9202
Pulse isolator

No. 9202V105-UK
Product version: 9202-003
PR electronics A/S offers a wide range of analog and digital signal conditioning devices for industrial automation. The product range includes Isolators, Displays, I.S. Interfaces, Temperature Transmitters, and Universal Devices. You can trust our products in the most extreme environments with electrical noise, vibrations and temperature fluctuations, and all products comply with the most exacting international standards. »Signals the Best« is the epitome of our philosophy - and your guarantee for quality.
PULSE ISOLATOR
9202
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**WARNING**
The following operations should only be carried out on a disconnected module and under ESD-safe conditions:
- General mounting, connection and disconnection of wires.
- Troubleshooting the module.

**WARNING**
Do not open the front plate of the module as this will cause damage to the connector for the display / programming front PR 4501. This module contains no DIP-switches or jumpers.

**SYMBOL IDENTIFICATION**

- **Triangle with an exclamation mark**: Read the manual before installation and commissioning of the module in order to avoid incidents that could lead to personal injury or mechanical damage.

- **The CE mark** proves the compliance of the module with the essential requirements of the directives.

- **The double insulation symbol** shows that the module is protected by double or reinforced insulation.

- **Ex** modules have been approved according to the ATEX directive for use in connection with installations in explosive areas.

**SAFETY INSTRUCTIONS**

**DEFINITIONS**

**Hazardous voltages** have been defined as the ranges: 75...1500 Volt DC, and 50...1000 Volt AC.

**Technicians** are qualified persons educated or trained to mount, operate, and also troubleshoot 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 module without damaging it. The packing should always follow the module until this has been permanently mounted. Check at the receipt of the module whether the type corresponds to the one ordered.

ENVIRONMENT
Avoid direct sunlight, dust, high temperatures, mechanical vibrations and shock, as well as rain and heavy moisture. If necessary, heating in excess of the stated limits for ambient temperatures should be avoided by way of ventilation. The module must be installed in pollution degree 2 or better. The module 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 module. Should there be any doubt as to the correct handling of the module, please contact your local distributor or, alternatively,

PR electronics A/S

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 module is provided with field wiring terminals and shall be supplied from a Power Supply having double / reinforced insulation. A power switch should be easily accessible and close to the module. The power switch should be marked with a label telling that it will switch off the voltage to the module.

For installation on Power Rail 9400 the power is supplied by the 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 modules 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 module is easily accessible.

CLEANING
When disconnected, the module may be cleaned with a cloth moistened with distilled water.

LIABILITY
To the extent that 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 DISMANTLE SYSTEM 9000

Picture 1:
By lifting the bottom lock, the module is detached from the power rail.
PULSE ISOLATOR
9202

- Interface for NAMUR sensors and switches
- Extended self-diagnostics and detection of cable fault
- 1 or 2 channels
- Can be supplied separately or installed on power rail, PR type 9400
- SIL 2-certified via Full Assessment

Advanced features

- Configuration and monitoring by way of detachable display front (PR 4501).
- Selection of direct or inverted function for each channel via PR 4501.
- Advanced monitoring of internal communication and stored data.
- Optional redundant supply via power rail and/or separate supply.
- SIL 2 functionality is optional and must be activated in a menu point.

Application

- The module 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.
- Pulse isolator for transmission of signals to the safe area from NAMUR sensors and mechanical switches installed in the hazardous area.
- Monitoring of error events and cable breakage via the individual status relay and/or a collective electronic signal via the power rail.
- The 9202 has been designed, developed and certified for use in SIL 2 applications according to the requirements of IEC 61508.

Technical characteristics

- 1 green and 2 yellow/red front LEDs indicate operation status and malfunction.
- 2.6 kVAC galvanic isolation between input, output and supply.
Applications

Input signals:
Channel 1:
- NAMUR
- Mechanical switch
  +
  -

Channel 2:
- NAMUR
- Mechanical switch
  +
  -

Output signals:
- Relay
  - Ch. 1:
    Channel 1: N.O. or N.C.
    Relay
    N.O. or N.C.
  - Ch. 2:
    Channel 2: N.O. or N.C.
    Relay
    N.O. or N.C.

Power connection:
- Rail, +24 VDC
- Rail, Gnd.
- Status relay signal
- Gnd.
- Supply +19.2...31.2 VDC
- Module status
- Module 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

Power rail

Supply via power rail
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 9202.
- When mounted in the process, the display shows process values and module status.

Technical characteristics

- LCD display with 4 lines; Line 1 (H=5.57 mm) shows status for each channel (OK or error). Line 2 (H=3.33 mm) shows output for channel 1 (ON / OFF), line 3 (H=3.33 mm) shows output for channel 2 (ON / OFF), and line 4 shows whether the module is SIL-locked. Static dot = SIL-locked and flashing dot = not SIL-locked. Line 4 also indicates status for relay 1 and relay 2.
- In order to protect the configuration against unauthorised changes, access to the menus can be blocked by a password.
MOUNTING / DEMOUNTING THE PR 4501/4511

1: Insert the taps of 4501/4511 into the holes at the top of the device.
2: Swing 4501/4511 into place.

Demounting of 4501/4511

3: Push the release button on the bottom of 4501/4511 and swing 4501/4511 up.
Order: 9202B

<table>
<thead>
<tr>
<th>Type</th>
<th>Switch</th>
<th>Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>9202B</td>
<td>Opto........ : 1</td>
<td>Single ...... : A</td>
</tr>
<tr>
<td></td>
<td>Relay N.O.  : 2</td>
<td>Double ...... : B</td>
</tr>
<tr>
<td></td>
<td>Relay N.C... : 3</td>
<td></td>
</tr>
</tbody>
</table>

Accessories

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4501</td>
<td>Display / programming front</td>
</tr>
<tr>
<td>4511</td>
<td>Communication enabler</td>
</tr>
<tr>
<td>9400</td>
<td>Power rail</td>
</tr>
<tr>
<td>9404</td>
<td>Module stop for rail</td>
</tr>
<tr>
<td>9410</td>
<td>Power control unit</td>
</tr>
<tr>
<td>9420</td>
<td>Power supply 24 V / 120 W - Ex nAC</td>
</tr>
</tbody>
</table>

Electrical specifications

Environmental conditions
Specifications range............................................... -20...+60°C
Storage temperature.............................................. -20...+85°C
Calibration temperature........................................ 20...28°C
Relative humidity..................................................... < 95% RH (non-cond.)
Protection degree.................................................... IP20
Installation in............................................................. Pollution degree 2 & measurement / 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.................................................. 170 g
Weight incl. 4501 / 4511 (approx.)............. 185 g / 270 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 : 2007
Vibration: 2...13.2 Hz.............................................. ±1 mm
Vibration: 13.2...100 Hz......................................... ±0.7 g
Common specifications:
Supply voltage, DC................................. 19.2...31.2 VDC
Max. consumption............................. ≤ 3 W (2 channels)
Fuse................................................... 400 mA SB / 250 VAC
Isolation voltages, test / operation:
Inputs / outputs / supply ...................... 2.6 kVAC / 300 VAC reinforced
Output 1 to output 2 .............................. 1.5 kVAC / 150 VAC reinforced
Status relay to supply ............................ 1.5 kVAC / 150 VAC reinforced
Communications interface ...................... Communication enabler 4511 / Programming front 4501
Response time for cable fault .................. < 200 ms
Calibration temperature ....................... 20...28°C
Auxiliary supplies:
NAMUR supply................................. 8 VDC / 8 mA

Inputs:
Sensor types:
NAMUR according to ......................... EN 60947-5-6
Mechanical switch with series \((R_s)\) and parallel \((R_p)\) resistance:
\(R_s\) .............................................. Nom. 750 \(\Omega\)
\(R_p\) .............................................. Nom. 15 k\(\Omega\)
Frequency range ................................. 0...5 kHz
Min. pulse length ................................ > 0.1 ms
Input resistance .................................. Nom. 1 k\(\Omega\)
Trig level, signal ................................. < 1.2 mA, > 2.1 mA
Trig level, cable fault ......................... < 0.1 mA, > 6.5 mA

Outputs:
Relay outputs:
Status relay:
Max. voltage..................................... 125 VAC / 110 VDC
Max. current ................................... 0.5 A AC / 0.3 A DC
Max. power ....................................... 62.5 VA / 32 W
Relay outputs:
Max. switch frequency ......................... 20 Hz
Max. voltage ................................... 250 VAC / 30 VDC
Max. current ................................... 2 A AC / 2 A DC
Max. power ....................................... 500 VA / 60 W
Opto, NPN outputs:
Max. switch frequency ......................... 5 kHz
Min. pulse length ................................ > 0.1 ms
Max. load, current / voltage .................. 80 mA / 30 VDC
Voltage drop at 80 mA ......................... < 2.5 VDC
Approvals:
EMC 2004/108/EC .................................................. EN 61326-1
LVD 2006/95/EC .................................................. EN 61010-1
UL, Standard for Safety ....................................... UL 61010-1
EAC TR-CU 020/2011 ........................................... EN 61326-1

Marine:
Det Norske Veritas, Ships & Offshore ............. Stand. f. Certific. No. 2.4

I.S. / Ex:
ATEX 94/9/EC .................................................. KEMA 07ATEX0146 X
IECEx ......................................................... IECEx KEM 06.0039 X
c FM us .......................................................... 3034430-C
INMETRO ..................................................... NCC 12.1307 X
CCOE ............................................................ P337349/5
EAC Ex TR-CU 012/2011 ................................ RU C-DK.GB08.V.00410

Functional Safety:
SIL2 Certified & Fully Assessed acc. to IEC 61508

Configuration of cable fault check

Diagnostics

<table>
<thead>
<tr>
<th>Module:</th>
<th>Configuration, common for both channels</th>
<th>Cable fault detection:</th>
</tr>
</thead>
<tbody>
<tr>
<td>9202</td>
<td>CA.BR = Yes or CA.SH = Yes</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>Else:</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Cable fault detection

<table>
<thead>
<tr>
<th>Input</th>
<th>Event</th>
<th>Readout</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>Cable break</td>
<td>CA.BR</td>
<td>&lt; 0.1 mA</td>
</tr>
<tr>
<td>All</td>
<td>Short-circuited cable</td>
<td>CA.SH</td>
<td>&gt; 6.5 mA</td>
</tr>
</tbody>
</table>
Hardware / Software error

Readout at hardware error:

<table>
<thead>
<tr>
<th>Error search</th>
<th>Readout</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communications test 4501 / 9202</td>
<td>NO.CO</td>
<td>Connection error</td>
</tr>
<tr>
<td>EEprom error - check configuration</td>
<td>FL.ER</td>
<td>Configuration error or crc mismatch, recovery configuration is loaded</td>
</tr>
<tr>
<td>Hardware error</td>
<td>DE.ER</td>
<td>Invalid recovery configuration in device</td>
</tr>
<tr>
<td>Hardware error</td>
<td>FC.ER</td>
<td>Invalid code checksum in 4501</td>
</tr>
<tr>
<td>EEprom error - check configuration</td>
<td>CO.ER</td>
<td>Invalid configuration (CRC or data)</td>
</tr>
<tr>
<td>Hardware error</td>
<td>CA.ER</td>
<td>Factory calibration error</td>
</tr>
<tr>
<td>Hardware error</td>
<td>HW.ER</td>
<td>HW setup - configuration mismatch</td>
</tr>
<tr>
<td>Hardware error</td>
<td>OC.ER</td>
<td>Main output controller communication error</td>
</tr>
<tr>
<td>Hardware error</td>
<td>MS.ER</td>
<td>Main internal supply out of bounds</td>
</tr>
<tr>
<td>Hardware error</td>
<td>MI.ER</td>
<td>Main initialisation selftest failed</td>
</tr>
<tr>
<td>Hardware error</td>
<td>MC.ER</td>
<td>Main flash or ram selftest failed</td>
</tr>
</tbody>
</table>

All error indications in the display flash once per second. The help text explains the error. In case of cable fault the backlight also flashes. This can be reset by pressing the key.

Errors affecting both channels are shown as error on channel 1 - and the line showing channel 2 is blank.

Hardware error can be reset in two ways. Either step through the menus (if the other channel is to stay in operation) or power cycle the module.

FUNCTION DESCRIPTION

Examples of connections in connection drawing and block diagram (1)...(4)

(1) NAMUR sensor with cable error detection in case of cable disconnection or short-circuit.

(2) Mechanical contact with cable error detection in case of cable disconnection or short-circuit, when Rs and Rp are mounted on the contact.

(3) Mechanical contact with cable error detection in case of cable disconnection, when Rp is mounted on the contact.

(4) Mechanical contact without cable error detection.
CONNECTIONS

Inputs:

Channel 1

NAMUR sensor, cable fault (1)

Switch, cable fault (2)

Switch, no cable fault (4)

Switch, cable fault, disconnection (3)

Channel 2

NAMUR sensor, cable fault (1)

Switch, cable fault (2)

Switch, no cable fault (4)

Switch, cable fault, disconnection (3)

Outputs:

Channel 1

Relay, N.C.

Relay, N.O.

Opto, NPN

Channel 2

Relay, N.C.

Relay, N.O.

Opto, NPN

R_p = 15 kΩ
R_s = 750 Ω

NC = no connection

(1)...(4) = See function description on page 12
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**RC Diagram**

- Power rail connections
- Supply +24 VDC
- Status relay N.C.
- Status relay N.C.

**Channel 1**
- Opto + or relay N.O.
or relay N.C.
- Opto - or relay N.O.
or relay N.C.

**Channel 2**
- Opto + or relay N.O.
or relay N.C.
- Opto - or relay N.O.
or relay N.C.

**NAMUR sensor**

- Device status, Green
- Ch. 1 status, Yellow/Red
- Ch. 2 status, Yellow/Red

- Switch, cable error
- Opto + or relay N.O.
or relay N.C.
- Opto - or relay N.O.
or relay N.C.

**9202**

- RP = 15 kΩ
- RS = 750 Ω

(1)...(4) = See function description on page 12

* NC = no connection
<table>
<thead>
<tr>
<th>State</th>
<th>Green LED</th>
<th>Ch. 1: Yellow / red</th>
<th>Ch. 2: Yellow / red</th>
<th>Status relay, N.C.</th>
<th>Power rail signal status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module OK</td>
<td>Flashing</td>
<td>OFF</td>
<td>OFF</td>
<td>Energised</td>
<td>OFF</td>
</tr>
<tr>
<td>No supply</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>De-energised</td>
<td>ON</td>
</tr>
<tr>
<td>Module defective</td>
<td>OFF</td>
<td>Red</td>
<td>Red</td>
<td>De-energised</td>
<td>OFF</td>
</tr>
<tr>
<td>Channel 1, relay energised</td>
<td>Flashing</td>
<td>Yellow</td>
<td>Energised</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>Channel 1, relay de-energised at cable fault</td>
<td>Flashing</td>
<td>Red flashing</td>
<td>De-energised</td>
<td>ON (if activated)</td>
<td></td>
</tr>
<tr>
<td>Channel 1, relay de-energised</td>
<td>Flashing</td>
<td>OFF</td>
<td>Energised</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>Channel 2, relay energised</td>
<td>Flashing</td>
<td>Yellow</td>
<td>Energised</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>Channel 2, relay de-energised at cable fault</td>
<td>Flashing</td>
<td>Red flashing</td>
<td>De-energised</td>
<td>ON (if activated)</td>
<td></td>
</tr>
<tr>
<td>Channel 2, relay de-energised</td>
<td>Flashing</td>
<td>OFF</td>
<td>Energised</td>
<td>OFF</td>
<td></td>
</tr>
</tbody>
</table>
Documentation for routing diagram.

In general

When configuring the 9202, 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 module in order to ensure a high degree of protection against unauthorised modifications to the configuration. Default password 2008 allows access to all configuration menus.

Cable fault information via display front 4501

Cable fault (see limits in the table) is displayed as CA.BR (cable break) or CA.SH (cable short-circuited). Cable fault is shown independently for each channel but the configuration is common for both channels. In case of cable fault the backlight flashes. This can be reset by pressing the key. When the cable fault has been remedied, the module will return to normal operation.
Advanced functions
The unit gives access to a number of advanced functions which can be reached by answering “Yes” to the point “adv.set”.

Display setup: Here you can adjust the brightness contrast and the backlight. Setup of tag numbers with 5 alphanumerics. Selection of functional readout in line 2 and 3 of the display - choose between readout of digital output or tag no. When selecting “ALT” the readout toggles between digital output and tag no.

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.

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 errors in the module are transmitted to the central surveillance in the PR 9410 power control unit.

Safety integrity level: See Safety Manual for details
SCROLLING HELP TEXTS IN DISPLAY LINE 3

[01] Set correct password [PASS]
[02] Enter advanced setup [ADV.SET]
[03] Enable cable short circuit error indication [CA.SH]
[04] Enable cable breakage error indication? [CA.BR]
[05] Enable rail status signal output? [RAIL.ER]
[06] Enter language setup [SETUP]
[07] Enter password setup [SETUP]
[08] Enter display setup [SETUP]
[09] Enter rail setup [SETUP]
[10] Enter SIL setup [SETUP]
[11] Select Direct channel function [CH1.FUN] [CH2.FUN]
    Select Inverted channel function [CH1.FUN] [CH2.FUN]
[12] Adjust LCD contrast [CONTRA]
[14] Write a 5-character channel TAG ['TAGON'] ['TAGON]
[15] Show Output load in display [DISP]
    Show Output state in display
    Show TAG in display
    Alternate information shown in display
[16] Configuration SIL status (Open / Locked) [CONFIG]
[17] Enable SIL configuration lock [EN.SIL]
[18] Enable Password protection [EN.PASS]
[19] Set New password [NEW.PAS]
[20] Select Language [LANGUA]
[21] Cable short circuit [I.CA.SH] [I.OFF]
[22] Cable breakage [I.ON] [I.CA.BR]
### 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

#### 1.0 = Default state
- Line 1 shows status for channel 1 and channel 2.
- Line 2 shows status for sensor 1.
- Line 3 shows status for sensor 2.
- Line 4 indicates whether the module is SIL-locked.

1.1 = Only if password-protected
1.2 = If password has been set.

#### Line 1 symbols:
- ™ = OK. Flashing “™” = error

#### Line 2 and 3 symbols:
- Input frequency > 1 Hz = ™

#### Line 4 symbols:
- Static dot = SIL-locked
- Flashing dot = not SIL-locked

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

If SIL-locked directly to [EN,SIL]

Continued on the page Routing diagram ADV.SET
ROUTING DIAGRAM,
ADVANCED SETTINGS (ADV.SET)
APPENDIX

IECE\textsuperscript{x} INSTALLATION DRAWING
ATEX INSTALLATION DRAWING
FM INSTALLATION DRAWING
INMETRO INSTALLATION DRAWING
SAFETY MANUAL
IECEx Installation drawing

For safe installation of 9202B 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.

IECEx Certificate: KEM 06.0039 X

Marking:
- [Ex ia Ga] IIIC/IIB/IIA
- Ex n A n C II C T 4 G c
- [Ex ia Da] III C
- [Ex ia Ma] I

Standards:
- IEC60079-26: 2006

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

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

Installation notes.
- Install in pollution degree 2, overvoltage category II as defined in IEC60664-1
- Do not separate connectors when energized and an explosive gas mixture is present.
- Do not mount or remove modules from the Power Rail when an explosive gas mixture is present.
- Disconnect power before servicing.
- The wiring of unused terminals is not allowed.

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

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

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

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

- $U_o: 10.6 \text{ VDC}$
- $I_o: 12 \text{ mADC}$
- $P_o: 32 \text{ mW}$
- $L_o/R_o: 1150 \mu\Omega$

<table>
<thead>
<tr>
<th>Co</th>
<th>IIC</th>
<th>IIB</th>
<th>IIA</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 \mu F</td>
<td>6.0 \mu F</td>
<td>18 \mu F</td>
<td>90 \mu F</td>
<td></td>
</tr>
<tr>
<td>260 mH</td>
<td>780 mH</td>
<td>1000 mH</td>
<td>1000 mH</td>
<td></td>
</tr>
</tbody>
</table>

**Supply / Output:**

- Terminal 11,12,13,14
- Terminal 31,32,33,34
- Terminal 91,92,93,94,95

- $U_{in}: 253 \text{ V max. 400 Hz}$

**Terminal CH1(11,12) CH2(13,14)**

**Digital output:** NPN output:
- Voltage max. 30 VDC
- Current max. 80 mA

**Relay output:** Non Hazardous location Zone 2 installation
- Voltage max. 250 VAC / 30 VDC
- Power max. 500 VA / 60 W
- Current max. 2 AAC / 2 ADC

- Voltage max. 32 V AC / 30 VDC
- Power max. 64 VA / 60 W
- Current max. 2 AAC / 2 ADC
ATEX Installation drawing

For safe installation of 9202B 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.

ATEX Certificate KEMA 07 ATEX 0146 X

Marking

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

Standards


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

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

Installation notes:
Install in pollution degree 2, overvoltage category II as defined in EN 60664-1

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.
U₀: 10.6 VDC  
I₀: 12 mADC  
P₀: 32 mW  
L₀/R₀: 1150 μH/Ω

<table>
<thead>
<tr>
<th>C₀</th>
<th>L₀</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 μF</td>
<td>260 mH</td>
<td>2.0 μF</td>
<td>260 mH</td>
</tr>
<tr>
<td>6.0 μF</td>
<td>780 mH</td>
<td>6.0 μF</td>
<td>780 mH</td>
</tr>
<tr>
<td>18 μF</td>
<td>1000 mH</td>
<td>18 μF</td>
<td>1000 mH</td>
</tr>
<tr>
<td>90 μF</td>
<td>1000 mH</td>
<td>90 μF</td>
<td>1000 mH</td>
</tr>
</tbody>
</table>

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

Terminal CH1(11,12) CH2(13,14)  
Digital output: NPN output:  
Voltage max 30 VDC  
Current max 80 mA

Terminal CH1(11,12) CH2(13,14)  
Relay output: Non Hazardous location Zone 2 installation  
Voltage max. 250 VAC / 30 VDC 32 VAC / 30 VDC  
Power max. 500 VA / 60 W 64 VA / 60 W  
Current max. 2 AAC / 2 ADC 2 AAC / 2 ADC

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

Ta: -20 ≤ Ta ≤ 60ºC  
Um: 253 V max. 400 Hz  
U₀: 253 V max. 400 Hz
FM Installation drawing

For safe installation of 9202B 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 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 3034430

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

Non Hazardous area or
Class I, Division 2, Group A,B,C,D T4 or Class I, Zone 2 Group IIC T4

Simple Apparatus or Intrinsically safe apparatus
with entity parameters:
Vmax (Uj) ≥ Vt (Uo)
Imax (I) ≥ It (Io)
Pi ≥ Pt(Po)
Ca(Co) ≥ Ccable + Ci
La(Lo) ≥ Lcable + Li

Uo / Vt: 10.6 V
Io / Isc: 12 mA
Pd/Pi: 32 mW
Lo/Ro La/Ra: 1150 µH/Ω

<table>
<thead>
<tr>
<th>Group</th>
<th>IIC</th>
<th>IIB</th>
<th>IIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>A,B</td>
<td>C,E,F</td>
<td>D,G</td>
</tr>
<tr>
<td>Cj/C0</td>
<td>2.0 µF</td>
<td>6.0 µF</td>
<td>18 µF</td>
</tr>
<tr>
<td>L0/Lj</td>
<td>260 mH</td>
<td>780 mH</td>
<td>1000 mH</td>
</tr>
</tbody>
</table>

Terminal CH1(44,42) CH2(54,52)
Terminal (31,32)

Supply:
- Voltage: 19.2 – 31.2 VDC
- Power: max. 3 W

Terminal (33,34)

Status Relay: Non Hazardous location: Division 2 or Zone 2 installation:
- Voltage max.: 125 VAC / 110 VDC; 32 VAC / 32VDC
- Power max.: 62.5 VA / 32 W; 16 VA / 32 W
- Current max.: 0.5 AAC / 0.3 ADC; 0.5 AAC / 1 ADC

Terminal CH1(11,12) CH2(13,14)

Digital output: NPN output:
- Voltage max.: 30 VDC
- Current max.: 80 mA

Terminal CH1(11,12) CH2(13,14)

Relay output: Non Hazardous location: Division 2 or Zone 2 installation:
- Voltage max.: 250 VAC / 30VDC; 32 VAC / 30VDC
- Power max.: 500 VA / 60W; 64 VA / 60 W
- Current max.: 2 AAC / 2ADC; 2 AAC / 2 ADC

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, overvoltage category II.

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

For installation in Zone 2 or Division 2, the module must be installed in a suitable outer enclosure according to the regulations in the CEC for Canada or NEC for USA.

The module is galvanically 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 and / or suitability for Div. 2 / Zone 2.

Warning: To prevent ignition of 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.
INMETRO Desenhos para Instalação

Para instalação segura do 9202B 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 .......... NCC 12.1307X

Marcas
[Ex ia Ga] IIC/IIB/IIA
Ex nA nC IIC T4 Gc
[Ex ia Da] IIIC

Normas
IEC60079-26: 2006

Terminais de fonte de alimentação (31,32)
Voltagem: 19.2 – 31.2 VDC

Relê de estado. terminais (33,34) Instalação Zona 2
Voltagem máx.: 125 VAC / 110 VDC
Potência máx.: 62,5 VA / 32 W
Corrente máx.: 0,5 A AC / 0,3 ADC

Notas de instalação:
Instalação em grau de poluição 2, categoria de sobretensão II conforme definido no IEC 60664-1
Não separe conectores quando energizado ou quando uma mistura de gás explosivo estiver presente.
Não monte ou remova módulos do trilho de alimentação quando uma mistura explosiva de gás estiver presente.
Desligue a alimentação antes da manutenção.
A fiação de terminais sem uso não é permitida.
A fonte de Loop e terminais de entrada de corrente para o mesmo canal não deve ser aplicada ao mesmo tempo.
Em tipo de proteção [Ex ia Da] os parâmetros para a segurança intrínseca para grupo de gás IIIB são aplicáveis.
Para a instalação em Zona 2, o módulo deve ser instalado em um invólucro certificado conforme as normas da série ABNT NBR IEC 60079 que proporcione um grau de proteção de pelo menos 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.
Entrada Ex:
CN1 (terminais 41,42,43,44)
CN2 (terminais 51,52,53,54)

U_o: 10,6 VDC
I_o: 12 mA DC
P_o: 32 mW
Lo/Ro: 1150 μH/Ω

<table>
<thead>
<tr>
<th>Co</th>
<th>C_o</th>
<th>C_o</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,0 μF</td>
<td>6,0 μF</td>
<td>18 μF</td>
</tr>
<tr>
<td>260 mH</td>
<td>780 mH</td>
<td>1000 mH</td>
</tr>
</tbody>
</table>

Fonte / Saída:
(terminais 11,12,13,14)
(terminais 31,32,33,34)
(terminais 91,92,93,94,95)

Saída digital: Saída NPN:
Voltagem máx.: 30 VDC
Corrente máx.: 80 mA

Saída relé: Área de não Risco Instalação Zona 2
Voltagem máx.: 250 VAC / 30 VDC 32 V AC / 30 VDC
Potência máx.: 500 VA / 60 W 64 VA / 60 W
Corrente máx.: 2 AAC / 2 ADC 2 AAC / 2 ADC
This safety manual is valid for the following product versions:

9202-002

9202-003
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3. Purpose of the product
4. Assumptions and restrictions for use of the product
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  4.2 Associated equipment
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    4.2.2 Opto output
    4.2.3 Field device
  4.3 Failure rates
  4.4 Safe parameterisation
  4.5 Installation in hazardous areas
5. Functional specification of the safety functions
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9. Failure category
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   14.2 Verification procedure
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   14.3 Functional test
15 Fault reaction and restart condition
16 User interface
   16.1 Scrolling help texts in display line 3
   16.2 Routing diagram
   16.3 Routing diagram - Advanced settings (ADV.SET)
17 Connections diagram
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 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**

Pulse isolator for transmission of signals to the safe area from NAMUR sensors and mechanical switches installed in the hazardous area.

The module 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 breakage, are monitored and signalled via the individual status relay and/or a collective electronic signal via the power rail.

The 9202 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
- Output pulse length, min.: 40 μs
- Mounting area: Zone 2 / Division 2 or safe area
- Mounting environment: Pollution degree 2 or better

4.2 **Associated equipment**

4.2.1 **Relay output**

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

4.2.2 **Opto output**

The opto output signals are fed to SIL 2 compliant inputs of a safety PLC specified to receive a frequency of 5 kHz and a pulse length down to 40 microseconds or the field device signal pulse length minus 60 microseconds.

4.2.3 **Field device**

The field device must provide a minimum pulse length of 100 microseconds.

4.3 **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.
4.4 **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.

4.5 **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 functions**

Pulse isolator as well as supply of NAMUR sensors and mechanical switches with cable error detection installed in the hazardous area. Cable error detection only works with NAMUR sensors or with the use of external resistors $R_S$ and $R_P$. See connections diagram at page 13 (switch, cable fault).

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></th>
<th>Relay</th>
<th>Opto</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of dangerous Failure per Hour (PFH)</td>
<td>4.66E-8</td>
<td>3.62E-8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note¹, Note²</td>
</tr>
<tr>
<td>Probability of failure on demand (PFD) - 1 year proof test interval</td>
<td>2.04E-4</td>
<td>1.58E-4</td>
</tr>
<tr>
<td>Proof test interval (10% of loop PFD)</td>
<td>4 years</td>
<td>5 years</td>
</tr>
<tr>
<td>Safe Failure Fraction</td>
<td>90%</td>
<td>91%</td>
</tr>
<tr>
<td>Demand response time, opto output</td>
<td>&lt;125 µs</td>
<td></td>
</tr>
<tr>
<td>Demand response time, relay output</td>
<td>&lt;10 ms</td>
<td></td>
</tr>
<tr>
<td>Demand mode</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Demand rate</td>
<td>1000 s</td>
<td></td>
</tr>
<tr>
<td>Mean Time To Repair (MTTR)</td>
<td>8 hours</td>
<td></td>
</tr>
<tr>
<td>Diagnostic test interval</td>
<td>10 seconds</td>
<td></td>
</tr>
<tr>
<td>Hardware Fault Tolerance (HFT)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Component Type</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>SIL capability</td>
<td>SIL 2</td>
<td></td>
</tr>
<tr>
<td>Description of the “Safe State”, opto output</td>
<td>High impedance</td>
<td></td>
</tr>
<tr>
<td>Description of the “Safe State”, relay output</td>
<td>De-energised</td>
<td></td>
</tr>
<tr>
<td>Relay lifetime (Note²)</td>
<td>100 000 times</td>
<td></td>
</tr>
</tbody>
</table>
Note¹: The 9202 contains no lifetime limiting components, therefore the PFH figures are valid for up to 12 years, according to IEC 61508.

Note²: The maximum frequency for Pulse Isolator 9202 with relay output is 20 Hz. 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.

9. **Failure category**

<table>
<thead>
<tr>
<th>Failure category</th>
<th>Failure rates (1/h)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Relay</td>
<td>Opto</td>
<td></td>
</tr>
<tr>
<td>Fail Safe Detected</td>
<td>0.000E+00</td>
<td>0.000E+00</td>
<td></td>
</tr>
<tr>
<td>Fail Safe Undetected</td>
<td>2.897E-07</td>
<td>2.755E-07</td>
<td></td>
</tr>
<tr>
<td>Fail Dangerous Detected</td>
<td>1.303E-07</td>
<td>1.356E-07</td>
<td></td>
</tr>
<tr>
<td>Fail Dangerous Undetected</td>
<td>4.658E-08</td>
<td>3.618E-08</td>
<td></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>Perform an ON / OFF signal for each channel</td>
</tr>
<tr>
<td>4</td>
<td>Observe whether the output channel 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 pulse isolator. 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 module 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 9202, 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:

- \( \wedge \) will increase the numerical value or choose the next parameter
- \( \vee \) will decrease the numerical value or choose the previous parameter
- \( \Box \) 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 \( \Box \) 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 module 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 Cable fault information via display front 4501

Cable fault (see limits in the table) is displayed as CA.BR (cable break) or CA.SH (cable short-circuited). Cable fault is shown independently for each channel but the configuration is common for both channels. In case of cable fault the backlight flashes. This can be reset by pressing the \( \Box \) key. When the cable fault has been remedied, the module will return to normal operation.

13.4 Advanced functions

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


13.4.1 Display setup
Here you can adjust the brightness contrast and the backlight. Setup of tag numbers with 5 alphanumerics. Selection of functional readout in line 2 and 3 of the display - choose between readout of digital output or tag no. When selecting "ALT" the readout toggles between digital output and tag no.

13.4.2 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.

13.4.3 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.

13.4.4 Power rail
In the menu "RAIL" you can choose if errors in the module are transmitted to the central surveillance in the PR 9410 power control unit.

13.4.5 Safety integrity level
See Safe parameterisation - user responsibility
14 Safe parameterisation - user responsibility

14.1 Safety-related configuration parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH1.FUN</td>
<td>DIR / INV</td>
<td>Direct / inverted channel function</td>
</tr>
<tr>
<td>CH2.FUN.</td>
<td>DIR / INV</td>
<td>Direct / inverted channel function</td>
</tr>
<tr>
<td>PASSW</td>
<td>0 - 9999</td>
<td>New password</td>
</tr>
</tbody>
</table>

The above safety-related configuration parameters are marked in red text in the routing diagrams and must be verified by the user in a SIL-configuration.

14.2 Verification procedure

The verification is done using the display / programming front PR 4501 by 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>DISP SETUP</td>
</tr>
<tr>
<td>3 Step down to (SIL SETUP) and press OK</td>
<td>EN.SIL</td>
</tr>
<tr>
<td>4 Set (EN SIL) to YES and press OK</td>
<td>NEW.PASS</td>
</tr>
<tr>
<td>5 Set password to a number between 0 and 9999 and press OK</td>
<td>Verify } Open &quot;briefly&quot; } LOCK*</td>
</tr>
<tr>
<td>6 Verify Channel 1 function and press OK</td>
<td>CH1.FUN</td>
</tr>
<tr>
<td>7 Verify Channel 2 function and press OK</td>
<td>CH2:FUN</td>
</tr>
<tr>
<td>8 Verify password and press OK</td>
<td>PASSW</td>
</tr>
<tr>
<td>9 Verify SIL and press OK</td>
<td></td>
</tr>
</tbody>
</table>

* Open is shown briefly in the display.
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>DISP SETUP</td>
</tr>
<tr>
<td>4 Step down to (SIL SETUP) and press OK</td>
<td>EN.SIL</td>
</tr>
<tr>
<td>5 Set (EN SIL) to YES and press OK</td>
<td>Verify(\Rightarrow)OPEN &quot;briefly&quot; (\Rightarrow)LOCK*</td>
</tr>
<tr>
<td>(At this time the module starts operating in SIL mode with the entered configuration parameters!)</td>
<td></td>
</tr>
<tr>
<td>6 Verify Channel 1 function and press OK</td>
<td>CH1.FUN</td>
</tr>
<tr>
<td>7 Verify Channel 2 function and press OK</td>
<td>CH2:FUN</td>
</tr>
<tr>
<td>8 Verify password and press OK</td>
<td>PASSW</td>
</tr>
<tr>
<td>9 Verify SIL and press OK</td>
<td></td>
</tr>
</tbody>
</table>

* Open is shown briefly in the display

14.3 Functional test

The user is responsible to make a functional test after verification of safety parameters. The procedure for periodic proof test described in section 10 shall be used.

15 Fault reaction and restart condition

When the 9202 detects a fault the output will go to Safe State, in which the opto output will go to “high impedance” or the relay output will go to “de-energised”. If the fault is application-specific (cable error detection) the 9202 will restart when the fault has been corrected.

For device faults there are 2 ways of bringing the module out of Safe State.
1. Power cycle the module.
2. Bring the module out of SIL mode (choose “NO” in the menu point “EN.SIL”), and set it back to SIL mode again (choose “YES” in the menu point “EN.SIL” and verify the configuration).
16 User interface

16.1 Scrolling help texts in display line 3

[01] Set correct password [PASS]
[02] Enter advanced setup [ADV.SET]
[03] Enable cable short circuit error indication [CA.SH]
[04] Enable cable breakage error indication? [CA.BR]
[05] Enable rail status signal output? [RAIL.ER]
[06] Enter language setup [SETUP]
[07] Enter password setup [SETUP]
[08] Enter display setup [SETUP]
[09] Enter rail setup [SETUP]
[10] Enter SIL setup [SETUP]
[11] Select direct channel function [CH1.FUN] [CH2.FUN]
[12] Select inverted channel function [CH1.FUN] [CH2.FUN]
[13] Adjust LCD contrast [CONTRA]
[14] Adjust LCD backlight [LIGHT]
[15] Write a 5-character channel ["TAGON"] ["TAGON"]
[16] Show output state in display [DISP]
[17] Show TAG in display
[18] Alternate shown information in display
[19] Configuration SIL status (Open / Locked) [CONFIG]
[20] Enable SIL configuration lock [EN.SIL]
[21] Enable password protection [EN.PASS]
[22] Set new password [NEW.PAS]
[23] Select language [LANGUA]
[24] Cable short circuit [^1CA.SH] [^2OFF]
[25] Cable breakage [^1ON] [^2CA.BR]
16.2 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

1.0 = Default state
Line 1 shows status for channel 1 and channel 2.
Line 2 shows status for sensor 1.
Line 3 shows status for sensor 2.
Line 4 indicates whether the module is SIL-locked.

1.1 = Only if password-protected
1.2 = If password has been set.

Line 1 symbols:
\[\text{OK} = \text{OK}. \text{ Flashing } = \text{error}\]

Line 2 and 3 symbols:
Input frequency > 1 Hz = \[\text{OK} \]

Line 4 symbols:
Static dot = SIL-locked
Flashing dot = not SIL-locked

1.0 = Default state
Line 1 shows status for channel 1 and channel 2.
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1.1 = Only if password-protected
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Line 1 symbols:
\[\text{OK} = \text{OK}. \text{ Flashing } = \text{error}\]

Line 2 and 3 symbols:
Input frequency > 1 Hz = \[\text{OK} \]

Line 4 symbols:
Static dot = SIL-locked
Flashing dot = not SIL-locked

To default state 1.0
16.3 Routing diagram - Advanced settings (ADV.SET)

To default state 1.0

Verification of SIL configuration
17. Connections diagram

Inputs:

<table>
<thead>
<tr>
<th>Channel 1</th>
<th>Channel 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAMUR sensor, cable fault</td>
<td>NAMUR sensor, cable fault</td>
</tr>
<tr>
<td>41 42 43 44</td>
<td>51 52 53 54</td>
</tr>
</tbody>
</table>

Outputs:

<table>
<thead>
<tr>
<th>Channel 1</th>
<th>Channel 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay, N.C.</td>
<td>Relay, N.C.</td>
</tr>
<tr>
<td>11 12 13 14</td>
<td>11 12 13 14</td>
</tr>
</tbody>
</table>

Rs = 750 Ω
Rp = 15 kΩ

NC = no connection

Version No. V5R0
Displays  Programmable displays with a wide selection of inputs and outputs for display of temperature, volume and weight, etc. Feature linearization, scaling, and difference measurement functions for programming via PReset software.

Ex interfaces  Interfaces for analog and digital signals as well as HART® signals between sensors / I/P converters / frequency signals and control systems in Ex zone 0, 1 & 2 and for some devices in zone 20, 21 & 22.

Isolation  Galvanic isolators for analog and digital signals as well as HART® signals. A wide product range with both loop-powered and multifunctional isolators featuring linearization, inversion, and scaling of output signals.

Temperature  A wide selection of transmitters for DIN form B mounting and DIN rail devices with analog and digital bus communication ranging from application-specific to multifunctional transmitters.

Multifunctional  PC or front programmable devices with universal options for input, output and supply. This range offers a number of advanced features such as process calibration, linearization and auto-diagnosis.