1 YEAR
WARRANTY

CE

CSA

FM
APPROVED

User's Guide

Shop online at

omega.com®

OMEGA®

omega.com
e-mail: info@omega.com
For latest product manuals:
omegamanual.info

TX92
RTD Temperature Transmitter

omega.com®

OMEGA®

OMEGAnet® On-Line Service omega.com	Internet e-mail info@omega.com

Servicing North America:

U.S.A.:
ISO 9001 Certified
OMEGA Engineering, Inc., One Omega Drive,
P.O. Box 4047, Stamford, CT 06907-0047 USA
Toll-Free: 1-800-826-6342 TEL: (203) 359-1660
FAX: (203) 359-7700 e-mail: info@omega.com

Canada:
976 Bergar
Laval (Quebec), H7L 5A1 Canada
Toll-Free: 1-800-826-6342 TEL: (514) 856-6928
FAX: (514) 856-6886 e-mail: info@omega.ca

For immediate technical or application assistance:

U.S.A. and Canada:
Sales Service: 1-800-826-6342/1-800-TC-OMEGA®
Customer Service: 1-800-622-2378/1-800-622-BEST®
Engineering Service: 1-800-872-9436/1-800-USA-WHEN®

Mexico/Latin America:
En Español: 001 (203) 359-7803
FAX: 001 (203) 359-7807
e-mail: info@omega.com.mx
espanol@omega.com

Servicing Europe:

Benelux:
Managed by the United Kingdom Office
Toll-Free: 0800 099 3344 TEL: +31 20 347 21 21
FAX: +31 20 643 46 43 e-mail: sales@omegaeng.nl

Czech Republic:
Frystatska 184, 733 01 Karviná, Czech Republic
Toll-Free: 0800-1-66342 TEL: +420-59-6311899
FAX: +420-59-6311114
e-mail: info@omegashop.cz

France:
Managed by the United Kingdom Office
Toll-Free: 0800 466 342 TEL: +33 (0) 161 37 29 00
FAX: +33 (0) 130 57 54 27 e-mail: sales@omega.fr

Germany/Austria:
Daimlerstrasse 26
D-75392 Deckenpfronn, Germany
Toll-Free: 0800 6397678 TEL: +49 (0) 7056 9398-0
FAX: +49 (0) 7056 9398-29 e-mail: info@omega.de

United Kingdom: ISO 9001 Certified
OMEGA Engineering Ltd.
One Omega Drive, River Bend Technology Centre, Northbank, Irlam, Manchester
M44 5BD United Kingdom
Toll-Free: 0800-488-488
TEL: +44 (0) 161 777-6611
FAX: +44 (0) 161 777-6622
e-mail: sales@omega.co.uk

RETURN REQUESTS / INQUIRIES

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

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

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

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

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

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.OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

TABLE OF CONTENTS

TX92
Miniature Two-Wire RTD Transmitter

1 Introduction

1.1 General Description

The Omega® TX90 Series Temperature Transmitters consist of the TX91 Miniature Two-Wire Thermocouple Transmitter and the TX92 Miniature Two-Wire RTD Transmitter. This manual is written for the TX92 RTD Transmitter.

The TX92 Two-Wire RTD Transmitter will produce a standard 4-20 mA output signal proportional to that produced by its RTD input temperature sensor. Transmission of the proportional current output may be accomplished by using copper wires. The TX92 RTD Transmitter accepts 100 Ohm, Platinum RTD sensors (PT100, alpha=0.00385).

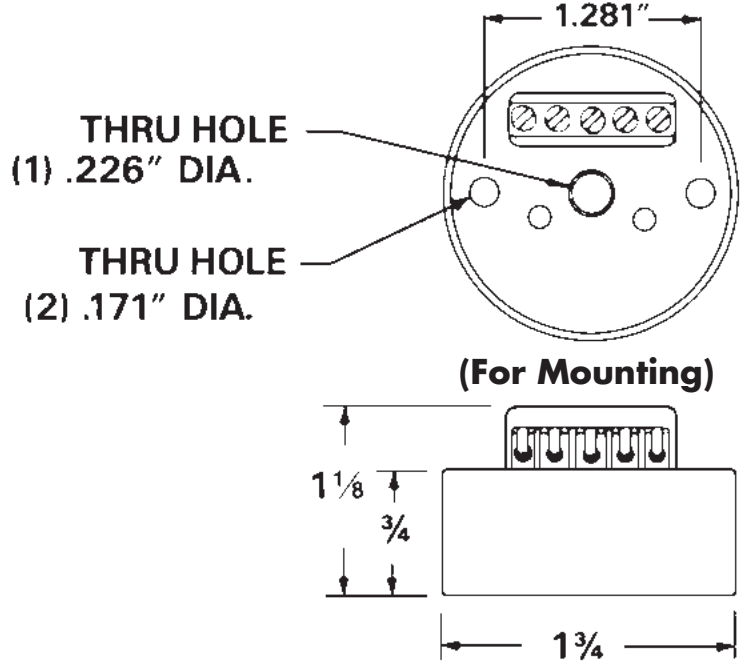


Figure 1-1. Photo of TX90 Series Transmitter
Figure 1-2. General Dimensions (in inches)

The TX92 transmitter is normally powered by an unregulated DC power supply as shown in Figure 1-3. The proportionally-transmitted signal begins at 4 mA, at the low end of its temperature range, and increases to 20 mA, at the high end of its temperature range. (There are various temperature ranges available for the TX92 transmitter. To order, refer to Section 1.3 Table 1.1 for correct Model Numbers and Range Codes.)

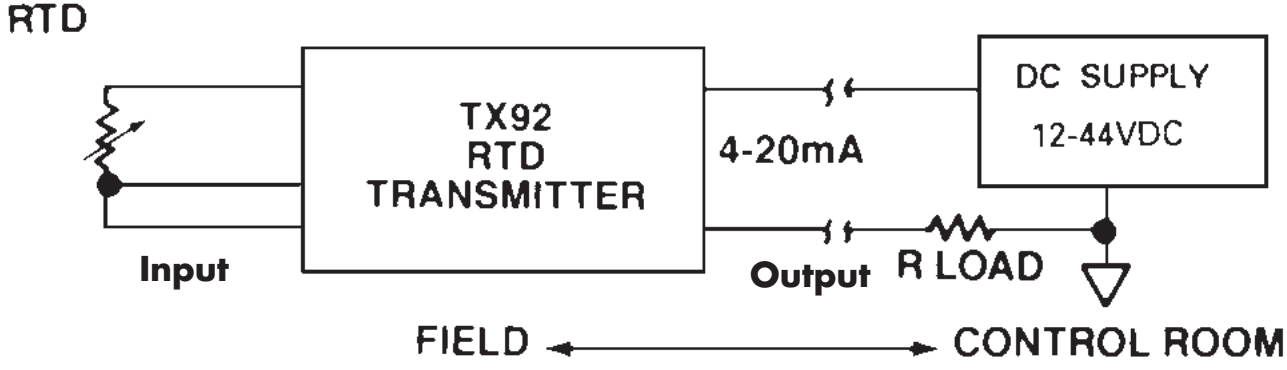


Figure 1-3. TX92 RTD Transmitter

The TX92 two-wire transmitter will work with 2-wire or 3-wire RTDs and provides an output current of 4-20 mA proportional to the RTD sensor. When the transmitter is mounted inside a protection head (such as the OMEGA NB1 Protection Head) two copper wires now carry the temperature signal and DC voltage to operate the transmitter, thereby reducing possible noise pick-up errors. The TX92 does NOT provide isolation between its input and the 4-20 mA output. Note, however, that the RTD element is electrically insulated.

The TX92 is FM Approved when wired with the proper intrinsic safety barriers. (See Intrinsically Safe Interconnection Diagram – Appendix A.)

1.2 Features

- 4-20 mA output
- ±0.1% full-scale accuracy (with the respect to the RTD input resistance)
- Upscale break protection
- Low cost

1.3 Models Available

TX92 Models Available

Model Number	Description
TX92-(*)	RTD transmitter (100Ω, Pt, alpha = 0.00385)
PRTX-(*)	PR-12 RTD probe, 12" L, 1/4" O.D., 304SS sheath

Table 1-1. Range Code

Input Types					
Range		RTD	Range		RTD
-40 to	120˚F	1	0 to	500˚F	4
0 to	200˚F	2	0 to	750˚F	5
0 to	300˚F	3	0 to	1000˚F	6

**Insert range code from Table 1-1*

For complete information on PR-12 RTD Probes, see the OMEGA Temperature Handbook.

2 Unpacking

Remove the packing list and verify that all equipment has been received. If there are any questions about the shipment, please call the OMEGA Customer Service Department.

Upon receipt of shipment, inspect the container and equipment for 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 in event reshipment is necessary.

3 Installation

3.1 Mounting the TX92

The TX92 Transmitter may be:

1. surface mounted,
2. mounted inside a protection head (refer to figure 3-1), or
3. installed into the OMEGA mounting track (part number RT) using an OMEGA mounting bracket (part number TX90-BR).

Figure 3-2 shows the RT mounting track.
Figure 3-3 shows the TX90-BR mounting bracket.
Figure 3-4 shows a typical installation of two transmitters using the bracket and mounting track.

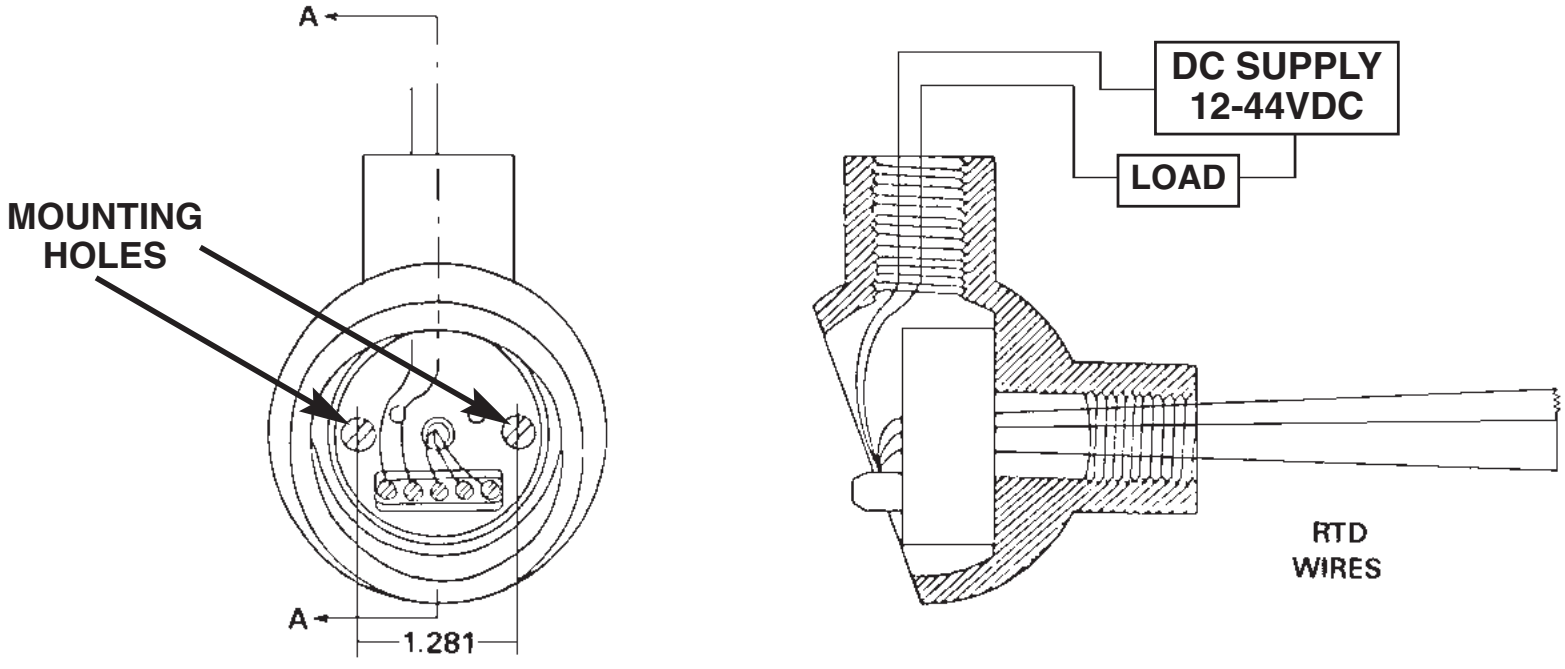
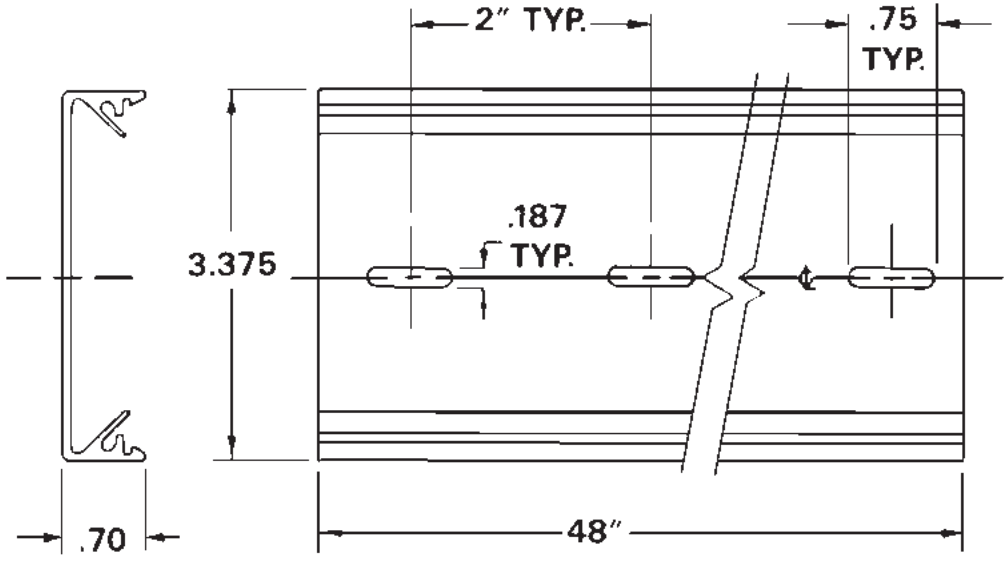


Figure 3-1 Assembly of the TX92 RTD Transmitter Inside an OMEGA NB1 Protection Head (in inches)



CAUTION

HANDTIGHTEN TRANSMITTER MOUNTING SCREWS ONLY. DO NOT OVER-TIGHTEN.

Figure 3-2 RT Mounting Track (in inches)

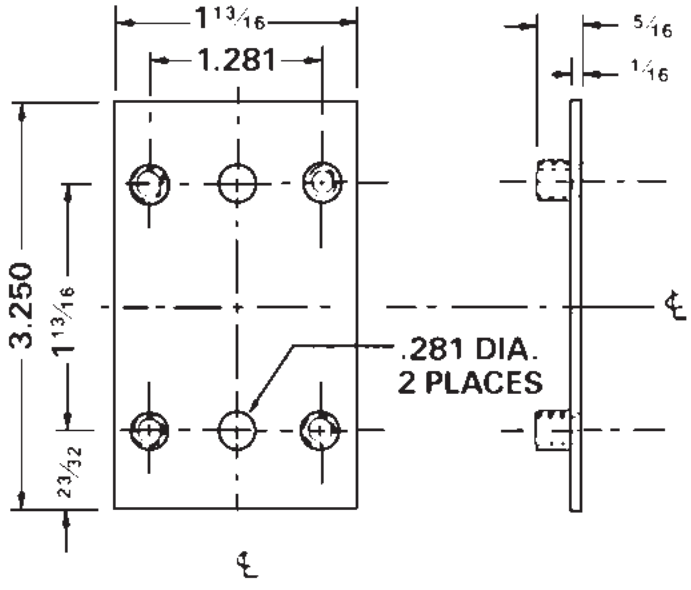


Figure 3-3 TX90-BR Mounting Bracket (in inches)

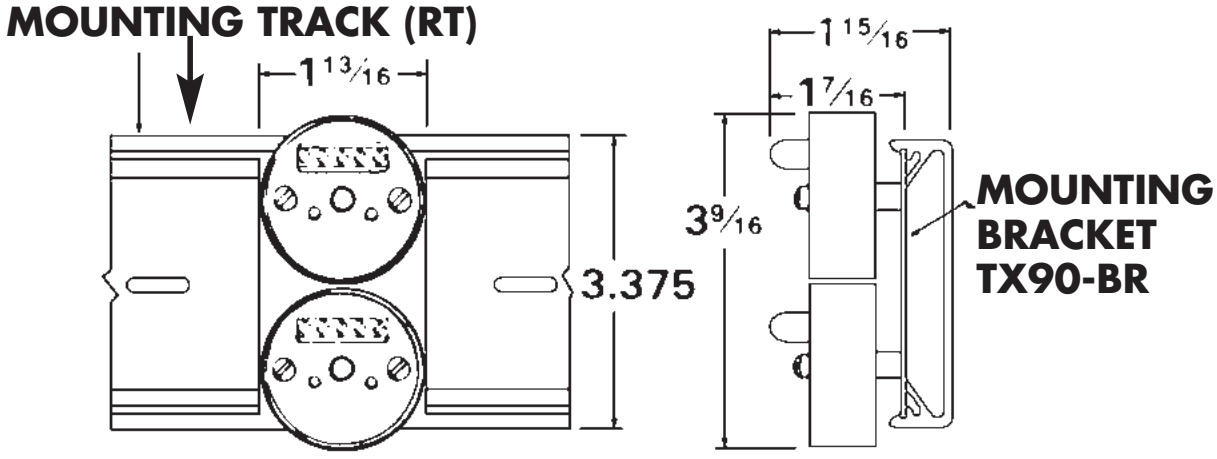


Figure 3-4 Installation with Bracket and Track (in inches)

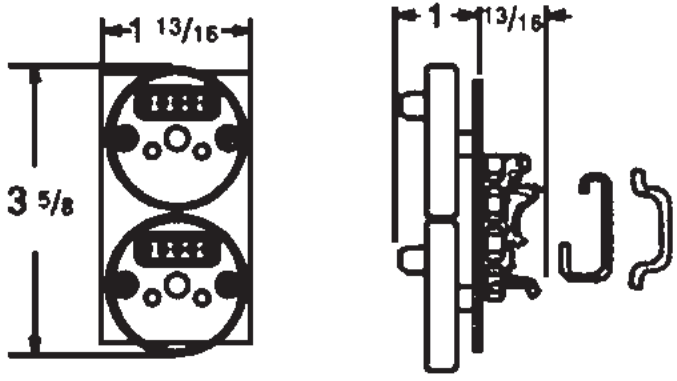


Figure 3-5 TX90-DIN DIN Rail Mounting Adapter (in inches)

3.2 Wiring the TX92 (Refer to Figure 3-5)

1. Connect a DC power supply in series with the load to the (+PS) and (-PS) power terminals. Note that the load (usually a monitoring instrument) may be connected to either the (+) or (-) power lead.
2. Connect the RTD element to the input terminals as shown.

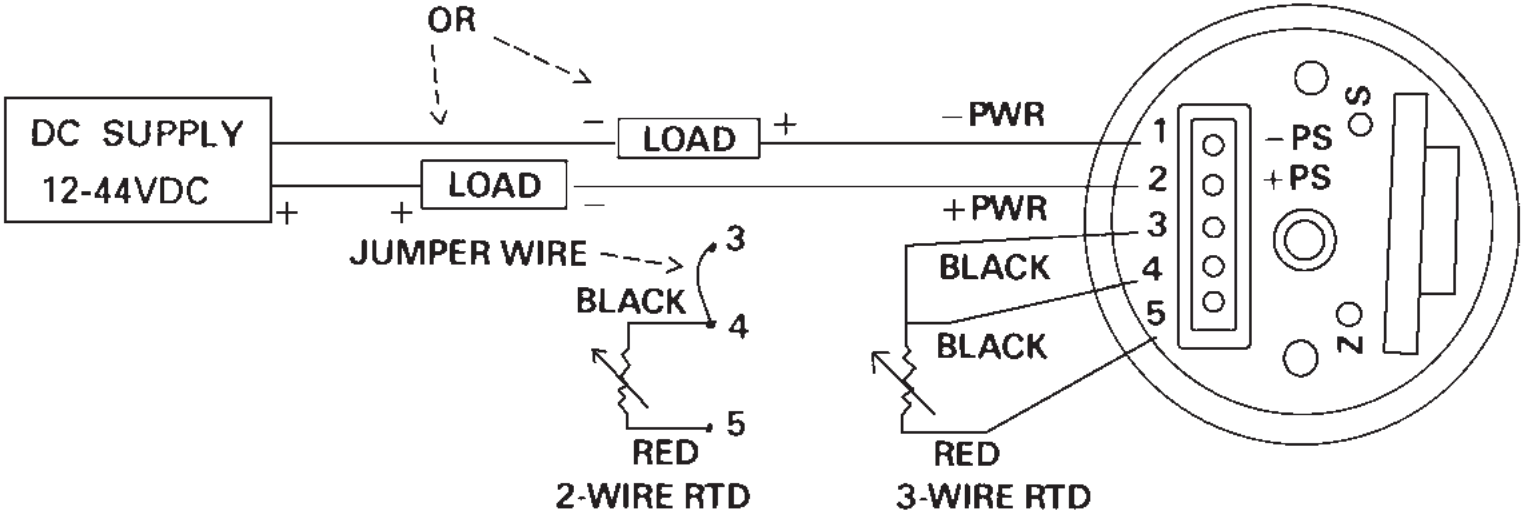


Figure 3-6 Wiring Diagram for the TX92

4 Calibration Instructions

4.1 Equipment Required

- Precision Decade Resistance Box, with 0.01 ohm resolution and ±0.02 ohm accuracy or
- Precision RTD Simulator, such as the OMEGA Model CL511 Precision Calibrator
- Precision DMM capable of measuring mA, with 0.001 mA resolution and ±0.002 mA accuracy
- Or a Thermocouple/RTD Calibrator/Simulator

4.2 Calibration Procedures (Refer to Figure 4-1)

Connect the calibration equipment according to Figure 4-1. Standard copper test leads are used with RTD instrumentation.

To check or adjust the calibration:

1. Locate the Z (zero) and S (span) potentiometers.
2. Select, from Table 4-1, the correct ohmic values for the Z (zero) and S (span) adjustments that correspond to the Model Number. For example, for Model TX92-2, the Z value is 93.04 ohms, and the S value is 135.97 ohms.

If a Thermocouple/RTD Simulator is used, such as the OMEGA Model CL511 Precision Calibrator, select the Temperature Input Z (zero) and S (span) values.

3. Set the decade box to the selected Z (zero) ohmic value. Adjust the Z potentiometer to read 4.000 mA on the monitoring instrument.
4. Set the decade box to the selected S (span) ohmic value. Adjust the S potentiometer to read 20.000 mA on the monitoring instrument.
5. Repeat steps 3 and 4, as required, until the readings are exactly 4.000 mA and 20.000 mA. This procedure is necessary since there is interaction between the two potentiometers.

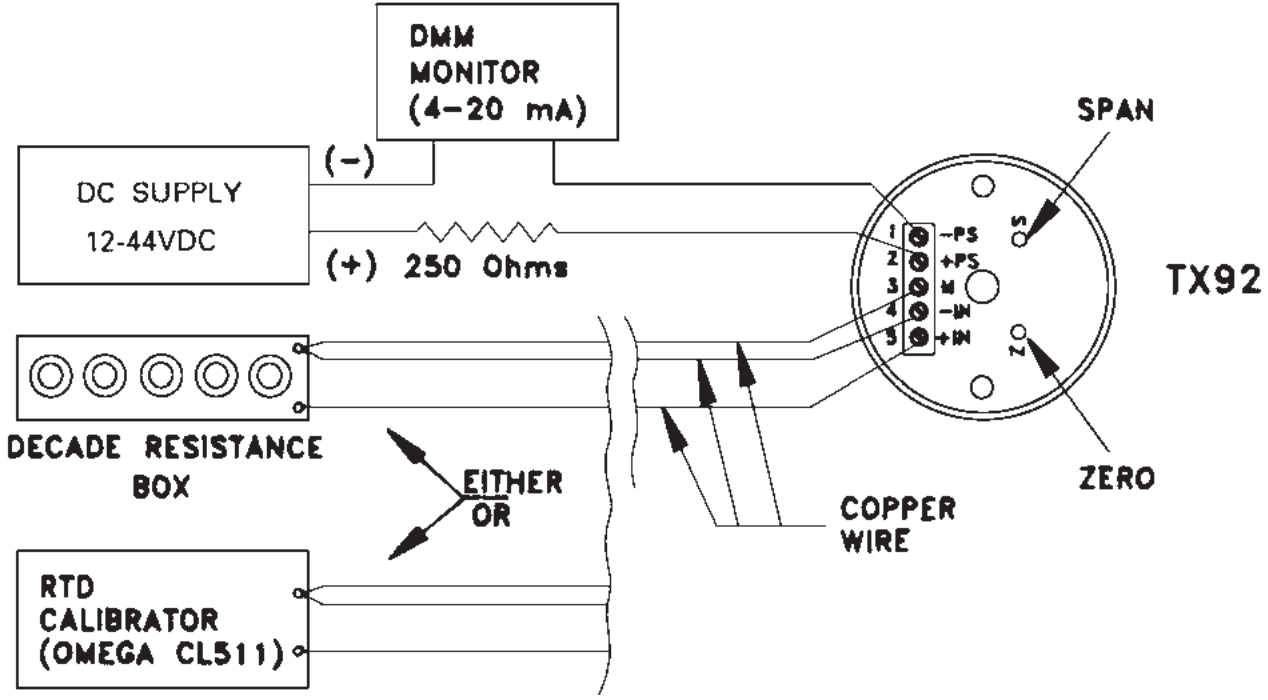


Figure 4-1. TX92 RTD Calibration Set-Up.

Table 4-1. Calibration Values for the TX92		
Temperature Input Range Zero/Span	**Model TX92**	**Resistance Input (Ohms) Alpha = 0.00385 Zero/Span**
-40/120˚F	-1	84.27/118.97
0/200˚F	-2	93.04/135.97
0/300˚F	-3	93.04/156.90
0/500˚F	-4	93.04/197.69
0/750˚F	-5	93.04/246.65
0/1000˚F	-6	93.04/293.39

5 Troubleshooting Guide

Malfunction or incorrect operation may be caused by:

1. Incorrect Readings:
   Check for improper wiring (Refer to Figure 3-5.)
2. Loose or broken wires:
   Check each terminal connection for tightness. Move each wire back and forth and note any changes in operation.
3. Too high a load resistance in the output current loop or too low a current rating on the power supply:

a) Measure the total resistance of each device (excluding the transmitter and power supply) in the 20 mA loop, including the resistance of the lead wires.

b) Calculate the maximum allowable loop resistance using the formula:

$$\text{Loop Resistance (maximum)} = \frac{V_{supply} - 12V}{0.020A}$$

For example, a 24V power supply would give a maximum loop resistance of: 12V/0.020A = 600 ohms.

c) Make sure the power supply is rated for at least 28 mA times the number of TX92 transmitters being powered. For example, if the supply is powering 5 transmitters, the supply should be rated for at least 140 mA.

6 Accessories

Model No.	Description
TX90-BR	Mounting Bracket
PSU-24B	Unregulated Power Supply, 24 Volts
TX82B	Process Loop-Powered Indicator
RT	48″ Mounting Track
TX90-DIN	DIN Rail Mounting Adapter
RAIL-35-2	6.5 Section 35mm DIN Rail

7 Specifications

General

Size:	1.75" dia. X 1.125" high (includes terminal strip)
Zero/Span Adjustment Range:	±25%
Power Supply Voltage Operating Range:	**+12VDC** to +44VDC, 28 mA max required per transmitter
Accuracy:	±0.1% of full scale (includes effects of hysteresis, repeatability and linearity proportional to the RTD input)
Ambient Temperature:	-13˚F to 185˚F (-25˚C to 85˚C)
Storage Temperature Range:	-85˚F to 193˚F (-65˚C to 89˚C)

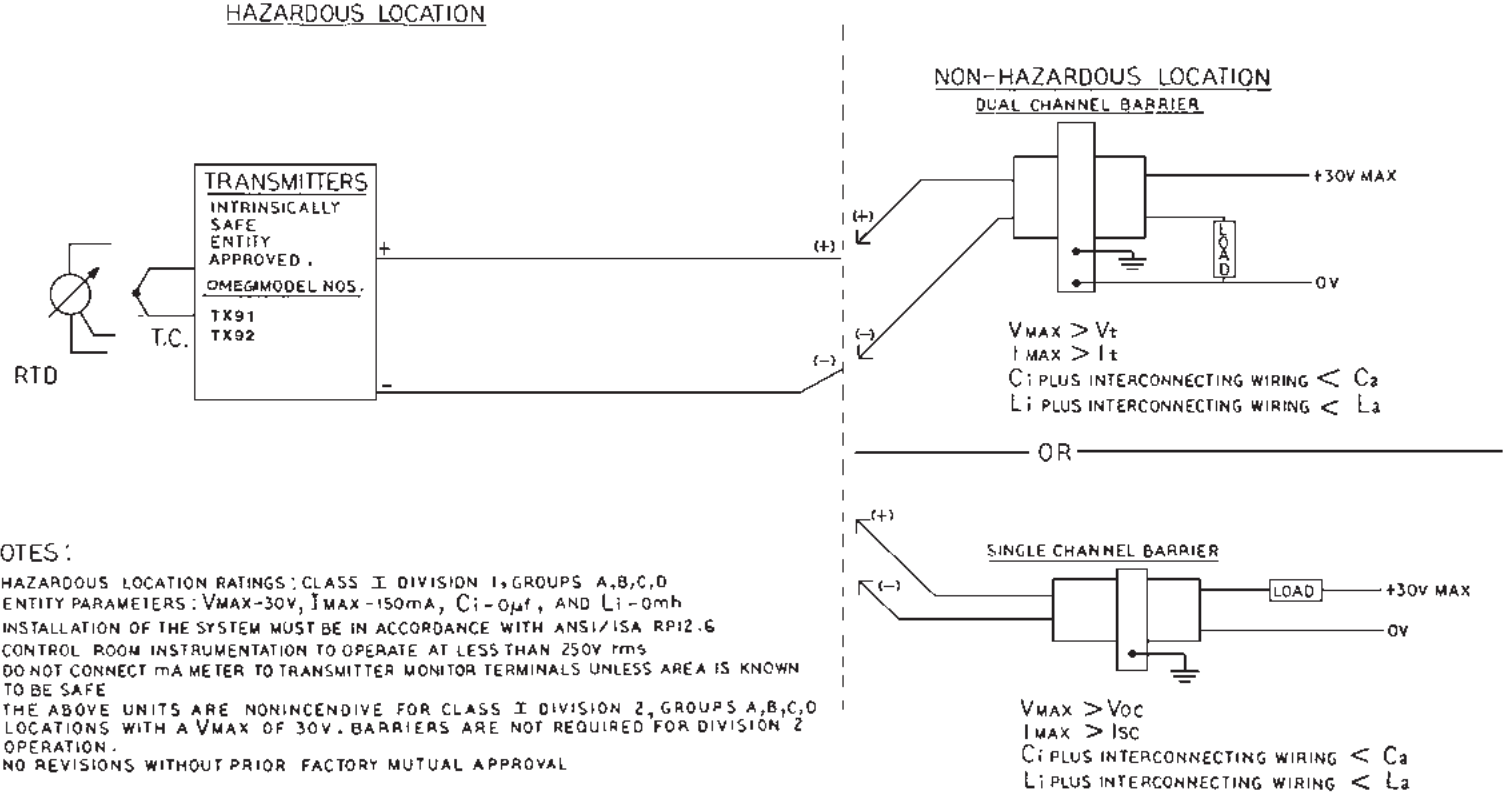
Thermal Zero Shift:	<0.01%/˚F of span (span >10 mV) <0.02%/˚F of span (span = 5 to 10 mV)
Thermal Span Shift:	<0.01%/˚F of span
Weight:	1.5 oz (50g)

Output

Current Output Span:	4-20 mA DC
Current Output Limits:	3 to 28 mA, typical
Maximum Loop Resistance:	(Vsupply – 12V)/0.020A = ohms
Load Resistance Effect:	0.05% of span per 300 ohms change
Power Supply Effect:	0.01% of output span per volt
Input Sensor:	2 or 3-wire RTD
Maximum Bridge Current:	2 mA

Appendix A

Intrinsically Safe Interconnection Diagram



NOTES:

1. HAZARDOUS LOCATION RATINGS: CLASS I DIVISION 1, GROUPS A,B,C,D
2. ENTITY PARAMETERS: VMAX-30V, IMAX-150mA, Ci-0μf, AND Li-0mh
3. INSTALLATION OF THE SYSTEM MUST BE IN ACCORDANCE WITH ANSI/ISA RP12.6
4. CONTROL ROOM INSTRUMENTATION TO OPERATE AT LESS THAN 250V rms
5. DO NOT CONNECT mA METER TO TRANSMITTER MONITOR TERMINALS UNLESS AREA IS KNOWN TO BE SAFE
6. THE ABOVE UNITS ARE NONINCENDIVE FOR CLASS I DIVISION 2, GROUPS A,B,C,D LOCATIONS WITH A VMAX OF 30V. BARRIERS ARE NOT REQUIRED FOR DIVISION 2 OPERATION.
7. NO REVISIONS WITHOUT PRIOR FACTORY MUTUAL APPROVAL

MADE IN USA

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. The OMEGA® 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; or 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.

Where Do I Find Everything I Need for Process Measurement and Control? OMEGA...Of Course!

Shop online at omega.com

TEMPERATURE

- Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- Wire: Thermocouple, RTD & Thermistor
- Calibrators & Ice Point References
- Recorders, Controllers & Process Monitors
- Infrared Pyrometers

PRESSURE, STRAIN AND FORCE

- Transducers & Strain Gages
- Load Cells & Pressure Gages
- Displacement Transducers
- Instrumentation & Accessories

FLOW/LEVEL

- Rotameters, Gas Mass Flowmeters & Flow Computers
- Air Velocity Indicators
- Turbine/Paddlewheel Systems
- Totalizers & Batch Controllers

pH/CONDUCTIVITY

- pH Electrodes, Testers & Accessories
- Benchtop/Laboratory Meters
- Controllers, Calibrators, Simulators & Pumps
- Industrial pH & Conductivity Equipment

DATA ACQUISITION

- Data Acquisition & Engineering Software
- Communications-Based Acquisition Systems
- Plug-in Cards for Apple, IBM & Compatibles
- Data Logging Systems
- Recorders, Printers & Plotters

HEATERS

- Heating Cable
- Cartridge & Strip Heaters
- Immersion & Band Heaters
- Flexible Heaters
- Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL

- Metering & Control Instrumentation
- Refractometers
- Pumps & Tubing
- Air, Soil & Water Monitors
- Industrial Water & Wastewater Treatment
- pH, Conductivity & Dissolved Oxygen Instruments

M1253/0311