



Isolated Transmitters



150T Series Thermocouple Input

Input Ranges

Thermocouple types J, K, T, R, S, E, B

Output Range

4 to 20mA DC

Power requirement

12 to 50V DC, loop-powered

Approvals (CSA, FM)

Int. Safe (Class I, Div. 1); Haz. Loc. (Class I, Div. 2)

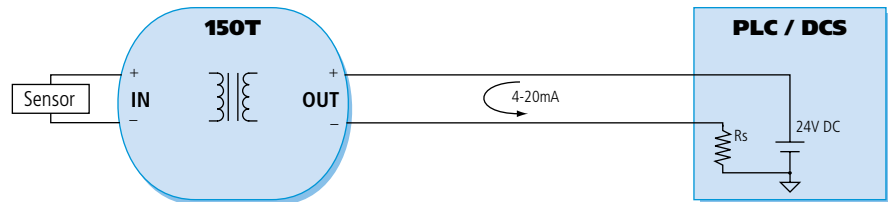
Description

These loop-powered transmitters convert thermocouple inputs to process current output signals. The output is linear to the millivolt signal generated by the thermocouple sensor. Output and power share the same pair of wires.

These two-wire transmitters deliver outstanding performance and a broad range of flexibility. Superior temperature performance is achieved by compensating for the temperature difference at the reference junction. Acromag's technique approximates the curve of the signal at the reference junction to deliver better accuracy than competitive units using linear compensation. The result is less drift and better accuracy.

Series 150T transmitters are ideal for remote or control room mounting. They feature rugged construction and remain stable even in harsh industrial environments.

150T Loop-Powered Transmitter



Special Features

- Excellent accuracy and stability ensure reliable measurements in harsh industrial environments.
- RFI and EMI resistance minimize the effects of noise.
- Isolated inputs prevent ground loops.
- Wide range zero and span adjustment enable precise calibration.
- Isolated inputs prevent ground loops.
- Thermocouple reference junction compensation reduces temperature drift and correct nonlinearity.
- Thermocouple break detection indicates open circuit failures with field-selectable upscale/downscale operation.

Performance

Reference Test Conditions

Input: 0-10mV with 100 ohm resistive source.

Output: 4-20mA into 500 ohm load.

Ambient temperature: 77°F (25°C).

Power supply: 24V DC supply.

Input

Input Range

Input span and zero are full range adjustable. Narrow span units ("S" prefix) handle 2-5mV spans with range factory calibrated to customer specifications.

-J (TC Type J):

Span: 100 to 760°C (180 to 1368°F)

Zero: -100 to 450°C (-148 to 842°F)

-K (TC Type K):

Span: 100 to 1200°C (180 to 2160°F)

Zero: -100 to 600°C (-148 to 1112°F)

-T (TC Type T):

Span: 150 to 400°C (270 to 720°F)

Zero: -150 to 300°C (-238 to 572°F)

-E (TC Type E):

Span: 100 to 700°C (180 to 1260°F)

Zero: -100 to 350°C (-148 to 662°F)

-R (TC Type R):

Span: 550 to 1750°C (990 to 3150°F)

Zero: 0 to 1200°C (32 to 2192°F)

-S (TC Type S):

Span: 550 to 1750°C (990 to 3150°F)

Zero: 0 to 1200°C (32 to 2192°F)

-B (TC Type B):

Span: 1000 to 1820°C (1800 to 3276°F)

Zero: 0 to 1000°C (32 to 2192°F)

Input Impedance

100K ohm at 10mV span; input current, +100nA, typical, includes thermocouple break detection current.

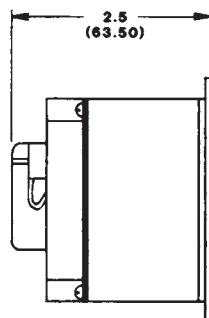
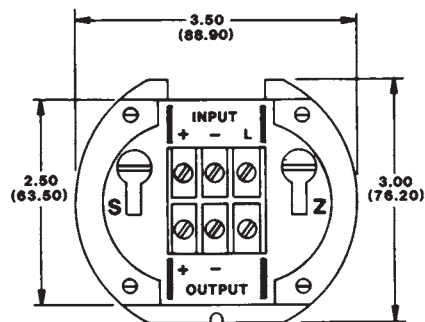
TC Reference Junction Compensation

Standard on all units and functional over entire operating temperature range. Includes unique circuitry to correct for reference junction non-linearity over ambient temperature.

Thermocouple Break Detection

Upscale or downscale, jumper selectable.

150T Dimensions



Dimensions are in inches (millimeters).



■ Performance (continued)

■ Output

Output Range

4-20mA DC output linear with input voltage signal.

Output Limits (approximate)

3.8mA DC to 30mA DC

Output Ripple

Less than 0.5% of maximum output span. Can be reduced to less than 0.1% by adding a 1 μ F capacitor across the load resistor.

Current Drive Capability

$R_{LOAD} (max.) = (V_{SUPPLY} - 12V)/20mA$.

At $V_{SUPPLY} = 24V$, $R_{LOAD} = 0$ to 600 ohms

Load Resistance Effect

Less than 0.005% of output span for 100 ohm change.

Accuracy

$\pm 0.1\%$ of calibrated span or 0.01 mV, whichever is greater. The error includes combined effects of transmitter repeatability, hysteresis, and terminal point linearity (conformity instead of linearity for thermocouple input), and adjustment resolution. Does not include sensor error.

Response Time

For a step input, the output reaches 98% of output span in 300ms, typical.

■ Power

Power Supply

External loop power supply required: minimum 12V DC, maximum 50V DC. Under no circumstances must the DC supply ever exceed 100 volts peak instantaneously. Unit has reverse polarity protection.

Power Supply Effect

DC Volts: $\pm 0.001\%$ of output span per volt DC.

60/120 Hz ripple: $\pm 0.01\%$ of span per volt peak to peak of power supply ripple.

■ Environmental

Ambient Temperature Range

-15 to 185°F (-25 to 85°C)

Ambient Temperature Effect

Less than $\pm 0.01\%$ of output span per °F ($\pm 0.018\%$ per °C) over ambient temperature range for reference test conditions; $\pm 0.025\%$ of output span per °F ($\pm 0.045\%$ per °C) for narrow span units at 5mV span. (Specification includes combined effects of zero and span over temperature, and reference junction errors.)

Isolation

Input circuit is electrically isolated from output/ power circuits allowing the input to operate at up to 250V AC or 354V DC off ground on a continuous basis (will withstand 1500V AC dielectric strength test for one minute without breakdown). Complies with test requirements outlined in ANSI C39.5-1974 for the voltage rating specified.

Noise Rejection

Common Mode: 130dB at 60 Hz, 100 ohm unbalance, typical.

Normal Mode: 30dB at 60 Hz, 100 ohm source, typical.

RFI Resistance

Less than $\pm 0.5\%$ of output span with RFI field strengths up to 10V/meter at frequencies of 27, 151 and 467 MHz.

EMI Resistance

Less than $\pm 0.25\%$ of output span effect with switching solenoids or commutator motors.

Surge Withstand Capability (SWC)

Input/Output terminations rated per ANSI/IEEE C37.90-1978. Unit is tested to a standardized test waveform that is representative of surges (high frequency transient electrical interference), observed in actual installations.

Approvals (CSA, FM)

Intrinsically Safe

Class I; Division 1; Groups A, B, C, D.

Hazardous Location

Class I; Division 2; Groups A, B, C, D.

■ Physical

Case

Self-extinguishing polypropylene UL94 V-0, recognized by CSA, color blue.

Printed Circuit Boards

Military grade FR-4 epoxy glass circuit board.

Connections

Barrier-type terminal strip using No. 6 screw & clamp plates. Wire range 12-26 AWG.

Environmental Protection

Water resistant enclosures, PC Boards are coated with fungus resistant acrylic conformal coating. Gasket material: silicon rubber.

Mounting Position Effect

Position insensitive.

Shipping Weight

One (1) pound (0.45 kg.) packed.

■ Ordering Information

Transmitter Models

NOTE 1: To add factory calibration, append "-C" to end of model number. Specify ranges on order.

NOTE 2: For agency approvals, add "CSA-" or "FM-" prefix to model number (e.g. FM-150T-J-I-20).

150T-J-I-20

150T-SJ-I-20-C* (for 90°C spans or smaller)

Transmitter, TC Type J input.

150T-K-I-20

150T-SK-I-20-C* (for 120°C spans or smaller)

Transmitter, TC Type K input.

150T-T-I-20

150T-ST-I-20-C* (for 115°C spans or smaller)

Transmitter, TC Type T input.

150T-R-I-20

150T-SR-I-20-C* (for 550°C spans or smaller)

Transmitter, TC Type R input.

150T-S-I-20

150T-SS-I-20-C* (for 575°C spans or smaller)

Transmitter, TC Type S input.

150T-E-I-20

150T-SE-I-20-C* (for 80°C spans or smaller)

Transmitter, TC Type E input.

150T-B-I-20

150T-SB-I-20-C* (for 1000°C spans or smaller)

Transmitter, TC Type B input.

Ordering Notes:

* Transmitters with narrow span input require factory calibration (-C suffix is already included in model number). Specify ranges on order.

Accessories

Power supplies

See Power Supplies on page 213.

150T-N4

NEMA 4 enclosure, water-tight.

150T-N12

NEMA 12 enclosure, oil-tight.

150T-XJSM-WM

150T-XJSM-PM

Explosion-proof enclosure (-WM for wall-mount or -PM w/pipe-mount hardware).

150T-SM-3.5

150T-SM-24

Mounting rail, 3.5" (holds one 150T) or 24" long.

150T-MSM

Metal surface mounting bracket.

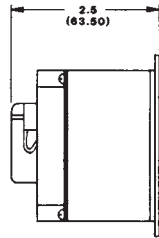
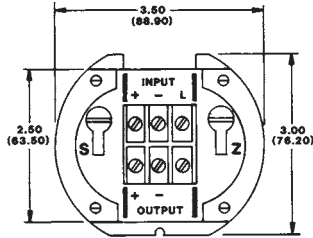
150T-DRA

DIN rail adapter.

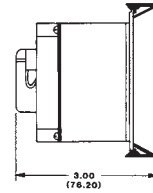
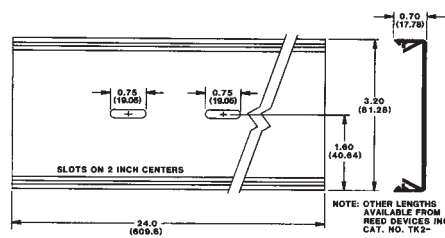


100T, 150T, 150I Dimensions

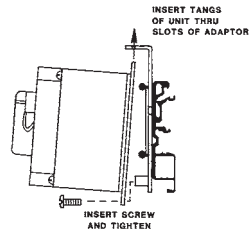
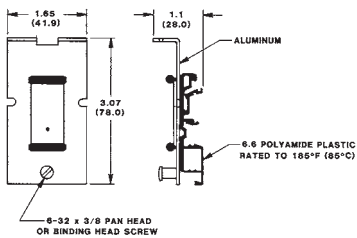
100T/150T/150I Housing



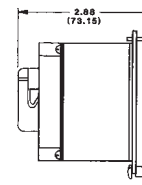
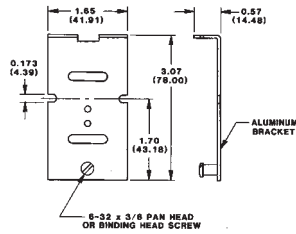
150T-SM-24 Mounting Rail



150T-DRA Adapter



150T-MSM Bracket



150T-N4, NEMA4 150T-N12, NEMA12

