Product manual

5116

Programmable transmitter

No. 5116V105-UK
From serial no. 181570001
6 Product Pillars
to meet your every need

Individually outstanding, unrivalled in combination

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

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

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

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

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

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

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

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Warning

This device is designed for connection to hazardous electric voltages. Ignoring this warning can result in severe personal injury or mechanical damage. To avoid the risk of electric shock and fire, the safety instructions of this manual must be observed and the guidelines followed. The specifications must not be exceeded, and the device must only be applied as described in the following. Prior to the commissioning of the device, this manual must be examined carefully. Only qualified personnel (technicians) should install this device. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Warning

Until the device is fixed, do not connect hazardous voltages to the device. The following operations should only be carried out on a disconnected device and under ESD-safe conditions:
- General mounting, wire connection and disconnection.
- Troubleshooting the device.

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

Warning

To keep the safety distances, the relay contacts on the device must not be connected to both hazardous and non-hazardous voltages at the same time. SYSTEM 5000 must be mounted on a DIN rail according to DIN 46277. The communication connector of SYSTEM 5000 is connected to the input terminals on which dangerous voltages can occur, and it must only be connected to the programming unit Loop Link by way of the enclosed cable.

Symbol identification

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

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

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

Ex devices have been approved acc. to the ATEX directive for use in connection with installations in explosive areas.
Safety instructions

Definitions

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

Technicians are qualified persons educated or trained to mount, operate, and also trouble-shoot technically correct and in accordance with safety regulations.

Operators, being familiar with the contents of this manual, adjust and operate the knobs or potentiometers during normal operation.

Receipt and unpacking

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

Environment

Avoid direct sun light, dust, high temperatures, mechanical vibrations and shock, and rain and heavy moisture. If necessary, heating in excess of the stated limits for ambient temperatures should be avoided by way of ventilation.

All devices fall under Installation Category II, Pollution Degree 2, and Insulation Class II.

Mounting

Only technicians, who are familiar with the technical terms, warnings, and instructions in the manual and who are able to follow these, should connect the device. Should there be any doubt as to the correct handling of the device, please contact your local distributor or, alternatively,

PR electronics A/S
www.prelectronics.com

Mounting and connection of the device should comply with national legislation for mounting of electric materials, i.e. wire cross section, protective fuse, and location. Descriptions of input / output and supply connections are shown in the block diagram and side label.

The following apply to fixed hazardous voltages-connected devices:

- The max. size of the protective fuse is 10 A and, together with a power switch, it should be easily accessible and close to the device. The power switch should be marked with a label telling it will switch off the voltage to the device.

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

UL installation requirements

Use 60/75°C copper conducters only.

For use only in pollution degree 2 or better.

Max. ambient temperature ................................................. 60°C

Max. wire size ............................................................... AWG 26-14

UL file number ............................................................. E231911

Calibration and adjustment

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

Normal operation

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

Cleaning

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

Liability

To the extent the instructions in this manual are not strictly observed, the customer cannot advance a demand against PR electronics A/S that would otherwise exist according to the concluded sales agreement.
How to demount system 5000

First, remember to demount the connectors with hazardous voltages.

Picture 1:
By lifting the bottom lock, the device is detached from the DIN rail.
Applications

Input signals:

Current
Voltage
Bipolar mV
RTD and lin. R
Connection, wires
TC

Potentiometer
Transmitter
V > 2.5 V
V <= 2.5 V

Output signals:

Relays

2-wire transmitter output

Supply:

21.6...253 VAC
or
19.2...300 VDC
Programmable transmitter

5116

• Input for RTD, TC, mV, Ohm, potmeter, mA and V
• 2-wire supply > 16.5 V
• Bipolar voltage input
• Output for current, voltage and 2 relays
• Universal AC or DC supply

Application
• Linearised, electronic temperature measurement with RTD or TC sensor.
• Conversion of linear resistance variation to a standard analog current / voltage signal, i.e. from solenoids and butterfly valves or linear movements with attached potentiometer.
• Power supply and signal isolator for 2-wire transmitters.
• Process control with 2 potential-free relay contacts which can be configured for advanced functions.
• Galvanic separation of analog signals and measurement of floating signals.

Technical characteristics
• Within a few seconds the user can program PR5116 to suit the specific application.
• By way of the front push-button the input can be calibrated to the exact span of the process. Zero drift on the process signal can be adjusted by a single press of the front button.
• Continuous check of vital stored data for safety reasons.
• 3-port 3.75 kVAC galvanic isolation.

Mounting / installation
• Mounted vertically or horizontally on a DIN rail. As the devices can be mounted without any distance between neighbouring units, up to 42 devices can be mounted per metre.
Order

<table>
<thead>
<tr>
<th>Type</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>5116</td>
<td>Standard: A, ATEX Ex and FM: B</td>
</tr>
</tbody>
</table>

Example: 5116B

NB! Please remember to order CJC connectors type 5910/5910Ex for TC inputs with internal CJC.

Electrical specifications

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

Mechanical specifications:
Dimensions (HxWxD) ...................................................... 109 x 23.5 x 130 mm
Weight approx. .......................................................... 235 g
DIN rail type ........................................................... DIN 46277
Wire size (min...max.) .................................................. 0.13...2.08 mm² AWG 26...14 stranded wire
Screw terminal torque ................................................... 0.5 Nm
Vibration ................................................................. IEC 60068-2-6
  2...13.2 Hz ........................................................... ±1 mm
  13.2...100 Hz ......................................................... ±0.7 g

Common electrical specifications:
Supply voltage ........................................................... 21.6...253 VAC, 50...60 Hz
or 19.2...300 VDC
Fuse ................................................................. 400 mA SB / 250 VAC
Max. required power ................................................... 2.4 W
Max. power dissipation ................................................ 2.0 W
Max. required power is the maximum power needed at terminals 31 and 33.
Max. power dissipation is the maximum power dissipated by the device.

Isolation voltage, test / operation .................................. 3.75 kVAC / 250 VAC
PELV/SELV ............................................................... IEC 61140
Communications interface ............................................... Loop Link
Signal / noise ratio ..................................................... Min. 60 dB (0...100 kHz)
Updating time:
  Temperature / ±mV input ........................................... 115 ms
  mA / V / mV input ................................................... 75 ms
Response time (0...90%, 100...10%), programmable:
  Temperature / ± mV input ........................................... 400 ms to 60 s
  mA / V / mV input ................................................... 250 ms to 60 s
Signal dynamics, input ................................................ 22 bit
Signal dynamics, output ............................................... 16 bit
Accuracy, the greater of the general and basic values:

<table>
<thead>
<tr>
<th>General values</th>
<th>Input type</th>
<th>Absolute accuracy</th>
<th>Temperature coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>All</td>
<td>≤ ±0.05% of span</td>
<td>≤ ±0.01% of span / °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Basic values</th>
<th>Input type</th>
<th>Basic accuracy</th>
<th>Temperature coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>mA</td>
<td>≤ ±4 µA</td>
<td>≤ ±0.4 µA / °C</td>
<td></td>
</tr>
<tr>
<td>Volt</td>
<td>≤ ±10 µV</td>
<td>≤ ±1 µV / °C</td>
<td></td>
</tr>
<tr>
<td>RTD</td>
<td>≤ ±0.2°C</td>
<td>≤ ±0.01°C / °C</td>
<td></td>
</tr>
<tr>
<td>Lin. R</td>
<td>≤ ±0.1°Ω</td>
<td>≤ ±10 mΩ / °C</td>
<td></td>
</tr>
<tr>
<td>TC type: E, J, K, L, N, T, U</td>
<td>≤ ±1°C</td>
<td>≤ ±0.05°C / °C</td>
<td></td>
</tr>
<tr>
<td>TC type: B, R, S, W3, W5, LR</td>
<td>≤ ±2°C</td>
<td>≤ ±0.2°C / °C</td>
<td></td>
</tr>
</tbody>
</table>

EMC - immunity influence: .................. < ±0.5% of span
Extended EMC immunity:
NAMUR NE 21, A criterion, burst .................. < ±1% of span

Auxiliary supplies:
Reference voltage: ................................ 2.5 VDC ±0.5% / 15 mA
2-wire supply (pin 54...52): .................. 28...16.5 VDC / 0...20 mA

Electrical specifications, temperature input,
terminal 41, 42, 43 and 44
Max. offset: ........................................ 50% of selected max. value

TC input:

<table>
<thead>
<tr>
<th>Type</th>
<th>Min. value</th>
<th>Max. value</th>
<th>Min. span</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>+400°C</td>
<td>+1820°C</td>
<td>200°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>E</td>
<td>-100°C</td>
<td>+1000°C</td>
<td>50°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>J</td>
<td>-100°C</td>
<td>+1200°C</td>
<td>50°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>K</td>
<td>-180°C</td>
<td>+1372°C</td>
<td>50°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>L</td>
<td>-100°C</td>
<td>+900°C</td>
<td>50°C</td>
<td>DIN 43710</td>
</tr>
<tr>
<td>N</td>
<td>-180°C</td>
<td>+1300°C</td>
<td>100°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>R</td>
<td>-50°C</td>
<td>+1760°C</td>
<td>200°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>S</td>
<td>-50°C</td>
<td>+1760°C</td>
<td>200°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>T</td>
<td>-200°C</td>
<td>+400°C</td>
<td>50°C</td>
<td>IEC 60584-1</td>
</tr>
<tr>
<td>U</td>
<td>-200°C</td>
<td>+600°C</td>
<td>75°C</td>
<td>DIN 43710</td>
</tr>
<tr>
<td>W3</td>
<td>0°C</td>
<td>+2300°C</td>
<td>200°C</td>
<td>ASTM E988-90</td>
</tr>
<tr>
<td>W5</td>
<td>0°C</td>
<td>+2300°C</td>
<td>200°C</td>
<td>ASTM E988-90</td>
</tr>
<tr>
<td>LR</td>
<td>-200°C</td>
<td>+800°C</td>
<td>50°C</td>
<td>GOST 3044-84</td>
</tr>
</tbody>
</table>

Sensor error current: ................................ Nom. 30 µA
CJC: .............................................. < ±1°C
Sensor error detection: ................................ Yes
RTD and linear resistance input

<table>
<thead>
<tr>
<th>Input type</th>
<th>Min. value</th>
<th>Max. value</th>
<th>Min. span</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt100</td>
<td>-200°C</td>
<td>+850°C</td>
<td>25°C</td>
<td>IEC 60751</td>
</tr>
<tr>
<td>Ni100</td>
<td>-60°C</td>
<td>+250°C</td>
<td>25°C</td>
<td>DIN 43760</td>
</tr>
<tr>
<td>Linear resist.</td>
<td>0 Ω</td>
<td>5000 Ω</td>
<td>30 Ω</td>
<td></td>
</tr>
</tbody>
</table>

| Cable resistance per wire       | 10 Ω       | (max. 50 Ω with less accuracy) |
| Sensor current                  | Nom. 0.2 mA|
| Effect of sensor cable resistance (3- / 4-wire) | < 0.002 Ω / Ω |
| Sensor error detection          | Yes        |

mV input:
- Measurement range: -2500...+2500 mV
- Min. measurement range (span): 5 mV
- Input resistance: > 5 MΩ

Electrical specifications, mA / V input, terminal 51, 52, 53 and 54
- Max. offset: 50% of selected max. value
- Current input:
  - Measurement range: 0...100 mA
  - Min. measurement range (span): 4 mA
  - Input resistance:
    - Supplied unit: Nom. 10 Ω + PTC 10 Ω
    - Non-supplied unit: RSHUNT = ∞, VDROP < 6 V
  - Sensor error detection:
    - loop error on 4...20 mA signals: Yes

Voltage input
- Measurement range: 0...250 VDC
- Min. measurement range (span): 5 mVDC
- Input resistance:
  - ≤ 2.5 VDC: Nom. 10 MΩ
  - > 2.5 VDC: Nom. 5 MΩ

Potentiometer input via 2.5 V ref.
- Potentiometer min.: 170 Ω

Electrical specifications - output
- Max. offset: 50% of selected max. value
- Current output
  - Signal range: 0...23 mA
  - Min. signal range (span): 10 mA
  - Load (max.): ≤ 600 Ω
  - Load stability: ≤ 0.01% of span / 100 Ω
  - Current limit: ≤ 28 mA

Voltage output
- Signal range: 0...10 VDC
- Min. signal range (span): 500 mV
- Load (min.): 500 kΩ

2-wire 4...20 mA output
- Signal range: 4...20 mA
- Load stability: ≤ 0.01% of span / 100 Ω
- Load resistance: ≤ (Vsupply-3.5) / 0.023 A [Ω]
- Max. external 2-wire supply: 29 VDC
- Effect of external 2-wire supply voltage variation: < 0.005% of span / V

Of span = of the currently selected measurement range
Sensor error detection and loop error on 4...20 mA

Programmable ................................................. 0...23 mA
NAMUR NE43 Upscale ........................................ 23 mA
NAMUR NE43 Downscale ...................................... 3.5 mA

Relay outputs
Sensor error detection ....................................... Break / Make / Hold / None
Max. voltage .................................................. 250 VAC / VDC
Max. AC current ................................................ 2 A
Max. AC power .................................................. 500 VA
Max. DC current, resistive load:
@ \(U_{\text{relay}} \leq 30\) VDC ........................................ 2 ADC
@ \(U_{\text{relay}} > 30\) VDC .......................................... \(1380 \times U_{\text{relay}}^2 \times 1.0085 \times U_{\text{relay}}\) ADC

Graphic depiction of \(1380 \times U_{\text{relay}}^2 \times 1.0085 \times U_{\text{relay}}\):

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

Approvals
Det Norske Veritas, Ships & Offshore ........................... Standard for Certification No. 2.4
UL, Standard for Safety ......................................... UL 508, CSA-C22.2 No. 14
EAC .............................................................. TR-CU 020/2011

I.S. / Ex approvals
ATEX ........................................................... KEMA 04ATEX1316 X
FM .............................................................. 3023092
EAC Ex TR-CU 012/2011 ....................................... RU C-DK.GB08.V.00410
Connections

Supply:

Inputs:

RTD, 2-wire
RTD, 3-wire
RTD, 4-wire
TC, internal CJC

TC, external CJC
Resistance, 2-wire
Resistance, 3-wire
Resistance, 4-wire

* If the device is reconfigured from temperature measurement with CJC connector to analogue measurement, the CJC connector must be demounted.

mV

Voltage <= 2.5 V
Voltage > 2.5 V

Potentiometer
Current
2-wire transmitter
Connections

Outputs:
Graphic depiction of relay actions Increasing / Decreasing

Relay action: Increasing
Setpoint = 50
Hysteresis = 10

Relay units
0 10 20 30 40 50 60 70 80 90 100

Off N.O.  On N.O.  Off N.O.
On N.C.  Off N.C.  On N.C.
t
Relay action: Decreasing
Setpoint = 50
Hysteresis = 10

Relay units
0 10 20 30 40 50 60 70 80 90 100

Off N.O.  On N.O.  Off N.O.
On N.C.  Off N.C.  On N.C.
t
Graphic depiction of relay action Window

Relay action: Window (shown for increasing signal)
Setpoint High = 60
Setpoint Low = 40
Hysteresis = 5

Relay units
0 10 20 30 40 50 60 70 80 90 100

Off  On  Off  On  Off
On  Off  On  Off  On
t
Contact: Closed inside window = ①
Contact: Open inside window = ②

Relay action: Window (shown for decreasing signal)
Setpoint High = 60
Setpoint Low = 40
Hysteresis = 5

Relay units
0 10 20 30 40 50 60 70 80 90 100

Off  On  Off  On  Off
On  Off  On  Off  On
t
Contact: Closed inside window = ①
Contact: Open inside window = ②
5116 connection to Loop Link

For connection of 5116B to Loop Link, please observe the instructions for intrinsically safe installation.

Activation of the process calibration button

Open the front cover and activate the switch with a pointed object, e.g. a small screwdriver.
The switch is placed a little to the right of the LEDs.

For further instructions see the description of the process calibration function on page 19.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Off</td>
<td>No relay function</td>
</tr>
<tr>
<td>Setpoint</td>
<td></td>
<td>Relay changes state at a limit on the span</td>
</tr>
<tr>
<td>Setpoint window</td>
<td></td>
<td>Relay changes state inside a range of the span</td>
</tr>
<tr>
<td>Sensor error indication</td>
<td></td>
<td>Only works for sensor error</td>
</tr>
<tr>
<td>Power indication</td>
<td></td>
<td>Relay is active when power is on</td>
</tr>
<tr>
<td><strong>Relay units for Relay 1 and Relay 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of input span</td>
<td>0...100% of input span.</td>
<td></td>
</tr>
<tr>
<td>Input units</td>
<td>E.g. °C, mV and mA</td>
<td></td>
</tr>
<tr>
<td>% of output span</td>
<td>0...100% of output span.</td>
<td></td>
</tr>
<tr>
<td>Output units</td>
<td>mA and V</td>
<td></td>
</tr>
<tr>
<td><strong>Setpoint</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setpoint</td>
<td>From min. to max. of relay units</td>
<td>Setpoint limit</td>
</tr>
<tr>
<td>Setpoint LOW (setpoint window only)</td>
<td>From min. to max. of relay units</td>
<td>Lower setpoint in setpoint window</td>
</tr>
<tr>
<td>Setpoint HIGH (setpoint window only)</td>
<td>From min. to max. of relay units</td>
<td>Higher setpoint in setpoint window</td>
</tr>
<tr>
<td><strong>Hysteresis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hysteresis</td>
<td>From 0.1...99.9% of relay units</td>
<td>Difference between setpoint value and reset value. At setpoint window the hysteresis is outside the window.</td>
</tr>
<tr>
<td><strong>On-delay</strong></td>
<td>0.3600 s</td>
<td>Time from the signal crosses the setpoint threshold until the relay activates. Time is reset at setpoint crossing.</td>
</tr>
<tr>
<td><strong>Off-delay</strong></td>
<td>0.3600 s</td>
<td>Time from the signal crosses the hysteresis threshold until the relay deactivates. Time is reset at hysteresis crossing.</td>
</tr>
<tr>
<td><strong>Action</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increasing</td>
<td></td>
<td>Activates at increasing signal</td>
</tr>
<tr>
<td>Decreasing</td>
<td></td>
<td>Activates at decreasing signal</td>
</tr>
<tr>
<td><strong>Contact</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normally open (N.O.)</td>
<td></td>
<td>Contact state before limit is reached</td>
</tr>
<tr>
<td>Normally closed (N.C.)</td>
<td></td>
<td>Contact state before limit is reached</td>
</tr>
<tr>
<td>Open inside window Energized</td>
<td></td>
<td>Relay deactivated inside setpoint window</td>
</tr>
<tr>
<td>Closed inside window</td>
<td></td>
<td>Relay activated inside setpoint window</td>
</tr>
<tr>
<td><strong>Sensor error detection</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensor error detection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact open</td>
<td></td>
<td>Relay deactivated</td>
</tr>
<tr>
<td>Contact closed</td>
<td></td>
<td>Relay activated</td>
</tr>
<tr>
<td>Hold</td>
<td></td>
<td>Relay state as before sensor error occurred</td>
</tr>
<tr>
<td>Off</td>
<td></td>
<td>No relay function</td>
</tr>
</tbody>
</table>
Process calibration 0% and 100% or only 0%
(not for RTD and TC input)
When the option "0% and 100% calibration" is actively configured in PReset it is possible to make the following process calibrations. Please note: Input 0% and 100% should be chosen higher than the process-calibrated span.

Process calibration 0% and 100%
1. Apply the actual 0% value.
2. Open the front cover, activate sw. 1 and wait until the green LED lights constantly.
3. Apply the actual 100% value.
4. Activate sw. 1. The LED will start flashing again.
The input on 5116 has now been scaled according to the actual process values.

When the option "0% calibration" is actively configured in PReset it is possible to make the following process calibration.

0% process calibration
1. Apply the actual 0% value.
2. Open the front cover and activate sw. 1.
The input on 5116 has now been scaled according to the actual process values.

Error functions

<table>
<thead>
<tr>
<th>Error reason</th>
<th>Value on analog output</th>
<th>Hardware error indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>No power supply</td>
<td>0 mA / 0 V</td>
<td>Contacts open / LEDs Off</td>
</tr>
<tr>
<td>Sensor error</td>
<td>As configured</td>
<td>As configured</td>
</tr>
<tr>
<td>RAM checksum check failed *)</td>
<td>0 mA / 0 V</td>
<td>Contacts open / LEDs Off</td>
</tr>
<tr>
<td>EEPROM checksum check failed</td>
<td>0 mA / 0 V</td>
<td>Contacts open / LEDs Off</td>
</tr>
<tr>
<td>Main program stopped</td>
<td>0 mA / 0 V</td>
<td>Contacts open / LEDs Off</td>
</tr>
<tr>
<td>DAC / relay program stopped</td>
<td>0 mA / 0 V</td>
<td>Contacts open / LEDs Off</td>
</tr>
</tbody>
</table>

*) Error can be reset by power cycling the device or sending a new configuration.
**) The green LED is controlled by the main processor.
ATEX Installation drawing

5116B

For safe installation of 5116B 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.

ATEX Certificate        KEMA 04ATEX 1316X

Marking

II (1) G [Ex ia Ga] IIIC/IIB/IIA
II (1) D [Ex ia Da] III C


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

Non Hazardous Area
-20 ≤ Ta ≤ 60ºC

Supply / Output / Relay
(terminal 31, 32, 33)
(terminal 11, 12, 13, 14)
(terminal 21, 22, 23, 24)

U_in: 253 VAC
## Terminal Uo Io Po Lo Co

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Uo</th>
<th>Io</th>
<th>Po</th>
<th>Lo</th>
<th>Co</th>
</tr>
</thead>
<tbody>
<tr>
<td>41, 42, 44, 43</td>
<td>7.5 V</td>
<td>2.2 mA</td>
<td>4.2 mW</td>
<td>1 H</td>
<td>1 H</td>
</tr>
<tr>
<td>51, 52, 53</td>
<td>7.5 V</td>
<td>2.2 mA</td>
<td>4.2 mW</td>
<td>1 H</td>
<td>1 H</td>
</tr>
<tr>
<td>51, 52, 53, 54</td>
<td>28 V</td>
<td>93 mA</td>
<td>650 mW</td>
<td>3 mH</td>
<td>16 mH</td>
</tr>
</tbody>
</table>

## Terminal (31, 33)

**Supply:**
- AC Voltage: 21.6 – 253 VAC
- DC Voltage: 19.2 – 300 VDC
- Power max.: 3.0 W

**Analog output:**
- Current: 0/4 – 20 mADC
- Voltage: 0 – 10 VDC

## Terminal (11, 12, 13, 14)

**Relay 1 and 2:**
- Voltage max.: 250 VAC / VDC
- AC Power max.: 500 VA
- AC Current max.: 2 AAC
- DC Current @ ≤ 30VDC: 2ADC
- DC Current @ ≥ 30VDC: 1380 * U⁻² * 1.0085U

## Installation notes

The intrinsically safe circuits are galvanically connected to the communications interface unit. The communications interface may only be connected temporarily, under the condition that the connectors with terminal numbers 41..44 and 51..54 are disconnected on the 5116B.

When a higher ingress protection than IP20 is required, this has to be achieved by an additional enclosure which is suitable for the applicable environmental conditions.

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

When two or more units are placed next to each other it has to be assured that all the terminal numbers 41…44 and 51…54 are placed on the same side and are separated from the non-intrinsically safe circuits of the units which could be mounted above or below it.

Each combination of circuits (to terminations 41…44 or to terminations 51…53 or to terminations 51..54) shall be connected via separated cables or if the combinations are in one cable shall be type A or B in accordance with EN60079-14.

Programming of the 5116B module is done by use of Loop Link 5909 outside hazardous area. If the module is installed in hazardous area, programming is allowed only if the area is known to be safe.
Control Drawing 5116QF01

Hazardous (Classified) Location

Class I, Division 1, Group A,B,C,D
Class II, Division 1 Group E, F, G
Class III, Division 1
Class I , Zone 0 and 1, Group IIC, IIB, IIA
Class II, Zone 20 and 21

Simple Apparatus or Intrinsicly safe apparatus with entity parameters:

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

The sum of capacitance and inductance of cable and intrinsic safe equipment must be less or equal to \( C_a \) and \( L_a \)

<table>
<thead>
<tr>
<th>Terminals</th>
<th>( V_{oc} ) (V)</th>
<th>( I_{sc} ) (mA)</th>
<th>( P_o ) (mW)</th>
<th>( L_a ) (mH)</th>
<th>( C_a ) (µF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>41,42,43,44</td>
<td>7.5</td>
<td>2.2</td>
<td>4.2</td>
<td>1000, 1000, 1000</td>
<td>6, 36, 445</td>
</tr>
<tr>
<td>51,52,53</td>
<td>7.5</td>
<td>2.2</td>
<td>4.2</td>
<td>1000, 1000, 1000</td>
<td>6, 36, 445</td>
</tr>
<tr>
<td>51,52,53,54</td>
<td>28</td>
<td>93.0</td>
<td>650</td>
<td>3</td>
<td>0.075</td>
</tr>
</tbody>
</table>

Installation notes:

1) The maximum non-hazardous location voltage is 250Vac/dc.
2) The installation shall be in accordance with the National Electrical Code NFPA 70, Articles 504 and 505.
3) 5116B is galvanic isolated and does not require grounding.
4) For Installation in Div 2 or Zone 2 the 5116B must be installed in an enclosure according to ANSI/ISA S82.
5) Install in Pollution degree 2 or better.
6) Use 60 / 75 °C Copper Conductors with Wire Size AWG: (26 – 14).
7) Warning: Substitution of components may impair intrinsic safety.
# Document history

The following list provides notes concerning revisions of this document.

<table>
<thead>
<tr>
<th>Rev. ID</th>
<th>Date</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>105</td>
<td>1901</td>
<td>ATEX installation drawing added</td>
</tr>
</tbody>
</table>
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