Product manual 6437

2-wire HART 7 temperature transmitter

No. 6437V101-UK
Product version: 01.00.00-01.99.99
6 Product Pillars
to meet your every need

Individually outstanding, unrivalled in combination

With our innovative, patented technologies, we make signal conditioning smarter and simpler. Our portfolio is composed of six product areas, where we offer a wide range of analog and digital devices covering over a thousand applications in industrial and factory automation. All our products comply with or surpass the highest industry standards, ensuring reliability in even the harshest of environments and have a 5-year warranty for greater peace of mind.

Our range of temperature transmitters and sensors provides the highest level of signal integrity from the measurement point to your control system. You can convert industrial process temperature signals to analog, bus or digital communications using a highly reliable point-to-point solution with a fast response time, automatic self-calibration, sensor error detection, low drift, and top EMC performance in any environment.

We deliver the safest signals by validating our products against the toughest safety standards. Through our commitment to innovation, we have made pioneering achievements in developing I.S. interfaces with SIL 2 Full Assessment that are both efficient and cost-effective. Our comprehensive range of analog and digital intrinsically safe isolation barriers offers multifunctional inputs and outputs, making PR an easy-to-implement site standard. Our backplanes further simplify large installations and provide seamless integration to standard DCS systems.

We provide inexpensive, easy-to-use, future-ready communication interfaces that can access your PR installed base of products. All the interfaces are detachable, have a built-in display for readout of process values and diagnostics, and can be configured via push-buttons. Product specific functionality includes communication via Modbus and Bluetooth and remote access using our PR Process Supervisor (PPS) application, available for iOS and Android.

Our unique range of single devices covering multiple applications is easily deployable as your site standard. Having one variant that applies to a broad range of applications can reduce your installation time and training, and greatly simplify spare parts management at your facilities. Our devices are designed for long-term signal accuracy, low power consumption, immunity to electrical noise and simple programming.

Our compact, fast, high-quality 6 mm isolators are based on microprocessor technology to provide exceptional performance and EMC-immunity for dedicated applications at a very low total cost of ownership. They can be stacked both vertically and horizontally with no air gap separation between units required.

Our display range is characterized by its flexibility and stability. The devices meet nearly every demand for display readout of process signals, and have universal input and power supply capabilities. They provide a real-time measurement of your process value no matter the industry, and are engineered to provide a user-friendly and reliable relay of information, even in demanding environments.
2-wire HART 7
temperature transmitter
6437

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2-wire HART 7 temperature transmitter
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- RTD, TC, potentiometer, linear resistance and bipolar mV input
- Single input, dual input or 2 channels (2x4 terminals)
- Wide ambient operating temperature of -50 to +85°C
- Total accuracy from 0.014%
- 2.5 kVAC galvanic isolation
- Full assessment to IEC61508 : 2010 for use in SIL 2/3 applications

Application
- Temperature measurement of a wide range of TC and RTD types.
- Conversion of wide span linear resistance and potentiometer inputs to 4...20 mA.
- Conversion of bipolar mV signals to 4...20 mA.
- Integration into asset management schemes.
- Critical applications requiring superior accuracy and/or sensor redundancy and drift detection.

Technical characteristics
- True dual input transmitter, accepts the widest range of dual input combinations.
- Sensor redundancy - output automatically switches to secondary sensor in event of primary sensor failure, maintaining uptime.
- Sensor drift detection - alerts when sensor differential exceeds user-defined limits, for maintenance optimization.
- Dynamic variable mapping for process data in addition to the primary variable e.g. dual input features such as average, differential and min./max. tracking.
- Groundbreaking digital and analog signal accuracy over full input span and ambient conditions.
- Extensive sensor matching including Callendar Van Dusen and custom linearizations.
- Programmable input limits with runtime metering ensure maximum process traceability and sensor out of range protection.
- IEC 61508 : 2010 full assessment up to SIL 2/3 applications together with enhanced EMC Functional Safety testing to IEC 61236-3-1.
- Meets NAMUR NE21, NE43, NE44, NE89 and NE107 compliant diagnostics information.

Mounting / installation / programming
- DIN rail mounting with up to 84 inputs per meter.
- Configuration via PReset using PR5909 Loop Link /HART modem, or by Asset Management tool (e.g. Pactware, AMS, HART communicator) for which all relevant DD, eDD and DTM files are available.
- The 6437A can be mounted in zone 2 and zone 22 / Class I, Division 2, Groups A, B, C, D.
- The 6437D can be mounted in zone 0, 1, 2 and zone 20, 21, 22 including M1 / Class I, Division 1, Groups A, B, C, D.
Applications

Dual input

Input
- 2 x 2/3/4 w RTD
- 2 x TC (2/3/4 w ext. CJC)
- 2 x TC (int. CJC)
- TC (int. CJC) + 2/3/4 w RTD
- TC (2/3 w ext. CJC) + 2/3/4 w RTD
- 2 x 2/3/4 w lin. R
- 2 x 3/4 w Pot
- 5 w Pot + 3 w Pot
- 2 x mV unipolar
- 2 x mV bipolar

Output
- 4...20 mA
- (Advanced functions)

Single input

Input
- 2/3/4 w RTD
- TC (2/3 w ext. CJC)
- TC (int. CJC)
- 2/3/4 w lin. R
- 3/4 w Pot
- mV unipolar
- mV bipolar

Output
- 4...20 mA

2 channels

Channel 1
- 2/3/4 w RTD
- TC (2/3 w ext. CJC)
- TC (int. CJC)
- 2/3/4 w lin. R
- 3/4 w Pot
- mV unipolar
- mV bipolar

Ch. 1
- Ch. 1, 4...20 mA

Ch. 2
- Ch. 2, 4...20 mA

Channel 2
- 2/3/4 w RTD
- TC (2/3 w ext. CJC)
- TC (int. CJC)
- 2/3/4 w lin. R
- 3/4 w Pot
- mV unipolar
- mV bipolar
Order

<table>
<thead>
<tr>
<th>Type</th>
<th>Version</th>
<th>Inputs</th>
<th>SIL approval</th>
<th>Marine approval</th>
</tr>
</thead>
<tbody>
<tr>
<td>6437</td>
<td></td>
<td>Single input (4 terminals)</td>
<td>SIL</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dual input (8 terminals)</td>
<td>No SIL</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 channels (2x4 terminals)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Accessories

- 5909 = Loop Link USB interface and PReset Software
- 276USB = HART modem with USB connection

Electrical specifications

**Environmental conditions:**
Ambient operating temperature range:
- Standard: -50°C to +85°C
- SIL: -40°C to +80°C

Storage temperature: -40°C to +85°C
Calibration temperature: 23...25°C
Humidity: < 99% RH (non-cond.)
Protection degree: IP20

**Mechanical specifications:**
Dimensions (HxWxD): 109 x 23.5 x 104 mm
Weight, single input / dual input / 2 channels: 150 g / 160 g / 185 g
Max. wire size: 0.13...2.08 mm² / AWG 26...14 stranded wire
Screw terminal torque: 0.5 Nm
Vibration:
- 2...25 Hz: ±1.6 mm
- 25...100 Hz: ±4 g

**Common specifications:**
Supply voltage, DC
- 6437A: 7.5*...48** VDC
- 6437D: 7.5*...30** VDC
- 6437, EU-RO: 8.3...33.6 VDC ±10%
Additional min. supply voltage when using test terminals: 0.8 V
Max. internal power dissipation: ≤ 850 mW per channel
Min. load resistance at > 37 V supply: (Supply voltage – 37) / 23 mA

Isolation voltage, test/operation:
- 6437A: 2.5 kVAC / 55 VAC
- 6437D: 2.5 kVAC / 42 VAC

Polarity protection: All inputs and outputs
Write protection, 6437x1-- & 6437x2--: jumper or software
Write protection, 6437x3--: Software
Warm-up time: < 5 min.
Start-up time: < 2.75 s
Programming: Loop Link & HART
Signal / noise ratio: > 60 dB
Long-term stability, better than: ±0.05% of span / year
                            ±0.18% of span / 5 years
Response time: 70 ms
Programmable damping: 0...60 s
Signal dynamics, input: 24 bit
Signal dynamics, output: 18 bit
Effect of supply voltage variation: < 0.005% of span / VDC

* Note: Observe that the minimum supply voltage must be as measured at the terminals of the 6437, i.e. all external drops must be considered.
** Note: Make sure to protect the device from overvoltages by using a suitable power supply or by installing overvoltage protecting devices.
### Basic values

<table>
<thead>
<tr>
<th>Input type</th>
<th>Basic accuracy</th>
<th>Temperature coefficient*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt10</td>
<td>≤ ±0.8°C</td>
<td>≤ ±0.020°C /°C</td>
</tr>
<tr>
<td>Pt20</td>
<td>≤ ±0.4°C</td>
<td>≤ ±0.010°C /°C</td>
</tr>
<tr>
<td>Pt50</td>
<td>≤ ±0.16°C</td>
<td>≤ ±0.004°C /°C</td>
</tr>
<tr>
<td>Pt100</td>
<td>≤ ±0.04°C</td>
<td>≤ ±0.002°C /°C</td>
</tr>
<tr>
<td>Pt200</td>
<td>≤ ±0.08°C</td>
<td>≤ ±0.002°C /°C</td>
</tr>
</tbody>
</table>
| Pt500      | T<sub>max</sub> ≤ 180°C: ≤ ±0.08°C  
               T<sub>max</sub> > 180°C: ≤ ±0.16°C  | ≤ ±0.002°C /°C           |
| Pt1000     | ≤ ±0.08°C      | ≤ ±0.002°C /°C           |
| Pt2000     | T<sub>max</sub> ≤ 300°C: ≤ ±0.08°C  
               T<sub>max</sub> > 300°C: ≤ ±0.40°C  | ≤ ±0.002°C /°C           |
| Pt10000    | ≤ ±0.16°C      | ≤ ±0.002°C /°C           |
| Pt x       | The highest tolerance of the adjacent points | The highest coefficient of the adjacent points |
| Ni10       | ≤ ±1.6°C       | ≤ ±0.020°C /°C           |
| Ni20       | ≤ ±0.8°C       | ≤ ±0.010°C /°C           |
| Ni50       | ≤ ±0.32°C      | ≤ ±0.004°C /°C           |
| Ni100      | ≤ ±0.16°C      | ≤ ±0.002°C /°C           |
| Ni120      | ≤ ±0.16°C      | ≤ ±0.002°C /°C           |
| Ni200      | ≤ ±0.16°C      | ≤ ±0.002°C /°C           |
| Ni500      | ≤ ±0.16°C      | ≤ ±0.002°C /°C           |
| Ni1000     | ≤ ±0.16°C      | ≤ ±0.002°C /°C           |
| Ni2000     | ≤ ±0.16°C      | ≤ ±0.002°C /°C           |
| Ni10000    | ≤ ±0.32°C      | ≤ ±0.002°C /°C           |
| Ni x       | The highest tolerance of the adjacent points | The highest coefficient of the adjacent points |
| Cu5        | ≤ ±1.6°C       | ≤ ±0.040°C /°C           |
| Cu10       | ≤ ±0.8°C       | ≤ ±0.020°C /°C           |
| Cu20       | ≤ ±0.4°C       | ≤ ±0.010°C /°C           |
| Cu50       | ≤ ±0.16°C      | ≤ ±0.004°C /°C           |
| Cu100      | ≤ ±0.08°C      | ≤ ±0.002°C /°C           |
| Cu200      | ≤ ±0.08°C      | ≤ ±0.002°C /°C           |
| Cu500      | ≤ ±0.16°C      | ≤ ±0.002°C /°C           |
| Cu1000     | ≤ ±0.08°C      | ≤ ±0.002°C /°C           |
| Cu x       | The highest tolerance of the adjacent points | The highest coefficient of the adjacent points |
| Lin. R: 0...400 Ω | ≤ ±40 mΩ      | ≤ ±2 mΩ /°C              |
| Lin. R: 0...100 kΩ | ≤ ±4 Ω       | ≤ ±0.2 Ω /°C             |
| Potentiometer: 0...100% | <0.05%     | <±0.005%                  |

* Input temperature coefficients are the listed values or 0.002% of input span, whichever is greater.
<table>
<thead>
<tr>
<th>Input type</th>
<th>Basic accuracy</th>
<th>Temperature coefficient*</th>
</tr>
</thead>
<tbody>
<tr>
<td>mV: -20...100 mV</td>
<td>( \pm 5 \mu V ) ≤ 0.01% of reading</td>
<td>( \pm 0.2 \mu V / ^\circ C )</td>
</tr>
<tr>
<td>mV: -100...1700 mV</td>
<td>( \pm 0.1 \mu V ) ≤ 0.01% of reading</td>
<td>( \pm 36 \mu V / ^\circ C )</td>
</tr>
<tr>
<td>mV: ±800 mV</td>
<td>( \pm 0.1 \mu V ) ≤ 0.01% of reading</td>
<td>( \pm 32 \mu V / ^\circ C )</td>
</tr>
<tr>
<td>TC E</td>
<td>( \pm 0.2^\circ C ) ≤ 0.01% of reading</td>
<td>( \pm 0.025^\circ C / ^\circ C )</td>
</tr>
<tr>
<td>TC J</td>
<td>( \pm 0.25^\circ C ) ≤ 0.01% of reading</td>
<td>( \pm 0.025^\circ C / ^\circ C )</td>
</tr>
<tr>
<td>TJ K</td>
<td>( \pm 0.25^\circ C ) ≤ 0.01% of reading</td>
<td>( \pm 0.025^\circ C / ^\circ C )</td>
</tr>
<tr>
<td>TC L</td>
<td>( \pm 0.35^\circ C ) ≤ 0.01% of reading</td>
<td>( \pm 0.025^\circ C / ^\circ C )</td>
</tr>
<tr>
<td>TC N</td>
<td>( \pm 0.4^\circ C ) ≤ 0.01% of reading</td>
<td>( \pm 0.025^\circ C / ^\circ C )</td>
</tr>
<tr>
<td>TC T</td>
<td>( \pm 0.25^\circ C ) ≤ 0.01% of reading</td>
<td>( \pm 0.025^\circ C / ^\circ C )</td>
</tr>
<tr>
<td>TC U</td>
<td>( &lt;0^\circ C: \pm 0.01^\circ C ) \leq 0.01% of reading ( \geq 200^\circ C: \pm 0.4^\circ C )</td>
<td>( \pm 0.025^\circ C / ^\circ C )</td>
</tr>
<tr>
<td>TC Lr</td>
<td>( \pm 0.2^\circ C ) ≤ 0.01% of reading</td>
<td>( \pm 0.1^\circ C / ^\circ C )</td>
</tr>
<tr>
<td>TC R</td>
<td>( &lt;200^\circ C: \pm 0.5^\circ C ) \leq 0.01% of reading ( \geq 200^\circ C: \pm 1.0^\circ C )</td>
<td>( \pm 0.1^\circ C / ^\circ C )</td>
</tr>
<tr>
<td>TC S</td>
<td>( &lt;200^\circ C: \pm 0.5^\circ C ) \leq 0.01% of reading ( \geq 200^\circ C: \pm 1.0^\circ C )</td>
<td>( \pm 0.1^\circ C / ^\circ C )</td>
</tr>
<tr>
<td>TC W3</td>
<td>( \pm 0.6^\circ C ) \leq 0.01% of reading</td>
<td>( \pm 0.1^\circ C / ^\circ C )</td>
</tr>
<tr>
<td>TC W5</td>
<td>( \pm 0.4^\circ C ) \leq 0.01% of reading</td>
<td>( \pm 0.1^\circ C / ^\circ C )</td>
</tr>
<tr>
<td>TC type: B1</td>
<td>( \pm 1^\circ C ) \leq 0.01% of reading</td>
<td>( \pm 0.1^\circ C / ^\circ C )</td>
</tr>
<tr>
<td>TC type: B2</td>
<td>( \pm 3^\circ C ) \leq 0.01% of reading</td>
<td>( \pm 0.1^\circ C / ^\circ C )</td>
</tr>
<tr>
<td>TC type: B3</td>
<td>( \pm 8^\circ C ) \leq 0.01% of reading</td>
<td>( \pm 0.8^\circ C / ^\circ C )</td>
</tr>
<tr>
<td>TC type: B4</td>
<td>not specified</td>
<td>not specified</td>
</tr>
<tr>
<td>CJC (internal)</td>
<td>( \pm 0.5^\circ C )</td>
<td>Included in basic accuracy</td>
</tr>
<tr>
<td>CJC (external)</td>
<td>( \pm 0.08^\circ C )</td>
<td>( \pm 0.002^\circ C / ^\circ C )</td>
</tr>
</tbody>
</table>

* Input temperature coefficients are the listed values or 0.002% of input span, whichever is greater.
TC B₁ accuracy specification range ........................................ > 400°C
TC B₂ accuracy specification range ........................................ > 160°C < 400°C
TC B₃ accuracy specification range ........................................ > 85°C < 160°C
TC B₄ accuracy specification range ........................................ < 85°C

**Output accuracies:**

<table>
<thead>
<tr>
<th>Output type</th>
<th>Basic accuracy</th>
<th>Temperature coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average measurement</td>
<td>Average of input 1 and 2 accuracy</td>
<td>Average of input 1 and 2 temperature coefficient</td>
</tr>
<tr>
<td>Differential measurement</td>
<td>Sum of input 1 and 2 accuracy</td>
<td>Sum of input 1 and 2 temperature coefficient</td>
</tr>
<tr>
<td>Analog output</td>
<td>≤ ±1.6μA (0.01% of full output span)</td>
<td>≤ ±0.48μA / K (≤ ±0.003% of full output span / K)</td>
</tr>
</tbody>
</table>
Accuracy calculation examples:

Example: Pt100 sensor, configured from -200°C to +850°C:

Pt100 Basic Accuracy = 0.04°C
Output Analog Accuracy = 0.0016 mA

Total Accuracy (mA) = \( \frac{\text{Basic Accuracy}}{\text{Configured Span Input}} \times 16.0 \text{ mA} + \text{Output Analog Accuracy} \)

Total Accuracy (mA) = \( \frac{0.04°C}{850°C - (-200°C)} \times 16.0 \text{ mA} + 0.0016 \text{ mA} = 0.0022 \text{ mA} \)

Total Accuracy (%) = \( \frac{\text{Total Accuracy (mA)}}{16.0 \text{ mA}} \times 100\% \)

Total Accuracy (%) = \( \frac{0.0022 \text{ mA}}{16.0 \text{ mA}} \times 100\% = 0.01381\% \)

Example: Type K TC, internal CJC, measured reading of 400°C, span 0...400°C:

Type K TC Basic Accuracy = 0.25°C
Output Analog Accuracy = 0.0016 mA

Total Accuracy (mA) = \( \frac{\text{Basic Accuracy} + \text{Int. CJC} + (\text{Gain Deviation} \times \text{Measured Reading})}{\text{Configured Span Input}} \times 16.0 \text{ mA} + \text{Output Analog Accuracy} \)

Total Accuracy (mA) = \( \frac{0.25°C + 0.5°C \times (0.0001 \times 400)}{400°C} \times 16.0 \text{ mA} + 0.0016 \text{ mA} = 0.0332 \text{ mA} \)

Total Accuracy (%) = \( \frac{\text{Total Accuracy (mA)}}{16.0 \text{ mA}} \times 100\% \)

Total Accuracy (%) = \( \frac{0.0332 \text{ mA}}{16.0 \text{ mA}} \times 100\% = 0.2075\% \)

Example: Type K TC, external CJC Pt1000, measured reading of 400°C, span 0...400°C:

Type K TC Basic Accuracy = 0.25°C
Output Analog Accuracy = 0.0016 mA

Total Accuracy (mA) = \( \frac{\text{Basic Accuracy} + \text{Ext. CJC} + (\text{Gain Deviation} \times \text{Measured Reading})}{\text{Configured Span Input}} \times 16.0 \text{ mA} + \text{Output Analog Accuracy} \)

Total Accuracy (mA) = \( \frac{0.25°C + 0.08°C \times (0.0001 \times 400)}{400°C} \times 16.0 \text{ mA} + 0.0016 \text{ mA} = 0.0164 \text{ mA} \)

Total Accuracy (%) = \( \frac{\text{Total Accuracy (mA)}}{16.0 \text{ mA}} \times 100\% \)

Total Accuracy (%) = \( \frac{0.0164 \text{ mA}}{16.0 \text{ mA}} \times 100\% = 0.1025\% \)

Example accuracy calculations are based on factory calibration ambient temperature, and do not take into account other potential sources of inaccuracy, e.g. power supply effect, ambient temperature fluctuation etc. which must also be considered.
EMC - immunity influence. ........................................... < ±0.1% of span
Extended EMC immunity:
NAMUR NE 21, A criterion, burst .................................... < ±1% of span

Input specifications:

RTD input types:

<table>
<thead>
<tr>
<th>Type</th>
<th>Standard</th>
<th>Min. value</th>
<th>Max. value</th>
<th>α</th>
<th>Min. span</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt10...10.000</td>
<td>IEC 60751</td>
<td>-200°C</td>
<td>+850°C</td>
<td>0.003851</td>
<td>10°C</td>
</tr>
<tr>
<td></td>
<td>JIS C 1604-8</td>
<td>-200°C</td>
<td>+649°C</td>
<td>0.003916</td>
<td>10°C</td>
</tr>
<tr>
<td></td>
<td>GOST 6651-2009</td>
<td>-200°C</td>
<td>+850°C</td>
<td>0.003910</td>
<td>10°C</td>
</tr>
<tr>
<td></td>
<td>Callendar Van Dusen</td>
<td>-200°C</td>
<td>+850°C</td>
<td>-----</td>
<td>10°C</td>
</tr>
<tr>
<td>Ni10...10.000</td>
<td>DIN 43760-1987</td>
<td>-60°C</td>
<td>+250°C</td>
<td>0.006180</td>
<td>10°C</td>
</tr>
<tr>
<td></td>
<td>GOST 6651-2009 / OIML R84:2003</td>
<td>-60°C</td>
<td>+180°C</td>
<td>0.006170</td>
<td>10°C</td>
</tr>
<tr>
<td>Cu5...1000</td>
<td>Edison Copper Winding No. 15</td>
<td>-200°C</td>
<td>+260°C</td>
<td>0.004270</td>
<td>100°C</td>
</tr>
<tr>
<td></td>
<td>GOST 6651-2009 / OIML R84:2003</td>
<td>-180°C</td>
<td>+200°C</td>
<td>0.004280</td>
<td>100°C</td>
</tr>
<tr>
<td></td>
<td>GOST 6651-94</td>
<td>-50°C</td>
<td>+200°C</td>
<td>0.004260</td>
<td>100°C</td>
</tr>
</tbody>
</table>

Connection type ............................................. 2-, 3- and 4-wire
Cable resistance per wire (max.) ................................ 50 Ω
Sensor current .................................................. < 0.15 mA
Effect of sensor cable resistance (3-/4-wire) .................. < 0.002 Ω / Ω
Sensor cable, wire-wire capacitance ............................. Max. 30 nF (Pt1000 & Pt10000 IEC and JIS +
Ni1000 & NI10000)
Max. 50 nF (others than above)

Sensor error detection, programmable .............................. None, Shorted, Broken, Shorted or Broken

笔记：无论传感器错误检测的配置如何，短路传感器错误检测将被禁用，如果配置的传感器类型值低于常数检测限的下限。最低检测限为短路传感器的检测限 15 Ω
Sensor error detection time (RTD element) ...................... ≤ 70 ms
Sensor error detection time (for 3rd and 4th wire) .............. ≤ 2000 ms

TC input types:

<table>
<thead>
<tr>
<th>Type</th>
<th>Min. temperature</th>
<th>Max. temperature</th>
<th>Min. span</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>0 (85)°C</td>
<td>+1820°C</td>
<td>100°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>E</td>
<td>-200°C</td>
<td>+1000°C</td>
<td>50°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>J</td>
<td>-100°C</td>
<td>+1200°C</td>
<td>50°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>K</td>
<td>-180°C</td>
<td>+1372°C</td>
<td>50°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>L</td>
<td>-200°C</td>
<td>+900°C</td>
<td>50°C</td>
<td>DIN 43710</td>
</tr>
<tr>
<td>Lr</td>
<td>-200°C</td>
<td>+800°C</td>
<td>50°C</td>
<td>GOST 3044-84</td>
</tr>
<tr>
<td>N</td>
<td>-180°C</td>
<td>+1300°C</td>
<td>50°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>R</td>
<td>-50°C</td>
<td>+1760°C</td>
<td>100°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>S</td>
<td>-50°C</td>
<td>+1760°C</td>
<td>100°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>T</td>
<td>-200°C</td>
<td>+400°C</td>
<td>50°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>U</td>
<td>-200°C</td>
<td>+600°C</td>
<td>50°C</td>
<td>DIN 43710</td>
</tr>
<tr>
<td>W3</td>
<td>0°C</td>
<td>+2300°C</td>
<td>100°C</td>
<td>ASTM E988-96</td>
</tr>
<tr>
<td>W5</td>
<td>0°C</td>
<td>+2300°C</td>
<td>100°C</td>
<td>ASTM E988-96</td>
</tr>
</tbody>
</table>

Cold junction compensation (CJC):
Constant, internal or external via a Pt100 or Ni100 sensor
Internal CJC temperature range .............................. -50°C to +100°C
External CJC connection ....................................... 2, 3 or 4-wire (4-wire only for dual input device)
External CJC cable resistance per wire (for 3- and 4-wire connections) ........ 50 Ω
Effect of CJC cable resistance (for 3- and 4-wire connections) .................. < 0.002 Ω / Ω
External CJC sensor current ................................... < 0.15 mA
External CJC temperature range: -50°C to +135°C
CJC Sensor cable, wire-wire capacitance: Max. 50 nF
Maximum total cable resistance: Max. 10 kΩ
Sensor cable, wire-wire capacitance: Max. 50 nF
Sensor error detection, programmable: None, Shorted, Broken, Shorted or Broken

⚠️ Shorted sensor error detection only applies to CJC sensor.

Sensor error detection time (TC element): ≤ 70 ms
Sensor error detection time, external CJC (for 3rd and 4th wire): ≤ 2000 ms

**Linear resistance input:**
- Input range: 0 Ω...100 kΩ
- Min. span: 25 Ω
- Connection type: 2-, 3- or 4-wire
- Cable resistance per wire (max.): 50 Ω
- Sensor current: < 0.15 mA
- Effect of sensor cable resistance (3-/ 4-wire): < 0.002 Ω / Ω
- Sensor cable, wire-wire capacitance: Max. 30 nF (Lin. R > 400 Ω)
  Max. 50 nF (Lin. R ≤ 400 Ω)
- Sensor error detection, programmable: None, Broken

**Potentiometer input:**
- Potentiometer: 10 Ω...100 kΩ
- Input range: 0...100%
- Min. span: 10%
- Connection type: 3-, 4- or 5-wire (5-wire only for dual input device)
- Cable resistance per wire (max.): 50 Ω
- Sensor current: < 0.15 mA
- Effect of sensor cable resistance (4-/ 5-wire): < 0.002 Ω / Ω
- Sensor cable, wire-wire capacitance: Max. 30 nF (Potentiometer > 400 Ω)
  Max. 50 nF (Potentiometer ≤ 400 Ω)
- Sensor error detection, programmable: None, Shorted, Broken, Shorted or Broken

⚠️ NOTE: Regardless of the sensor error detection configuration, shorted sensor error detection will be disabled if the configured potentiometer size is lower than the constant detection limit for shorted sensor.

Detection limit for shorted sensor: 15 Ω
Sensor error detection time, wiper arm: ≤ 70 ms (no shorted sensor detection)
Sensor error detection time, element: ≤ 2000 ms
Sensor error detection time (4th and 5th wire): ≤ 2000 ms

**mV input:**
- Measurement range: -800...+800 mV (bipolar)
- Min. span: 2.5 mV
- Input resistance: 10 MΩ
- Sensor cable, wire-wire capacitance: Max. 30 nF (input range: -100...1700 mV)
  Max. 50 nF (input range: -20...100 mV)
- Sensor error detection, programmable: None, Broken
- Sensor error detection time: ≤ 70 ms

**Output specifications and HART:**
- Normal range, programmable: 3.8...20.5 / 20.5...3.8 mA
- Extended range (output limits), programmable: 3.5...23 / 23...3.5 mA
- Updating time: 10 ms
- Load (@ current output): ≤ (Vsupply - 7.5) / 0.023 [Ω]
- Load stability: < 0.01% of span / 100 Ω

Of span = Of the presently selected range
Sensor error indication, programmable ........................................ 3.5...23 mA
(shorted sensor error detection is ignored at TC and mV input)
NAMUR NE43 Upscale ................................................................. > 21 mA
NAMUR NE43 Downscale ............................................................ < 3.6 mA
HART protocol revisions ............................................................ HART 7 and HART 5

Programmable input/output limits:
Error current .............................................................................. Enable / disable
Set error current ........................................................................ 3.5 mA...23 mA

Programmable input and current output limits are available to increase system safety and integrity.

Input:
When the input signal exceeds either of the programmable lower and upper limits, the device will output a user defined error current. Setting input limits ensures that any out of range measurements can be uniquely identified and flagged via the transmitter output, resulting in improved asset and material protection e.g. thermal runaway of a reaction process can be mitigated.

Example:
Pt100 input ranged 100°C to 400°C
Input limits set to Upper = +650°C, Lower = -150°C
Error current set to 3.5 mA
Output limits set to Upper = 20.5 mA, Lower = 3.8 mA
Output:
When the current output exceeds either of the programmable upper and lower limits, the device will output a user defined error current.

Observed authority requirements:
EMC .......................................................... 2014/30/EU
ATEX .......................................................... 2014/34/EU
RoHS .......................................................... 2011/65/EU
EAC .......................................................... TR-CU 020/2011
EAC Ex .......................................................... TR-CU 012/2011

Approvals:
Ex / I.S.:
ATEX
6437A .......................................................... DEKRA 18ATEX0135X
6437D .......................................................... DEKRA 16ATEX0047X
IEEx .......................................................... IECEx DEK. 16.0029X
c FM us .......................................................... FM16CA0146X / FM16US0287X
c CSA us .......................................................... 70066266
INMETRO .................................................... DEKRA 16.0008X
NEPSI, 6437x1-- and 6437x2-- .................................... GYJ18.1057X
EAC Ex .......................................................... RU C-DK.P698.B.00192

Marine approval:
EU RO Mutual Recognition Type Approval ................................ MRA0000023

Functional safety (Pending):
SIL2 Certified & Fully Assessed acc. to IEC 61508 : 2010
SFF> 93% - type B component
SIL3 Applicable through redundant structure (HFT=0; 1oo2)
FMEDA report - www.prelectroncis.com
LED function

Onboard LED indicates faults according to NAMUR NE44 and NE107.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Green / red LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device OK</td>
<td>Constant</td>
</tr>
<tr>
<td>No supply</td>
<td>OFF</td>
</tr>
<tr>
<td>Indication of faults independent of the device, e.g. wire break, sensor short circuit, violation of input or output limits</td>
<td>Flashing</td>
</tr>
<tr>
<td>Device error</td>
<td>Constant</td>
</tr>
</tbody>
</table>

For detailed device diagnostic behaviours and NE107 messaging, see Appendix A on page 59.

Jumpers

The 6437x1-- and 6437x2-- have two front jumpers - one jumper to enable Write Protection and one jumper to select the output current at Safe State to go above 21 mA as specified in NAMUR NE43.

If the jumper is not inserted, the output current at Safe State will go lower than 3.6 mA as specified in NAMUR NE43.
Test pins

The test pins allow measurement of loop current directly while maintaining loop integrity. Power must be connected to the transmitter when using the test pins.

Warning!
For hazardous area installation, only certified test equipment may be used.

HART commands

For definitions and further information on HART commands for the 6437 please consult the 6437 HART Field Device Specification.
### Advanced functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Differential**       | Analog output signal is proportional to the difference between input 1 and input 2 measurements.  
                         | \( \text{Analog output} = \text{Input 1} - \text{Input 2} \) or  
                         | \( \text{Input 2} - \text{Input 1} \) or  
                         | \(|\text{Input 2} - \text{Input 1}|| |
| **Average measurement**| Analog output signal is proportional to the average of input 1 and input 2 measurements.  
                         | \( \text{Analog output} = 0.5 \times (\text{Input 1} + \text{Input 2}) \) |
| **Max.**               | Analog output is proportional to the input with the highest value.  
                         | \( \text{IF (Input 1} > \text{Input 2}) \) THEN \( \text{AnalogOutput} = \text{Input 1} \) ELSE \( \text{AnalogOutput} = \text{Input 2} \) |
| **Min.**               | Analog output is proportional to the input with the lowest value.  
                         | \( \text{IF (Input 1} < \text{Input 2}) \) THEN \( \text{AnalogOutput} = \text{Input 1} \) ELSE \( \text{AnalogOutput} = \text{Input 2} \) |
| **Sensor drift**       | If the differential between input 1 and input 2 measured values exceed a predefined limit  
                         | then a sensor drift error is indicated.  
                         | \( \text{IF } \lvert \text{Input 1} - \text{Input 2} \rvert > \text{SensorDriftLimit} \) THEN \( \text{IndicateSensor-DriftError} \) |
| **Redundancy (Hot Backup)** | Analog output is proportional to input 1 as long as no error is detected and input is within  
                                | user-defined limits. If sensor error on input 1 is detected or if sensor 1 value is outside user-defined limits, analog output then becomes proportional to input 2 and a warning indication is generated.  
                                | \( \text{IF(NoSensorErrorOnInput1 AND Input1InsideLimits) THEN AnalogOutput} = \text{Input 1} \) ELSEIF(NoSensorErrorOnInput2 AND Input2InsideLimits) THEN AnalogOutput = Input 2 |
| **Customized linearization - Polynomial Type** | Supports polynomial linearization up to 5 segments, each with up to 4th order polynomials. |
| **Customized linearization - Callendar Van Dusen** | Supports direct entry of CVD constants. |
| **Customized linearization - Table linearization** | Supports table linearization with up to 60 in/out values. |
| **Customized linearization - 2nd order spline linearization** | Supports 2nd order spline linearization with up to 40 output values. |
| **Runtime meter - transmitter electronics** | Recording of internal transmitter temperatures during operation, logging time spent in each of 9 fixed sub temperature ranges. |
|                        | \(< -50°C \)  
                         | \(-50..-30°C \)  
                         | \(-30..-10°C \)  
                         | \(-10..+10°C \)  
                         | \(+10..+30°C \)  
                         | \(+30..+50°C \)  
                         | \(+50..+70°C \)  
                         | \(+70..+85°C \)  
                         | \( >85°C \) |
| **Runtime meter - inputs** | Recording of input measurement values during operation, logging time spent in each of 9 fixed sub input ranges. Subranges are defined individually for each input type. |
| **Slave pointer - transmitter electronics** | Recording of min./max. internal transmitter temperature for device's complete lifetime. |
| **Slave pointer - inputs** | Recording of min./max. values for input/s measurements is saved. Values are reset when measurement configuration is changed. |
Dynamic variable mapping

Four dynamic variables are supported, PV, SV, TV and QV. Using HART commands, these may be assigned to any Device Variable (DV 0 - 15) in any combination. The device variable mapped to PV controls the loop current.

<table>
<thead>
<tr>
<th>Device Variables</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DV0</td>
<td>Input 1 (temperature, voltage, resistance...)</td>
</tr>
<tr>
<td>DV1</td>
<td>Input 2 (temperature, voltage, resistance...)</td>
</tr>
<tr>
<td>DV2</td>
<td>CJC 1, input 1 CJC temperature, only valid if input 1 is a TC input</td>
</tr>
<tr>
<td>DV3</td>
<td>CJC 2, input 2 CJC temperature, only valid if input 2 is a TC input</td>
</tr>
<tr>
<td>DV4</td>
<td>Average input 1 and input 2</td>
</tr>
<tr>
<td>DV5</td>
<td>Difference input 1 - input 2</td>
</tr>
<tr>
<td>DV6</td>
<td>Difference input 2 - input 1</td>
</tr>
<tr>
<td>DV7</td>
<td>Absolute difference (input 1 - input 2)</td>
</tr>
<tr>
<td>DV8</td>
<td>Minimum (input 1, input 2)</td>
</tr>
<tr>
<td>DV9</td>
<td>Maximum (input 1, input 2)</td>
</tr>
<tr>
<td>DV10</td>
<td>Input 1 with input 2 as backup</td>
</tr>
<tr>
<td>DV11</td>
<td>Input 2 with input 1 as backup</td>
</tr>
<tr>
<td>DV12</td>
<td>Average input 1 and 2, with both as backup</td>
</tr>
<tr>
<td>DV13</td>
<td>Minimum of input 1 and 2, with both as backup</td>
</tr>
<tr>
<td>DV14</td>
<td>Maximum of input 1 and 2, with both as backup</td>
</tr>
<tr>
<td>DV15</td>
<td>Electronics temperature</td>
</tr>
</tbody>
</table>

Overview of device variables
Write protection by software

The Default Active Password when the device leaves the factory is "********"; this value can be changed by the user. The Universal Active Password "00002008" will always be accepted and this value cannot be changed. The Universal Active Password shall only be used if the Active Password has been lost and needs to be reset to a known value. When changing the password, use only Latin-1 characters that can be entered and displayed on any terminal.

When write protection is enabled, no "write" commands are accepted regardless of the "Write Protect" Hardware Jumper position.

Write protection by jumper

If a hardware jumper is set in position "Write Protect", no "write" commands are accepted regardless if disabled by software.

Changing the HART protocol version

It is possible to change the unit's HART protocol revision by using the PReset software and a PR 5909 Loop Link interface or a HART interface. Other HART configuration tools like a handheld HART terminal may also be used.

Procedure for using a HART hand-held terminal to change the 6437 from HART 7 to HART 5 and vice versa:

Change the 6437 from HART 7 to HART 5:

1. After entering the device menu (or after pressing home) the online menu is shown
2. Select Device Setup and press right arrow key (or simply press 7)
3. Select Diagnostics/Service and press right arrow key (or simply press 3)
4. Select Write Protection and press right arrow key (or simply press 6)
5. Select Change to HART 5 and press right arrow key (or simply press 3)
6. When display says “Are you sure you want to change protocol to HART 5?” press OK
7. Enter the correct active password, default is “********” (eight stars), and press OK
8. When the display says “Device is now in HART 5 mode” press OK and then Exit to go offline and rescan for new devices.
9. The device will now appear as being a 6437 (HART 5) device, select it to enter the online menu again

   NOTE! After changing to HART 5, the configuration will be reset to the factory default.

The quick key sequence from the online menu is: 7, 3, 6, 3, OK, OK, OK, Exit.

To change the device back to HART 7, just follow the same procedure as above, except Change to HART 7 must be selected in step 5.

When changing back to HART 7, the configuration remains unchanged.
Procedure for using the PReset software and 5909 Loop Link or HART communication interface to change the 6437 from HART 7 to HART 5 and vice versa:

Switching from HART 7 to HART 5
Select the 6437 product and click the "HART" tab.
Click "Device Password / Write Protection / Protocol..." and select "Change protocol to HART 5" in the pop-up window, then acknowledge by pressing OK.

The following message will now appear:

NOTE! After changing to HART 5, the configuration will be reset to the factory default.
Switching from HART 5 to HART 7
Select the 6437 product and click the “HART” tab.
Click “Device Password / Write Protection / Protocol…” and select “Change protocol to HART 7” in the pop-up window, then acknowledge by pressing OK.

The following message will now appear:

```
Device Password / Write Protection

The protocol has been changed successfully to HART 7
```

SIL functionality
For instructions and further information on how to enable SIL mode on the 6437 please consult the Safety Manual.
Connections

Single input:

Dual inputs:

* When using thermocouple input, the 6437 can be configured for either constant, internal or external CJC via a Pt100 or Ni100 sensor. This must be selected during device configuration.

Output:

2-wire installation
Connections

2 channels - input:

Channel 1

`2 w / 3 w / 4 w RTD or lin. R` (internal CJC or external 2 w / 3 w / 4 w CJC*)

Channel 2

`2 w / 3 w / 4 w RTD or lin. R` (internal CJC or external 2 w / 3 w / 4 w CJC*)

Output:

Channel 1

2-wire installation

Channel 2

2-wire installation

* When using thermocouple input, the 6437 can be configured for either constant, internal or external CJC via a Pt100 or Ni100 sensor. This must be selected during device configuration.
Block diagrams

6437x3--, ch. 1

6437x3--, ch. 2
Programming

6437 can be configured in the following 4 ways:
1. With PR electronics A/S’ communications interface Loop Link and PReset PC configuration software.
2. With a HART modem and PReset PC configuration software.
3. With a HART communicator with PR electronics A/S’ DDL driver.
4. Via programming framework, e.g. DCS, PACTWare, etc.

1: Loop Link
For programming please refer to the drawing below and the help functions in PReset.
When communicating with non-installed devices, connectors 11, 12, 13, 14 (channel 1) and 21, 22, 23, 24 (channel 2) can be dismantled in the safe area to connect the terminals of the communications interface to the pins.
Loop Link is not approved for communication with devices installed in hazardous (Ex) area.

2: HART modem
For programming please refer to the drawing below and the help functions in PReset.
3: HART communicator
For programming please refer to the drawing below. To get access to product-specific commands, the HART communicator must be loaded with the PR electronics A/S DDL driver. This can be ordered either at the HART Communication Foundation or PR electronics A/S.

4: Programming framework
Support for both EDD and FDT/DTM technology, offering configuration and monitoring via relevant DCS/Asset Management Systems and supported management packages e.g. Pactware.
Connection of transmitters in multidrop mode

- The communication is either by means of a HART communicator or a HART modem.
- The HART communicator or a HART modem can be connected across AB or BC.
- The outputs of max. 63 transmitters can be connected in parallel for a digital HART communication on 2-wires.
- Before it is connected, each transmitter must be configured with a unique number from 1 to 63. If 2 transmitters are configured with the same number, both will be excluded. The transmitters must be programmed for multidrop mode (with a fixed output signal of 4 mA). Maximum current in the loop is therefore 252 mA.
- The PReset PC configuration software can configure the individual transmitter for multidrop mode and provide it with a unique polling address.
ATEX Installation drawing 6437QA01-V3R0

ATEX Certificate      DEKRA 16ATEX 0047X

Ex ia Installation
For safe installation of the 6431Dxxx and 6437Dxxx the following must be observed.

Marking

II 1 G  Ex ia IIC T6...T4 Ga or
II 2(1) G  Ex ib [ia Ga] IIC T6...T4 Gb
II 1 D  Ex ia IIIC Da
I  M1  Ex ia I Ma

Hazardous Area
Zone 0, 1, 2, 20, 21, 22 and M1

Unclassified Area

Terminal: 54,53,52,51 and 44,43,42,41
Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5μF

Terminal: 44,43,42,41
Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5μF

Terminal: 54,53,52,51
Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5μF
Ex ib Installation

Hazardous Area
Zone 0, 1, 2, 20, 21, 22 and M1

Terminal:
54, 53, 52, 51 and 44, 43, 42, 41
Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5 μF

Terminal:
44, 43, 42, 41
Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5 μF

Terminal:
54, 53, 52, 51
Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5 μF
Ex ia and ib installation

Ui: 30 VDC; Ii: 120 mA; Li: 0 μH; Ci: 1.0nF

<table>
<thead>
<tr>
<th>Pi per channel</th>
<th>Temperature class</th>
<th>Maximum ambient temperature</th>
<th>Single and dual input</th>
<th>Two channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>900 mW</td>
<td>T6</td>
<td>+50 °C</td>
<td>+45 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T5</td>
<td>+65 °C</td>
<td>+60 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>+85 °C</td>
<td>+85 °C</td>
<td></td>
</tr>
<tr>
<td>750 mW</td>
<td>T6</td>
<td>+55 °C</td>
<td>+50 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T5</td>
<td>+70 °C</td>
<td>+65 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>+85 °C</td>
<td>+85 °C</td>
<td></td>
</tr>
<tr>
<td>610 mW</td>
<td>T6</td>
<td>+60 °C</td>
<td>+55 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T5</td>
<td>+75 °C</td>
<td>+70 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>+85 °C</td>
<td>+85 °C</td>
<td></td>
</tr>
</tbody>
</table>

General installation instructions

Year of manufacture can be taken from the first two digits in the serial number.

If the enclosure is made of non-metallic materials or is made of metal having a paint layer thicker than 0.2 mm (group IIC), or 2 mm (group IIB, IIA, I), or any thickness (group III), electrostatic charges shall be avoided.

For EPL Ga, if the enclosure is made of aluminum, it must be installed such, that ignition sources due to impact and friction sparks are excluded.

The distance between terminals, inclusive the wires bare part, shall be at least 3 mm separated from any earthed metal.

The test pins allow measurement of loop current directly while maintaining loop integrity. Power must be connected to the transmitter when using the test pins. For hazardous area installation, only certified test equipment may be used.

If the transmitter was applied in type of protection Ex nA or Ex ec, it may afterwards not be applied for intrinsic safety.

The front connector and front test pads provides an intrinsically safe extension-port signal and may only be connected to dedicated equipment of PR electronics.

Warning: Do not connect or disconnect plugs and sockets when energized.

For installation in a potentially explosive dust atmosphere, the following instructions apply:

The transmitter shall be mounted in an enclosure, that is providing a degree of protection of at least IP5X according to EN60529. The enclosure shall be suitable for the application and correctly installed.

Cable entry devices and blanking elements shall fulfill the same requirements.

For EPL Da, the surface temperature “T” of the enclosure, for a dust layer with a maximum thickness of 5mm, is the ambient temperature +20 K.
For installation in mines the following instructions apply:
The transmitter shall be mounted in a metal enclosure that is providing a degree of protection of at least IP54 according to EN60529.
Aluminum enclosures are not allowed for mines.
The enclosure shall be suitable for the application and correctly installed.
Cable entry devices and blanking elements shall fulfill the same requirements.

**Ex nA / Ex ec / Ex ic Installation**
For safe installation of the 6431Axxx and 6437Axxx the following must be observed.

*ATEX Certificate*  
DEKRA 18ATEX0135X

*Standards:*

*Marking*  
- II 3 G Ex nA IIC T6…T4 Gc  
- II 3 G Ex ec IIC T6…T4 Gc  
- II 3 G Ex ic IIC T6…T4 Gc  
- II 3 D Ex ic IIIC Dc

**Hazardous Area**

Zone 2 and 22

**Terminal:**
- 54,53,52,51 and 
- 44,43,42,41
- Uo: 7.2 VDC  
- Io: 7.3 mA  
- Po: 13.2 mW  
- Lo: 667 mH  
- Co: 13.5μF

**Terminal:**
- 44,43,42,41
- Uo: 7.2 VDC  
- Io: 7.3 mA  
- Po: 13.2 mW  
- Lo: 667 mH  
- Co: 13.5μF

**Terminal:**
- 54,53,52,51
- Uo: 7.2 VDC  
- Io: 7.3 mA  
- Po: 13.2 mW  
- Lo: 667 mH  
- Co: 13.5μF
| 643xA1: Terminal | 44 43,42,41 |
| 643xA2: Terminal | In1: 44 43,42,41 In2: 54 53,52,51 |
| 643xA3: Terminal | Ch1: 44 43,42,41 Ch2: 54 53,52,51 |

<table>
<thead>
<tr>
<th>Ex nA &amp; Ex ec</th>
<th>Ex ic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vmax = 7.2VDC</td>
<td>Uo: 7.2 VDC; Io: 7.3 mA Po: 13.2 mW; Lo: 667 mH; Co: 13.5μF</td>
</tr>
</tbody>
</table>

| 643xA1: Terminal: 11,12 |
| 643xA2: Terminal: 11,12 |
| 643xA3: Terminal: Ch1: 11,12 Ch2: 21,22 |

<table>
<thead>
<tr>
<th>Supply / output circuit</th>
<th>Maximum ambient temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex nA &amp; Ex ec</td>
<td>Ex ic</td>
</tr>
<tr>
<td>Li = 0 uH</td>
<td>Ci = 1.0 nF</td>
</tr>
<tr>
<td>Vmax= 37 VDC</td>
<td>Uo= 48 VDC</td>
</tr>
<tr>
<td></td>
<td>Li = 0 uH</td>
</tr>
<tr>
<td>Vmax= 30 VDC</td>
<td>Uo= 30 VDC</td>
</tr>
<tr>
<td></td>
<td>Li = 0 uH</td>
</tr>
<tr>
<td></td>
<td>Ci = 1.0 nF</td>
</tr>
</tbody>
</table>

**General installation instructions**

If the enclosure is made of non-metallic materials, or if it is made of metal having a paint layer thicker than 0.2 mm (group IIC), or 2 mm (group IIB, IIA, I), or any thickness (group III), electrostatic charges shall be avoided.

For an ambient temperature ≥ 60ºC, heat resistant cables shall be used with a rating of at least 20 K above the ambient temperature.

The enclosure shall be suitable for the application and correctly installed.

The distance between terminals, inclusive the wires bare part, shall be at least 3 mm separated from any earthed metal.

'TEST' connection, may only be applied when the area is safe, or if supply / output circuit and the applied current meter are intrinsically safe.

**Warning:** Do not connect or disconnect Terminal Blocks when energized.
For installation in a potentially explosive gas atmosphere, the following instructions apply:
The transmitter shall be installed in an enclosure providing a degree of protection of not less than IP54 in accordance with EN60079-0, which is suitable for the application and correctly installed, e.g. in an enclosure that is in type of protection Ex n or Ex e. Additionally, the area inside the enclosure shall be pollution degree 2 or better, as defined in EN60664-1.
Cable entry devices and blanking elements shall fulfill the same requirements.

For installation in a potentially explosive dust atmosphere, the following instructions apply:
The surface temperature “T” of the enclosure, for a dust layer with a maximum thickness of 5 mm, is the ambient temperature +20 K.
If the transmitter is supplied with an intrinsically safe signal "ic" and interfaces an intrinsically safe signal "ic" (e.g. a passive device), the transmitter shall be mounted in an enclosure that provides a degree of protection of at least IP54 according to EN60079-0.
Cable entry devices and blanking elements shall fulfill the same requirements.

If the transmitter is supplied with an non-sparking signal "nA", or interfaces a non sparking signal, the transmitter shall be mounted in an enclosure, providing a degree of protection of at least IP54 according to EN60079-0, and in conformance with type of protection Ex tD, or Ex t.
Cable entry devices and blanking elements shall fulfill the same requirements.
Ex ia Installation
For safe installation of the 6431Dxxx and 6437Dxxx the following must be observed.

Marking
Ex ia IIC T6...T4 Ga or
Ex ib [ia Ga] IIC T6...T4 Gb
Ex ia IIIC Da
Ex ia I Ma

Hazardous Area
Zone 0, 1, 2, 20, 21, 22 and M1

Unclassified Area

Terminal:
54, 53, 52, 51 and
44, 43, 42, 41

Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5μF

Terminal:
44, 43, 42, 41

Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5μF

Terminal:
54, 53, 52, 51

Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5μF
Ex ib Installation

Hazardous Area
Zone 0, 1, 2, 20, 21, 22 and M1

Hazardous Area
Zone 1

Unclassified Area

Terminal:
54, 53, 52, 51 and 44, 43, 42, 41

Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5μF

Terminal:
44, 43, 42, 41

Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5μF

Terminal:
54, 53, 52, 51

Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5μF

Terminal:

44, 43, 42, 41

Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5μF

Terminal:

54, 53, 52, 51

Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5μF
Ex ia and ib installation

Ui: 30 VDC; li: 120 mA; Li: 0 μH; Ci: 1.0nF

<table>
<thead>
<tr>
<th>P_i per channel</th>
<th>Temperature class</th>
<th>Maximum ambient temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single and dual input</td>
<td>Two channel</td>
</tr>
<tr>
<td>900 mW</td>
<td>T6</td>
<td>+50 °C</td>
</tr>
<tr>
<td></td>
<td>T5</td>
<td>+65 °C</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>+85 °C</td>
</tr>
<tr>
<td>750 mW</td>
<td>T6</td>
<td>+55 °C</td>
</tr>
<tr>
<td></td>
<td>T5</td>
<td>+70 °C</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>+85 °C</td>
</tr>
<tr>
<td>610 mW</td>
<td>T6</td>
<td>+60 °C</td>
</tr>
<tr>
<td></td>
<td>T5</td>
<td>+75 °C</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>+85 °C</td>
</tr>
</tbody>
</table>

General installation instructions

Year of manufacture can be taken from the first two digits in the serial number.
If the enclosure is made of non-metallic materials or is made of metal having a paint layer thicker than 0.2 mm (group IIC), or 2 mm (group IIB, IIA, I), or any thickness (group III), electrostatic charges shall be avoided.
For EPL Ga, if the enclosure is made of aluminum, it must be installed such, that ignition sources due to impact and friction sparks are excluded.
The distance between terminals, inclusive the wires bare part, shall be at least 3 mm separated from any earthed metal.
The test pins allow measurement of loop current directly while maintaining loop integrity. Power must be connected to the transmitter when using the test pins. For hazardous area installation, only certified test equipment may be used.
If the transmitter was applied in type of protection Ex nA or Ex ec, it may afterwards not be applied for intrinsic safety.
The front connector and front test pads provides an intrinsically safe extension-port signal and may only be connected to dedicated equipment of PR electronics.

Warning: Do not connect or disconnect plugs and sockets when energized.

For installation in a potentially explosive dust atmosphere, the following instructions apply:
The transmitter shall be mounted in an enclosure, that is providing a degree of protection of at least IP5X according to IEC60529. The enclosure shall be suitable for the application and correctly installed.
Cable entry devices and blanking elements shall fulfill the same requirements.
For EPL Da, The surface temperature of the enclosure, for a dust layer with a maximum thickness of 5mm, is the ambient temperature +20 K.

For installation in mines the following instructions apply:
The transmitter shall be mounted in a metal enclosure that is providing a degree of protection of at least IP54 according to IEC60529.
Aluminum enclosures are not allowed for mines. The enclosure shall be suitable for the application and correctly installed. Cable entry devices and blanking elements shall fulfill the same requirements.

**Ex nA / Ex ec / Ex ic Installation**
For safe installation of the 6431Axxx and 6437Axxx the following must be observed.

**Marking**

- Ex nA IIC T6...T4 Gc
- Ex ec IIC T6...T4 Gc
- Ex ic IIC T6...T4 Gc
- Ex ic IIIC Dc

**Hazardous Area**

- Zone 2 and 22

**Unclassified Area**

**Terminal:**

- 54,53,52,51 and 44,43,42,41
- Uo: 7.2 VDC
- Io: 7.3 mA
- Po: 13.2 mW
- Lo: 667 mH
- Co: 13.5μF

**Terminal:**

- 44,43,42,41
- Uo: 7.2 VDC
- Io: 7.3 mA
- Po: 13.2 mW
- Lo: 667 mH
- Co: 13.5μF

**Terminal:**

- 54,53,52,51
- Uo: 7.2 VDC
- Io: 7.3 mA
- Po: 13.2 mW
- Lo: 667 mH
- Co: 13.5μF
Ex nA & Ex ec | Ex ic
---|---
Vmax = 7.2 VDC | Uo: 7.2 VDC; Io: 7.3 mA
| Po: 13.2 mW; Lo: 667 mH; Co: 13.5 μF

Supply / output circuit

<table>
<thead>
<tr>
<th>Ex nA &amp; Ex ec</th>
<th>Ex ic</th>
<th>Ex ic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Li = 0 uH, Ci = 1.0 nF</td>
<td>Li = 0 uH, Ci = 1.0 nF</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vmax</th>
<th>Ui</th>
<th>Pi = 851 mW per channel</th>
<th>Tempe rate class</th>
<th>Single and dual input</th>
<th>Two channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>37 VDC</td>
<td>37 VDC</td>
<td>851 mW per channel</td>
<td>T4</td>
<td>+85 °C</td>
<td>+85 °C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>T5</td>
<td>+70 °C</td>
<td>+65 °C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>T6</td>
<td>+55 °C</td>
<td>+50 °C</td>
</tr>
<tr>
<td>30 VDC</td>
<td>30 VDC</td>
<td>700 mW per channel</td>
<td>T4</td>
<td>+85 °C</td>
<td>+85 °C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>T5</td>
<td>+75 °C</td>
<td>+70 °C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>T6</td>
<td>+60 °C</td>
<td>+55 °C</td>
</tr>
</tbody>
</table>

General installation instructions

If the enclosure is made of non-metallic materials, or if it is made of metal having a paint layer thicker than 0.2 mm (group IIC), or 2 mm (group IIB, IIA, I), or any thickness (group III), electrostatic charges shall be avoided.

For an ambient temperature ≥ 60°C, heat resistant cables shall be used with a rating of at least 20 K above the ambient temperature.

The enclosure shall be suitable for the application and correctly installed.

The distance between terminals, inclusive the wires bare part, shall be at least 3 mm separated from any earthed metal.

'TEST' connection, may only be applied when the area is safe, or if supply / output circuit and the applied current meter are intrinsically safe.

Warning: Do not connect or disconnect Terminal Blocks when energized.
For installation in a potentially explosive gas atmosphere, the following instructions apply:
The transmitter shall be installed in an enclosure providing a degree of protection of not less than IP54 in accordance with IEC 60079-0, which is suitable for the application and correctly installed, e.g. in an enclosure that is in type of protection Ex n or Ex e. Additionally, the area inside the enclosure shall be pollution degree 2 or better, as defined in IEC 60664-1. Cable entry devices and blanking elements shall fulfill the same requirements.

For installation in a potentially explosive dust atmosphere, the following instructions apply:
If the transmitter is supplied with an intrinsically safe signal "ic" and interfaces an intrinsically safe signal "ic" (e.g. a passive device), the transmitter shall be mounted in an enclosure that provides a degree of protection of at least IP54 according to IEC60079-0. Cable entry devices and blanking elements shall fulfill the same requirements.

If the transmitter is supplied with an non-sparking signal "nA", or interfaces a non sparking signal, the transmitter shall be mounted in an enclosure, providing a degree of protection of at least IP54 according to IEC60079-0, and in conformance with type of protection Ex tD, or Ex t. Cable entry devices and blanking elements shall fulfill the same requirements. The surface temperature "T" of the enclosure, for a dust layer with a maximum thickness of 5 mm, is the ambient temperature +20 K.
Division 1 / Ex ia, Intrinsic Safe Installation

For safe installation of the 6431Dxxx and 6437Dxxx the following must be Observed.

Marking: Class I Division 1, Groups A,B,C,D
Class I, Zone 0: Ex/AEx ia IIC, T6…T4
Ex/AEx ia IIC T6…T4
Ex/AEx ib [ia] IIC T6…T4

**IS Installation instructions**

• Install in accordance with the US the National Electrical Code (NEC) or for Canada the Canadian Electrical Code (CEC).

• The transmitter must be installed in a suitable enclosure to meet installation codes stipulated in the Canadian Electrical Code (CEC) or for US the National Electrical Code (NEC).

• To establish Class II and Class III, Division 1 or IIIC ratings, the equipment shall be installed in an enclosure that is approved for use in Class II and Class III hazardous (classified) locations.

• If the enclosure is made of non-metallic materials or of painted metal, electrostatic charging shall be avoided.

• Use supply wires with a rating of at least 5 K above the ambient temperature.

**WARNING:** Substitution of components may impair intrinsic safety

**AVERTISSEMENT:** la substitution de composants peut nuire à la sécurité intrinsèque
Hazardous Area
CL I, DIV 1 or
CL I, Zone 0

Non Classified Area

Terminal
44,43,42,41 and 54,53,52,51

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>44,43,42,41 and 54,53,52,51</td>
<td>44,43,42,41,54,53,52,51</td>
</tr>
<tr>
<td>Uo</td>
<td>7.2 VDC</td>
</tr>
<tr>
<td>Io</td>
<td>7.3 mA</td>
</tr>
<tr>
<td>Po</td>
<td>13.2 mW</td>
</tr>
<tr>
<td>Lo</td>
<td>667 mH</td>
</tr>
<tr>
<td>Co</td>
<td>13.5 μF</td>
</tr>
</tbody>
</table>

Terminal 11,12
Ex ia / Div 1;  

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Temperature Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>11,12</td>
<td></td>
</tr>
<tr>
<td>U1: 30 VDC; I1: 120 mA</td>
<td></td>
</tr>
<tr>
<td>Li:0 μH; Ci:1.0nF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T4: -50 ≤ Ta ≤ 85°C</td>
</tr>
<tr>
<td></td>
<td>T5: -50 ≤ Ta ≤ 70°C</td>
</tr>
<tr>
<td></td>
<td>T6: -50 ≤ Ta ≤ 55°C</td>
</tr>
<tr>
<td>U1: 30 VDC; I1: 120 mA</td>
<td></td>
</tr>
<tr>
<td>Pi:900 mW; Li:0 μH; Ci:1.0nF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T4: -50 ≤ Ta ≤ 85°C</td>
</tr>
<tr>
<td></td>
<td>T5: -50 ≤ Ta ≤ 70°C</td>
</tr>
<tr>
<td></td>
<td>T6: -50 ≤ Ta ≤ 55°C</td>
</tr>
<tr>
<td>U1: 30 VDC; I1: 100 mA</td>
<td></td>
</tr>
<tr>
<td>Pi:750 mW; Li:0 μH; Ci:1.0nF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T4: -50 ≤ Ta ≤ 85°C</td>
</tr>
<tr>
<td></td>
<td>T5: -50 ≤ Ta ≤ 75°C</td>
</tr>
<tr>
<td></td>
<td>T6: -50 ≤ Ta ≤ 60°C</td>
</tr>
</tbody>
</table>

Temperature Range

Um ≤ 250V
Voc or Uo ≤ Vmax or Ui
Isc or Io ≤ Imax or li
Po ≤ Pmax or Pi
Ca or Co ≥ Ci + Ccable
La or Lo ≥ Li + Lcable

643xD1, 643XD2

Hazardous Area CL I, DIV 1 or CL I, Zone 0

Non Classified Area

Terminal 44,43,42,41 and 54,53,52,51

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>44,43,42,41 and 54,53,52,51</td>
<td>44,43,42,41,54,53,52,51</td>
</tr>
<tr>
<td>Uo</td>
<td>7.2 VDC</td>
</tr>
<tr>
<td>Io</td>
<td>7.3 mA</td>
</tr>
<tr>
<td>Po</td>
<td>13.2 mW</td>
</tr>
<tr>
<td>Lo</td>
<td>667 mH</td>
</tr>
<tr>
<td>Co</td>
<td>13.5 μF</td>
</tr>
</tbody>
</table>

Associated equipment or Barrier
Terminal 44, 43, 42, 41 and 54, 53, 52, 51

**Terminal**
- **Uo**: 7.2 VDC
- **Io**: 7.3 mA
- **Po**: 13.2 mW
- **Lo**: 667 mH
- **Co**: 13.5 μF

**Temperature Range**

<table>
<thead>
<tr>
<th>Temperature Range</th>
<th>T4: -50 ≤ Ta ≤ 85°C</th>
<th>T5: -50 ≤ Ta ≤ 70°C</th>
<th>T6: -50 ≤ Ta ≤ 55°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pi: 900 mW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pi: 750 mW</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Terminal 11, 12 and 21, 22**

**Ex ia / Div 1**
- **Ui**: 30 VDC; **Ii**: 120 mA
- **Li**: 0 μH; **Ci**: 1.0nF

**Pi**: 900 mW

**Pi**: 750 mW

**Hazardous Area**
- **CL I, DIV 1 or CL I, Zone 0**

**Non Classified Area**

**Um ≤ 250V**
- **Voc or Uo ≤ Vmax or Ui**
- **Isc or Io ≤ Imax or Ii**
- **Po ≤ Pmax or Pi**
- **Ca or Co ≥ Ci + Ccable**
- **La or Lo ≥ Li + Lcable**
Zone 0 / Zone 1, Intrinsic Safe Installation

Hazardous Area
CL I, Zone 0 IIC

Hazardous Area
CL I, Zone 1 IIC

Terminal 44, 43, 42, 41 and 54, 53, 52, 51

- Uo: 7.2 VDC
- Io: 7.3 mA
- Po: 13.2 mW
- Lo: 667 mH
- Co: 13.5 μF

Terminal 11, 12

- Ex ib [ ia Ga ] IIC T6...T4 Gb;
- Ui: 30 VDC; Ii: 120 mA
- Li: 0 μH; Ci: 1.0 nF

- Uo: 7.2 VDC
- Io: 12.9 mA
- Po: 23.3 mW
- Lo: 200 mH
- Co: 13.5 μF

Temperature Range

- T4: -50 ≤ Ta ≤ 85°C
- T5: -50 ≤ Ta ≤ 70°C
- T6: -50 ≤ Ta ≤ 55°C

- T4: -50 ≤ Ta ≤ 85°C
- T5: -50 ≤ Ta ≤ 75°C
- T6: -50 ≤ Ta ≤ 60°C

Associated equipment or Barrier

Um ≤ 250V
Voc or Uo ≤ Vmax or Ui
Isc or Io ≤ Imax or li
Po ≤ Pi
Ca or Co ≥ Ci + Ccable
La or Lo ≥ Li + Lcable
Hazardous Area
CL I, Zone 0 IIC

Terminal
44,43,42,41 and
54,53,52,51

<table>
<thead>
<tr>
<th>Terminal 11,12 and 21 22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex ib [ ia Ga ] IIC T6...T4 Gb</td>
</tr>
<tr>
<td>Ui: 30 VDC; li: 120 mA</td>
</tr>
<tr>
<td>Li:0 μH; Ci:1.0nF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temperature Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>T4: -50 ≤ Ta ≤ 85°C</td>
</tr>
<tr>
<td>T5: -50 ≤ Ta ≤ 70°C</td>
</tr>
<tr>
<td>T6: -50 ≤ Ta ≤ 55°C</td>
</tr>
</tbody>
</table>

Non Classified Area

Hazardous Area
CL I, Zone 1 IIC

Terminal 11,12 and 21 22
Ex ib [ ia Ga ] IIC T6...T4 Gb

<table>
<thead>
<tr>
<th>Terminal 11,12 and 21 22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex ib [ ia Ga ] IIC T6...T4 Gb</td>
</tr>
<tr>
<td>Ui: 30 VDC; li: 120 mA</td>
</tr>
<tr>
<td>Li:0 μH; Ci:1.0nF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temperature Range</th>
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<tbody>
<tr>
<td>T4: -50 ≤ Ta ≤ 85°C</td>
</tr>
<tr>
<td>T5: -50 ≤ Ta ≤ 75°C</td>
</tr>
<tr>
<td>T6: -50 ≤ Ta ≤ 60°C</td>
</tr>
</tbody>
</table>

Terminal
44,43,42,41 and
54,53,52,51

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Uo</th>
<th>Io</th>
<th>Po</th>
<th>Lo</th>
<th>Co</th>
</tr>
</thead>
<tbody>
<tr>
<td>44,43,42,41 and 54,53,52,51</td>
<td>7.2 VDC</td>
<td>7.3 mA</td>
<td>13.2 mW</td>
<td>667 mH</td>
<td>13.5 μF</td>
</tr>
</tbody>
</table>

Um ≤ 250V
Voc or Uo ≤ Vmax or Ui
Isc or Io ≤ Imax or li
Po ≤ Pi
Ca or Co ≥ Ci + Ccable
La or Lo ≥ Li + Lcable
Division 2 / Ex nA, Non Incendive Installation
For safe installation of the 6431Axxx and 6437Axxx the following must be observed.

Marking
Class I, Division 2, Groups A, B, C, D
Class I, Zone 2: Ex/AEx nA IIC T6...T4
Ex nA IIC T6...T4
Class I, Zone 2: Ex/AEx nA [ic] IIC T6...T4
Ex nA [ic] IIC T6...T4

Hazardous Area
CL I, Div 2, GP ABCD
CL I, Zone 2, IIC

Unclassified Area

Terminal:
54,53,52,51
44,43,42,41

Vmax: 7.2 VDC
<table>
<thead>
<tr>
<th>Terminal 11, 12 and 21, 22</th>
<th>Temperature Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex nA</td>
<td></td>
</tr>
<tr>
<td>Supply voltage: max 37 VDC</td>
<td>T4: -50 ≤ Ta ≤ 85°C</td>
</tr>
<tr>
<td></td>
<td>T5: -50 ≤ Ta ≤ 70°C</td>
</tr>
<tr>
<td></td>
<td>T6: -50 ≤ Ta ≤ 55°C</td>
</tr>
<tr>
<td>Supply voltage: max 30 VDC</td>
<td>T4: -50 ≤ Ta ≤ 85°C</td>
</tr>
<tr>
<td></td>
<td>T5: -50 ≤ Ta ≤ 75°C</td>
</tr>
<tr>
<td></td>
<td>T6: -50 ≤ Ta ≤ 60°C</td>
</tr>
</tbody>
</table>

NI Installation instructions

- The transmitter must be installed in an enclosure providing a degree of protection of at least IP54 according to IEC60529 that is suitable for the application and is correctly installed. Cable entry devices and blanking elements shall fulfill the same requirements.
- If the enclosure is made of non-metallic materials or of painted metal, electrostatic charging shall be avoided.
- Use supply wires with a rating of at least 5 K above the ambient temperature.

WARNING: Substitution of components may impair suitability for Class I, Division 2

AVERTISSEMENT: la substitution de composants peut nuire à l’aptitude à la Classe I, Division 2.

WARNING: Do not disconnect equipment unless power has been switched off or the area is known to be safe.

AVERTISSEMENT: Ne débranchez pas l’équipement sauf si l’alimentation a été coupée ou si la zone est connue pour être sûre.

Non Incendive field wiring installation

The non incendive field wiring Circuit concept allows interconnection of Nonincendive Field wiring Apparatus with Associated Nonincendive Field Wiring Apparatus or Associated Intrinsically Safe Apparatus or Associated Apparatus not specially examined in combination as a system using any of the wiring methods permitted for unclassified locations, \( \text{Voc} < \text{Vmax}, \text{Ca} \geq \text{Ci} + \text{Ccable}, \text{La} \geq \text{Li} + \text{Lcable} \).

<table>
<thead>
<tr>
<th>Terminal 11, 12 and 21, 22</th>
<th>Temperature Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non Incendive Field wiring parameters</td>
<td></td>
</tr>
<tr>
<td>Vmax= 30 VDC, Ci=1nF, Li=0</td>
<td>T4: -50 ≤ Ta ≤ 85°C</td>
</tr>
<tr>
<td></td>
<td>T5: -50 ≤ Ta ≤ 75°C</td>
</tr>
<tr>
<td></td>
<td>T6: -50 ≤ Ta ≤ 60°C</td>
</tr>
</tbody>
</table>

Functional Ratings:
Unom ≤ 30 VDC; Inom ≤ 3.5 - 23 mA
Division 1 / Zone 0, Intrinsic Safe Installation

For safe installation of the 6431Dxxx and 6437Dxxx the following must be observed.

Marking

- CL I, Div 1, Gp A,B,C,D
- CL I, Zone 0 AEx ia IIC, T6...T4
- CL I, Zone 1 [0] AEx ib [ia] IIC, T6...T4
- Ex ia IIC, T6...T4
- Ex ib [ia Ga] IIC, T6...T4 Gb

Hazardous Area

- CL I, Div 1, GP ABCD
- CL I, Zone0 IIC

Terminals:

- 54, 53, 52, 51
- 44, 43, 42, 41

Uo: 7.2 VDC
Io: 12.9 mA
Po: 23.3 mW
Lo: 200 mH
Co: 13.5 μF

Non Classified Area

Um ≤ 250V
Voc or Uo ≤ Vmax or Ui
Isc or Io ≤ Imax or li
Po ≤ Pi
Ca or Co ≥ Ci + Ccable
La or Lo ≥ Li + Lcable
**Terminal 11,12 and 21, 22 Ex ia / Div 1**

<table>
<thead>
<tr>
<th>AEx/Ex ia IIC, T6…T4 Ga</th>
<th>Temperature Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>CL I, Div 1, Gp ABCD, T6…T4;</td>
<td>T4: -50 ≤ Ta ≤ 85°C</td>
</tr>
<tr>
<td>Ui: 30 VDC; li: 120 mA ; P:900 mW; Li:0 μH; Ci:1.0nF</td>
<td>T5: -50 ≤ Ta ≤ 70°C</td>
</tr>
<tr>
<td>Ui: 30 VDC; li: 100 mA ; P:750 mW; Li:0 μH; Ci:1.0nF</td>
<td>T6: -50 ≤ Ta ≤ 55°C</td>
</tr>
</tbody>
</table>

**Zone 0 / Zone 1, Intrinsic Safe Installation**

**Hazardous Area**
- CL I, Zone 0 IIC
- CL I, Zone 1 IIC

**Terminal 54,53,52,51**

- Uo: 7.2 VDC
- Io: 12.9 mA
- Po: 23.3 mW
- Lo: 200 mH
- Co: 13.5μF

<table>
<thead>
<tr>
<th>Hazardous Area</th>
<th>Hazardous Area</th>
<th>Non Classified Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>643xD</td>
<td>643xD3</td>
<td>Um ≤ 250V</td>
</tr>
</tbody>
</table>

- Voc or Uo ≤ Vmax or Ui
- Isc or Io ≤ Imax or li
- Po ≤ Pi
- Ca or Co ≥ Ci + Ccable
- La or Lc ≥ Li + Lcable

**Associated equipment or Barrier**

643xD: 6437V101-UK 49
IS installation instructions

- Install in accordance with the US the National Electrical Code (NEC) or for Canada the Canadian Electrical Code (CEC).

- Equipment that is FM-approved for intrinsic safety may be connected to barriers based on the ENTITY CONCEPT. This concept permits interconnection of approved transmitters, meters and other devices in combinations which have not been specifically examined by FM, provided that the agency's criteria are met. The combination is then intrinsically safe, if the entity concept is acceptable to the authority having jurisdiction over the installation.

- The entity concept criteria are as follows:
  The intrinsically safe devices, other than barriers, must not be a source of power. The maximum voltage $U_i$ ($V_{\text{max}}$) and current $I_i$ ($I_{\text{max}}$), and maximum power $P_i$ ($P_{\text{max}}$), which the device can receive and remain intrinsically safe, must be equal to or greater than the voltage ($U_o$ or $V_{oc}$ or $V_t$) and current ($I_o$ or $I_{sc}$ or $I_t$) and the power $P_o$ which can be delivered by the barrier.

- The sum of the maximum unprotected capacitance ($C_i$) for each intrinsically device and the interconnecting wiring must be less than the capacitance ($C_a$) which can be safely connected to the barrier.

- The sum of the maximum unprotected inductance ($L_i$) for each intrinsically device and the interconnecting wiring must be less than the inductance ($L_a$) which can be safely connected to the barrier.

- The entity parameters $U_o, V_{oc}$ or $V_t$ and $I_o, I_{sc}$ or $I_t$, and $C_a$ and $L_a$ for barriers are provided by the barrier manufacturer.

- The transmitter must be installed in a suitable enclosure to meet installation codes stipulated in the Canadian Electrical Code (CEC) or for US the National Electrical Code (NEC).
  - If the enclosure is made of non-metallic materials or of painted metal, electrostatic charging shall be avoided.

- Use supply wires with a rating of at least 5 K above the ambient temperature.

**WARNING:** Substitution of components may impair intrinsic safety

**AVERTISSEMENT:** La substitution de composants peut nuire à la sécurité intrinsèque
Division 2 / Zone 2, Non Sparking Installation
For safe installation of the 6431Axxx and 6437Axxx the following must be observed.

Marking
- Class I, Division 2, GP A,B,C,D; T6...T4
- Class I, Zone 2 AEx nA IIC, T6...T4 Gc
- Class I, Zone 2 Ex nA IIC, T6...T4 Gc
- NIFW, CL I, Div 2, GP A,B,C,D

Hazardous Area
- CL I, Div 2, GP ABCD
- CL I, Zone 2 IIC

Terminal:
- 54,53,52,51
- 44,43,42,41

Vmax: 7.2 VDC
NI Installation instructions

• The transmitter must be installed in an enclosure providing a degree of protection of at least IP54 according to IEC60529 that is suitable for the application and is correctly installed. Cable entry devices and blanking elements shall fulfill the same requirements.
• If the enclosure is made of non-metallic materials or of painted metal, electrostatic charging shall be avoided.
• Use supply wires with a rating of at least 5 K above the ambient temperature.

WARNING: Substitution of components may impair suitability for Class I, Division 2

AVERTISSEMENT: la substitution de composants peut nuire à l'aptitude à la Classe I, Division 2.

WARNING: Do not disconnect equipment unless power has been switched off or the area is known to be safe.

AVERTISSEMENT: Ne débranchez pas l'équipement sauf si l'alimentation a été coupée ou si la zone est connue pour être sûre.

Non Incendive field wiring installation

The non incendive field Wiring Circuit concept allows interconnection of Nonincendive Field wiring Apparatus with Associated Nonincendive Field Wiring Apparatus or Associated Intrinsically Safe Apparatus or Associated Apparatus not specially examined in combination as a system using any of the wiring methods permitted for unclassified locations, \( \text{Voc} < \text{Vmax}, \ \text{Ca} \geq \text{Ci} + \text{Ccable}, \ \text{La} \geq \text{Li} + \text{Lcable} \).

<table>
<thead>
<tr>
<th>Terminal 11, 12 and 21, 22</th>
<th>Non Incendive Field Wiring parameters</th>
<th>Temperature Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage: max 37 VDC</td>
<td>Vmax = 30 VDC, Ci = 1nF, Li = 0</td>
<td>T4: -50 ≤ Ta ≤ 85°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T5: -50 ≤ Ta ≤ 70°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T6: -50 ≤ Ta ≤ 55°C</td>
</tr>
<tr>
<td>Supply voltage: max 30 VDC</td>
<td></td>
<td>T4: -50 ≤ Ta ≤ 85°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T5: -50 ≤ Ta ≤ 75°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T6: -50 ≤ Ta ≤ 60°C</td>
</tr>
</tbody>
</table>

Functional Ratings:
Unom ≤ 30 VDC; Inom ≤ 3.5 - 23 mA
Instalação INMETRO 6437QB01-V3R0

INMETRO Certificado DEKRA 16.0008X

Normas: ABNT NBR IEC60079-0:2013, ABNT NBR IEC60079-11:2013
ABNT NBR IEC60079-15:2012

Para a instalação segura do 6431Dxxx e 6437Dxxx os seguintes pontos devem ser observados

NOTAS
Ex ia IIC T6...T4 Ga or
Ex ib [ia Ga] IIC T6...T4 Gb
Ex ia IIIC Da
Ex ia I Ma

Instalação Ex ia

Área Classificada
Zone 0, 1, 2, 20, 21, 22 and M1

Área Não classificada

Terminais:
54, 53, 52, 51 e
44, 43, 42, 41
Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5 μF

Terminais:
44, 43, 42, 41
Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5 μF

Terminais:
54, 53, 52, 51
Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5 μF
Instalação Ex ib

Área Classificada
Zone 0, 1, 2, 20, 21, 22 and Ma

Área Classificada
Zone 1

Área Não Classificada

Terminais: 54,53,52,51 e 44,43,42,41
Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5μF

Terminais: 44,43,42,41
Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5μF

Terminais: 54,53,52,51
Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5μF
**Instalações Ex ia e Ex ib**

**Ui:** 30 VDC; 
**Ii:** 120 mA; 
**Li:** 0 μH; 
**Ci:** 1.0nF

<table>
<thead>
<tr>
<th>P&lt;sub&gt;i&lt;/sub&gt; por canal</th>
<th>Classe de temperatura</th>
<th>Faixas de Temperaturas</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Entrada simples e dupla</td>
</tr>
<tr>
<td>900 mW</td>
<td>T6</td>
<td>+50 °C</td>
</tr>
<tr>
<td></td>
<td>T5</td>
<td>+65 °C</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>+85 °C</td>
</tr>
<tr>
<td>750 mW</td>
<td>T6</td>
<td>+55 °C</td>
</tr>
<tr>
<td></td>
<td>T5</td>
<td>+70 °C</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>+85 °C</td>
</tr>
<tr>
<td>610 mW</td>
<td>T6</td>
<td>+60 °C</td>
</tr>
<tr>
<td></td>
<td>T5</td>
<td>+75 °C</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>+85 °C</td>
</tr>
</tbody>
</table>

**Instruções Gerais de Instalação**

O ano de fabricação pode ser obtido a partir dos dois primeiros dígitos do número de série. Se o invólucro for feito de materiais não metálicos ou de metal com uma camada de tinta mais espessa que 0,2 mm (grupo IIC) ou 2 mm (grupo IIB, IIA, I) ou qualquer espessura (grupo III), cargas eletrostáticas devem ser evitadas.

Para EPL Ga, se o invólucro for de alumínio, ele deverá ser instalado de forma que as fontes de ignição devido a faíscas de impacto e fricção sejam excluídas.

A distância entre os terminais, inclusive a parte nua dos fios, deve ser pelo menos 3 mm separada de qualquer metal aterrado.

Os pinos de teste permitem medir a corrente do loop diretamente, mantendo a integridade do loop. A energia deve estar conectada ao transmissor ao usar os pinos de teste. Para instalação em áreas classificadas, somente equipamentos de teste certificados podem ser utilizados.

Se o transmissor foi aplicado no tipo de proteção Ex nA ou Ex ec, pode não ser aplicado posteriormente para segurança intrínseca.

O conector frontal e os pads de teste frontais fornecem um sinal de porta de extensão intrinsecamente seguro e só podem ser conectados a equipamentos dedicados da PRelectronics.

**Aviso:** Não conecte ou desconecte as fichas e as tomadas quando energizados.

**Para instalação em uma atmosfera potencialmente explosiva de poeira, as seguintes instruções se aplicam:**

O transmissor deve ser montado em um gabinete que ofereça um grau de proteção de pelo menos IP5X, de acordo com a ABNT NBR IEC60529. O gabinete deve ser adequado para a aplicação e instalado corretamente.

Os dispositivos de entrada de cabos e os elementos de supressão devem cumprir os mesmos requisitos.

Para EPL Da, a temperatura da superfície do gabinete, para uma camada de poeira com uma espessura máxima de 5 mm, é a temperatura ambiente de +20 K.
Para instalações em Minas, as instruções abaixo se aplicam:
O transmissor deverá ser montado em um gabinete de metal que possibilita um grau mínimo de proteção IP54 de acordo com a ABNT NBR IEC60529
Gabinetes de Alumínio não são permitidos para instalações em Minas.
O gabinete deve ser adequado para a aplicação e instalado corretamente.
Os dispositivos de entrada de cabos e os elementos espaçadores devem satisfazer os mesmos requisitos

Instalações Ex nA / Ex ec / Ex ic
Para instalações seguras do 6431Axxx e 6437Axxx as seguintes instruções devem ser observadas

Notas
Ex nA IIC T6...T4 Gc
Ex ec IIC T6...T4 Gc
Ex ic IIC T6...T4 Gc
Ex ic IIIC Dc

Área Classificada
Zone 2 and 22

643xA
Terminais:
54,53,52,51 e 44,43,42,41
Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5μF

Terminais:
44,43,42,41
Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5μF

Terminais:
54,53,52,51
Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5μF

Área Não Classificada

643xA3
Terminais:
44,43,42,41
Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5μF

Terminais:
54,53,52,51
Uo: 7.2 VDC
Io: 7.3 mA
Po: 13.2 mW
Lo: 667 mH
Co: 13.5μF
<table>
<thead>
<tr>
<th>Terminais</th>
<th>54,53,52,51</th>
<th>44,43,42,41</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex nA &amp; Ex ec</td>
<td>Li = 0 uH, Ci = 1.0 nF</td>
<td>Uo: 7.2 VDC; Io: 7.3 mA, Po: 13.2 mW; Lo: 667 mH; Co: 13.5 μF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Terminais</th>
<th>54,53,52,51 e 44,43,42,41</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex ic</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ex nA &amp; Ex ec</th>
<th>Ex ic</th>
<th>Vmax = 7.2 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Li = 0 uH, Ci = 1.0 nF</td>
<td>Li = 48 VDC, Ci = 1.0 nF</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Circuito de alimentação / saída</th>
<th>Faixa de Temperatura</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex nA &amp; Ex ec</td>
<td>Ex ic</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ex nA &amp; Ex ec</th>
<th>Ex ic</th>
<th>Uo = 7.2 VDC, Io = 7.3 mA, Po = 13.2 mW, Lo = 667 mH, Co = 13.5 μF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Li = 0 uH, Ci = 1.0 nF</td>
<td>Li = 48 VDC, Ci = 1.0 nF</td>
<td></td>
</tr>
</tbody>
</table>

| 643xA1: Terminais: 11,12 |
| 643xA2: Terminais: 11,12 |
| 643xA3: Terminais: Ch1: 11,12 Ch2: 21,22 |

<table>
<thead>
<tr>
<th>Classe de temperatura</th>
<th>Entrada simples e dupla</th>
<th>Dois canais</th>
</tr>
</thead>
<tbody>
<tr>
<td>T4</td>
<td>+85 °C</td>
<td>+85 °C</td>
</tr>
<tr>
<td>T5</td>
<td>+70 °C</td>
<td>+65 °C</td>
</tr>
<tr>
<td>T6</td>
<td>+55 °C</td>
<td>+50 °C</td>
</tr>
</tbody>
</table>

**Instruções gerais de instalação:**
Se o invólucro for feito de materiais não metálicos, ou se for feito de metal com uma camada de tinta mais espessa que 0,2 mm (grupo IIC), ou 2 mm (grupo IIB, IIA, I) ou qualquer espessura (grupo III), cargas eletrostáticas devem ser evitadas.
Para uma temperatura ambiente ≥ 60°C, devem ser utilizados cabos resistentes ao calor com uma classificação de pelo menos 20 K acima da temperatura ambiente.
O gabinete deve ser adequado para a aplicação e instalado corretamente.
A distância entre terminais, fios inclusivos não isolados, deve ser separada por pelo menos 3 mm de qualquer metal aterrado.
A conexão TESTE, deve ser utilizado somente quando a área é segura, ou quando a fonte / circuito de saída e o medidor de corrente aplicado seja do tipo intrinsecamente seguro.

**Aviso:** Não conecte ou desconecte as fichas e as tomadas quando energizados.
Para instalações em uma atmosfera de gás potencialmente explosiva, as instruções abaixo e aplicarão:
O transmissor deve ser instalado em um gabinete que forneça um grau de proteção não inferior a IP54, de acordo com a ABNT NBR IEC 60079-0, adequado para a aplicação e corretamente instalado, por exemplo, em um gabinete que esteja no tipo de proteção Ex n ou Ex e.
Além disso, a área dentro do gabinete deve ter grau de poluição 2 ou melhor, conforme definido na ABNT NBR IEC 60664-1.
Os dispositivos de entrada de cabos e os elementos de supressão devem cumprir os mesmos requisitos.

Para a instalação em uma atmosfera de poeira potencialmente explosiva, as seguintes instruções se aplicarão:
Se o transmissor é fornecido com um sinal intrinsecamente seguro "ic" e faz interface com um sinal intrinsecamente seguro "ic" (por exemplo, um dispositivo passivo), o transmissor deve ser montado em um gabinete que ofereça um grau de proteção de pelo menos IP54, de acordo com a ABNT NBR IEC60079-0.
Os dispositivos de entrada de cabos e os elementos de supressão devem cumprir os mesmos requisitos.
Se o transmissor é alimentado com um sinal anti-faísca “nA”, ou faz interface com um sinal anti-faísca, o transmissor deverá ser montado em um gabinete que, possibilite uma proteção mínima do tipo IP54 de acordo com a ABNT NBR IEC60079-0, e em conformidade com o tipo de proteção Ex tD, ou Ex t.
Os dispositivos de entrada de cabos e os elementos de supressão devem cumprir os mesmos requisitos.
A temperatura da superfície “T” do gabinete, para uma camada de poeira com uma espessura máxima de 5 mm, é a temperatura ambiente de +20 K.
<table>
<thead>
<tr>
<th>Incident Description</th>
<th>Description</th>
<th>LED reaction</th>
<th>Analog Output Reaction</th>
<th>NE-107 Class</th>
<th>User action</th>
<th>Error #</th>
</tr>
</thead>
<tbody>
<tr>
<td>The device variable mapped to PV (and analog output current) is beyond its</td>
<td>Primary Value Out Of Limits</td>
<td>Flashing Red</td>
<td>Enters configured Value</td>
<td>Maintenance</td>
<td>Reconnect or repair sensor</td>
<td>0</td>
</tr>
<tr>
<td>operating limits.</td>
<td></td>
<td></td>
<td></td>
<td>required</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any other device variable is beyond its operating limits.</td>
<td>Non-Primary Value Out Of Limits</td>
<td>Flashing Red</td>
<td>No impact</td>
<td>Maintenance</td>
<td>Reconnect or repair sensor</td>
<td>1</td>
</tr>
<tr>
<td>The loop current has reached the Current Output Upper Limit (UL) or Output Lower</td>
<td>Loop Current Saturated</td>
<td>Flashing Red</td>
<td>Enters configured Value</td>
<td>Maintenance</td>
<td>Reconnect or repair sensor</td>
<td>2</td>
</tr>
<tr>
<td>Limit (LL) as configured with command #147, and is no longer corresponding to the</td>
<td></td>
<td></td>
<td></td>
<td>required</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PV value.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The analogue output current is being simulated or disabled.</td>
<td>Loop Current Fixed</td>
<td>Flashing Red</td>
<td>Enters configured Value</td>
<td>Function</td>
<td>N.A.</td>
<td>3</td>
</tr>
<tr>
<td>The configuration has changed since this bit was last cleared (seen from same</td>
<td>Configuration Changed</td>
<td>No Impact</td>
<td>No impact</td>
<td>N.A.</td>
<td>N.A.</td>
<td>6</td>
</tr>
<tr>
<td>master type, Primary- or Secondary Master).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A sensor error (broken/shorted sensor) is detected on Input 1.</td>
<td>Primary Input 1 error</td>
<td>Flashing Red</td>
<td>Enters configured Value</td>
<td>Failure</td>
<td>Reconnect or repair sensor</td>
<td>10</td>
</tr>
<tr>
<td>A sensor error (broken/shorted sensor) is detected on Input 2. This is only possible</td>
<td>Primary Input 2 error (only if Input 2 is enabled)</td>
<td>Flashing Red</td>
<td>Enters configured Value</td>
<td>Failure</td>
<td>Reconnect or repair sensor</td>
<td>11</td>
</tr>
<tr>
<td>if Input type 2 is &lt;&gt; &quot;None&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>A sensor error (broken/shorted sensor) is detected on the CJC measurement used</td>
<td>CJC for Input 1 error (only if used)</td>
<td>Flashing Red</td>
<td>Enters configured Value</td>
<td>Failure</td>
<td>Reconnect or repair sensor</td>
<td>12</td>
</tr>
<tr>
<td>for Input 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>A sensor error (broken/shorted sensor) is detected on the CJC measurement used</td>
<td>CJC for Input 2 error (only if used)</td>
<td>Flashing Red</td>
<td>Enters configured Value</td>
<td>Failure</td>
<td>Reconnect or repair sensor</td>
<td>13</td>
</tr>
<tr>
<td>for Input 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The difference between measurements on Input 1 and Input 2 is outside the configured</td>
<td>Dual Input: Sensor drift alarm (only if enabled)</td>
<td>Flashing Red</td>
<td>Enters configured Value</td>
<td>Failure</td>
<td>Reconnect or repair sensor</td>
<td>14</td>
</tr>
<tr>
<td>sensor drift limit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A sensor error (broken/shorted) is detected, backup sensor is in use</td>
<td>Dual Input: Backup sensor OK, main sensor error</td>
<td>No Impact</td>
<td>No impact</td>
<td>Maintenance</td>
<td>Reconnect or repair sensor</td>
<td>15</td>
</tr>
<tr>
<td>A sensor error (broken/shorted) is detected on the backup sensor, no backup</td>
<td>Dual Input: Backup sensor error, main sensor OK</td>
<td>No Impact</td>
<td>No impact</td>
<td>Maintenance</td>
<td>Reconnect or repair sensor</td>
<td>16</td>
</tr>
<tr>
<td>available</td>
<td></td>
<td></td>
<td></td>
<td>required</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Configuration is temporary invalid &lt; 3 seconds, e.g. while downloading parameters</td>
<td>Configuration not supported by device</td>
<td>Flashing Red</td>
<td>Value is held (freeze)</td>
<td>Function</td>
<td>N.A.</td>
<td>17</td>
</tr>
<tr>
<td>Configuration is temporary invalid &gt; 3 seconds, e.g. if download is paused</td>
<td>Configuration not supported by device</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Correct and/or re-send the</td>
<td>18</td>
</tr>
<tr>
<td>The device is operated outside its specified temperature range</td>
<td>Internal electronics temperature alarm</td>
<td>Flashing Red</td>
<td>No impact</td>
<td>Out of</td>
<td>Check operating temperature</td>
<td>19</td>
</tr>
<tr>
<td>The device is operated outside its specified temperature range in SIL mode</td>
<td>Internal electronics temperature alarm</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Check operating temperature</td>
<td>20</td>
</tr>
<tr>
<td>Power is applied but still too low</td>
<td>Minimum supply voltage not reached</td>
<td>Off</td>
<td>Safe State</td>
<td>Function</td>
<td>Check power supply (at output</td>
<td>21</td>
</tr>
<tr>
<td>The device is transitioning to SIL mode, or have failed to do so</td>
<td>Attempting or failed to enter SIL mode</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Function</td>
<td>The SIL configuration must be</td>
<td>22</td>
</tr>
<tr>
<td>An unrecoverable error occurred in the internal communication to the Input CPU</td>
<td>Error in communication with Input CPU</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Reset or re-power the device.</td>
<td>23</td>
</tr>
</tbody>
</table>

Appendix A: Diagnostics overview
<table>
<thead>
<tr>
<th>Incident Description</th>
<th>Description</th>
<th>LED reaction</th>
<th>Analog Output Reaction</th>
<th>NE-107 Class</th>
<th>User action</th>
<th>Error #</th>
</tr>
</thead>
<tbody>
<tr>
<td>An unrecoverable error occurred in the Input CPU</td>
<td>Input CPU reconfiguration failed</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Reset or re-power the device. If the error is persistant send in the device for repair</td>
<td>24</td>
</tr>
<tr>
<td>The device is operated below its specified voltage supply range</td>
<td>Supply voltage too low</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Check power supply (at output terminals). Reset or re-power the device. If the error is persistant send in the device for repair</td>
<td>25</td>
</tr>
<tr>
<td>The read back loop current differs from the calculated output current</td>
<td>Loop current read back error</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Check power supply (at output terminals). Reset or re-power the device. If the error is persistant send in the device for repair</td>
<td>26</td>
</tr>
<tr>
<td>The device is operated above its specified voltage supply range</td>
<td>Supply voltage too high</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Check power supply (at output terminals). Reset or re-power the device. If the error is persistant send in the device for repair</td>
<td>27</td>
</tr>
<tr>
<td>The configuration in the NVM has become inconsistent</td>
<td>Error in data verification after writing to EEPROM</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Correct and/or re-send the configuration. If the error is persistant send the device to repair</td>
<td>28</td>
</tr>
<tr>
<td>The configuration in the NVM has become inconsistent</td>
<td>CRC16 error in cyclic test of EEPROM</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Correct and/or re-send the configuration. If the error is persistant send the device to repair</td>
<td>29</td>
</tr>
<tr>
<td>An unrecoverable error occurred in the internal communication to the EEPROM</td>
<td>Error in EEPROM communication</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Reset or re-power the device. If the error is persistant send in the device for repair</td>
<td>30</td>
</tr>
<tr>
<td>An unrecoverable memory error occurred in the internal main CPU</td>
<td>CRC16 error in cyclic test of program code in FLASH</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Reset or re-power the device. If the error is persistant send in the device for repair</td>
<td>31</td>
</tr>
<tr>
<td>An exception error occurred in the main CPU program execution</td>
<td>Exception error during code execution</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Reset or re-power the device. If the error is persistant send in the device for repair</td>
<td>32</td>
</tr>
<tr>
<td>The main program was reset unintentionally due to a stuck up</td>
<td>Watchdog Reset Executed</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Correct and/or re-send the configuration. If the error is persistant send the device to repair</td>
<td>33</td>
</tr>
<tr>
<td>Sensor error is detected on the internal temperature sensor</td>
<td>Internal RTD sensor error</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Reset or re-power the device. If the error is persistant send in the device for repair</td>
<td>34</td>
</tr>
<tr>
<td>An unrecoverable memory error occurred in the internal main CPU</td>
<td>CRC16 error in cyclic test of safe-domain RAM contents</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Reset or re-power the device. If the error is persistant send in the device for repair</td>
<td>35</td>
</tr>
<tr>
<td>An exception error occurred in the main CPU program execution</td>
<td>Stack integrity error</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Reset or re-power the device. If the error is persistant send in the device for repair</td>
<td>36</td>
</tr>
<tr>
<td>An unrecoverable memory error occurred in the internal main CPU</td>
<td>CRC16 error in factory data in FLASH</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Reset or re-power the device. If the error is persistant send in the device for repair</td>
<td>37</td>
</tr>
<tr>
<td>An unrecoverable memory error occurred in the internal main CPU</td>
<td>RAM cell error</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Reset or re-power the device. If the error is persistant send in the device for repair</td>
<td>38</td>
</tr>
<tr>
<td>An unrecoverable memory error occurred in the internal main CPU</td>
<td>Safe domain RAM integrity error</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Reset or re-power the device. If the error is persistant send in the device for repair</td>
<td>39</td>
</tr>
<tr>
<td>An unrecoverable memory error occurred in the internal input CPU</td>
<td>CRC16 error in input CPU configuration</td>
<td>Lights Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Reset or re-power the device. If the error is persistant send in the device for repair</td>
<td>40</td>
</tr>
<tr>
<td>Incident Description</td>
<td>Description</td>
<td>LED reaction</td>
<td>Analog Output Reaction</td>
<td>NE-107 Class</td>
<td>User action</td>
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</tr>
<tr>
<td>----------------------</td>
<td>-------------</td>
<td>-------------</td>
<td>------------------------</td>
<td>--------------</td>
<td>------------------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>A critical measurement error is detected on internal voltage reference</td>
<td>Drift error, reference voltage FVR</td>
<td>Flashing Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Reconnect or repair sensor. If the error is persistant send in the device for repair</td>
<td>41</td>
</tr>
<tr>
<td>A critical measurement error is detected on internal voltage reference</td>
<td>Drift error, reference voltage VREF</td>
<td>Flashing Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Reconnect or repair sensor. If the error is persistant send in the device for repair</td>
<td>42</td>
</tr>
<tr>
<td>A critical measurement error is detected on Input 1</td>
<td>Drift error, primary Input 1</td>
<td>Flashing Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Reconnect or repair sensor. If the error is persistant send in the device for repair</td>
<td>43</td>
</tr>
<tr>
<td>A critical measurement error is detected on Input 2</td>
<td>Drift error, primary Input 2</td>
<td>Flashing Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Reconnect or repair sensor. If the error is persistant send in the device for repair</td>
<td>44</td>
</tr>
<tr>
<td>A critical measurement error is detected on the ground measurement</td>
<td>Drift error, ground voltage offset to terminal 3</td>
<td>Flashing Red</td>
<td>Safe State</td>
<td>Failure</td>
<td>Reconnect or repair sensor. If the error is persistant send in the device for repair</td>
<td>45</td>
</tr>
<tr>
<td>The device is in simulation mode and one or more of its Device Variables are not representative of the process</td>
<td>Device Variable Simulation Active</td>
<td>No Impact</td>
<td>No impact</td>
<td>N.A.</td>
<td>N.A.</td>
<td>46</td>
</tr>
</tbody>
</table>
# Document history

The following list provides notes concerning revisions of this document.

<table>
<thead>
<tr>
<th>Rev. ID</th>
<th>Date</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>2014</td>
<td>Initial release of the product.</td>
</tr>
<tr>
<td>101</td>
<td>2018</td>
<td>Accuracy table updated for TC and mV inputs. Accuracy calculations updated for TC examples.</td>
</tr>
</tbody>
</table>
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