**ΩE OMEGA**™

# User's Guide

# DP25B-E
# Process Panel Meter

# ΩΞ OMEGA™

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## PREFACE

Manual Objectives

This manual shows you how to set up and use the Programmable Digital Meter.

Standard Procedures:

- \* Checking voltage jumpers, or changing voltage power
- \* Mounting the panel
- \* Selecting the input type
- \* Selecting a decimal point position
- \* Scaling with known loads (on-line calibration)
- \* Scaling without known loads
- \* Enabling/disabling the front-panel tare
- \* Displaying the filtered/unfiltered input signal
- \* Selecting a display color
- \* Setting the setpoint's active band
- \* Selecting a latched or unlatched operation
- \* Setting setpoint deadbands
- \* Enabling/disabling setpoint changes
- \* Enabling/disabling the RESET button in the Run Mode

Optional Procedures:

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

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

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## NOTES, WARNINGS and CAUTIONS

Information that is especially important to note is identified by three 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.

# 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.

**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**        Programmable Digital Meter indicator/controller with all applicable connectors attached.

**1**        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 Introduction

## 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.

**Note ☞**
- 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!**

2

# SECTION 2.  ABOUT THE METER

## 2.1  DESCRIPTION

The Digital Programmable  Process meter  is a value packed indicator/controller. Four full digits and broad scaling capability allow for display in virtually all engineering units. A wide variety of DC current and voltage input ranges cover typical process applications. Standard features include sensor excitation and front panel or remote tare.  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.  A mechanical lockout has been included to guard against unauthorized changes.

## 2.2  FEATURES

The following is a list of standard features:

* 4-digit three color Programmable "Big" LED display
  or 4-digit, Standard LED Display
* NEMA 4 / Type 4 Front Bezel
* ±0.03 % accuracy
* 8 DC input ranges: 0-100 mV, ±50 mV, 0-5 V, 1-5 V,
  0-10 V, ±5 V, 0-20 mA, and 4-20 mA
* 5, 10, 12, or 24 Vdc sensor excitation
* Peak detection
* Front panel and remote tare function
* Nonvolatile memory-no battery backup
* 115 or 230 Vac 50/60 Hz power supply or
  10-32 Vdc or 26-56 Vdc

The following is a list of optional features:

* Dual 5 amp, form C relay outputs
* Scalable analog output
* Proportional control
* Easy setup for proportional control

**Note** ☞ Features with ▽ are for the "B" version which has three-color programmable "Big" LED display - All segment characters shown are for the "B" version.

### 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. 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 instruments |
| RP38 | 19-In. Rack Panel for three (3) 1/8 DIN instruments |

## 2.4 FRONT OF THE METER

NEW
Figure 2-1 shows each part of the front of the three-color programmable "Big" LED display meter (Version B).
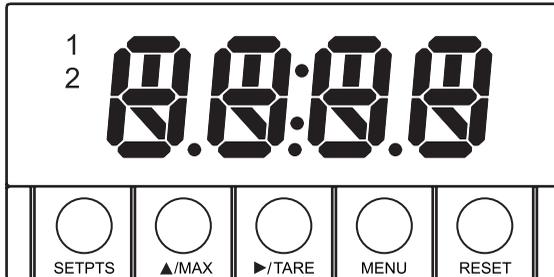
**Digital LED Display:**
-1.9.9.9 or 9.9.9.9 4-digit three color programmable, 21 mm (0.83") high LED display with programmable decimal point.

SETPTS  ▲/MAX  ▶/TARE  MENU  RESET

### Figure 2-1.  Front-Panel with Big Display

Figure 2-2 shows each part of the front of the standard LED display meter.
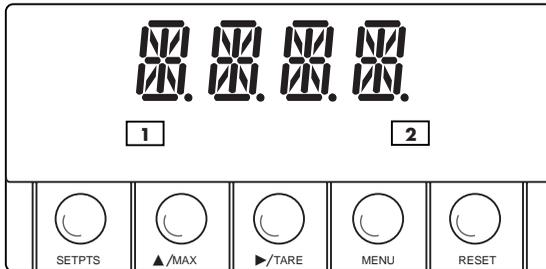
**Digital LED Display:**
-1.9.9.9. or 9.9.9.9. 14 segment, 13.8 mm (0.54") high LED display with programmable decimal point.

SETPTS  ▲/MAX  ▶/TARE  MENU  RESET

### Figure 2-2.  Front-Panel wtih Standard Display

These meter display windows (both versions) light when appropriate:

- **1 -** Setpoint 1 status
- **2** - Setpoint 2 status

5 Pushbuttons for programming the meter.

## 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 ▲/**MAX** and ▶/**TARE** buttons to alter these settings, then press the **SETPTS** button to store new values.

Unless you press the **SETPTS**, ▶/**TARE**, or ▲/**MAX** button within 20 seconds, the meter will scroll to setpoint 2 and then to the Run Mode.

**Note☞** *If the dual relay option is not installed or if the* L.3= 1 *on the* L R.C F *menu, pressing the **SETPTS** button will display the meter's firmware version.*

▲/**MAX** Button

In the Run Mode, this button will recall the **PEAK** reading since the last press of the **RESET** button.

In the Configuration Mode, press this button to change the value of the flashing digit shown on the display and/or toggle between menu choices, such as R. I=t or R. I=N on R d.C F menu. When configuring your setpoint values, press the ▲/**MAX** button to advance the flashing digit's value from 0 to 9 by 1.

▶/**TARE** Button

In the Run Mode press the ▶/**TARE** button to tare your reading (zeroing) if you configure the Reading Configuration bit R. I=t of the R d.C F menu. If you configure R. I=N, the ▶/**TARE** button has no function.

In the Configuration Mode, press the this 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.

**Note ☞** *Only if you have not installed the lockout jumpers on the main board.*

In the Configuration Mode, press the **MENU** button to store changes in the nonvolatile memory and then advance you to the next menu item.

---

**RESET** Button

If you hard reset (press the **MENU** button followed by the **RESET** button) or power off/on the meter, it shows **RST**, followed by **PROC**.

In the Run Mode, press the **RESET** button to reset tare, if any. The meter shows **t.RSt** and returns to the Run Mode.

In the Configuration Mode, press the **RESET** button once to review the previous menu. Press the **RESET** button twice to perform a hard reset and return to the Run Mode.

In the Peak Mode, press the **RESET** button to reset peak values. The meter shows **PK.RS** and returns to the Run Mode.

In the Setpoint Mode, press the **RESET** button to reset the latched setpoint. The meter shows **SP.RS** and enters the Run Mode.

**Note ☞** *When in setpoint or Configuration Mode, if the meter shows 9999 or -1999 with all flashing digits, the value has overflowed. Press the ▲/MAX button to start a new value.*

# About The Meter

## 2.5 BACK OF THE METER

Figure 2-2 shows the label describing 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.
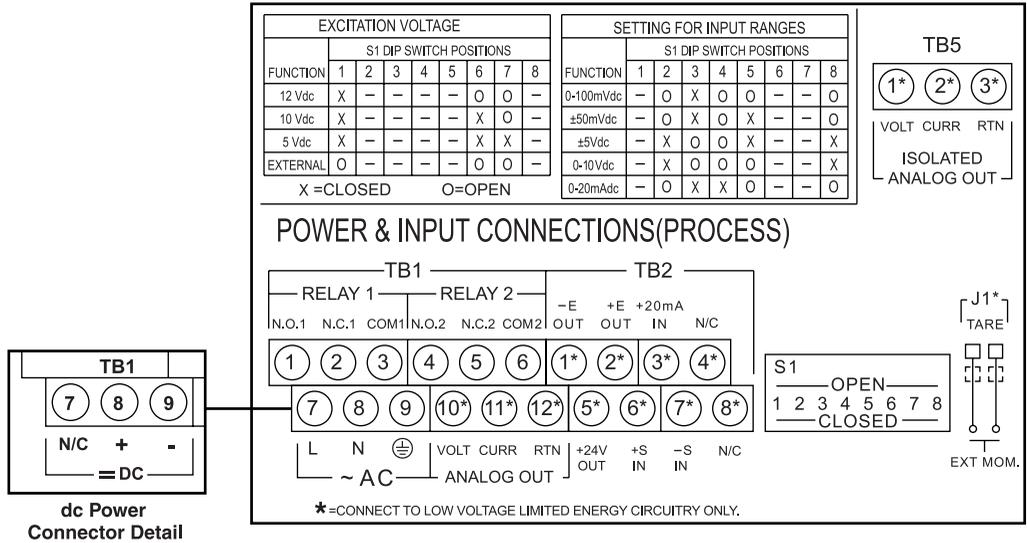


**Figure 2-3. Connector Label (AC-Powered and DC-Powered Detail)**

## 2.5 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 voltage output |
| TB1-11 | Analog current output |
| TB1-12 | Analog return |
| TB2-1 | -E: Negative excitation connection from meter (5, 10, 12 V) |
| TB2-2 | +E: Positive excitation connection from meter (5, 10, 12 V) |
| TB2-3 | +20 mA connection for analog input |
| TB2-4 | Not used. |
| TB2-5 | +24 V output connection |
| TB2-6 | +S: Positive signal input |
| TB2-7 | -S: Negative signal input and return for +20 mA or +24 V |
| TB2-8 | Not used |
| TB5-1 | Isolated Analog Voltage Output |
| TB5-2 | Isolated Analog Current Output |
| TB5-3 | Isolated Analog Output Return |
| J1 (1-2) | Remote tare connection with a momentary switch |

# About The Meter

The DIP switches are located at the S1 position (refer to Figure 3-2). Use a small instrument, such as a paper clip, to change the switches from open to closed. Table 2-3 lists DIP switch settings at the S1 position required to complete the setup of your meter.

## Table 2-3. DIP Switch Positions/Input Range & Excitation

| Function | S1 DIP Switch Positions | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| C= Closed | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| O= Open | | | | | | | | |
| **Settings for Excitation Voltage** | | | | | | | | |
| Internal 5/10/12 excitation | C | - | - | - | - | - | - | - |
| External 5/10/12 excitation | O | - | - | - | - | O | O | - |
| Internal 12 Vdc excitation | C | - | - | - | - | O | O | - |
| Internal 10 Vdc excitation | C | - | - | - | - | C | O | - |
| Internal 5 Vdc excitation | C | - | - | - | - | C | C | - |
| **Settings for Input Ranges** | | | | | | | | |
| 0-100 mV DC | - | O | C | O | O | - | - | O |
| ±50 mV DC | - | O | C | O | C | - | - | O |
| ±5 Vdc | - | C | O | O | C | - | - | C |
| 0-10 Vdc | - | C | O | O | O | - | - | C |
| 0-20 mA DC | - | O | C | C | O | - | - | O |

Note ☞  The display must also be configured to the selected input type after setting the DIP switches (see Section 4.1, Selecting the Input Type)

## 2.6 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.

Note ☞  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 ▨▨▨, followed by ▨▨▨▨.

## 3.1  RATING/PRODUCT LABEL

This label is located on top of the meter housing (refer to Figure 3-4).

## 3.2  MAIN BOARD POWER JUMPERS (refer to Figure 3-1)

Note ☞ **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!

1. Remove the main board from the case. Refer to Section 2.6.

2. Locate the solder jumpers W1, W2, and W3 (located near the edge of the main board alongside the transformer).

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.

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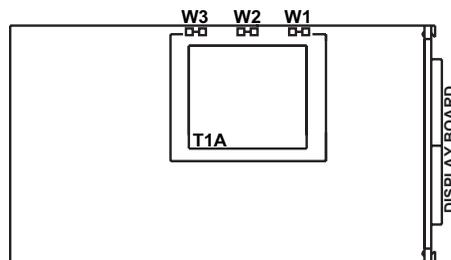


### Figure 3.1  Main Board Power Jumpers

## 3.2  MAIN BOARD POWER JUMPERS (Continued)

Figure 3-2 shows the location jumper positions on the main board.
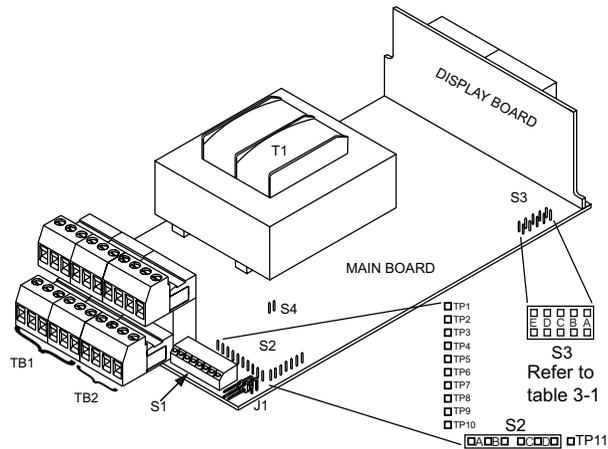


**Figure 3-2.  Main Board Jumper Positions**
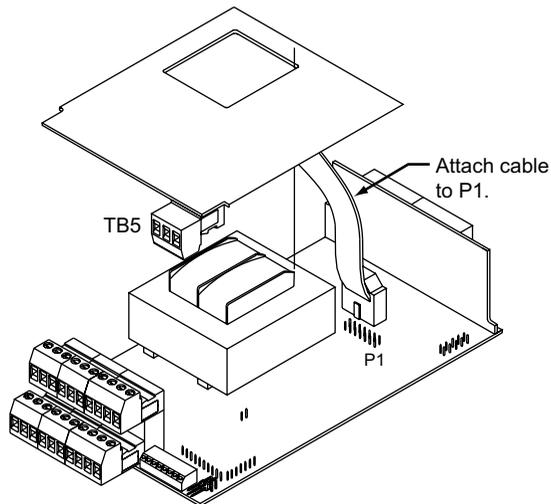


**Figure 3-3.  Upper Isolated Analog Output Option Board Installation**

## 3.2  MAIN BOARD POWER JUMPERS (Continued)

S2 jumpers are used for testing purposes.  Do not use as reading errors may result.

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 as reading errors may result.

S4-A Factory default jumper installed.

### 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 factory calibration only. |
| S3-C | Removed. Not used. |
| S3-D | Removed. Not used. |
| S3-E | If installed without S3-B, the **MENU** button locks out. If you press the **MENU** button, the meter shows █▌▐█▐▌. |

## 3.3 PANEL MOUNTING
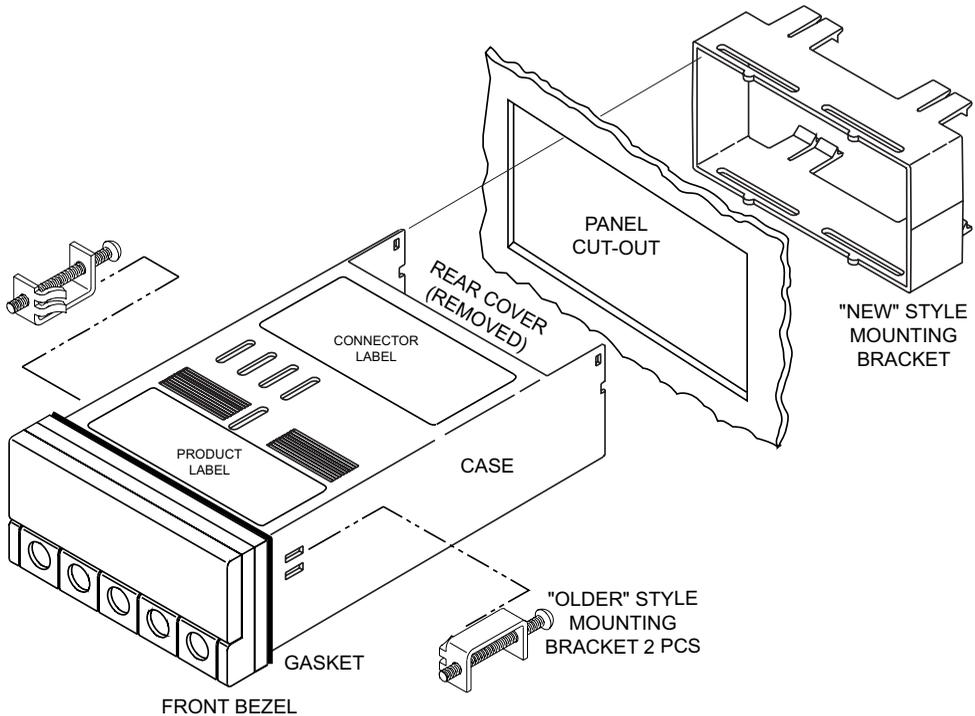


**Figure 3-4. Meter - Exploded View**

1. Cut a hole in your panel, as shown in **Figure 3-4**. For specific dimensions refer to **Figure 3-5**.

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.



PANEL THICKNESS
6,4 (.25) MAX
0,8 (.03) MIN

1,5
R(.06)     45,00  + 0,61/-0,00
4 PLCS    (1.772  + .024/–.000)

92,00  + 0,81/–0,00
(3.622  + .032/–.000)
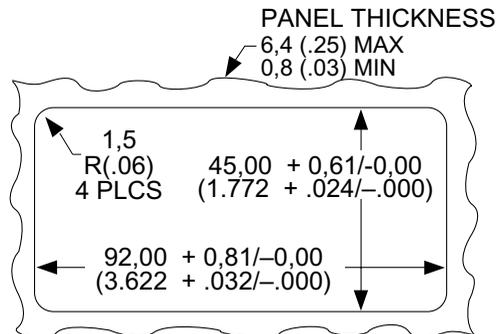
NOTE: Dimensions in Millimeters (Inches)

**Figure 3-5.  Panel Cut-Out**

## 3.4 CONNECTING SENSOR INPUTS

Figures 3-6 through 3-12 describe how to connect your sensors.
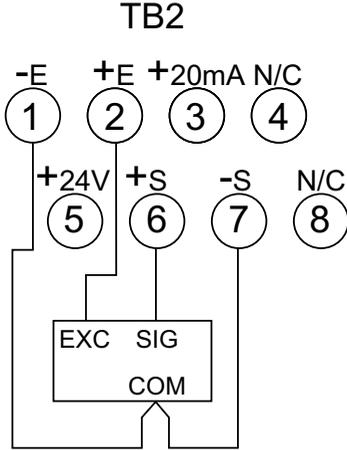


**Figure 3-6. 3-Wire DC Input Connections with Internal Excitation**
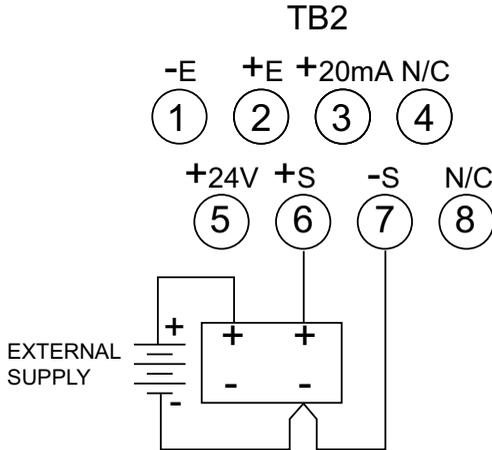


**Figure 3-7. 3-Wire DC Input Connections with External Excitation**

## 3.4 CONNECTING SENSOR INPUTS (Continued)
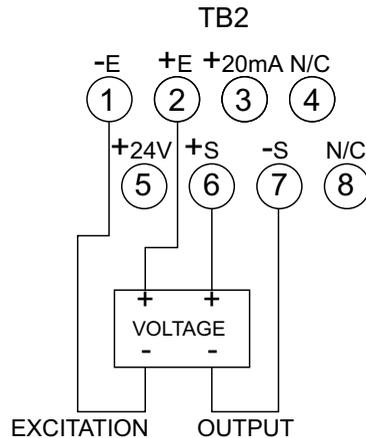


**Figure 3-8. 4-Wire DC Input Connections with Internal Excitation**
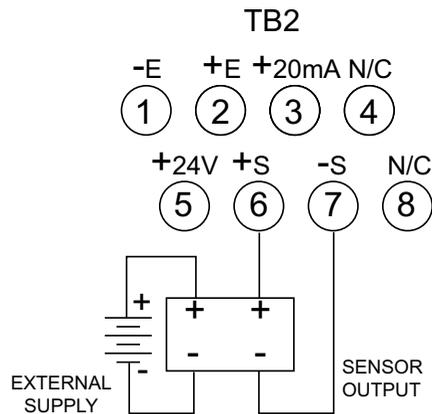


**Figure 3-9. Wire DC Input Connections with External Excitation**

## 3.4 CONNECTING SENSOR INPUTS (Continued)

TB2
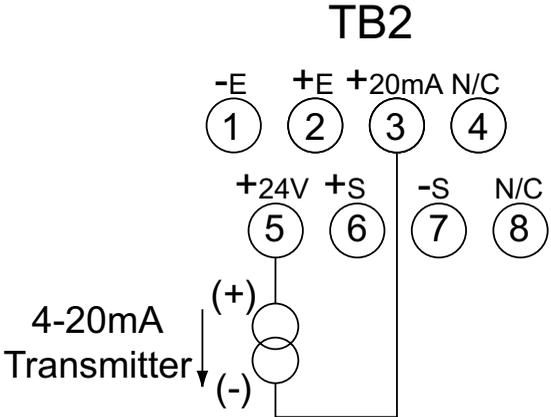


**Figure 3-10. DC Current Input Connections with Internal Excitation**

TB2
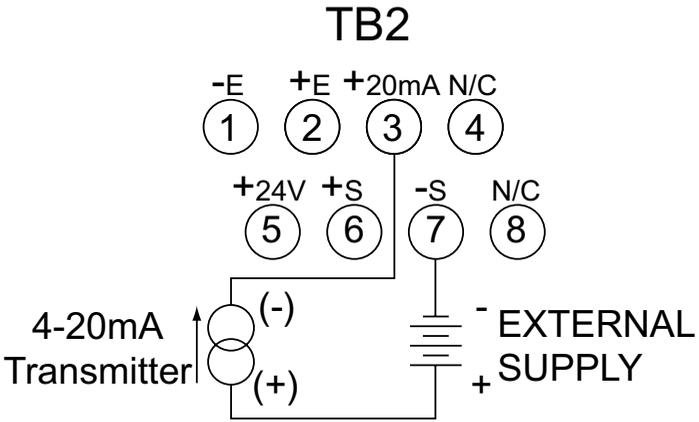


**Figure 3-11. DC Current Input Connections with External Excitation**

## 3.4 CONNECTING SENSOR INPUTS (Continued)



**Figure 3-12. DC Current Input Connections with Current Source**

## 3.5 CONNECTING MAIN POWER

Connect the AC main power connections as shown in Figure 3-13.

⚠ **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 3-13. Main Power Connections - AC Powered Unit**

## 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. Main Power Connection - AC Powered Unit | | | |
|---|---|---|---|
| | | **WIRE COLORS** | |
| **TB1** | **AC POWER** | **EUROPE** | **USA** |
| 7 | $\sim$ AC Line | Brown | Black |
| 8 | $\sim$ AC Neutral | Blue | White |
| 9 | $\sim$ AC Earth | Green/Yellow | Green |

Connect the DC main power connections as shown in Figure 3-14.
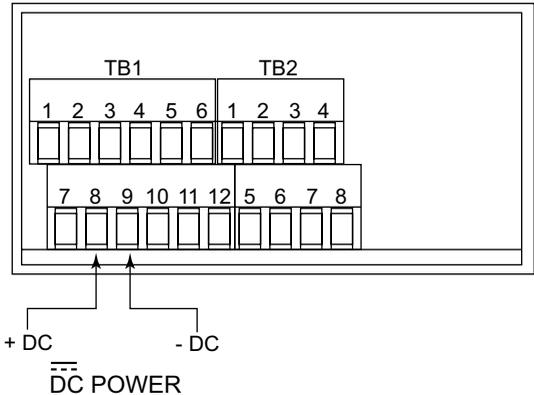


When using DC power, refer to the Table 8-1 Color Chart in the Specifications Section for Display Color, Intensity, Excitation Voltage and Current, and Analog Output Isolated Option. Failure to use proper ratings may result in damaging the unit.

### Figure 3-14.  Main Power Connections - DC Powered Unit

# 3 Getting Started

## 3.6 CONNECTING EXTERNAL TARE SWITCH

Connect external tare connections as shown in Figure 3-15.
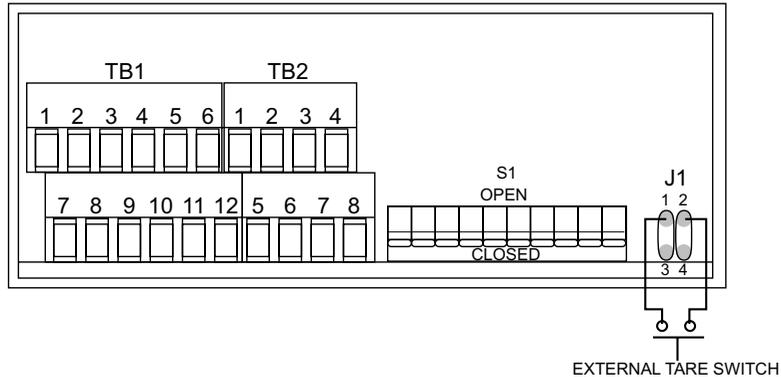


**Figure 3-15.  External Tare Connections**

## 3.7  CONNECTING ANALOG AND RELAY OUTPUTS

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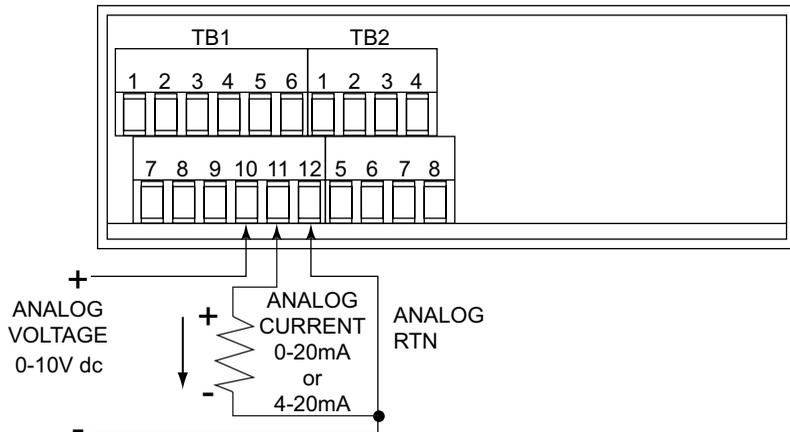


**Figure 3-16.  Analog Output Connections**

**3.7 CONNECTING ANALOG AND RELAY OUTPUTS (Continued)**
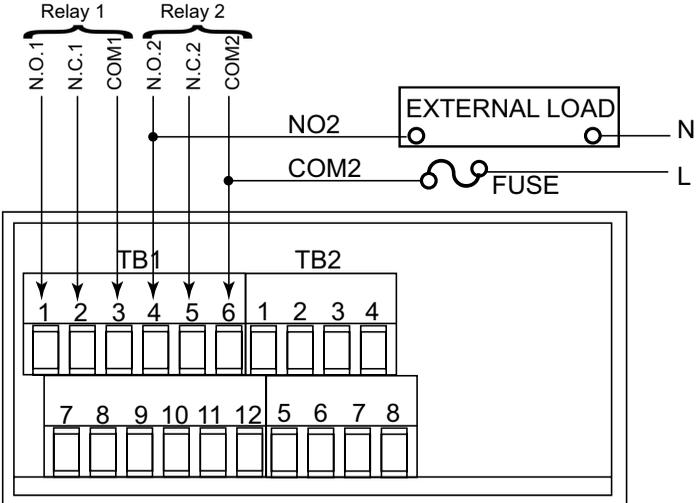


**Figure 3-17. Relay Output Connections.**
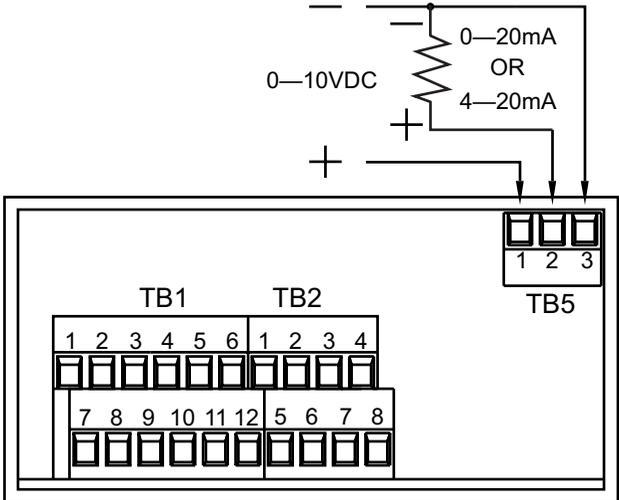


**Figure 3-18. Isolated Analog Output Connections.**

# SECTION 4. CONFIGURING THE METER

**Note** ☞    Refer to Table 6-1 for a summary list of menu configuration.

## 4.1 SELECTING THE INPUT TYPE `INPE`

To select your appropriate input type signal, follow these steps:

**Note** ☞    Before proceeding, set the input DIP switch settings at the back of your meter. (Refer to Table 2-3).

1.    Press the **MENU** button. The meter shows `INPE`.

2.    Press the ►/**TARE** button. The meter flashes one of the following:

   •    `0-20` *(for 4-20 mA dc)* (Default)
   •    `100M` (for 0-100 mV dc)
   •    `±50M` (for ±50 mV dc)
   •    `10V` (for 0-10 Vdc)
   •    `±5V` (for ±5 Vdc)

3.    Press the ▲/**MAX** 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

Note ☞    Refer to Table 6-1 for a summary list of menu configuration.

To select a decimal point display position, follow these steps:

1.    Press the **MENU** button until the meter shows dEC.P.

2.    Press the ►/**TARE**  button. The meter shows one of the following:

- FFF.F
- FF.FF
- F.FFF
- FFFF  (Default)

3.    Press the ▲/**MAX**  button to scroll between available choices.

4.    Press the **MENU** button to store your choice. The meter momentarily shows
StRd, followed by the next menu Rd.S.O  (Reading Scale and Offset). Or you can
press the **RESET** button to abort and go back to the dEC.P menu.

## 4.3 SELECTING READING SCALE AND OFFSET Rd.S.O

Note ☞    Refer to Table 6-1 for a summary list of menu configuration.

To scale the meter to show readings in engineering units. There are two methods.  One
method is to scale with known inputs. Another method is to scale without known inputs:
you calculate input values based on the transducer specifications and manually enter
them through the keyboard.

# Configuring The Meter

## 4.3.1 Scaling with Known Loads (On-Line Calibration)

Note ☞   For maximum resolution, find the maximum signal that will be applied to the meter input.

- For regular voltage input, refer to the main body of Table 4-1.
- For millivolt or milliamp input, refer to the main body of Table 4-2.

Set the DIP switch positions as indicated at the top of either Table 4-1 or 4-2.  The numbers 1 through 8 in the top row of either table represent dip switches 1 through 8, and the O, C or X directly below the number indicates the correct position of each switch.

- 'O' Switch should be open or up.
- 'C' Switch should be closed or down.
- 'X' Switch is used to control excitation (refer to Table 2-3 to determine correct position of these switches).

Once Dip switches have been positioned correctly, apply power.  Proceed to the `Rd.CF` (Reading Configuration) and set R2 equal to the value in the right hand column of the chart.

### Table 4-1.  Range Selection Dip Switch Positions For Regular Voltage Input

| 12345678<br>XCOOOXXC | 12345678<br>XCOOCXXC | RD.CF*<br>R2= |
|---|---|---|
| 0 - 10 V | ±5 V | 4 |
| 0 - 5 V | ±5 V | 3 |
| 0 - 3 V | ±3 V | 2 |
| 0 - 2 V | ±2 V | 1 |
| 0 - 1 V | ±1 V | 0 |

### Table 4-2.  Range Selection Dip Switch Positions For Millivolt/ Milliamp Input

| 12345678<br>XOCOOXX0 | 12345678<br>XOCOCXX0 | 12345678<br>XOCCOXX0 | RD.CF*<br>R2= |
|---|---|---|---|
| 0 - 100 mV | ±50 mV | 0 - 20 mA | 4 |
| 0 - 50 mV | ±50 mV | 0 - 10 mA | 3 |
| 0 - 30 mV | ±30 mV | 0 - 6 mA | 2 |
| 0 - 20 mV | ±20 mV | 0 - 4 mA | 1 |
| 0 - 10 mV | ±10 mV | 0 - 2 mA | 0 |

\* Reading Configuration

## 4.3.1 Scaling with Known Loads (On-Line Calibration) (Continued)

To scale with known inputs:  apply known loads to a transducer connected to a meter, or simulate the transducer output with a voltage or current simulator. To scale with known inputs, follow these steps:

1.    Apply a known load equal to approximately 0% of the transducer range.

2.    Press the **MENU** button until the meter shows `Rd.5.0`.

3.    Press the ►/**TARE** button. The meter shows `IN 1` (Input 1).

> Note ☞     `IN 1` (Input 1) is the unscaled display reading at minimum input.

4.    Press the ►/**TARE** button again. The meter shows last stored value for Input 1.

5.    Press the ►/**TARE** button once more. The meter shows the actual signal being received.

6.    Press the **MENU** button to store this value as `IN 1` (Input 1).  The meter shows `Rd 1` (Read 1).

> Note ☞     `Rd 1` (Read 1) is the desired display reading at Input 1.

7.    Press the ►/**TARE** button. The meter shows the last stored value for Read 1.

8.    Press the ▲/**MAX** button to change the value of your digits.

9.    Press the ►/**TARE** button to scroll horizontally to the next digit.

10.   Press the **MENU** button to store value as `Rd 1`.  The meter shows `IN 2` (Input 2).

> Note ☞     `IN 2` (Input 2) is the unscaled display reading at maximum input.

### 4.3.1  Scaling with Known Loads (On-Line Calibration) (Continued)

11.  Apply a known load equal to approximately 100% of the transducer range.

12.  Press the ▶/**TARE** button again. The meter shows the last stored value for Input 2.

13.  Press the ▶/**TARE** button once more. The meter shows the actual signal being received.

14.  Press the **MENU** button to store Input 2 value. The meter shows Rd 2 (Read 2).

> **Note** ☞    Rd 2 (Read 2) is the desired display reading at input 2.

15.  Press the ▶/**TARE** button. The meter shows the last stored value for Read 2.

16.  Press the ▲/**MAX** button to change the value of your digits.

17.  Press the ▶/**TARE** button to scroll horizontally to the next digit.

18.  Press the **MENU** button to store value as Rd 2 (Read 2). The meter momentarily shows StRd, followed by Rd.CF. Meter scaling is now complete.

### 4.3.2  Scaling Without Known Loads

To scale without known inputs, calculate input values based on the transducer specifications and manually enter them on the front-panel pushbuttons.  The following example assumes a pressure transducer with these specifications:

**Pressure Range:    0 to 2000 PSI**

**Output Span:    1 to 5 Vdc**

1.    Determine the correct values for `IN 1` and `IN 2` based on the transducer specifications.  In most cases, `Rd 1` & `Rd 2` are equal to the minimum and maximum of the transducer output span.  The example assumes `Rd 1` & `Rd 2` are equal to the pressure range of the transducer (`Rd 1` = 0000 and `Rd 2` = 2000). Calculate `IN 1` and `IN 2` using the transducer output span and the following equation:

`IN` = (Sensor Output) x (Natural Gain) x (Multiplier).

### Table 4-3.  Natural Gain

| Input Range | Span Units | Natural Gain |
|---|---|---|
| 0 to 100 mV | Millivolts | 100 cts/mV |
| ±50 mV | Millivolts | 40 cts/mV |
| 0 to 10 V | Volts | 1000 cts/V |
| ± 5 V | Volts | 400 cts/V |
| 0 to 20 mA | Milliamps | 500 cts/mA |

2.    Determine the multiplier by the Input Resolution setting (`R.2` in the `Rd.CF` menu) and the input range selected.  Typically `R.2=4` is suitable for most applications.

### Table 4-4.  Input Resolution Multiplier

| Input Range | R.2=4 | R.2=3 | R.2=2 | R.2=1 | R.2=0 |
|---|---|---|---|---|---|
| 0 to 100 mV | 1.000 | 2.000 | 3.333 | 5.000 | 10.00 |
| 0 to 10 V | 1.000 | 2.000 | 3.333 | 5.000 | 10.00 |
| 0 to 20 mA | 1.000 | 2.000 | 3.333 | 5.000 | 10.00 |
| ± 50 mV | 1.000 | 1.000 | 1.667 | 2.500 | 5.000 |
| ± 5 V | 1.000 | 1.000 | 1.667 | 2.500 | 5.000 |

### 4.3.2 Scaling Without Known Loads (Continued)

3.    Determine **IN 1** & **IN 2** input range and resolution.  The example selects the 0 to 10 V range and 10 uV resolution (**R.2-4**).

Example: **IN 1** = (1 Volt) x (1000 cts/v) x (1.000) = 1000
**IN 2** = (5 Volt) x (1000 cts/v) x (1.000) = 5000
**Rd 1** = 0000
**Rd 2** = 2000

4.    Press **MENU** button until the meter shows **Rd.S.0**.

5.    Press the ▶/**TARE** button. The meter shows **IN 1**.

6.    Press the ▶/**TARE** button again, the meter shows the last Input 1  value, with the fourth digit flashing.

7.    Press the ▲/**MAX** button to change the value of your digits.

8.    Press the ▶/**TARE** button to scroll horizontally to the next digit.

9.    Press the **MENU** button to store this value.  The meter shows **Rd 1**.

10.   Press the ▶/**TARE** button. The meter shows the last value for read 1.

Repeat steps 7, 8 and 9 until **Rd 1**, **IN 2** and **Rd 2** have been displayed, verified, changed (if necessary) and stored.

## 4.4  USING READING CONFIGURATION **Rd.CF**

**Note** ☞    Refer to Table 6-1 for a summary list of menu configuration.

You may use Reading Configuration **Rd.CF** to configure your meter for the following:

•    To enable or disable the front panel tare
•    To set the input resolution of your meter
•    To display the filtered/unfiltered signal input value

### 4.4.1 Enabling or Disabling the Front-Panel Tare

To enable or disable the front-panel tare, follow these steps:

1.   Press the **MENU** button until `Rd.CF` displays.

2.   Press the ►/**TARE** button.  The meter shows one of the following:

   • `R.1=t` *(Tare enabled)* (Default)
   • `R.1=N` (Tare disabled)

3.   Press the ▲/**MAX** button to view last stored selection. Press the ▲/**MAX** button to toggle between selections.

4.   Press the ►/**TARE** button to select input resolution or press the **MENU** button to store your selections. `StRd` momentarily displays, followed by `COLR` menu.

### 4.4.2 Setting Input Resolution

To set the input resolution of your meter, follow these steps:

1.   Press the `MENU` button until `Rd.CF` displays, then press the ►/**TARE** button twice.
   or
   Press the ►/**TARE** button from `R.1`.

   One of the following displays (default is `R.2=4`):

   `R.2=4` = *10 µV for Unipolar inputs.  25 µV for Bipolar inputs*
   `R.2=0` = 1 µV for Unipolar inputs. 5 µV for Bipolar inputs.
   `R.2=1` = 2 µV for Unipolar inputs. 10 µV for Bipolar inputs
   `R.2=2` = 3 µV for Unipolar inputs. 15 µV for Bipolar inputs.
   `R.2=3` = 5 µV for Unipolar inputs. 25 µV for Bipolar inputs

**Example:**  3 µV resolution means that if you input 0-30 mV, at 30 mV the display shows `9999`.

2.   Press the ▲/**MAX** button to scroll through available selections.

3.   Press the ►/**TARE** button to display the filtered/unfiltered signal input or press the **MENU** button to store your selections. `StRd` momentarily displays, followed by `COLR` menu.

### 4.4.3  Displaying the Filtered/Unfiltered Input Signal

To display the filtered/unfiltered signal input, follow these steps:

1.  Press the **MENU** button until `Rd.CF` displays, then press the ►/**TARE** button three times.
    **or**
    Press the ►/**TARE** button from `R.2`.

    One of the following displays:

    -   `R.3-F` *(Filtered value)* (Default)
    -   `R.3-U` (Unfiltered value)

2.  Press the ▲/**MAX** button to toggle between available choices.

3.  Press the **MENU** button to store your selections. `StRd` momentarily displays, followed by `COLR` menu.

## 4.5  Selecting a Display Color `COLR`  ▽*NEW*▽

▼ **Note** ☞   Refer to Table 6-1 for a summary list of menu configuration.

Selecting "Display Color" is not active unless your meter is a Version "B".

To select a display color, follow these steps:

1.  Press the **MENU** button until the meter shows  `COLR`.

2.  Press the ►/**TARE** button. The meter shows one of the following:

    -   `GRN`
    -   `REd`
    -   `AMbR`

3.  Press the ▲/**MAX**  button to scroll between available choices.

4.  Press the **MENU** button to store your choice. The meter momentarily shows `StRd`,  followed by the next menu `S1.CF`  (Setpoint 1 Configuration). Or you can press the **RESET** button to abort and go back to the `Rd.CF` menu.

## 4.6  USING SETPOINT 1 CONFIGURATION **S1.CF**

Note ☞    Refer to Table 6-1 for a summary list of menu configuration.

Setpoint 1 Configuration **S1.CF** is not active unless your meter has dual relay output capabilities.  The LED's will display whether the **S1.CF** 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

### 4.6.1  Setting Setpoint 1's Active Band

1. Press the **MENU**  button until the meter shows **S1.CF**.

2. Press the ►/**TARE**  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 ▲/**MAX** button to toggle between available choices.

4. Press the ►/**TARE** button to select if Setpoint 1 is latched or unlatched or press the **MENU** button to store your selection.

### 4.6.2  Selecting if Setpoint 1 is Latched or Unlatched

1. Press the **MENU** button until **S1.CF** displays, then press the ►/**TARE** button twice.
   or
   Press the ►/**TARE** button from **S.1**.

   The meter shows one of the following:

   - **S.2=U** *Setpoint 1 to be unlatched* (Default)
   - **S.2=L** Setpoint 1 to be latched

2. Press the ▲/**MAX** button to toggle between available choices.

3. Press the **MENU** button to store your selection(s).  The meter momentarily shows **StRd**,  followed by **S2.CF** (Setpoint 2 Configuration).

## 4.7  USING SETPOINT 2 CONFIGURATION 𝟝𝟤.𝖢𝖥

> **Note** ☞  Refer to Table 6-1 for a summary list of menu configuration.

Setpoint 2 Configuration 𝟝𝟤.𝖢𝖥 is not active unless your meter has dual relay output capabilities. The LED's will display whether the 𝟝𝟤.𝖢𝖥 is active or not. You may use Setpoint 2 Configuration 𝟝𝟤.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

### 4.7.1  Setting Setpoint 2's Active Band

1.  Press the **MENU** button until the meter shows 𝟝𝟤.𝖢𝖥.

2.  Press the ►/**TARE** button. The meter shows one of the following:

    - 𝟝.𝟣-𝖠 *(Active above the setpoint)* (Default)
    - 𝟝.𝟣-𝖻 (Active below the setpoint)

3.  Press the ▲/**MAX** button to toggle between available choices.

4.  Press the ►/**TARE** button to select if Setpoint 2 is latched **or** unlatched or press the **MENU** button to store your selection and enter 𝟝𝟣.𝖽𝖻 (Setpoint 1 Deadband)

### 4.7.2  Selecting if Setpoint 2 is Latched or Unlatched

1.  Press the **MENU** button until 𝟝𝟤.𝖢𝖥 displays, then press the ►/**TARE** button twice.
    or
    Press the ►/**TARE** button from 𝟝.𝟣.

    The meter shows one of the following:

    - 𝟝.𝟤-𝖴 *Setpoint 2 to be unlatched* (Default)
    - 𝟝.𝟤-𝖫 Setpoint 2 to be latched

2.  Press the ▲/**MAX** button to toggle between available choices.

3.  Press the **MENU** button to store your selection(s). The meter momentarily shows 𝟝𝗍𝖱𝖽, followed by 𝟝𝟣.𝖽𝖻 (Setpoint 1 Deadband).

## 4.8  SETTING THE SETPOINT 1 DEADBAND **S1.db**

**Note ☞**    Refer to Table 6-1 for a summary list of menu configuration.

Setpoint 1 Deadband **S1.db** is not active unless your meter has dual relay output capabilities.  The LED's will display whether the **S1.db** is active or not.  The Setpoint 1 Default deadband is 0003.  To change the deadband (hysteresis) of Setpoint 1, follow these steps:

1.    Press the **MENU** button until the meter shows **S1.db**.

2.    Press the ►/**TARE** button. The meter shows the last previously stored 4-digit number (0000 through 9999) with flashing 4th digit.

3.    Press the ▲/**MAX** button to change the value of the flashing digit. If you continue to press the ▲/**MAX** button, the flashing digit's value continues to change.

4.    Press the ►/**TARE** button to scroll to the next digit.

5.    Press the **MENU** button to store your selection.  The meter momentarily shows **StRd**,  followed by **S2.db** (Setpoint 2 Deadband).

## 4.9  SETTING THE SETPOINT 2 DEADBAND **S2.db**

**Note ☞**    Refer to Table 6-1 for a summary list of menu configuration.

Setpoint 2 Deadband **S2.db** is not active unless your meter has dual relay output capabilities.  The LED's will display whether the **S2.db** is active or not.  The Setpoint 2 default deadband is 0003. To change the deadband (hysteresis) of Setpoint 2, follow these steps:

1.    Press the **MENU** button until the meter shows **S2.db**.

2.    Press the ►/**TARE** button. The meter shows the last previously stored 4-digit number (0000 through 9999) with flashing 4th digit.

3.    Press the ▲/**MAX** button to change the value of the flashing digit. If you continue to press the ▲/**MAX** button, the flashing digit's value continues to change.

4.    Press the ►/**TARE** button to scroll to the next digit.

5.    Press the **MENU** button to store your selection. The meter momentarily shows **StRd**,  followed by **Ot.CF** (Output Configuration) if you have analog output capabilities.

## Figure 4-1. Alarm Example



ACTIVE BELOW                    ACTIVE ABOVE

ACTIVE BELOW
WITH DEADBAND 3

ACTIVE ABOVE
WITH DEADBAND 3

NOTE: DEADBAND WORKS AS HYSTERISIS

ACTIVE BELOW LATCHED           ACTIVE ABOVE LATCHED
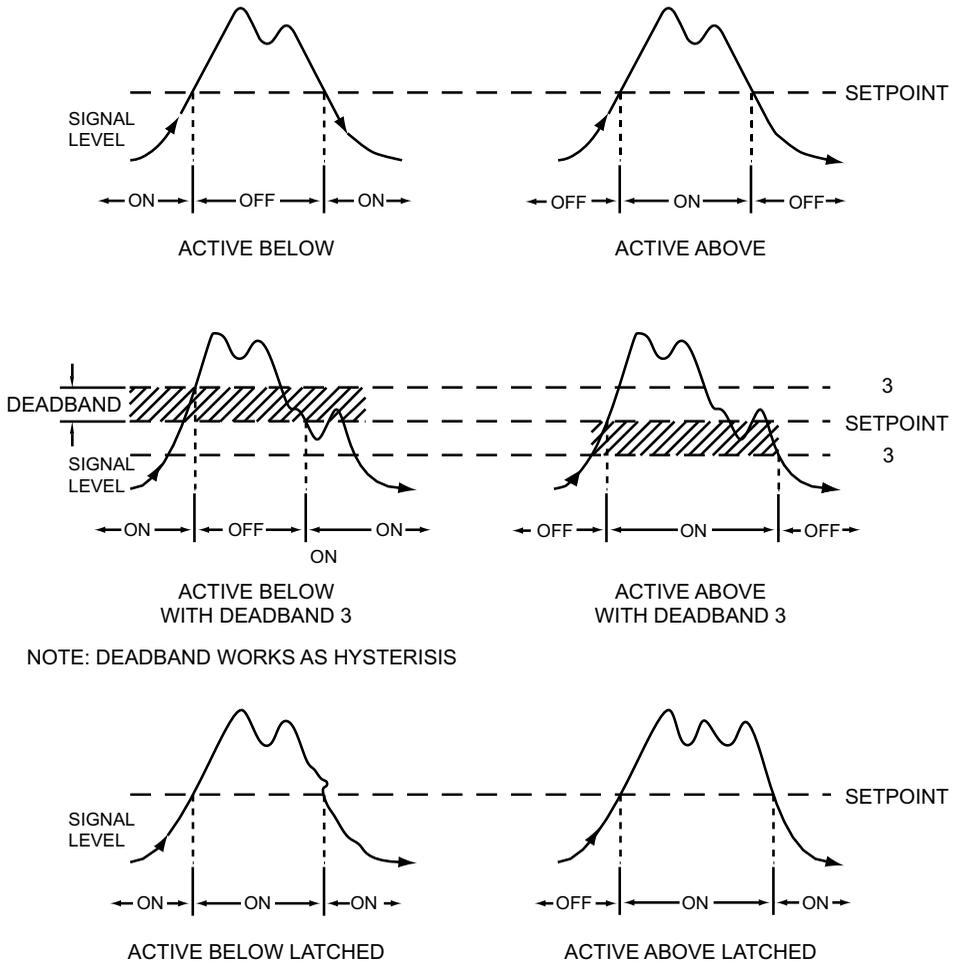
**Note** ☞  To reset latched alarms you must:

1. Input a signal **OUT** of the alarm zone
2. Then press **SETPTS** and then, **RESET** button

## 4.10 USING OUTPUT CONFIGURATION 𝙊𝙩.𝘾𝙁

Note ☞ $\quad$ Refer to Table 6-1 for a summary list of menu configuration.

Output Configuration 𝙊𝙩.𝘾𝙁 is not active unless your meter has analog output capabilities. The menu will display whether analog output is present or not. Analog output must be ordered at the time of purchase.

Use Output Configuration 𝙊𝙩.𝘾𝙁 to select the following:

- To enable or disable the analog output
- To select if the analog output is current or voltage
- To select if the analog output is regular or proportional

### 4.10.1 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 ►/**TARE** button. The meter shows one of the following:

    - 𝙊.𝙄=𝙀 *(Analog output enabled)* (Default)
    - 𝙊.𝙄=𝙙 (Analog output disabled)

3. Press the ▲/**MAX** button to toggle between available choices.

4. Press the ►/**TARE** button to select analog output as current or voltage or press the **MENU** button to store your selection and enter 𝙊𝙩.𝙎.𝙊 (Output Scale and Offset).

## 4.10.2 Selecting Analog Output as Current or Voltage

1. Press the **MENU** button until it shows **Ot.CF**, then press the ►/**TARE** button twice.
   or

   Press the ►/**TARE** button from **O.1**.
   The meter shows one of the following:

   - **O.2-C** *(Analog output = current)* (Default)
   - **O.2-V** (Analog output = voltage)

2. Press the ▲/**MAX** button to toggle between available choices.

3. Press the ►/**TARE** button to select analog output or proportional control or press the **MENU** button to store your selection and enter **Ot.S.O** (Output Scale and Offset).

## 4.10.3 Selecting Analog Output or Proportional Control

Note ☞ Use this section to select if the meter will transmit an analog signal proportional to the display readings, or proportional to the error signal between the display reading and Setpoint 1.

Proportional Control Analog Option is not available for models without Relay Option.

1. Press the **MENU** button until it shows **Ot.CF**, then press the ►/**TARE** button twice.
   or

   Press the ►/**TARE** button from **O.2**.
   The meter shows one of the following:

   - **O.3-A** *(Analog output is regular)* (Default)
   - **O.3-P** (Analog output is proportional)

2. Press the ▲/**MAX** button to toggle between available choices.

## 4.10.3 Selecting Analog Output or Proportional Control (Continued)

3a.   If you select `0.3-A`, press the **MENU** button to store your selection. The meter momentarily shows `StRd`, followed by `Ot.S.O` (Output Scale and Offset).

3b.   If you select `0.3-P`, press the ▶/**TARE** button. The meter shows one of the following:

•   `0.4-d`      (Proportional analog output is **DIRECT ACTING)**
•   `0.4-R`      (Proportional analog output is **REVERSE ACTING**).

4.    Press the ▲/**MAX** button to toggle between available choices.

5.    Press the **MENU** button to store your selections. The meter momentarily shows `StRd`, followed by `P.bNd` (Proportional Band).

      Additionally, if you select `0.2-V` (Analog output to be voltage), press the ▶/**TARE** button. One of the following displays:

•   `0.S-F`      (Proportional 0-10 V analog output)
•   `0.S-H`      (Proportional 0-5 V analog output).

6.    Press the ▲/**MAX** button to toggle between available choices.

7.    Press the **MENU** button to store your selections. The meter momentarily shows `StRd`, followed by `P.bNd` (Proportional Band).

## 4.11 SELECTING PROPORTIONAL BAND P.bNd

Proportional Band P.bNd is not active unless your meter has analog output and relay 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).

- 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 "<u>full on</u>" (e.g. 20 mA out for 4-20 mA).
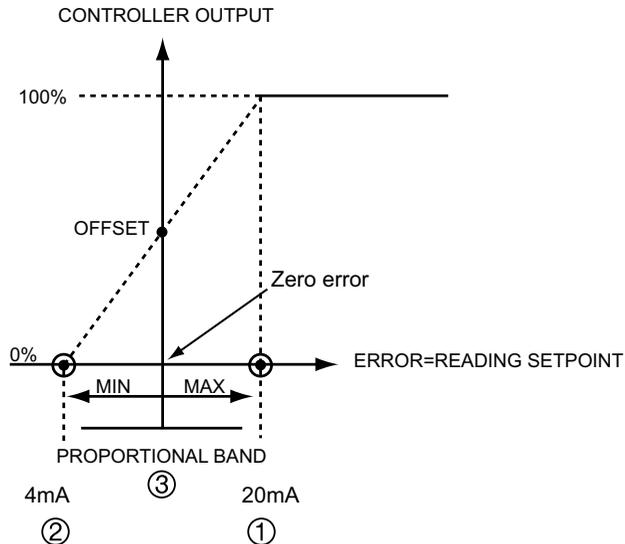


**Figure 4-2.  Controller Output**

- The second point of interest is the magnitude of the error signal that drives the controller output to "<u>full off</u>" (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 "Offset" and it is the output value of the controller which causes zero error.

*Note* ☞ The above example illustrates the parameters for the 4-20 mA analog out, likewise, analog voltage output will have these (3) points of interest.

## 4.11 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, follow these steps:

1.    Press the **MENU** button until the meter shows P.bNd.

If P.bNd menu doesn't show, set 0.3-P on Menu 0t.CF.

> **Note** ☞    Remember to press ►/**TARE** when 0t.CF is displayed until 0.3-A, then press ▲/**MAX,** unit will show 0.3-P. Pressing the **MENU** button will store the selection.

2.    Press the ►/**TARE** button. The meter shows last previously stored 4-digit number (0000 through 9999) with flashing 4th digit.

3.    Press the ▲/**MAX** button to change the value of the flashing digit. If you continue to press the ▲/**MAX** button, the flashing digit's value continues to change.

4.    Press the ►/**TARE** button to scroll to the next digit.

5.    Press the **MENU** button to store your selection.  The meter shows StRd, followed by M.RSt (Manual Reset).

# Configuring The Meter

## 4.12 USING MANUAL RESET `M.RSt`

> **Note** ☞  Refer to Table 6-1 for a summary list of menu configuration.

Manual Reset `M.RSt` is not active unless your meter has analog output and relay capabilities. The menu will display whether analog output is present or not.  This feature allows you to offset the error that may occur with your setpoint. In order to determine the amount of error, you must compare your display value to the Setpoint 1 value. The difference between these two values (display - Setpoint 1) is the amount of error that you may want to enter into Manual Reset `M.RSt`.  The value of `M.RSt` must be less than `P.bNd`/2.  Larger values will not be accepted and the meter will display `ER4` (flashing).

1.  Press the **MENU** button until `M.RSt` displays.

    > **Note** ☞  This menu `M.RSt` and `P.bNd` will show up if **0.3=P** on **OT.CF**.

2.  Press the ►/**TARE** button. The meter shows the last previously stored 4-digit number (-1999 through 9999) with flashing 4th digit.

3.  Press the ▲/**MAX** button to change the value of the flashing digit. If you continue to press the ▲/**MAX** button, the flashing digit's value continues to change.

4.  Press the ►/**TARE** button to scroll to the next digit.

5.  Press the **MENU** button to store your selection.  `StRd` momentarily displays, followed by `RSt` (Reset).

## 4.13  USING OUTPUT SCALE AND OFFSET $\boxed{\text{0t.S.0}}$

> Note ☞  Refer to Table 6-1 for a summary list of menu configuration.

Output Scale and Offset $\boxed{\text{0t.S.0}}$ 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 $\boxed{\text{0t.S.0}}$ scales your 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).

1.      Press the **MENU** button until $\boxed{\text{0t.S.0}}$ displays.

2.      Press the ►/**TARE** button. $\boxed{\text{Rd 1}}$ (Read 1) displays.

> Note ☞  This is your first point of display reading.

3.      Press the ►/**TARE**  button again. The meter shows the last previously stored
        4-digit number (-1999 through 9999) with flashing 4th digit.

4.      Press the ▲/**MAX** button to change the digits.

5.      Press the ►/**TARE** button to scroll to the next digit.

6.      Press the **MENU** button to store your selection. $\boxed{\text{0Ut.1}}$ (Output 1) displays.

> Note ☞  This starting analog signal corresponds to your Read 1 display.

7.      Press the ►/**TARE**  button.  Selected output displays.

> Note ☞  If you select $\boxed{\text{0.2=U}}$ for voltage, the maximum signal you may select is 10.00 for an 0-10 Vdc signal output.  If you select $\boxed{\text{0.2=C}}$ for current, the maximum signal you may select is 20.00.

8.      Press the ▲/**MAX** button to enter the Output 1 signal selection.   If you continue to
        press the ▲/**MAX** button, the flashing digit's value continues to change.

9.      Press the ►/**TARE** button to scroll to the next digit.

10.     Press the **MENU** button to store your selection. $\boxed{\text{Rd 2}}$ (Read 2) displays.

> Note ☞  This is your second point of display reading.

## 4.13  USING OUTPUT SCALE AND OFFSET `0t.5.0`  (Continued)

11.  Press the ►/**TARE** button. The meter shows last previously stored 4-digit number (-1999 through 9999) displays with flashing 4th digit.

12.  Press the ▲/**MAX** button to change the value of the flashing digit.  If you continue to press the ▲/**MAX** button, the flashing digit's value continues to change.

13.  Press the ►/**TARE** button to scroll to the next digit.

14.  Press the **MENU** button to store your selection. The meter shows `0ut.2` (Output 2).

▼ **Note** ☞  This analog signal should correspond to your Read 2 display.

    15.  Press the ►/**TARE** button.  The meter shows selected output.

▼ **Note** ☞  If you select `0.2=4` for voltage, the maximum signal you may select is 10.00 for an 0-10 Vdc signal output.  If you select `0.2=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 ▲/**MAX** button to change the value of the flashing digit. If you continue to press the ▲/**MAX** button, the flashing digit's value continues to change.

17.  Press the ►/**TARE** button to scroll to the next digit.

18.  Press the **MENU** button to store your selection.  The meter momentarily shows `5tRd`, followed by `LK.CF` (Lockout Configuration).

⚠ **WARNING:** If the meter displays all flashing values on any item, the value has overflowed.  Press the ▲/**MAX** button to start new values.

## 4.14  USING LOCK OUT CONFIGURATION `LK.CF`

▼ **Note** ☞   Refer to Table 6-1 for a summary list of menu configuration.

Use Lock Out Configuration `LK.CF` for the following:

- To enable or disable setpoint changes
- To enable or disable the **RESET** button in the Run Mode
- To enable or disable displaying the meter's firmware version.

### 4.14.1  Enabling or Disabling the RESET button in the Run Mode

1. Press the **MENU** button until the meter shows `LK.CF` (after `Ot.S.0`).

2. Press the ►/**TARE** button.  The meter shows one of the following:
   - `RS.=E` *To enable the RESET button in the Run Mode* (Default)
   - `RS.=d` To disable the **RESET** button in the Run Mode

3. Press the ▲/**MAX** button to toggle between available choices.

4. Press the **MENU** button to store the changes.  The meter shows `StRd` if the new value is different otherwise the meter shows `bR.it` and returns to the Run Mode.

### 4.14.2  Enabling or Disabling SETPOINT Changes

1. Press the **MENU** button until the meter shows `LK.CF` (after `Ot.S.0`).

2. Press the ►/**TARE** button twice.  The meter shows one of the following:

   - `SP.=E` *To enable setpoint changes* (Default)
   - `SP.=d` To disable setpoint changes

3. Press the ▲/**MAX** button to toggle between available choices.

4. Press the **MENU** button to store the changes.  The meter shows `StRd` if the new value is different otherwise the meter shows `bR.it` and returns to the Run Mode.

### 4.14.3 SETPOINT Display Function: Firmware version or Setpoint value

1.   Press the **MENU** button until the meter shows ▐▐▐.▐▐▐ (after ▐▐.▐.▐ ).

2.   Press the ►/**TARE** button three times. The meter shows one of the following:

     • ▐.▐▐▐ **SETPTS** button will display setpoint values.
     • ▐.▐▐▐ **SETPTS** button will display the meter's firmware version.

3.   Press the ▲/**MAX** button to toggle between the choices above.

4.   Press the **MENU** button to store the changes.  The meter shows ▐▐▐▐ if the new
     value is different otherwise the meter shows ▐▐.▐▐ and returns to the Run Mode.

> **Note** ☞
>
> If your meter does not have the relay option, setpoint menu items above will
> not be available and **SETPTS** button will always display the meter's firmware
> version. These units will have ▐▐▐ (overload) or ▐▐▐▐ memory indicated by
> Alarm 1 & 2 LED displays. LEDs can be reset by pressing **MENU** then
> **RESET** button or by Power **OFF** then **ON**.

## 4.15  USING DISPLAY BRIGHTNESS CONFIGURATION  ▽NEW▽

Changing "Display Brightness" is not active unless your meter is a Version "B".

1.   Press the **MENU** button until the meter shows ▐▐.▐▐ (after ▐▐▐▐).

2.   Press the ►/**TARE** button from ▐▐.▐▐.  The meter shows one of the following:

     •   ▐.▐▐▐ Medium Brightness
     •   ▐.▐▐▐ Low Brightness
     •   ▐.▐▐▐ *High Brightness* (Default)

3.   Press the ▲/**MAX** button to toggle between available choices.

4.   Press the **MENU** button to store your selection. The meter momentarily shows
     ▐▐▐▐ followed by ▐▐▐▐, ▐▐▐, ▐▐▐▐, then measured value.

# SECTION 5.  DISPLAY MESSAGES

## Table 5-1. Display Messages

| MESSAGE | DESCRIPTION |
|---------|-------------|
| PROC | Process Meter |
| RSt | Hard (Power On) Reset |
| INPt | Input Type |
| dEC.P | Decimal Point |
| Rd.S.O | Reading Scale and Offset |
| Rd.CF | Reading Configuration |
| COLR | Display Color (NEW) |
| S1.CF | Setpoint 1 Configuration |
| S2.CF | Setpoint 2 Configuration |
| S1.db | Setpoint 1 Deadband |
| S2.db | Setpoint 2 Deadband |
| P.bNd | Proportional Band |
| M.RSt | Manual Reset |
| ER4 | Manual Reset Error |
| Ot.CF | Output Configuration |
| Ot.S.O | Output Scale and Offset |
| LK.CF | Lock Out Configuration |
| bR.it | Display Brightness (NEW) |
| +OL | + Overload Signal |
| -OL | -  Overload Signal |
| RS.OF | Resolution Overflow |
| +999 | Value Overflow in Setpoint/Menu & Peak Routines |
| -1999 | Value Overflow in Setpoint/Menu & Peak Routines |
| ER1 | 2 Coordinate Format Programming Error |
| PEAK | Peak Value |
| PK.RS | Peak Reset |
| t.RS | Tare Reset |
| SP.RS | Reset Latched Alarms |
| SP1 | Setpoint 1 Value |
| SP2 | Setpoint 2 Value |
| R.OV.S | Resolution Over Scale |
| V.-8.8 | Firmware Version (where $8$ is 0 ~ 9) |
| RUN | Operating Mode |

## SECTION 6.  MENU CONFIGURATION DISPLAYS

Not all menu items display on standard meters.

### Table 6-1. Menu Configuration Displays

(Defaults in Bold and Italics)

| MENU | ►/TARE | ▲/MAX |
|---|---|---|
| `INPt` | Show input choices: | `100m`<br>`±50m`<br>`10v`<br>`±5v`<br>`0-20` (*Default*) |
| `dEC.P` | Show current decimal point position | `FFFF` (*Default*)<br>`F.FFF`<br>`FF.FF`<br>`FFF.F` |
| Reading Scale & Offset<br>`Rd.5.0` | Shows `IN 1`<br>**1** Shows prior value entered and flashing digit. Scrolls to the next digit.<br>• If ►/**TARE** is pressed, actual input is shown and can not be changed with ▲/**MAX**.<br>• If ▲/**MAX** is pressed, unit can scroll through digits with ►/**TARE**. | Changes the value of the flashing digit |
| **2** Enter new value and show `Rd 1` | **3** Shows prior value entered and flashing digit. Scrolls to the next digit. | Changes the value of the flashing digit |
| **4** Enter new value and show `IN2` | **5** Shows prior value entered and flashing digit. Scrolls to the next digit.<br>• If ►/**TARE** is pressed, actual input is shown and can not be changed with ▲/**MAX**.<br>• If ▲/**MAX** is pressed, unit can scroll through digits with ►/**TARE**. | Changes the value of the flashing digit |
| **6** Enter new value and show `Rd2` | **7** Shows prior value entered and flashing digit. Scrolls to the next digit. | Changes the value of the flashing digit |

## SECTION 6.  MENU CONFIGURATION DISPLAYS (Continued)

### Table 6-1. Menu Configuration Displays (Continued)

(Defaults in Bold and Italics)

| MENU | ▶/TARE | ▲/MAX |
|---|---|---|
| Reading Configuration<br><br>$Rd.CF$ | R.1= | R.1=t *(Tare enabled)*<br>R.1=N (Tare disabled) |
| | R.2= | R.2=0 (1 µV resolution for unipolar & 5 µV resolution for bipolar) |
| | | R.2=1 (2 µV resolution for unipolar & 10 µV resolution for bipolar) |
| | | R.2=2 (3 µV resolution for unipolar & 15 µV resolution for bipolar) |
| | | R.2=3 (5 µV resolution for unipolar & 25 µV resolution for bipolar) |
| | | R.2=4 *(10 µV resolution for unipolar & 25 µV resolution for bipolar)* |
| | | *Note:  3 µV resolution means if your input is 0-30 mV, at 30 mV the display shows 9999.* |
| | R.3= | R.3=F *(Filtered value)*<br>R.3=U (Unfiltered value) |
| Display Color Selection<br><br>$COLR$ | Show input choices: | GRN (Green)<br>REd (Red)<br>AMbR (Amber) |
| Setpoint 1 Configuration<br><br>$S1.CF$ | S.1= | S.1=A *(Active above)*<br>S.1=b (Active below) |
| | S.2= | S.2=U *(Unlatched)*<br>S.2=L (Latched) |
| Setpoint 2 Configuration<br><br>$S2.CF$ | S.1= | S.1=A *(Active above)*<br>S.1=b (Active below) |
| | S.2= | S.2=U *(Unlatched)*<br>S.2=L (Latched) |

NEW

### SECTION 6.  MENU CONFIGURATION DISPLAYS (Continued)

**Table 6-1. Menu Configuration Displays (Continued)**

(Defaults in Bold and Italics)

| MENU | ▶/**TARE** | ▲/**MAX** |
|---|---|---|
| Setpoint 1 Deadband  `S1.db` | Press to scroll to the next digit to the right | Press to change the value of the flashing digit |
| Setpoint 2 Deadband  `S2.db` | Press to scroll to the next digit to the right | Press to change the value of the flashing digit |
| Output Configuration  `Ot.CF` | 0.1 = | `0.1=E` *(Analog output is enabled)*  `0.1=d` (Analog output is disabled) |
| | 0.2 = | `0.2=C` *(Analog output is current)*  `0.2=V` (Analog output is voltage) |
| | 0.3 = | `0.3=A` *(Regular analog output)*  `0.3=P` (Proportional analog output)* |
| | 0.4 =  shown if menu `0.3=P` | `0.4=d` (Proportional analog is direct acting)  `0.4=R` (Proportional analog is reverse acting) |
| | 0.5 =  shown if menu `0.2=V` | `0.5=F` (Analog output is 0-10 Vdc)  `0.5=H` (Analog output is 0-5 Vdc) |

| |
|---|
| *Note* ▼  \* If you select `0.2V` and `0.3=P`, you may select your analog output to be 0-10 V or 0-5 V by accessing submenu `0.5=F` or `0.5=H`.  \* If `0.3=P`, you may select your proportional output analog to be:  • Direct Acting `0.4=d`: 4-20 mA, 0-5 V, 0-10 V  • Reverse Acting `0.4=R`: 20-4 mA, 5 V-0 V, 10 V-0 V |

## SECTION 6. MENU CONFIGURATION DISPLAYS (Continued)

### Table 6-1. Menu Configuration Displays (Continued)

(Defaults in Bold and Italics)

| MENU | ▶/TARE | ▲/MAX |
|---|---|---|
| **P.bNd**<br>Proportional Band<br>**shown menu if 0.3=P** | Shows prior value entered.<br>Scrolls to the next digit to the right. | Changes the value of the flashing digit |
| **M.RSt**<br>Manual Reset<br>**shown menu if 0.3=P** | Shows prior value entered.<br>Scrolls to the next digit to the right. | Changes the value of the flashing digit |
| Output Scale & Offset<br>**Ot.S.O**<br>(Shown if **0.3=A** in Output Configuration Menu **Ot.CF**) | **1** Shows **Rd1**<br>Shows prior value entered and flashing digit.<br>Scrolls to the next digit. | Changes the value of the flashing digit |
| **2** Enter new value and show **Out1** | **3** Shows prior value entered and flashing digit.<br>Scrolls to the next digit. | Changes the value of the flashing digit |
| **4** Enter new value and show **Rd2** | **5** Shows prior value entered and flashing digit.<br>Scrolls to the next digit. | Changes the value of the flashing digit |
| **6** Enter new value and show **Out2** | **7** Shows prior value entered and flashing digit.<br>Scrolls to the next digit. | Changes the value of the flashing digit |

## SECTION 6.  MENU CONFIGURATION DISPLAYS (Continued)

### Table 6-1. Menu Configuration Displays (Continued)

(Defaults in Bold and Italics)

| MENU | ►/TARE | ▲/MAX |
|---|---|---|
| Lock Out Configuration<br><br>**L K.C F** | **RS=** | **R S = E** *(Enable RESET button in the Run Mode)*<br>**R S = d** (Disable **RESET** button in the Run Mode) |
| | **SP=** | **S P = E** *(Enable setpoint changes)*<br>**S P = d** (Disable setpoint changes) |
| | **L3=** | **L 3 = 0** *(SETPTS button display setpoint values)*<br>**L 3 = 1** (**SETPTS** button display firmware version **V.-8.8**<br>where *8* is 0~9) |
| *NEW* Brightness Configuration<br><br>**b R 1 t** | | **M.brt** (Medium Brightness)<br><br>**L.brt** (Low Brightness)<br><br>**H.brt** *(High Brightness)* |

### Table 6-2. Run Mode Displays

| Display | ►/TARE | ▲/MAX | RESET | Description |
|---|---|---|---|---|
| **PEAK** | | Displays the peak reading and must be pressed again to return to the normal operating mode without resetting. | Reset the peak reading when in this mode. | **Peak Reading**<br><br>Displays the highest reading since last reset. |
| **t.RSt** | Press to activate. | | Will reset your tare when viewing this function. | **Tare Reset** |
| **SP.RS** | | | | **Reset Latched Alarms**<br><br>Pressing the **RESET** button resets your latched alarms. |

## SECTION 7.  SETPOINT CONFIGURATION DISPLAYS

### Table 7-1. Setpoint Configuration Displays

| MENU | ▶/TARE | ▲/MAX | Description |
|---|---|---|---|
| **5P 1** | Press to scroll to the next digit to the right | Press to change the value of the flashing digit | SETPOINT 1<br><br>Select from  -1999 through 9999 |
| **5P2** | Press to scroll to the next digit to the right | Press to change the value of the flashing digit | SETPOINT 2<br><br>Select from  -1999 through 9999 |

## SECTION 8.  SPECIFICATIONS

**SIGNAL INPUT**

| | |
|---|---|
| Input Ranges: | 0-100 mV, ± 50 mV, 0-10 V, ± 5 V, 0-20 mA, 4-20 mA |
| 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) = 60 dB<br>Common Mode Rejection (CMR) = 120 dB |
| Resistance: | 100 Meg ohms for 100 mV or ±50 mV input range<br>1 Meg ohm for 10 V or +5 V input range<br>5 ohms for 20 mA current input range |

NEW

| | |
|---|---|
| "Big" Display: | 4-digit, three color programmable 9-segment, LED 21 mm (0.83") |
| Symbol: | 8.8.8.8 (-1.9.9.9 ~ 9.9.9.9) |
| 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/sec Polarity Automatic |

**ACCURACY  AT  25°C**

| | |
|---|---|
| Max Error Strain/Process: | ±0.03% of reading, ±1 count |
| Span Tempco: | 50 ppm/°C |
| Step Response: | 1 sec |
| Warm Up to Rated Accuracy: | 30 min |
| Excitation Voltage: | <u>AC power units</u>    <u>DC power units</u><br>24 V @ 25 mA,    **Refer to Table 8-1**<br>12 V @ 50 mA,    Color chart for DC Output<br>10 V @ 120 mA,    Excitation<br>5 V @ 60 mA |
| Load Regulation: | 1.1% |
| Line Regulation: | 0.02% per Vac |

## SECTION 8.  SPECIFICATIONS (Continued)

### 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 Vac or 30 Vdc

### 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% |
| Step Response Time: | 2 - 3 seconds to 99% of the final value |

### ISOLATED ANALOG OUTPUT (TB5, if applicable)

Same as non-isolated analog output except isolated.

| | |
|---|---|
| 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 |
| Isolation | 130 Vrms working voltage, 1000 V/60sec Dielectric test |

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

### SECTION 8.  SPECIFICATIONS (Continued)

**INPUT POWER INFORMATION**

∿ AC units             115/230 V~(AC) ± 10%, 50/60 Hz
                                        9.5 W max, power consumption (Non-Isolated Analog Out)
                                        11.0 W max, power consumption (Isolated Analog Out)

=== DC units             12-32 Vdc, 8W
                                        (Refer to Table 8-1 below)

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" (45 x 92mm)

Weight:                        1.27 lb (575 g)

Case material:              Polycarbonate, 94 V-O UL rated

Protection:                   NEMA-4/Type 4 Front Bezel
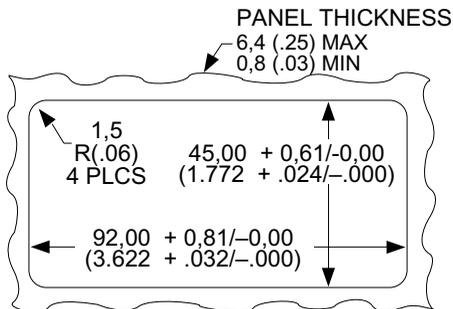
**SECTION 8.  SPECIFICATIONS (Continued)**

**Table 8-1. COLOR CHART FOR DC POWER**

| COLOR | HIGH BRIGHTNESS | MEDIUM & LOW BRIGHTNESS |
|---|---|---|
| RED | Sensor Excitation:<br>    24 V @ 25 mA,<br>    12 V, 10 V, 5 V @ 35 mA Max<br>Analog Output:<br>    Non-Isolated option only | Any combination of Sensor Excitation<br>and Analog Output<br>    24 V @ 25 mA,<br>    12 V @ 35 mA Max<br>    10 V @ 35 mA Max<br>    5 V @ 35 mA Max |
| GREEN | **Warning:**<br><br>• Do not use Internal Excitation.<br>  Use External Excitation. | Analog Output:<br>    Non-Isolated options or<br>    Isolated Analog option |
| AMBER | • Do not use Isolated Analog Output.<br>  Use Non-Isolated Analog Ouput. | |

**Note** ☞ HIGH/LOW Brightness and AMBER are only available on Version "B" meters. Standard display meters are MEDIUM Brightness.

**SECTION 8.  SPECIFICATIONS (Continued)**



48,0 (1.89)

96,0 (3.78)

FRONT BEZEL

20,3 (.80)

151,4 (5.96)

RETAINER

CASE

REAR COVER

SIDE VIEW

TOP VIEW

PANEL THICKNESS
6,4 (.25) MAX
0,8 (.03) MIN

1,5
R(.06)     45,00  + 0,61/-0,00
4 PLCS    (1.772  + .024/–.000)

92,00  + 0,81/–0,00
(3.622  + .032/–.000)
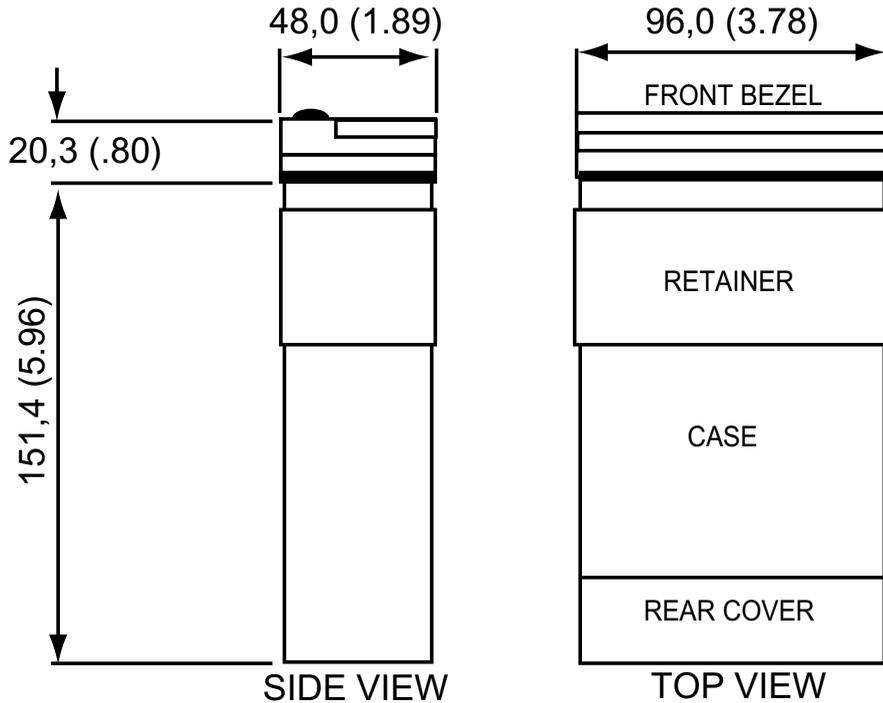
NOTE: Dimensions in Millimeters (Inches)

**Figure 8-1 Meter Dimensions/ Panel Cutout**

# SECTION 9.  FACTORY PRESET VALUES

## Table 9-1.  Factory Preset Values

| MENU ITEM | FACTORY PRESET VALUES |
|---|---|
| `INPt` | Input Type: 0-20 (0-20 mA dc input) |
| `dEC.P` | Decimal Point Position: `FFFF` |
| `Rd.S.O` | Reading Scale and Offset: 4-20 mA dc = 0-1000 |
| `Rd.CF` | Reading Configuration: `R.1=t` (Tare enabled) `R.2=4` (10 µV resolution for unipolar & 25 µV resolution for bipolar) `R.3=F` (Filtered value) |
| `COLR` | Normal Color Display: `REd` or `GRN`  (Note: depending how unit was ordered) |
| `S1.CF` | Setpoint 1 Configuration: `S.1=A` (Setpoint is active above) `S.2=U` (Setpoint is unlatched) |
| `S2.CF` | Setpoint 2 Configuration: `S.1=A` (Setpoint is active above) `S.2=U` (Setpoint is unlatched) |
| `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) |
| `Ot.S.O` | Output Scale and Offset: 0-1000 = 4-20 mA dc |
| `LK.CF` | Lock Out Configuration `RS=E` (Enable the **RESET** button in the Run Mode) `SP=E` (Enable setpoint changes) `L3=0` (Display setpoint values) |
| `bRIt` | `H.brt` (Brightness Level) |
| `SP1` | Setpoint 1 Value: `0000` |
| `SP2` | Setpoint 2 Value: `0000` |
| Sensor Excitation Output: 12 Vdc | |

NEW (COLR row)

NEW (bRIt row)

# CE APPROVALS INFORMATION

$C\!\!\in$  This product conforms to EMC 2014/30/EU (EMC directive)

**Electrical Safety: 2014/35/EU (Low Voltage Directive)**
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: (Low Voltage dc Power Option*) | 500 Vac (720 Vdc) |
| • 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: (Low Voltage dc Power Option*) | 500 V |
| • Isolated Analog: | 500 V |
| • Input/Output Signals: | 500 V |

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

**Additional Information**
RoHS II: The above product has been declared by the original supplier as Compliant. The manufacturer of this item declares that the product complies with the EEE RoHS II Directive 2011/65/EC.

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

# NOTES

# NOTES

# WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) 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.

**OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.**

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

# 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: | FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA: |
|---|---|
| 1. Purchase Order number under which the product was PURCHASED, | 1. Purchase Order number to cover the COST of the repair, |
| 2. Model and serial number of the product under warranty, and | 2. Model and serial number of the product, and |
| 3. Repair instructions and/or specific problems relative to the product. | 3. Repair instructions and/or specific problems relative to the product. |

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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