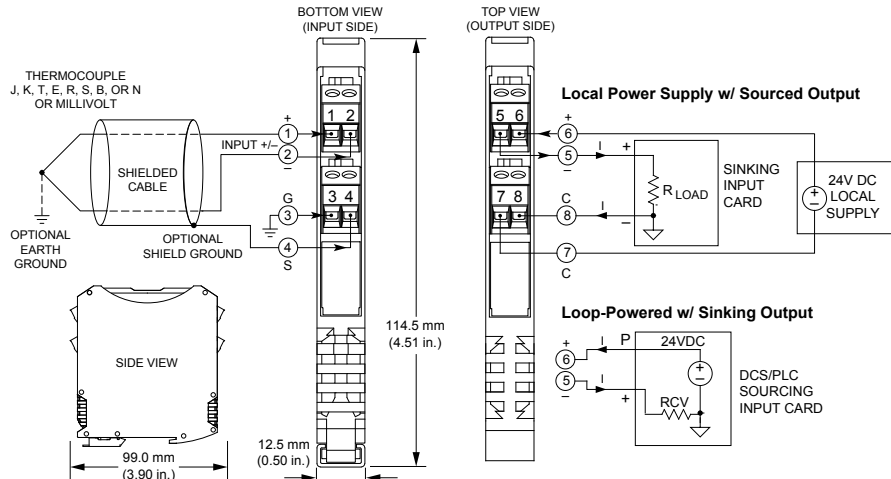


# Transmitters: TT230 Series

**TT233** Thermocouple/millivolt input two-wire/three-wire transmitter



Universal thermocouple or  $\pm 100\text{mV}$  input ◆ 4-20mA output (sink/source) ◆ 12-32V DC loop/local power

## Description

The TT233 model is a space-saving two-wire transmitter that isolates and converts a millivolt or thermocouple sensor input to a proportional 4-20mA control signal. Power is received from the output loop current or a DC supply when using a three-wire connection. The transmitter performs thermocouple linearization, cold-junction compensation, and lead-break detection.

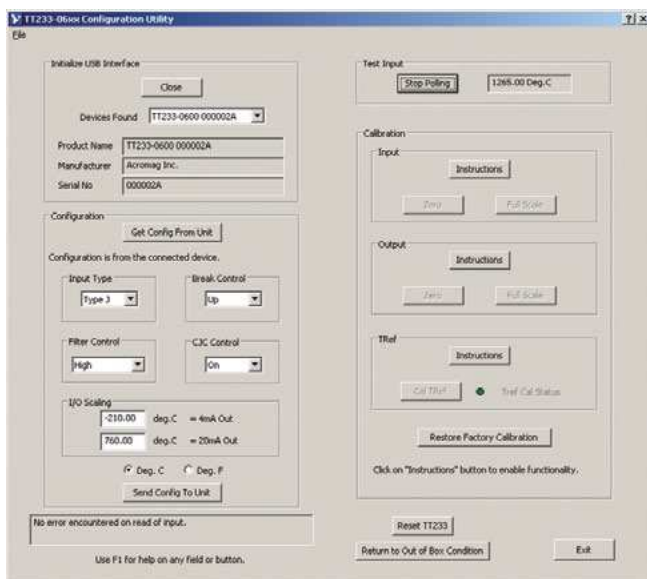
High-voltage isolation separates the input from the output circuit. Isolation protects from surges, reduces noise, and eliminates ground loop errors.

Setup and calibration are fast and easy with a convenient USB connection to your PC and Acromag's Windows configuration software.

Advanced signal processing capabilities, variable range input, and convenient USB programming make this instrument a very versatile temperature measurement device. These transmitters can withstand harsh industrial environments and operate reliably across a wide temperature range with very low drift. They feature RFI, EMI, ESD, EFT, and surge protection plus low radiated emissions.

## Key Features & Benefits

- Easy setup and digital calibration via USB with Windows configuration software
- Universal thermocouple or millivolt input (TC Type J, K, T, R, S, E, B, N or  $\pm 100\text{mV}$ )
- Space-saving 12.5mm (0.5 inch) unit with pluggable terminals for convenient wiring
- High accuracy, linearity, stability, and reliability
- Low temperature drift ( $<80\text{ppm}/^\circ\text{C}$ )
- User-selectable filtering (none, low, med., high)
- Supports sink or source output wiring
- Supports reverse-acting (inverse) output
- Selectable upscale or downscale operation for sensor errors and lead-break detection
- 1500V input isolation
- NAMUR-compliant output loop current
- Shock (50g) and vibration (5g) resistant
- Mounts on Type T DIN-rail
- Wide ambient operation ( $-40$  to  $80^\circ\text{C}$ )
- CE compliant. UL/cUL Class 1 Div 2 Zone 2 approvals



TT230 Series Transmitter Configuration Software is downloadable (FREE) from [www.acromag.com](http://www.acromag.com).  
Windows XP, Vista, 7, & 8

TT233 Model software allows you to configure transmitters offline, save the file, and download settings into units later, at your convenience.

**Acromag**   
THE LEADER IN INDUSTRIAL I/O

Tel 248-295-0880 ■ Fax 248-624-9234 ■ [sales@acromag.com](mailto:sales@acromag.com) ■ [www.acromag.com](http://www.acromag.com) ■ 30765 Wixom Rd, Wixom, MI 48393 USA



# Transmitters: TT230 Series

## TT233 Thermocouple input two-wire/three-wire transmitter

### Performance Specifications

**IMPORTANT:** To prevent damage or errors from grounded PCs and surges, Acromag strongly recommends use of their USB-ISOLATOR when configuring a TT230 Series transmitter.

#### ■ USB Interface

##### USB Connector

USB Mini-B type socket, 5-pin.

##### USB Data Rate

12Mbps. USB v1.1 and 2.0 compatible.

##### USB Transient Protection

Transient voltage suppression on power and data lines.

##### USB Cable Length

5.0 meters maximum.

##### Driver

Not required. Uses built-in Human Interface Device (HID) USB drivers of the Windows operating system.

#### ■ Input

##### Default Configuration/Calibration

Input: TC J, -210 to 760°C, high filter, Break: up

Output: 4 to 20mA.

##### Input Ranges and Accuracy

Input	Range	Accuracy
TC J	-210 to 760°C (-346 to 1400°F)	±0.5°C
TC K	-200 to 1372°C (-328 to 2502°F)	±0.5°C
TC T	-260 to 400°C (-436 to 752°F)	±0.5°C
TC R	-50 to 1768°C (-58 to 3214°F)	±1.0°C
TC S	-50 to 1768°C (-58 to 3214°F)	±1.0°C
TC E	-200 to 1000°C (-328 to 1832°F)	±0.5°C
TC B	260 to 1820°C (500 to 3308°F)	±1.0°C
TC N	-230 to 1300°C (-382 to 2372°F)	±1.0°C
mV	-100 to 100mV	±0.1mV

Error includes the effects of repeatability, terminal point conformity, and linearization. Does not include CJC error.

##### Thermocouple Reference

##### (Cold Junction Compensation)

±0.2°C typical, ±0.5°C maximum at 25°C.

##### Ambient Temperature Effect

Better than ±80ppm/°C (±0.008%/°C).

##### Zero Scaling Adjust

0 to 95% of range, typical.

##### Full Scale Adjust

5 to 100% of full scale range, typical.

##### Lead Break (Sensor Burnout) Detection

Configurable for either upscale (24mA) or downscale (3.3mA) operation.

##### Input Over-Voltage Protection

Bipolar Transient Voltage Suppressors (TVS), 5.6V clamp level typical.

##### Resolution

Millivolt input: 0.0025% (1 part in 40,000)  
Thermocouple input: 0.1°C.

##### Input Filter

Selectable digital filtering settings (none, low, medium, high).

##### Input Filter Bandwidth

Normal mode plus digital filtering within the ADC. Bandwidth (-3dB) varies with digital filter setting from 4Hz without filtering to 0.33Hz with high filtering.

##### Noise Rejection (Common Mode, High Filter)

155dB @ 60Hz, typical with 100 ohm input unbalance.

#### ■ Output

##### Output Range

4 to 20mA DC.

##### Output Compliance

$R_{LOAD} = (V_{SUPPLY} - 11V) / 0.020A$ .

$R_{LOAD} = 0$  to 650 ohms @ 24V DC.

##### Output Response Time (for step input change)

Time to reach 98% of final output value (typical)	
No filtering	104 milliseconds
Low filter	380 milliseconds
Medium filter	760 milliseconds
High filter	960 milliseconds

#### ■ Environmental

##### Operating temperature

-40 to 80°C (-40° to 176°F).

##### Storage temperature

-40 to 85°C (-40 to 185°F).

##### Relative humidity

5 to 95% non-condensing.

##### Power Requirement

12-32V DC SELV (Safety Extra Low Voltage), 24mA max.

##### Isolation

1500V AC peak. 250V AC (354V DC) continuous isolation between input and output circuits.

##### Shock and Vibration Immunity

Vibration: 5g, per IEC 60068-2-64.

Shock: 50g, per IEC 60068-2-27.

##### Electromagnetic Compatibility (EMC) Compliance

Radiated Emissions: BS EN 61000-6-4, CISPR 16.

RFI: BS EN 61000-6-2, IEC 61000-4-3.

Conducted RFI: BS EN 61000-6-2, IEC 61000-4-6.

ESD: BS EN 61000-6-2, IEC 61000-4-2.

EFT: BS EN 61000-6-2, IEC 61000-4-4.

Surge Immunity: BS EN 61000-6-2, IEC 61000-4-5.

##### Approvals

CE compliant. UL/cUL listing.

Designed for Class I; Division 2; Groups ABCD; Zone 2.

#### ■ Physical

##### General

General-purpose enclosure designed for mounting on 35mm "T-type" DIN rail.

##### Case Material

Self-extinguishing polyamide, UL94 V-0 rated, color light gray. General-purpose NEMA Type 1 enclosure.

##### I/O Connectors

Removable plug-in terminal blocks rated for 12A/250V; AWG #26-12, stranded or solid copper wire.

##### Dimensions

12.5 x 114.5 x 99.0 mm (0.5 x 4.51 x 3.90 inches).

##### Shipping Weight

0.22 kg (0.5 pounds) packed.

### Ordering Information

#### Models

##### TT233-0600

Transmitter, thermocouple/millivolt input.

#### Services

##### TT230-Config/Cal

Factory custom configuration/calibration service.

Specify input type, input/output zero and full-scale values, filtering, and sensor fault settings on order.

#### Software

##### TTC-SIP (recommend one kit per customer)

Software Interface Package for Acromag TT Series transmitters. Includes configuration software CD-ROM (5040-944), isolator (USB-ISOLATOR) and two USB cables (4001-112, 4001-113).

#### Accessories

See [www.acromag.com](http://www.acromag.com) for more information.

##### USB-ISOLATOR

USB-to-USB isolator, includes USB cable (4001-112).

ISO9001  
AS9100



Tel 248-295-0880 ■ Fax 248-624-9234 ■ [sales@acromag.com](mailto:sales@acromag.com) ■ [www.acromag.com](http://www.acromag.com) ■ 30765 Wixom Rd, Wixom, MI 48393 USA