1.OF | RTD for T1: 000.0 |
| T2.OF | RTD for T2: 000.0 |
| SP1 | Setpoint 1 Value: 000.0 |
| SP2 | Setpoint 2 Value: 000.0 |

# APPROVALS INFORMATION

**Electrical Safety EN61010-1:2001**

Safety requirements for electrical equipment for measurement, control and laboratory.

**Double Insulation**

**Pollution Degree 2**

**Dielectric withstand Test per 1 min**

- Power to Input/Output: 2300 Vac (3250 Vdc)
- Power to Input/Output: 500 Vac (720 Vdc)
  (Low Voltage dc Power Option*)
- Power to Relays Output: 2300 Vac (3250 Vdc)
- Relay 1 to Relay 2: 2300 Vac (3250 Vdc)
- Isolated Analog to Inputs: 1000 Vac (1420 Vdc)
- Analog to Inputs: No Isolation

**Measurement Category I**

Category I are measurements performed on circuits not directly connected to the Mains Supply (power). Maximum Line-to-Neutral working voltage is 50 Vac/dc. This unit should not be used in Measurement Categories II, III, IV.

**Transients Overvoltage Surge (1.2 / 50uS pulse)**

- Input Power: 2500 V
- Input Power: 500 V
  (Low Voltage dc Power Option*)
- Isolated Analog: 500 V
- Input/Output Signals: 500 V

***Note:*** **Units configured for external low power dc voltage, 10-32 Vdc (Basic Insulation)*

**EMC EN61326:1997 + and A1:1998 + A2:2001**

Immunity and Emissions requirements for electrical equipment for measurement, control and laboratory.

- EMC Emissions Table 4, Class B of EN61326
- EMC Immunity** Table 1 of EN61326

***Note:*** ***I/O signal and control lines require shielded cables and these cables must be located on conductive cable trays or in conduits. Furthermore, the length of these cables should not exceed 30 meters*



Refer to the EMC and Safety installation considerations (Guidelines) of this manual for additional information.

# WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **61 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **five (5) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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# RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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