TT230 Series Brochure

Space-Saving 2-Wire Isolated Transmitters
Experience counts: especially when you are selecting an I/O partner. And with 60+ years of I/O experience, Acromag can help you to improve reliability, increase productivity and reduce your costs.

Acromag: The I/O Leader
Acromag is a customer-driven manufacturer focused on developing process automation I/O products that provide the best long term value in the industry. Compare and you’ll find that Acromag products offer an unmatched balance of price, performance, and features.

60+ Years of I/O Experience
Acromag has more than 60 years of measurement and control experience. Since 1957, we have delivered nearly a million units to thousands of customers around the globe for manufacturing, power, environmental, transportation, and military applications.

Top Quality and a 2-Year Warranty
We take every measure to guarantee you dependable operation and products that perform at or beyond their specifications. Our state-of-the-art manufacturing and military-grade components add an extra degree of ruggedness. Most products qualify for an extended 2-year warranty. And with ISO9000/AS9100 certified quality control, you get full confidence.

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Online Ordering
For your convenience, Acromag provides full product documentation and pricing information on our website. You can obtain quotes or even place your order directly on our website.

Fast Delivery from Stock
Most products can be shipped within 24 hours of receiving your order.

Special Services
We are happy to accommodate your special requirements and offer the following services:
• custom product development
• custom calibration
• source inspections, quality audits
• special shipping, documentation
• protective humiseal coating
• plastic and stainless steel tagging

Certification and Approvals
Many Acromag products carry globally recognized agency approvals and safety certifications.
• CE
• UL, cUL
• ATEX
• CSA
• Ethernet conformance
• Modbus conformance
• Profibus certification
• IECex
Transmitters: TT230 Series

TT230 Series Thin 2-Wire Transmitters

Introduction
The TT230 series features space-saving thin transmitters and isolators that combine flexibility with rugged housing to withstand harsh industrial environments. Advanced signal processing capabilities, variable range input, and convenient USB programming make these instruments versatile for many applications.

Input
Various sensor signals (by model)

Output
4-20mA current (sink or source)

Power
■ Loop-power (2-wire connection)

Key Features and Benefits
■ Space saving 12.5mm housing
■ Easy setup via USB with Windows® configuration software
■ Supports sink and source output in a single model
■ Better than 0.1% accuracy
■ 1500V AC isolation
■ Wide operation temperature of -40 to 80°C
■ Fast response times
■ Adjustable filtering levels
■ Normal/reverse acting operation (except TT231)
■ Shock and vibration resistant
■ CE Compliant. UL/cUL Class 1 Div 2 Zone 2 approvals. ATEX and IECEx Certified.

TT231 RTD Input
RTD ohms mA

Input
■ 100 ohm Pt RTD; alpha = 379-393
■ 0-900 ohms linear resistance

See data sheet

TT233 Thermocouple, Millivolt Input
TC mV mA

Input
■ Type J, K, T, R, S, E, B, N thermocouple
■ ±100mV

See data sheet

TT234 Potentiometer/Thermistor Input
Pot Therm mA mA

Input
■ 100-100K ohms from potentiometer/slidewire
■ 2K - 30K ohms thermistor
■ Custom 100 - 1M ohms

See data sheet

TT235 Isolated RTD Input
RTD ohms mA

Input
■ 100, 200, 500, or 1000 ohm Pt RTD; 120 ohm Ni RTD; 10 ohm Cu RTD
■ 0-450 ohms linear resistance

See data sheet

TT236 Current, Millivolt Input
mA mV mA

Input
■ 0-20mA, 4-20mA DC
■ ±1mA, ±20mA DC
■ 0-500mV DC
■ 0-20A AC

See data sheet

TT237 Low-Voltage Input
V mA mA

Input
■ ±1V DC
■ ±5V DC
■ ±500mV DC
■ ±10V DC

See data sheet

TT238 High-Voltage Input
V mA mA

Input
■ ±15V DC
■ ±75V DC
■ ±150V DC

See data sheet

TT239 Frequency, Pulse Input
kHz mA

Input
■ 0 - 100KHz
■ Up to 12V rms amplitude
■ Unipolar or bipolar signals

See data sheet

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Tel: 877-214-6267 ■ sales@acromag.com ■ www.acromag.com ■ 30765 S Wixom Rd, Wixom, MI 48393 USA
Transmitters: TT230 Series

Key Features

**Loop-powered 4-20mA**
Power is received from the output loop (2-wire) to provide sinking current output.

**Simple Configuration**
Digital setup and calibration with straightforward Windows (Vista and newer) software via USB.

**Input Options**
- Loop-powered 4-20mA
- Sink or Source Output
- Rugged Design
- Space Saving
- Wide ambient temperature operation, shock and vibration-resistant, as well as CE and UL/cUL Class 1, Division 2, Zone 2 approved and ATEX and IECEx certified.
- Extra output connections support sourced output with local power supply.
- A strikingly thin enclosure, at only 12.5mm wide, to easily achieve high-density DIN-rail mounting.

Tel: 877-214-6267  ■  sales@acromag.com  ■  www.acromag.com  ■  30765 S Wixom Rd, Wixom, MI 48393 USA
Transmitters: TT230 Series

General Operation and Performance Specifications

The following specifications are common to all TT230 Series transmitter modules.

<table>
<thead>
<tr>
<th>USB Interface</th>
<th>Physical</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>USB Connector</strong></td>
<td>General-purpose enclosure designed for mounting on 35mm &quot;T-type&quot; DIN rail.</td>
</tr>
<tr>
<td>USB Mini-8 type socket, 5-pin</td>
<td>Case Material</td>
</tr>
<tr>
<td><strong>USB Data Rate</strong></td>
<td>I/O Connectors</td>
</tr>
<tr>
<td>12Mbps. USB v1.1 and 2.0 compatible</td>
<td>Shipping Weight</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
<th>Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output Range</strong></td>
<td>Operating Temperature</td>
</tr>
<tr>
<td>4 to 20mA DC</td>
<td>Storage Temperature</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>Relative Humidity</td>
</tr>
<tr>
<td>±0.05% of span typical</td>
<td>Power Requirement</td>
</tr>
<tr>
<td><strong>Isolation (except model TT231)</strong></td>
<td><strong>Isolation</strong></td>
</tr>
<tr>
<td><strong>Shock and Vibration Immunity</strong></td>
<td><strong>Shock and Vibration Immunity</strong></td>
</tr>
<tr>
<td><strong>Electromagnetic Compatibility (EMC) Compliance</strong></td>
<td><strong>Shock and Vibration Immunity</strong></td>
</tr>
<tr>
<td>Radiated Emissions: BS EN 61000-6-4, CISPR 16</td>
<td><strong>Electromagnetic Compatibility (EMC) Compliance</strong></td>
</tr>
<tr>
<td>RFI: BS EN 61000-6-2, IEC 61000-4-3</td>
<td><strong>Electromagnetic Compatibility (EMC) Compliance</strong></td>
</tr>
<tr>
<td>Conducted RFI: BS EN 61000-6-2, IEC 61000-4-6</td>
<td><strong>Electromagnetic Compatibility (EMC) Compliance</strong></td>
</tr>
<tr>
<td>ESD: BS EN 61000-6-2, IEC 61000-4-2</td>
<td><strong>Surge Immunity</strong></td>
</tr>
<tr>
<td>Surge Immunity: BS EN 61000-6-2, IEC 61000-4-5</td>
<td><strong>Approvals</strong></td>
</tr>
<tr>
<td><strong>Approvals</strong></td>
<td><strong>Approvals</strong></td>
</tr>
</tbody>
</table>

**Dimensions** *in millimeters (inches)*

TT Series USB Transmitter Connections
Module Configuration

Screen shots of Windows-based transmitter configuration software. Using simple pull-down menus and user-input, your transmitter is ready for use in a snap.
**Transmitters: TT230 Series**

**TT231** RTD/resistance input two-wire/three-wire transmitter

**Description**

The TT231 model is a space-saving two-wire transmitter that converts a 100 ohm Platinum RTD sensor input to a proportional 4-20mA signal. Power is received from the output loop current or a DC supply when using a three-wire connection. The transmitter provides sensor excitation plus performs linearization, lead-wire compensation, and lead-break detection.

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 RTD or linear resistance input ranges (any 100 ohm Pt RTD with 375-393 alpha)
- Space-saving 12.5mm (0.5 inch) unit with pluggable terminals for convenient wiring
- High accuracy, linearity, stability, and reliability
- Advanced analog signal conditioning ASIC eliminates digitization errors
- Low temperature drift (<80ppm/°C)
- Supports sink or source output wiring
- Programmable over/under-range limits
- Selectable upscale or downscale operation for sensor errors and lead-break detection
- NAMUR-compliant output loop current
- Shock (25g) and vibration (4g) resistant
- Mounts on Type T DIN-rail
- Wide ambient operation (-40 to 80°C)
- CE compliant. UL/cUL Class I Div 2, ATEX / IECEx Zone 2 approvals

**100 ohm Pt RTD or 0-900 ohm input ◆ 4-20mA output (sink/source) ◆ 12-32V DC loop/local power**

**TT230 Series Transmitter Configuration Software** is downloadable (FREE) from www.acromag.com. Windows XP, Vista, 7, & 8

**Configuration Software**

- **Device Connect**
  - **Device Details**
    - **Device Name**: TT231-2000-600000
    - **Manufacturer**: Acromag Inc.
    - **Serial #: 800000

- **Unit Status**
  - **Fault Status**: No Faults
  - **Read Status**: Reset Unit

- **Sensor Fault/Break Detection**
  - **Threshold Value**: 0.00 (0.00%)
  - **Break Detection**: 2.00mA

- **Factory Settings**
  - **Restore Factory Settings**
  - **Submenu USB Configuration**

**TT230 Series Transmitter** is designed for ease of use and flexibility in industrial applications. It supports a wide range of input signals and provides a stable output signal suitable for integration into various control systems. The compact design and USB connectivity make it an ideal choice for space-constrained environments.
Transmitters: TT230 Series

TT231  RTD/resistance 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
100Ω Pt RTD, α = 0.00385 Ω/Ω/°C, 0-200°C input, 4-20mA output, upscale break detection.
Input Configuration
Two-, three- or four-wire sensor input connections.
Input Ranges
100 ohm Platinum RTD, alpha = 375-393, 385 (default), -50 to 850°C (-58 to 1562°F).
0 to 900 ohms linear resistance.
Programs in °C, °F, or ohmic integer values only.
Zero Adjust
RTD 3/4 wire: -50, -17.78, or 0°C (-58, 0, 32°F).
RTD 2 wire: 0°C (32°F) fixed.
RES: 0 or 100 ohms.
Full-Scale Adjust
RTD: up to 850°C (1562°F), 50°C (58°F) span minimum.
Resistance: up to 900 ohms, 8 ohm span minimum.
Excitation Current
0.5mA, nominal, each ± lead
Lead-Wire Compensation
25 ohms per lead
Lead Break (Sensor Burnout) Detection
Configurable for either upscale or downscale.
Input Filter Bandwidth
-3dB at 700Hz, typical, normal mode filter.

Output
Output Range
4 to 20mA DC.
Under-scale limit adjustable for 2.1 to 3.6mA, nominal.
Over-scale limit adjustable for 21 to 30mA, nominal.
Output Fault Limits (Sensor Fault)
0.4mA below selected under-scale threshold and 1.0mA above over-scale threshold, typical.
Output Compliance
\[ \text{R} \text{LOAD} = (\text{V}_{\text{SUPPLY}} - 8.8V) / 0.020A. \]
\[ \text{R} \text{LOAD} = 0 \text{ to } 750 \text{ ohms @ 24V DC.} \]
Output Accuracy
Better than ±0.1% of span, typical for spans less than 500°C. Includes the effects of repeatability, terminal point conformity, and linearization, but does not include sensor error.
Ambient Temperature Effect
Better than ±0.008% per °C of input span or ±80ppm/°C, typical. Includes the combined effects of zero and span drift over temperature.
Output Response Time (for step input change)
500µS, typical with 250 ohm load (to reach 98% of final output value).

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
9-32V DC SELV (Safety Extra Low Voltage), 30mA max.
Shock and Vibration Immunity
Vibration: 4g, per IEC 60068-2-6
Shock: 25g, 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. Designed for UL/cUL Class I Division 2 Groups ABCD, ATEX / IECEx 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
TT231-0600
Transmitter, RTD/resistance 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 for more information.

USB-ISOLATOR
USB-to-USB isolator, includes USB cable (4001-112)
Transmitters: TT230 Series

TT233 Thermocouple/millivolt input two/three-wire transmitter

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 ±100mV)
- Space-saving 12.5mm (0.5 inch) unit with pluggable terminals for convenient wiring
- High accuracy, linearity, stability, and reliability
- Low temperature drift (<80ppm/°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 (25g) and vibration (4g) resistant
- Mounts on Type T DIN-rail
- Wide ambient operation (-40 to 80°C)
- CE compliant. UL/cUL Class I Div 2, ATEX / IECEx Zone 2 approvals

Universal thermocouple or ±100mV input ◆ 4-20mA output (sink/source) ◆ 12-32V DC loop/local power

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

The Agility™ Config Tool is downloadable (FREE) at the Google Play Store. For Android Devices only.

TT233 Model software allows you to configure transmitters offline, save the file, and download settings into units later, at your convenience.
Transmitters: TT230 Series

**Performance Specifications**

**Input Ranges and Accuracy**

<table>
<thead>
<tr>
<th>Input</th>
<th>Range</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC J</td>
<td>-210 to 760°C</td>
<td>±0.5°C</td>
</tr>
<tr>
<td>TC K</td>
<td>-200 to 1372°C</td>
<td>±0.5°C</td>
</tr>
<tr>
<td>TC T</td>
<td>-260 to 400°C</td>
<td>±0.5°C</td>
</tr>
<tr>
<td>TC R</td>
<td>-50 to 1768°C</td>
<td>±1.0°C</td>
</tr>
<tr>
<td>TC S</td>
<td>-50 to 1768°C</td>
<td>±1.0°C</td>
</tr>
<tr>
<td>TC E</td>
<td>-200 to 1000°C</td>
<td>±0.5°C</td>
</tr>
<tr>
<td>TC B</td>
<td>260 to 1820°C</td>
<td>±1.0°C</td>
</tr>
<tr>
<td>TC N</td>
<td>-230 to 1300°C</td>
<td>±1.0°C</td>
</tr>
<tr>
<td>mV</td>
<td>100 to 200mV</td>
<td>±1.1mV</td>
</tr>
</tbody>
</table>

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

**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.

**USB Interface**

- **USB Connector**: USB Mini-B type socket, 5-pin.
- **USB Data Rate**: 12Mbps. USB v1.1 and 2.0 compatible.

**Input**

- Default Configuration/Calibration: Input: TC J, -210 to 760°C, high filter, Break: up
- Output: 4 to 20mA DC.

**Ordering Information**

- **Models**: TT233-0600
- **Services**: TT232-Config/Cal
- **Software**: TTC-SIP
- **Accessories**: 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).

**Shipping Weight**: 0.22 kg (0.5 pounds) packed

**Dimensions**: 12.5 x 114.5 x 99.0 mm (0.5 x 4.51 x 3.90 inches)

**Approvals**

- CE compliant. Designed for UL/cUL Class I Division 2 Groups ABCD, ATEX / IECEx Zone 2.
- IP 3 G Ex nA IIC T4 Gc -40°C ≤ Ta ≤ +80°C

**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.
- Noise Rejection (Common Mode, High Filter)
  - 155dB @ 60Hz, typical with 100 ohm input unbalance.

**Electromagnetic Compatibility (EMC) Compliance**

- Radiated Emissions: BS EN 61000-6-4, CISPR 16 RF: BS EN 61000-6-2, IEC 61000-4-3 Conducted RFI: BS EN 61000-6-2, IEC 61000-4-4 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
Transmitters: TT230 Series

**TT234** Potentiometer / thermistor input two-wire transmitter

**Description**

The TT234 model is a space-saving two-wire transmitter that isolates and converts a resistive sensor input to a proportional 4-20mA signal. Power is received from the output loop current or a DC supply when using a three-wire connection. The transmitter provides sensor excitation plus performs linearization, lead-wire compensation, and lead-break detection.

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
- Interfaces 100-100kΩ potentiometer/slidewire and 100-1MΩ NTC thermistor/rheostat inputs
- Customizable thermistor linearization table with preset curves for popular resistances
- 1500V isolation between input/output circuits
- Space-saving 12.5mm (0.5 inch) unit with pluggable terminals for convenient wiring
- High accuracy, linearity, stability, and reliability
- Supports normal or reverse-acting output
- Supports sink or source output wiring
- User-selectable filtering (none, low, med., high)
- Fast response (as low as 11ms)
- Selectable upscale or downscale operation for sensor errors and lead-break detection
- NAMUR-compliant output loop current
- Shock (25g) and vibration (4g) resistant
- Wide ambient operation (-40 to 80°C)
- CE compliant. UL/cUL Class I Div 2, ATEX / IECEx Zone 2 approvals

**Potentiometer/slidewire, thermistor input** ◆ **4-20mA output (sink/source)** ◆ **12-32V DC loop/local power**

**TT234 Model software allows you to configure transmitters offline, save the file, and download into units later, at your convenience.**
# Transmitters: TT230 Series

## TT234  Potentiometer / thermistor input two-wire transmitter

### Performance Specifications

**Input**

**Default Configuration**

Pot/slidewire, 0% to 100% input, 4-20mA output, downscale break detect, medium filter.

**I/O Connectors**

- **USB Connector**: USB Mini-B type socket, 5-pin.
- **USB Data Rate**: 12Mbps. USB v1.1 and 2.0 compatible.
- **USB Transient Protection**
  - **USB Cable Length**: 5.0 meters maximum
  - **USB Connector**: USB Mini-B type socket, 5-pin.
  - **USB-to-USB isolator**, includes USB cable (4001-112).
  - **USB-ISOLATOR**, (5040-944), isolator (USB-ISOLATOR) and two USB cables (4001-112, 4001-113).
- **Software**
  - Software Interface Package for Acromag TT Series transmitters. Includes configuration software CD-ROM (3040-944), isolator (USB-ISOLATOR) and two USB cables (4001-112, 4001-113).
- **Ordering Information**
  - **Models**
    - TT234-0600
    - Transmitter, potentiometer/thermistor input
  - **Services**
    - TT230-Config/Cal
    - Factory custom configuration/calibration service.
  - **Software**
    - TTC-SIP
    - (recommend one kit per customer)
  - **Accessories**
    - See [www.acromag.com](http://www.acromag.com) for more information.
- **USB-ISOLATOR**
  - USB-to-USB isolator, includes USB cable (4001-112)

**Output**

- **Output Range**: 4 to 20mA DC
- **Under-range capability**: 3.5mA
- **Over-range capability**: 24mA
- **Output DAC Resolution**: 16-bit D/A converter
- **Output Accuracy**: Better than ±0.05% of span, typical (±0.1% max.) for nominal input spans. Includes the effects of repeatability, terminal point conformity, and linearization, but does not include sensor error.
- **Output Compliance**
  - **VLOAD**: (VSUPPLY - 11V) / 0.020A
  - **ILOAD**: 0 to 650 ohms @ 24V DC
- **Output Response Time (for step input change)**

**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 maximum.
- **Shock and Vibration Immunity**
  - **Shock**: 5g, per IEC 60068-2-6, 11ms.
  - **Vibration**: 1g, per IEC 60068-2-6, 11ms.
- **Radiated Emissions**: BS EN 61000-6-4, CISPR 16
- **Surge Immunity**: BS EN 61000-6-4, IEC 61000-4-4

**Electromagnetic Compatibility (EMC) Compliance**

- Radiated Emissions: BS EN 61000-6-4, CISPR 16
- Conducted RFI: BS EN 61000-6-2, IEC 61000-4-3
- Conducted ESD: BS EN 61000-6-2, IEC 61000-4-2
- Conducted EFT: BS EN 61000-6-4, IEC 61000-4-4
- Surge Immunity: BS EN 61000-6-2, IEC 61000-4-4

**Approvals**

- CE compliant. Designed for UL/cUL Class I Division 2
- Groups A/B/C/D, ATEX / IECEx Zone 2.
- II 3 G Ex nA IIC T4 Gc -40°C < Ta < +80°C

**Ordering Information**

- **Models**
  - TT234-0600
  - Transmitter, potentiometer/thermistor input
- **Services**
  - TT230-Config/Cal
  - Factory custom configuration/calibration service.
- **Software**
  - TTC-SIP
  - (recommend one kit per customer)
- **Accessories**
  - See [www.acromag.com](http://www.acromag.com) for more information.
- **USB-ISOLATOR**
  - USB-to-USB isolator, includes USB cable (4001-112)

**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 maximum.
- **Shock and Vibration Immunity**
  - **Shock**: 5g, per IEC 60068-2-6, 11ms.
  - **Vibration**: 1g, per IEC 60068-2-6, 11ms.
- **Radiated Emissions**: BS EN 61000-6-4, CISPR 16
- **Surge Immunity**: BS EN 61000-6-4, IEC 61000-4-4

**Electromagnetic Compatibility (EMC) Compliance**

- Radiated Emissions: BS EN 61000-6-4, CISPR 16
- Conducted RFI: BS EN 61000-6-2, IEC 61000-4-3
- Conducted ESD: BS EN 61000-6-2, IEC 61000-4-2
- Conducted EFT: BS EN 61000-6-4, IEC 61000-4-4
- Surge Immunity: BS EN 61000-6-2, IEC 61000-4-4

**Approvals**

- CE compliant. Designed for UL/cUL Class I Division 2
- Groups A/B/C/D, ATEX / IECEx Zone 2.
- II 3 G Ex nA IIC T4 Gc -40°C < Ta < +80°C

**Ordering Information**

- **Models**
  - TT234-0600
  - Transmitter, potentiometer/thermistor input
- **Services**
  - TT230-Config/Cal
  - Factory custom configuration/calibration service.
- **Software**
  - TTC-SIP
  - (recommend one kit per customer)
- **Accessories**
  - See [www.acromag.com](http://www.acromag.com) for more information.
- **USB-ISOLATOR**
  - USB-to-USB isolator, includes USB cable (4001-112)
**Transmitters: TT230 Series**

**TT235 Isolated RTD/resistance input two-wire transmitter**

**Description**

The TT235 model is a space-saving two-wire transmitter that isolates and converts an RTD sensor input to a proportional 4-20mA signal. Power is received from the output loop current or a DC supply when using a three-wire connection. The transmitter provides sensor excitation plus performs linearization, lead-wire compensation, and lead-break detection.

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
- Selectable RTD or linear resistance input type: Pt RTD (100Ω, 200Ω, 500Ω, or 1000Ω), Ni RTD (120Ω), Cu RTD (10Ω), or Resistance (0-450Ω)
- 1500V isolation between input/output circuits
- Space-saving 12.5mm (0.5 inch) unit with pluggable terminals for convenient wiring
- High accuracy, linearity, stability, and reliability
- Supports normal or reverse-acting output
- Supports sink or source output wiring
- User-selectable filtering (none, low, med., high)
- Fast response (as low as 22ms)
- Selectable upscale or downscale operation for sensor errors and lead-break detection
- NAMUR-compliant output loop current
- Shock (25g) and vibration (4g) resistant
- Wide ambient operation (-40 to 80°C)
- CE compliant. UL/cUL Class I Div 2, ATEX / IECEx Zone 2 approvals

**RTD (Pt, Ni, Cu) or 0-450 ohm input ◆ 4-20mA output (sink/source) ◆ 12-32V DC loop/local power**

**TT230 Series Transmitter Configuration Software is downloadable (FREE) from**

[www.acromag.com](http://www.acromag.com).

Windows XP, Vista, 7, & 8

The Agility™ Config Tool is downloadable (FREE) at

the Google Play Store For Android Devices only

**TT235 Model software allows you to configure transmitters offline, save the file, and download into units later, at your convenience.**
**TT230 Series**

**TT235** Isolated RTD/resistance input two-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**
  - 100Ω Pt RTD, α=0.00385, -200 to 850°C input, 4-20mA output, upscale break detect, medium filter.
- **Input Configuration**
  - Two-, three- or four-wire sensor input connections.
  - Programs in °C, °K, °F, or ohmic integer values only.
  - Two-, three- or four-wire sensor input connections.
- **Input Ranges**
  - | Input Type | Input Range | Accuracy² |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RTD, Pt 100Ω</td>
<td>-200 to 850°C</td>
<td>±0.25°C</td>
</tr>
<tr>
<td>RTD, Pt 200Ω</td>
<td>-200 to 850°C</td>
<td>±0.30°C</td>
</tr>
<tr>
<td>RTD, Pt 500Ω</td>
<td>-200 to 850°C</td>
<td>±0.50°C</td>
</tr>
<tr>
<td>RTD, Pt 1000Ω</td>
<td>-200 to 850°C</td>
<td>±1.0°C</td>
</tr>
<tr>
<td>Ni 120Ω (Minco 7-120)</td>
<td>-80 to 320°C</td>
<td>±0.08°C</td>
</tr>
<tr>
<td>Cu 10Ω (Minco 16-9)</td>
<td>-200 to 270°C</td>
<td>±1.0°C</td>
</tr>
<tr>
<td>Resistance (linear)</td>
<td>0 to 25Ω</td>
<td>±0.05Ω</td>
</tr>
<tr>
<td>Resistance (linear)</td>
<td>0 to 450Ω</td>
<td>±0.1Ω</td>
</tr>
<tr>
<td>Resistance (linear)</td>
<td>0 to 9000Ω</td>
<td>±0.9Ω</td>
</tr>
<tr>
<td>Resistance (linear)</td>
<td>0 to 2250Ω</td>
<td>±2.3Ω</td>
</tr>
<tr>
<td>Resistance (linear)</td>
<td>0 to 4500Ω</td>
<td>±4.5Ω</td>
</tr>
</tbody>
</table>

Note 1: Linear resistance input range approaches but does not include Ω or 500Ω. If exactly Ω or 500Ω is measured, break detection is triggered.

Note 2: Rated accuracy (in °C and % of span) applies for input spans greater than 5% of input full-scale.

- **Input Scaling Adjust**
  - Zero: 0 to 95% of range, typical.
  - Full scale: 5 to 100% of full scale range, typical.
- **Lead Break (Sensor Burnout) Detection**
  - Configurable for either upscale or downscale.

#### Output

- **Output Range**
  - 4 to 20mA DC
  - Under-range capability 3.5mA
  - Over-range capability 24mA
- **Output Compliance**
  - $R_{LOAD} = (V_{SUPPLY} - 11V) / 0.020A$
  - $R_{LOAD} = 0$ to 650 ohms @ 24V DC
- **Output DAC Resolution**
  - 16-bit D/A converter
- **Output Accuracy**
  - Better than ±0.05% of span, typical (±0.1% max.) for for nominal input spans. Includes the effects of repeatability, terminal point conformity, and linearization, but does not include sensor error.
- **Ambient Temperature Effect**
  - Better than ±0.008% per °C of input span or ±80ppm°C, typical. Includes the combined effects of zero and span drift over temperature.
- **Output Response Time (for step input change)**
  - No filter: 22ms
  - Low filter: 50ms
  - Medium filter: 160ms
  - High filter: 1210ms

#### 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 maximum.
- **Shock and Vibration Immunity**
  - Vibration: 4g, per IEC 60068-2-6
  - Shock: 25g, per IEC 60068-2-27
- **Electromagnetic Compatibility (EMC) Compliance**
  - Radiated Emissions: BS EN 61000-6-4, CISPR 16
  - RFI: BS EN 61000-6-3, IEC 61000-4-6
  - 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. Designed for UL/ULC Class I Division 2 Groups ABCD, ATEX / IECEx Zone 2.
  - II 3 G Ex nA IIC T4 Gc -40°C ≤ Ta ≤ +80°C

#### 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

- **TT235-0600**
  - Transmitter, isolated RTD/resistance 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

- **USB-ISOLATOR**
  - USB-to-USb isolator, includes USB cable (4001-112)
Transmitters: TT230 Series

TT236  Current/millivolt input two-wire/three-wire transmitter

Description
The TT236 model is a space-saving two-wire transmitter that isolates and converts a DC current or low voltage input to a proportional 4-20mA control signal. A single unit supports both voltage and current input for extra flexibility. Power is received from the output loop current or a DC supply when using a three-wire connection.

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.

Multi-range ±20mA or ±500mV input  ◆  4-20mA output (sink/source)  ◆  12-32V DC loop/local power

Key Features & Benefits
- Easy setup and digital calibration via USB with Windows configuration software
- Single unit supports unipolar and bipolar input ranges up to ±20mA or ±500mV DC
- Accepts 0-20A AC input (with external sensor)
- Space-saving 12.5mm (0.5 inch) unit with pluggable terminals for convenient wiring
- High accuracy, linearity, stability, and reliability
- User-selectable filtering (low, medium, high)
- Supports sink or source output wiring
- Supports reverse-acting (inverse) output
- 1500V input isolation
- NAMUR-compliant output loop current
- Shock (25g) and vibration (4g) resistant
- Mounts on Type T DIN-rail
- Wide ambient operation (-40 to 80°C)
- CE compliant. UL/cUL Class I Div 2, ATEX / IECEx Zone 2 approvals

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

The Agility™ Config Tool is downloadable (FREE) at the Google Play Store. For Android Devices only

TT236 Model software allows you to configure transmitters offline, save the file, and download into units later, at your convenience.
## Transmitters: TT230 Series

### TT236 Current/millivolt input two-wire/three-wire transmitter

#### Performance Specifications

**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.

**Input**
- **Default Configuration/Calibration**
  - Input: 4 to 20mA, medium filter.
  - Output: 4 to 20mA.
- **Input Ranges and Accuracy**
  - Range: 
    - ±500mV: ±0.05% of span
    - 0 to 500mV: ±0.05% of span
    - ±20mA: ±0.05% of span
    - 0 to 20mA: ±0.05% of span
    - 4 to 20mA: ±0.05% of span
    - 0 to 11.17mA (for AC sensor): ±0.05% of span
  - Error includes the effects of repeatability, terminal point conformity, and linearization.

**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**: 4g, per IEC 60068-2-6
- **Shock**: 25g, per IEC 60068-2-7

**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. Designed for UL/cUL Class I Division 2 Groups ABCD, ATEX / IECEx Zone 2.
- II 3 G Ex nA IIC T4 Gc -40°C < Ta < +80°C

#### 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**
- **TT236-0600**
  - Two-wire transmitter, current/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)
- **5020-350**
  - AC current sensor (toroidal transformer); converts 0-20A AC to 0-11.17mA DC

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**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.
**Transmitters: TT230 Series**

**TT237**  Process voltage input two-wire/three-wire transmitter

**Description**
The TT237 model is a space-saving two-wire transmitter that isolates and converts a process level DC voltage input to a proportional 4-20mA control signal. A single unit supports multiple voltage input ranges for extra flexibility. Power is received from the output loop current or a local DC supply when using a three-wire connection. 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
- Single unit supports ±1V, ±5V, and ±10V DC input ranges
- Space-saving 12.5mm (0.5 inch) unit with pluggable terminals for convenient wiring
- High accuracy, linearity, stability, and reliability
- User-selectable filtering (low, medium, high)
- Supports sink or source output wiring
- Supports reverse-acting (inverse) output
- 1500V input isolation
- NAMUR-compliant output loop current
- Shock (25g) and vibration (4g) resistant
- Mounts on Type T DIN-rail
- Wide ambient operation (-40 to 80°C)
- CE compliant. UL/cUL Class I Div 2, ATEX / IECEx Zone 2 approvals

**Multi-range ±1V, ±5V, or ±10V input**  ◆ 4-20mA output (sink/source)  ◆ 12-32V DC loop/local power

**TT230 Series Transmitter Configuration Software** is downloadable (FREE) from www.acromag.com

Windows XP, Vista, 7, & 8.

The Agility™ Config Tool is downloadable (FREE) at the Google Play Store

For Android Devices only

TT237 Model software allows you to configure transmitters offline, save the file, and download into units later, at your convenience.

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**TT237 Process Voltage Input Two-Wire/Three-Wire Transmitter**

USB Configured

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**Multi-range ±1V, ±5V, or ±10V input**

- 4-20mA output (sink/source)
- 12-32V DC loop/local power

**TT230 Series Transmitter Configuration Software** is downloadable (FREE) from www.acromag.com

Windows XP, Vista, 7, & 8.

The Agility™ Config Tool is downloadable (FREE) at the Google Play Store

For Android Devices only

TT237 Model software allows you to configure transmitters offline, save the file, and download into units later, at your convenience.
Transmitters: TT230 Series

TT237  Process voltage input two-wire/three-wire transmitter

**Performance Specifications**

**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.

**Input**
- **Default Configuration/Calibration**:
  - Input: ±10V DC, medium filtering
  - Output: 4 to 20mA
- **Input Ranges and Accuracy**:

<table>
<thead>
<tr>
<th>Range</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>±1V DC</td>
<td>±0.05% of span</td>
</tr>
<tr>
<td>±5V DC</td>
<td>±0.05% of span</td>
</tr>
<tr>
<td>±10V DC</td>
<td>±0.05% of span</td>
</tr>
</tbody>
</table>

Error includes the effects of repeatability, terminal point conformity, and linearization.

**Output**
- **Output Range**: 4 to 20mA DC
- **Output Compliance**:
  - $\text{RL}_{\text{LOAD}} = \left( \text{V}_{\text{SUPPLY}} - 11V \right) / 0.020A$
  - $\text{RL}_{\text{LOAD}} = 0$ to 650 ohms @ 24V DC
- **Output Response Time (for step input change)**
  - Time to reach 98% of final output value (typical)
    - Low filter: 50 milliseconds
    - Medium filter: 150 milliseconds
    - High filter: 1200 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: 4g, per IEC 60068-2-6
  - Shock: 25g, per IEC 60068-2-7
- **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. Designed for UL/cUL Class I Division 2 Groups ABCD, ATEX / IECEx Zone 2.
- II 3 G Ex nA IIC T4 Gc -40°C < Ta < +80°C

**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**
- TT237-0600
  - Two-wire transmitter, process voltage 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 for more information.

**USB-Isolator**
- USB-to-USB isolator, includes USB cable (4001-112)
Transmitters: TT230 Series

TT238 High voltage input two-wire/three-wire transmitter

Description
The TT238 model is a space-saving two-wire transmitter that isolates and converts a high level DC voltage input to a proportional 4-20mA control signal. A single unit supports multiple voltage input ranges for extra flexibility. Power is received from the output loop current or a local DC supply when using a three-wire connection.

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
- Single unit supports ±15V, ±75V, and ±150V DC input ranges
- Space-saving 12.5mm (0.5 inch) unit with pluggable terminals for convenient wiring
- High accuracy, linearity, stability, and reliability
- User-selectable filtering (low, medium, high)
- Supports sink or source output wiring
- Supports reverse-acting (inverse) output
- 1500V input isolation
- NAMUR-compliant output loop current
- Shock (25g) and vibration (4g) resistant
- Mounts on Type T DIN-rail
- Wide ambient operation (-40 to 80°C)
- CE compliant. UL/cUL Class I Div 2, ATEX / IECEx Zone 2 approvals

Multi-range ±15V, ±75V, or ±150V input ◆ 4-20mA output (sink/source) ◆ 12-32V DC loop/local power

Windows XP, Vista, 7, & 8

The Agility™ Config Tool is downloadable (FREE) at the Google Play Store
For Android Devices only

TT238 Model software allows you to configure transmitters offline, save the file, and download into units later, at your convenience.
Transmitters: TT230 Series

**TT238** High voltage input two-wire/three-wire transmitter

### Performance Specifications

**Input Over-Voltage Protection**
Bipolar Transient Voltage Suppressors (TVS), 220V working typical.

**Input Resolution**
Bipolar input: 1 part in 50000 (±25000)
Unipolar input: 1 part in 25000

**Input Filter**
Selectable digital filtering settings (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)**
130dB @ 60Hz, typical with 100 ohm input unbalance.

### Output

**Output Range**
4 to 20mA DC.

**Output Compliance**
\[ R_{LOAD} = \frac{(V_{SUPPLY} - 11V)}{0.020A} \]
\[ R_{LOAD} = 0 \text{ to } 650 \text{ ohms @ 24V DC}. \]

**Output Response Time (for step input change)**
Time to reach 98% of final output value (typical)
- Low filter: 50 milliseconds
- Medium filter: 150 milliseconds
- High filter: 1200 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: 4g, per IEC 60068-2-6
- Shock: 25g, 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. Designed for UL/cUL Class I Division 2 Groups ABCD, ATEX / IECEx Zone 2.

\[ \text{II 3 G Ex nA IIC T4 Gc -40°C} \leq T_a \leq +80°C \]

### 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**

TT238-0600
Two-wire transmitter, high voltage 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 for more information.

**USB-Isolator**
USB-to-USB isolator, includes USB cable (4001-112).
Transmitters: TT230 Series

TT239 Frequency/pulse/PWM input two-wire transmitter

**Description**

The TT239 model is a space-saving two-wire transmitter that isolates and converts a frequency, pulse, or pulse-width modulation (PWM) input to a proportional 4-20mA signal. You can select to measure either the input frequency or the duty cycle. Power is received from the output loop current or a DC supply when using a three-wire connection.

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 frequency 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
- Measures frequency or duty cycle and interfaces many input types up to 100KHz
- Accepts input amplitudes up to 120Vrms (±170V DC, unipolar or bipolar)
- Adjustable 0Hz cut-off, sample averaging, and output update time
- Software configurable pull-up/down resistors (+4V DC input pull-up for sensors/transducers)
- 1500V isolation between input/output circuits
- Space-saving 12.5mm (0.5 inch) unit with pluggable terminals for convenient wiring
- Fast response time and high accuracy
- Supports normal or reverse-acting output
- Supports sink or source output wiring
- NAMUR-compliant output loop current
- Shock (25g) and vibration (4g) resistant
- Wide ambient operation (-40 to 80°C)
- CE compliant. UL/cUL Class I Div 2, ATEX / IECEx Zone 2 approvals

### Multi-range frequency/pulse input

- 4-20mA output (sink/source)
- 12-32V DC local/local power

**TT230 Series Transmitter Configuration Software**

Configuration Software is downloadable (FREE) from www.acromag.com.

Windows® XP, Vista, 7, & 8

**The Agility™ Config Tool** is downloadable (FREE) at the Google Play Store

For Android Devices only

TT239 Model software allows you to configure transmitters offline, save the file, and download into units later, at your convenience.
## TT239 - Frequency/pulse/PWM input two-wire transmitter

### Performance Specifications

**Input Scaling Adjust**
Zero: Adjustable over 0 to 99% of full-scale input.
Full scale: Adjustable over 0.5Hz to 100KHz.

Cut-off frequency: Adjustable over 0.01Hz to 100KHz.

**Input Pull-up/Pull-down**
(Internal, software-select)
Configurable 12.4K pull-up to +4V and 1K pull-down to –FRTN, or disabled. 15V DC maximum input.
4V pull-up with ±83mV hysteresis or 3V when ±84mV.

**Unipolar Signal Configuration**
Amplitude: 0 to 3V DC min., 0 to 170V DC max.
Thresholds: Configurable for 1.6V DC (±25mV hysteresis) or 5V DC (±83mV hysteresis), typical.

**Bipolar Signal Configuration**
Amplitude: ±50 to ±200mV min. (depending on range and hysteresis), 120VDC max. (±170V DC).
Thresholds: ±0mV nominal (±25 or ±83mV hysteresis).

### Output

**Output Range**
4 to 20mA DC, wired as sink or source.
Under-range capability 3.6mA. Over-range 24mA.

**Output Compliance**
\( R_{LOAD} = (V_{Supply} - 12V) / 0.020A \).

**Output DAC Resolution**
16-bit D/A converter

**Output Update**
Software configurable from 0ms to 5000ms.
Determines the rate at which the output signal is updated, unless optionally overridden.

**Output Settling Time**
1ms, 0% to 98% for a step-change in input, typical.

**Output Accuracy**
Better than ±0.05% of span, typical (±0.1% max.) for nominal input spans. Includes the effects of repeatability, terminal point conformity, and linearization, but does not include sensor error.

**Ambient Temperature Effect**
Better than ±0.0020% per °C of input span or ±20ppm/°C, typical. Includes the combined effects of zero and span drift over temperature.

### Environmental

**Temperature Range**
Operation: -40 to 80°C (-40° to 176°F)
Storage: -40°C 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 maximum

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

**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 61000-4-4
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 61000-4-4

### Ordering Information

**Models**
TT239-0600
Transmitter, isolated frequency/pulse/PWM input

**Services**
TT239-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**
TT-UISIP (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 for more information.

**USB-Isolator**
USB-to-USB isolator, includes USB cable (4001-112)
The Agility™ Config Tool is a mobile application that allows easy setup and configuration of Acromag TT Series transmitters via a tethered mobile device.

This free app is available for Android devices at the Google Play store at Acromag Agility™ Config Tool.

Demo the software, no need for a module. To enter demo mode simply tap the icon in the upper left corner 8 times.

Key Features & Benefits

- Connects to Acromag TT Series transmitters (except models TT231)
- Requires the use of USB OTG Cable (Acromag part #: 5028-565) and USB A to Mini B Cable (Acromag part #: 4001-113)
- Configures and calibrates TT Series products via phone or tablet running Android 4.3 ICS (Ice Cream Sandwich) or later.
- View wiring diagrams, even without an internet connection
- Perform quick and easy field diagnostics and troubleshooting
- Ideal for field technicians

Quick and easy access to the wiring diagram, even offline without internet access.
Accessories

**Configuration Software**

TT230 Series Configuration
Simple to use, whether you need the full software interface package (includes USB isolator and cables) or just the configuration software itself. Acromag makes it easy to get started.

**Acromag Agility™ Config Tool**
Easy to download, configuration too mobile app for free download at the [Google Play Store.](https://play.google.com/store)

**Ordering Information**

- **TTC-SIP**
  Software Interface Package, includes: configuration software CD-ROM, USB-isolator, and two USB cables (4001-112, 4001-113).
- **TT230-Config/Cal**
  Factory custom configuration/calibration service for all TT230 models.
- **TT230-CONFIG**
  Free download of TT230 Transmitter Configuration Software.

**Mounting Hardware**

Din-Rail Mounting
For your convenience, Acromag offers several mounting accessories to simplify your system installation. Our 19" rack-mount kit provides a clean solution for mounting your I/O modules and a power supply. Or you can buy precut DIN rail strips for mounting on any flat surface.

**Ordering Information**

- **20RM-16-DIN**
  19" rack-mount kit with DIN rail.
- **DIN RAIL 3.0**
- **DIN RAIL 16.7**
  DIN rail strip, Type T, 3 inches (75mm) or 16.7 inches (425mm)

**Power Supplies**

Universal Slimline Power Supplies
Input Power Requirement
Universal Input (85-264V AC / 100-370V DC)
Output
10W, 15W, 30W, 60W, 90W, 120W, 240W

**Ordering Information**

- **PS5R-VB24**
  Power supply, 15W, 0.65A at 24V DC
- **PS5R-VD24**
  Power supply, 60W, 2.5A at 24V DC
  Visit [www.acromag.com](http://www.acromag.com) for additional models and more information.

**USB Isolator**

USB-to-USB Isolator
This compact, industrial-grade isolator provides a high-voltage isolation barrier between a computer and a connected USB device; protecting equipment from electrical surges, transient voltage spikes, and ground loop currents.

**Ordering Information**

- **USB-Isolator**
  USB isolator, includes USB cable (Part # 4001-112) for isolator-to-PC connection

**USB Cables**

Cables for PC-to-USB isolator, USB isolator-to-transmitter connections, and mobile device-to-USB isolator-to-transmitter connections.

**Ordering Information**

- **4001-112**
  USB Cable, Type A to Type B, 1 meter
- **4001-113**
  USB Cable, Type A to Mini-B, 1 meter
- **5028-565**
  USB Cable, USB OTG Cable, 6 inches