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TCX 226

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 226 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 226 provides 600 volts ac or 1000 volts dc isolation from the input to output/power supply.

The primary features of the TCX 226 are:

- Wide range—covers the full range of ISA standard thermocouples and mv.
- Field adjustable via plug in jumpers 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 Resistant.
- NO INTERACTION of zero and span controls.
- Small size—DIN mounting package provides. Only 1" w x 3.1" h x 3.6" d.
- Options for NEMA 4 and NEMA 7 housings, SNAP TRACK and surface mounting.

3.0 INSTALLATION

The instrument is supplied in a non-metallic general purpose DIN rail mount enclosure as standard. NEMA 4, 7 or 12 enclosures are optionally available. Installation area/location must agree with the supplied instruments including operating temperature and ambient conditions. For detailed mounting and installation information refer to page 4 inside.

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).

A six position compression terminal block is provided for the I/O and power connections. A housing ground terminal is not required due to non-metallic housing.

Controls

Instrument controls consist of the following:

- Two 16 position switches for **COARSE ZERO** and **COARSE SPAN** control.
- One 4 position jumper for selection of major range.
- One 4-position jumper for TC-type.
- One 2-position jumper for 20 mv elevation.
- Two multiturn potentiometers; **FINE ZERO** and **SPAN** controls.

The FINE ZERO and SPAN controls are accessible through the front of the instrument.

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.



6.0 CONFIGURATION

All ADTECH units are factory calibrated per P.O. instructions. Usually, a complete recalibration is not required unless you want to change input type, output type, or the range of the unit. A calibration sticker located on the unit identifies the model, calibration and options present. If recalibration to the same range is required, follow section 6.1.

For new range:

- A. Open the case to gain access to the unit's pc boards. The larger pc board is the input pcb and the smaller pc board is the output/power.
- B. To determine the MAJOR RANGE setting calculate:
 1. Input Span (mV) = millivolts full scale – millivolts zero scale.
 2. Input Zero (mV) = millivolts zero scale.
 3. The Major range is the number from Table 1 that is just larger (in magnitude) of the two calculations above. Set the jumper in Table 1 to the major range determined.
- C. If the input range includes readings below 0°C (32°F) you must set the Input Zero Control for 20 mV elevation, otherwise set it to 0mV elevation. See Table 2 for the jumper setting.
- D. Select the TC burnout action from Table 3.
- E. Select the TC type from Table 4.

6.1 CALIBRATION

To perform a calibration check or re-calibration of the instrument, 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 or as a voltage across a resistor shunt, e.g. 1-5 vdc across 250 ohms.

- D. Apply an input corresponding to the zero input temperature. Rotate the **FINE ZERO** control fully counterclockwise. Rotate the **COARSE ZERO** switch(SW1) 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).
- E. With the input set at the zero input, adjust the **fine ZERO** control for 4.00 ma to the desired accuracy.
- F. Apply an input corresponding to the full scale input temperature. Turn the **FINE SPAN** control fully counterclockwise. Turn the **COURSE SPAN** switch(SW2) to a position where the output just exceeds 20.00 ma output. Turn the switch back one number less (but not less than 0).
- G. With the input set to the full scale input, adjust the fine span control for 20.00 ma to the desired accuracy.
- H. Repeat steps E and G until the readings remain within to desired calibration accuracy.
- I. 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

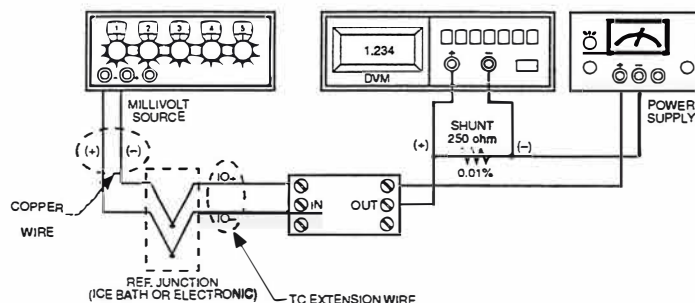
CORRECTIVE ACTION

No output

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.

All external checks are complete. Problem seems to be internal.

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.



Typical Test Connection

8.0 TABLES, OUTLINE / MOUNTING

**TABLE 1
MAJOR RANGE**

10mV	J2-B
30mV	J2-A
100mV	J2-D
Reserved	J2-C

**TABLE 2
INPUT ZERO
ELEVATION CONTROL**

20mV	J3-A
0mV	J3-B

**TABLE 3
TC BURNOUT ACTION**

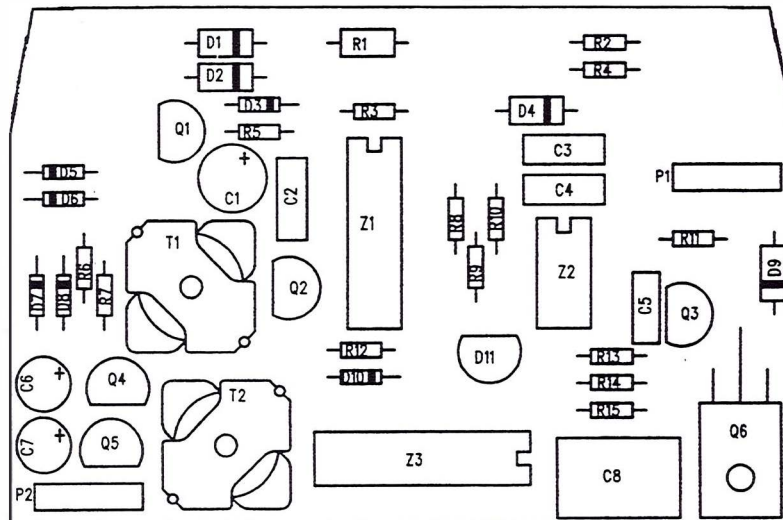
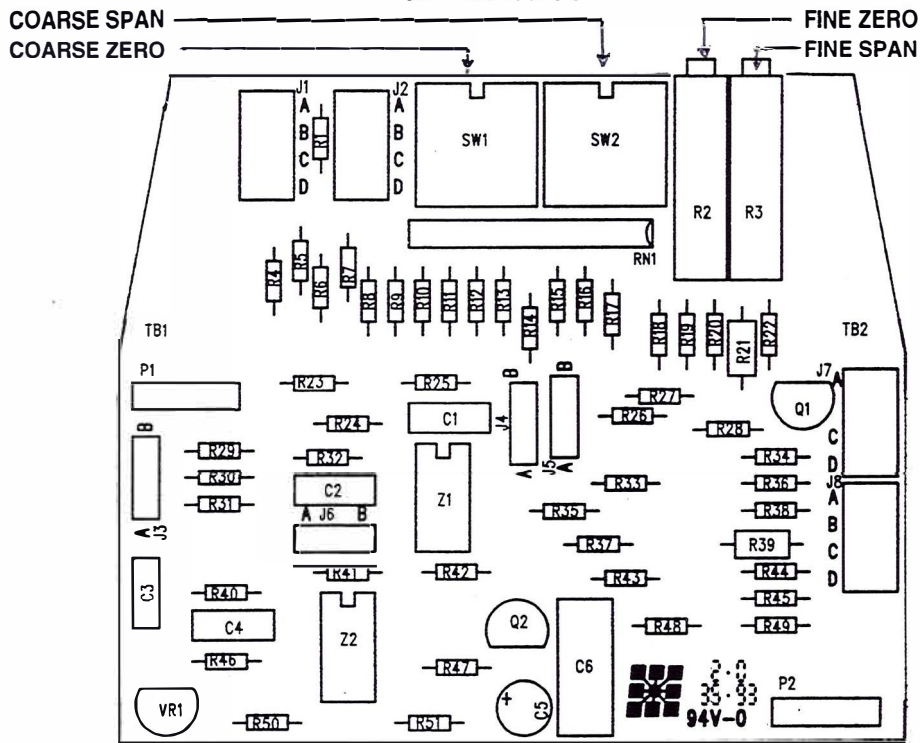
Up Scale	J5-A
Down Scale	J5-B

**TABLE 4
TC TYPE**

E	J1-A
J	J1-B
T, K	J1-C
R, S	J1-D
B	J1-Out

Jumper J6: A Fixed

8.1 PCB LAYOUT



9.0 SPECIFICATIONS

INPUT/OUTPUT

INPUT SIGNALS

- 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)
- Zero Suppression: up to 100% of the major range selected in 16 divisions of the coarse zero adjustment switch.
- Span: from 0.5 mv to 100 mv full scale—switch selectable. The coarse span switch adds 16 divisions to each major range.
- Upscale/Downscale Burnout Protection: standard Burnout current: 0.1 micro amperes—nominal

OUTPUT SIGNALS

- 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 minimum = 8.0 vdc

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

PERFORMANCE

- Calibrated Accuracy: $\pm 0.1\%$ (of mv input)
- Independent Linearity: $\pm 0.01\%$ maximum, $\pm 0.006\%$ typical (14 bit digital linearity)
- Repeatability: $\pm 0.005\%$ maximum; $\pm 0.002\%$ typical

- Zero TC: $\pm \left(\frac{.025}{\text{input span (MV)}} + 0.007 \right) \% \text{ of span max/}^\circ\text{C}$
 - Span TC: $\pm 0.008\% \text{ of span max/}^\circ\text{C}$
 - Load Effect: $\pm 0.005\% \text{ zero to full load}$
 - Output Ripple: 10 mv P/P maximum
 - Response Time: 110 milliseconds (10 to 90% step response)
 - Bandwidth: (-3 db): 3.2 Hz
 - Temperature Range: -25° to 185°F (-31° to 85°C) operating
-40° to 200°F (-40° to 93°C) storage
 - Power Supply Effect: $\pm 0.005\% \text{ over operating range}$
 - Isolation: Input/output/case: 1000 vdc or 600 vac
 - Cold Junction Compensation Error: 1.5°C max (0° to 50°C)
 - Burnout Current: 0.1 micro amperes—nominal
- Note: All accuracies are given as a percentage of span

POWER

- 8 to 42 vdc—standard

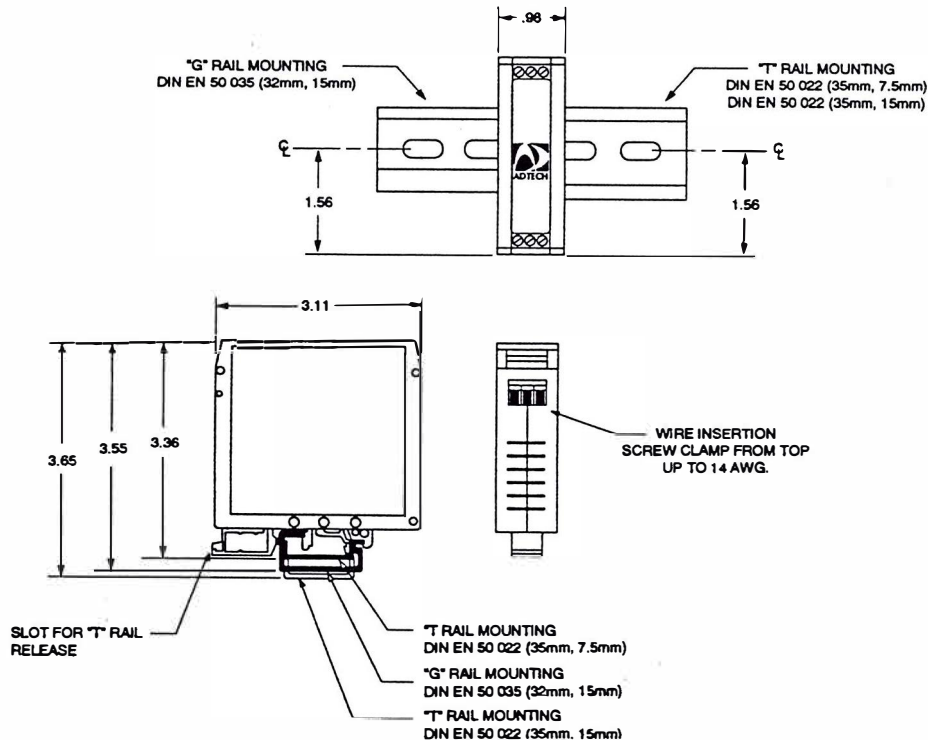
MECHANICAL

- Electrical Classification: General purpose
- Connection: Screw, compression type, accepts up to 14 AWG
- Controls: Refer to page 1
- Mounting: DIN, Surface, Snap-Track, or NEMA 4, 7 or 12
- Weight: Net Unit: 4 oz. (115 grams)
Shipping: Nominal 7 oz. (200 grams)

OPTIONS

Option Number	Description
H 15D, H 25 - H30	Mounting
LPI 40D	Loop Indicator

10.0 OUTLINE & MOUNTING



OPTIONAL MOUNTINGS – see separate drawings provided or request from the factory

Option	H-15	D Explosion Proof, Class 1, Group B, C & D
Option	H-25	Snap Track Mounting N/C (Specify)
Option	H-26	Surface Mounting N/C (Specify)
Option	H-27	NEMA 4 Enclosure
Option	H-29	T35 DIN T rail 2 Ft. Long
Option	H-30	T32 DIN G rail 2 Ft. Long