Product manual

9116

Universal converter

No. 9116V108-UK
Product version: 9116-003
6 Product Pillars to meet your every need

Individually outstanding, unrivalled in combination

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

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

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

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

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

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

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

## 9116

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</table>
**Warning**

The following operations should only be carried out on a disconnected device and under ESD-safe conditions:
- General mounting, wire connection and disconnection.
- Troubleshooting the device.

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

**Warning**

Do not open the front plate of the device as this will cause damage to the connector for the display / programming front PR 45xx.

*This device contains no DIP-switches or jumpers.*

---

**Symbol identification**

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

- **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

9116

- 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 45xx); 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
- 9116Axx can be mounted in the safe area or in zone 2 / Class I, Division 2, Groups A, B, C, D.
- 9116Bxx can be mounted in the safe area or in zone 2 / Class 1, Division 2 and receive signals from zone 0, 1, 2 and zone 20, 21, 22 including mining / Class I/II/III, Division 1, Gr. A-G.
- Conversion and scaling of temperature, 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.
- Suitable for the use in systems up to Performance Level "d" according to ISO-13849.

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 - 9116Axx

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

*Order separately: CJC connector 5910.

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

Same power rail as above

Zone 2 & Cl. 1, Div. 2, gr. A-D or Safe Area
Applications - 9116Bxx

Input signals:

- Potentiometer
- RTD and lin. R connection, wires
- TC

*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

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

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

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

Application
• Communications interface for modification of operational parameters in 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 45xx
1: Insert the tabs of the PR 45xx into the holes at the top of the device.
2: Hinge the PR 45xx down until it snaps into place.

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

- **4501**: Display / programming front
- **4511**: Communication enabler
- **5910**: CJC connector for 9116Axx
- **5910Ex**: CJC connector for 9116Bxx
- **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 / 451x: 109 x 23.5 x 116 / 131 mm
- Weight approx.: 185 g
- Weight incl. 4501 / 451x (approx.): 200 g / 215 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

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Max. power dissipation</th>
<th>Max. required power</th>
</tr>
</thead>
<tbody>
<tr>
<td>9116x1x</td>
<td>1 channel (Ex Uo 28 V)</td>
<td>≤ 1.7 W</td>
<td>≤ 2.1 W</td>
</tr>
<tr>
<td>9116x2x</td>
<td>1 channel (Ex Uo 21.4 V)</td>
<td>≤ 1.7 W</td>
<td>≤ 2.1 W</td>
</tr>
</tbody>
</table>

Max. required power is the maximum power needed at terminals 31 and 32.
Max. power dissipation is the maximum power dissipated by the device.
If the 9116 is used with the 45xx, then add 40 mW to the max. power dissipation and 70 mW to the max. required power for each device with the 45xx.
Isolation - test / working:
- Input to any ................................................................. 2.6 kVAC / 300 VAC reinforced isolation
- Analog output to supply .................................................. 2.6 kVAC / 300 VAC reinforced isolation
- Output relay to analog output ............................................. 1.5 kVAC / 150 VAC reinforced isolation or 300 VAC basic isolation
- Status relay to supply ..................................................... 1.5 kVAC / 150 VAC reinforced isolation

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

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

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

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

Accuracy, the greater of the general and basic values:

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

General values

<table>
<thead>
<tr>
<th>Input type</th>
<th>Basic accuracy</th>
<th>Temperature coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>mA</td>
<td>≤ ±16 μA</td>
<td>≤ ±1.6 μA / °C</td>
</tr>
<tr>
<td>Volt</td>
<td>≤ ±20 μV</td>
<td>≤ ±2 μV / °C</td>
</tr>
<tr>
<td>Pt100, Pt200, Pt 1000</td>
<td>≤ ±0.2°C</td>
<td>≤ ±0.02°C/°C</td>
</tr>
<tr>
<td>Pt50, Pt400, Ni50</td>
<td>≤ ±0.4°C</td>
<td>≤ ±0.04°C/°C</td>
</tr>
<tr>
<td>Pt250, Pt300</td>
<td>≤ ±0.6°C</td>
<td>≤ ±0.06°C/°C</td>
</tr>
<tr>
<td>Pt20</td>
<td>≤ ±0.8°C</td>
<td>≤ ±0.08°C/°C</td>
</tr>
<tr>
<td>Pt10</td>
<td>≤ ±1.4°C</td>
<td>≤ ±0.14°C/°C</td>
</tr>
<tr>
<td>TC type: E, J, K, L, N, T, U</td>
<td>≤ ±1°C</td>
<td>≤ ±0.1°C/°C</td>
</tr>
<tr>
<td>TC type: R, S, W3, W5, LR</td>
<td>≤ ±2°C</td>
<td>≤ ±0.2°C/°C</td>
</tr>
<tr>
<td>TC type: B 160...400°C</td>
<td>≤ ±4.5°C</td>
<td>≤ ±0.45°C/°C</td>
</tr>
<tr>
<td>TC type: B 400...1820°C</td>
<td>≤ ±2°C</td>
<td>≤ ±0.2°C/°C</td>
</tr>
</tbody>
</table>

Auxiliary supplies for 9116x1x:
- 2-wire supply (terminal 54...52) ..................................... 28...16.5 VDC / 0...20 mA

Auxiliary supplies for 9116x2x:
- 2-wire supply (terminal 54...52) ..................................... 21.4...16.5 VDC / 0...20 mA
### RTD, linear resistance and potentiometer input

<table>
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<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
  -20...20°C and 28...70°C ≤ ±2°C
- via internal CJC sensor: ±(2.0°C + 0.4°C * Δt)
  Δt = internal temperature - ambient temperature

Sensor error detection: Programmable ON or OFF (only wire breakage)

Sensor error current:
- when detecting: Nom. 2 μA
- else: 0 μA

### Current input

- Measurement range: 0...23 mA
- Programmable measurement ranges: 0...20 and 4...20 mA
- Input resistance: Nom. 20 Ω + PTC 50 Ω
- 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] ....................................... (Vs supply - 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 / VDC
Max. AC current .................................................. 2 A
Max. AC power ................................................... 500 VA
Max. DC current, resistive load:
@ U_{relay} ≤ 30 VDC .............................................. 2 ADC
@ U_{relay} > 30 VDC .............................................. \left[1380 \times U_{relay} \times (1.0085)^{-2}\right] ADC

Graphic depiction of \left[1380 \times U_{relay} ^2 \times 1.0085^{U_{relay}}\right]:

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
ATEX ............................................................... 2014/34/EU
RoHS ............................................................... 2011/65/EU

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

I.S. / Ex
ATEX ............................................................... KEMA 10ATEX0053 X
IECEx .............................................................. IECEx KEM 10.0022X
c FM us. .......................................................... FM19US0058X / FM19CA0031X
INMETRO ........................................................ DEKRA 16.0004X
c UL us, UL 913 (only 9116xx-U9) ..................... E233311
EAC Ex .......................................................... RU C-OK.HA65.B.00355/19

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

<table>
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<th>Device</th>
<th>Configuration</th>
<th>Sensor error detection</th>
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<tbody>
<tr>
<td>9116</td>
<td>ERR.ACT=NONE - OUT.ERR=NONE.</td>
<td>OFF</td>
</tr>
<tr>
<td>Else</td>
<td>ON</td>
<td></td>
</tr>
</tbody>
</table>

Sensor error check:

Visualisation in the 45xx of:

Input signal outside range

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

<table>
<thead>
<tr>
<th>Input</th>
<th>Range</th>
<th>Readout</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>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

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

<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>Readout at hardware error</th>
<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>
<td></td>
</tr>
<tr>
<td>CJC connector error - check CJC-connector block</td>
<td>CJ.ER</td>
<td>Defect (or missing) CJC-connector or temperature out of allowed range**</td>
<td></td>
</tr>
<tr>
<td>Input error - check input connection and reset power</td>
<td>IN.ER</td>
<td>Signal levels on input beyond limits or connected to wrong terminals*</td>
<td></td>
</tr>
<tr>
<td>Output error - check output connections and reset power</td>
<td>AO.ER</td>
<td>Error in analogue output current (SIL mode only)*</td>
<td></td>
</tr>
<tr>
<td>No communication</td>
<td>NO.CO</td>
<td>No communication with (45xx)</td>
<td></td>
</tr>
<tr>
<td>Flash memory error - check configuration</td>
<td>FL.ER</td>
<td>FLASH error (configuration invalid)***</td>
<td></td>
</tr>
<tr>
<td>Invalid configuration type or version</td>
<td>TY.ER</td>
<td>Configuration read from EEprom has invalid type or rev. no.</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>RA.ER</td>
<td>RAM error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>IF.ER</td>
<td>Internal Flash error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>SW.ER</td>
<td>SW monitor error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>AD.ER</td>
<td>A/D converter error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>AO.SU</td>
<td>Analog output supply error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>CA.ER</td>
<td>Factory calibration error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>CM.ER</td>
<td>Main CPU error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>RE.ER</td>
<td>Relay readback error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>II.ER</td>
<td>Initialisation check error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>RS.ER</td>
<td>Reset error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>IC.ER</td>
<td>Input communication error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>M1.ER</td>
<td>Main CPU to Ch. 1 error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>MC.ER</td>
<td>Main CPU config. error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>MF.ER</td>
<td>Main CPU Flash error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>MR.ER</td>
<td>Main CPU RAM error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>MS.ER</td>
<td>Main CPU supply error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>MP.ER</td>
<td>Main CPU ProgFlow error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>MI.ER</td>
<td>Main CPU initialization check error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>DE.ER</td>
<td>Device error*</td>
<td></td>
</tr>
<tr>
<td>Hardware error</td>
<td>FC.ER</td>
<td>Invalid code checksum in 4511/4501</td>
<td></td>
</tr>
</tbody>
</table>

---

* 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.

---

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

Power rail connections

Supply and status relay

NC = no connection

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

Outputs:

Current (Active output)

2-wire transmitter (Passive output)

Relay

* Order separately: CJC connector 5910 / 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></td>
<td>ON</td>
<td>De-energized</td>
<td>Closed</td>
</tr>
<tr>
<td>Device OK</td>
<td>Flashing</td>
<td></td>
<td></td>
<td>Energized</td>
<td>Open</td>
</tr>
<tr>
<td>Signal OK</td>
<td>Flashing</td>
<td></td>
<td>OFF</td>
<td>Energized</td>
<td>Open</td>
</tr>
<tr>
<td>Output relay energized</td>
<td>Flashing</td>
<td></td>
<td>ON</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></td>
<td>OFF</td>
<td>Energized</td>
<td>Open</td>
</tr>
</tbody>
</table>
Configuration / operating the function keys

Documentation for routing diagram.

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 unauthorized modifications to the configuration.
Password protection is mandatory in SIL applications.
If the configured password is not known, please contact PR electronics support - www.prelectronics.com/contact.

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 5910 / PR 5910Ex) must be ordered separately.

Signal and sensor error indication via display front 45xx
Sensor error (see limits in the table) is displayed as SE.BR (sensor break) or SE.SH (sensor short). Signals outside the selected range (not sensor error, see table for limits) are displayed as IN.LO indicating low input signal or IN.HI indicating high input signal. The error indication is displayed as text in line 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 45xx.

Signal and sensor error indication without display front
Status of the unit can also be read from the 3 LEDs in the front of the device.
- Green flashing LED indicates normal operation.
- No light in the green LED indicates lack of supply voltage or error in the device.
- Steady red LED indicates fatal error.
- Flashing red LED indicates sensor error.

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 28.

**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 29.

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 45xx. Then a high signal (not necessarily 100%) is applied and the actual value is entered via 45xx. If you accept to use the calibration, the device will work according to this new adjustment. If you later reject this menu point or choose another type of input signal the device will return to factory calibration.

**Process simulation function:** In the menu point “EN.SIM” it is possible to simulate an input signal by means of the arrow keys and thus control the output signal up or down or the relay state OFF and ON. You must exit the menu by pressing >> (no time-out).

The simulation function exits automatically, if the 45xx is detached.

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

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

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

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

**Safety Integrity Level (SIL):** See Safety Manual for details.
Power up

50.0
SETP.

PASSW.

Txt 1

I,30.00
Io12.00mA

1

If SIL-locked directly
to [EN.SIL]

0000
9999

NO
YES

0000
NO
ADVSRT
Txt 2

VOLT
LIN.R
POTM
CURR
TEMP

2-10
0-10
0-5
0-2-1
0-1

UNIT
%U
Txt 4

4W
3W
2W

0-0
R 0%
Txt 7

3W

0
R 100%
Txt 8

LIN.R
IN TYPE
Txt 3

POTM
IN TYPE
Txt 3

CURR
IN TYPE
Txt 3

Pt
Ni
TC

1000
-10

3W

4W
3W

4-20
4-20

TEMP
IN TYPE
Txt 3

Pt
SENSOR
Txt 10

100
-50

3W

4W
3W

100

Ni
SENSOR
Txt 10

Ni
SENSOR
Txt 17

TC.Lr TC.WS
TC.J T.C.T C.S
TC.R TC.N TCL
TC.WK TC.J T.C.E

CONN
INT

YES
ADVSRT
Txt 2

TC
SENSOR
Txt 10

TC.K
SENSOR
Txt 10

INT
CJC
Txt 31

*1.1
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.

*1.2
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.

*1.0
Only if password-protected.

Error indication, example

I SE.BR
\$03.50mA

Power up

Fast setpoint adjustment and relay test

Increase setpoint
Decrease setpoint
Save and exit the menu
and \( ^\wedge \) simultaneously = change relay state.

Routing diagram ADV.SET

Continued on the page
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  to Back to previous menu / return to menu 1.0 without saving.
*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.
Routing diagram, advanced settings (ADV.SET)

To default state 1.0

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

Verify SIL configuration

9116 - Product version 9116-003
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 0.1-1 V input range
  Select 0-5 V input range
  Select 1-5 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 Pt250 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-B sensor type
  Select TC-E sensor type
  Select TC-J sensor type
  Select TCK sensor type
  Select TCL sensor type
  Select TCN sensor type
  Select TCR sensor type
  Select TCS sensor type
  Select TCT sensor type
  Select TCU sensor type
  Select TCW3 sensor type
  Select TCW5 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] Select No error action - output undefined at error
  Select Downscale at error
  Select Namur NE43 downscale at error
  Select Namur NE43 upscale at error
[34] Select Analogue output response time in seconds.
[35] Set Temperature for analogue output low
  Set Temperature for analogue output high
[36] Enter SIL setup
[37] Enter Simulation mode
[38] Perform Process Calibration
[39] Enter Language setup
[40] Enter Password setup
[41] Enter Display setup
[42] Perform Memory operations
[43] Load saved configuration into module
  Save configuration in display front
[44] Adjust LCD contrast
[45] Adjust LCD backlight
[46] Write a 5-character channel TAG
[47] Show Analog output value in display
[48] Show TAG on display
  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 ↑ to toggle relay
[54] Enable Password protection?
[55] Set New password
[56] Enable Fastset functionality?
[57] Relay setpoint - press = 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
IECEx 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.

IECEx 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 ≤ +60°C

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

Status relay, terminal (33,34)
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)
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

Revision date: 2018-03-01
Version Revision V8 R0
Prepared by: PB
Page: 1/5
**Module 9116B1**

<table>
<thead>
<tr>
<th>Terminal 51-52, 51-53</th>
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<tbody>
<tr>
<td><strong>Ui</strong></td>
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<td><strong>Ci</strong></td>
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<td><strong>Li</strong></td>
<td>1 μH</td>
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<td>218 μH/Ω</td>
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<td>2.1 μF</td>
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<tr>
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<td>5 mH/Ω</td>
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<tr>
<td>IIA</td>
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<td>10 mH/Ω</td>
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**Module 9116B2**

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</tr>
<tr>
<td><strong>Ci</strong></td>
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<td><strong>Li</strong></td>
<td>1 μH</td>
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<td>4 mH</td>
<td>54 μH/Ω</td>
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<tr>
<td>IIB</td>
<td>640 nF</td>
<td>16 mH</td>
<td>218 μH/Ω</td>
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<tr>
<td>IIA</td>
<td>2.1 μF</td>
<td>32 mH</td>
<td>436 μH/Ω</td>
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<tr>
<td>IIB</td>
<td>640 nF</td>
<td>1000 mH</td>
<td>35 mH/Ω</td>
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<td>2.1 μF</td>
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<td>IIB</td>
<td>73 μF</td>
<td>828 mH</td>
<td>5 mH/Ω</td>
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<tr>
<td>IIA</td>
<td>1000 μF</td>
<td>1000 mH</td>
<td>10 mH/Ω</td>
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</table>

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

Non Hazardous area
or Zone 2

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

Status relay, terminal (33,34)
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)
Zone 2 installation
Voltage max: 32 V AC / 30 VDC
Power max: 64 VA / 60 W
Current max: 2 A AC / 2 ADC

4-20 mA
Loop-powered
transmitter

 seams to be
4501

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

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

Status relay, terminal (33,34)
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)
Zone 2 installation
Voltage max: 32 V AC / 30 VDC
Power max: 64 VA / 60 W
Current max: 2 A AC / 2 ADC

-20 ≤T_a ≤ +60°C

Module 9116B 1/2
Terminal 54-52

U_i 30 V
I_i 120 mA
P_i 900 mW
C_i 3 nF
L_i 2 μH

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

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<tr>
<td>U_o</td>
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<tr>
<td>I_o</td>
<td>93 mA</td>
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<td>P_o</td>
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<td>2.1 μF</td>
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Module 9116B2
Term. 54-52; 51-52

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<td>21.4 V</td>
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<td>1.13 μF</td>
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<td>P_o</td>
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<td>II_A</td>
<td>4.15 μF</td>
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9116Bxx Installation:

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

-20 ≤ Ta ≤ +60°C

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

Status relay, terminal (33,34)
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)
Zone 2 installation
Voltage max: 32 V AC / 30 VDC
Power max: 64 VA / 60 W
Current max: 2 A AC / 2 ADC

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<tr>
<th>Terminal 51-52</th>
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<tbody>
<tr>
<td>Ui</td>
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<td>li</td>
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<tr>
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<tr>
<td>Ci</td>
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<td>0.4 μF</td>
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<td>IIB</td>
<td>2.3 μF</td>
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<td>100mH/Ω</td>
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<tr>
<td>Po</td>
<td>IIA</td>
<td>9.5 μF</td>
<td>100 mH</td>
<td>200mH/Ω</td>
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9116Axx Installation:

Non Hazardous area or Zone 2

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

Marking 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

-20 ≤Ta ≤ +60°C

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

Status relay, terminal (33,34)
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)
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

Revision date: 2018-03-01
Version Revision V8 R0
Prepared by: PB
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<td><strong>Pi</strong></td>
<td>900 mW</td>
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<tr>
<td><strong>Cl</strong></td>
<td>3 nF</td>
</tr>
<tr>
<td><strong>Li</strong></td>
<td>1 μH</td>
</tr>
<tr>
<td><strong>Uo</strong></td>
<td>28 V</td>
</tr>
<tr>
<td><strong>Io</strong></td>
<td>93 mA</td>
</tr>
<tr>
<td><strong>Po</strong></td>
<td>650 mW</td>
</tr>
<tr>
<td><strong>Uo</strong></td>
<td>21.4 V</td>
</tr>
<tr>
<td><strong>Io</strong></td>
<td>93 mA</td>
</tr>
<tr>
<td><strong>Po</strong></td>
<td>650 mW</td>
</tr>
<tr>
<td><strong>Uo</strong></td>
<td>21.4 V</td>
</tr>
<tr>
<td><strong>Io</strong></td>
<td>93 mA</td>
</tr>
<tr>
<td><strong>Po</strong></td>
<td>650 mW</td>
</tr>
<tr>
<td><strong>Uo</strong></td>
<td>21.4 V</td>
</tr>
<tr>
<td><strong>Io</strong></td>
<td>93 mA</td>
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<td><strong>Po</strong></td>
<td>650 mW</td>
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Module 9116B1

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<td><strong>Io</strong></td>
<td>640 nF</td>
<td>16 mH</td>
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<tr>
<td><strong>Po</strong></td>
<td>2.1 μF</td>
<td>32 mH</td>
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Module 9116B2

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Module 9116B1

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Module 9116B2

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<td>1000 mH</td>
<td>100 mH/Ω</td>
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</tr>
<tr>
<td><strong>Io</strong></td>
<td>73 μF</td>
<td>1000 mH</td>
<td>400 mH/Ω</td>
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Module 9116B1

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<td>5 mH/Ω</td>
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<td><strong>Po</strong></td>
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Module 9116B2

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<td>207 mH</td>
<td>1 mH/Ω</td>
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<tr>
<td><strong>Io</strong></td>
<td>73 μF</td>
<td>828 mH</td>
<td>5 mH/Ω</td>
<td></td>
</tr>
<tr>
<td><strong>Po</strong></td>
<td>1000 μF</td>
<td>1000 mH</td>
<td>10 mH/Ω</td>
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**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 °C ≤Ta ≤ +60°C

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

Status relay, terminal (33,34)  
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)  
Zone 2 installation  
Voltage max:  32 V AC / 30 VDC  
Power max:  64 VA / 60 W  
Current max:  2 A AC / 2 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)  
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

<table>
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<td>li</td>
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<td></td>
<td>Pi</td>
<td>900 mW</td>
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<tr>
<td></td>
<td>Ci</td>
<td>3 nF</td>
</tr>
<tr>
<td></td>
<td>Li</td>
<td>2 μH</td>
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Module 9116B1  
Term. 54-52; 51-52

<table>
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<th>Lo/Ro</th>
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<tbody>
<tr>
<td>Uo</td>
<td>28 V</td>
<td>80 nF</td>
<td>4 mH</td>
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<td>lo</td>
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<td>16 mH</td>
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<tr>
<td>Po</td>
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<td>32 mH</td>
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Module 9116B2  
Term. 54-52; 51-52

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<th>Lo/Ro</th>
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<tbody>
<tr>
<td>Uo</td>
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</tr>
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<td>lo</td>
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<td>4.15 μF</td>
<td>32 mH</td>
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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

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

Status relay, terminal (33,34)
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)
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

Module 9116B 1/2
Terminal 51-52

<table>
<thead>
<tr>
<th>U_i</th>
<th>30 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>I_i</td>
<td>120 mA</td>
</tr>
<tr>
<td>P_i</td>
<td>900 mW</td>
</tr>
<tr>
<td>C_i</td>
<td>3 μF</td>
</tr>
<tr>
<td>L_i</td>
<td>2 μH</td>
</tr>
</tbody>
</table>

Module 9116B 1/2
Term. 52-51, 51-52

<table>
<thead>
<tr>
<th>Group</th>
<th>Co</th>
<th>Lo</th>
<th>Lo/Ro</th>
</tr>
</thead>
<tbody>
<tr>
<td>U_o</td>
<td>16.6 V</td>
<td>0.4 μF</td>
<td>100 mH</td>
</tr>
<tr>
<td>I_o</td>
<td>0.2 mA</td>
<td>2.3 μF</td>
<td>100 mH</td>
</tr>
<tr>
<td>P_o</td>
<td>0.8 mW</td>
<td>9.5 μF</td>
<td>100 mH</td>
</tr>
</tbody>
</table>

Revision date: 2018-03-01
Version Revision: V8 R0
Prepared by: PB
Page: 4/5
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.
FM Installation drawing

9116
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.

4501
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.

Simple Apparatus or Intrinsic safe apparatus with entity parameters:

-20 ≤ Ta ≤ +60ºC

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)
Um: 253 V max. 400 Hz
### Module 9116B1

<table>
<thead>
<tr>
<th>Terminal 51-52, 51-53</th>
<th>Co</th>
<th>Lo</th>
<th>Lo/Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uo, Voc 28 V</td>
<td>80 nF</td>
<td>4 mH</td>
<td>54 μH/Ω</td>
</tr>
<tr>
<td>Io, Isc 93 mA</td>
<td>640 nF</td>
<td>15 mH</td>
<td>218 μH/Ω</td>
</tr>
<tr>
<td>Po 650 mW</td>
<td>2.1 μF</td>
<td>32 mH</td>
<td>436 μH/Ω</td>
</tr>
</tbody>
</table>

### Module 9116B2

<table>
<thead>
<tr>
<th>Terminal 51-52, 51-53</th>
<th>Co</th>
<th>Lo</th>
<th>Lo/Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uo, Voc 21.4 V</td>
<td>1.6 μF</td>
<td>4 mH</td>
<td>64 μH/Ω</td>
</tr>
<tr>
<td>Io, Isc 93 mA</td>
<td>640 nF</td>
<td>15 mH</td>
<td>218 μH/Ω</td>
</tr>
<tr>
<td>Po 650 mW</td>
<td>4.15 μF</td>
<td>32 mH</td>
<td>436 μH/Ω</td>
</tr>
</tbody>
</table>

### Installation notes:

In Class I, Division 2 installations, the subject equipment shall be mounted within a too-secured enclosure which is capable of accepting one or more of the Class I, Division 2 wiring methods specified in the National Electrical Code (ANSI/NFPA 70) or Canadian Electrical Code (C22.1).

In Zone 2 installations, the subject equipment shall be mounted within a tool secured enclosure which is capable of accepting one or more of the Zone 2 wiring methods specified in the National Electrical Code (ANSI/NFPA 70) or the Canadian Electrical Code (C22.1). Where installed in outdoor or potentially wet locations, the enclosure shall, at a minimum, meet the requirements of IP54.

In Zone 2 installations, the installer shall ensure protection of supply terminals against transient voltages exceeding 140% of the rated supply voltage.

Install in environments rated Pollution Degree 2 or better; overvoltage category I or II.

The module must be supplied from a Power Supply having double or reinforced insulation.

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

For installation on the 9400 Power Rail the power must be supplied from Power Control Module Unit 9410.

The module is galvanic isolated and does not require grounding.

Use 60 / 75 ºC Copper Conductors with wire Size AWG: (26-14).

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

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

**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 Group IIC, [Ex ia Ga] IIC Gc

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

-20 °C ≤Ta ≤ +60°C

4-20 mA Loop-powered transmitter

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 / 30 VDC
Power max: 64 VA / 60 W
Current max: 2 A AC / 2 ADC

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

Module 9116B1
Terminals 52-54
Uo, Voc 28 V
Io, Isc 93 mA
Po 650 mW
Group IIC or A,B
Co 80 nF
Lo 4 mH
Lo/Ro 54 μH/Ω

Group IIB or C,E,F
640 nF
16 mH
218 μH/Ω

Group IIA or D,G
2.1 μF
32 mH
436 μH/Ω

Module 9116B2
Terminals 52-54
Uo, Voc 21.4 V
Io, Isc 93 mA
Po 650 mW
Group IIC or A,B
0.16 μF
4 mH
54 μH/Ω

Group IIB or C,E,F
1.13 μF
16 mH
218 μH/Ω

Group IIA or D,G
4.15 μF
32 mH
436 μH/Ω
Ui, Vmax 30 V
Ii, Imax 120 mA
Pi 900 mW
Ci 3 nF
Li 2 μH

Terminal 51-52

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

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

(terminal 11,12,13,14)
(terminal 31,32,33,34)
(terminal 91,92,93,94,95)
U_{in} 253 V max. 400 Hz
UL Installation drawing

For safe installation of associated apparatus 9116Bx the following must be observed. The module shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area.

For installation in DIV2/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.

**9116A1-U9, 9116B1-U9: Universal Converter Voc or Uo: 28V**

**9116A2-U9, 9116B2-U9: Universal Converter Voc or Uo: 21.4V**

**Marking:**

- Install in CL I DIV2 GP A-D T4 provide IS circuits to CL I-III DIV 1 GP A-G or CL I Zn2 Gp IIIC T4 provides IS circuits for CL I Zn0 Gp IIIC/Zn20 Gp IIIC Um=253V [Exia] - Installation Drawing: 9116QU01

The 9116Bx is galvanically isolating associated apparatus for installation in non-hazardous locations or Class I, Division 2, Groups A – D hazardous locations with intrinsically safe connections to Class I, II and III hazardous locations.

**9116Ax** is intended for installation in non-hazardous locations or Class I, Division 2, Groups A – D or Zone 2 Group IIC hazardous locations.

**Standards:**

- UL 121201 NONINCENDIVE ELECTRICAL EQUIPMENT FOR USE IN CLASS I AND II, DIVISION 2 AND CLASS III, DIVISIONS 1 AND 2 HAZARDOUS (CLASSIFIED) LOCATIONS Edition 9 - Revision Date 2018/08/31

- CSA C22.2 NO. 213 NONINCENDIVE ELECTRICAL EQUIPMENT FOR USE IN CLASS I AND II, DIVISION 2 AND CLASS III, DIVISIONS 1 AND 2 HAZARDOUS (CLASSIFIED) LOCATIONS - Edition 3 - Issue Date 2017/09/01

- UL 913 STANDARD FOR INTRINSICALLY SAFE APPARATUS AND ASSOCIATED APPARATUS FOR USE IN CLASS I, II, III, DIVISION 1, HAZARDOUS (CLASSIFIED) LOCATIONS - Edition 8 - Revision Date 2015/10/16

- CSA C22.2 NO. 60079-0 EXPLOSIVE ATMOSPHERES — PART 0: EQUIPMENT — GENERAL REQUIREMENTS - Edition 3 - Issue Date 2015/10/01

- CSA C22.2 NO. 60079-11:14 EXPLOSIVE ATMOSPHERES — PART 11: EQUIPMENT PROTECTION BY INTRINSIC SAFETY "I"- Edition 2 - Issue Date 2014/02/01
9116Bx-U9 Installation:

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

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

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

Status relay, terminal (33,34)
Class I Division 2 or
Zone 2 installation:
Voltage max: 32 Vac/ 32 Vdc
Current max: 0.5 Aac / 0.3Adc

Relay output, terminal (13,14)
Class I Division 2 or
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
Installation notes 9116Ax-U9 and 9116Bx-U9:

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

The module is galvanically isolated and does not require grounding.

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

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

Warning: Substitution of components may impair intrinsic safety.

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

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

Avertissement : Pour éviter l’inflammation d’atmosphères explosibles, déconnectez l’alimentation avant les opérations d’entretien. Ne montez pas ou n’enlevez pas les connecteurs quand le module est sous tension et en présence d’un mélange de gaz. Ne montez pas ou n’enlevez pas les modules du rail d’alimentation en présence d’un mélange de gaz.
Installation notes 9116Bx-U9:

Associated Equipment /Appareillage Associé [Ex ia]

The Ex output current of this associated apparatus is limited by a resistor such that the output voltage-current plot is a straight line drawn between open-circuit voltage and short-circuit current. Selected intrinsically safe equipment must be third party listed as intrinsically safe for the application, and have intrinsically safe entity parameters conforming with Table 1 below.

**TABLE 1:**

<table>
<thead>
<tr>
<th>I.S. Equipment</th>
<th>Associated Apparatus</th>
</tr>
</thead>
<tbody>
<tr>
<td>V max (or U1)</td>
<td>≥ Voc or Vt (or Uo)</td>
</tr>
<tr>
<td>I max (or I1)</td>
<td>≥ Isc or It (or I0)</td>
</tr>
<tr>
<td>P max, Pi</td>
<td>≥ Po</td>
</tr>
<tr>
<td>Ci + Ccable</td>
<td>≤ Ca (or Co)</td>
</tr>
<tr>
<td>Li + Lcable</td>
<td>≤ La (or Lo)</td>
</tr>
</tbody>
</table>

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

Capacitance and inductance of the field wiring from the intrinsically safe equipment to the associated apparatus shall be calculated and must be included in the system calculations as shown in Table 1. Cable capacitance, Ccable, plus intrinsically safe equipment capacitance, Ci must be less than the marked capacitance, Ca (or Co), shown on any associated apparatus used. The same applies for inductance (Lcable, Li and La or Lo, respectively). Where the cable capacitance and inductance per foot are not known, the following values shall be used: Ccable = 60 pF/ft., Lcable = 0.2 μH/ft.

Where multiple circuits extend from the same piece of associated apparatus, they must be installed in separate cables or in one cable having suitable insulation. Refer to Article 504.30(B) of the National Electrical Code (ANSI/NFPA 70) and Instrument Society of America Recommended Practice ISA RP12.06 for installing intrinsically safe equipment.

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

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

Terminals 41-44 are internally connected to terminals 51-54.

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

For installations in which both the Ci and Li of the intrinsically safe apparatus exceeds 1% of the Ca (or Co) and La (or Lo) parameters of the associated apparatus (excluding the cable), then 50% of Ca (or Co) and La (or Lo) parameters are applicable and shall not be exceeded. The reduced capacitance shall not be greater than 1 μF for Groups C and/or D, and 600 nF for Groups A and B. The values of Ca (or Co) and La (or Lo) determined by this method shall not be exceeded by the sum of all of Ci plus cable capacitances and the sum of all of the Li plus cable inductances in the circuit respectively.
9116Bx-U9 Splitter Installation:

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

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

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

Status relay, terminal (33,34)
Class I Division 2 or
Zone 2 installation:
Voltage max: 32 Vac/ 32 Vdc
Current max: 0.5 Aac / 0.3 Adc

Relay output, terminal (13,14)
Class I Division 2 or
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 9116B1-U9
Terminal 51-54,52-54

- Voc, Uo: 28V
- Isc, Io: 93mA
- Po: 650mW

<table>
<thead>
<tr>
<th>Group</th>
<th>Ca or Co</th>
<th>La or Lo</th>
<th>Lo/Ro</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIC or A,B</td>
<td>80 nF</td>
<td>4 mH</td>
<td>54 µH/Ω</td>
</tr>
<tr>
<td>IIB or C,E,F</td>
<td>640nF</td>
<td>16 mH</td>
<td>218µH/Ω</td>
</tr>
<tr>
<td>IIA or D,G</td>
<td>4.15µF</td>
<td>32 mH</td>
<td>436µH/Ω</td>
</tr>
</tbody>
</table>

Module 9116B2-U9
Terminal 51-54,52-54

- Voc, Uo: 21.4V
- Isc, Io: 93mA
- Po: 650mW

<table>
<thead>
<tr>
<th>Group</th>
<th>Ca or Co</th>
<th>La or Lo</th>
<th>Lo/Ro</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIC or A,B</td>
<td>1.13µF</td>
<td>16 mH</td>
<td>218µH/Ω</td>
</tr>
<tr>
<td>IIB or C,E,F</td>
<td>4.15µF</td>
<td>32 mH</td>
<td>436µH/Ω</td>
</tr>
<tr>
<td>IIA or D,G</td>
<td>0.16µF</td>
<td>4 mH</td>
<td>54 µH/Ω</td>
</tr>
</tbody>
</table>

9116B1-U9 and 9116B2-U9
Terminal 51-52, 54-52

- Vmax or Ui: 30V;
- Imax or li:120mA;
- Pi:900mW;
- Ci:3nF;
- Li:2µH

Revision date: 2019-11-26
Version Revision: V1 R0
Prepared by: PB
Page: 5/7
9116Bx-U9 Installation:

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

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

-20 ≤ Ta ≤ +60℃

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

Status relay, terminal (33,34)
Class I Division 2 or
Zone 2 installation:
Voltage max: 32 Vac/ 32 Vdc
Current max: 0.5 Aac / 0.3Adc

Relay output, terminal (13,14)
Class I Division 2 or
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

9116B1-U9 and 9116B2-U9
Terminal 51-52

Vmax or Ui: 30V;
Imax or Ii:120mA;
Pi:900mW;
Ci:6nF;
Li:2µH
9116Ax-U9 and 9116Bx-U9 Installation:

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

Class I, Division 2 or Zone 2 Installation:

Status relay, terminal (33,34)
Voltage max: 32 Vac / 32 Vdc
Current max: 0.5 Aac / 0.3Adc

Relay output, terminal (13,14)
Voltage max: 32 V AC / 30 VDC
Power max: 64 VA / 60 W
Current max: 2 A AC / 2 ADC
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/IIIB/IIIA
Ex nA nC IIC T4 Gc
[Ex ia Da] IIIIC
[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

Relé de estado, terminais (33,34)
Instalação em área não classificada:
Voltagem máx.: 125 VAC / 110 VDC
Power 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
<table>
<thead>
<tr>
<th>Module 9116B1</th>
<th>Module 9116B2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Terminal 51-52, 51-53</strong></td>
<td><strong>Terminal 51-52, 51-53</strong></td>
</tr>
<tr>
<td><strong>U1</strong></td>
<td><strong>U1</strong></td>
</tr>
<tr>
<td>30 V</td>
<td>30 V</td>
</tr>
<tr>
<td><strong>Ii</strong></td>
<td><strong>Ii</strong></td>
</tr>
<tr>
<td>120 mA</td>
<td>120 mA</td>
</tr>
<tr>
<td><strong>Pi</strong></td>
<td><strong>Pi</strong></td>
</tr>
<tr>
<td>900 mW</td>
<td>900 mW</td>
</tr>
<tr>
<td><strong>Ci</strong></td>
<td><strong>Ci</strong></td>
</tr>
<tr>
<td>3 nF</td>
<td>3 nF</td>
</tr>
<tr>
<td><strong>Li</strong></td>
<td><strong>Li</strong></td>
</tr>
<tr>
<td>1 μH</td>
<td>1 μH</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module 9116B1</th>
<th>Module 9116B2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Terminal 51-54, 52-54</strong></td>
<td><strong>Terminal 51-54, 52-54</strong></td>
</tr>
<tr>
<td><strong>Uo</strong></td>
<td><strong>Uo</strong></td>
</tr>
<tr>
<td>28 V</td>
<td>21.4 V</td>
</tr>
<tr>
<td><strong>Io</strong></td>
<td><strong>Io</strong></td>
</tr>
<tr>
<td>93 mA</td>
<td>93 mA</td>
</tr>
<tr>
<td><strong>Po</strong></td>
<td><strong>Po</strong></td>
</tr>
<tr>
<td>650 mW</td>
<td>650 mW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module 9116B1</th>
<th>Module 9116B2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Terminal 51-53</strong></td>
<td><strong>Terminal 51-53</strong></td>
</tr>
<tr>
<td><strong>Uo</strong></td>
<td><strong>Uo</strong></td>
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<tr>
<td>28 V</td>
<td>21.4 V</td>
</tr>
<tr>
<td><strong>Io</strong></td>
<td><strong>Io</strong></td>
</tr>
<tr>
<td>1.1 mA</td>
<td>1.1 mA</td>
</tr>
<tr>
<td><strong>Po</strong></td>
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</tr>
<tr>
<td>8 mW</td>
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<table>
<thead>
<tr>
<th>Module 9116B1</th>
<th>Module 9116B2</th>
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<tr>
<td><strong>Terminal 51-52</strong></td>
<td><strong>Terminal 51-52</strong></td>
</tr>
<tr>
<td><strong>Uo</strong></td>
<td><strong>Uo</strong></td>
</tr>
<tr>
<td>8.3 V</td>
<td>8.3 V</td>
</tr>
<tr>
<td><strong>Io</strong></td>
<td><strong>Io</strong></td>
</tr>
<tr>
<td>0.2 mA</td>
<td>0.2 mA</td>
</tr>
<tr>
<td><strong>Po</strong></td>
<td><strong>Po</strong></td>
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<tr>
<td>0.4 mW</td>
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<tr>
<th>Module 9116B1</th>
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<td><strong>Terminal 41,42,43,44</strong></td>
<td><strong>Terminal 41,42,43,44</strong></td>
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<tr>
<td><strong>Uo</strong></td>
<td><strong>Uo</strong></td>
</tr>
<tr>
<td>8.3 V</td>
<td>8.3 V</td>
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<tr>
<td><strong>Io</strong></td>
<td><strong>Io</strong></td>
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<tr>
<td>13.1 mA</td>
<td>13.1 mA</td>
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<tr>
<td><strong>Po</strong></td>
<td><strong>Po</strong></td>
</tr>
<tr>
<td>27.3 mW</td>
<td>27.3 mW</td>
</tr>
</tbody>
</table>

### 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 conformidade com o tipo de proteção ‘Ex n’ ou ‘Ex e’, fornecendo no mínimo grau de proteção IP54.

Dispositivos de entrada de cabo e elementos de vedação devem cumprir com os mesmos requisitos.

Para a instalação de trilho de energia na Zona 2, apenas o trilho de alimentação Rail 9400 fornecido pela Unidade de Controle de Potência 9410 é permitido.
Module 9116B 1/2

Terminal 54-52

<table>
<thead>
<tr>
<th>Ui</th>
<th>30 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>li</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>
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</table>

Module 9116B1

Term. 54-52; 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>Uo</td>
<td>28 V</td>
<td>IIIC</td>
<td>80 nF</td>
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<tr>
<td>lo</td>
<td>93 mA</td>
<td>IIIB</td>
<td>640 nF</td>
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<tr>
<td>Po</td>
<td>650 mW</td>
<td>IIA</td>
<td>2.1 μF</td>
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Module 9116B2

Term. 54-52; 51-52

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<th>Group</th>
<th>Co</th>
<th>Lo</th>
<th>Lo/Ro</th>
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<tbody>
<tr>
<td>Uo</td>
<td>21.4 V</td>
<td>IIIC</td>
<td>0.16 μF</td>
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<tr>
<td>lo</td>
<td>93 mA</td>
<td>IIIB</td>
<td>1.13 μF</td>
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<tr>
<td>Po</td>
<td>650 mW</td>
<td>IIA</td>
<td>4.15 μF</td>
</tr>
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</table>

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)
U_m: 253 V máx. 400 Hz
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
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 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>Terminal 51-52</th>
<th>U</th>
<th>li</th>
<th>Pi</th>
<th>Ci</th>
<th>Li</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>30 V</td>
<td>120 mA</td>
<td>900 mW</td>
<td>3 nF</td>
<td>2 μH</td>
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<table>
<thead>
<tr>
<th>Module 9116B 1/2</th>
<th>Group</th>
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<th>Lo</th>
<th>Lo/RO</th>
</tr>
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<tbody>
<tr>
<td>Term. 52-51,51-52</td>
<td>Uo: 16.6 V</td>
<td>IIC</td>
<td>0.4 μF</td>
<td>100 mH</td>
</tr>
<tr>
<td>Io: 0.2 mA</td>
<td>IIb</td>
<td>2.3 μF</td>
<td>100 mH</td>
<td>100mH/Ω</td>
</tr>
<tr>
<td>Po: 0.8 mW</td>
<td>IIA</td>
<td>9.5 μF</td>
<td>100 mH</td>
<td>200mH/Ω</td>
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## 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>
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</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>
<tr>
<td>107</td>
<td>1815</td>
<td>Relay data updated, graph with resistive loads inserted. ATEX and IECEx installation drawings updated with new relay data.</td>
</tr>
</tbody>
</table>
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