

# PR



UK



## 3100

**6 mm Series of Isolators  
and Converters**

Models no. 3103 / 3104 /  
3105 / 3108 / 3109

No. 3100V100-UK (1038)



**SIGNALS THE BEST**

- DK** ▶ PR electronics A/S tilbyder et bredt program af analoge og digitale signalbehandlingsmoduler til industriel automation. Programmet består af Isolatorer, Displays, Ex-barrierer, Temperaturtransmittere, Universaltransmittere mfl. Vi har modulerne, du kan stole på i selv barske miljøer med elektrisk støj, vibrationer og temperaturudsving, og alle produkter opfylder de strengeste internationale standarder. Vores motto »Signals the Best« er indbegrebet af denne filosofi – og din garanti for kvalitet.
- UK** ▶ 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.
- FR** ▶ 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.
- DE** ▶ PR electronics A/S verfügt über ein breites Produktprogramm an analogen und digitalen Signalverarbeitungsmodulen für die industrielle Automatisierung. Dieses Programm umfasst Displays, Temperaturtransmitter, Ex- und galvanische Signaltrenner, und Universalgeräte. Sie können unsere Geräte auch unter extremen Einsatzbedingungen wie elektrisches Rauschen, Erschütterungen und Temperaturschwingungen vertrauen, und alle Produkte von PR electronics werden in Übereinstimmung mit den strengsten internationalen Normen produziert. »Signals the Best« ist Ihre Garantie für Qualität!

# 6 MM SERIES OF ISOLATORS AND CONVERTERS

**3103 / 3104 / 3105 / 3108 / 3109**

## CONTENTS

|   |    |
|---|----|
| Warning .....                                     | 2  |
| Safety instructions.....                          | 3  |
| cFMus installation in Division 2 or Zone 2 .....  | 3  |
| IECEX, ATEX installation in Zone 2 .....          | 4  |
| Flexible supply .....                             | 5  |
| Mounting and demounting of system 3000.....       | 6  |
| System 3000 installation on 7.5 mm DIN Rail ..... | 7  |
| EC declaration of conformity .....                | 8  |
| Highlights .....                                  | 9  |
| Product overview .....                            | 9  |
| Applications.....                                 | 10 |
| Electrical specifications.....                    | 11 |
| Connections .....                                 | 13 |
| Installation on power rail .....                  | 14 |
| Marking.....                                      | 14 |
| DIP-switch programming .....                      | 15 |
| 3104 .....  | 15 |
| 3105 .....  | 16 |
| 3109 .....  | 16 |
| LED indication.....                               | 17 |

NB.: Click on the entries in the table of contents to go to the desired section.



**GENERAL**

## WARNING

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.

Until the device is fixed, do not connect hazardous voltages to the device.

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



**HAZARD-  
OUS  
VOLTAGE**

## WARNING

In applications with high working voltages, it must be ensured that there is sufficient spacing or isolation between neighbouring devices to maintain protection against electric shock.

The connector of Adapter 4590 is connected to the input terminals on which dangerous voltages can occur.

## 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.



**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 according to the ATEX directive for use in connection with installations in explosive areas.

# SAFETY INSTRUCTIONS

## 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 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. All devices can be used for Measurement Category II and Pollution Degree 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](http://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 this manual and on the side label.

SYSTEM 3000 must be mounted on a DIN rail according to EN 60715.

## UL INSTALLATION (PENDING)

Use 60/75°C copper conductors only.

Wire size..... AWG 26-12

UL file number..... E314307

## CFMUS INSTALLATION IN DIVISION 2 OR ZONE 2 (PENDING)

NI, Class I, Div. 2, Group A, B, C, D T4 or I, Zone 2, AEx nA IIC T4 or Ex nA IIC T4.

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

Where installed in outdoor or potentially wet locations the enclosure shall at a minimum meet the requirements of IP54.

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

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

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

**Warning:** Do not mount or remove devices from the Power Rail when an explosive gas mixture is present.

### **IECEX, ATEX INSTALLATION IN ZONE 2 (PENDING)**

IECEX KEM 10.0068..... Ex nA IIC T4 Gc

KEMA 10ATEX0147 X..... II 3G Ex nA IIC T4

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

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

For installation in Zone 2, the device must be installed in an outer enclosure having an IP protection of at least IP54 and conforming to the requirements of EN60079-15.

For installation on Power Rail in Zone 2, only Power Rail type 9400 supplied by Power Control Unit type 9410 is allowed.

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

Do not mount or remove devices from the Power Rail when an explosive gas mixture is present.

### **CLEANING**

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

## LIABILITY

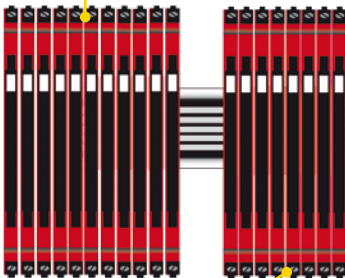
To the extent the instructions in this manual are not strictly observed, the customer cannot advance a demand against PR electronics A/S that would otherwise exist according to the concluded sales agreement.

## FLEXIBLE SUPPLY

The units can be supplied with 24 VDC $\pm$ 30% via direct wiring and a loop between the devices. This permits the supply of up to 130 units.

The power connector unit 3405 is a standalone supply unit which supplies the power rail. With 3405, up to 100 units can be supplied.

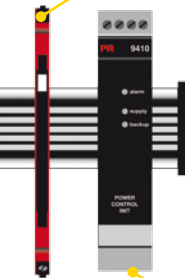
Protective fuse: 2.5 A.



Protective fuse: 0.4 A.

Alternatively, the 24 V supply voltage can be distributed via a power rail that receives the voltage from another connected unit (3103, -04, -05, -08, -09, or -14). In this way up to 20 units can be supplied.

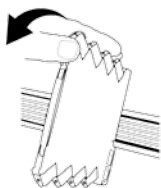
Protective fuse: 2.5 A.



Protective fuse: PR 9410.

With the power control unit 9410 redundant supply is possible. This solution can supply up to 200 units.

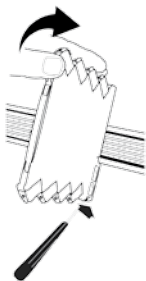
## MOUNTING AND DEMOUNTING OF SYSTEM 3000



**Picture 1:**

Mounting on DIN rail.

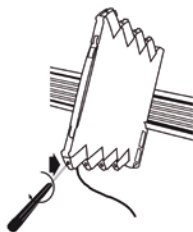
Click the device onto the rail



**Picture 2:**

Demounting from DIN rail.

First, remember to demount the connectors with hazardous voltages. Detach the device from the DIN rail by lifting the bottom lock.



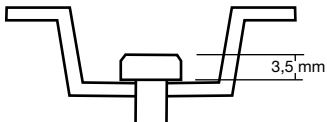
**Picture 3:**

Wire size 0.13 x 2.5 mm<sup>2</sup> stranded wire.

Screw terminal torque 0.5 Nm.



## INSTALLATION OF SYSTEM 3000 ON 7.5 MM DIN RAIL



To avoid short circuit between the Power Rail connectors on the 3000 devices and the screws holding the 7.5 mm DIN rail, the head of the screws shall be no more than 3.5 mm high.

## SUPPLY OF POWER RAIL

It is possible to supply the power rail via the supply terminals.

The terminals can pass a current of max. 400 mA.

# EC DECLARATION OF CONFORMITY

As manufacturer

**PR electronics A/S**  
**Lerbakken 10**  
**DK-8410 Rønde**

hereby declares that the following products:

**Type: 3103, 3104, 3105, 3108 and 3109**

are 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 devices.

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

**EN 61010-1 : 2001**

\*The ATEX Directive 94/9/EC and later amendments

**EN 60079-0 : 2006 and EN 60079-15 : 2005**

Notified body

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

Rønde, 15 April 2010



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Kim Rasmussen  
Manufacturer's signature

\*Does not apply to 3105

## **6 MM SERIES OF ISOLATORS AND CONVERTERS 3103 / 3104 / 3105 / 3108 / 3109**

*The product family 3103, 3104, 3105, 3108 & 3109 are slimline isolaters for 24 VDC fixed supply and can be used for different purposes.*

### **Highlights**

- *Can be supplied separately or installed on power rail*
- *Can be delivered with customer parameterisation on request*
- *Approvals by CE, UL, DNV, GL, ATEX zone 2, IECEx zone 2 and FM Div. 2 (all but CE pending)*
- *Possibility of loop supply output*

## Product overview

| PR type no.                   | 3103  | 3104  | 3105   |
|-------------------------------|---|---|--|
| <b>PR product name</b>        | Isolated repeater   | Isolated converter  | Isolated converter   |
| <b>Description</b>            | Fixed loop isolator / repeater.                           | Loop isolator / converter for standard DC signals.<br>DIP-switch setup. | Loop isolator / converter for standard DC signals.<br>DIP-switch setup.<br>Low cost. |
| <b>Parameterisation</b>       | None  | DIP-switch  | DIP-switch   |
| <b>Input signal</b>           | 0...20 mA   | 0/2...10 V<br>0/1...5 V<br>0/4...20 mA                                  | 0/2...10 V<br>0/1...5 V<br>0/4...20 mA   |
| <b>Loop supply output</b>     |   | >17 V @ 20 mA   |  |
| <b>Output signal (active)</b> | 0...20 mA (1:1)   | 0/2...10 V<br>0/1...5 V<br>0/4...20 mA                                  | 0/2...10 V<br>0/1...5 V<br>0/4...20 mA   |
| <b>Approvals (pending)</b>    | UL, FM Div.2,<br>ATEX zone 2,<br>IECEX Zone 2,<br>DNV, GL | UL, FM Div.2,<br>ATEX zone 2,<br>IECEX Zone 2,<br>DNV, GL               |  |

| PR type no.                   | 3108  | 3109  |
|-------------------------------|---|---|
| <b>PR product name</b>        | Isolated repeater / splitter                              | Isolated converter / splitter   |
| <b>Description</b>            | Fixed loop isolator / repeater with dual output.          | Loop isolator / converter for standard DC signals.<br>DIP-switch setup.<br>Dual output. |
| <b>Parameterisation</b>       | None  | DIP-switch  |
| <b>Input signal</b>           | 0...20 mA   | 0/2...10 V<br>0/1...5 V<br>0/4...20 mA  |
| <b>Loop supply output</b>     |   | >17 V @ 20 mA   |
| <b>Output signal (active)</b> | 0...20 mA (1:1)   | 0/2...10 V<br>0/1...5 V<br>0/4...20 mA  |
| <b>Approvals (pending)</b>    | UL, FM Div.2,<br>ATEX zone 2,<br>IECEX zone 2,<br>DNV, GL | UL, FM Div.2,<br>ATEX zone 2,<br>IECEX zone 2,<br>DNV, GL                               |

## Applications

The 3100 isolator family are designed for the automation and process industries.

These devices are the result of extensive development and test procedures make them very well suited for conversion and galvanic isolation in the following applications:

- Isolation and 1:1 conversion of current signals in the range 0...20 mA.
- Isolation and conversion of standard DC signals.
- Power supply and signal isolator for 2-wire transmitters.
- Isolation and splitting of standard DC signals.
- Installation in ATEX Ex zone 2 / FM division 2.
- Suitable for environments with high vibration stress, e.g. ships

## Electrical specifications

|   |                          |
|---|--------------------------|
| Specifications range.....                 | -25°C to +70°C           |
| Specifications range, 3105.....           | 0 to +70°C               |
| Storage temperature .....                 | -40°C to +85°C           |
| Supply voltage, DC .....                  | 16.8...31.2 VDC          |
| Max. consumption.....                     | ≤ 1.2 W                  |
| Max. consumption, 3103, -05 & -08.....    | ≤ 0.8 W                  |
| Isolation voltage, test / operation ..... | 2.564 kVAC / 250 VAC     |
| Accuracy .....                            | < ±0.05% of span         |
| Signal / noise ratio .....                | Min. 60 dB (0...100 kHz) |
| Response time (0...90%, 100...10%):       |                          |
| mA / V input .....                        | 7 ms                     |
| Calibration temperature.....              | 20...28°C                |
| EMC immunity influence .....              | < ±0.5% of span          |
| Extended EMC immunity:                    |                          |
| NAMUR NE 21, A criterion, burst .....     | < ±1% of span            |
| 2-wire supply (terminal 3...4).....       | 28...17 VDC / 0...20 mA  |
| 2-wire supply (terminal 3...4).....       | 28...15 VDC / 0...23 mA  |
| Relative humidity.....                    | < 95% RH (non-cond.)     |
| Dimensions (HxWxD).....                   | 113 x 6.1 x 115 mm       |
| Protection degree.....                    | IP20                     |
| Weight .....                              | 70 g                     |

## Current input

|                                      |                      |
|--------------------------------------|----------------------|
| Measurement range .....              | 0...20 mA            |
| Programmable measurement ranges..... | 0...20 and 4...20 mA |
| Input resistance.....                | Nom. 20 Ω + PTC 50 Ω |

## Voltage input

|                                      |                                     |
|--------------------------------------|-------------------------------------|
| Measurement range .....              | 0...10 VDC                          |
| Programmable measurement ranges..... | 0...10 / 2...10 / 0...5 / 1...5 VDC |
| Input resistance.....                | Nom. ≤ 500 kΩ                       |

## Current output

|                                  |                          |
|----------------------------------|--------------------------|
| Signal range (span).....         | 0...23 mA                |
| Programmable signal ranges ..... | 0...20 / 4...20 mA       |
| Load (max.).....                 | 23 mA / 300 Ω / 6.9 VDC  |
| Load stability.....              | < 0.002% of span / 100 Ω |

**of span** = of the currently selected measurement range

## Voltage output

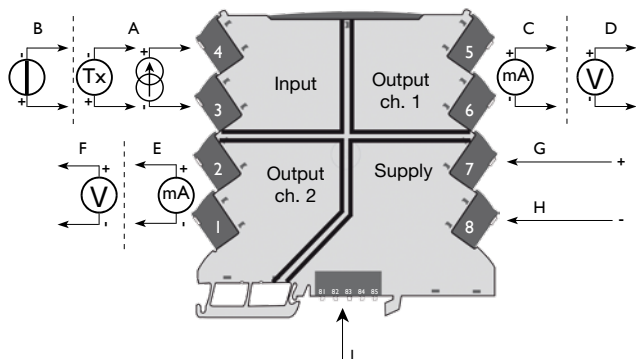
|                                  |                                     |
|----------------------------------|-------------------------------------|
| Signal range .....               | 0...10 VDC                          |
| Programmable signal ranges ..... | 0...10 / 2...10 / 0...5 / 1...5 VDC |
| Load (min).....                  | 10 K $\Omega$                       |

## Approvals

|  |                                 |
|--|---------------------------------|
| Det Norske Veritas, Ships & Offshore ..... | Stand. f. Certification No. 2.4 |
| Germanischer Lloyd .....                   | VI-7-2                          |
| *ATEX 94/9/EC.....                         | EN 60079-0, -15                 |
| *IECEX .....                               | IEC 60079-0, -15                |
| *c FM us .....                             | FM 3600, 3611, 3810             |
|  | CSA E60079-0, -15               |
|  | CSA 22.2 -213                   |
| EMC 2004/108/EC .....                      | EN 61326-1                      |
| LVD 2006/95/EC.....                        | EN 61010-1                      |
| UL, Standard for Safety .....              | UL 61010-1                      |
| Safe Isolation.....                        | EN 61140                        |

\* Does not apply to 3105

## CONNECTIONS



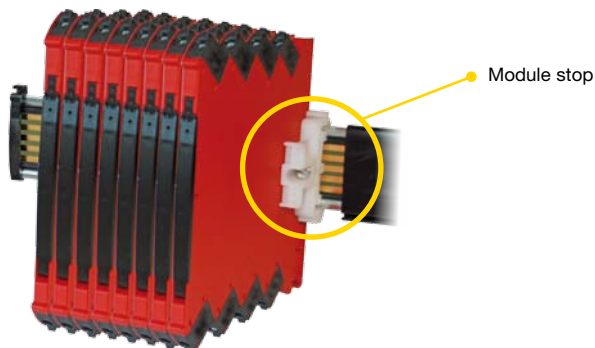
|          | Input signals | 3103 | 3104 | 3105 | 3108 | 3109 |
|----------|---------------|------|------|------|------|------|
| <b>A</b> | Current       | x    | x    | x    | x    | x    |
| <b>B</b> | Voltage       |      | x    | x    |      | x    |

|          | Output signals | 3103 | 3104 | 3105 | 3108 | 3109 |
|----------|----------------|------|------|------|------|------|
| <b>C</b> | Current 1      | x    | x    | x    | x    | x    |
| <b>D</b> | Voltage 1      |      | x    | x    |      | x    |
| <b>E</b> | Current 2      |      |      |      | x    | x    |
| <b>F</b> | Voltage 2      |      |      |      |      | x    |

|          | Supply                 | 3103 | 3104 | 3105 | 3108 | 3109 |
|----------|------------------------|------|------|------|------|------|
| <b>G</b> | Supply +               | x    | x    | x    | x    | x    |
| <b>H</b> | Supply -               | x    | x    | x    | x    | x    |
| <b>I</b> | Power rail connections | x    | x    | x    | x    | x    |



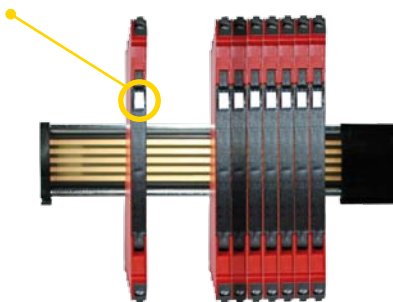
## INSTALLATION ON POWER RAIL



All devices can be installed on a power rail (PR part number 9400) supported, if necessary, by module stop for power rail (PR part number 9403). Power supply units can be mounted on the power rail according to customer requirements.

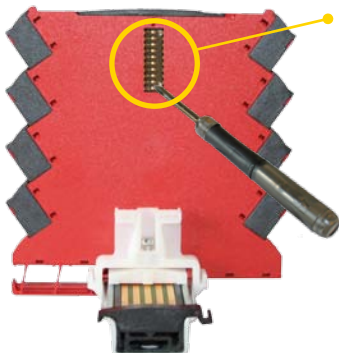
## MARKING

The front cover of the 3100 series has been designed with an area for affixation of a click-on marker. The area assigned to the marker measures 5 x 7.5 mm. Markers from Weidmüller's MultiCard System, type MF 5/7.5, are suitable (PR part number MF5/7.5).



## DIP-SWITCH PROGRAMMING

The devices 3104, 3105 and 3109 can be configured via DIP-switches. The DIP-switches are located on the side of the device and can be adjusted with a small screwdriver or other implement.



Adjustment of DIP-switches.

Default factory settings are:

Input = 0...20 mA

Output = 0...20 mA

All DIP-switches in the OFF position

The tables below show the configuration based on DIP-switch settings.

NA = no function of DIP-switch.

### 3104

| Input setup  |     |     |     |     |           | Output setup |     |     |    |    |    |
|--------------|-----|-----|-----|-----|-----------|--------------|-----|-----|----|----|----|
|              | 1   | 2   | 3   | 4   |           | 5            | 6   | 7   | 8  | 9  | 10 |
| 0...20 mA    | OFF | OFF | OFF | OFF | 0...20 mA | OFF          | OFF | OFF | NA | NA | NA |
| 4...20 mA    | OFF | OFF | ON  | OFF | 4...20 mA | OFF          | ON  | OFF | NA | NA | NA |
| 0...10 V     | OFF | ON  | OFF | OFF | 0...10 V  | ON           | OFF | OFF | NA | NA | NA |
| 2...10 V     | OFF | ON  | ON  | OFF | 2...10 V  | ON           | ON  | OFF | NA | NA | NA |
| 0...5 V      | OFF | ON  | OFF | ON  | 0...5 V   | ON           | OFF | ON  | NA | NA | NA |
| 1...5 V      | OFF | ON  | ON  | ON  | 1...5 V   | ON           | ON  | ON  | NA | NA | NA |
| 0...20 mA Tx | ON  | OFF | OFF | OFF |           |              |     |     |    |    |    |
| 4...20 mA Tx | ON  | OFF | ON  | OFF |           |              |     |     |    |    |    |

## 3105

| Input setup |    |     |     |     | Output setup |     |     |     |    |    |    |
|-------------|----|-----|-----|-----|--------------|-----|-----|-----|----|----|----|
|             | 1  | 2   | 3   | 4   |              | 5   | 6   | 7   | 8  | 9  | 10 |
| 0...20 mA   | NA | OFF | OFF | OFF | 0...20 mA    | OFF | OFF | OFF | NA | NA | NA |
| 4...20 mA   | NA | OFF | ON  | OFF | 4...20 mA    | OFF | ON  | OFF | NA | NA | NA |
| 0...10 V    | NA | ON  | OFF | OFF | 0...10 V     | ON  | OFF | OFF | NA | NA | NA |
| 2...10 V    | NA | ON  | ON  | OFF | 2...10 V     | ON  | ON  | OFF | NA | NA | NA |
| 0...5 V     | NA | ON  | OFF | ON  | 0...5 V      | ON  | OFF | ON  | NA | NA | NA |
| 1...5 V     | NA | ON  | ON  | ON  | 1...5 V      | ON  | ON  | ON  | NA | NA | NA |

## 3109

| Input setup  |     |     |     |     | Output setup |     |     |           |     |     |     |
|--------------|-----|-----|-----|-----|--------------|-----|-----|-----------|-----|-----|-----|
|              |     |     |     |     | Channel 1    |     |     | Channel 2 |     |     |     |
|              | 1   | 2   | 3   | 4   |              | 5   | 6   | 7         | 8   | 9   | 10  |
| 0...20 mA    | OFF | OFF | OFF | OFF | 0...20 mA    | OFF | OFF | OFF       | OFF | OFF | OFF |
| 4...20 mA    | OFF | OFF | ON  | OFF | 4...20 mA    | OFF | ON  | OFF       | OFF | ON  | OFF |
| 0...10 V     | OFF | ON  | OFF | OFF | 0...10 V     | ON  | OFF | OFF       | ON  | OFF | OFF |
| 2...10 V     | OFF | ON  | ON  | OFF | 2...10 V     | ON  | ON  | OFF       | ON  | ON  | OFF |
| 0...5 V      | OFF | ON  | OFF | ON  | 0...5 V      | ON  | OFF | ON        | ON  | OFF | ON  |
| 1...5 V      | OFF | ON  | ON  | ON  | 1...5 V      | ON  | ON  | ON        | ON  | ON  | ON  |
| 0...20 mA Tx | ON  | OFF | OFF | OFF |              |     |     |           |     |     |     |
| 4...20 mA Tx | ON  | OFF | ON  | OFF |              |     |     |           |     |     |     |

## LED INDICATION



The device is equipped with a green power LED in the front to indicate the operation status, see the table below.

| LED                               | Condition   | Output and loop supply | Action required                     |
|-----------------------------------|---|------------------------|-------------------------------------|
| OFF                               | No supply / device error or code-flash CRC error                          | De-energized           | Connect supply / replace device     |
| 1 Flash<br>(0.5 s OFF + 0.5 s ON) | Power-up or restart   | De-energized           | -                                   |
| Flashing 13 Hz<br>(15 ms ON)      | Device OK   | Energized              | -                                   |
| Flashing 1 Hz<br>(15 ms ON)       | Illegal DIP-switch setting  | De-energized           | Correct setting and re-power device |
| Flashing 1 Hz<br>(0.5 s ON)       | Restarting due to:<br>Supply error/hardware.<br>RAM or program flow error | De-energized           | Adjust supply / replace device      |



**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.



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