9202

Pulse isolator

No. 9202V102-IN
Product version: 9202-002

Signals the Best

PR electronics A/S offers a wide range of analogue and digital signal conditioning modules for industrial automation. The product range includes Isolators, Displays, Ex Interfaces, Temperature Transmitters, and Universal Modules. 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.

PR electronics A/S offre une large gamme de produits pour le traitement des signaux analogiques et numériques dans tous les domaines industriels. La gamme de produits s’étend des transmetteurs de température aux afficheurs, des isolateurs aux interfaces SI, jusqu’aux modules universels. Vous pouvez compter sur nos produits même dans les conditions d’utilisation sévères, p.ex. bruit électrique, vibrations et fluctuations de température. Tous nos produits sont conformes aux normes internationales les plus strictes. Notre devise »SIGNALS the BEST« c’est notre ligne de conduite - et pour vous l’assurance de la meilleure qualité.

**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.

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

**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.

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**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.

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**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.
EC DECLARATION OF CONFORMITY

As manufacturer

PR electronics A/S
Lerbakken 10
DK-8410 Rønde

hereby declares that the following product:

Type: 9202
Name: Pulse isolator

is in conformity with the following directives and standards:

The EMC Directive 2004/108/EC and later amendments

EN 61326-1 : 2006

For specification of the acceptable EMC performance level, refer to the electrical specifications for the module.

The Low Voltage Directive 2006/95/EC and later amendments

EN 61010-1 : 2001

The ATEX Directive 94/9/EC and later amendments

EN 61241-0:2006, EN 61241-11:2006, EN 60079-0:2006,
ATEX certificate: KEMA 07ATEX0146 X

Notified body

KEMA Quality B.V. (0344)
Utrechtseweg 310, 6812 AR Arnhem
P.O. Box 5185, 6802 ED Arnhem
The Netherlands

Rønde 26 November 2008

Peter Rasmussen
Manufacturer's signature
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 / div. 2 and receive signals from zone 0, 1, 2, 20, 21 and 22 / 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.
Input signals:

Channel 1:

NAMUR Mechanical switch

Output signals:

Channel 1: Opto + Opto - Opto + Opto -

Channel 2:

NAMUR Mechanical switch

Power rail

Status relay signal

Rail, +24 VDC

Rail, Gnd.

Power connection:

Gnd. -

Supply +19.2...31.2 VDC

Module status

Module status

Supply via power rail

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

Zone 2 / Cl. 1, div. 2, gr. A-D or safe area
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 / installation

• Click 4501 onto the front of 9202.
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>

4501 = Display / programming front
9400 = Power rail

Electrical specifications
Specifications range........................................... -20...+60°C
Storage temperature ........................................ -20...+85°C

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 ................................... Programming front 4501
Response time for cable fault .............................. < 200 ms
Calibration temperature .................................... 20...28°C
Auxiliary supplies:
  NAMUR supply .............................................. 8 VDC / 8 mA
  Vibration, IEC 60068-2-6 ................................. Test Fc, 1 g, 2...100 Hz
  Vibration, continuous, IEC 60068-2-64 ................ Test Fh, 1 g, 3...100 Hz
  Wire size .................................................. AWG 26...14 / 0.13...2.08 mm²
  stranded wire
Screw terminal torque ....................................... 0.5 Nm
Relative humidity ........................................... < 95% RH (non-cond.)
Dimensions, without display front (HxBxD) ........... 109 x 23.5 x 104 mm
Dimensions, with display front (HxBxD) ............. 109 x 23.5 x 116 mm
Protection degree ........................................... IP20
Weight .......................................................... 170 g / 185 g with 4501
**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 60 \(\mu s\)
- Max. load, current / voltage 80 mA / 30 VDC
- Voltage drop at 80 mA < 2.5 VDC

**Marine approval:**
- Det Norske Veritas, Ships & Offshore Pending

**GOST R approval:**
- VNIIIFTRI, Cert No. See www.prelectronics.com

**SIL certification:**
- exida, Cert No. PREI 070902 P0002 C01

**Observed authority requirements:**
- **Standard:**
  - EMC 2004/108/EC EN 61326-1
  - LVD 2006/95/EC EN 61010-1
  - ATEX 94/9/EC EN 60079-0, -11, -15 , -26 and EN 61241-0, -11
  - IECEx IEC 60079-0, -11, -15 and -26
  - IEC 61241-0 and -11
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 (CA.BR, CA.SH):

<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 \( \times \) 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)
41 42 43 44

Switch, cable fault (2)
41 42 43 44

Switch, no cable fault (4)
41 42 43 44

Switch, cable fault, disconnection (3)
41 42 43 44

Channel 2

NAMUR sensor, cable fault (1)
51 52 53 54

Switch, cable fault (2)
51 52 53 54

Switch, no cable fault (4)
51 52 53 54

Switch, cable fault, disconnection (3)
51 52 53 54

Outputs:

Channel 1

Relay, N.C.
11 12 13 14

Relay, N.O.
11 12 13 14

Opto, NPN
11 12 13 14

Channel 2

Relay, N.C.
11 12 13 14

Relay, N.O.
11 12 13 14

Opto, NPN
11 12 13 14

$R_P = 15 \, k\Omega$

$R_S = 750 \, \Omega$

NC = no connection

(1)...(4) = See function description on page 12
## Signal error and cable fault indications without display front

<table>
<thead>
<tr>
<th>List of LED and error signal indications</th>
<th>Green LED</th>
<th>State</th>
<th>Power rail signal status</th>
<th>Channel 1: Yellow / red</th>
<th>Channel 2: Yellow / red</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flashing</td>
<td>OFF</td>
<td>Module OK</td>
<td>Energised</td>
<td>Yellow</td>
<td>Yellow</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
<td>No supply</td>
<td>De-energised</td>
<td>Red</td>
<td>Red</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
<td>Module defective</td>
<td>De-energised</td>
<td>Yellow</td>
<td>Yellow</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>State</th>
<th>Green LED</th>
<th>State</th>
<th>Power rail signal status</th>
<th>Channel 1: relay energised</th>
<th>Channel 1: relay de-energised at cable fault</th>
<th>Channel 1: relay de-energised</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module OK</td>
<td>Flashing</td>
<td>Energised</td>
<td>Energised</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
</tr>
<tr>
<td>No supply</td>
<td>OFF</td>
<td>De-energised</td>
<td>De-energised</td>
<td>Red</td>
<td>Red</td>
<td>Red</td>
</tr>
<tr>
<td>Module defective</td>
<td>OFF</td>
<td>De-energised</td>
<td>De-energised</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>State</th>
<th>Green LED</th>
<th>State</th>
<th>Power rail signal status</th>
<th>Channel 2: relay energised</th>
<th>Channel 2: relay de-energised at cable fault</th>
<th>Channel 2: relay de-energised</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module OK</td>
<td>Flashing</td>
<td>Energised</td>
<td>Energised</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
</tr>
<tr>
<td>No supply</td>
<td>OFF</td>
<td>De-energised</td>
<td>De-energised</td>
<td>Red</td>
<td>Red</td>
<td>Red</td>
</tr>
<tr>
<td>Module defective</td>
<td>OFF</td>
<td>De-energised</td>
<td>De-energised</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
</tr>
</tbody>
</table>
CONFIGURATION / OPERATING THE FUNCTION KEYS

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

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**PR**

**SIL 2**

IEC 61508 CERTIFIED

Full assessment
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]
[6/1] Enter password setup [SETUP]
[6/2] Enter display setup [SETUP]
[6/3] Enter rail setup [SETUP]
[6/4] Enter SIL setup [SETUP]
[07] Select Direct channel function [CH1.FUN] [CH2.FUN]
Select Inverted channel function [CH1.FUN] [CH2.FUN]
[09] Adjust LCD contrast [CONTRA]
[10] Adjust LCD backlight [LIGHT]
[11] Write a 5-character channel TAG ['TAGON'] ['TAGON']
[12] Show Output load in display [DISP]
Show Output state in display
Show TAG in display
Alternate information shown in display
[13] Configuration SIL status (Open / Locked) [CONFIG]
[14] Enable SIL configuration lock [EN.SIL]
[15] Enable Password protection [EN.PASS]
[16] Set New password [NEW.PAS]
[17] Select Language [LANGUA]
[18] Cable short circuit [ON] [OFF]
[19] Cable breakage [ON] [OFF]
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:
- \(\square\) = OK. Flashing \(\square!\) = error

Line 2 and 3 symbols:
- Input frequency > 1 Hz = \(\square\) \(\square\) \(\square\) \(\square\)

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.
APPENDIX

IECEx INSTALLATION DRAWING

ATEX INSTALLATION DRAWING

FM INSTALLATION DRAWING

SAFETY MANUAL
IECEx Installation drawing

9202
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.

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.

IECEx Certificate  KEM 06.0039 X
Marking  Ex nA nC IIC T4 Gc
          [Ex ia Ga] IIC/IIB/IIA
          [Ex ia Da] III C

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

-20 ≤ Ta ≤ 60ºC

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

Uo: 10.6 VDC
Io: 12 mADC
Po: 32 mW
Lo/Ro: 1150 μH/Ω

<table>
<thead>
<tr>
<th></th>
<th>IIC</th>
<th>IIB</th>
<th>IIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co</td>
<td>2.0</td>
<td>6.0</td>
<td>18</td>
</tr>
<tr>
<td>Lo(Ro)</td>
<td>260</td>
<td>780</td>
<td>1000</td>
</tr>
</tbody>
</table>

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

U_m: 253 V max. 400 Hz
Terminal (31,32)
Supply:
Voltage: 19.2 – 31.2 VDC
Power max.: 3 W

Terminal (33,34)
Status Relay: Non Hazardous location Zone 2 installation
Voltage max.: 125 VAC / 110 VDC 32 VAC / 32 VDC
Power max.: 62.5 VA / 32 W 16 VA / 32 W
Current max.: 0.5 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 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

Installation notes:
For installation in Zone 2, the module must be installed in an outer enclosure having an IP protection of at least IP54 according to type of protection Ex-n or Ex-e.
For installation on Power Rail in Zone 2, only Power Rail type 9400 supplied by Power Control Unit type 9410 is allowed.
In type of protection “intrinsic safety iD” the parameters for intrinsic safety for gas group IIB are applicable.
If the sensor circuits (Terminals 41..44, 51..54) have been installed in a type of protection other than “intrinsic safety”, the module shall not be re-installed in type of protection “intrinsic safety”.
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.
ATEX Installation drawing

9202
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.

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.

ATEX Certificate KEMA 07 ATEX 0146 X

Marking
II 3 G Ex nA nC IIC T4
II (1) G [Ex ia] IIC/IIIB/IIIA
II (1) D [Ex iaD]

Standards

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

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

U_m: 253 V max. 400 Hz

Ex input:
CH1 (terminal 41,42,43,44)
CH2 (terminal 51,52,53,54)
Terminal (31,32)
Supply:
Voltage  19.2 – 31.2 VDC
Power max.  3 W

Terminal (33,34)
Status Relay:  Non Hazardous location  Zone 2 installation
Voltage max.  125 VAC / 110 VDC  32 VAC / 32 VDC
Power max.  62.5 VA / 32 W  16 VA / 32 W
Current max.  0.5 A AC / 0.3 ADC  0.5 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  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

Installation notes:
For installation in Zone 2, the module must be installed in an outer enclosure having an IP protection of at least IP54, according to type of protection Ex-n or Ex-e.
For installation on Power Rail in Zone 2, only Power Rail type 9400 supplied by Power Control Unit type 9410 is allowed.
In type of protection “intrinsic safety iD” the parameters for intrinsic safety for gas group IIB are applicable.
After the sensor circuits (Terminals 41..44, 51..54) have been installed in a type of protection other than “intrinsic safety”, the module shall not be re-installed in type of protection “intrinsic safety”.
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.
FM Installation drawing

9202
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.

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.

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, [AEx 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 (Ui) ≥ Vt (Uo)
Imax (Ii) ≥ It (Io)
Pn/Po ≥ Pt(Po)
Ca(Co) ≥ Ca + Ci
La(Lo) ≥ La + Li

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

terminal 11,12,13,14)
(terminals 31,32,33,34)
(terminals 91,92,93,94,95)
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
Power max.: 62.5 VA / 32 W
Current max.: 0.5 AAC / 0.3 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
Power max.: 500 VA / 60W
Current max.: 2 AAC / 2ADC

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.
The module must be installed in pollution degree 2 or better.
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 °C 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.
SAFETY MANUAL

PULSE ISOLATOR

9202

This safety manual is valid for the following product versions:

9202-002
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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>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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Relay</td>
</tr>
<tr>
<td>Fail Safe Detected</td>
<td>0.000E+00</td>
</tr>
<tr>
<td>Fail Safe Undetected</td>
<td>2.897E-07</td>
</tr>
<tr>
<td>Fail Dangerous Detected</td>
<td>1.303E-07</td>
</tr>
<tr>
<td>Fail Dangerous Undetected</td>
<td>4.658E-08</td>
</tr>
</tbody>
</table>

10. Periodic proof test procedure

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bypass the safety PLC or take other appropriate action to avoid a false trip</td>
</tr>
<tr>
<td>2</td>
<td>Connect a simulator identical to the input setup</td>
</tr>
<tr>
<td>3</td>
<td>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:

玩具 will increase the numerical value or choose the next parameter

玩具 will decrease the numerical value or choose the previous parameter

叉叉 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 叉叉 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 叉叉 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”.

Version No. V4R0
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>VerifyOPEN &quot;briefly&quot; 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.
14.2.2 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></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] Enable SIL setup [ SETUP ]
- [10] Select direct channel function [ CH1.FUN ] [ CH2.FUN ]
- [11] Select inverted channel function [ CH1.FUN ] [ CH2.FUN ]
- [12] Adjust LCD contrast [ CONTRA ]
- [14] Write a 5-character channel [ "TAGON ] [ "TAGON ]
- [15] Show output state in display [ DISP ]
- [16] Show TAG in display
- [17] Alternate shown information in display
- [18] Configuration SIL status (Open / Locked) [ CONFIG ]
- [19] Enable SIL configuration lock [ EN.SIL ]
- [20] Enable password protection [ EN.PASS ]
- [21] Set new password [ NEW.PAS ]
- [22] Select language [ LAU.NGA ]
- [23] Cable short circuit [ 1CA.SH ] [ 2OFF ]
- [24] 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 ok 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

Continued on the page
Routing diagram ADV.SET
16.3 Routing diagram - Advanced settings (ADV.SET)

**Disp, Pass, Lang, Rail, Sil**

**Disp**
- OK
- Setup
  - OK
  - Text 6

**Pass**
- OK
- Setup
  - OK
  - Text 6/1

**Lang**
- OK
- Setup
  - OK
  - Text 6/2

**Rail**
- OK
- Setup
  - OK
  - Text 6/3

**Sil**
- OK
- Setup
  - OK
  - Text 6/4

**Confirmation of SIL configuration**

**Yes**
- 2008
- Text 12

**No**
- 1.2

**Values**
- 9999
- 0000

**Language**
- DE, DK, ES, FR, IT, SE, UK

**Pass**
- YES
- Text 15

**Lang**
- UK
- Language

**Rail**
- YES
- Text 9

**Sil**
- YES
- Text 14

**Verification of SIL configuration**

**To default state 1.0**
17. Connections diagram

Inputs:
- NAMUR sensor, cable fault
  Channel 1: 41 42 43 44
  Channel 2: 51 52 53 54
- Switch, cable fault
  Channel 1: 41 42 43 44
  Channel 2: 51 52 53 54
- Switch, no cable fault
  Channel 1: 41 42 43 44
  Channel 2: 51 52 53 54

Outputs:
- Relay, N.C.
  Channel 1: 11 12 13 14
  Channel 2: 11 12 13 14
- Relay, N.O.
  Channel 1: 11 12 13 14
  Channel 2: 11 12 13 14
- Opto, NPN
  Channel 1: 11 12 13 14
  Channel 2: 11 12 13 14

`R_p = 15 kΩ
R_s = 750 Ω`

NC = no connection
Displays  Programmable displays with a wide selection of inputs and outputs for display of temperature, volume and weight, etc. Feature linearisation, scaling, and difference measurement functions for programming via PReset software.

Ex interfaces  Interfaces for analogue 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 modules in zone 20, 21 & 22.

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

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

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