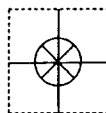
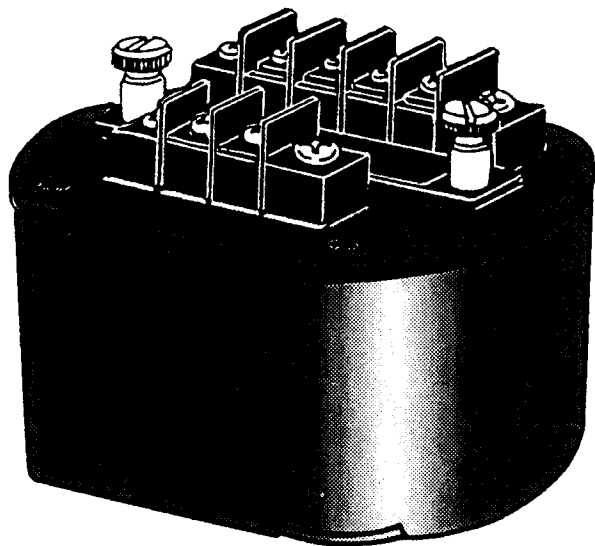


TX71, TX73, TX75 Isolated Thermocouple and RTD Transmitters



User's Guide



General Description

The OMEGA® TX70 Series Two-Wire Transmitters for thermocouples and RTD's feature DIP switch selection for input type and range. With the thermocouple models, the user may select J, K, or T input with one model, or E, R, or S with another. All models feature 80% zero and span adjustability within any user-selected input range.

Isolated models are available with any desired input, with either a 4 to 20 mA or 10 to 50 mA output signal.

The TX70 thermocouple models provide cold-junction compensation. The RTD models provide lead-length compensation for 3-wire RTD inputs, and linearize to better than 0.1% of any adjusted span for high-accuracy temperature conformity. Overall accuracy of the TX70 units (including linearity, hysteresis, and stability) is better than 0.5% of any adjusted span.

Ranging example: The 0° to 500° C range for a type K thermocouple and a minimum span of 100° C, the user may select any 100° span within that 0° to 500° C range, such as 14° to 114° C or 379° to 479° C. Note that two-wire transmitters are linearized to the voltage signal produced by a thermocouple, and not to the actual temperature.

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Input Ranges

The TX70 Series offer the user a choice of field-selectable input ranges (refer to input range tables). Top-accessed adjustments allow field calibration to obtain any span within the specified range, down to the corresponding minimum span. The input ranges are (low-end) adjustable to zero degrees for both Fahrenheit and Celsius scales. (For RTD Range 3, "zero" must be calibrated within a range of 30° to 75° F, or 0° to 25° C.) The figures shown in the Input Range Tables are not intended to indicate ° F/° C equivalence.

TX71: J,K,T, INPUT RANGE TABLE (TX72 Non-Isolated Version)

TC TYPE/ RANGE	°F		°C		TO SELECT RANGE, POSITION SWITCH:				
	MAXIMUM SPAN	MINIMUM SPAN	MAXIMUM SPAN	MINIMUM SPAN	S1	S2	S3	S4	S5
J1	0 to 900	200	0 to 500	100	ON	OFF	ON	ON	OFF
J2	0 to 1400	300	0 to 760	150	OFF	ON	OFF	ON	OFF
J3	-350 to 1100	350	-200 to 600	200	OFF	ON	OFF	OFF	OFF
K1	0 to 900	200	0 to 500	100	ON	ON	OFF	ON	ON
K2	0 to 1900	400	0 to 1000	200	OFF	ON	OFF	ON	ON
K3	0 to 2500	500	0 to 1370	300	OFF	ON	ON	ON	ON
K4	-450 to 900	400	-270 to 500	200	ON	OFF	ON	OFF	ON
T1	0 to 750	150	0 to 400	100	ON	ON	OFF	ON	ON
T2	-450 to 750	350	-270 to 400	200	ON	OFF	ON	OFF	ON

TX73: E,R,S INPUT RANGE TABLE (TX74 Non-Isolated Version)

TYPE/ RANGE	°C		°F		TO SELECT RANGE, POSITION SWITCH:				
	MAXIMUM RANGE	MINIMUM SPAN	MAXIMUM RANGE	MINIMUM SPAN	S1	S2	S3	S4	S5
E1	0 to 150	30	0 to 300	60	ON	ON	OFF	ON	OFF
E2	0 to 300	60	0 to 600	120	ON	OFF	ON	ON	OFF
E3	0 to 500	100	0 to 950	200	OFF	ON	OFF	ON	OFF
E4	0 to 1000	200	0 to 1800	400	OFF	ON	ON	ON	OFF
E5	-270 to 0	100	-450 to 0	160	ON	ON	OFF	OFF	OFF
E6	-270 to 150	150	-450 to 300	200	ON	OFF	ON	OFF	OFF
E7	-270 to 350	200	-450 to 650	350	OFF	ON	OFF	OFF	OFF
E8	-270 to 850	300	-450 to 1500	550	OFF	ON	ON	OFF	OFF
R/S1	0 to 950	220	0 to 1700	400	ON	ON	OFF	ON	ON
R/S2	0 to 1760	450	0 to 3200	750	ON	OFF	ON	ON	ON

TX75: RTD INPUT RANGE TABLE (TX76 Non-Isolated Version)

INPUT RANGE (100Ω Pt RTD)	°F		°C		TO SELECT RANGE, POSITION SWITCH:		
	MAXIMUM SPAN	MINIMUM SPAN	MAXIMUM SPAN	MINIMUM SPAN	S1	S2	S3
1	0 to 1000	200	0 to 600	120	OFF	OFF	ON
2	0 to 500	100	0 to 300	60	OFF	ON	OFF
3	30 to 130	20	0 to 50	10	ON	OFF	OFF

NOTE: Non-Isolated versions, TX72, TX74, TX76 have been discontinued.

Output Ranges

An access cover located on the top of the TX70 protects the input/output range selection switches (refer to Top View Diagrams). Switch selectable 4 to 20 mA or 10 to 50 mA outputs are provided using Switch S6 (for TX70 thermocouple models) or Switch S4 (for TX70 RTD models). The OFF (open) position selects 4 to 20 mA, and the ON (closed) position selects the 10 to 50 mA range.

Calibration

(Refer to Input Range Tables and Top View Diagrams.)

Open the access cover on the top of the unit. First select the output range using Switch S6 (thermocouple models) or Switch S4 (RTD models). The ON (closed) position selects a 10 to 50 mA output, the OFF (open) position selects a 4 to 20 mA output. Refer to the Input Ranges Tables, select the appropriate input temperature range, and position switches S1 through S5 (thermocouple models) or S1 through S3 (RTD models) as designated in the tables.

Connect the input of the TX70 to an appropriate source (voltage source calibrator, thermocouple models; resistance standard, RTD models) representing the desired minimum input. If using a thermocouple, connect to a millivolt source through an ice point reference as shown, using the proper thermocouple materials. The tables in section Z of the OMEGA Temperature Handbook can be used to set the millivolt input. A decade resistance box can be used for RTD inputs with the resistance value obtained from the Z section of the OMEGA Temperature Handbook. Measuring the output loop current, adjust the coarse zero switch to obtain an output closest to the minimum scale input (zero), which will be either 4 mA or 10 mA, depending upon which output has been selected. Adjust fine zero to obtain an exact minimum scale input reading. Note that it may become necessary to switch coarse zero up or down one position.

In some instances with the TX70 thermocouple models, because of the difference between °F and C, the unit may not reach zero (4 mA or 10 mA) when the input is near 0° F or 0° C. If this appears to be the case, turn switch S4 off and adjust the coarse zero switch several turns clockwise. Retry zero using the coarse and fine zero adjust controls. Note: these adjustments do not affect the unit's performance.

To obtain the desired full scale input (span) of either 20 mA

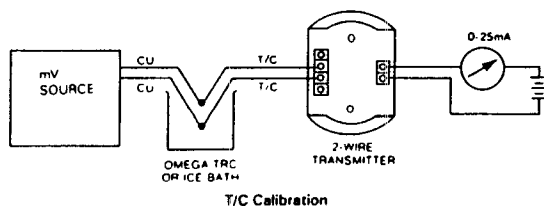
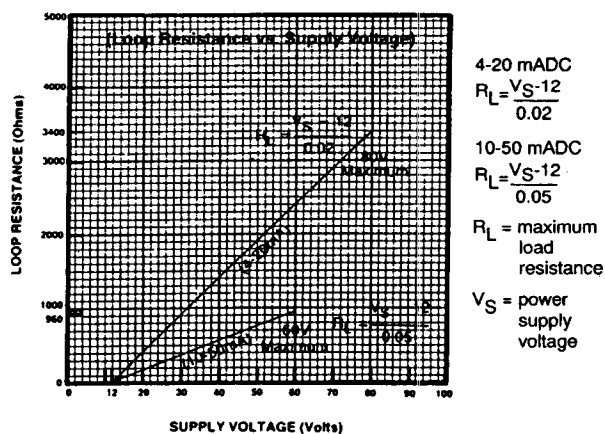
or 50 mA (depending on output scale selected), perform similar adjustments using the coarse span and fine adjustments, and trim as required.

Mounting

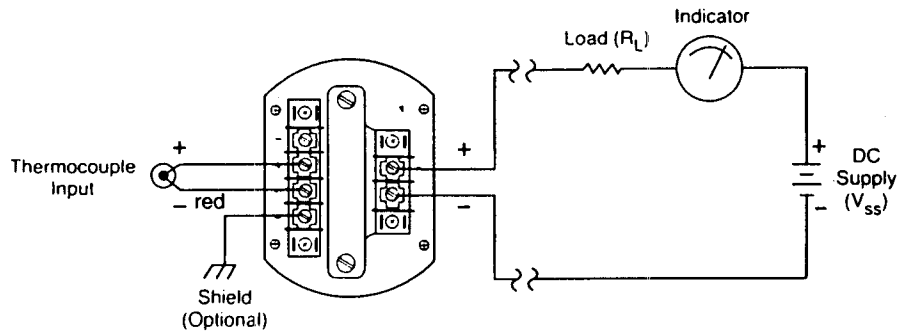
The TX70 Series Transmitters are designed for installation in industrial field environments. These units are enclosed in rugged, die-cast aluminum housings which are sealed for protection against corrosion, moisture, dust and electrical noise such as radio-frequency (rfi) and electromagnetic (emi) interference. Convenient barrier terminal strip connections are provided.

The TX70 Series fit easily into the HEP-TX70 Explosion-Proof Housing (optional). Mounting bosses located on the base of the HEP-TX70 Explosion-Proof Housing are used to seat the TX70 and prevent internal rotation. A retainer ring (see Assembly Diagram) secures the TX70 in the housing. No other internal mounting hardware is required.

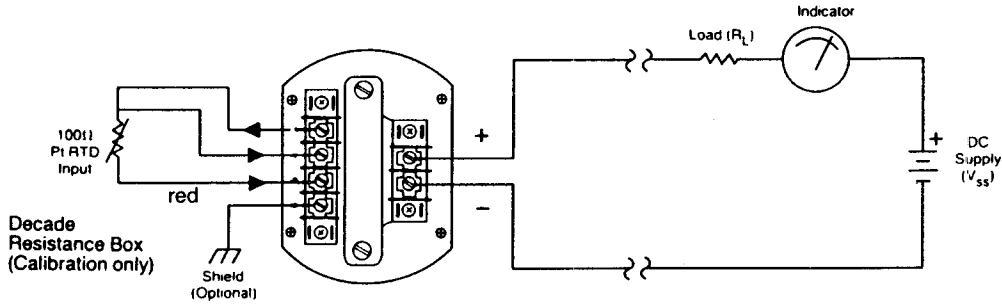
LOOP DRIVE CAPABILITY



THERMOCOUPLE MODELS TX71/73 TERMINAL WIRING

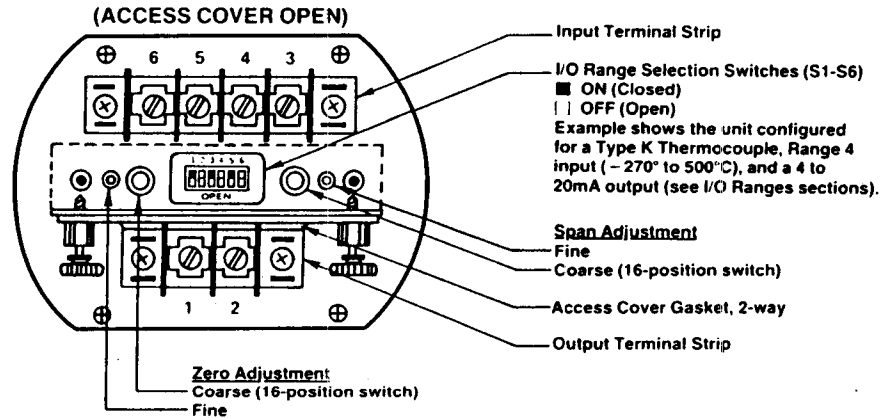


RTD MODEL TX75 TERMINAL WIRING

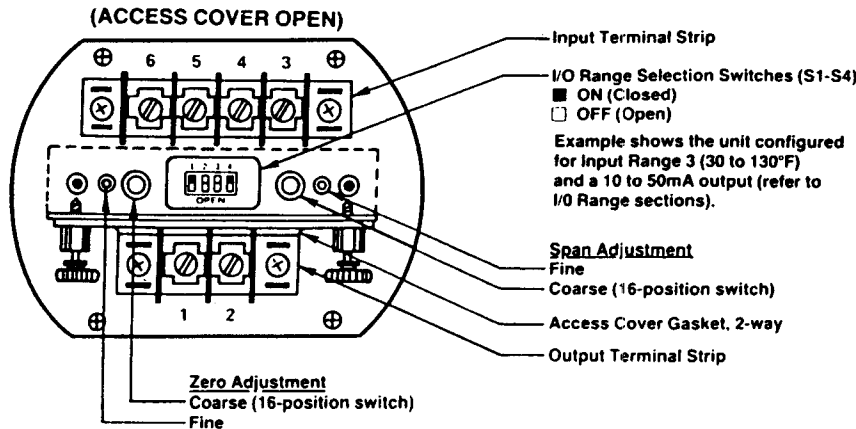


TOP VIEW DIAGRAMS

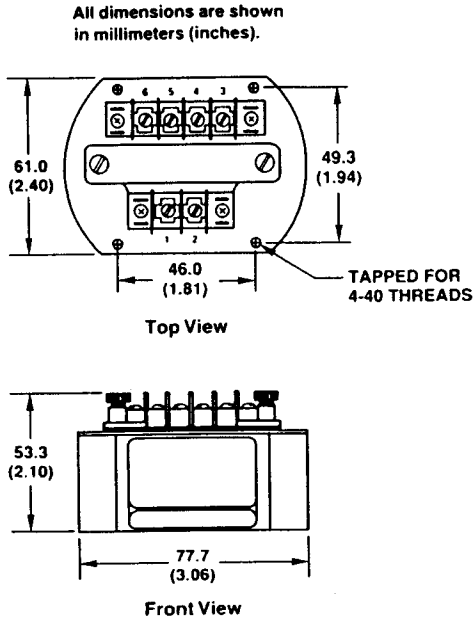
THERMOCOUPLE MODELS TX71/73



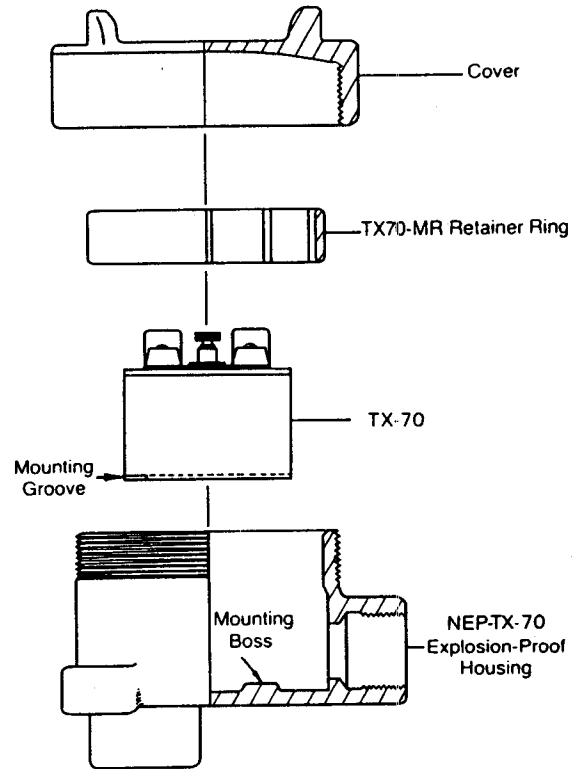
RTD MODEL TX75



DIMENSIONS



ASSEMBLY DIAGRAM



Specifications

Input Span:	Refer to Input Range Tables
Maximum Leadwire Resistance Effect:	Less than $0.25\mu\text{V}$ per ohm of thermocouple resistance; 1% of span error with up to 40 ohms per lead for RTD
Burnout Detection Current (Thermocouple Models):	250mA, maximum
Output Span:	4 to 20 mA or 10 to 50 mA, switch selectable
Minimum Output Current:	3.3 mA, typical
Maximum Output Current:	4 to 20 mA range: 24 mA, typical; 10 to 50 mA range: 58mA, typical
Excitation Current (RTD Models):	1 mA, typical
Supply Voltage Range:	4 to 20 mA: 12 to 80 Vdc, 10 to 50 mA: 12 to 60 Vdc
Max. Change in Supply Voltage Effect:	0.05% of span
Max. Change in Load Effect:	0.05% of span

Linearizing Accuracy (RTD Models):	Within 0.1% of standard R/T tables, typical; 0.2% maximum
Stability:	Zero: within 0.02% of span/ $^{\circ}\text{C}$, Span: within 0.01% of span/ $^{\circ}\text{C}$
Accuracy:	0.5% of any adjusted span
Zero and Span Adjustability:	80% of any selected range
Repeatability:	0.05% of span
Cold-Junction Error:	Type J/K/T/E/ Inputs: 1°C , typical: $0-80^{\circ}\text{C}$ ambient; 3°C , typical: $-40^{\circ}\text{C}-0$ ambient Type R/S Inputs: 2°C , typical: $0-80^{\circ}\text{C}$ ambient, 5°C , typical: $40^{\circ}\text{C}-0$ ambient
Response Time:	400ms maximum
RFI Effect (5W, 470MHz at 3-Feet):	Less than 1% of span error
Isolation (Isolated Models Only):	600 Vdc or peak ac maximum, input to output
Operating Temperature Range (Ambient):	-40° to 80°C



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 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 the product, and
3. Repair instructions and/or specific problems relative to the product.

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