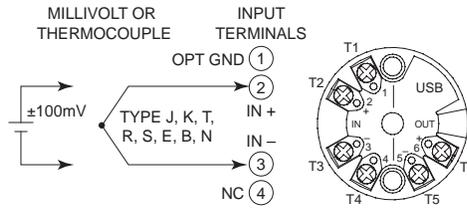


# Transmitters: ST130 Series

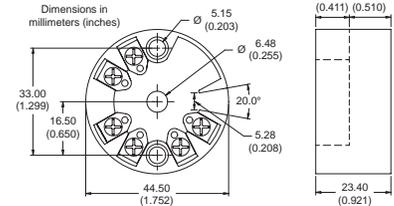
**ST133** Isolated thermocouple/mV input head-mount transmitter 



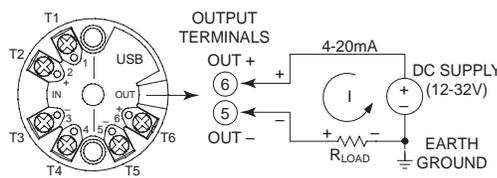
## INPUT CONNECTIONS



## DIMENSIONS



## OUTPUT CONNECTIONS



Thermocouple (8 types) or  $\pm 100\text{mV}$  input ◆ 4-20mA output ◆ 1500V isolation ◆ Loop-powered

## Description

The ST133 is a low-cost 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. The transmitter performs signal linearization, cold-junction compensation, and lead-break detection functions.

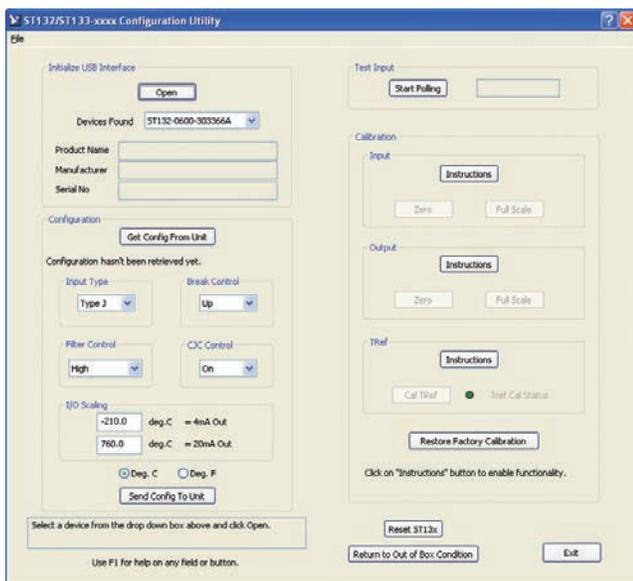
High-voltage isolation separates the input from the output circuit. Isolation protects from surges, reduces noise, and eliminates ground loop errors.

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
- Flexible thermocouple or millivolt input ranges (TC Type J, K, T, R, S, E, B, N or  $\pm 100\text{mV}$ )
- 1500V input isolation
- 24-bit A/D microcontroller
- High accuracy, linearity, stability, and reliability
- Low temperature drift ( $<75\text{ppm}/^\circ\text{C}$ )
- User selectable filtering (none, low, med. high)
- Fast response time (as low as 90ms)
- Supports reverse-acting (inverse) output
- Selectable upscale or downscale operation for sensor errors and lead-break detection
- Non-polarized output/power connection
- Mounts in DIN Form B sensor heads
- Shock (50g) and vibration (5g) resistant
- Optional DIN rail adapter
- Wide ambient operation ( $-40$  to  $80^\circ\text{C}$ )
- Hardened for harsh environments
- CE compliant. UL/cUL Class 1 Div 2 Zone 2 approvals. ATEX / IECEx Zone 2.



ST130 Series Transmitter Configuration Software is downloadable (FREE) from [www.acromag.com](http://www.acromag.com).

ST133 software allows you to configure transmitters offline, save the file, and download settings into units later, at your convenience.



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# Transmitters: ST130 Series

## ST133 Isolated thermocouple input head-mount transmitter with USB-configuration

### Performance Specifications

**IMPORTANT:** To prevent damage or errors from grounded PCs and surges, Acromag strongly recommends use of the USB-ISOLATOR when configuring an ST130 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, upscale fault, high filter.

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 at 25°C operating ambient temperature.

##### Thermocouple Reference

##### (Cold Junction Compensation)

±0.1°C typical, ±0.3°C maximum at 25°C.

##### Ambient Temperature Effect

Better than ±75ppm/°C (±0.0075%/°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.

Thermocouple Input Bias Current  
±250nA typical (TC break).

##### 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

Normal mode filtering, plus selectable digital filtering settings (none, low, medium, high) optimized and fixed per input range within the A/D converter.

##### Noise Rejection (Normal Mode)

75dB @ 60Hz, typical with 100 ohm input unbalance.

#### ■ Output

##### Output Range

4 to 20mA DC.

##### Output Compliance

$R_{LOAD} = (V_{SUPPLY} - 12V) / 0.024A$ .

$R_{LOAD} = 0$  to 500 ohms @ 24V DC.

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

Time to reach 98% of final output value (typical)	
No filtering	90 to 125ms
Low filter	240 to 420ms
Medium filter	550 to 1020ms
High filter	900 to 1500ms

#### ■ 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 listings. ATEX / IECEx Zone 2. Designed for Class I; Division 2; Groups ABCD; Zone 2.

#### ■ Physical

##### General

General purpose enclosure with potted circuit designed for mounting in DIN Form B connection heads.

##### Case Material

Self-extinguishing polycarbonate ABS plastic, UL94 V-0 rated base material. USB dust cap material is Santoprene, 251-70W232.

##### I/O Connectors

Barrier strip type, captive screw terminals. Wire range: AWG #14-28 solid or stranded.

##### Shipping Weight

0.5 pounds (0.22 Kg) packed.

### Ordering Information

#### Models

##### ST133-1610

Same as ST133-1600 plus UL/cUL Class 1 Division 2 Zone 2 approval and ATEX Certified.

*If mounting screws are required, order one ST130-MTG with each unit.*

#### Services

##### ST13x-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

##### ST13C-SIP (recommend one kit per customer)

Software Interface Package. Includes configuration software (ST130-CONFIG), isolator (USB-ISOLATOR) and two USB cables (Part # 4001-112, 4001-113) for Acromag ST130 Series head-mount transmitters.

#### Accessories

##### Connection Head Enclosures

See Bulletin 8400-630 or [www.acromag.com](http://www.acromag.com) for info.

##### ST130-DIN

DIN-rail adapter (Type G or T).

##### USB-ISOLATOR

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

ISO9001  
AS9100



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