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. The detachable 4501 Local Operator Interface (LOI) allows for local monitoring of process values, device configuration, error detection and signal simulation. The next generation, our 4511 Remote Operator Interface (ROI) does all that and more, adding remote digital communications via Modbus/RTU, while the analog output signals are still available for redundancy. With the 4511 you can further expand connectivity with a PR gateway, which connects via industrial Ethernet, wirelessly through a Wi-Fi router or directly with the devices using our Portable Plant Supervisor (PPS) application. The PPS app is available for iOS, Android and Windows.

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.
# Universal Converter 9116B

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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 4511/4501.
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.
Universal Converter
9116B

- Input for RTD, TC, Ohm, potentiometer, mA and V
- Supply for 2-wire transmitters
- Active / passive mA output and relay output
- Can be supplied separately or installed on power rail, PR 9400
- SIL 2-certified via Full Assessment

Advanced features
- Configuration and monitoring by way of detachable display front (PR 4511/4501); process calibration, signal and relay simulation.
- Advanced relay configuration, e.g. setpoint, window, delay, sensor error indication and power monitoring
- Copying of the configuration from one device to others of the same type via the display front.
- Reduced Uo Ex data < 8.3 V for active input signals.
- TC inputs with internal or external CJC for higher accuracy.
- Active / passive mA output via the same two terminals

Application
- The device can be mounted in the safe area and in zone 2 / cl. 1 div. 2 and receive signals from zone 0, 1, 2 and zone 20, 21, 22 including M1 / Class I/II/III, Div. 1, Gr. A-G.
- Conversion and scaling of temperature, voltage, potentiometer and linear resistance signals.
- Power supply and signal isolator for 2-wire transmitters.
- Monitoring of error events and cable breakage via the individual status relay and/or a collective electronic signal via the power rail.
- The 9116 has been designed, developed and certified for use in SIL 2 applications according to the requirements of IEC 61508.

Technical characteristics
- 1 green and 1 red front LED indicate operation status and malfunction. 1 yellow LED indicates relay status.
- 2.6 kVAC galvanic isolation between input, output and supply.
Applications

Input signals:
- Potentiometer
- RTD and lin. R Connection, wires

*Order separately: CJC connector 5910Ex.

Output signals:
- Analog, 0/4...20 mA and relay

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

Zone 2 & Cl. 1, Div. 2, gr. A-D or Safe Area
PR 4511/4501 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 9116.
- Can be moved from one 9116 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 (H=3.33 mm) toggles between input value and tag no.
  - Line 3 (H=3.33 mm) shows output value and UNIT.
  - Line 4 shows status for relay and 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 4511/4501
1: Insert the tabs of the PR 4511/4501 into the holes at the top of the device.
2: Hinge the PR 4511/4501 down until it snaps into place.

Demounting of the PR 4511/4501
3: Push the release button on the bottom of the PR 4511/4501 and hinge the the PR 4511/4501 out and up.
4: With the PR 4511/4501 hinged up, remove from holes at the top of the device.
Order  

<table>
<thead>
<tr>
<th>Type</th>
<th>Max. loop voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>9116B</td>
<td>Uo 28 VDC        : 1</td>
</tr>
<tr>
<td></td>
<td>Uo 21.4 VDC      : 2</td>
</tr>
</tbody>
</table>

Example: 9116B2

Accessories

4501 = Display / programming front  
4511 = Communication enabler  
5910Ex = CJC connector  
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  
- Dimensions (HxWxD) w/ 4501 / 4511: 109 x 23.5 x 116 / 131 mm  
- Weight approx.: 185 g  
- Weight incl. 4501 / 4511 (approx.): 200 g / 285 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: 1.25 A SB / 250 VAC
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 9116 is used with the 4511 / 4501, then add 40 mW to the max. power dissipation and 70 mW to the max. required power for each device with the 4511 / 4501.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Max. power dissipation</th>
<th>Max. required power</th>
</tr>
</thead>
<tbody>
<tr>
<td>9116B1</td>
<td>1 channel (Ex Uo 28 V)</td>
<td>≤ 1.7 W</td>
<td>≤ 2.1 W</td>
</tr>
<tr>
<td>9116B2</td>
<td>1 channel (Ex Uo 21.4 V)</td>
<td>≤ 1.7 W</td>
<td>≤ 2.1 W</td>
</tr>
</tbody>
</table>

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
- Communications interface .................................................. Communication enabler 4511 /
  Programming front 4501

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>General values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input type</td>
</tr>
<tr>
<td>All</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Basic values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input type</td>
</tr>
<tr>
<td>mA</td>
</tr>
<tr>
<td>Volt</td>
</tr>
<tr>
<td>Pt100, Pt200, Pt 1000</td>
</tr>
<tr>
<td>Pt500, Ni100, Ni200, Ni 1000</td>
</tr>
<tr>
<td>Pt50, Pt400, Ni50</td>
</tr>
<tr>
<td>Pt250, Pt300</td>
</tr>
<tr>
<td>Pt20</td>
</tr>
<tr>
<td>Pt10</td>
</tr>
<tr>
<td>TC type: E, J, K, L, N, T, U</td>
</tr>
<tr>
<td>TC type: R, S, W3, W5, LR</td>
</tr>
<tr>
<td>TC type: B 160...400°C</td>
</tr>
<tr>
<td>TC type: B 400...1820°C</td>
</tr>
</tbody>
</table>
Auxiliary supplies for 9116B1:
2-wire supply (terminal 54..52) .................................................. 28...16.5 VDC / 0...20 mA

Auxiliary supplies for 9116B2:
2-wire supply (terminal 54..52) .................................................. 21.4...16.5 VDC / 0...20 mA

RTD, linear resistance and potentiometer input:

<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>
<tr>
<td>Linear resist.</td>
<td>0 Ω</td>
<td>10000 Ω</td>
<td>-</td>
</tr>
<tr>
<td>Potentiometer</td>
<td>10 Ω</td>
<td>10000 Ω</td>
<td>-</td>
</tr>
</tbody>
</table>

Input for RTD types:
Pt10°*, Pt20°*, Pt50°*, Pt100, Pt200, Pt250, Pt300, Pt400, Pt500, Pt1000
Ni50, Ni100, Ni120, Ni1000

Cable resistance per wire (max.), RTD ........................................... 50 Ω

Sensor current; RTD .................................................. Nom. 0.2 mA

Effect of sensor cable resistance (3- / 4-wire), RTD .......................... < 0.002 Ω / Ω

Sensor error detection, RTD .................................................. Programmable ON / OFF

Short circuit detection, RTD .................................................. Yes

* No short circuit detection for Pt10, Pt20 and Pt50
* No short circuit detection for Lin. R_0%≤ app. 18 Ω

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
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:
  Loop break 4...20 mA ................................................. Yes
  NB: Only when input is selected as 4...20 mA

Voltage input:
  Measurement range .............................................. 0...12 VDC
  Programmable measurement ranges ............................... 0...1 / 0.2...1 / 0...5 / 1...5 / 0...10 and 2...10 VDC
  Input resistance .................................................... Nom. >10 MΩ

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/Downscale. ............................... 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

Relay output in safe area:
  Relay functions ................................................... Setpoint, Window, Sensor error, Power and Off
  Hysteresis, in % of span / display range ....................... 0.1...25 / 1...25
  On and Off delay .................................................. 0...3600 s
  Sensor error reaction ............................................ Break / Make / Hold
  Max. voltage ....................................................... 250 VAC / 30 VDC
  Max. current ....................................................... 2 AAC / 2 ADC
  Max. AC power ...................................................... 500 VA / 60 W

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
  LVD ................................................................. 2014/35/EU
  RoHS ............................................................... 2011/65/EU

Approvals:
  DNV-GL, Ships & Offshore ........................................ Standard for Certification No. 2.4
  c UL us, Standard for Safety ................................... UL 61010-1
  EAC ................................................................. TR-CU 020/2011
  I.S. / Ex:
    ATEX 2014/34/EU ............................................... KEMA 10ATEX0053 X
    IECEx ............................................................ IECEx KEM 10.0022X
    c FM us .......................................................... 3038267-C
    INMETRO ........................................................ DEKRA 16.0004 X
    CCOE ............................................................. P337349/4
    EAC Ex TR-CU 012/2011 ........................................ RU C-DK.GB08.V.00410

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>9116</td>
<td>ERR.ACT=None - OUT.ERR=None.</td>
<td>OFF</td>
</tr>
<tr>
<td>Else:</td>
<td></td>
<td>ON</td>
</tr>
</tbody>
</table>

### Visualisation in the 4511/4501 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>VOLT</td>
<td>0...1 V / 0.2...1 V</td>
<td>IN.LO</td>
<td>&lt; -25 mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IN.HI</td>
<td>&gt; 1.2 V</td>
</tr>
<tr>
<td></td>
<td>0...10 V / 2...10 V</td>
<td>IN.LO</td>
<td>&lt; -25 mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IN.HI</td>
<td>&gt; 12 V</td>
</tr>
<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>LIN.R</td>
<td>0...800 Ω</td>
<td>IN.LO</td>
<td>&lt; -10 Ω</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IN.HI</td>
<td>&gt; 900 Ω</td>
</tr>
<tr>
<td></td>
<td>0...10 kΩ</td>
<td>IN.LO</td>
<td>&lt; -10 Ω</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IN.HI</td>
<td>&gt; 11 kΩ</td>
</tr>
<tr>
<td>POTM</td>
<td>0 - 100%</td>
<td>IN.LO</td>
<td>&lt; -0.5 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IN.HI</td>
<td>&gt; 100.5 %</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

<table>
<thead>
<tr>
<th>Input</th>
<th>Range</th>
<th>Readout</th>
<th>Condition</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;= 21 mA</td>
</tr>
<tr>
<td>POTM</td>
<td>All, SE.BR on all 3-wire</td>
<td>SE.BR</td>
<td>Sensor broken</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SE.SH</td>
<td>Sensor shorted</td>
</tr>
<tr>
<td>LIN.R</td>
<td>All</td>
<td>SE.BR</td>
<td>Sensor broken or wire resistance too high</td>
</tr>
<tr>
<td></td>
<td>For Lin. R_0%≥ app. 18 Ω</td>
<td>SE.SH</td>
<td>Sensor shorted</td>
</tr>
<tr>
<td>TEMP</td>
<td>All</td>
<td>SE.BR</td>
<td>Sensor broken or wire resistance too high</td>
</tr>
<tr>
<td></td>
<td>Pt100 to Pt1000 and Ni50 to Ni1000</td>
<td>SE.SH</td>
<td>Sensor shorted</td>
</tr>
</tbody>
</table>
## Error indications

<table>
<thead>
<tr>
<th>Error search</th>
<th>Readout</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<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>
</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>
</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>
</tr>
<tr>
<td>Output error - check output connections and reset power</td>
<td>AO.ER</td>
<td>Error in analogue output current (SIL mode only)*</td>
</tr>
<tr>
<td>No communication</td>
<td>NO.CO</td>
<td>No communication with (4511/4501)</td>
</tr>
<tr>
<td>Flash memory error - check configuration</td>
<td>FL.ER</td>
<td>FLASH error (configuration invalid)***</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>
</tr>
<tr>
<td>Hardware error</td>
<td>RA.ER</td>
<td>RAM error*</td>
</tr>
<tr>
<td>Hardware error</td>
<td>IF.ER</td>
<td>Internal Flash error*</td>
</tr>
<tr>
<td>Hardware error</td>
<td>Sw.ER</td>
<td>SW monitor error*</td>
</tr>
<tr>
<td>Hardware error</td>
<td>Ad.ER</td>
<td>A/D converter error*</td>
</tr>
<tr>
<td>Hardware error</td>
<td>AoSU</td>
<td>Analog output supply error*</td>
</tr>
<tr>
<td>Hardware error</td>
<td>CA.ER</td>
<td>Factory calibration error*</td>
</tr>
<tr>
<td>Hardware error</td>
<td>CM.ER</td>
<td>Main CPU error*</td>
</tr>
<tr>
<td>Hardware error</td>
<td>RE.ER</td>
<td>Relay readback error*</td>
</tr>
<tr>
<td>Hardware error</td>
<td>II.ER</td>
<td>Initialisation check error*</td>
</tr>
<tr>
<td>Hardware error</td>
<td>RS.ER</td>
<td>Reset error*</td>
</tr>
<tr>
<td>Hardware error</td>
<td>IC.ER</td>
<td>Input communication error*</td>
</tr>
<tr>
<td>Hardware error</td>
<td>M1.ER</td>
<td>Main CPU to Ch. 1 error*</td>
</tr>
<tr>
<td>Hardware error</td>
<td>MC.ER</td>
<td>Main CPU config. error*</td>
</tr>
<tr>
<td>Hardware error</td>
<td>MF.ER</td>
<td>Main CPU Flash error*</td>
</tr>
<tr>
<td>Hardware error</td>
<td>MR.ER</td>
<td>Main CPU RAM error*</td>
</tr>
<tr>
<td>Hardware error</td>
<td>MS.ER</td>
<td>Main CPU supply error*</td>
</tr>
<tr>
<td>Hardware error</td>
<td>MP.ER</td>
<td>Main CPU ProgFlow error*</td>
</tr>
<tr>
<td>Hardware error</td>
<td>MI.ER</td>
<td>Main CPU initialization check error*</td>
</tr>
<tr>
<td>Hardware error</td>
<td>DE.ER</td>
<td>Device error*</td>
</tr>
<tr>
<td>Hardware error</td>
<td>FC.ER</td>
<td>Invalid code checksum in 4511/4501</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 \( \Rightarrow \) 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

Inputs:

**Supply and status relay**

- Supply +
- Supply -
- NC

**Error signal**

- Supply +
- Supply -
- NC

NC = no connection

**Outputs:**

**Current (Active output)**

- 11
- 12
- 13
- 14

**2-wire transmitter (Passive output)**

- 11
- 12
- 13
- 14

**Relay**

- N.O.

**Power rail connections**

- 91
- 92
- 93
- 94
- 95

**Supply and status relay**

- 31
- 32
- 33
- 34

**Inputs:**

- RTD, 2-wire
- RTD, 3- / 4-wire
- TC, internal CJC sensor
- CJC connector

- Resistance, 2-wire
- Resistance, 3- / 4-wire
- Potentiometer

- 2-wire transmitter
- Current
- Voltage

* TC, CJC connector
* Order separately: CJC connector 5910Ex
## List of LED and error signal indications

<table>
<thead>
<tr>
<th>Condition</th>
<th>Green LED</th>
<th>Relay: Yellow LED</th>
<th>Error: Red LED</th>
<th>Status relay, N.C.</th>
<th>Power rail signal status</th>
</tr>
</thead>
<tbody>
<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></td>
<td>De-energized</td>
<td>Closed</td>
</tr>
<tr>
<td>Device OK</td>
<td>Flashing</td>
<td>OFF</td>
<td></td>
<td>Energized</td>
<td>Open</td>
</tr>
<tr>
<td>Signal OK</td>
<td>Flashing</td>
<td>OFF</td>
<td></td>
<td>Energized</td>
<td>Open</td>
</tr>
<tr>
<td>Output relay energized</td>
<td>Flashing</td>
<td>ON</td>
<td>OFF</td>
<td>Energized</td>
<td>Open</td>
</tr>
<tr>
<td>Output relay energized w. wire short/break</td>
<td>Flashing</td>
<td>ON</td>
<td>Flashing</td>
<td>De-energized</td>
<td>Closed (if activated)</td>
</tr>
<tr>
<td>Output relay de-energized w. wire short/break</td>
<td>Flashing</td>
<td>OFF</td>
<td>Flashing</td>
<td>De-energized</td>
<td>Closed (if activated)</td>
</tr>
<tr>
<td>Output relay de-energized</td>
<td>Flashing</td>
<td>OFF</td>
<td>OFF</td>
<td>Energized</td>
<td>Open</td>
</tr>
</tbody>
</table>
Configuration / operating the function keys

In general
When configuring the 9116, 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. Default password 2008 allows access to all configuration menus. Password protection is mandatory in SIL applications.

Selection of units
After choosing the input signal type you can choose which process units should be shown in the display (see table). By selection of temperature input 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 5910Ex) must be ordered separately.

Signal and sensor error indication via display front 4511/4501
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 1 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 relay status and status for communication COM (running circle) indicating correct functioning of 4511/4501.

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.

Relay functions
5 different settings of relay function can be selected.
- Setpoint: The unit works as a single trip amplifier
- Window: The relay has a window that is defined by a low and a high setpoint. On both sides of the window the relay has the same status.
- Error function: The relay is activated by sensor error.
- Power: The relay is activated as long as the power is on.
- Off: The relay is deactivated.
**Increasing/decreasing:** The relay can be set to activate at increasing or decreasing input signal.

**Delay:** An ON and an OFF delay can be set in the range 0...3600 s.

**Hysteresis:** A hysteresis can be set at 0.1...25% of the span or between 1 and 25% of display range.

**Window:** The window function is selected by choosing “window” in the menu and defining a high and a low setpoint. See the graphic depiction of the window functions on page 26.

**Setpoint:** The setpoint function is selected by choosing “setpoint” in the menu and entering the desired limit. The device then works as a single limit switch. See the graphic depiction of the setpoint functions on page 27.

An activated relay means that the contact is closed if the contact function “normally open” is selected, and the contact is open if the contact function “normally closed” is selected. The delay time for activation and deactivation can be set independently of each other in the menus ON.DEL and OFF.DEL respectively.

### 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. Input value is always shown in line 2. Selection of functional readout in line 3 of the display - choose between readout of 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 4511/4501. Then a high signal (not necessarily 100%) is applied and the actual value is entered via 4511/4501. 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 or the relay state OFF and ON. You must exit the menu by pressing (no time-out). The simulation function exits automatically, if the 4511/4501 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 4511/4501, and then move the 4511/4501 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.

**Safety Integrity Level (SIL):** See Safety Manual for details.
Fast setpoint adjustment and relay test

- Increase setpoint
- Decrease setpoint
- Save and exit the menu
- Change relay state.

If SIL-locked directly to [EN.SIL]

- Default state.
- Line 1 shows input status
- Line 2 shows input value and TAG NO.
- Line 3 shows output value and units.
- Line 4 shows status for relay and communication and whether the device is SIL-locked.
  - Static dot = SIL-locked and flashing dot = not SIL-locked.

*1.0 Only if password-protected.

*1.1 Only if FastSet is activated and the relay function is setpoint.

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

Error indication, example:

- SE.BR
- mA SE.BR

Power up

- 1,30.00
- Io12.00mA
- 3W CONNEC.

Routing diagram ADV.SET

Continued on the page

9116 - Product version 9116-003
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.
Only if input types support sensor error check.
Not valid for these input signals: 0...20 mA and voltage.

*1.4 Only if input signal is temperature.
Routing diagram, advanced settings (ADV.SET)

DE, DK, ES, FR, IT, SE, UK

To default state 1.0

2.0 in the submenu simulation (SIM) you must press \( \rightarrow \) to return to the default state 1.0.

Verify SIL configuration.
Help text overview

[01] Set correct password
[02] Enter Advanced setup menu?
[03] Select Temperature input
   Select Potentiometer input
   Select Linear resistance input
   Select Current input
   Select Voltage input
[04] Select 0.0-1 V input range
   Select 0.2-1 V input range
   Select 0-5 V input range
   Select 0-10 V input range
[05] Select 0-20 mA input range
   Select 4-20 mA input range
[06] Select 2-Wire sensor connection
   Select 3-Wire sensor connection
   Select 4-Wire sensor connection
[07] Set Resistance value low
[08] Set Resistance value high
[09] Select Celsius as temperature unit
   Select Fahrenheit as temperature unit
[10] Select TC sensor type
   Select Ni sensor type
   Select Pt sensor type
[12] Select Decimal point position
[13] Set Display range low
[14] Set Display range high
[15] Select Relay setpoint in % of input range
   Select Relay setpoint in displayed units
[16] Select Pt10 sensor type
   Select Pt20 sensor type
   Select Pt50 sensor type
   Select Pt100 sensor type
   Select Pt200 sensor type
   Select Pt300 sensor type
   Select Pt400 sensor type
   Select Pt500 sensor type
   Select Pt1000 sensor type
[17] Select Ni50 sensor type
   Select Ni100 sensor type
   Select Ni200 sensor type
   Select Ni1000 sensor type
[18] 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
   Select TC-R sensor type
   Select TC-S sensor type
   Select TC-T sensor type
   Select TC-U sensor type
   Select TC-W3 sensor type
   Select TC-W5 sensor type
   Select TC-Lr sensor type
[19] Select OFF function - relay is permanently off
   Select POWER function - relay indicates power status OK
   Select ERROR function - relay indicates sensor error only
   Select WINDOW function - relay is controlled by 2 setpoints
   Select SETPOINT function - relay is controlled by 1 setpoint
[20] Select Normally Closed contact
   Select Normally Open contact
[21] Set Relay setpoint
[22] Select Action on decreasing signal
   Select Action on increasing signal
[23] Set Relay hysteresis
[24] Select No error action - undefined status at error
   Select Open relay contact at error
   Select Close relay contact at error
   Select Hold relay status at error
[25] Set Relay ON delay in seconds
[26] Set Relay OFF delay in seconds
[27] Select Contact is Closed Inside Window
   Select Contact is Open Inside Window
[28] Set Relay window setpoint low
[29] Set Relay window setpoint high
[30] Set Relay window hysteresis
[31] Select Internal temperature sensor
   Select CJC connector (Accessory)
[32] Select Open relay contact at error
   Select Close relay contact at error
[33] Set Relay window setpoint high
[34] Select 0-20 mA output range
   Select 4-20 mA output range
   Select 20-0 mA output range
   Select 20-4 mA output range
[35] Select No error action - output undefined at error
   Select Downsides at error
   Select Namur NE43 downscale at error
   Select Namur NE43 upscale at error
[36] Select Analogue output response time in seconds.
[37] Set Temperature for analogue output low
[38] Set Temperature for analogue output high
[39] Enter SIL setup
[40] Enter Simulation mode
[41] Enter Rail setup
[42] Perform Process Calibration
[43] Enter Language setup
[44] Enter Password setup
[45] Enter Display setup
[46] Perform Memory operations
[47] Load saved configuration into module
[48] Save configuration in display front
[49] Adjust LCD contrast
[50] Adjust LCD backlight
[51] Write a 5-character channel TAG
[52] Show Analog output value in display
[53] Show TAG on display
[54] Alternate shown information in display
[49] Calibrate Input low to process value?
[50] Calibrate Input high to process value?
[51] Enable input simulation?
[52] Set the input simulation value
[53] Relay simulation - use \( \wedge \) to toggle relay
[54] Enable Password protection?
[55] Set New password
[56] Enable Fastset functionality?
[57] Relay setpoint - press \( \Rightarrow \) to save
[58] Relay setpoint - Read only
[59] Select Language
[60] Use process calibration values?
[61] Set value for low calibration point
[62] Set value for high calibration point
[63] Enable Rail status signal output?
[64] Enable SIL configuration lock?
  0...20 mA is not a valid output range for SIL operation
[65] is channel using process-compensated calibration data?
[66] Configuration SIL status (Open / Locked)
[80] Sensor short circuit
[81] Sensor wire breakage
[82] Display underrange
[83] Display overrange
[84] Input underrange
[85] Input overrange
[86] Input error - check input connections and reset power
[87] Output error - check connections and reset power
[88] Flash memory error - check configuration
[89] Invalid configuration type or version
[90] Hardware error
[91] CJC sensor error - check device temperature
[92] CJC error - check CJC connector block
[93] No communication
Graphic depiction of window
Graphic depiction of setpoint

Input signal

Setpoint (increasing)

Hysteresis

ON delay

OFF delay

Time

Closed

Relay contact (N.O.)

Open

Relay On
Appendix

IECEx installation drawing

ATEX Installation Drawing

FM Installation Drawing

Desenho de Instalacao INMETRO

Safety Manual
IECEEx Installation drawing

For safe installation of 9116 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.

IECEEx Certificate: KEM 10.0022X

Marking 9116Bxx: [Ex ia Ga] IIC/IIB/IIA
Ex nA nC IIC T4 Gc
[Ex ia Da] IIIC
[Ex ia Ma] I

Marking 9116Axx: Ex nA nC IIC T4 Gc


9116Bxx Installation:
Hazardous area
Zone 0, 1, 2, 20, 21 and 22

Non Hazardous area
or Zone 2

-20 ≤ Ta ≤ +60ºC

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

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

Relay output, terminal (13,14)
Non hazardous area installation
Voltage max: 250 VAC / 30 VDC
Power max: 500 VA / 60 W
Current max: 2 A AC / 2 ADC

Zone 2 installation
Voltage max: 32 VAC / 30 VDC
Power max: 64 VA / 60 W
Current max: 2 A AC / 2 ADC

(terminal 11,12,13,14)
(terminal 31,32,33,34)
(terminal 91,92,93,94,95)
Um: 253 V; max. 400 Hz
**Installation notes:**

For group I (mines), the parameters for group IIA apply.

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 KEMA 07ATEX0152 X) is allowed.
9116Bxx Installation:

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

Non Hazardous area

-20 ≤ Ta ≤ +60°C

Module 9116B1/2
Terminal 54-52

<table>
<thead>
<tr>
<th>Term.</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ii</td>
<td>120 mA</td>
</tr>
<tr>
<td>Pi</td>
<td>900 mW</td>
</tr>
<tr>
<td>Ci</td>
<td>3 nF</td>
</tr>
<tr>
<td>Li</td>
<td>2 μH</td>
</tr>
</tbody>
</table>

Module 9116B1
Term. 54-52; 51-52

<table>
<thead>
<tr>
<th>Group</th>
<th>Co</th>
<th>Lo</th>
<th>Lo/Ro</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIC</td>
<td>80 nF</td>
<td>4 mH</td>
<td>54 μH/Ω</td>
</tr>
<tr>
<td>IIB</td>
<td>640 nF</td>
<td>16 mH</td>
<td>218 μH/Ω</td>
</tr>
<tr>
<td>IIA</td>
<td>2.1 μF</td>
<td>32 mH</td>
<td>436 μH/Ω</td>
</tr>
</tbody>
</table>

Module 9116B2
Term. 54-52; 51-52

<table>
<thead>
<tr>
<th>Group</th>
<th>Co</th>
<th>Lo</th>
<th>Lo/Ro</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIC</td>
<td>0.16 μF</td>
<td>4 mH</td>
<td>54 μH/Ω</td>
</tr>
<tr>
<td>IIB</td>
<td>1.13 μF</td>
<td>16 mH</td>
<td>218 μH/Ω</td>
</tr>
<tr>
<td>IIA</td>
<td>4.15 μF</td>
<td>32 mH</td>
<td>436 μH/Ω</td>
</tr>
</tbody>
</table>

Status relay, terminal (33,34)

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

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

Relay output, terminal (13,14)

Non hazardous area installation
Voltage max: 250 VAC / 30 VDC
Power max: 500 VA / 60 W
Current max: 2 A AC / 2A DC

Zone 2 installation:
Voltage max: 32 V AC / 32 VDC
Power max: 64 VA / 60 W
Current max: 2 A AC / 2 ADC

(terminal 11,12,13,14)
(terminal 31,32,33,34)
(terminal 91,92,93,94,95)
Um: 253 V max. 400 Hz
9116Bxx Installation:

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

Non Hazardous area
or Zone 2

-20 °C ≤ Ta ≤ +60°C

Status relay, terminal (33,34)
Non hazardous area installation
Voltage max: 125 VAC / 110 VDC
Power max: 62.5 VA / 32 W
Current max: 0.5 A AC / 0.3 ADC

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

Relay output, terminal (13,14)
Non hazardous area installation
Voltage max: 250 VAC / 30 VDC
Power max: 500 VA / 60 W
Current max: 2 A AC / 2 ADC

Zone 2 installation
Voltage max: 32 VAC / 32 VDC
Power max: 64 VA / 60 W
Current max: 2 A AC / 2 ADC

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

Module 9116B 1/2
Terminal 51-52

<table>
<thead>
<tr>
<th>Group</th>
<th>Co</th>
<th>Lo</th>
<th>Lo/ Ro</th>
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<tbody>
<tr>
<td>Ue</td>
<td>16.6 V</td>
<td>0.4 μF</td>
<td>100 mH</td>
</tr>
<tr>
<td>Ie</td>
<td>0.2 mA</td>
<td>2.3 μF</td>
<td>100 mH</td>
</tr>
<tr>
<td>Pe</td>
<td>0.8 mW</td>
<td>9.5 μF</td>
<td>100 mH</td>
</tr>
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</table>
9116Axx Installation:

Non Hazardous area or Zone 2

Status relay, terminal (33,34)
Non hazardous area installation
- Voltage max: 125 VAC / 110 VDC
- Power max: 62.5 VA / 32 W
- Current max: 0.5 A AC / 0.3 A DC

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

Relay output, terminal (13,14)
Non hazardous area installation
- Voltage max: 250 VAC / 30 VDC
- Power max: 500 VA / 60 W
- Current max: 2 A AC / 2 A DC

Zone 2 installation
- Voltage max: 32 V AC / 30 VDC
- Power max: 64 VA / 60 W
- Current max: 2 A AC / 2 A DC

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

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.

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 Installation drawing

For safe installation of 9116 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 10 ATEX 0053 X

Marking 9116Bxx:
- II (1) G [Ex ia Ga] IIC/IIB/IIA
- II 3 G Ex nA nC IIC T4 Gc
- II (1) D [Ex ia Da] IIIC
- I (M1) [Ex ia Ma] I

Marking 9116Axx:
- II 3G Ex nA nC IIC T4 Gc

Standards

9116Bxx Installation:
- Hazardous area
- Zone 0, 1, 2, 20, 21, 22

Non Hazardous area or Zone 2

Status relay, terminal (33,34)

Non hazardous area installation
- Voltage max: 125 VAC / 110 VDC
- Power max: 62.5 VA / 32 W
- Current max: 0.5 A AC / 0.3 ADC

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

Relay output, terminal (13,14)

Non hazardous area installation
- Voltage max: 250 VAC / 30 VDC
- Power max: 500 VA / 60 W
- Current max: 2 A AC / 2 ADC

Zone 2 installation
- Voltage max: 32 V AC / 30 VDC
- Power max: 64 VA / 60 W
- Current max: 2 A AC / 2 ADC

(terminal 11,12,13,14)
(terminal 31,32,33,34)
(terminal 91,92,93,94,95)

*U_m*: 253 V; max 400 Hz
<table>
<thead>
<tr>
<th>Module 9116B1</th>
<th>Module 9116B2</th>
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<tbody>
<tr>
<td>Terminal 51-52, 51-53</td>
<td>Terminal 51-52, 51-53</td>
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<tr>
<td>Ul</td>
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<tr>
<td>Ii</td>
<td>120 mA</td>
</tr>
<tr>
<td>Pi</td>
<td>900 mW</td>
</tr>
<tr>
<td>Ci</td>
<td>3 nF</td>
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<tr>
<td>Li</td>
<td>1 μH</td>
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<th>Module 9116B1</th>
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<td>Terminal 51-54, 52-54</td>
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<td>Group</td>
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<td>---------------</td>
<td>---------------</td>
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<tr>
<td>Uo</td>
<td>28 V</td>
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<tr>
<td>Io</td>
<td>93 mA</td>
</tr>
<tr>
<td>Po</td>
<td>650 mW</td>
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<tr>
<td>Group</td>
<td>Co</td>
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<td>Uo</td>
<td>28 V</td>
</tr>
<tr>
<td>Io</td>
<td>93 mA</td>
</tr>
<tr>
<td>Po</td>
<td>650 mW</td>
</tr>
</tbody>
</table>

### Installation notes:

For group I (mines), the parameters for group IIA apply.

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 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 KEMA 07ATEX0152 X) is allowed.
**9116Bxx Installation:**

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

Non Hazardous area or Zone 2

\[-20 \, ^\circ\text{C} \leq T_a \leq +60\, ^\circ\text{C}\]

**Status relay, terminal (33,34)**

**Non hazardous area installation**
Voltage max: 125 VAC / 110 VDC
Power max: 62.5 VA / 32 W
Current max: 0.5 A AC / 0.3 ADC

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

**Relay output, terminal (13,14)**

**Non hazardous area installation**
Voltage max: 250 VAC / 30 VDC
Power max: 500 VA / 60 W
Current max: 2 A AC / 2 ADC

**Zone 2 installation**
Voltage max: 32 V AC / 30 VDC
Power max: 64 VA / 60 W
Current max: 2 A AC / 2 ADC

**Module 9116B1 1/2**
Term. 54-52

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<tr>
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<tr>
<td>Po</td>
<td>650 mW</td>
<td>2.1 μF</td>
<td>32 mH</td>
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**Module 9116B2**
Term. 54-52; 51-52

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<tr>
<td>Uo</td>
<td>21.4 V</td>
<td>0.16 μF</td>
<td>4 mH</td>
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<tr>
<td>Io</td>
<td>93 mA</td>
<td>1.13 μF</td>
<td>16 mH</td>
</tr>
<tr>
<td>Po</td>
<td>650 mW</td>
<td>4.15 μF</td>
<td>32 mH</td>
</tr>
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</table>
9116Bxx Installation:

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

Non Hazardous area 
or Zone 2

-20 °C ≤ Ta ≤ +60°C

Status relay, terminal (33,34)
Non hazardous area installation
Voltage max: 250 VAC / 110 VDC
Power max: 62.5 VA / 32 W
Current max: 0.5 A AC / 0.3 ADC

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

Relay output, terminal (13,14)
Non hazardous area installation
Voltage max: 250 VAC / 30 VDC
Power max: 500 VA / 60 W
Current max: 2 A AC / 2 ADC

Zone 2 installation
Voltage max: 32 V AC / 30 VDC
Power max: 64 VA / 60 W
Current max: 2 A AC / 2 ADC

(terminal 11,12,13,14)
(terminal 31,32,33,34)
(terminal 91,92,93,94,95)

Um: 253 V max. 400 Hz

Module 9116B 1/2
Terminal 51-52
| Li | 30 V |
| li | 120 mA |
| Pi | 900 mW |
| Qi | 3 nF |
| Li | 2 μH |

<table>
<thead>
<tr>
<th>Module 9116B 1/2 Term. 52-51, 51-52</th>
<th>Group</th>
<th>Co</th>
<th>Lo</th>
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<tr>
<td>Uo</td>
<td>16.6 V</td>
<td>IIC</td>
<td>0.4 μF</td>
<td>100 mH</td>
</tr>
<tr>
<td>Io</td>
<td>0.2 mA</td>
<td>IIB</td>
<td>2.3 μF</td>
<td>100 mH</td>
</tr>
<tr>
<td>Po</td>
<td>0.8 mW</td>
<td>II A</td>
<td>9.5 μF</td>
<td>100 mH</td>
</tr>
</tbody>
</table>
9116Axx Installation:

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.

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 9116B 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.

c-FM-us Certificate .................................................. 3038267

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 Class I, Zone 0/1 Group IIC, [Ex ia] IIC

Simple Apparatus or Intrinsic safe apparatus with entity parameters:

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

-20 \leq T_a \leq +60^\circ C

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

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

Relay output, terminal (13,14)
Non hazardous area installation
Voltage max: 250 VAC / 30 VDC
Power max: 500 VA / 60 W
Current max: 2 A AC / 2 ADC

Zone 2 installation
Voltage max: 32 VAC / 30 VDC
Power max: 64 VA / 60 W
Current max: 2 A AC / 2 ADC

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

Revision date: 2012-06-08
Version Revision: V6 R0
Prepared by: PB
Page: 1/4
### Module 9116B1

<table>
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<tbody>
<tr>
<td>Terminal 51-52, 51-53</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Uo, Voc</td>
<td>28 V</td>
<td>IIC or AB</td>
<td>80 nF</td>
</tr>
<tr>
<td>Io, Isc</td>
<td>93 mA</td>
<td>IIB or C,E,F</td>
<td>640 nF</td>
</tr>
<tr>
<td>Po</td>
<td>650 mW</td>
<td>IIA or D,G</td>
<td>2.1 μF</td>
</tr>
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<td>Terminal 51-53</td>
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<tr>
<td>Uo, Voc</td>
<td>8.3 V</td>
<td>IIC or AB</td>
<td>7 μF</td>
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<tr>
<td>Io, Isc</td>
<td>0.2 mA</td>
<td>IIB or C,E,F</td>
<td>73 μF</td>
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<tr>
<td>Po</td>
<td>0.4 mW</td>
<td>IIA or D,G</td>
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<td>8.3 V</td>
<td>IIC or AB</td>
<td>7 μF</td>
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<tr>
<td>Io, Isc</td>
<td>13.1 mA</td>
<td>IIB or C,E,F</td>
<td>73 μF</td>
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<td>Po</td>
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### Module 9116B2

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<tr>
<td>Uo, Voc</td>
<td>21.4 V</td>
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<td>0.16 μF</td>
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<td>Io, Isc</td>
<td>93 mA</td>
<td>IIB or C,E,F</td>
<td>1.13 μF</td>
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<tr>
<td>Po</td>
<td>650 mW</td>
<td>IIA or D,G</td>
<td>4.15 μF</td>
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<tr>
<td>Uo, Voc</td>
<td>8.3 V</td>
<td>IIC or AB</td>
<td>7 μF</td>
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<td>Po</td>
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<td>IIA or D,G</td>
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<td>73 μF</td>
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<tr>
<td>Po</td>
<td>27.3 mW</td>
<td>IIA or D,G</td>
<td>1000 μF</td>
</tr>
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</table>

### Installation notes:

The installation and wiring shall be in accordance with the Canadian Electrical Code for Canada and National Electrical Code NFPA 70, Article 500 or 505 for installation in USA.

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.

Install in pollution degree 2 or better, overvoltage category I or II.

The module must be installed in an enclosure suitable for the environment for which it is used.

In Class I, Division 2 /Zone 2 installations, the subject equipment shall be mounted within a tool-secured enclosure which is capable of accepting one or more of the Class I, Division 2 wiring methods specified in the National Electrical Code for USA or the Canadian Electrical Code for Canada.

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.

**Warning:** Do not mount or remove modules from the Power Rail when 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 Class I, Zone 0/1 Group IIC, [Ex ia] IIC

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

#### Status relay, terminal (33,34)
**Non hazardous area installation**
- Voltage max: 125 VAC / 110 VDC
- Power max: 62.5 VA / 32 W
- Current max: 0.5 A AC / 0.3 ADC

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

#### Relay output, terminal (13,14)
**Non hazardous area installation**
- Voltage max: 250 VAC / 30 VDC
- Power max: 500 VA / 60 W
- Current max: 2 A AC / 2 ADC

#### Zone 2 installation:
- Voltage max: 32 VAC / 32 VDC
- Power max: 64 VA / 60 W
- Current max: 2 A AC / 2 ADC

---

**Module 9116B 1/2**
- **Terminal 52-54**
- **Ui, Vmax**: 30 V
- **Ii, Imax**: 120 mA
- **Pi**: 900 mW
- **Ci**: 3 nF
- **Li**: 2 μH

---

**Module 9116B1**
- **Terminal 52-54**

<table>
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<tr>
<th>Group</th>
<th>Co</th>
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<tr>
<td>Uo, Voc</td>
<td>28 V</td>
<td>80 nF</td>
<td>4 mH</td>
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<tr>
<td>lo, Isc</td>
<td>93 mA</td>
<td>640 nF</td>
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**Module 9116B2**
- **Terminal 52-54**

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<td>Po</td>
<td>650 mW</td>
<td>4.15 μF</td>
<td>32 mH</td>
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**Unclassified Location or**

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

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**Revision date:** 2012-06-08  
**Version Revision:** V6 R0  
**Prepared by:** PB  
**Page:** 3/4
Hazardous Classified Location
Class I/II/III, Division 1, Group A,B,C,D,E,F,G or Class I, Zone 0/1 Group IIIC, [AEx ia] IIC or Class I, Zone 0/1 Group IIIC, [Ex ia] IIC

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

-20 °C ≤ Ta ≤ +60°C

Status relay, terminal (33,34)
Unclassified location installation:
Voltage max: 125 VAC / 110 VDC
Power max: 62.5 VA / 32 W
Current max: 0.5 A AC / 0.3 ADC

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

Relay output, terminal (13,14)
Unclassified location installation:
Voltage max: 250 VAC / 30 VDC
Power max: 500 VA / 60 W
Current max: 2 A AC / 2 ADC

Zone 2 installation:
Voltage max: 32 VAC / 32 VDC
Power max: 64 VA / 60 W
Current max: 2 A AC / 2 ADC

Module 9116B 1/2
Terminal 51-52
Ui, Vmax 30 V
Ii, Imax 120 mA
Pi 900 mW
Ci 3 nF
Li 2 μH

Module 9116B 1/2
Terminals 51-52
Uo, Voc 16.6 V
Io, Isc 0.2 mA
Po 0.8 mW

Group Co Lo Lo/Ro
IIC or A,B 0.4 μF 100 mH 25 mH/Ω
IIB or C,E,F 2.3 μF 100 mH 100 mH/Ω
IIA or D,G 9.5 μF 100 mH 200 mH/Ω

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

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

-20 °C ≤ Ta ≤ +60°C

Status relay, terminal (33,34)
Unclassified location installation:
Voltage max: 125 VAC / 110 VDC
Power max: 62.5 VA / 32 W
Current max: 0.5 A AC / 0.3 ADC

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

Relay output, terminal (13,14)
Unclassified location installation:
Voltage max: 250 VAC / 30 VDC
Power max: 500 VA / 60 W
Current max: 2 A AC / 2 ADC

Zone 2 installation:
Voltage max: 32 VAC / 32 VDC
Power max: 64 VA / 32 W
Current max: 2 A AC / 2 ADC

Module 9116B 1/2
Terminal 51-52
Ui, Vmax 30 V
Ii, Imax 120 mA
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IIC or A,B 0.4 μF 100 mH 25 mH/Ω
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IIA or D,G 9.5 μF 100 mH 200 mH/Ω

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Module 9116B 1/2
Terminal 51-52
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Ii, Imax 120 mA
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Module 9116B 1/2
Terminals 51-52
Uo, Voc 16.6 V
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Group Co Lo Lo/Ro
IIC or A,B 0.4 μF 100 mH 25 mH/Ω
IIB or C,E,F 2.3 μF 100 mH 100 mH/Ω
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-20 °C ≤ Ta ≤ +60°C

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Relay output, terminal (13,14)
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Voltage max: 250 VAC / 30 VDC
Power max: 500 VA / 60 W
Current max: 2 A AC / 2 ADC

Zone 2 installation:
Voltage max: 32 VAC / 32 VDC
Power max: 64 VA / 32 W
Current max: 2 A AC / 2 ADC

Module 9116B 1/2
Terminal 51-52
Ui, Vmax 30 V
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Module 9116B 1/2
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Group Co Lo Lo/Ro
IIC or A,B 0.4 μF 100 mH 25 mH/Ω
IIB or C,E,F 2.3 μF 100 mH 100 mH/Ω
IIA or D,G 9.5 μF 100 mH 200 mH/Ω
INMETRO Desenhos para Instalação

Para instalação segura do 9116B 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

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 16.0004X

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


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

Área de não classificada
ou Zona 2

-20 ≤Ta ≤ +60ºC

Relê de estado, terminais (33,34)

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

Instalação em Zona 2:
Voltagem máx.: 32 VAC/ 32 VDC
Potência máx.: 16 VA / 32 W

Relé de estado, terminais (13,14)

Instalação em área não classificada:
Voltagem máx.: 250 VAC / 30 VDC
Potência máx.: 500 VA / 60 W
Corrente máx.: 2 A AC / 2 ADC

Instalação em Zona 2:
Voltagem máx.: 32 VAC / 30 VDC
Potência máx.: 64 VA / 60 W
Corrente máx.: 2 A AC / 2 ADC

(terminais 11,12,13,14)
(terminais 31,32,33,34)
(terminais 91,92,93,94,95)
Um: 253 V; máx. 400 Hz
Notas de instalação:

Para o grupo I (minas), aplicam-se os parâmetros do grupo IIA.

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 de gás explosivo estiver presente.

Desligue a alimentação antes da manutenção.

A fiação de terminais sem uso não é permitida.

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

Área de não classificada
ou Zona 2

-20 °C ≤ Ta ≤ +60°c

Rele de estado, terminais (33,34)
Instalação em área não classificada:
Voltagem máx.: 125 VAC / 110 VDC
Potência máx.: 62,5 VA / 32 W
Corrente máx.: 0,5 A AC / 0,3 ADC

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

Rele de estado, terminais (13,14)
Instalação em área não classificada:
Voltagem máx.: 250 VAC / 30 VDC
Potência máx.: 500 VA / 60 W
Corrente máx.: 2 A AC / 2 A DC

Instalação em Zona 2:
Voltagem máx.: 32 V AC / 32 VDC
Potência máx.: 64 VA / 60 W
Corrente máx.: 2 A AC / 2 ADC

(terminais 11,12,13,14)
(terminais 31,32,33,34)
(terminais 91,92,93,94,95)
Um. 253 V máx. 400 Hz

<table>
<thead>
<tr>
<th>Terminal 54-52</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1</td>
</tr>
<tr>
<td>Ii</td>
</tr>
<tr>
<td>Pi</td>
</tr>
<tr>
<td>Qi</td>
</tr>
<tr>
<td>Li</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module 9116B1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term. 54-52; 51-52</td>
</tr>
<tr>
<td>U0</td>
</tr>
<tr>
<td>I0</td>
</tr>
<tr>
<td>P0</td>
</tr>
<tr>
<td>Group</td>
</tr>
<tr>
<td>IIC</td>
</tr>
<tr>
<td>IIB</td>
</tr>
<tr>
<td>IIA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module 9116B2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term. 54-52; 51-52</td>
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<tr>
<td>U0</td>
</tr>
<tr>
<td>I0</td>
</tr>
<tr>
<td>P0</td>
</tr>
<tr>
<td>Group</td>
</tr>
<tr>
<td>IIC</td>
</tr>
<tr>
<td>IIB</td>
</tr>
<tr>
<td>IIA</td>
</tr>
</tbody>
</table>
Área de classificada
Zona 0, 1, 2, 20, 21, 22

Área de não classificada
ou Zona 2

-20 ≤ Ta ≤ +60°C

Rele de estado, terminais (33,34)
Instalação em área não classificada:
Voltagem máx.: 125 VAC / 110 VDC
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Corrente máx.: 0,5 A AC / 0,3 ADC

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

Rele de estado, terminais (13,14)
Instalação em área não classificada:
Voltagem máx.: 250 VAC / 30 VDC
Potência máx.: 500 VA / 60 W
Corrente máx.: 2 A AC / 2 ADC

Instalação em Zona 2:
Voltagem máx.: 32 VAC / 32 VDC
Potência máx.: 64 VA / 60 W
Corrente máx.: 2 A AC / 2 ADC

(terminais 11,12,13,14)
(terminais 31,32,33,34)
(terminais 91,92,93,94,95)
Um: 253 V máx. 400 Hz

<table>
<thead>
<tr>
<th>Module 9116B 1/2</th>
<th>Terminal 51-52</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uo</td>
<td>30 V</td>
</tr>
<tr>
<td>Ii</td>
<td>120 mA</td>
</tr>
<tr>
<td>Pi</td>
<td>900 mW</td>
</tr>
<tr>
<td>Ci</td>
<td>3 nF</td>
</tr>
<tr>
<td>Li</td>
<td>2 μH</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module 9116B 1/2</th>
<th>Term. 52-51, 51-52</th>
<th>Group</th>
<th>Co</th>
<th>Lo</th>
<th>Lo/Ro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uo</td>
<td>16.6 V</td>
<td>IIIC</td>
<td>0.4 μF</td>
<td>100 mH</td>
<td>25mH/Ω</td>
</tr>
<tr>
<td>Io</td>
<td>0.2 mA</td>
<td>IIIB</td>
<td>2.3 μF</td>
<td>100 mH</td>
<td>100mH/Ω</td>
</tr>
<tr>
<td>Po</td>
<td>0.8 mW</td>
<td>IIIB</td>
<td>9.5 μF</td>
<td>100 mH</td>
<td>200mH/Ω</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>106</td>
<td>1722</td>
<td>Specifications for max. required power added New ATEX, IECEx and INMETRO certificates and installation drawings</td>
</tr>
</tbody>
</table>
SAFETY MANUAL

UNIVERSAL CONVERTER
9116

This safety manual is valid for the following product versions:
9116-003
9116-002
9116-001
1 Observed standards

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC 61508</td>
<td>Functional Safety of electrical / electronic / programmable electronic</td>
</tr>
<tr>
<td></td>
<td>safety-related systems</td>
</tr>
<tr>
<td></td>
<td>safety-related systems</td>
</tr>
<tr>
<td>IEC 61326-3-1:2008</td>
<td>Immunity requirements for safety-related systems</td>
</tr>
</tbody>
</table>

2 Acronyms and abbreviations

<table>
<thead>
<tr>
<th>Acronym / Abbreviation</th>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Element</td>
<td></td>
<td>Term defined by IEC 61508 as “part of a subsystem comprising a single component or any group of components that performs one or more element safety functions”</td>
</tr>
<tr>
<td>PFD</td>
<td>Probability of Failure on Demand</td>
<td>This is the likelihood of dangerous safety function failures occurring on demand.</td>
</tr>
<tr>
<td>PFH</td>
<td>Probability of dangerous Failure per Hour</td>
<td>The term “Probability” is misleading, as IEC 61508 defines a Rate.</td>
</tr>
<tr>
<td>SFF</td>
<td>Safe Failure Fraction</td>
<td>Safe Failure Fraction summarises the fraction of failures which lead to a safe state and the fraction of failures which will be detected by diagnostic measures and lead to a defined safety action.</td>
</tr>
<tr>
<td>SIF</td>
<td>Safety Integrity Function</td>
<td>Function that provides fault detection (to ensure the necessary safety integrity for the safety functions)</td>
</tr>
<tr>
<td>SIL</td>
<td>Safety Integrity Level</td>
<td>The international standard IEC 61508 specifies four discrete safety integrity levels (SIL 1 to SIL 4). Each level corresponds to a specific probability range regarding the failure of a safety function.</td>
</tr>
</tbody>
</table>

3 Purpose of the product

Conversion and scaling of temperature (Pt, Ni and TC), voltage, potentiometer, linear resistance and current signals from hazardous area.

The device can be mounted in the safe area and in zone 2 / div. 2 and receive signals from zone 0, 1, 2, 20, 21 and 22 / Class I/II/III, Div. 1, Gr. A-G.

Error events, including cable faults, are monitored and signalled via the individual status relay and/or a collective electronic signal via the power rail.

The 9116 has been designed, developed and certified for use in SIL 2 applications according to the requirements of IEC 61508.
4 Assumptions and restrictions for use of the product

4.1 Basic safety specifications
Operational temperature range............. -20...+60°C
Storage temperature range.................. -20...+85°C
Power supply type, min....................... Double or reinforced
Supply voltage............................... 19.2...31.2 VDC
Relay output pulse length, min............. 70 ms
Loop supply ..................................... >16.5 V @ 20 mA
External loop supply voltage.............. 5...26 VDC + external drop
(Passive output)
Mounting area............................ Zone 2 / Division 2 or safe area
Mounting environment...................... Pollution degree 2 or better

4.2 Safety accuracy
The analogue output and relay output corresponds to the applied input within the safety accuracy.
Safety accuracy............................. ±2%

4.2.1 Minimum span
For temperature measurements, the selected range (OUT.HI - OUT.LO), and for linear resistance measurements the selected range (R 100% - R 0%), shall be larger or equal to the values below:

<table>
<thead>
<tr>
<th>Input type</th>
<th>Minimum span for safety accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt100, Pt200, Pt1000</td>
<td>28°C</td>
</tr>
<tr>
<td>Pt500, Ni100, Ni120, Ni1000</td>
<td>43°C</td>
</tr>
<tr>
<td>Pt50, Pt400, Ni50</td>
<td>57°C</td>
</tr>
<tr>
<td>Pt250, Pt300</td>
<td>85°C</td>
</tr>
<tr>
<td>Pt20</td>
<td>142°C</td>
</tr>
<tr>
<td>Pt10</td>
<td>283°C</td>
</tr>
<tr>
<td>TC: E, J, K, L, N, T, U</td>
<td>91°C</td>
</tr>
<tr>
<td>Linear resistance, R 100% ≤ 800 Ω</td>
<td>53 Ω</td>
</tr>
<tr>
<td>Linear resistance, R 100% &gt; 800 Ω</td>
<td>667 Ω</td>
</tr>
</tbody>
</table>

4.2.2 Range limitations
TC type B shall not be used below +400°C

4.3 Associated equipment

4.3.1 RTD or linear resistance sensor wiring
If a 2-wire or a 3-wire connection for RTD or linear resistance is selected,
the end user must ensure that the applied sensor wiring does not introduce failures exceeding the requirements for the safety application.

4.3.2 Sensor errors
If the loop supply is used to supply a current input signal, the sensor error indication shall be enabled on the safety output(s).
If sensor error detection is disabled, or if any of the configurations below are used, the user must ensure that the applied sensor, including wiring, has a failure rate that qualifies it for the safety application without sensor error detection enabled:
- Input is current, 0-20 mA
- Input is voltage
- Input is linear resistance and $R \_0\% < 18 \Omega$ (no short circuit detection)
- Input it Pt10, Pt20 or Pt50 (no short circuit detection)
- Input is potentiometer (no short circuit detection on arm)

4.3.3 Process calibration
If a process calibration is taken into SIL-mode operation, it is mandatory that the accuracy of the device (and sensor, if applicable) are tested by the end user after SIL-mode is entered, in addition to the normal functional test. Refer to section 14 - Safe parameterisation - user responsibility.

4.3.4 Analogue output
The connected safety PLC shall be able to detect and handle the fault indications on the analogue output of the 9116 converter by having a NAMUR NE43-compliant current input.

4.3.5 Relay output
The relay output shall only be connected to equipment which has a current limiting function of 2 A.

4.4 Failure rates
The basic failure rates from the Siemens standard SN 29500 are used as the failure rate database.
Failure rates are constant, wear-out mechanisms are not included.
External power supply failure rates are not included.

4.5 Safe parameterisation
The user is responsible for verifying the correctness of the configuration parameters. (See section 14 Safe parameterisation - user responsibility).
Manual override may not be used for safety applications.

4.6 Installation in hazardous areas
The IECEx Installation drawing, ATEX Installation drawing and FM Installation drawing shall be followed if the products are installed in hazardous areas.

5 Functional specification of the safety function
Conversion of current signals (0...20 mA or 4...20 mA), voltage signals, potentiometer, linear resistance, RTD sensor signals or thermocouple sensor signals from hazardous areas to a 4...20 mA current output signal, and/or an output relay, within specified accuracy.
For RTD and linear resistance input sensors, cable resistances of up to 50 Ω per wire can be compensated if 3- or 4-wire connection is configured.

For thermocouple sensors, cold junction temperature errors can be compensated, either by an internally mounted temperature sensor, or by an accessory connector with a built-in temperature sensor. The selection of CJC measurement must be done and verified by the end user.

6 Functional specification of the non-safety functions

The status relay (terminal 33 and 34), error signal on power rail (terminal 91) and LED outputs are not suitable for use in any Safety Instrumented Function.

7 Safety parameters

<table>
<thead>
<tr>
<th>RTD, TC, LinR and Potentiometer input, Current output</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of dangerous Failure per Hour (PFH)</td>
<td>4.30E-08</td>
</tr>
<tr>
<td>Probability of failure on demand (PFD) - 1 year proof test interval</td>
<td>2.82E-04</td>
</tr>
<tr>
<td>Proof test interval (10% of loop PFD)</td>
<td>4 years</td>
</tr>
<tr>
<td>Safe Failure Fraction</td>
<td>93%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RTD, TC, LinR and Potentiometer input, Relay output</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of dangerous Failure per Hour (PFH)</td>
<td>6.20E-08</td>
</tr>
<tr>
<td>Probability of failure on demand (PFD) - 1 year proof test interval</td>
<td>4.03E-04</td>
</tr>
<tr>
<td>Proof test interval (10% of loop PFD)</td>
<td>3 years</td>
</tr>
<tr>
<td>Safe Failure Fraction</td>
<td>90%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage input, Current output</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of dangerous Failure per Hour (PFH)</td>
<td>5.60E-08</td>
</tr>
<tr>
<td>Probability of failure on demand (PFD) - 1 year proof test interval</td>
<td>3.66E-04</td>
</tr>
<tr>
<td>Proof test interval (10% of loop PFD)</td>
<td>3 years</td>
</tr>
<tr>
<td>Safe Failure Fraction</td>
<td>93%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage input, Relay output</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of dangerous Failure per Hour (PFH)</td>
<td>7.60E-08</td>
</tr>
<tr>
<td>Probability of failure on demand (PFD) - 1 year proof test interval</td>
<td>4.89E-04</td>
</tr>
<tr>
<td>Proof test interval (10% of loop PFD)</td>
<td>2 years</td>
</tr>
<tr>
<td>Safe Failure Fraction</td>
<td>91%</td>
</tr>
</tbody>
</table>
### Current input, Current output

| Probability of dangerous Failure per Hour (PFH) | 4.20E-08 |
| Probability of failure on demand (PFD) - 1 year proof test interval | 2.77E-04 |
| Proof test interval (10% of loop PFD) | 5 years |
| Safe Failure Fraction | 95% |

### Current input, Relay output

| Probability of dangerous Failure per Hour (PFH) | 6.20E-08 |
| Probability of failure on demand (PFD) - 1 year proof test interval | 4.00E-04 |
| Proof test interval (10% of loop PFD) | 3 years |
| Safe Failure Fraction | 93% |

### Common Safety Parameters

| Demand response time | Signal input: < 0.5 seconds Potentiometer and linear resistance input < 0.65 seconds Temperature input: < 1.1 seconds |
| Demand mode | High |
| Demand rate | 3000 seconds |
| Mean Time To Repair (MTTR) | 24 hours |
| Diagnostic test interval | 30 seconds |
| Hardware Fault Tolerance (HFT) | 0 |
| Component Type | B |
| SIL capability | SIL 2 |
| Description of the “Safe State”, analogue output | Output ≤ 3.6 mA or Output ≥ 21 mA |
| Description of the “Safe State”, relay output | Contact open (relay de-energized) |
| Relay lifetime (Note2) | 100 000 times |

Note1: The 9116 contains no lifetime limiting components, therefore the PFH figures are valid for up to 12 years, according to IEC 61508.

Note2: The user must calculate the product lifetime with regard to the relay lifetime.

### 8 Hardware and software configuration

All configurations of software and hardware versions are fixed from factory, and cannot be changed by end-user or reseller.

This manual only covers products labelled with the product version (or range of versions) specified on the front page.
### Failure category

#### Failure rates (1/h) for RTD, TC, LinR and Potentiometer input, Current output

<table>
<thead>
<tr>
<th>Condition</th>
<th>Rate (1/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fail Safe Detected</td>
<td>0.000E-0</td>
</tr>
<tr>
<td>Fail Safe Undetected</td>
<td>2.78E-07</td>
</tr>
<tr>
<td>Fail Dangerous Detected</td>
<td>3.52E-07</td>
</tr>
<tr>
<td>Fail Dangerous Undetected</td>
<td>4.30E-08</td>
</tr>
</tbody>
</table>

#### Failure rates (1/h) for RTD, TC, LinR and Potentiometer input, Relay output

<table>
<thead>
<tr>
<th>Condition</th>
<th>Rate (1/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fail Safe Detected</td>
<td>0.000E-0</td>
</tr>
<tr>
<td>Fail Safe Undetected</td>
<td>3.59E-07</td>
</tr>
<tr>
<td>Fail Dangerous Detected</td>
<td>2.30E-07</td>
</tr>
<tr>
<td>Fail Dangerous Undetected</td>
<td>6.20E-08</td>
</tr>
</tbody>
</table>

#### Failure rates (1/h) for Voltage input, Current output

<table>
<thead>
<tr>
<th>Condition</th>
<th>Rate (1/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fail Safe Detected</td>
<td>0.000E-0</td>
</tr>
<tr>
<td>Fail Safe Undetected</td>
<td>3.95E-07</td>
</tr>
<tr>
<td>Fail Dangerous Detected</td>
<td>4.79E-07</td>
</tr>
<tr>
<td>Fail Dangerous Undetected</td>
<td>5.60E-08</td>
</tr>
</tbody>
</table>

#### Failure rates (1/h) for Voltage input, Relay output

<table>
<thead>
<tr>
<th>Condition</th>
<th>Rate (1/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fail Safe Detected</td>
<td>0.000E-0</td>
</tr>
<tr>
<td>Fail Safe Undetected</td>
<td>4.80E-07</td>
</tr>
<tr>
<td>Fail Dangerous Detected</td>
<td>3.53E-07</td>
</tr>
<tr>
<td>Fail Dangerous Undetected</td>
<td>7.60E-08</td>
</tr>
</tbody>
</table>

#### Failure rates (1/h) for Current input, Current output

<table>
<thead>
<tr>
<th>Condition</th>
<th>Rate (1/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fail Safe Detected</td>
<td>0.000E-0</td>
</tr>
<tr>
<td>Fail Safe Undetected</td>
<td>4.44E-07</td>
</tr>
<tr>
<td>Fail Dangerous Detected</td>
<td>5.54E-07</td>
</tr>
<tr>
<td>Fail Dangerous Undetected</td>
<td>4.20E-08</td>
</tr>
</tbody>
</table>

#### Failure rates (1/h) for Current input, Relay output

<table>
<thead>
<tr>
<th>Condition</th>
<th>Rate (1/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fail Safe Detected</td>
<td>0.000E-0</td>
</tr>
<tr>
<td>Fail Safe Undetected</td>
<td>6.36E-07</td>
</tr>
<tr>
<td>Fail Dangerous Detected</td>
<td>3.20E-07</td>
</tr>
<tr>
<td>Fail Dangerous Undetected</td>
<td>6.20E-08</td>
</tr>
</tbody>
</table>
10 Periodic proof test procedure

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bypass the safety PLC or take other appropriate action to avoid a false trip</td>
</tr>
<tr>
<td>2</td>
<td>Connect a simulator identical to the input setup</td>
</tr>
<tr>
<td>3</td>
<td>Apply input value corresponding to 0/100% output range</td>
</tr>
<tr>
<td>4</td>
<td>Observe whether the outputs acts as expected</td>
</tr>
<tr>
<td>5</td>
<td>Restore the input terminals to full operation</td>
</tr>
<tr>
<td>6</td>
<td>Remove the bypass from the safety PLC or otherwise restore normal operation</td>
</tr>
</tbody>
</table>

This test will detect approximately 95% of possible “du” (dangerous undetected) failures in the device. The proof test is equivalent to the functional test.

11 Procedures to repair or replace the product

Any failures that are detected and that compromise functional safety should be reported to the sales department at PR electronics A/S.

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

12 Maintenance

No maintenance required.

13 Documentation for routing diagram

The routing diagram is shown in section 16.2.

13.1 In general

When configuring the 9116, 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:

- \( \uparrow \) will increase the numerical value or choose the next parameter
- \( \downarrow \) will decrease the numerical value or choose the previous parameter
- \( \rightarrow \) will accept 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 \( \rightarrow \) 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.

13.2 Further explanations

13.2.1 Password protection

Access to the configuration 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. Default password 2008 allows access to all configuration menus. Password protection is mandatory in SIL applications.
13.2.2 Sensor/cable fault information via display front 4501
When the function is enabled and supported by selected input type, sensor or cable faults are displayed as SE.BR (sensor break) or SE.SH (cable short-circuited).
In case of sensor or cable fault the backlight flashes. This can be reset by pressing the \(\text{Esc}\) key. When the sensor or cable fault has been remedied, the device will return to normal operation.

13.3 Advanced functions (ADV.SET)
The device gives access to a number of advanced functions which can be reached by answering “Yes” to the point “ADV.SET”.

13.3.1 Memory (MEM)
In the memory menu a non-SIL configuration can be either saved or loaded from the local memory of the 4501 display unit. Choose SAVE to store the current configuration in the 4501 memory. Press LOAD to read a previously stored configuration in the 4501 memory and store it in the device. It is only possible to load a configuration stored from the same type of device and from the same version, or earlier.

13.3.2 Display setup (DISP)
The brightness contrast and the backlight can be adjusted. Tag number with 5 alphanumerics can be entered. Functional readout in line 3 of the display can be selected: choose between readout of output current or tag no. When selecting ”ALT” the readout alternates between output current and tag no.

13.3.3 Password (PASS)
Here you can choose a password between 0000 and 9999 in order to protect the device against unauthorised modifications to the configuration. The device is delivered default without password.

13.3.4 Language (LANG)
In this menu 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.

13.3.5 Process calibration (CAL)
A process calibration can be made by the end user. A known process signal must be applied for both low and high end of the input measurement range. The known input of the applied low end signal must be entered in the CAL.LO menu and confirmed by pressing OK before removing or changing the applied signal to the high end signal. The known input of the applied high end signal must be entered in the CAL.HI menu and confirmed by pressing OK before removing. It is possible to enable or disable the use of the latest process calibration.

13.3.6 Power rail (RAIL)
In this menu it can be chosen if sensor errors are transmitted to the central surveillance in the PR 9410 power control device.
13.3.7 Simulation (SIM)
It is possible to override the actual measured input signal by a simulated value. In the REL.SIM menu it is possible to simulate the relay state without affecting the analogue output, by pressing \( \wedge \). Leaving the simulation menus, or disconnecting the 4501 device, will disable the simulation mode and bring the output back to correspond to the actual measured value. Simulation is not possible in SIL-mode.

13.3.8 Safety integrity level (SIL)
See section 14 - Safe parameterisation - user responsibility

14 Safe parameterisation - user responsibility

14.1 Safety-related configuration parameters

14.1.1 Common parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
</table>
| IN.TYPE | Selected input type:  
TEMP = Temperature  
CURR = Current  
VOLT = Voltage  
LIN.R = Linear resistance  
POTM = Potentiometer |
| I.RANGE | Selected fixed input range for current measurements (for IN.TYPE = CURR):  
0_20 = 0...20 mA (no sensor error detection!)  
4_20 = 4...20 mA |
| V.RANGE | Selected fixed input range for voltage measurements (for IN.TYPE = VOLT) |
| SENSOR | Selected temperature sensor type (for IN.TYPE = TEMP):  
TC = Thermocouple  
Ni = Ni RTD sensor  
Pt = Pt RTD sensor |
<table>
<thead>
<tr>
<th>Pt.TYPE</th>
<th>Pt sensor type (for SENSOR = Pt):</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 = Pt10</td>
<td></td>
</tr>
<tr>
<td>20 = Pt20</td>
<td></td>
</tr>
<tr>
<td>50 = Pt50</td>
<td></td>
</tr>
<tr>
<td>100 = Pt100</td>
<td></td>
</tr>
<tr>
<td>200 = Pt200</td>
<td></td>
</tr>
<tr>
<td>250 = Pt250</td>
<td></td>
</tr>
<tr>
<td>300 = Pt300</td>
<td></td>
</tr>
<tr>
<td>400 = Pt400</td>
<td></td>
</tr>
<tr>
<td>500 = Pt500</td>
<td></td>
</tr>
<tr>
<td>1000 = Pt1000</td>
<td></td>
</tr>
</tbody>
</table>

(No short circuit detection!)

<table>
<thead>
<tr>
<th>Ni.TYPE</th>
<th>Ni sensor type (for SENSOR = Ni):</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 = Ni50</td>
<td></td>
</tr>
<tr>
<td>100 = Ni100</td>
<td></td>
</tr>
<tr>
<td>120 = Ni120</td>
<td></td>
</tr>
<tr>
<td>1000 = Ni1000</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TC.TYPE</th>
<th>Thermocouple type (for SENSOR = TC):</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC.B = Thermocouple type B</td>
<td></td>
</tr>
<tr>
<td>TC.E = Thermocouple type E</td>
<td></td>
</tr>
<tr>
<td>TC.J = Thermocouple type J</td>
<td></td>
</tr>
<tr>
<td>TC.K = Thermocouple type K</td>
<td></td>
</tr>
<tr>
<td>TC.L = Thermocouple type L</td>
<td></td>
</tr>
<tr>
<td>TC.N = Thermocouple type N</td>
<td></td>
</tr>
<tr>
<td>TC.R = Thermocouple type R</td>
<td></td>
</tr>
<tr>
<td>TC.S = Thermocouple type S</td>
<td></td>
</tr>
<tr>
<td>TC.T = Thermocouple type T</td>
<td></td>
</tr>
<tr>
<td>TC.U = Thermocouple type U</td>
<td></td>
</tr>
<tr>
<td>TC.W3 = Thermocouple type W3</td>
<td></td>
</tr>
<tr>
<td>TC.W5 = Thermocouple type W5</td>
<td></td>
</tr>
<tr>
<td>TC.Lr = Thermocouple type Lr</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CJC</th>
<th>CJC type for SENSOR = TC:</th>
</tr>
</thead>
<tbody>
<tr>
<td>INT = Internal CJC sensor measurement</td>
<td></td>
</tr>
<tr>
<td>CONN = CJC connector measurement (accessory)</td>
<td></td>
</tr>
</tbody>
</table>
| **CONNEC** | Selected sensor connection type for RTD or linear resistance measurements (for SENSOR = Ni or Pt or IN.TYPE = LIN.R):
2W = 2-wire
3W = 3-wire
4W = 4-wire
If 2W or 3W is selected, the end user must ensure that the applied sensor wiring does not introduce failures exceeding the requirements for the safety application. |
|---|---|
| **R 0%** | 0% input range for linear resistance measurements (for IN.TYPE = LIN.R).
This value must be < (R 100% - minimum span), refer to 4.2.1 |
| **R 100%** | 100% input range for linear resistance measurements (for IN.TYPE = LIN.R)
This value must be > (R 0% + minimum span), refer to 4.2.1 |
| **UNIT** | Selected temperature unit for IN.TYPE = TEMP
°C = degrees Celsius
°F = degrees Fahrenheit
For IN.TYPE ≠ TEMP selectable units refer to routing diagram |
| **DISP.LO** | 0% display value on 4501. Can be used as base for relay setpoints (for IN.TYPE ≠ TEMP) |
| **DISP.HI** | 100% display value on 4501. Can be used as base for relay setpoints (for IN.TYPE ≠ TEMP) |
| **NEW.PAS** | Password for protection of the device configuration from unauthorized access. Range from 0 to 9999. |
### 14.1.2 Parameters related to Relay Output

| REL.UNI | Relay Units (for IN.TYPE ≠ TEMP):  
|         | PERC = Relay setpoint in percent of input range.  
|         | DISP = Relay setpoints and hysteresis values relates to DISP.LO and DISP.HI (display units) |
| REL.FUN | Relay Function:  
|         | OFF (Note3) = Relay is always OFF  
|         | POW (Note3) = Relay is always ON if power is applied  
|         | ERR = Relay is activated when sensor error is present  
|         | WIND = Relay is activated when input signal is between SETP.LO and SETP.HI values  
|         | SETP = Relay is activated when input signal reaches SETP value |
| CONTAC. | Relay contact function:  
|         | N.C. =Normally Closed relay contact (for REL.FUN = SETP)  
|         | N.O. = Normally Open relay contact (for REL.FUN = SETP)  
|         | O.I.W = Relay contact Open Inside Window (for REL.FUN = WIND)  
|         | C.I.W = Relay contact Closed Inside Window (for REL.FUN = WIND) |
| SETP.   | Relay setpoint value in REL.UNI units for IN.TYPE ≠ TEMP or in UNIT for IN.TYPE = TEMP. (for REL.FUN = SETP) |
| SETP.LO | Relay setpoint low value in REL.UNI units for IN.TYPE ≠ TEMP or in UNIT for IN.TYPE = TEMP. (for REL.FUN = WIND) |
| SETP.HI | Relay setpoint high value in REL.UNI units for IN.TYPE ≠ TEMP or in UNIT for IN.TYPE = TEMP. (for REL.FUN = WIND) |
| ACT.DIR | Relay action for increasing or decreasing input signal  
|         | (for REL.FUN = SETP):  
|         | DECR = Relay activates when input signal ≤ SETP  
|         | INCR = Relay activates when input signal ≥ SETP |
| HYST   | Hysteresis value in REL.UNI units for IN.TYPE ≠ TEMP or in UNIT for IN.TYPE = TEMP. (for REL.FUN = SETP or WIND) |
### ERR.ACT

Relay sensor error action (for REL.FUN = SETP, WIND or ERR):
- Only relevant if IN.TYPE = TEMP, CURR and I.RANGE = 4-20, POTM or LIN.R and R 0% is ≥ 18.
- NONE (Note³) = Sensor error detection NOT enabled (Note⁴), relay state at sensor error is undefined. (NOT for REL.FUN = ERR)
- OPEN = Relay contact is open at sensor error
- CLOS = Relay contact is closed at sensor error
- HOLD (Note³) = Relay contact holds the state as before sensor error occurred. (NOT for REL.FUN = ERR)

### ON.DEL

Relay ON delay from SETP or SETP.LO/HI is crossed in units of seconds (for REL.FUN = SETP or WIND)

### OFF.DEL

Relay OFF delay from SETP +/- HYST or SETP.LO/HI +/- HYST is crossed in units of seconds (for REL.FUN = SETP or WIND)

---

**Note³:** Value not allowed if the relay is used in a safety application (EN.SIL = YES) and IN.TYPE = CUR and loop supply is used to supply a current input signal.

**Note⁴:** Error detection is enabled if OUT.ERR ≠ none, but relay state at sensor error is undefined.

### 14.1.3. Parameters related to analoge output

<table>
<thead>
<tr>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>O.RANGE</td>
<td>Fixed output range for current output:</td>
</tr>
<tr>
<td></td>
<td>0-20 = 0...20 mA</td>
</tr>
<tr>
<td></td>
<td>Value not allowed when EN.SIL = YES (Safety applications)</td>
</tr>
<tr>
<td></td>
<td>4-20 = 4...20 mA</td>
</tr>
<tr>
<td></td>
<td>20-0 = 20...0 mA</td>
</tr>
<tr>
<td></td>
<td>Value not allowed when EN.SIL = YES (Safety applications)</td>
</tr>
<tr>
<td></td>
<td>20-4 = 20...4 mA</td>
</tr>
</tbody>
</table>

| OUT.ERR| Fixed output value on detected sensor error:                               |
|        | NONE (Note⁵) = Sensor error detection NOT enabled (Note⁶), output at sensor error is undefined. |
|        | The end user must ensure that the applied sensor including wiring has a failure rate qualifying it for the safety application without the detection enabled. |
|        | 0 mA = Output is 0 mA at sensor error                                    |
|        | 3.5 mA = Output is 3.5 mA at sensor error (NE43 downscale)               |
|        | 23 mA = Output is 23 mA at sensor error (NE4 Upscale)                    |
OUT.LO | Selected temperature value for 0% output for IN.TYPE = TEMP in units defined by the UNIT parameter (°C or °F). Range is defined by the selected temperature sensor (SENSOR and TC.TYPE, Ni.TYPE or Pt.TYPE), but value must be less than OUT.HI - minimum span.

OUT.HI | Selected temperature value for 100% output for IN.TYPE = TEMP in units defined by the UNIT parameter (°C or °F). Range is defined by the selected temperature sensor (SENSOR and TC.TYPE, Ni.TYPE or Pt.TYPE), but must be larger than OUT.LO + minimum span.

RESP | Analogue output response time in seconds. Range is 0.0 to 60.0 seconds.

USE.CAL | Use the applied process calibration values:
        NO = The last performed process calibration is not used. The channel operates with accuracy as specified.
        YES = The last performed process calibration is in operation. The required accuracy must be verified by user.

Note⁵: Value not allowed if analogue output is used in a safety application (EN.SIL = YES) and IN.TYPE = CURR and loop supply is used to supply a current input signal.

Note⁶: Error detection is enabled if ERR.ACT ≠ NONE, but analogue output value is undefined.

14.2. Verification procedure

The verification is done using the display / programming front PR 4501 and following the procedure described below.
### 14.2.1 If no password is set

<table>
<thead>
<tr>
<th>Action</th>
<th>Display shows</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Press OK</td>
<td>ADV.SET</td>
</tr>
<tr>
<td>2 Set (ADV.SET) to Yes and press OK</td>
<td>SETUP</td>
</tr>
<tr>
<td>3 Set SETUP to SIL and press OK</td>
<td>EN.SIL</td>
</tr>
<tr>
<td>4 Set EN.SIL to YES and press OK</td>
<td>NEW.PAS</td>
</tr>
<tr>
<td>5 Set password to a number between 0 and 9999 and press OK</td>
<td>CONFIG Verify OPEN-&gt;LOCK (Note7)</td>
</tr>
<tr>
<td>(At this time the device starts operating in SIL mode with the entered configuration parameters!)</td>
<td></td>
</tr>
<tr>
<td>6 Press OK to confirm verification of the OPEN-&gt;LOCK in the display</td>
<td>IN.TYPE</td>
</tr>
<tr>
<td>7 Verify input type and press OK</td>
<td>I.RANGE</td>
</tr>
<tr>
<td>8 Verify fixed input current range and press OK (ONLY if IN.TYPE = CURR)</td>
<td>CONNEC</td>
</tr>
<tr>
<td>(ONLY if IN.TYPE = CURR)</td>
<td></td>
</tr>
<tr>
<td>9 Verify sensor connection type and press OK</td>
<td>UNIT</td>
</tr>
<tr>
<td>(ONLY if IN.TYPE = TEMP and SENSOR = Ni or Pt or IN.TYPE = LIN.R)</td>
<td></td>
</tr>
<tr>
<td>10 Verify temperature unit and press OK (ONLY if IN.TYPE = TEMP)</td>
<td>SENSOR</td>
</tr>
<tr>
<td>11 Verify temperature sensor type and press OK (ONLY if IN.TYPE = TEMP)</td>
<td>Pt.TYPE</td>
</tr>
<tr>
<td>12 Verify Pt sensor type and press OK (ONLY if IN.TYPE = TEMP and SENSOR = Pt)</td>
<td>Ni.TYPE</td>
</tr>
<tr>
<td>13 Verify Ni sensor type and press OK (ONLY if IN.TYPE = TEMP and SENSOR = Ni)</td>
<td>TC.TYPE</td>
</tr>
<tr>
<td>14 Verify Thermocouple type and press OK (ONLY if IN.TYPE = TEMP and SENSOR = TC)</td>
<td>CJC</td>
</tr>
</tbody>
</table>

Note7: Open is shown briefly in the display.
<table>
<thead>
<tr>
<th>Action</th>
<th>Display shows</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 Verify CJC type and press OK (ONLY if IN.TYPE = TEMP and SENSOR = TC)</td>
<td>V.RANGE</td>
</tr>
<tr>
<td>16 Verify fixed input voltage range and press OK (ONLY if IN.TYPE = VOLT)</td>
<td>R 0%</td>
</tr>
<tr>
<td>17 Verify input resistance 0% range and press OK (ONLY if IN.TYPE = LIN.R)</td>
<td>R 100%</td>
</tr>
<tr>
<td>18 Verify input resistance 100% range and press OK (ONLY if IN.TYPE = LIN.R)</td>
<td>UNIT</td>
</tr>
<tr>
<td>19 Verify display units for 4501 and press OK (ONLY if IN.TYPE ≠ TEMP)</td>
<td>DEC.P</td>
</tr>
<tr>
<td>20 Verify display decimal point for 4501 and press OK (ONLY if IN.TYPE ≠ TEMP)</td>
<td>DISP.LO</td>
</tr>
<tr>
<td>21 Verify display value for 4501 at 0% input and press OK (ONLY if IN.TYPE ≠ TEMP)</td>
<td>DISP.HI</td>
</tr>
<tr>
<td>22 Verify display value for 4501 at 100% input and press OK (ONLY if IN.TYPE ≠ TEMP)</td>
<td>REL.UNI</td>
</tr>
<tr>
<td>23 Verify relay setpoint units and press OK (ONLY if IN.TYPE ≠ TEMP)</td>
<td>REL.FUN</td>
</tr>
<tr>
<td>24 Verify relay function and press OK</td>
<td>CONTAC.</td>
</tr>
<tr>
<td>25 Verify relay contact function and press OK (ONLY if REL.FUN ≠ OFF or POW)</td>
<td>SETP.</td>
</tr>
<tr>
<td>26 Verify relay setpoint and press OK (ONLY if REL.FUN = SETP)</td>
<td>SETP.LO</td>
</tr>
<tr>
<td>27 Verify low setpoint value and press OK (ONLY if REL.FUN = WIND)</td>
<td>SETP.HI</td>
</tr>
<tr>
<td>28 Verify high setpoint value and press OK (ONLY if REL.FUN = WIND)</td>
<td>ACT.DIR</td>
</tr>
<tr>
<td>Action</td>
<td>Display shows</td>
</tr>
<tr>
<td>--------</td>
<td>--------------</td>
</tr>
<tr>
<td>29</td>
<td>Verify relay activation direction and press OK (ONLY if REL.FUN = SETP)</td>
</tr>
<tr>
<td>30</td>
<td>Verify relay setpoint hysteresis and press OK (ONLY if REL.FUN = SETP or WIND)</td>
</tr>
<tr>
<td>31</td>
<td>Verify relay action on sensor error and press OK (ONLY if REL.FUN = SETP, WIND or ERR and the selected input type and range support sensor error detection, refer to section 4.3.2)</td>
</tr>
<tr>
<td>32</td>
<td>Verify relay ON delay and press OK (ONLY if REL.FUN = SETP or WIND)</td>
</tr>
<tr>
<td>33</td>
<td>Verify relay OFF delay and press OK (ONLY if REL.FUN = SETP or WIND)</td>
</tr>
<tr>
<td>34</td>
<td>Verify fixed output range for current output</td>
</tr>
<tr>
<td>35</td>
<td>Verify fixed output value on detected sensor error and press OK (ONLY if IN.TYPE ≠ VOLT, or IN.TYPE = CURR and I.RANGE ≠ 0-20 mA)</td>
</tr>
<tr>
<td>36</td>
<td>Verify temperature for 0% output and press OK (ONLY if IN.TYPE = TEMP)</td>
</tr>
<tr>
<td>37</td>
<td>Verify temperature for 100% output and press OK (ONLY if IN.TYPE = TEMP)</td>
</tr>
<tr>
<td>38</td>
<td>Verify analogue output response time and press OK</td>
</tr>
<tr>
<td>39</td>
<td>Verify the use of applied process calibration values and press OK</td>
</tr>
<tr>
<td>40</td>
<td>Verify password and press OK</td>
</tr>
<tr>
<td>41</td>
<td>Verify SIL mode within 1 second</td>
</tr>
</tbody>
</table>
14.2.2 If password is set

<table>
<thead>
<tr>
<th>Action</th>
<th>Display shows</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Press OK</td>
<td>PASSW</td>
</tr>
<tr>
<td>2 Enter password and press OK</td>
<td>ADV.SET</td>
</tr>
<tr>
<td>3 Set ADV.SET to Yes and press OK</td>
<td>SETUP</td>
</tr>
<tr>
<td>4 Set SETUP to SIL and press OK</td>
<td>EN.SIL</td>
</tr>
<tr>
<td>5 Set EN.SIL to YES and press OK (At this time the device starts operating in SIL mode with the entered configuration parameters!)</td>
<td>CONFIG Verify OPEN-&gt;LOCK (Note8)</td>
</tr>
<tr>
<td>6 to 41 As step 6 to 41 for 14.2.1</td>
<td>As step 6 to 41 for 14.2.1</td>
</tr>
</tbody>
</table>

Note8: Open is shown briefly in the display

14.2.3 If any parameter is found to be incorrect during verification
Remove SIL-mode (by entering the password and selecting EN.SIL = NO). Go through the setup menu and correct the parameter(s). Repeat step 1 to 36 (with correct parameters).

14.3 Functional test
The user is responsible to make a functional test after verification of the safety parameters. The procedure for periodic proof test described in section 10 shall be used.
In addition, if a process calibration is taken into SIL-mode operation (refer to section 13.3 - Advanced functions), it is mandatory that the accuracy of the device (and sensor, if applicable) are tested.

15 Fault reaction and restart condition
When the 9116 detects a fault the outputs will go to Safe State, in which the outputs will be “de-energised”.
If the fault is application-specific (cable error detection) the 9116 will restart when the fault has been corrected.
Power cycle the device for bringing it out of Safe State.
16 User interface

[01] Set correct password
[02] Enter Advanced setup menu?
[03] Select Temperature input
Select Potentiometer input
Select Linear resistance input
Select Current input
Select Voltage input
[04] Select 0.0-1 V input range
Select 0.2-1 V input range
Select 1-5 V input range
Select 0-10 V input range
Select 2-10 V input range
[05] Select 0-20 mA input range
Select 4-20 mA input range
[06] Select 2-Wire sensor connection
Select 3-Wire sensor connection
Select 4-Wire sensor connection
[07] Set Resistance value low
[08] Set Resistance value high
[09] Select Celsius as temperature unit
Select Fahrenheit as temperature unit
[10] Select TC sensor type
Select Ni sensor type
Select Pt sensor type
[12] Select Decimal point position
[13] Set Display range low
[14] Set Display range high
[15] Select Relay setpoint in % of input range
Select Relay setpoint in display units
[16] Select Pt10 sensor type
Select Pt20 sensor type
Select Pt50 sensor type
Select Pt100 sensor type
Select Pt200 sensor type
Select Pt300 sensor type
Select Pt400 sensor type
Select Pt500 sensor type
Select Pt1000 sensor type
[17] Select Ni50 sensor type
Select Ni100 sensor type
Select Ni120 sensor type
Select Ni1000 sensor type
[18] 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
Select TC-R sensor type
Select TC-S sensor type
Select TC-T sensor type
Select TC-U sensor type
Select TC-W3 sensor type
Select TC-W5 sensor type
Select TC-Lr sensor type
[19] Select OFF function - relay is permanently off
Select POWER function - relay indicates power status OK
Select ERROR function - relay indicates sensor error only
Select WINDOW function - relay is controlled by 2 setpoints
Select SETPOINT function - relay is controlled by 1 setpoint
[20] Select Normally Closed contact
Select Normally Open contact
[21] Set Relay setpoint
[22] Select Action on decreasing signal
Select Action on increasing signal
[23] Set Relay hysteresis
[24] Select No error action - undefined status at error
Select Open relay contact at error
Select Close relay contact at error
Select Hold relay status at error
[25] Set Relay ON delay in seconds
[26] Set Relay OFF delay in seconds
[27] Select Contact is Closed Inside Window
Select Contact is Open Inside Window
[28] Set Relay window setpoint low
[29] Set Relay window setpoint high
[30] Set Relay window hysteresis
[31] Select Internal temperature sensor
Select CJC connector (Accessory)
[32] Select No error action - output undefined at error
Select Downscale at error
Select Namur NE43 downscaled at error
Select Namur NE43 upscaled at error
[33] Select Analyset output response time in seconds.
[34] Set Temperature for analogue output low
Set Temperature for analogue output high
[35] Enter SIL setup
Enter Simulation mode
Enter Rail setup
Perform Process Calibration
Enter Language setup
Enter Password setup
Enter Display setup
Perform Memory operations
[36] Load saved configuration into module
Save configuration in display front
[37] Adjust LCD contrast
[38] Adjust LCD backlight
[39] Write a 5-character channel TAG
[40] Show Analog output value in display
Show TAG on display
Alternate shown information in display
[41] Calibrate Input low to process value?
[42] Calibrate Input high to process value?
[43] Enable input simulation?
Set the input simulation value
[44] Relay simulation - use to toggle relay
[45] Enable Password protection?
[46] Set New password
[47] Enable Fastset functionality?
[48] Relay setpoint - press to save
[49] Calibrate Input low to process value?
[58] Relay setpoint - Read only
[59] Select Language
[60] Use process calibration values?
[61] Set value for low calibration point
[62] Set value for high calibration point
[63] Enable Rail status signal output?
[64] Enable SIL configuration lock?
  0...20 mA is not a valid output range for SIL operation
[65] Is channel using process-compensated calibration data?
[66] Configuration SIL status (Open / Locked)
[67] Sensor short circuit
[68] Sensor wire breakage
[69] Display underrange
[70] Display overrange
[71] Input underrange
[72] Input overrange
[73] Input error - check input connections and reset power
[74] Output error - check input connections and reset power
[75] Flash memory error - check configuration
[76] Invalid configuration type or version
[77] Hardware error
[78] CJC sensor error - check device temperature
[79] CJC error - check CJC connector block
[80] No communication
16.2 Routing diagram

Fast setpoint adjustment and relay test
- Increase setpoint
- Decrease setpoint
- Save and exit the menu
- And and simultaneously = change relay state

Power up

1.0

1.1 Error indication, example

Error indication, example

Increased setpoint
Decrease setpoint
Save and exit the menu
And simultaneously = change relay state
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
Accept the chosen value and proceed to the next menu
Hold Back to previous menu / return to menu 1.0 without saving

1.0 = Default state. Line 1 shows input status. Line 2 toggles between process value and UNIT. Line 3 shows output and TAG No. Line 4 shows status for relay and communication and whether the device is SIL-locked. Static dot = SIL-locked and flashing dot = not SIL-locked.

1.1 = Only if password-protected.
1.2 = Only if FastSet is activated and the relay function is setpoint.
1.3 = Only if input types support sensor error check. Not valid for these input signals: 0...20 mA and voltage.
1.4 = Only if input signal is temperature.
1.5 = Only if the configuration is not protected by a password.

Selectable UNITS:

- °C
- °F
- m/s
- mm/s
- m
- cm
- mm
- µm
- ft/s
- in/s
- in
- mils
- yd
- m/s²
- l
- s
- rpm
- m³
- Hz
- W

- min
- kg
- g
- N
- Pa
- kPa
- MPa
- bar
- mbar
- kJ
- Wh
- m³
- Hz
- W

- °C
- °F
- l/s
- kW
- l/min
- 1/h
- A
- gal/min
- mA
- gal/h
- t
- mol
- pH

[blank]
To default state 1.0
2.0 In the submenu simulation (SIM) you must press \( \text{ok} \) to return to the default state 1.0.

Red text signifies safety parameters in a SIL configuration.

To default state 1.0.
17 Connections diagram

Inputs:

- RTD, 2-wire
  - 41 42 43 44
  - Diagram

- RTD, 3-/4-wire
  - 41 42 43 44
  - Diagram

- TC, internal CJC sensor
  - 41 42 43 44
  - Diagram

- Resistance, 2-wire
  - 41 42 43 44
  - Diagram

- Resistance, 3-/4-wire
  - 41 42 43 44
  - Diagram

- Potentiometer
  - 41 42 43 44
  - Diagram

- 2-wire transmitter
  - 51 52 53 54
  - Diagram

- Current (Active output)
  - 11 12 13 14
  - Diagram

- Voltage
  - 51 52 53 54
  - Diagram

Outputs:

- 2-wire transmitter (Passive output)
  - 11 12 13 14
  - Diagram

- Relay
  - 11 12 13 14
  - Diagram
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