

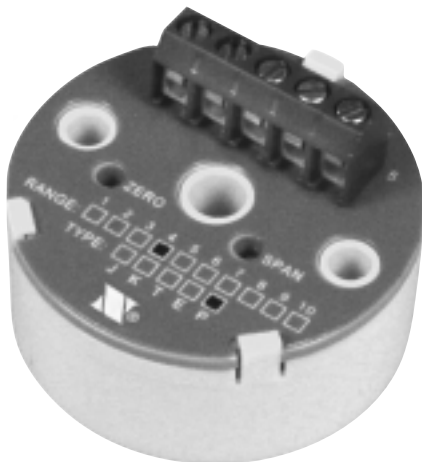


# MTX-P (RTD)

4-20 mA

## MINI TEMPERATURE TRANSMITTER

Operator's Manual



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

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

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## **SECTION 1 GETTING STARTED**

### **1.1 Unpacking**

Remove the packing list and verify that you have received all equipment. If you have any questions, contact the nearest Customer Service Department, as listed on the cover of this manual.

Upon receipt of shipment, inspect the container and equipment for any signs of damage. Note 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 materials and carton in the event reshipment is necessary.

### **1.2 Safety and EMC Considerations**

This instrument is a Class III device (8 to 50 Vdc). Always use a power supply, which complies with EN 60950 safety standard.

#### **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!**

### **1.3 General Description**

The MTX Series transmitter accepts platinum 100 ohm sensor type RTDs and will produce a standard 4-20 mA output signal proportional to that produced by its attached RTD input. The transmitter does NOT provide isolation between its input and the 4-20 mA output; therefore, an ungrounded RTD is suggested to prevent possible ground loops.

The transmitter provides amplification, common-mode rejection and controlling the current draw from an 8-to-50 Vdc source to produce the 4-to-20 mA output signal. As much as 800 ohms dropping resistance may be used in the power leads of the MTX when the unit is energized from a 24 Vdc source because of the small compliance voltage needed by the unit.

## 1.4 Available Ranges

As specified in Table 1-1, the transmitter has 10 ranges. Depending upon the range, the transmitter can measure temperature span as narrow as 180°F or as wide as 1000°F. A multi-turn, top-accessible potentiometer provides fine span tuning. A second top-accessible, multi-turn potentiometer provides a zero adjustment which allows placement of the 4-mA output temperature within +/- 25% for Fahrenheit and +/- 10% for Celsius of nominal span (refer to Section 3.0, Calibrating the Transmitter, for more details). Models MTX-\***-L** are transmitters with the 4-20mA output linearized to temperature.

**Table 1-1. Range/Models**

| <b>Range</b> | <b>Model</b> |       |
|--------------|--------------|-------|
| -40 to 140°F | P01          | P01-L |
| 0 to 200°F   | P02          | P02-L |
| 0 to 300°F   | P03          | P03-L |
| 0 to 500°F   | P04          | P04-L |
| 0 to 750°F   | P05          | P05-L |
| 0 to 1000°F  | P06          | P06-L |
| -0 to 100°C  | P07          | P07-L |
| -0 to 150°C  | P08          | P08-L |
| -0 to 250°C  | P09          | P09-L |
| -0 to 400°C  | P10          | P10-L |

## 1.5 Ordering Guide

The model number describes the functionality of the transmitter.

|      | Model | Temperature Range                       |
|------|-------|---|
| MTX- | P01   | -40 to 140°F                            |
|      | P02   | -0 to 200°F                             |
|      | P03   | -0 to 300°F                             |
|      | P04   | -0 to 500°F                             |
|      | P05   | -0 to 750°F                             |
|      | P06   | -0 to 1000°F                            |
|      | P07   | -0 to 100°C                             |
|      | P08   | -0 to 150°C                             |
|      | P09   | -0 to 250°C                             |
|      | P10   | -0 to 400°C                             |
|      | -L    | 4-20mA output linearized to temperature |
|      | FS    | **Factory Scaling Option:               |

\*\*Factory Scaling available for additional charge. Consult factory.

To order additional transmitters, write MTX followed by the model letter and number. For example:

MTX-P02 = RTD Transmitter with a temperature range of -0 to 200°F.

or

MTX-P02-L = RTD Transmitter with the 4-20mA output linearized to temperature and a temperature range of -0 to 200°F.

## 1.6 Shock Resistance

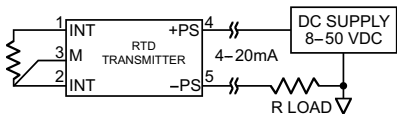
Lightweight MTX transmitter circuit boards are fabricated from rigid, shock resistant materials with the components soldered to the circuit board.

The MTX transmitter's small size permits mounting into thermowells or wall mounting in confined areas.

## 2.0 CONNECTING POWER AND SIGNAL INPUTS

1. Verify that the transmitter is connected for the correct power voltage rating.
2. Connect the power supply to pin 4 and the resistance load to pin 5.
3. Connect the sensor to pins 1, 2 and 3.

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



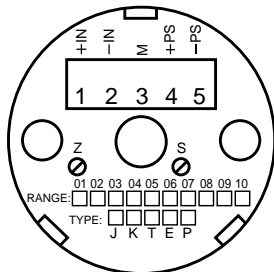
**Figure 2-1 Power Input Setup**

+PS and -PS screws accept 2mm (13 gauge) or lighter wire. Input range is 8-50 Vdc.

**Table 2-1. Screw-Terminal Pin Assignment**

|   |                      |
|---|----------------------|
| 1 | RTD                  |
| 2 | RTD                  |
| 3 | M (Sense)            |
| 4 | +Power/Signal Output |
| 5 | -Power/Signal Output |

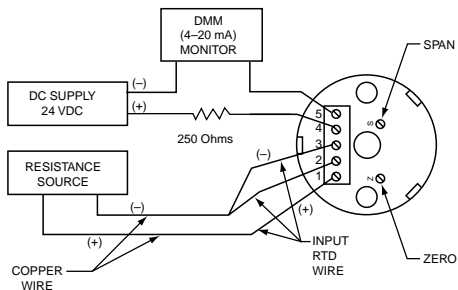
**Figure 2-2 Pin Assignment**



### 3.0 CALIBRATING THE TRANSMITTER

#### Calibration Setup:

1. Insert the reference RTD.
2. Connect RTD simulator.
3. Connect DMM monitor and power supply.



**Figure 3-1. Calibration Setup (Resistance Source)**

To calibrate the transmitter, follow these steps (refer to Figure 3-1):

1. Locate the model number in Table 3-1 or 3-2 and set the resistance source to the LO-IN value.
2. Adjust the Zero potentiometer until the milliammeter reads 4.00 mA.
3. Set the resistance source to the HI-IN value (in your appropriate table) and read the output current on the milliammeter.
4. Adjust the Span potentiometer to obtain the 20 mA on the milliammeter.
5. Set the resistance source to LO-IN resistance. If the output current is not 4.00 mA, repeat steps 2 through 7.
6. When calibration is complete, remove the transmitter from the setup.

### 3.0 CALIBRATING THE TRANSMITTER (Continued)

An RTD calibrator may be used in place of the resistance source - refer to Figure 3-2.

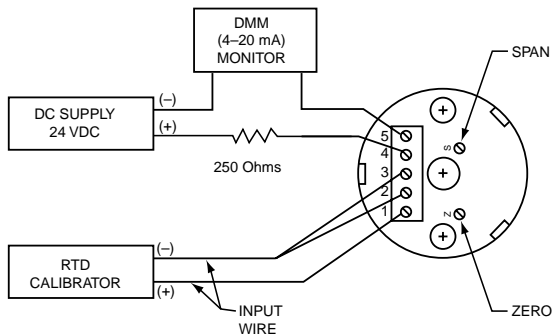


Figure 3-2. Calibration Setup (RTD Simulator)

Table 3-1. Fahrenheit Temperature to OHMS Conversion Chart

| Value | Model Number/Range |              |              |              |              |               |
|-------|--------------------|--------------|--------------|--------------|--------------|---------------|
|       | P01                | P02          | P03          | P04          | P05          | P06           |
| MTX-  | (-40 to 140°F)     | (0 to 200°F) | (0 to 300°F) | (0 to 500°F) | (0 to 750°F) | (0 to 1000°F) |
| LO IN | 84.27 Ω            | 92.95 Ω      | 92.95 Ω      | 92.95 Ω      | 92.95 Ω      | 92.95 Ω       |
| HI IN | 123.24 Ω           | 135.85 Ω     | 156.96 Ω     | 197.71 Ω     | 246.74 Ω     | 293.56 Ω      |

Table 3-2. Celsius Temperature to OHMS Conversion Chart

| Value | Model Number/Range |              |              |              |
|-------|--------------------|--------------|--------------|--------------|
|       | P07                | P08          | P09          | P10          |
| MTX-  | (0 to 100°C)       | (0 to 150°C) | (0 to 250°C) | (0 to 400°C) |
| LO IN | 100 Ω              | 100 Ω        | 100 Ω        | 100 Ω        |
| HI IN | 138.51 Ω           | 157.33 Ω     | 194.10 Ω     | 247.09 Ω     |

## 4.0 SPECIFICATIONS

### INPUT

|                     |   |
|---------------------|---|
| Configuration:      | Non-isolated input                        |
| Transducer types:   | Platinum RTD                              |
| Burnout indication: | Upscale over-range indication, 40 mA max. |

### OUTPUT

|                              |                             |
|------------------------------|-----------------------------|
| Linear range:                | 4 to 20 mA <sub>dc</sub>    |
| Current Output limits:       | <2 to >40 mA (open RTD)     |
| Compliance (supply-voltage): | 8 to 50 V <sub>dc</sub>     |
| Reverse polarity protection: | 350 V peak                  |
| Maximum loop resistance:     | (Supply Voltage - 8V)/20 mA |

### ACCURACY

|   |   |
|---|---|
| Hysteresis and repeatability:                         | Within $\pm 0.1\%$ of FS                          |
| Linearity with respect to input:                      | $\pm 0.1\%$ of FS                                 |
| For -L models: linearity with respect to temperature: | $\pm 0.2\%$ of FS                                 |
| Power supply effect:                                  | Within $\pm 0.01\%/V$                             |
| Temperature effect:                                   | Zero and Span: Within $\pm 0.1\%$ FS/ $^{\circ}F$ |

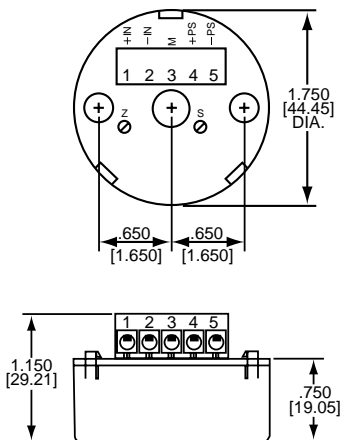
### ENVIRONMENTAL

|                        |  |
|------------------------|--|
| Operating temperature: | -40 to 185 $^{\circ}F$ (-40 to 85 $^{\circ}C$ )  |
| Storage temperature:   | -50 to 250 $^{\circ}F$ (-45 to 121 $^{\circ}C$ ) |
| Humidity:              | To 90% (non-condensing)                          |

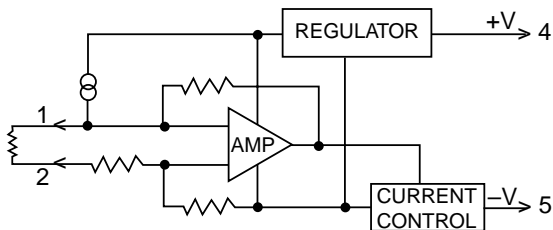
### MECHANICAL

|                              |                        |
|------------------------------|------------------------|
| Weight:                      | less than 1.2 oz (34g) |
| Diameter:                    | 1.75 in (44.34 mm)     |
| Height (including barriers): | 1.25 in (31.75 mm)     |

#### 4.0 SPECIFICATIONS (Continued)



**Figure 4-1. Case Dimensions**



**Figure 4-2. Transmitter Block Diagram**

- NOTES -

- NOTES -

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If the unit should malfunction, it must be returned to the factory for evaluation. NEWPORT's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by NEWPORT, if the unit is found to be defective it will be repaired or replaced at no charge. NEWPORT'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 being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of NEWPORT's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

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1. P.O. 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.

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Newport Electronics, Inc.  
2229 South Yale Street • Santa Ana, CA • 92704 • U.S.A.  
TEL: (714) 540-4914 • FAX: (203) 968-7311  
Toll Free: 1-800-639-7678 • [www.newportUS.com](http://www.newportUS.com) • e-mail: [info@newportUS.com](mailto:info@newportUS.com)  
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Newport Technologies, Inc.  
976 Bergar • Laval (Quebec) • H7L 5A1 • Canada  
TEL: (514) 335-3183 • FAX: (514) 856-6886  
Toll Free: 1-800-639-7678 • [www.newport.ca](http://www.newport.ca) • e-mail: [info@newport.ca](mailto:info@newport.ca)

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Newport Electronics, Ltd.  
One Omega Drive • River Bend Technology Centre  
Northbank, Irlam • Manchester M44 5BD • United Kingdom  
Tel: +44 161 777 6611 • FAX: +44 161 777 6622  
Toll Free: 0800 488 488 • [www.newportuk.co.uk](http://www.newportuk.co.uk) • e-mail: [sales@newportuk.co.uk](mailto:sales@newportuk.co.uk)

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Newport Electronics B.V.  
Postbus 8034 • 1180 LA Amstelveen • The Netherlands  
TEL: +31 20 3472121 • FAX: +31 20 6434643  
Toll Free: 0800 0993344 • [www.newport.nl](http://www.newport.nl) • e-mail: [info@newport.nl](mailto:info@newport.nl)

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Newport Electronics spol s.r.o.  
Frystatska 184, 733 01 Karviná • Czech Republic  
TEL: +420 59 6311899 • FAX: +420 59 6311114  
Toll Free: 0800-1-66342 • [www.newport.cz](http://www.newport.cz) • e-mail: [info@newport.cz](mailto:info@newport.cz)

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Newport Electronics GmbH  
Daimlerstrasse 26 • D-75392 Deckenpfronn • Germany  
TEL: 49 7056 9398-0 • FAX: 49 7056 9398-29  
Toll Free: 0800 / 6397678 • [www.newport.de](http://www.newport.de) • e-mail: [sales@newport.de](mailto:sales@newport.de)

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Newport Electronique S.A.R.L.  
11, rue Jacques Cartier • 78280 Guyancourt • France  
TEL: +33 1 61 37 29 00 • FAX: +33 1 30 57 54 27  
Toll Free: 0800 466 342 • [www.newport.fr](http://www.newport.fr) • e-mail: [sales@newport.fr](mailto:sales@newport.fr)

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