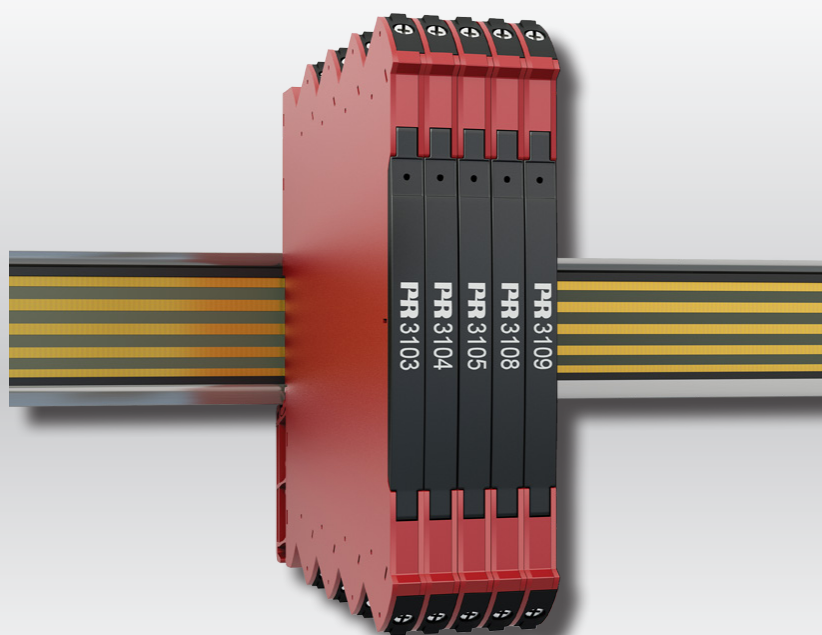


PERFORMANCE
MADE
SMARTER

Product manual

3100

***6 mm series of isolators
and converters***



TEMPERATURE | I.S. INTERFACES | COMMUNICATION INTERFACES | MULTIFUNCTIONAL | ISOLATION | DISPLAY

Models no. 3103 / 3104 / 3105 / 3108 / 3109
No. 3100V111-UK

PR
electronics

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.



Temperature

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.



I.S. Interface

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.



Communication

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.



Multifunction

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.



Isolation

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.



Display

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.

6 mm series of isolators and converters 3103 / 3104 / 3105 / 3108 / 3109

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Warnings



GENERAL

To avoid the risk of electric shock and fire, the safety instructions of this product 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 product 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.

To avoid explosion and serious injury: Modules having mechanical failures must be returned to PR electronics for repair or replacement.

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



**HAZARDOUS
VOLTAGE**

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

In applications where hazardous voltage is connected to in-/outputs of the device, sufficient spacing or isolation from wires, terminals, and enclosure - to surroundings (incl. neighboring devices), must be ensured to maintain protection against electric shock.



CAUTION

Potential electrostatic charging hazard. To avoid the risk of explosion due to electrostatic charging of the enclosure, do not handle the units unless the area is known to be safe, or appropriate safety measures are taken to avoid electrostatic discharge.

Symbol identification



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



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



The UKCA mark proves the compliance of the device with the essential requirements of the UK regulations.



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

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

The device must be installed in pollution degree 2 or better.

The device is designed to be safe at least under an altitude up to 2000 m.

The device is designed for indoor use.

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, e.g. wire cross section, protective fuse, and location.

Descriptions of input / output and supply connections are shown in the block diagram and side label.

The device is provided with field wiring terminals and shall be supplied from a Power Supply having double / reinforced insulation. A power switch should be easily accessible and close to the device. The power switch shall be marked as the disconnecting unit for the device.

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

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

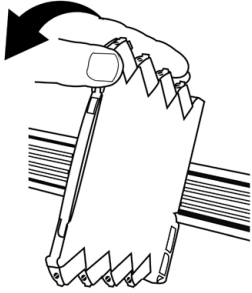
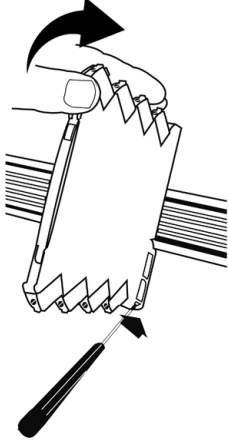
Cleaning

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

Liability

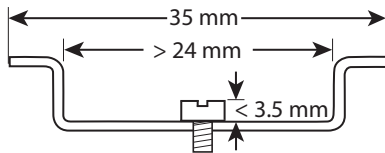
To the extent the instructions in this manual are not strictly observed, the customer cannot advance a demand against PR electronics A/S that would otherwise exist according to the concluded sales agreement.

Mounting / demounting of system 3000

Mounting on DIN rail / power rail (Fig.1)	Demounting from DIN rail / power rail (Fig.2)
Click the device onto the rail	First, remember to demount the connectors with hazardous voltages. Detach the device from the rail by moving the bottom lock down.
	

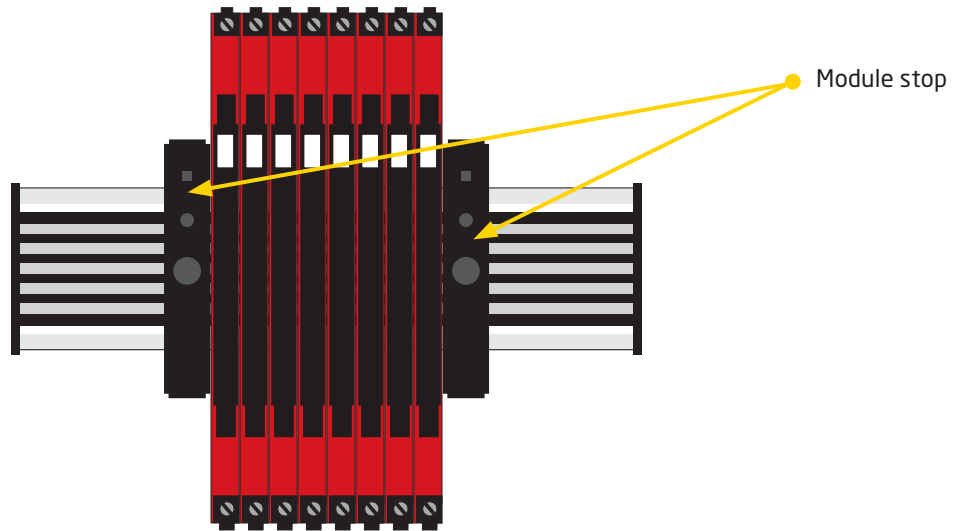


System 3000 devices can be mounted on DIN rail or power rail (where applicable).
When installing system 3000 devices with power rail connectors on a standard 7.5 mm DIN rail the head of the screws holding the rail shall be no more than 3.5 mm high to prevent potential short circuit of the power rail connectors.



Installation on DIN rail / power rail

System 3000 devices can be installed on a DIN rail or on a power rail.

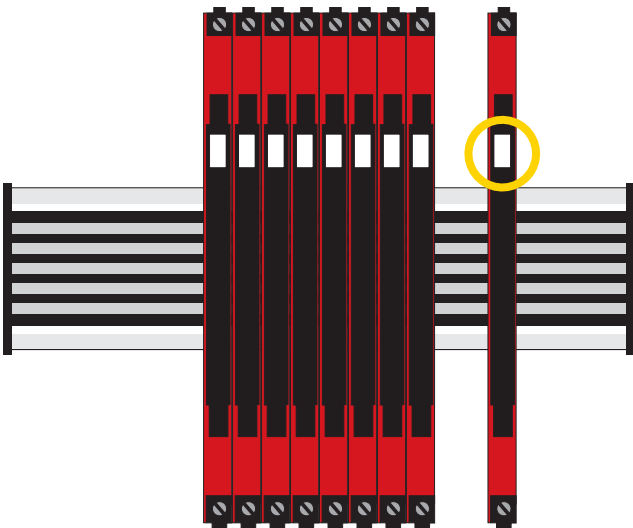


For marine applications, the devices must be supported by a module stop (PR part number 9404).

Power supply units can be mounted on the power rail according to customer requirements.

Marking

The front cover of the 3000 devices 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.



Flexible supply

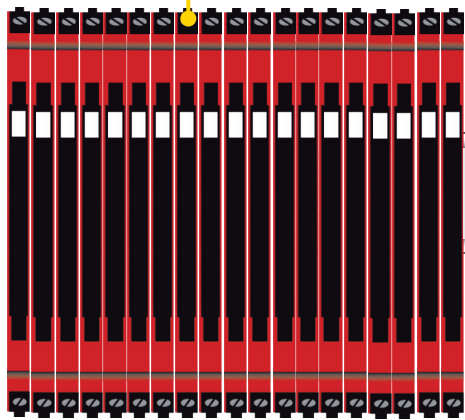
The technical specifications specify the maximum required power at nominal operating values, e.g. 24 V supply voltage, 60°C ambient temperature, 600 Ω load, and 20 mA output current.

External protective fuses may be required depending on power source selected. Protective fuse ratings are specified below.

DIN rail solution - device daisy chain:

The units can be supplied with 24 VDC \pm 30% via direct wiring and a loop between the devices.

Protective fuse: 2.5 A.



Protective fuse: 0.4 A.

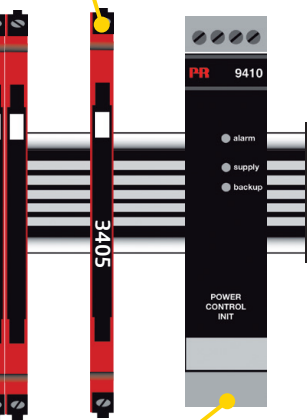
Power rail solution #1:

Alternately, you can connect 24 VDC to any 3000 device with power rail connector which will then energize other units on the rail.

Power rail solution #2:

The PR 3405 power connector unit allows easy connection of a 24 VDC / 2.5 A source to the power rail.

Protective fuse: 2.5 A.



Protective fuse: Located inside the PR 9410.

Power rail solution #3:

The PR 9410 power control unit can energize and power 96 W to the rail. Redundant power supplies are possible.

Note:

Device type 3xxx-N can only be supplied via the DIN rail solution with direct wiring on each device.

External fuse characteristics:

The 2.5 A fuse must break after not more than 120 seconds at 6.4 A.

6 mm series of isolators and converters

3103 / 3104 / 3105 / 3108 / 3109

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

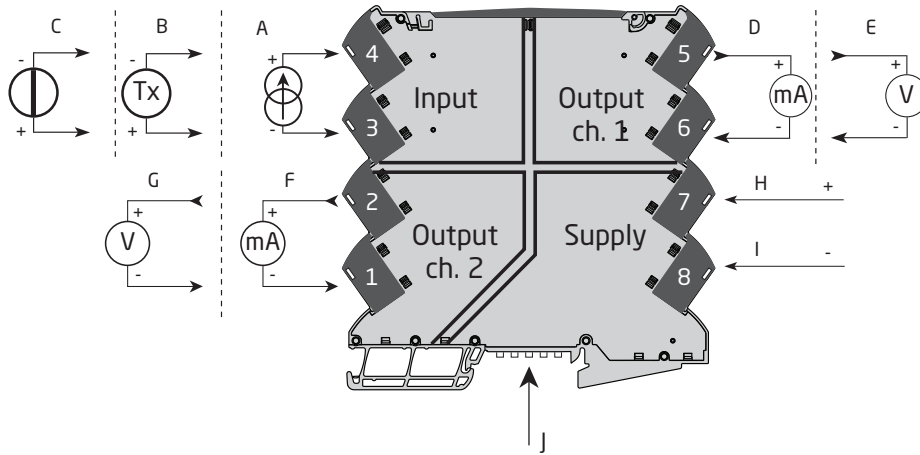
- Can be supplied separately or installed on power rail
- Can be delivered with customer parameterisation on request
- Approvals by CE, UL, DNV, CCC, ATEX zone 2, IECEx zone 2, UKEX zone 2 and FM Div. 2
- Possibility of loop supply output

Applications

The 3000 isolator family are designed for the automation and process industries. These devices are the result of extensive development and test procedures making 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 / IECEx zone 2 / UKEX zone 2 / FM division 2.
- Suitable for environments with high vibration stress, e.g. ships

Connections



**Safe Area or
Zone 2 & Cl. 1, Div. 2, gr. A-D**

	Input signals	3103	3104	3105	3108	3109
A	Current	x	x	x	x	x
B	Tx		x			x
C	Voltage		x	x		x

	Output signals	3103	3104	3105	3108	3109
D	Current 1	x	x	x	x	x
E	Voltage 1		x	x		x
F	Current 2				x	x
G	Voltage 2					x

	Supply	3103	3104	3105	3108	3109
H	Supply +	x	x	x	x	x
I	Supply -	x	x	x	x	x
J	Power rail connections (Only type 31xx with power rail option)	x	x	x	x	x

Product overview

PR type no.	3103	3104	3105
PR product name	Isolated repeater	Isolated converter	Isolated converter
Description	Fixed loop isolator / repeater.	Loop isolator / converter for standard DC signals. DIP-switch setup.	Loop isolator / converter for standard DC signals. DIP-switch setup. Low cost.
Parameterisation	None	DIP-switch	DIP-switch
Input signal	0...23 mA	0/2...10 V 0/1...5 V 0/4...23 mA	0/2...10 V 0/1...5 V 0/4...23 mA
Loop supply output		> 17 V @ 20 mA	
Output signal (active)	0...23 mA (1:1)	0/2...10 V 0/1...5 V 0/4...23 mA	0/2...10 V 0/1...5 V 0/4...23 mA
Approvals	UL, safety, FM Div. 2, ATEX zone 2, IECEX zone 2, UKEX zone 2, CCC, DNV marine, EAC Ex	UL, safety, FM Div. 2, ATEX zone 2, IECEX zone 2, UKEX zone 2, CCC, DNV marine, EAC Ex	UL, safety, DNV marine, EAC

PR type no.	3108	3109
PR product name	Isolated repeater / splitter	Isolated converter / splitter
Description	Fixed loop isolator / repeater with dual output.	Loop isolator / converter for standard DC signals. DIP-switch setup. Dual output.
Parameterisation	None	DIP-switch
Input signal	0...23 mA	0/2...10 V 0/1...5 V 0/4...23 mA
Loop supply output		>17 V @ 20 mA
Output signal (active)	0...23 mA (1:1)	0/2...10 V 0/1...5 V 0/4...23 mA
Approvals	UL, safety, FM Div. 2, ATEX zone 2, IECEX zone 2, UKEX zone 2, CCC, DNV marine, EAC Ex	UL, safety, FM Div. 2, ATEX zone 2, IECEX zone 2, UKEX zone 2, CCC, DNV marine, EAC Ex

Order

Type	Version	
3103	Isolated repeater	With power rail connector / terminals : - Supplied via terminals : -N
3104	Isolated converter	With power rail connector / terminals : - Supplied via terminals : -N
3105	Isolated converter	With power rail connector / terminals : - Supplied via terminals : -N
3108	Isolated repeater / splitter	With power rail connector / terminals : - Supplied via terminals : -N
3109	Isolated converter / splitter	With power rail connector / terminals : - Supplied via terminals : -N

Example: 3108-N (Isolated repeater / splitter, supplied via terminals)

Accessories

9404 = Module stop for rail

Accessories for power rail devices

3405 = Power rail connector unit

9400 = Power rail - 7.5 or 15 mm high

9410 = Power control unit

9421 = Power supply

Technical data

Environmental conditions:

Operating temperature	-25°C to +70°C
Operating temperature, 3105	0 to +70°C
Storage temperature	-40°C to +85°C
Calibration temperature.	20...28°C
Relative humidity	< 95% RH (non-cond.)
Protection degree	IP20
Installation in pollution degree 2 & overvoltage category II.	

Mechanical specifications:

Dimensions (HxWxD)	113 x 6.1 x 115 mm
Weight approx.	70 g
DIN rail type.	DIN EN 60715 - 35 mm
Wire size.	0.13...2.5 mm ² / AWG 26...12 stranded wire
Screw terminal torque.	0.5 Nm
Vibration.	IEC 60068-2-6
2...25 Hz.	±1,6 mm
25...100 Hz.	±4 g

Common electrical specifications:

Supply voltage, DC. 16.8...31.2 VDC

Power requirements:

Type	Max. power dissipation	Max. required power
3103	0.60 W	0.65 W
3104	0.55 W	1.20 W
3105	0.52 W	0.80 W
3108	0.48 W	0.75 W
3109	0.60 W	1.20 W

*Max. required power is the maximum power needed at power supply terminals or rail connector.**Max. power dissipation is the maximum power dissipated at nominal operating values.*

Isolation voltage, test. 2.5 kVAC

Isolation voltage working. 300 VAC (reinforced) /
250 VAC (Zone 2, Div. 2)

Double isolation Input / output 1 / output 2 / supply

Signal dynamics, input / output Analog signal chain

Signal / noise ratio. Min. 60 dB

Cut-off frequency (3 dB) > 100 Hz

Response time (0...90%, 100...10%):

mA / V input < 7 ms

Accuracy. < ±0.05% of span

Accuracy, 3105. < ±0.2% of span

Temperature coefficient. < ±0.01% of span / °C

Temperature coefficient, 3105 < ±0.015% of span / °C

EMC immunity influence < ±0.5% of span

Extended EMC immunity:

NAMUR NE 21, A criterion, burst < ±1% of span

Auxiliary supplies:

2-wire supply (terminal 3 and 4) > 17 VDC / 20 mA

Current input:

Measurement range 0...23 mA

Programmable measurement ranges 0...20 and 4...20 mA

Input voltage drop < 1.5 VDC

Input resistance Nom. 20 Ω + PTC 50 Ω

Voltage input:

Measurement range 0...10.25 VDC

Programmable measurement ranges 0...10 / 2...10 / 0...5 / 1...5 VDC

Input resistance ≥ 500 kΩ

Current output:

Signal range (span) 0...23 mA

Programmable signal ranges 0...20 / 4...20 mA

Load, 3103, 3104 & 3105 ≤ 600 Ω

Load, 3108 & 3109 ≤ 300 Ω per channel

Load stability < 0.002% of span / 100 Ω

Current limit. ≤ 28 mA

Voltage output:

Signal range. 0...10 VDC

Programmable signal ranges 0...10 / 2...10 / 0...5 / 1...5 VDC

Load (min.) >10 kΩ

of span = of the selected range

Observed authority requirements:

EMC	2014/30/EU & UK SI 2016/1091
LVD	2014/35/EU & UK SI 2016/1101
RoHS	2011/65/EU & UK SI 2012/3032
ATEX	2014/34/EU & UK SI 2016/1107
EAC	TR-CU 020/2011
*EAC Ex	TR-CU 012/2011

Approvals:

DNV, Ships & Offshore.	TAA00001RW
c UL us, UL 61010-1.	E314307

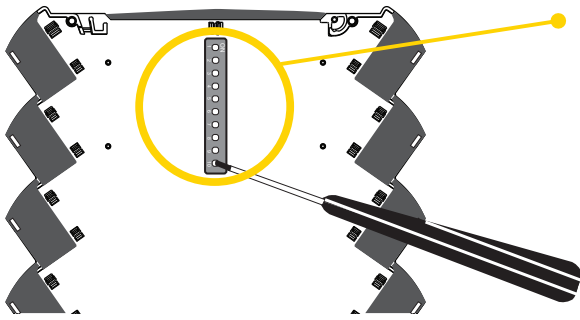
I.S. / Ex approvals:

*ATEX	KEMA 10ATEX0147 X
*IECEX	KEM 10.0068 X
*UKEX	DEKRA 21UKEX0055X
*c FM us	FM17US0004X / FM17CA0003X
*CCC	2020322310003554
*EAC Ex	RU C-DK.HA65.B.00355/19

* Does not apply to 3105

DIP-switch configuration

Applicable devices 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.



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							

Remember to cycle power for power rail / terminals to reload DIP-switch values at power up.

For easy DIP-switch programming, our DIP-switch configurator can be found at:
www.prelectronics.com/dip-switch-configurator/

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							
	1	2	3	4		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								

Remember to cycle power for power rail / terminals to reload DIP-switch values at power up.

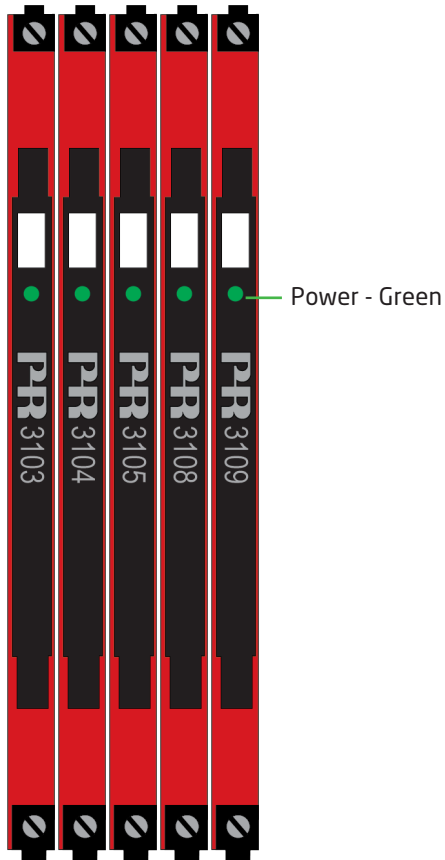
For easy DIP-switch programming, our DIP-switch configurator can be found at:
www.prelectronics.com/dip-switch-configurator/

Operation & troubleshooting

The 3000 series devices provide multiple features for easy user operation and for performing efficient troubleshooting.

Monitoring the operational status is easy from the front LED.

Status indicator front LED



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

Installation instructions

UL installation

Use 60/75°C copper conductors only.

Wire size AWG 26-12

UL file number E314307

The device is an Open Type Listed Process Control Equipment. To prevent injury resulting from accessibility to live parts the equipment must be installed in an enclosure. The power Supply unit must comply with NEC Class 2, as described by the National Electrical Code® (ANSI / NFPA 70).

IECEX, ATEX and UKEX installation in Zone 2

IECEX KEM 10.0068 X Ex ec IIC T4 Gc

KEMA 10ATEX0147 X I 3 G Ex ec IIC T4 Gc

DEKRA 21UKEX0055X II 3 G Ex ec IIC T4 Gc

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.

The devices shall be installed in a suitable enclosure providing a degree of protection of at least IP54 according to EN IEC 60079-0, taking into account the environmental conditions under which the equipment will be used.

When the temperature under rated conditions exceeds 70°C at the cable or conduit entry point, or 80°C at the branching point of the conductors, the temperature specification of the selected cable shall be in compliance with the actual measured temperature.

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

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

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

cFmus installation in Division 2 or Zone 2

FM17CA0003X / FM17US0004X Class I, Div. 2, Group A, B, C, D T4 or

Class 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).

The 3000 System Isolators and Converters must be connected to limited output NEC Class 2 circuits, as outlined in the National Electrical Code® (ANSI / NFPA 70), only. If the devices are connected to a redundant power supply (two separate power supplies), both must meet this requirement.

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

Warning: Substitution of components may impair suitability for zone 2 / division 2.

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.

Document history

The following list provides notes concerning revisions of this document.

Rev. ID	Date	Notes
108	1745	Models 31xx-N added. Specifications for max. required power and power dissipation added. PESO/CCOE approval added.
109	1939	PESO/CCOE approval discontinued . Side label updated.
110	2108	CCC approval added. ATEX and IECEx approvals updated - Ex na changed to Ex ec.
111	2205	Side label updated. UKEX approval added.

We are near you, *all over the world*

Our trusted red boxes are supported wherever you are

All our devices are backed by expert service and a 5-year warranty. With each product you purchase, you receive personal technical support and guidance, day-to-day delivery, repair without charge within the warranty period and easily accessible documentation.

We are headquartered in Denmark, and have offices and authorized partners the world over. We are a local

business with a global reach. This means that we are always nearby and know your local markets well. We are committed to your satisfaction and provide **PERFORMANCE MADE SMARTER** all around the world.

For more information on our warranty program, or to meet with a sales representative in your region, visit prelectronics.com.

Benefit today from *PERFORMANCE MADE SMARTER*

PR electronics is the leading technology company specialized in making industrial process control safer, more reliable and more efficient. Since 1974, we have been dedicated to perfecting our core competence of innovating high precision technology with low power consumption. This dedication continues to set new standards for products communicating, monitoring and connecting our customers' process measurement points to their process control systems.

Our innovative, patented technologies are derived from our extensive R&D facilities and from having a great understanding of our customers' needs and processes. We are guided by principles of simplicity, focus, courage and excellence, enabling some of the world's greatest companies to achieve PERFORMANCE MADE SMARTER.