

**RoHS 2 Compliant**



# User's Guide

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## **CN1001-RTD**

## **RTD Temperature Controller**

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WARNING: These products are not designed for use in, and should not be used for, patient-connected applications.

This device is marked with the international caution symbol. It is important to read the Setup Guide before installing or commissioning this device as the guide contains important information relating to safety and EMC.



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# SECTION 1. INTRODUCTION

## 1.1 DESCRIPTION

The Resistance Temperature Detector meter with Time Proportional is a value packed indicator/ controller. Four full digits allow for an accurate display of your temperature. Select from 2, 3, or 4 wire input configuration. A fully scalable analog output is standard. You may configure this output as a proportional controller, or to follow your display. Dual 5 amp, form C relays outputs are also included with all units for alarm or control of critical processes. Front panel peak detection and memory is also standard. A mechanical lockout has been included to guard against unauthorized changes.

## 1.2 STANDARD FEATURES

The following is a list of features:

- \* 4-digit, red, 14 segment LED Display
- \* NEMA 4 / Type 4 Front Bezel
- \*  $\pm 0.5$  °C accuracy
- \* Peak Detection and Memory
- \* Dual 5 amp, form C relay outputs
- \* Scalable Analog output
- \* Analog out proportional or time proportional control
- \* Front panel controller tuning
- \* Non-volatile memory-no battery backup
- \* Easy setup for proportional control
- \* 115 or 230 Vac 50/60 Hz power supply or 10-32 Vdc or 26-56 Vdc

## SECTION 2. AVAILABLE ACCESSORIES

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



## SECTION 3. 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	Indicator/controller 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 4. SAFETY CONSIDERATIONS

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## 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.

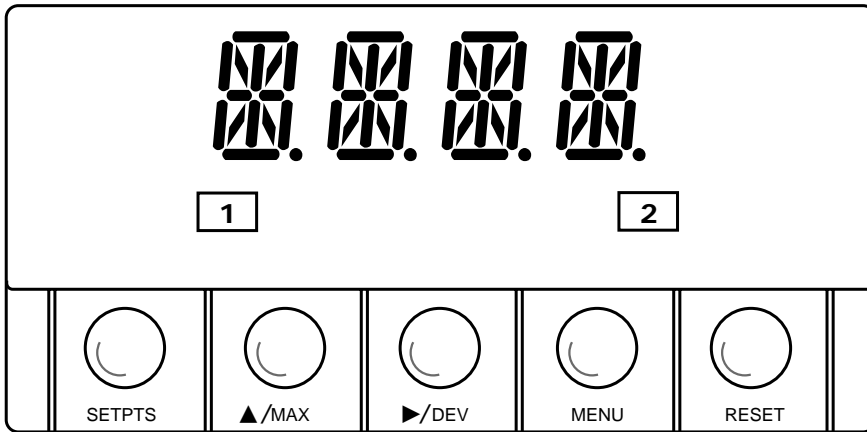
### EMC Considerations

- 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 5. PARTS OF THE METER

Figure 5-1 shows each part of the front of the meter. Table 5-1 gives a brief description of each part.



**Figure 5-1 Front Panel Illustration**

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

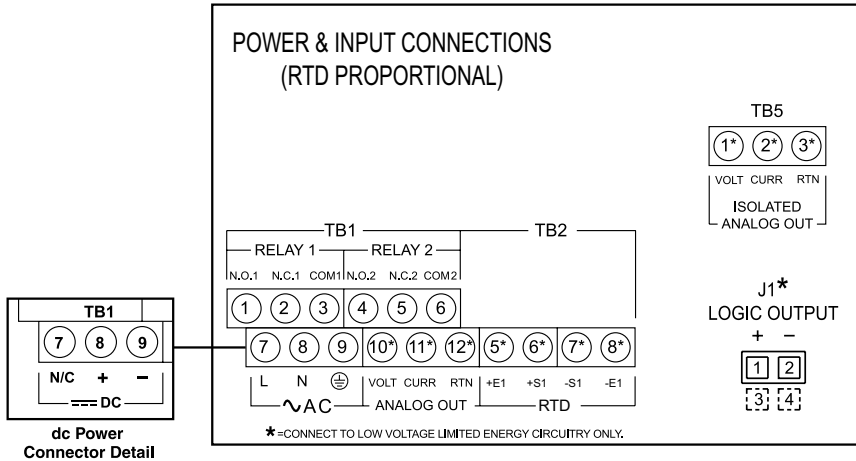
**Table 5-1 Front PanelPart Description**

ITEM	Description
1	<p>-1.9.9.9. or 9.9.9.9.</p> <p><b>4-digit 14 segment, 0.54" high LED display with programmable decimal point.</b></p>
2	<p><b>SETPOINT LED</b></p> <p><b>These LEDs labled 1 and 2 display the status of setpoints 1 and 2.</b></p>
3	<p><b>SETPTS Button</b></p> <p>This button functions only in the run mode. When the meter is in the run mode, press this button to sequentially recall the previous setpoint settings. After using the <b>▲/MAX</b> and <b>▶/DEV</b> buttons to alter these settings as desired, press the <b>SETPTS</b> button to store these new values.</p> <p>Unless you press the <b>SETPTS</b> button within 20 seconds to store your input, the meter will scroll to setpoint 2 and retain the last value stored.</p> <p><i>If the "L.3=1" on the "LK.CF" menu, pressing the <b>SETPTS</b> button will display the meter's firmware version.</i></p>
4	<p><b>▲/MAX Button</b></p> <p>During the run mode, press the <b>▲/MAX</b> button to recall the PEAK reading since the last press of the <b>RESET</b> button. To return to the current readings without resetting the PEAK reading, press the <b>▲/MAX</b> button. To reset the PEAK reading, press the <b>RESET</b> button.</p> <p>During the configuration mode, use the <b>▲/MAX</b> button to change the values of the flashing digit shown on the display and/or toggle between menu choices, such as "<b>R.1=F</b>" or "<b>R.1=C</b>". When configuring your setpoint values, press the <b>▲/MAX</b> button to increment the flashing digit from 0 to 9 by 1's.</p>

<p><b>5</b></p>	<p><b>▶/DEV Button</b></p> <p>During the run mode press the ▶/DEV button to display the deviation from setpoint 1.</p> <p>When configuring your setpoint values, press the ▶/DEV button to scroll to the next digit.</p>
<p><b>6</b></p>	<p><b>MENU Button</b></p> <p>In the run mode, press the <b>MENU</b> button to terminate the current measuring process and enter you into the configuration mode.</p> <p>In the configuration mode, press the <b>MENU</b> button to store changes in the non-volatile memory and then advance you to the next menu item.</p>
<p><b>7</b></p>	<p><b>RESET Button</b></p> <p>In the run mode, press the <b>RESET</b> button to reset the setpoints and display "<b>SP.RS</b>". If display shows peak value, press the <b>RESET</b> button to reset peak value. Display shows "<b>PK.RS</b>".</p> <p>In the configuration mode, press the <b>RESET</b> button once to review the previous menu.</p> <p>Pressing the <b>RESET</b> button twice results in a hard reset and returns you to the run mode.</p>

## 5.2 REAR OF THE METER

Figure 5-2 shows the connector label mounted at the top of the meter housing. Table 5-2 gives a brief description of each connector at the back of the meter.



**Figure 5-2 Connector Label (ac power with dc detail)**

## 5.2 REAR OF THE METER (Continued)

**Table 5-2 Rear Connector Description**

<b>Connector Description</b>	
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	not used
TB2-2	not used
TB2-3	not used
TB2-4	not used
TB2-5	+E1: Positive excitation (current source)
TB2-6	+S1: Positive signal input
TB2-7	-S1: Negative signal input
TB2-8	-E1: Negative excitation
TB5-1	Isolated Analog Voltage Output
TB5-2	Isolated Analog Current Output
TB5-3	Isolated Analog Output Return
J1-1	Transistor Logic Output (positive)
J1-2	Transistor Logic Output (negative)

# SECTION 6. SETUP

## 6.1 CONDITIONS REQUIRING 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.

## 6.2 CONDITIONS REQUIRING DISASSEMBLY



---

*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.



---

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

---

## 6.3 RATING/PRODUCT LABEL

This label is located on top of the meter housing (Refer to Figure 6-4).

## 6.4 MAIN BOARD POWER JUMPERS



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**Important:** If you want to change the Factory preset jumpers, do the following steps; otherwise go to section 6.5.

---



---

**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 6.2.
2. Locate the solder jumpers W1, W2, and W3 (located near the edge of the main board alongside the transformer - refer to Figure 6-1).
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.**



## 6.4 MAIN BOARD POWER JUMPERS (continued)

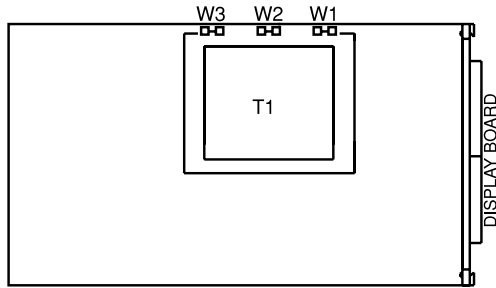


Figure 6-1 Main Board Power Jumpers (W1, W2, W3)

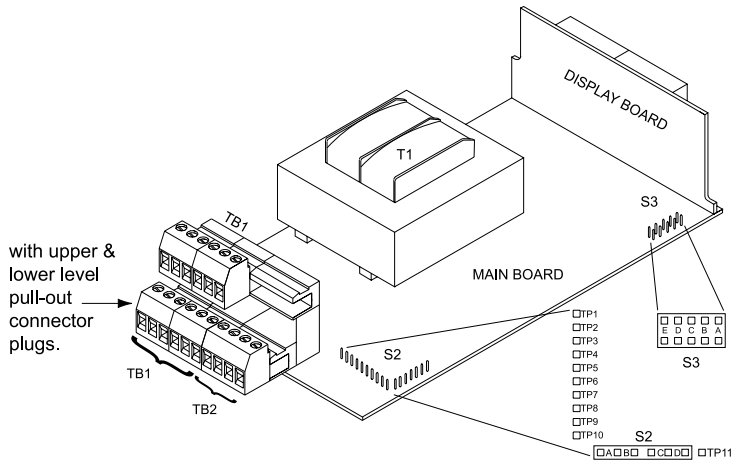


Figure 6-2 Main Board Jumper Positions

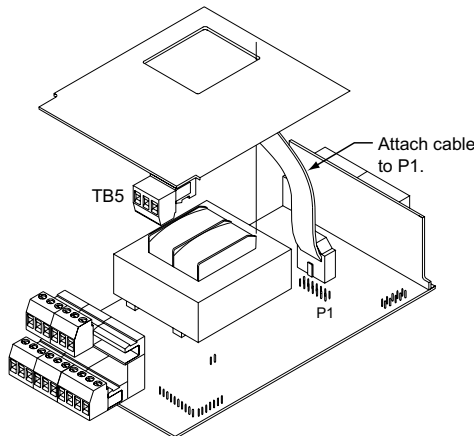


Figure 6-3 Upper Isolated Analog Outlook Option Board Installation

## 6.4 MAIN BOARD POWER JUMPERS (Continued)

Refer to Figure 6-2.

S2 jumpers are for sensor break indications:

- \* S2A jumper is not used
- \* S2B jumper is for positive sensor break (i.e. heating)
- \* S2C & S2D are not used

S3 jumpers are used for the following (refer to Table 6-1):

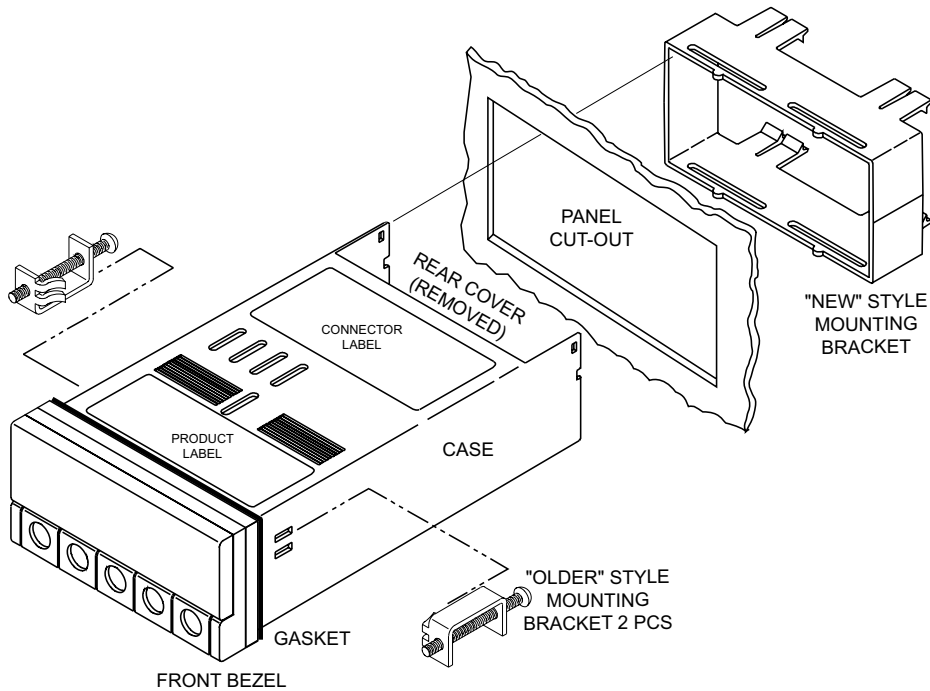
- \* To enable or disable the front panel push-buttons
- \* To allow for an extremely low resistance load for analog output
- \* To disable the **MENU** button

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

**Table 6-1 Jumper Functions**

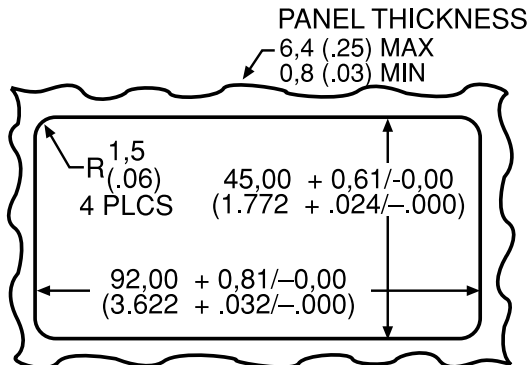
<b>Jumper</b>	<b>Description</b>
S3-A	Install to enable front panel push-buttons. Remove to disable all front panel push-buttons
S3-B	Removed. Install for factory calibration only.
S3-C	Normally removed. Install for analog voltage output when load is less than 1 KW impedance. Care should be taken when installing this jumper.
S3-D	Removed. Not used.
S3-E	If installed without S3-B, the <b>MENU</b> button locks out. If you press the <b>MENU</b> button, the meter shows "LOCK".

## 6.5 PANEL MOUNTING



**Figure 6-4 Meter - Exploded View**

1. Cut a hole in your panel, as shown in Figure 6-4. For specific dimensions refer to Figure 6-5.
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 7 to connect your sensor input and main power.



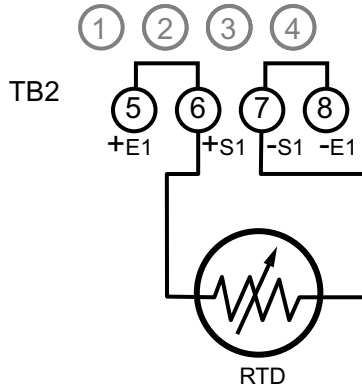
NOTE: Dimensions in Millimeters (Inches)

**Figure 6-5 Panel Cut-Out**

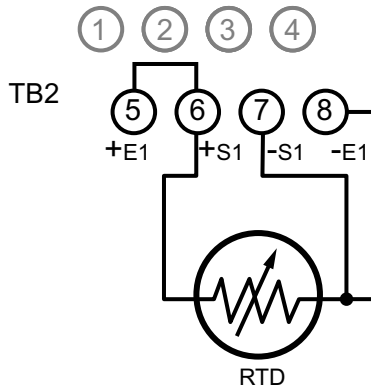
# SECTION 7. SENSOR INPUT/ MAIN POWER CONNECTIONS

## 7.1 SENSOR INPUT CONNECTIONS

Figures 7-1 through 7-3 describe how to connect your sensors.



**Figure 7-1 2-Wire RTD Input Connection**



**Figure 7-2 3-Wire RTD Input Connection**

## 7.1 SENSOR INPUT CONNECTIONS (continued)

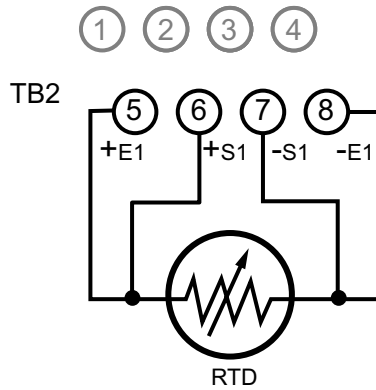


Figure 7-3 4-Wire RTD Input Connection

## 7.2 MAIN POWER CONNECTIONS

Connect the ac main power connections as shown in Figure 7-4.



**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!

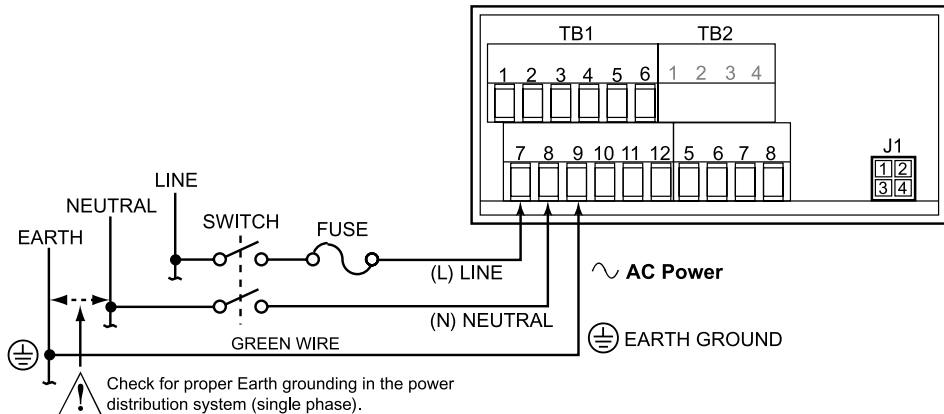


Figure 7-4 Main Power Connection - ac powered unit

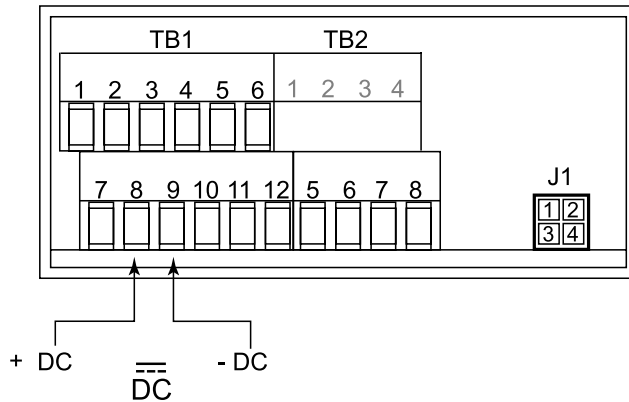
## 7.1 SENSOR INPUT CONNECTIONS (continued)

Table 7-1 shows the wire color and respective terminal connections for both USA and Europe.

**Table 7-1 ac Power Connections**

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

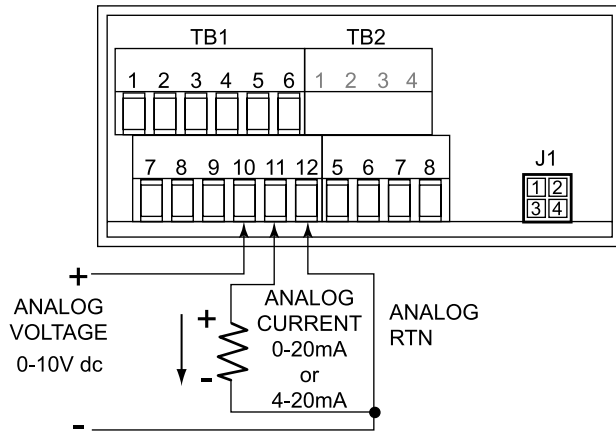
Connect the dc main power connections as shown in Figure 7-5.



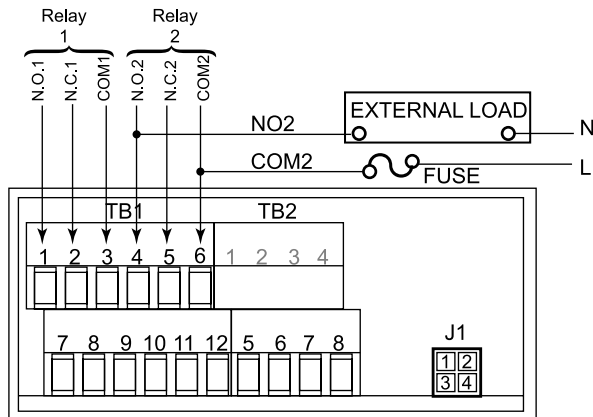
**Figure 7-5 Main Power Connection - dc powered unit**

### 7.3 ANALOG AND RELAY OUTPUT CONNECTIONS

Figure 7-6 and 7-7 illustrates how to connect your analog and dual relay outputs at the rear of the meter.

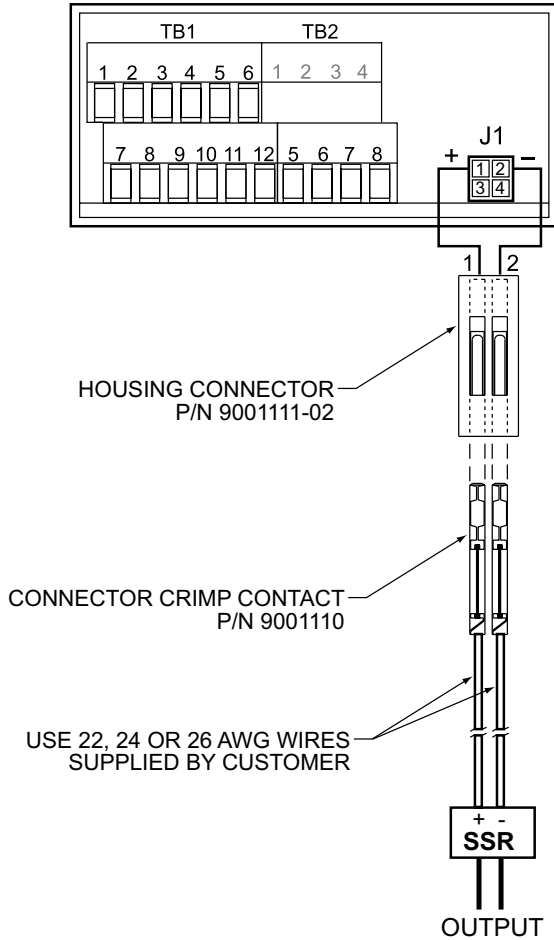


**Figure 7-6 Analog Output Connections**

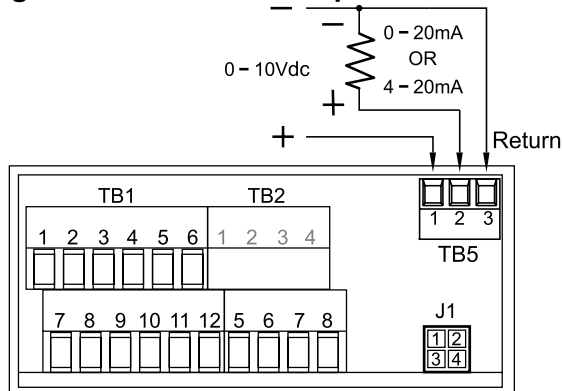


**Figure 7-7 Relay Output Connections**

### 7.3 ANALOG AND RELAY OUTPUT CONNECTIONS (continued)



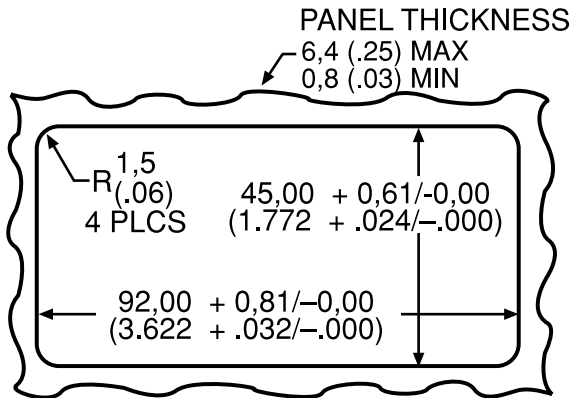
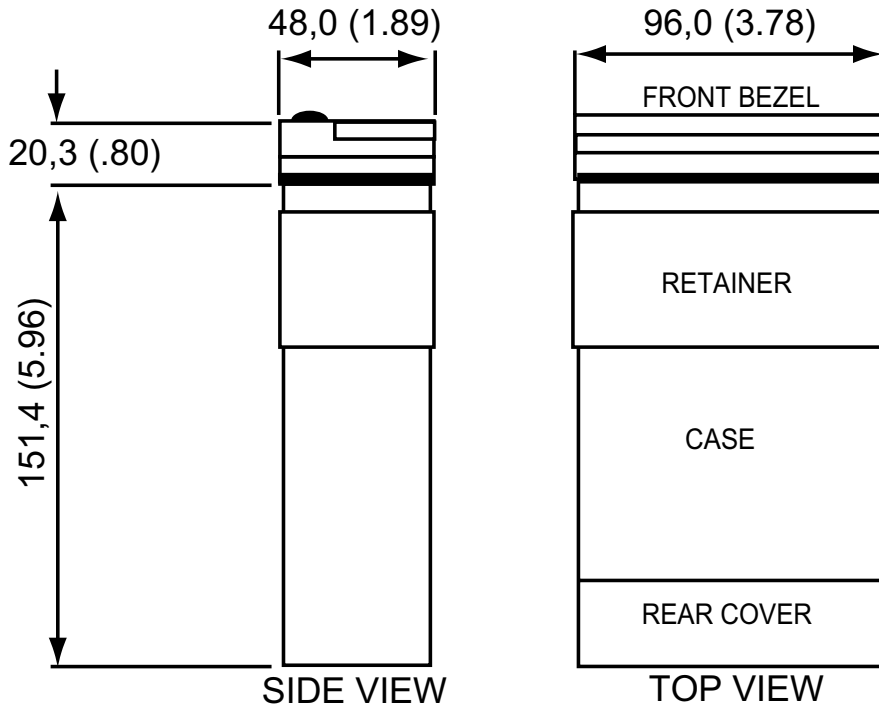
**Figure 7-8 Transistor Output Connections**



**Figure 7-9 Isolated Analog Output Connections (option)**



SECTION 25. SPECIFICATIONS (continued)



NOTE: Dimensions in Millimeters (Inches)

Figure 25-1 Meter Dimensions

## SECTION 26. FACTORY PRESET VALUES

Table 26-1. Factory Preset Values

MENU ITEM	FACTORY PRESET VALUES
<b>INPT</b>	Input Type: <b>RTD.3</b>
<b>DEC.P</b>	Decimal Point Position: <b>FFFF.</b>
<b>RD.CF</b>	Reading Configuration: <b>R.1=F</b> (Fahrenheit)
<b>S1.CF</b>	Setpoint 1 Configuration: <b>S.1=A</b> (Setpoint is active above) <b>S.2=U</b> (Setpoint is unlatched) <b>S.3=O</b> (On/Off control)
<b>S2.CF</b>	Setpoint 2 Configuration: <b>S.1=A</b> (Setpoint is active above) <b>S.2=U</b> (Setpoint is unlatched)
<b>S1.DB</b>	Setpoint 1 Deadband: <b>030.0</b>
<b>S2.DB</b>	Setpoint 2 Deadband: <b>030.0</b>
<b>OT.CF</b>	Output Configuration: <b>O.1=E</b> (Analog output is enabled) <b>O.2=C</b> (Analog output is current) <b>O.3=A</b> (Analog output follows the display value)
<b>OT.S.O</b>	Output Scale and Offset: 0-1000 = 4-20 mA dc
<b>LK.CF</b>	Lock Out Configuration <b>RS=E</b> (Enable the <b>RESET</b> button in the run mode) <b>SP=E</b> (Enable setpoint changes)
<b>SP1</b>	Setpoint 1 Value: 0000
<b>SP2</b>	Setpoint 2 Value: 0000

## APPROVALS INFORMATION

This product conforms to the EMC directive 89/336/EEC amended by 93/68/EEC, and with the European Low Voltage Directive 72/23/EEC.

### 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 **one (1) year** from the date of purchase. In addition to OMEGA's standard warranty period, OMEGA Engineering will extend the warranty period for **four (4) additional years** if the warranty card enclosed with each instrument is returned to OMEGA.

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 which wear are not warranted, including but 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 product, and
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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