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TCX 126

Two-Wire Isolated Thermocouple Transmitter Instruction Manual

1.0 INTRODUCTION

These instructions refer to the above model. Supplementary sheets are attached if the unit has special options or features. For detailed specifications, see page 4 or refer to the Data Bulletin. All ADTECH instruments are factory calibrated and supplied with a label detailing the calibration. Adjustments are normally not necessary. A simple calibration should be performed to verify calibration before installation.

2.0 GENERAL DESCRIPTION

The ADTECH Model TCX 126 Isolated Two-Wire Thermocouple Transmitter provides high accuracy conversion of ISA type J, K, T, E, R, S and B thermocouples and mv to a standard 4-20 ma dc process signal.

The TCX 126 provides 350 volts ac or 600 volts dc isolation from the input to output/power supply.

The primary features of the TCX 126 are:

- Wide range – covers the full range of ISA standard thermocouples and mv.
- Field adjustable via front accessible switches and potentiometers.
- Zero suppression of up to 100% of the major range with a 16 position switch.
- High accuracy, repeatability, and ambient temperature effect stability.
- RFI Protection: Standard.
- NO INTERACTION of zero and span controls.
- Small size - universal mounting package provides integral RFI protection and an environmental seal.
- Options for NEMA 4 and NEMA 7 housings, SNAP TRAK and DIN rail mounting (DIN 46 277 standard).

3.0 INSTALLATION

The instrument is supplied in a sturdy die cast aluminum housing with an epoxy paint finish. The housing is gasketed providing an environmental seal for the internal electronics and controls. NEMA 4, NEMA 7 and 12, Snap Track and DIN rail (TS32 and TS35) are optionally available. Installation area/ location must agree with the supplied instruments including operating temperature and ambient conditions.

Mounting

Refer to page 3 for outline and mounting dimensions. The standard instrument is surface mounted with integral #6-32 S.S. thumb screws.

Electrical Connections

The wire used to connect the instrument to the control system **Input / Output** should be twisted pair(s) and sized according to normal practice. Shielded cable is not normally necessary

(if used, the shield must be grounded at the negative input of the ADTECH instrument and left floating at the sensor).

Two barrier terminal blocks with #6-32 screws and 0.325" spacing are provided for I / O connections.

Controls

Instrument controls consist of the following:

- Two 16 position switches for **COARSE ZERO** and **SPAN** control.
- One 8 position dip switch for selection of thermocouple and major range.
- Two multiturn potentiometers; **FINE ZERO** and **SPAN** controls.

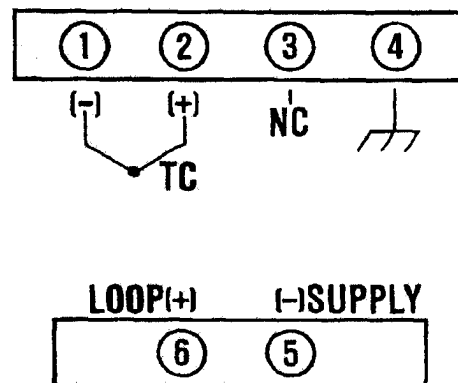
All controls are accessible through the front of the instrument. An integral gasketed cover provides an environmental seal for the controls and internal electronics when the controls are not in use.

4.0 MAINTENANCE

These instruments are electronic and require no maintenance except periodic cleaning and calibration verification. If the unit appears to be mis-operating, it should be checked as installed per section 6.0 or removed for a bench check per sections 6.0 and 7.0. MOST problems are traced to field wiring and / or associated circuits. If the problem appears to be with the instrument, proceed to sections 6.0 and 7.0.

5.0 CONNECTIONS

Standard connections are shown below and on the instrument face plate, Data Bulletin or on attached supplementary sheets.



NOTE 1: Terminal #3 should not have any customer connections.

NOTE 2: Intrinsically safe when connected per Installation DWG 270-A-000003.

6.0 CALIBRATION

All ADTECH instruments are calibrated per your instructions at the factory. A calibration sticker located on the unit identifies the model, calibration, and options present.

To perform a calibration check or re-calibration of the instrument, please follow this procedure.

- A. Make sure the unit I / O wiring is properly connected and that the correct power source per the label is also connected. The instrument must be at normal power for a minimum of 2 minutes before proceeding to B.
- B. The input signal source must be adjustable from 0 to 100% in steps of 10% or at least 25%. The source should be either precalibrated or an accurate meter must be used to monitor the input. The input signal needs to conform to an acceptable method of simulating a thermocouple signal.
- C. The output may be monitored as a current that can be represented as a voltage across a resistor shunt.
- D. Set s1 - positions 1 through 4 - to the desired thermocouple setting (see section 8). Set the desired burnout action (s1 - position 5) and the major range (s1 - positions 7 and 8). If you are measuring negative temperatures, you may need to set s1 - position 6 to elevate the signal by 20 mv.
- E. Apply an input corresponding to the zero input temperature. Rotate the FINE ZERO control fully counterclockwise. Rotate the COARSE ZERO switch to a position where the zero level just goes above 4.00 ma output. Rotate the COARSE ZERO switch back one number less than the previous position (but not less than zero).
- F. With the input set at the zero input, adjust the fine ZERO control for 4.00 ma to the desired accuracy.
- G. Apply an input corresponding to the full scale input temperature. Rotate the fine SPAN control fully counterclockwise. Rotate the coarse SPAN switch to a position where the output just exceeds 20.00 ma output. Rotate the switch back one number less (but not less than 0).
- H. With the input set to the full scale input, adjust the fine span control for 20.00 ma to the desired accuracy.
- I. Repeat steps F and H until the readings remain within to desired calibration accuracy.
- J. Check the instrument at the 25-50-75% input settings minimum.

7.0 FIELD TROUBLE SHOOTING GUIDE

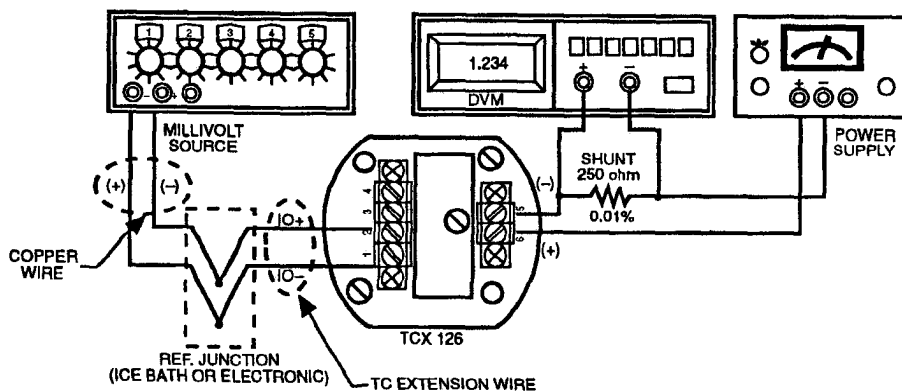
This section offers a simple, first level trouble-shooting aid for an apparent instrument malfunction.

SYMPTOM	CORRECTIVE ACTION
No output	<ol style="list-style-type: none"> 1. Check the input and output connections carefully. 2. Check that the power supply polarity is correct and that the output loop power is present on the indicated terminals. 3. Check that the input source is correct and that it changes magnitude between zero and full scale values when so adjusted. 4. Make sure the output loop is complete and that the correct meter range is selected. <p>All external checks are complete. Problem seems to be internal.</p>

The instrument is environmentally sealed. Troubleshooting beyond the above may be difficult without special equipment. We do not recommend attempting repair of the unit in the field. ADTECH offers a very responsive repair policy.

WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.

AVERTISSEMENT: LA SUBSTITUTION DE COMPOSANTS PEUT COMPROMETTRE LA SECURITE INTRINSEQUE.



Typical Test Connection

8.0 TABLES, OUTLINE / MOUNTING

Note: If 20mv elevation is used, zero offset is calculated as (ZERO INPUT + 20mv)

Example: Input = -5mv + 20mv = 15mv

T/C TYPE	1	2	3	4
B/MV	OFF	OFF	OFF	OFF
R/S	ON	OFF	OFF	OFF
T/K	OFF	ON	OFF	OFF
J	OFF	OFF	ON	OFF
E	OFF	OFF	OFF	ON

BURNOUT Upscale OFF
Downscale ON

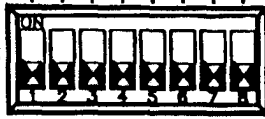
20 mv Elevation Switch ON Only
(if minimum input is below 0°C or 32°F).

MAJOR RANGE*	7	8
10 mv	ON	OFF
30 mv	OFF	ON
100 mv	OFF	OFF

Coarse



ZERO
Fine



S1

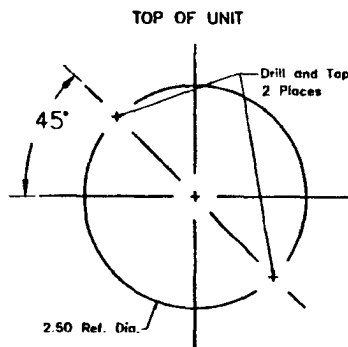


Coarse

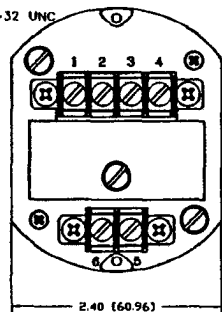
ZERO
Fine

*Major Range - Select the value that is just larger than the required span or zero offset

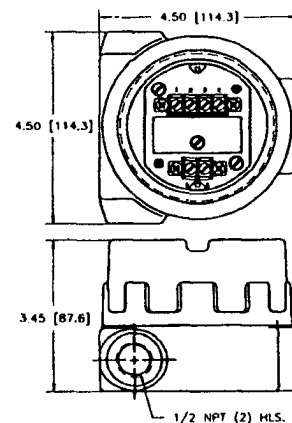
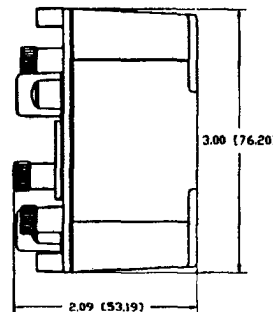
OUTLINE & MOUNTING



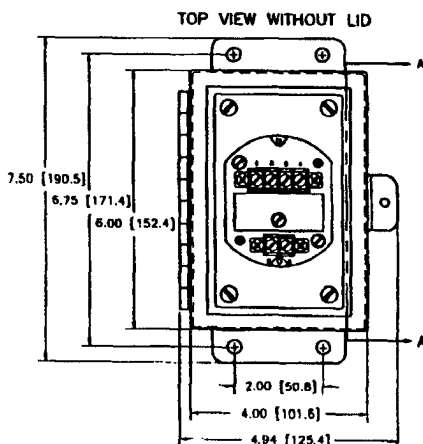
SURFACE MOUNT
STANDARD HOUSING



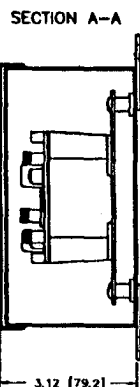
STANDARD
HOUSING



EXPLOSION PROOF
HOUSING OPTION



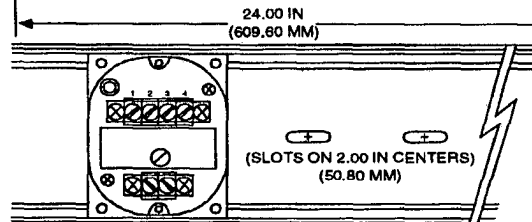
NEMA 12 = Option H144; NEMA 4 = H13A



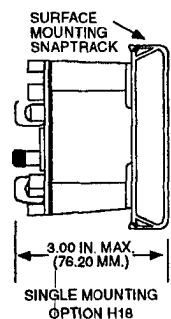
NEMA 4/12

MULTIPLE MOUNTING OPTION H 19 (8 UNITS MAX IN 24 IN. LENGTH)

NOTE: Option H22 must be ordered for Snap Track Utilization



SNAP TRACK



9.0 SPECIFICATIONS

INPUT/OUTPUT

INPUT SIGNALS

- a. Thermocouple and mv, all standard ISA Calibration (B, E, J, K, R, S, T), -20 mv to 100 mv spans (Z in greater than 1 megohm)
- b. Zero Suppression: up to 100% of the major range selected in 16 divisions of the coarse zero adjustment switch.
- c. Span: from 0.5 mv to 100 mv full scale—switch selectable. The coarse span switch adds 16 divisions to each major range.
- d. Upscale/Downscale Burnout Protection: standard
Burnout current: 0.1 micro amperes—nominal

OUTPUT SIGNALS

- a. 4-20 ma dc

OUTPUT LOOP DRIVE CAPABILITY

$$R(\text{ohm}) = \frac{(V \text{ supply} - V \text{ minimum}) 1000}{I \text{ out max. ma}}$$

$$V \text{ minimum} = 8.0 \text{ vdc}$$

I out	4 - 20 ma			
V supply	12	24	36	42
R (ohm)	200	800	1400	1700

PERFORMANCE

- a. **Calibrated Accuracy:** $\pm 0.1\%$
- b. **Independent Linearity:** $\pm 0.01\%$ maximum, $\pm 0.006\%$ typical (14 bit digital linearity)
- c. **Repeatability:** $\pm 0.005\%$ maximum; $\pm 0.002\%$ typical
- d. **Zero TC:** $\pm \left(\frac{.025}{\text{input span (MV)}} + 0.007 \right) \% \text{ of span max/}^\circ\text{C}$
- e. **Span TC:** $\pm 0.008\%$ of span max/ $^\circ\text{C}$
- f. **Load Effect:** $\pm 0.005\%$ zero to full load
- g. **Output Ripple:** 10 mv P/P maximum
- h. **Response Time:** 110 milliseconds (10 to 90% step response)
- i. **Bandwidth:** (-3 db): 3.2 Hz
- j. **Temperature Range:** -25 $^\circ$ to 185 $^\circ$ F (-31 $^\circ$ to 85 $^\circ$ C) operating
-40 $^\circ$ to 200 $^\circ$ F (-40 $^\circ$ to 93 $^\circ$ C) storage
- k. **Power Supply Effect:** $\pm 0.005\%$ over operating range
- m. **Isolation:** Input/output/case: 600 vdc or 350 vac

n. **Cold Junction Compensation Error:** $\pm 1.5^\circ\text{C}$ max (0 $^\circ$ to 50 $^\circ\text{C}$)

o. **Burnout Current:** 0.1 micro amperes—nominal

Note: All accuracies are given as a percentage of span

POWER

- a. 8 to 42 vdc—standard

MECHANICAL

- a. Electrical Classification: general purpose, CSA pending
- b. Connection: Barrier terminal strips (0.325" spacing, No. 6 screws)
- c. Controls: One 8 position dip switch for major range
Two 16 position rotary switches for **COARSE ZERO** and **SPAN** control
Two multiturn potentiometers for **FINE ZERO** and **SPAN** control
- d. Mounting: Surface, Snap-Track, DIN or NEMA 4, 7 & 12
- e. Weight: Net Unit: 8 oz. (228 grams)
Shipping: Nominal 1 pound (455 grams)

OPTIONS

<u>Option Number</u>	<u>Description</u>
H 13 through H 20	Mounting