Product manual

9113

Temperature / mA Converter

No. 9113V108-UK
Product version: 9113-004
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.
Temperature / mA Converter

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Warning

The following operations should only be carried out on a disconnected device and under ESD-safe conditions:

General mounting, wire connection and disconnection.
Troubleshooting the device.

Repair of the device and replacement of circuit breakers must be done by PR electronics A/S only.

Warning

Do not open the front plate of the device as this will cause damage to the connector for the display / programming front PR 45xx.
This device contains no DIP-switches or jumpers.

Symbol identification

Triangle with an exclamation mark: Read the manual before installation and commissioning of the device in order to avoid incidents that could lead to personal injury or mechanical damage. Warning/demand. Potentially lethal situations.

The CE mark proves the compliance of the device with the essential requirements of the directives.

The double insulation symbol shows that the device is protected by double or reinforced insulation.

Ex devices have been approved acc. to the ATEX directive for use in connection with installations in explosive areas. See installation drawings in appendix.

Safety instructions

Definitions

Hazardous voltages have been defined as the ranges: 75 to 1500 Volt DC, and 50 to 1000 Volt AC.
Technicians are qualified persons educated or trained to mount, operate, and also trouble-shoot technically correct and in accordance with safety regulations.
Operators, being familiar with the contents of this manual, adjust and operate the knobs or potentiometers during normal operation.

Receipt and unpacking

Unpack the device without damaging it and check whether the device type corresponds to the one ordered. The packing should always follow the device until this has been permanently mounted.

Environment

Avoid direct sun light, dust, high temperatures, mechanical vibrations and shock, and rain and heavy moisture. If necessary, heating in excess of the stated limits for ambient temperatures should be avoided by way of ventilation.
The device must be installed in pollution degree 2 or better.
The device is designed to be safe at least under an altitude up to 2 000 m.
Mounting
Only technicians, who are familiar with the technical terms, warnings, and instructions in the manual and who are able to follow these, should connect the device. Should there be any doubt as to the correct handling of the device, please contact your local distributor or, alternatively,

PR electronics A/S
www.prelectronics.com

The use of stranded wires is not permitted for mains wiring except when wires are fitted with cable ends.

Descriptions of input / output and supply connections are shown in the block diagram and on the side label.

The device is provided with field wiring terminals and shall be supplied from a Power Supply having double / reinforced insulation. A power switch shall be easily accessible and close to the device. The power switch shall be marked as the disconnecting unit for the device.

For installation on Power Rail 9400 the power is supplied by Power Control Unit 9410.

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

Calibration and adjustment
During calibration and adjustment, the measuring and connection of external voltages must be carried out according to the specifications of this manual. The technician must use tools and instruments that are safe to use.

Normal operation
Operators are only allowed to adjust and operate devices that are safely fixed in panels, etc., thus avoiding the danger of personal injury and damage. This means there is no electrical shock hazard, and the device is easily accessible.

Cleaning
When disconnected, the device may be cleaned with a cloth moistened with distilled water.

Liability
To the extent the instructions in this manual are not strictly observed, the customer cannot advance a demand against PR electronics A/S that would otherwise exist according to the concluded sales agreement.

How to demount system 9000

Picture 1:
By lifting the bottom lock, the device is detached from the DIN rail.
Temperature / mA converter

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- Input for RTD, TC and mA
- Active / passive mA output via the same two terminals
- 1 or 2 channels
- Can be supplied separately or installed on power rail, PR type 9400
- SIL 2-certified via Full Assessment

Advanced features
- Configuration and monitoring by way of detachable display front (PR 45xx); process calibration and signal simulation.
- Copying of the configuration from one device to others of the same type via the display front.
- TC inputs can use either the internal CJC or a terminal with a built-in Pt100 sensor (PR 5910 / PR 5910Ex for channel 1; PR 5913 / PR 5913Ex for channel 2) for higher accuracy.
- Advanced monitoring of internal communication and stored data.
- SIL 2 functionality is optional and must be activated in a menu point.

Application
- 9113Axx can be mounted in the safe area or in zone 2 / Class I, Division 2, Groups A, B, C, D.
- 9113Bxx can be mounted in the safe area or in zone 2 / Class 1, Division 2 and receive signals from zone 0, 1, 2 and zone 20, 21, 22 including mining / Class I/II/III, Division 1, Gr. A-G.
- Conversion and scaling of temperature (Pt, Ni and TC) and active current signals.
- The 9113 has been designed, developed and certified for use in SIL 2 applications according to the requirements of IEC 61508.
- Suitable for the use in systems up to Performance Level "d" according to ISO-13849.

Technical characteristics
- 1 green and 2 red front LEDs indicate operation status and malfunction.
- 2.6 kVAC galvanic isolation between input, output and supply.
Applications - 9113Axx

Input signals:
Channel 1
Current
- TC
- Connection, wires
- RTD
- Connection, wires
*Order separately: CJC connector 5910

Output signals:
Analog, 0/4...20 mA
Channel 2
- 2-wire supply -
- 2-wire supply -

Channel 1
- 2-wire supply -
- 2-wire supply -

Power rail
- Error signal
- Rail, supply +
- Rail, supply -
- No connection
- No connection

Power connection:
Supply -
Supply +19.2...31.2 VDC
Device status
N.C.
Device status

Zone 2 & Cl. 1, Div. 2, gr. A-D
or Safe Area
Input signals:

Channel 1

Current

TC

*Order separately: CJC connector 5910Ex

RTD Connection, wires

Channel 2

Current

TC

*Order separately: CJC connector 5913Ex

RTD Connection, wires

Zone 0, 1, 2, 20, 21, 22, M1 & Cl. I/II/III, Div. 1, gr. A-G

Output signals:

Analog, 0/4...20 mA

Channel 2

2-wire supply -

Power rail

Error signal

Rail, supply +

Rail, supply -

No connection

Device status

Supply -

Supply +19.2...31.2 VDC

Device status

Device status

Same power rail as above

Zone 2 & Cl. 1, Div. 2, gr. A-D or Safe Area
PR 45xx display / programming front

Functionality
The simple and easily understandable menu structure and the explanatory help texts guide you effortlessly and automatically through the configuration steps, thus making the product very easy to use. Functions and configuration options are described in the section “Configuration / operating the function keys”.

Application
• Communications interface for modification of operational parameters in 9113.
• Can be moved from one 9113 device to another and download the configuration of the first unit to subsequent units.
• When mounted in the process, the display shows process values and device status.

Technical characteristics
• LCD display with 4 lines:
  Line 1 (H=5.57 mm) shows input status
  Line 2 and 3 (H=3.33 mm) show analog input / output value or TAG no. and units.
  Line 4 shows status for communication and whether the device is SIL-locked.
  Static dot = SIL-locked and flashing dot = not SIL-locked.
• Programming access can be blocked by assigning a password. The password is saved in the device in order to ensure a high degree of protection against unauthorised modifications to the configuration.

Mounting / demounting the PR 45xx
1: Insert the tabs of the PR 45xx into the holes at the top of the device.
2: Hinge the PR 45xx down until it snaps into place.

Demounting of the PR 45xx
3: Push the release button on the bottom of the PR 45xx and hinge the the PR 45xx out and up.
4: With the PR 45xx hinged up, remove from holes at the top of the device.
Order

<table>
<thead>
<tr>
<th>Type</th>
<th>Associated apparatus</th>
<th>Channels</th>
<th>I.S. / Ex approvals</th>
</tr>
</thead>
<tbody>
<tr>
<td>9113</td>
<td>No</td>
<td>Single: A</td>
<td>ATEX, IECEx, FM, INMETRO, EAC-Ex</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>Double: B</td>
<td>cULus, ATEX, IECEx, FM, INMETRO, EAC-Ex</td>
</tr>
</tbody>
</table>

Example: 9113BB

Accessories

- 4501 = Display / programming front
- 4511 = Communication enabler
- 5910 = CJC connector, channel 1, for 9113Axx
- 5913 = CJC connector, channel 2, for 9113ABx
- 5910Ex = CJC connector, channel 1, for 9113Bxx
- 5913Ex = CJC connector, channel 2, for 9113BBx
- 9400 = Power rail
- 9404 = Module stop for rail
- 9410 = Power control unit
- 9421 = Power supply 24 V - Ex nA nC

Electrical specifications

Environmental conditions

- Operating temperature: -20°C to +60°C
- Storage temperature: -20°C to +85°C
- Calibration temperature: 20...28°C
- Relative humidity: < 95% RH (non-cond.)
- Protection degree: IP20

Installation in: Pollution degree 2 & overvoltage category II.

Mechanical specifications

- Dimensions (HxWxD): 109 x 23.5 x 104 mm
- Weight approx: 250 g
- Weight incl. 4501 / 451x (approx.): 265 g / 280 g
- DIN rail type: DIN EN 60715 - 35 mm
- Wire size: 0.13...2.08 mm² / AWG 26...14 stranded wire
- Screw terminal torque: 0.5 Nm
- Vibration: IEC 60068-2-6
  - 2...13.2 Hz: ±1 mm
  - 13.2...100 Hz: ±0.7 g

Common electrical specifications

- Supply voltage: 19.2...31.2 VDC
- Fuse: 400 mA SB / 250 VAC

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Max. power dissipation</th>
<th>Max. required power</th>
</tr>
</thead>
<tbody>
<tr>
<td>9113xAx</td>
<td>1 channel</td>
<td>≤ 0.8 W</td>
<td>≤ 0.8 W</td>
</tr>
<tr>
<td>9113xBx</td>
<td>2 channels</td>
<td>≤ 1.4 W</td>
<td>≤ 1.4 W</td>
</tr>
</tbody>
</table>

Max. required power is the maximum power needed at terminals 31 and 32.
Max. power dissipation is the maximum power dissipated by the device.
If the 9113 is used with the 45xx, then add 40 mW to the max. power dissipation and 70 mW to the max. required power for each device with the 45xx.
Isolation - test / working:
- Input to any ........................................... 2.6 kVAC / 300 VAC reinforced isolation
- Analog output to supply ................................. 2.6 kVAC / 300 VAC reinforced isolation
- Status relay to supply ................................... 1.5 kVAC / 150 VAC reinforced isolation

Programming ............................................. PR 45xx

Signal dynamics, input / output ....................... 24 bit / 16 bit

Signal / noise ratio ..................................... Min. 60 dB (0...100 kHz)

Response time (0...90%, 100...10%):
- Temperature input, programmable ................... 1...60 s
- mA / V input, programmable ........................... 0.4...60 s

Accuracy, the greater of the general and basic values:

<table>
<thead>
<tr>
<th>Input type</th>
<th>Absolute accuracy</th>
<th>Temperature coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>≤ ±0.1% of span</td>
<td>≤ ±0.01% of span / °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input type</th>
<th>Basic accuracy</th>
<th>Temperature coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>mA</td>
<td>≤ ±16 μA</td>
<td>≤ ±1.6 μA / °C</td>
</tr>
<tr>
<td>Pt100, Pt200, Pt 1000</td>
<td>≤ ±0.2°C</td>
<td>≤ ±0.02°C/°C</td>
</tr>
<tr>
<td>Pt500, Ni100, Ni120, Ni 1000</td>
<td>≤ ±0.3°C</td>
<td>≤ ±0.03°C/°C</td>
</tr>
<tr>
<td>Pt50, Pt400, Ni50</td>
<td>≤ ±0.4°C</td>
<td>≤ ±0.04°C/°C</td>
</tr>
<tr>
<td>Pt250, Pt300</td>
<td>≤ ±0.6°C</td>
<td>≤ ±0.06°C/°C</td>
</tr>
<tr>
<td>Pt20</td>
<td>≤ ±0.8°C</td>
<td>≤ ±0.08°C/°C</td>
</tr>
<tr>
<td>Pt10</td>
<td>≤ ±1.4°C</td>
<td>≤ ±0.14°C/°C</td>
</tr>
<tr>
<td>TC type: E, J, K, L, N, T, U</td>
<td>≤ ±1°C</td>
<td>≤ ±0.1°C/°C</td>
</tr>
<tr>
<td>TC type: R, S, W3, W5, LR</td>
<td>≤ ±2°C</td>
<td>≤ ±0.2°C/°C</td>
</tr>
<tr>
<td>TC type: B 160...400°C</td>
<td>≤ ±4.5°C</td>
<td>≤ ±0.45°C/°C</td>
</tr>
<tr>
<td>TC type: B 400...1820°C</td>
<td>≤ ±2°C</td>
<td>≤ ±0.2°C/°C</td>
</tr>
</tbody>
</table>

EMC - immunity influence .......................... < ±0.5% of span

Extended EMC immunity:
- NAMUR NE 21, A criterion, burst .................. < ±1% of span
RTD input
Input for RTD types:
Pt10*, Pt20*, Pt50*, Pt100, Pt200, Pt250, Pt300, Pt400, Pt500, Pt1000
Ni50, Ni100, Ni120, Ni1000

<table>
<thead>
<tr>
<th>Input type</th>
<th>Min. value</th>
<th>Max. value</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt100</td>
<td>-200°C</td>
<td>+850°C</td>
<td>IEC 60751</td>
</tr>
<tr>
<td>Ni100</td>
<td>-60°C</td>
<td>+250°C</td>
<td>DIN 43760</td>
</tr>
</tbody>
</table>

Cable resistance per wire (max.) .................. 50 Ω
Sensor current ........................................... Nom. 0.2 mA
Effect of sensor cable resistance (3- / 4-wire) ........ < 0.002 Ω / Ω
Sensor error detection ................................ Programmable ON / OFF
Sensor error current:
  when detecting ......................................... < 2 μA
  else .................................................... 0 μA
* No short circuit detection for Pt10, Pt20 and Pt50

TC input

<table>
<thead>
<tr>
<th>Type</th>
<th>Min. value</th>
<th>Max. value</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>0°C</td>
<td>+1820°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>E</td>
<td>-100°C</td>
<td>+1000°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>J</td>
<td>-100°C</td>
<td>+1200°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>K</td>
<td>-180°C</td>
<td>+1372°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>L</td>
<td>-200°C</td>
<td>+900°C</td>
<td>DIN 43710</td>
</tr>
<tr>
<td>N</td>
<td>-180°C</td>
<td>+1300°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>R</td>
<td>-50°C</td>
<td>+1760°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>S</td>
<td>-50°C</td>
<td>+1760°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>T</td>
<td>-200°C</td>
<td>+400°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>U</td>
<td>-200°C</td>
<td>+600°C</td>
<td>DIN 43710</td>
</tr>
<tr>
<td>W3</td>
<td>0°C</td>
<td>+2300°C</td>
<td>ASTM E988-90</td>
</tr>
<tr>
<td>W5</td>
<td>0°C</td>
<td>+2300°C</td>
<td>ASTM E988-90</td>
</tr>
<tr>
<td>LR</td>
<td>-200°C</td>
<td>+800°C</td>
<td>GOST 3044-84</td>
</tr>
</tbody>
</table>

Cold junction compensation (CJC):
  via external sensor in connector 5910 ................... 20...28°C ≤ ±1°C
  -20...20°C and 28...70°C ≤ ±2°C
  via internal CJC sensor .................................. ±(2.0°C + 0.4°C * Δt)
  Δt = internal temperature - ambient temperature
Sensor error detection ................................ Programmable ON or OFF
  (only wire breakage)
Sensor error current:
  when detecting ......................................... Nom. 2 μA
  else .................................................... 0 μA

Current input
Measurement range ..................................... 0...23 mA
Programmable measurement ranges ...................... 0...20 and 4...20 mA
Input resistance ....................................... Nom. 20 Ω + PTC 50 Ω
Sensor error detection ................................ Programmable ON / OFF
  Only 4...20 mA (NAMUR)

Current output
Signal range (span) .................................... 0...23 mA
Programmable signal ranges ............................ 0...20 / 4...20 / 20...0 and 20...4 mA
Load ..................................................... ≤ 600 Ω
Load stability ......................................... ≤ 0.01% of span / 100 Ω
Sensor error detection ................................ 0 / 3.5 / 23 mA / none
NAMUR NE 43 Upscale / Downsacle .................... 23 mA / 3.5 mA
Output limitation:
on 4...20 and 20...4 mA signals .................................................. 3.8...20.5 mA
on 0...20 and 20...0 mA signals .................................................. 0...20.5 mA
Current limit ................................................................. ≤ 28 mA

Passive 2-wire output installation
Max. external 2-wire supply .................................................. 26 VDC
Max. load resistance [Ω] .................................................. (Vsupply - 3.5) / 0.023 A
Effect of external 2-wire supply voltage variation .................................. < 0.005% of span / V

Status relay in safe area
Max. voltage ................................................................. 125 VAC / 110 VDC
Max. current ............................................................... 0.5 AAC / 0.3 ADC
Max. AC power ......................................................... 62.5 VA / 32 W

of span = of the currently selected measurement range

Observed authority requirements
EMC ........................................................ ................. 2014/30/EU
ATEX ........................................................ ......... 2014/34/EU
LVD ........................................................ ............ 2014/35/EU
RoHS ........................................................ .......... 2011/65/EU

Approvals
DNV-GL, Ships & Offshore ........................................... TAA00000JD
ClassNK ............................................................ TA18527M
c UL us, UL 61010-1 .................................................. E314307
EAC ........................................................ ............ TR-CU 020/2011
EAC LVD ............................................................ TR-CU 004/2011
EAC Ex ............................................................ TR-CU 012/2011

I.S. / Ex
ATEX ........................................................ ......... KEMA 07ATEX0148 X
IECEx .............................................................. IECEx KEM 09.0052X
c FM us ............................................................ FM19US0059X / FM19CA0032X
INMETRO .......................................................... DEKRA 16.0003 X
c UL us, UL 913 (only 9113xx-U9) ........................................ E233311
EAC Ex ............................................................ RU C-DK.HA65.B.00355/19

Functional Safety
SIL2 Certified & Fully Assessed acc. to IEC 61508
### Configuration of sensor error check

<table>
<thead>
<tr>
<th>Device:</th>
<th>Configuration</th>
<th>Sensor error detection:</th>
</tr>
</thead>
<tbody>
<tr>
<td>9113</td>
<td>OUT.ERR=NONE.</td>
<td>OFF</td>
</tr>
<tr>
<td>Else:</td>
<td></td>
<td>ON</td>
</tr>
</tbody>
</table>

### Visualisation in the 45xx of:

#### Input signal outside range

Outside range readout (IN.LO, IN.HI):
If the valid range of the A/D converter or the polynomial is exceeded

<table>
<thead>
<tr>
<th>Input</th>
<th>Range</th>
<th>Readout</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>CURR</td>
<td>0...20 mA / 4...20 mA</td>
<td>IN.LO</td>
<td>&lt; -1.05 mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IN.HI</td>
<td>&gt; 25.05 mA</td>
</tr>
<tr>
<td>TEMP</td>
<td>TC / RTD</td>
<td>IN.LO</td>
<td>&lt; temperature range -2°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IN.HI</td>
<td>&gt; temperature range +2°C</td>
</tr>
</tbody>
</table>

#### Display readout below min. / above max. (-1999, 9999):

<table>
<thead>
<tr>
<th>Input</th>
<th>Range</th>
<th>Readout</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>All</td>
<td>-1999</td>
<td>Display readout &lt; -1999</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9999</td>
<td>Display readout &gt; 9999</td>
</tr>
</tbody>
</table>

### Sensor error detection

Sensor error detection (SE.BR, SE.SH):

<table>
<thead>
<tr>
<th>Input</th>
<th>Range</th>
<th>Readout</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>CURR</td>
<td>Loop break (4...20 mA)</td>
<td>SE.BR</td>
<td>&lt;= 3.6 mA; &gt;= 20.75 mA</td>
</tr>
<tr>
<td>TEMP</td>
<td>TC</td>
<td>SE.BR</td>
<td>&gt; 10 kΩ...165 kΩ</td>
</tr>
<tr>
<td></td>
<td>RTD: 2-, 3- and 4-wire</td>
<td>SE.BR</td>
<td>&gt; 900...1000 Ω</td>
</tr>
<tr>
<td></td>
<td>For Pt10, Pt20, Pt50, Pt100, Pt200, Ni50 and Ni120</td>
<td>SE.BR</td>
<td>(cable &gt; 50 Ω)</td>
</tr>
<tr>
<td></td>
<td>RTD: 2-, 3- and 4-wire</td>
<td>SE.SH</td>
<td>&lt; app. 15 Ω</td>
</tr>
<tr>
<td></td>
<td>for Pt250, Pt300, Pt400, Pt500, Pt1000 and Ni1000</td>
<td>SE.BR</td>
<td>&gt; 10...12 kΩ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(cable &gt; 50 Ω)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SE.SH</td>
<td>&lt; app. 15 Ω</td>
</tr>
<tr>
<td>Error search</td>
<td>Readout</td>
<td>Cause</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>---------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>CJC sensor error - check device temperature</td>
<td>CJ.ER</td>
<td>Defect internal CJC sensor or CJC temperature out of allowed range**</td>
<td></td>
</tr>
<tr>
<td>CJC connector error - check CJC-connector block</td>
<td>CJ.ER</td>
<td>Defect (or missing) CJC-connector or temperature out of allowed range**</td>
<td></td>
</tr>
<tr>
<td>Input error - check input connection and reset power</td>
<td>IN.ER</td>
<td>Signal levels on input beyond limits or connected to wrong terminals*</td>
<td></td>
</tr>
<tr>
<td>Output error - check output connections and reset power</td>
<td>AO.ER</td>
<td>Error in analog output current (SIL mode only)*</td>
<td></td>
</tr>
<tr>
<td>No communication</td>
<td>NO.CO</td>
<td>No communication with 45xx</td>
<td></td>
</tr>
<tr>
<td>Flash memory error - check configuration</td>
<td>FL.ER CO.ER</td>
<td>FLASH error (configuration invalid)***</td>
<td></td>
</tr>
<tr>
<td>Invalid configuration type or version</td>
<td>TY.ER</td>
<td>Configuration read from EEprom has invalid type or rev. no.</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>RA.ER</td>
<td>RAM error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>IF.ER</td>
<td>Internal Flash error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>Sw.ER</td>
<td>Sw monitor error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>AD.ER</td>
<td>A/D converter error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>AO.SU</td>
<td>Analog output supply error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>CA.ER</td>
<td>Factory calibration error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>CM.ER</td>
<td>Main CPU error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>II.ER</td>
<td>Initialisation check error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>RS.ER</td>
<td>Reset error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>IC.ER</td>
<td>Input communication error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>M1.ER</td>
<td>Main CPU to Ch.1 error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>M2.ER</td>
<td>Main CPU to Ch.2 error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>MC.ER</td>
<td>Main CPU config. error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>MF.ER</td>
<td>Main CPU Flash error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>MR.ER</td>
<td>Main CPU RAM error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>MS.ER</td>
<td>Main CPU supply error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>MP.ER</td>
<td>Main CPU ProgFlow error*</td>
<td></td>
</tr>
</tbody>
</table>

! All error indications in the display flash once per second. The help text explains the error. If the error is a sensor error, the display backlight flashes as well - this is acknowledged (stopped) by pushing the button.

* Error is acknowledged by resetting the device power.

** Error can be disregarded by selecting input type different than TC.

*** Error is acknowledged by stepping through the basic setup.
Connections

Power rail connections

Supply and status relay

NC = no connection

Inputs:

Channel 1

RTD, 2-wire

RTD, 3- / 4-wire

TC, internal CJC sensor

*TC, CJC connector

Channel 2

RTD, 2-wire

RTD, 3- / 4-wire

TC, internal CJC sensor

*TC, CJC connector

Current

Current

* Order separately: CJC connector 5910 / 5910Ex (ch. 1) / 5913 / 5913Ex (ch. 2).

Outputs:

Channel 1

Current (Active output)

2-wire transmitter (Passive transmitter)

Current (Active output)

2-wire transmitter (Passive output)

Channel 2

Current (Active output)

2-wire transmitter (Passive transmitter)
Block diagram

9113

* NC = no connection
## Signal error and cable fault indications without display front

### List of LED and error signal indications

<table>
<thead>
<tr>
<th>Condition</th>
<th>Green LED</th>
<th>Ch. 1: Red LED</th>
<th>Ch. 2: Red LED</th>
<th>Status relay, N.C.</th>
<th>Power rail signal status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device OK</td>
<td>Flashing</td>
<td>OFF</td>
<td>OFF</td>
<td>Energized</td>
<td>Open</td>
</tr>
<tr>
<td>No supply</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>De-energized</td>
<td>Closed</td>
</tr>
<tr>
<td>Device defective</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>De-energized</td>
<td>Closed</td>
</tr>
<tr>
<td>Ch. 1 defective (ch. 2 OK)</td>
<td>Flashing</td>
<td>ON</td>
<td>OFF</td>
<td>De-energized</td>
<td>Closed</td>
</tr>
<tr>
<td>Ch. 2 defective (ch. 1 OK)</td>
<td>Flashing</td>
<td>OFF</td>
<td>ON</td>
<td>De-energized</td>
<td>Closed</td>
</tr>
<tr>
<td>Channel 1, signal OK</td>
<td>Flashing</td>
<td>OFF</td>
<td>OFF</td>
<td>Energized</td>
<td>Open</td>
</tr>
<tr>
<td>Ch. 1, wire short / break</td>
<td>Flashing</td>
<td>Flashing</td>
<td>OFF</td>
<td>De-energized</td>
<td>Closed (if activated)</td>
</tr>
<tr>
<td>Channel 2, signal OK</td>
<td>Flashing</td>
<td>OFF</td>
<td>OFF</td>
<td>Energized</td>
<td>Open</td>
</tr>
<tr>
<td>Ch. 2, wire short / break</td>
<td>Flashing</td>
<td>OFF</td>
<td>Flashing</td>
<td>De-energized</td>
<td>Closed (if activated)</td>
</tr>
</tbody>
</table>
Configuration / operating the function keys

In general

When configuring the 9113, you will be guided through all parameters and you can choose the settings which fit the application. For each menu there is a scrolling help text which is automatically shown in line 3 on the display.

Configuration is carried out by use of the 3 function keys:
- will increase the numerical value or choose the next parameter
- will decrease the numerical value or choose the previous parameter
- will save the chosen value and proceed to the next menu

When configuration is completed, the display will return to the default state 1.0. Pressing and holding will return to the previous menu or return to the default state (1.0) without saving the changed values or parameters.

If no key is activated for 1 minute, the display will return to the default state (1.0) without saving the changed values or parameters.

Further explanations

Password protection: Programming access can be blocked by assigning a password. The password is saved in the device in order to ensure a high degree of protection against unauthorised modifications to the configuration. If the configured password is not known, please contact PR electronics support - www.prelectronics.com/contact.

Selection of units

By selection of temperature input you can choose which process units should be shown in the display (see table). The process value is always displayed in Celsius or Fahrenheit. This is selected in the menu point after selection of temperature input.

CJC

In the CJC menu you can choose between CJC connector and internal cold junction compensation. The CJC connector (PR 5910 / PR 5910Ex for channel 1; PR 5913 / PR 5913Ex for channel 2) must be ordered separately.

Signal and sensor error indication via display front 45xx

Sensor error (see limits in the table) is displayed as SE.BR (sensor break) or SE.SH (sensor short). Signals outside the selected range (not sensor error, see table for limits) are displayed as IN.LO indicating low input signal or IN.HI indicating high input signal. The error indication is displayed as text in line 2 for channel 1 and line 3 for channel 2 and at the same time the backlight flashes. Line 4 of the display is a status line which shows whether the device is SIL-locked (static dot = SIL-locked and flashing dot = not SIL-locked) as well as status for communication COM (running circle) indicating correct functioning of 45xx.

Signal and sensor error indication without display front

Status of the unit can also be read from the 3 LEDs in the front of the device.
- Green flashing LED indicates normal operation.
- No light in the green LED indicates lack of supply voltage or error in the device.
- Steady red LED indicates fatal error.
- Flashing red LED indicates sensor error.

Advanced functions

The unit gives access to a number of advanced functions which can be reached by answering “Yes” to the point “ADV.SET”.

Display setup: Here you can adjust the brightness contrast and the backlight. Setup of TAG numbers with 5 alphanumerics. Selection of functional readout in line 2 and 3 of the display - choose between readout of analog input, analog output or tag no or alternating display.

Two-point process calibration: The device can be process-calibrated in 2 points to fit a given input signal. A low input signal (not necessarily 0%) is applied and the actual value is entered via 45xx. Then a high signal (not necessarily 100%) is applied and the actual value is entered via 45xx. If you accept to use the calibration, the device will work according to this new adjustment. If you later reject this menu point or choose another type of input signal the device will return to factory calibration.
Process simulation function: In the menu point “EN.SIM” it is possible to simulate an input signal by means of the arrow keys and thus control the output signal up or down. You must exit the menu by pressing \( \text{Esc} \) (no time-out). The simulation function exits automatically, if the 45xx is detached.

Password: Here you can choose a password between 0000 and 9999 in order to protect the unit against unauthorised modifications to the configuration. The unit is delivered default without password.

Memory: In the memory menu you can save the configuration of the device in the 45xx, and then move the 45xx onto another device of the same type and download the configuration in the new device.

Language: In the menu “LANG” you can choose between 7 different language versions of help texts that will appear in the menu. You can choose between UK, DE, FR, IT, ES, SE and DK.

Power rail: In the menu “RAIL” you can choose if sensor errors are transmitted to the central surveillance in the PR 9410 power control unit.

Routing diagram

If no key is activated for 1 minute, the display will return to the default state 1.0 without saving configuration changes.

Increase value / choose next parameter
Decrease value / choose previous parameter
Save the chosen value and proceed to the next menu
Hold Back to previous menu / return to menu 1.0 without saving.

Power up

If SIL-locked directly to [EN,SIL]

Line 1 shows input status
Line 2 and 3 show analog input / output value or TAG no. and units.
Line 4 shows status for communication and whether the device is SIL-locked.
Static dot = SIL-locked and flashing dot = not SIL-locked.

Not valid for 0...20 mA input signal.

4-20mA

Only if input signal is temperature.

Min. and max. acc. to selected sensor type

Only if configuration is not protected by a password.

Red text signifies safety parameters in a SIL configuration. See safety manual for details.

*1.0 Default state.

*1.1 Only if password-protected.

9113 - Product version 9113-004
Configuration of CH2 identical to CH1

To default state 1.0
Routing diagram, advanced settings (ADV.SET)

To default state 1.0

2.0 In the submenu simulation (SIM) you must press \( \Rightarrow \) to return to the default state 1.0.
Help text overview

[01] Set correct password
[02] Enter advanced setup menu?
[03] Select temperature input
  Select current input
[04] Select 0-20 mA input range
  Select 4-20 mA input range
[05] Select TC sensor type
  Select Ni sensor type
  Select Pt sensor type
[06] Select Pt10 sensor type
  Select Pt20 sensor type
  Select Pt50 sensor type
  Select Pt100 sensor type
[07] Select Ni50 sensor type
  Select Ni100 sensor type
  Select Ni120 sensor type
  Select Ni1000 sensor type
[08] Select TC-B sensor type
  Select TC-E sensor type
  Select TC-J sensor type
  Select TC-K sensor type
  Select TC-L sensor type
  Select TC-N sensor type
[09] Select 2-wire sensor connection
  Select 3-wire sensor connection
  Select 4-wire sensor connection
[11] Select Celsius as temperature unit
  Select Fahrenheit as temperature unit
[12] Select 0-20 mA output range
  Select 4-20 mA output range
  Select 20-0 mA output range
  Select 20-4 mA output range
[13] Select no error action - output undefined at error
  Select downslope at error
  Select NAMUR NE43 downslope at error
  Select NAMUR NE43 upscale at error
[14] Set temperature for analog output low
[15] Set temperature for analog output high
[16] Enable Rail status signal output?
[17] Enter SIL setup
[18] Load saved configuration into 9113
  Save 9113 configuration in 45xx
[19] Adjust LCD contrast
[20] Adjust LCD backlight
[21] Write a 5-character channel TAG
[22] Show analog input value in display
  Show analog output value in display
  Show TAG in display
[23] Enable password protection?
[24] Set new password
[25] Select language
[26] Select channel to simulate
[27] Calibrate input low to process value?
[28] Set value for low calibration point
[29] Calibrate input high to process value?
[30] Set value for high calibration point
[31] Use process calibration values?
[32] Select channel to simulate
[33] Set the input simulation value
[34] Enable SIL configuration lock?
  0-20 mA is not a valid output range for SIL operation
[35] Set Analog output response time in seconds
[36] Select internal temperature sensor
  Select CJC connector (accessory)
[37] ...is channel using process-compensated calibration data?
[38] Configuration SIL status (Open / Locked)
[39] Sensor wire breakage
[40] Sensor short circuit
[41] Input underrange
[42] Input overrange
[43] Input error - check input connections and reset power
[44] Output error - check connections and reset power
[45] Flash memory error - check configuration
[46] Invalid configuration type or version
[47] Hardware error
[48] CJC sensor error - check device temperature
[49] CJC error - check CJC connector block
[50] No communication
IECEx Installation drawing

For safe installation of 9113 the following must be observed. The module shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area. Year of manufacture can be taken from the first two digits in the serial number.

For Installation in Zone 2 the following must be observed.

The 4501 programming module is to be used solely with PR electronics modules. It is important that the module is undamaged and has not been altered or modified in any way. Only 4501 modules free of dust and moisture shall be installed.

IECEx Certificate: KEM 09.0052 X
Marking 9113Bx: [Ex ia Ga] IIC/IIB/IIA

Ex nA nC IIC T4 Gc
[Ex ia Da] IIC
[Ex ia Ma] I

Marking 9113Ax: II 3 G Ex nA nC IIC T4 Gc


Supply terminal (31,32)
Voltage : 19.2 – 31.2 VDC

Status Relay. terminal (33,34) Zone 2 Installation
Voltage max: 125 VAC / 110 VDC 32 VAC / 32 VDC
Power max: 62.5 VA / 32 W 16 VA / 32 W
Current max: 0.5 A AC / 0.3 ADC 0.5 A AC / 1 ADC

Installation notes:
Install in pollution degree 2, overvoltage category II as defined in IEC60664-1.

Do not separate connectors when energized and an explosive gas mixture is present.
Do not mount or remove modules from the Power Rail when an explosive gas mixture is present.
Disconnect power before servicing.

The wiring of unused terminals is not allowed.

In type of protection [Ex ia Da] the parameters for intrinsic safety for gas group IIB are applicable.

For installation in Zone 2, the module shall be installed in an enclosure in type of protection Ex n or Ex e, providing a degree of protection of at least IP54. Cable entry devices and blanking elements shall fulfill the same requirements.

For installation on Power Rail in Zone 2, only Power Rail type 9400 supplied by Power Control Unit type 9410 (Type Examination Certificate IECEx KEM 08.0025X) is allowed.
9113Bx Installation:
Hazardous area  Non Hazardous area
Zone 0,1,2, 20, 21, 22  or Zone 2

-20 ≤Ta ≤ +60°C

Ex input
CH1 (terminal 41,42,43,44)
CH2 (terminal 51,52,53,54)
U_o:  8.7 V
I_o:  18.4 mA
P_o:  40 mW
L_o/R_o  892 μH/Ω

<table>
<thead>
<tr>
<th>C_o</th>
<th>IIC</th>
<th>IIB</th>
<th>II A or I</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 μF</td>
<td>50 μF</td>
<td>1000 μF</td>
<td></td>
</tr>
<tr>
<td>100 mH</td>
<td>300 mH</td>
<td>700 mH</td>
<td></td>
</tr>
</tbody>
</table>

U_i:  10 V
I_i:  30 mA
C_i:  30 nF
L_i:  820 nH
9113Bx Installation:
Hazardous area
Zone 0,1,2, 20, 21, 22
Non Hazardous area
or Zone 2

-20 ≤ Ta ≤ +60°C

Ex input
CH1 (terminal 43 +)
CH2 (terminal 52 -)

U₀: 17.4 V
I₀: 18.4 mA
P₀: 80 mW
L₀/R₀: 445 μH/Ω

Supply / Output:
Supply / Output:
terminal 11,12,13,14)
terminal 31,32,33,34)
terminal 91,92,93,94,95)

Uᵢ: 10 V
Iᵢ: 30 mA
Cᵢ: 15 nF
Lᵢ: 1.7 μH

IIC IIB IIA
C₀: 0.3 μF 1.6 μF 8 μF
L₀: 80 mH 250 mH 600 mH

Uᵢ: 253 V max. 400 Hz
9113Ax Installation:

Non Hazardous area or Zone 2

-20 ≤ Ta ≤ 60°C

Supply: 19.2 – 31.2 VDC
(terminal 31,32)
(terminal 91,92,93,94,95)

Input
CH1 (terminal 41,42,43,44)
CH2 (terminal 51,52,53,54)

Status Relay. terminal (33,34)

Zone 2 Installation

Voltage max: 125 VAC / 110 VDC
Power max: 62.5 VA / 32 W
Current max: 0.5 A AC / 0.3 ADC

For installation in Zone 2, the module shall be installed in an enclosure in type of protection Ex n or Ex e, providing a degree of protection of at least IP54. Cable entry devices and blanking elements shall fulfill the same requirements.

For installation on Power Rail in Zone 2, only Power Rail type 9400 supplied by Power Control Unit type 9410 (Type Examination Certificate IECEx KEM 08.0025X) is allowed.

For Installation in Zone 2 the following must be observed.
The 4501 programming module is to be used solely with PRelectronics modules. It is important that the module is undamaged and has not been altered or modified in any way. Only 4501 modules free of dust and moisture shall be installed.
ATEX Installation drawing

For safe installation of 9113 the following must be observed. The module shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area.

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

For Installation in Zone 2 the following must be observed. The 4501 programming module is to be used solely with PR electronics modules. It is important that the module is undamaged and has not been altered or modified in any way. Only 4501 modules free of dust and moisture shall be installed.

ATEX Certificate: KEMA 07ATEX 0148 X

Marking 9113Bx:
II (1) G [Ex ia Ga] IIIC/IIIB/IIA
II 3 G Ex nA nC IIC T4 Gc
II (1) D [Ex ia Da] IIIIC
I (M1) [Ex ia Ma] I

Marking 9113Ax
II 3 G Ex nA nC IIC T4 Gc


Supply terminal (31,32)
Voltage: 19.2 – 31.2 VDC

Status Relay, terminal (33,34) Zone 2 Installation
Voltage max: 125 VAC / 110 VDC 32 VAC / 32 VDC
Power max: 62.5 VA / 32 W 16 VA / 32 W
Current max: 0.5 A AC / 0.3 ADC 0.5 A AC / 1 ADC

Installation notes:
Install in pollution degree 2, overvoltage category II as defined in EN60664-1.

Do not separate connectors when energized and an explosive gas mixture is present. Do not mount or remove modules from the Power Rail when an explosive gas mixture is present. Disconnect power before servicing. The wiring of unused terminals is not allowed.

In type of protection [Ex ia Da] the parameters for intrinsic safety for gas group IIIB are applicable.

For installation in Zone 2, the module shall be installed in an enclosure in type of protection Ex n or Ex e, providing a degree of protection of at least IP54. Cable entry devices and blanking elements shall fulfill the same requirements.

For installation on Power Rail in Zone 2, only Power Rail type 9400 supplied by Power Control Unit type 9410 (Type Examination Certificate KEMA 07ATEX0152 X) is allowed.
9113Bx Installation:

Hazardous area
Zone 0,1,2, 20, 21, 22

Non Hazardous area
or Zone 2

-20 ≤ Ta ≤ +60°C

Ex input
CH1 (terminal 41,42,43,44)
CH2 (terminal 51,52,53,54)

<table>
<thead>
<tr>
<th>U_o</th>
<th>I_o</th>
<th>P_o</th>
<th>L_o/Ro</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.7 V</td>
<td>18.4 mA</td>
<td>40 mW</td>
<td>892 μH/Ω</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C_o</th>
<th>L_o</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 μF</td>
<td>100 mH</td>
</tr>
<tr>
<td>50 μF</td>
<td>300 mH</td>
</tr>
<tr>
<td>1000 μF</td>
<td>700 mH</td>
</tr>
</tbody>
</table>

U_m: 253 V max. 400 Hz
Supply / Output:
(terminal 11,12,13,14)
(terminal 31,32,33,34)
(terminal 91,92,93,94,95)

<table>
<thead>
<tr>
<th>U_i</th>
<th>I_i</th>
<th>C_i</th>
<th>L_i</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 V</td>
<td>30 mA</td>
<td>30 nF</td>
<td>820 nH</td>
</tr>
</tbody>
</table>
9113Bx Installation:

Hazardous area  
Zone 0, 1, 2, 20, 21, 22  
Non Hazardous area  
or Zone 2  
-20 ≤Ta ≤ +60°C

Ex input  
CH1 (terminal 43)  
CH2 (terminal 52)  
U_o: 17.4 V  
I_o: 18.4 mA  
P_o: 80 mW  
L_o/Ro 445 μH/Ω

<table>
<thead>
<tr>
<th>IIC</th>
<th>IIB</th>
<th>IIA or I</th>
</tr>
</thead>
<tbody>
<tr>
<td>C_o: 0.3 μF</td>
<td>1.6 μF</td>
<td>8 μF</td>
</tr>
<tr>
<td>L_o: 80 mH</td>
<td>250 mH</td>
<td>600 mH</td>
</tr>
</tbody>
</table>

U_i: 10 V  
I_i: 30 mA  
C_i: 15 nF  
L_i: 1.7 μH

Supply / Output:  
(terminal 11, 12, 13, 14)  
(terminal 31, 32, 33, 34)  
(terminal 91, 92, 93, 94, 95)  
U_m: 253 V max. 400 Hz
9113Ax Installation:

Non Hazardous area or Zone 2

-20 ≤ Ta ≤ 60ºC

Supply: 19.2 – 31.2 VDC
(terminal 31,32)
(terminal 91,92,93,94,95)

Input
CH1 (terminal 41,42,43,44)
CH2 (terminal 51,52,53,54)

Status Relay, terminal (33,34)
Zone 2 Installation
Voltage max: 125 VAC / 110 VDC
Power max: 62.5 VA / 32 W
Current max: 0.5 A AC / 0.3 ADC

For installation in Zone 2, the module shall be installed in an enclosure in type of protection Ex n or Ex e, providing a degree of protection of at least IP54. Cable entry devices and blanking elements shall fulfill the same requirements.

For installation on Power Rail in Zone 2, only Power Rail type 9400 supplied by Power Control Unit type 9410 (Type Examination Certificate KEMA 07ATEX0152 X) is allowed.

For Installation in Zone 2 the following must be observed. The 4501 programming module is to be used solely with PR Electronics modules. It is important that the module is undamaged and has not been altered or modified in any way. Only 4501 modules free of dust and moisture shall be installed.
For safe installation of 9113B the following must be observed. The module shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area.

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

For Installation in Zone 2 / Division 2 the following must be observed.
The 4501 programming module is to be used solely with PR electronics modules. It is important that the module is undamaged and has not been altered or modified in any way.
Only 4501 modules free of dust and moisture shall be installed.

**Hazardous Classified Location**
Class I/II/III, Division 1, Group A,B,C,D,E,F,G or Class I, Zone 0/1 Group IIC, [AEx ia] IIC or Group IIC, [Ex ia Ga] IIC Gc

**Unclassified Location or Hazardous Classified Location**
Class I, Division 2, Group A,B,C,D T4 or Class I Zone 2 Group IIC T4 Gc

**Intrinsically safe apparatus**
entity parameters:

\[
\begin{align*}
V_{\text{max}} (U_i) & \geq V_t (U_o) \\
I_{\text{max}} (I_i) & \geq I_t (I_o) \\
P_i & \geq P_o \\
C_a & \geq C_{\text{cable}} + C_i \\
L_a & \geq L_{\text{cable}} + L_i
\end{align*}
\]

The sum of capacitance and inductance of cable and intrinsic safe equipment must be less or equal to Ca and La

\[P_{\text{terminal 11,12,13,14}}\]
\[P_{\text{terminal 31,32,33,34}}\]
\[P_{\text{terminal 91,92,93,94,95}}\]

Um: 253V, max 400Hz
Ex input
CH1 (terminal 41,42,43,44)
CH2 (terminal 51,52,53,54)

<table>
<thead>
<tr>
<th></th>
<th>IIC / Group A,B</th>
<th>IIB / Group C,E,F</th>
<th>IIA / Group D,G</th>
</tr>
</thead>
<tbody>
<tr>
<td>C_a / C_o</td>
<td>5 µF</td>
<td>50 µF</td>
<td>1000 µF</td>
</tr>
<tr>
<td>L_a / L_o</td>
<td>100 mH</td>
<td>300 mH</td>
<td>700 mH</td>
</tr>
</tbody>
</table>

U_i: 10 V
I_i: 30 mA
C_a: 30 nF
L_a: 820 nH

Status Relay. terminal (33,34)
Voltage max: 125VAC / 110VDC
Power max: 62,5VA / 32W
Current max: 0.5A AC / 0.3ADC

Zone 2 installation:
Voltage max: 32VAC / 32VDC
Power max: 16VA / 32W
Current max: 0.5A AC / 1ADC

Installation notes:
In Class I, Division 2 installations, the subject equipment shall be mounted within a too-secured enclosure which is capable of accepting one or more of the Class I, Division 2 wiring methods specified in the National Electrical Code (ANSI/NFPA 70) or the Canadian Electrical Code (C22.1). In Class I, Zone 2 installations, the subject equipment shall be mounted within a too secured enclosure which is capable of accepting one or more of the Class I, Zone 2 wiring methods specified in the National Electrical Code (ANSI/NFPA 70) or the Canadian Electrical Code (C22.1). Where installed in outdoor or potentially wet locations, the enclosure shall, at a minimum, meet the requirements of IP54.
In Class I, Zone 2 installations, the installer shall ensure protection of supply terminals against transient voltages exceeding 140% of the rated supply voltage.

Install in environments rated Pollution Degree 2 or better; overvoltage category I or II. The module must be supplied from a Power Supply having double or reinforced insulation. The use of stranded wires is not permitted for mains wiring except when wires are fitted with cable ends.
For installation on the 9400 Power Rail the power must be supplied from Power Control Module Unit 9410. The module is galvanic isolated and does not require grounding. Use 60 / 75 ºC Copper Conductors with wire Size AWG: (26-14).
Warning: Substitution of components may impair intrinsic safety.
Warning: To prevent ignition of the explosive atmospheres, disconnect power before servicing and do not separate connectors when energized and an explosive gas mixture is present.

**Hazardous Classified Location**
Class I/II/III, Division 1, Group A,B,C,D,E,F,G or Class I, Zone 0/1 Group IIC, [AEx ia] IIC or Group IIC, [Ex ia Ga] IIC Gc

**Unclassified Location or Hazardous Classified Location**
Class I, Division 2, Group A,B,C,D T4 or Class I Zone 2 Group IIC T4 Gc

### Intrinsically safe apparatus entity parameters:

- $V_{\text{max}} (U_i) \geq V_t (U_o)$
- $I_{\text{max}} (I_i) \geq I_t (I_o)$
- $P_i \geq P_o$
- $C_a \geq C_{\text{cable}} + C_i$
- $L_a \geq L_{\text{cable}} + L_i$

The sum of capacitance and inductance of cable and intrinsically safe equipment must be less or equal to $C_a$ and $L_a$.

### Ex input
**CH1** (terminal 42,43)
- $V_t (U_o): 17.4$ V
- $I_t (I_o): 18.4$ mA
- $P_o: 80$ mW
- $L_o/R_o: 445 \mu$H/$\Omega$

**CH2** (terminal 52,53)

<table>
<thead>
<tr>
<th>IIIC / Group A,B</th>
<th>IIB / Group C,E,F</th>
<th>IIA / Group D,G</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C_a / C_o: 0.3 \mu$F</td>
<td>$1.6 \mu$F</td>
<td>$8 \mu$F</td>
</tr>
<tr>
<td>$L_a / L_o: 80$ mH</td>
<td>$250$ mH</td>
<td>$600$ mH</td>
</tr>
</tbody>
</table>

- $U_i: 10$ V
- $I_i: 30$ mA
- $C_i: 15$ nF
- $L_i: 1.7 \mu$H

**Terminal Diagram**

- $-20 \leq T_a \leq 60^\circ C$
UL Installation drawing

For safe installation of associated apparatus 9113Bx-U9 the following must be observed. The module shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area.

For Installation in Div2/Zone2 the following must be observed.
The 4501 programming module is to be used solely with PR electronics modules. It is important that the module is undamaged and has not been altered or modified in any way. Only 4501 modules free of dust and moisture shall be installed.

9113AA-U9, 9113BA-U9: 1 Channel Temperature / mA Converter
9113AB-U9, 9113BB-U9: 2 Channel Temperature / mA Converter

Marking:
Proceeding Cont. Eq. for Use in Haz. Loc.
Install in CL I DIV2 GP A-D T4 provide IS circuits to CL I-III DIV 1 GP A-G or CL I Zn2 Gp IIC T4 provides IS circuits for CL I Zn0 Gp IIC/Zn20 Gp IIIC
Um=253V [Exia] Installation Drawing: 9113QU01

The 9113Bx-U9 is a galvanic isolating associated apparatus for installation in non-hazardous locations or Class I, Division 2, Groups A – D hazardous locations with intrinsically safe connections to Class I, II and III hazardous locations.

Standards:
- UL 121201 NONINCENDIVE ELECTRICAL EQUIPMENT FOR USE IN CLASS I AND II, DIVISION 2 AND CLASS III, DIVISIONS 1 AND 2 HAZARDOUS (CLASSIFIED) LOCATIONS Edition 9 - Revision Date 2018/08/31
- CSA C22.2 NO. 213 NONINCENDIVE ELECTRICAL EQUIPMENT FOR USE IN CLASS I AND II, DIVISION 2 AND CLASS III, DIVISIONS 1 AND 2 HAZARDOUS (CLASSIFIED) LOCATIONS- Edition 3 - Issue Date 2017/09/01
- UL 913 STANDARD FOR INTRINSICALLY SAFE APPARATUS AND ASSOCIATED APPARATUS FOR USE IN CLASS I, II, III, DIVISION 1, HAZARDOUS (CLASSIFIED) LOCATIONS- Edition 8 - Revision Date 2015/10/16
- CSA C22.2 NO. 60079-0 EXPLOSIVE ATMOSPHERES — PART 0: EQUIPMENT — GENERAL REQUIREMENTS- Edition 3 - Issue Date 2015/10/01
- CSA C22.2 NO. 60079-11:14 EXPLOSIVE ATMOSPHERES — PART 11: EQUIPMENT PROTECTION BY INTRINSIC SAFETY "I”- Edition 2 - Issue Date 2014/02/01
9113Bx-U9 Installation

Hazardous Classified Location
Class I/II/III, Division 1, Group A,B,C,D,E,F,G
Zone 0,1, 2 Group IIC, IIB, IIA or
Zone 20, 21

Unclassified Location or
Hazardous Classified Location
Class I, Division 2, Group ABCD T4
Class I Zone 2 Group IIC T4

Simple Apparatus or
Intrinsic safe apparatus
with entity parameters:

Vmax (Ui) ≥ Vt (Uo)
Imax (Ii) ≥ It (Io)
Pi ≥ Pt (Po)
Ca ≥ Ccable + Ci
La ≥ Lcable + Li

Ex input
CH1 (terminal 41,42,43,44)
CH2 (terminal 51,52,53,54)
Voc or U0: 8.7 V
Isc or I0: 18.4 mA
Po: 40 mW
Lo/Ro 892μH/Ω

Ca or Co: 5 µF
La or Lo: 100 mH

Vmax or U: 10 V
Imax or I: 30 mA
Ci: 30 nF
Li: 820 nH

Power Rail

<table>
<thead>
<tr>
<th>IIC or A,B</th>
<th>IIB or C,E,F</th>
<th>IIA or D,G</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 µF</td>
<td>1000 µF</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ca or Co</th>
<th>5 µF</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>La or Lo</th>
<th>300 mH</th>
</tr>
</thead>
</table>

| 700 mH |

Umax: 253V, max 400Hz

Revision date: 2019-11-26
Version Revision: V1 R0
Prepared by: PB
Page: 2/5
9113Bx-U9 Splitter Installation

**Hazardous Classified Location**
Class I/II/III, Division 1, Group A,B,C,D,E,F,G
Zone 0, 1, 2 Group IIC, IIB, IIA or
Zone 20, 21

**Unclassified Location or**
Hazardous Classified Location
Class I, Division 2, Group ABCD T4
Class I Zone 2 Group IIC T4

---

Simple Apparatus or
Intrinsic safe apparatus
with entity parameters:

- $V_{\text{max}} (U_i) \geq V_{t} (U_o)$
- $I_{\text{max}} (I_i) \geq I_{t} (I_o)$
- $P_{i} \geq P_{t} (P_o)$
- $C_a \geq C_{\text{cable}} + C_i$
- $L_a \geq L_{\text{cable}} + L_i$

---

**Ex input**

<table>
<thead>
<tr>
<th>CH1 (terminal 43 +)</th>
<th>CH2 (terminal 52 -)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voc or $U_o$: 17.4 V</td>
<td>Voc or $U_o$: 17.4 V</td>
</tr>
<tr>
<td>Isc or $I_o$: 18.4 mA</td>
<td>Isc or $I_o$: 18.4 mA</td>
</tr>
<tr>
<td>$P_o$: 80 mW</td>
<td>$P_o$: 80 mW</td>
</tr>
<tr>
<td>$L_o/R_o$: 445 μH/Ω</td>
<td>$L_o/R_o$: 445 μH/Ω</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>IIC or A,B</th>
<th>IIB or C,E,F</th>
<th>IIA or D,G</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C_a$ or $C_o$: 0.3 μF</td>
<td>$C_a$ or $C_o$: 0.3 μF</td>
<td>$C_a$ or $C_o$: 0.3 μF</td>
</tr>
<tr>
<td>$L_a$ or $L_o$: 80 mH</td>
<td>$L_a$ or $L_o$: 80 mH</td>
<td>$L_a$ or $L_o$: 80 mH</td>
</tr>
</tbody>
</table>

---

- $V_{\text{max}} or U_i$: 10 V
- $I_{\text{max}} or I_i$: 30 mA
- $C_i$: 15 nF
- $L_i$: 1.7 μH

---

Revision date: 2019-11-26
Version Revision: V1 R0
Prepared by: PB
Page: 3/5
Installation notes 9113Ax-U9 and 9113Bx-U9:

The module must be installed in a tool-secured enclosure suitable for the application in accordance with the National Electrical Code (ANSI/NFPA 70) for installation in the United States, the Canadian Electrical Code for installations in Canada, or other local codes, as applicable.

The module is galvanically isolated and does not require grounding.

Install in pollution degree 2, overvoltage category II, in accordance with IEC 60664-1.

Use minimum 75 ºC copper conductors with wire size AWG: (26-14)

There are no serviceable parts in the equipment and no component substitution is permitted.

**Warning:** Substitution of components may impair intrinsic safety.

**Avertissement:** La substitution de composants peut compromettre la sécurité intrinsèque.

**Warning:** To prevent ignition of the explosive atmospheres, disconnect power before servicing and do not separate connectors, install or remove module from Power Rail when energized and an explosive gas mixture is present.

**Avertissement** : Pour éviter l’inflammation d’atmosphères explosibles, déconnectez l’alimentation avant les opérations d’entretien. Ne montez pas ou n’enlevez pas les connecteurs quand le module est sous tension et en présence d’un mélange de gaz. Ne montez pas ou n’enlevez pas les modules du rail d’alimentation en présence d’un mélange de gaz.

Installation notes 9113Bx-U9:

Associated Equipment /Appareillage Associé [Ex ia]

The Ex output current of this associated apparatus is limited by a resistor such that the output voltage-current plot is a straight line drawn between open-circuit voltage and short-circuit current.

Selected intrinsically safe equipment must be third party listed as intrinsically safe for the application, and have intrinsically safe entity parameters conforming with Table 1 below.

**TABLE 1:**

<table>
<thead>
<tr>
<th>I.S. Equipment</th>
<th>Associated Apparatus</th>
</tr>
</thead>
<tbody>
<tr>
<td>V max (or U)</td>
<td>≥ Voc or Vt (or Uo)</td>
</tr>
<tr>
<td>I max (or I)</td>
<td>≥ Isc or It (or Io)</td>
</tr>
<tr>
<td>P max, Pi</td>
<td>≥ Po</td>
</tr>
<tr>
<td>Ci + Ccable</td>
<td>≤ Ca (or Co)</td>
</tr>
<tr>
<td>Li + Lcable</td>
<td>≤ La (or Lo)</td>
</tr>
</tbody>
</table>

The module may also be connected to a simple apparatus as defined in Article 504.2 and installed and temperature classified in accordance with Article 504.10(D) of the National Electrical Code (ANSI/NFPA 70), or other local codes, as applicable.

Capacitance and inductance of the field wiring from the intrinsically safe equipment to the associated apparatus shall be calculated and must be included in the system calculations as shown in Table 1. Cable capacitance, Ccable, plus intrinsically safe equipment capacitance, Ci must be less than the marked capacitance, Ca (or Co), shown on any associated apparatus used. The same applies for inductance (Lcable, Li and La or Lo, respectively). Where the cable capacitance and inductance per foot are not known, the following values shall be used: Ccable = 60 pF/ft., Lcable = 0.2 μH/ft.
Where multiple circuits extend from the same piece of associated apparatus, they must be installed in separate cables or in one cable having suitable insulation. Refer to Article 504.30(B) of the National Electrical Code (ANSI/NFPA 70) and Instrument Society of America Recommended Practice ISA RP12.06 for installing intrinsically safe equipment.

Intrinsically safe circuits must be wired and separated in accordance with Article 504.20 of the National Electrical Code (ANSI/NFPA 70) or other local codes, as applicable.

The 9113B has not been evaluated for use in combination with another associated apparatus.

There are no serviceable parts in the equipment and no component substitution is permitted.

For installations in which both the Ci and Li of the intrinsically safe apparatus exceeds 1% of the Ca (or Co) and La (or Lo) parameters of the associated apparatus (excluding the cable), then 50% of Ca (or Co) and La (or Lo) parameters are applicable and shall not be exceeded. The reduced capacitance shall not be greater than 1 μF for Groups C and/or D, and 600 nF for Groups A and B. The values of Ca (or Co) and La (or Lo) determined by this method shall not be exceeded by the sum of all of Ci plus cable capacitances and the sum of all of the Li plus cable inductances in the circuit respectively.

9113Ax-U9 and 9113Bx-U9 Installation:

Non Hazardous area or
Class I, Division 2, Group ABCD T4
or Zone 2 Group IIC T4

Supply terminal (31,32)
Voltage: 19.2 – 31.2 VDC

Class I, Division 2 or
Zone 2 installation:

Status relay, terminal (33,34)
Voltage max: 32 Vac/ 32 Vdc
Current max: 0.5 Aac / 0.3A dc
INMETRO Desenhos para Instalação

Para instalação segura do 9113B o manual seguinte deve ser observado. O módulo deve ser instalado somente por profissionais qualificados que estão familiarizados com as leis nacionais e internacionais, diretrizes e normas que se aplicam a esta área.

Ano de fabricação pode ser obtido a partir dos dois primeiros dígitos do número de série.

4501

Para a instalação na Zona 2 o seguinte deve ser observado. O módulo de programação de 4501 deve ser utilizado apenas com os módulos PRelectronics. É importante que o módulo esteja intacto e não tenha sido alterado ou modificado de qualquer maneira. Apenas os módulos 4501 livres de poeira e umidade devem ser instalados.

INMETRO Certificado ………… DEKRA 16.0003X

Marcasão:

[Ex ia Ga] IIC/IIB/IIIA
Ex nA nC IIC T4 Gc
[Ex ia Da] IIIC
[Ex ia Ma] I

Normas:

ABNT NBR IEC 60079-0:2013, ABNT NBR IEC60079-11:2013,

Instalação 9113Bx 2 Circuitos

Área de classificada
Zona 0,1,2, 20, 21, 22

Área de nao classificada
ou Zona 2

-20 ≤Ta ≤ +60ºC

(terminais 11,12,13,14)
(terminais 31,32,33,34)
(terminais91,92,93,94,95)
Uₘ: 253 V, máx. 400 Hz

TRILHO DE ENERGIA
Entrada Ex
CN1 (terminais 41,42,43,44)
CN2 (terminais 51,52,53,54)

U_o: 8,7 V
I_o: 18,4 mA
P_o: 40 mW
Lo/Ro 892 μH/Ω

<table>
<thead>
<tr>
<th></th>
<th>IIC</th>
<th>IIB</th>
<th>IIA</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>C_o</td>
<td>5 μF</td>
<td>50 μF</td>
<td>1000 μF</td>
<td>1000 μF</td>
</tr>
<tr>
<td>L_o</td>
<td>100 mH</td>
<td>300 mH</td>
<td>700 mH</td>
<td>700 mH</td>
</tr>
</tbody>
</table>

U_i: 10 V
I_i: 30 mA
C_i: 30 nF
L_i: 820 nH

Relê de estado, terminais (33,34)

Voltagem máx.: 125 VAC / 110 VDC
Potência máx.: 62,5 VA / 32 W
Corrente máx.: 0,5 A AC / 0,3 ADC

Instalação Zone 2:
Voltagem máx.: 32 VAC / 32 VDC
Potência máx.: 16 VA / 32 W
Corrente máx.: 0,5 A AC / 1 ADC

Notas de Instalação:

Instalação em grau de poluição 2, categoria de sobretensão II conforme definido no IEC 60664-1. Os circuitos não intrinsecamente seguros só pode ser conectado para sobretensão limitado ao categoria I/II como definido na IEC 60664-1.
Não separe conectores quando energizado ou quando uma mistura de gás explosivo estiver presente.
Não monte ou remova módulos do trilho de alimentação quando uma mistura explosiva de gás estiver presente.
Desligue a alimentação antes da manutenção.
A fiação de terminais sem uso não é permitida.
A fonte de Loop e terminais de entrada de corrente para o mesmo canal não deve ser aplicada ao mesmo tempo.
Em tipo de proteção [Ex ia Da] os parâmetros para a segurança intrínseca para grupo de gás IIB são aplicáveis.
Para a instalação em Zona 2, o módulo deve ser instalado em um invólucro conformidade com o tipo de proteção 'Ex n' ou 'Ex e', fornecendo no mínimo grau de proteção IP54.
Dispositivos de entrada de cabo e elementos de vedação devem cumprir com os mesmos requisitos.

Para a instalação de trilho de energia na Zona 2, apenas o trilho de alimentação Rail 9400 fornecido pela Unidade de Controle de Potência 9410 é permitido.
Instalação 9113Bx 2 Circuitos combinado

Área de classificada
Zona 0,1,2, 20, 21, 22
ou Zona 2

-20 ≤ Ta ≤ +60°C

Entrada EX
CN1 (terminais 43 +)
CN2 (terminais 52 -)

Uo: 17,4 V
Io: 18,4 mA
Po/Ro: 80 mW
Lo/Ro: 445 μH/Ω

Uo: 10 V
Io: 30 mA
Co: 15 nF
Li: 1,7 μH

IIC | IIB | IIA | I
---|---|---|---
0,3 μF | 1,6 μF | 8 μF | 8 μF
80 mH | 250 mH | 600 mH | 600 mH

Um: 253 V, máx. 400 Hz

9113 - 9113-004 43
## 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>107</td>
<td>1722</td>
<td>Specifications for max. required power added. New ATEX, IECEX and INMETRO certificates and installation drawings.</td>
</tr>
</tbody>
</table>
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