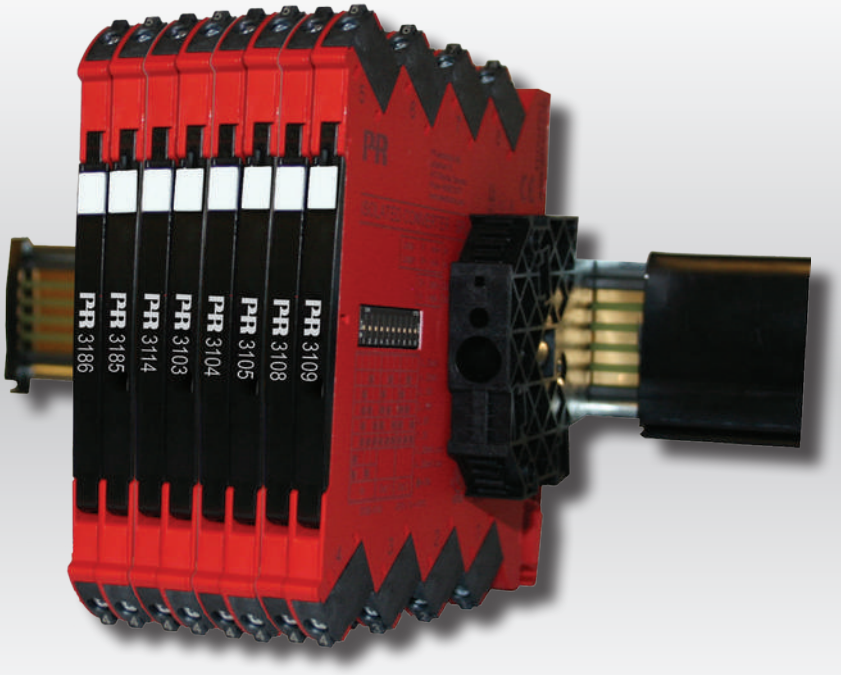
PERFORMANCE MADE SMARTER

Product manual
3100
6 mm series of isolators and converters



ZONE 2 | IEC IECEx Zone 2 | FM APPROVED ZONE 2 / DIV 2 | c UL us LISTED | DNV·GL DNVGL.COM/AF | Ex | EAC | CE

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

Models no. 3103 / 3104 / 3105 / 3108 / 3109
No. 3100V109-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

Table of contents

Warning 4
Symbol identification 4
Safety instructions 4
UL installation 5
cFMus installation in Division 2 or Zone 2 5
IECEx, ATEX installation in Zone 2 5
Flexible supply 7
Mounting and demounting of system 3000 8
Installation on DIN rail / power rail 9
Supply of power rail 9
Marking 9
Side label 10
Applications 11
Product overview 12
Order 13
Accessories 13
Accessories for power rail devices 13
Technical data 13
Connections 16
LED indication 17
DIP-switch programming 18
3104 18
3105 19
3109 19
Document history 20

Warning



GENERAL

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

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

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



HAZARDOUS VOLTAGE

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: 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.



Ex devices have been approved acc. 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 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 can be used for Measurement Category II and Pollution Degree 2.
The device 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 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 this installation guide and on the 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.

UL installation

Use 60/75°C copper conducters 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 accessability 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).

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.

IECEx, ATEX installation in Zone 2

IECEx KEM 10.0068 X . . . . . Ex nA IIC T4 Gc
KEMA 10ATEX0147 X . . . . . II 3G Ex nA 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.

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

The devices shall be installed in a suitable enclosure providing a degree of protection of at least IP54 according to EN60529, 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.

Provisions shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 40%.

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

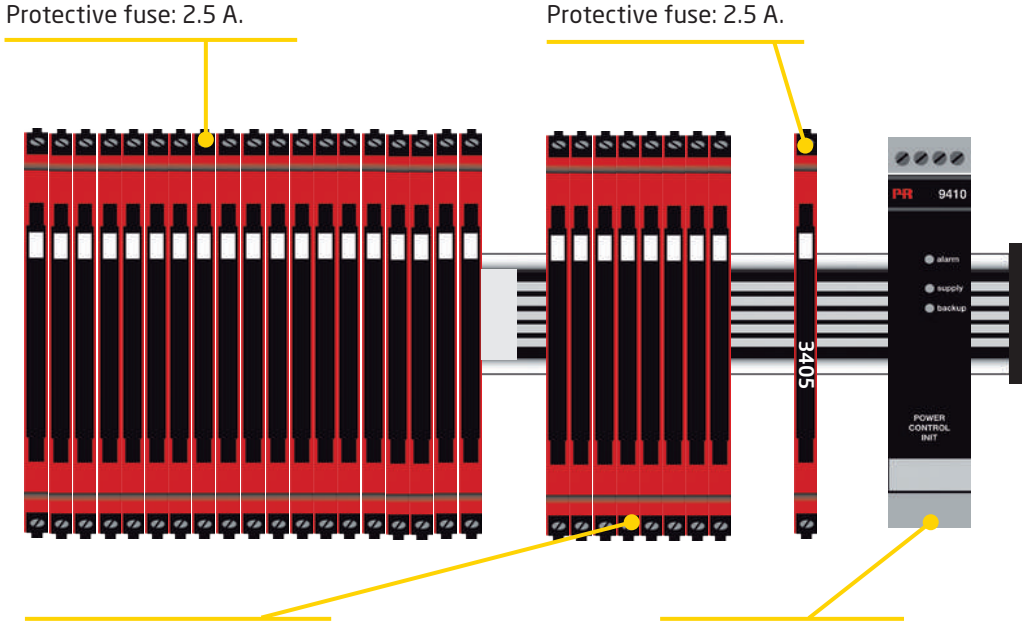
To the extent the instructions in this manual are not strictly observed, the customer cannot advance a demand against PR electronics A/S that would otherwise exist according to the concluded sales agreement.

Flexible supply

The technical specifications specifies 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.

DIN rail solution - device daisy chain:
The units can be supplied with 24 VDC ±30% via direct wiring and a loop between the devices.

Power rail solution #2:
The 3405 power connector unit allows easy connection of a 24 VDC / 2.5 A source to the power rail.



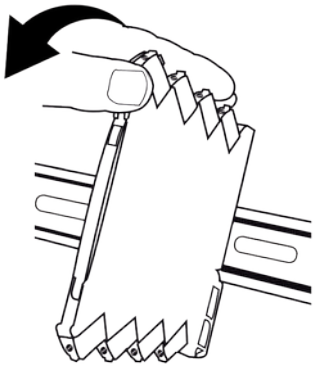
Power rail solution #1:
Alternately, you can connect 24 VDC to any one 3000 device with power rail connector which will then energize other units on the rail.

Power rail solution #3:
The 9410 power control unit can energize and power 96 W to the rail. Redundant power supplies are possible.

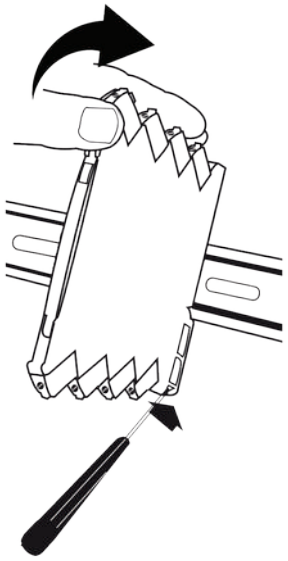
Note:
Device type 3xxx-N can only be supplied via the DIN rail solution with direct wiring on each device.

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

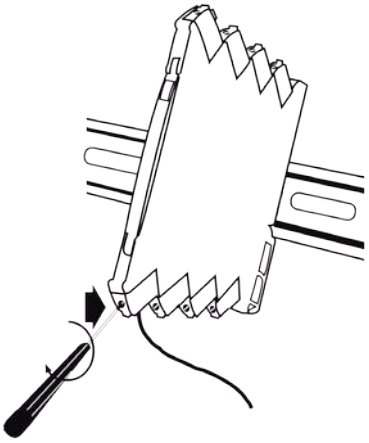
Mounting and demounting of system 3000



Picture 1:
Mounting on DIN rail / power rail.
Click the device onto the rail.

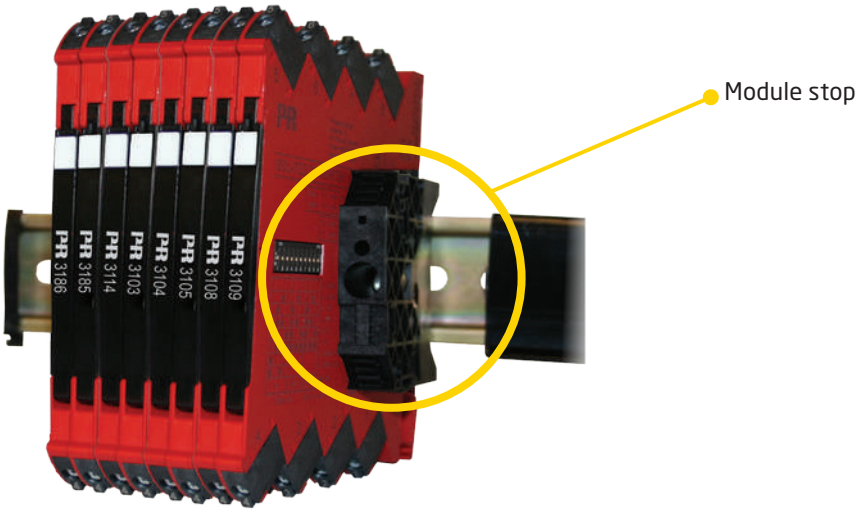


Picture 2:
Demounting from DIN rail / power rail.
First, remember to demount the connectors with hazardous voltages.
Detach the device from the DIN rail by lifting the bottom lock.



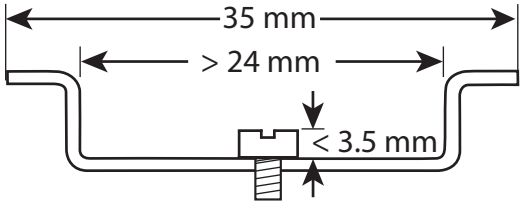
Picture 3:
Wire size AWG 26-12 / 0.13 x 2.5 mm^2 stranded wire.
Screw terminal torque 0.5 Nm.

Installation on DIN rail / power rail



The devices in the 3000 series 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.

If you want to install a 3000 device with power rail connectors on a standard DIN rail, the head of the screws holding the 7.5 mm DIN rail shall be no more than 3.5 mm high in order to avoid short circuit between the power rail connectors on the 3000 device and the screws.

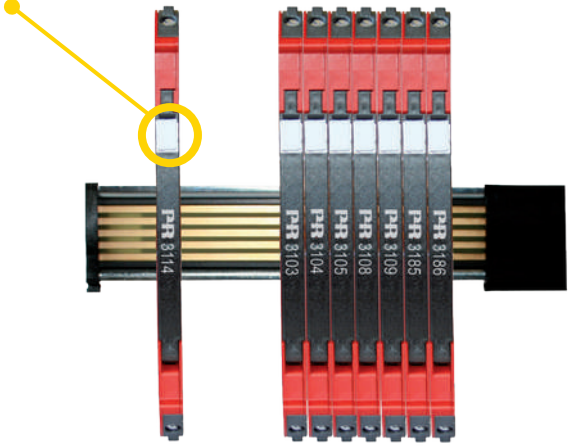


Supply of power rail

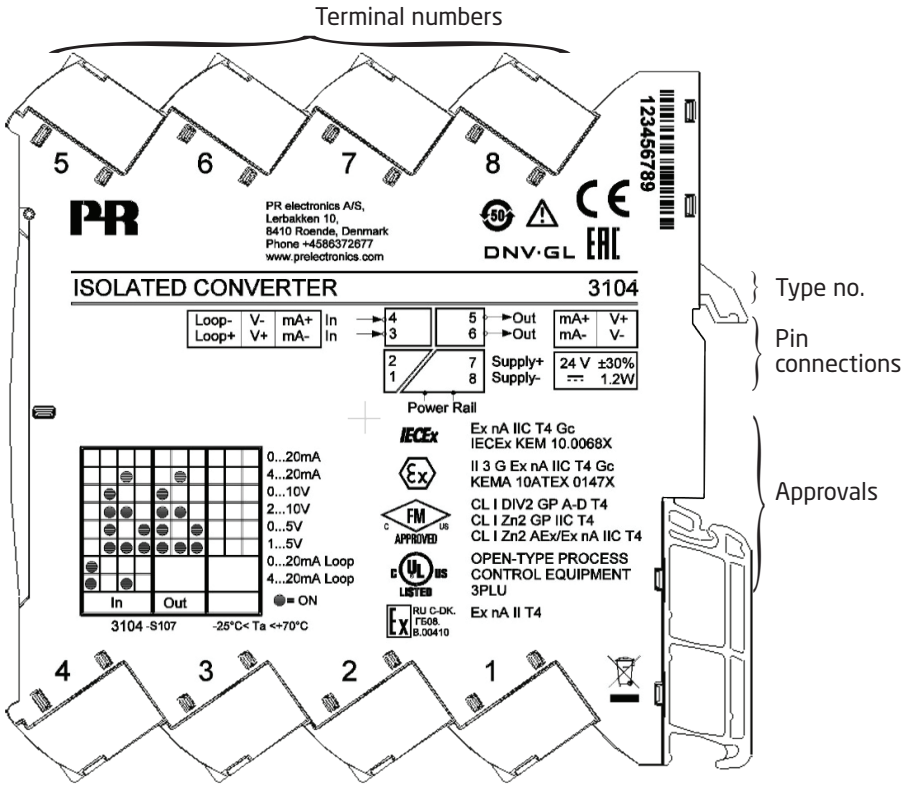
It is possible to supply the power rail via the supply terminals.
The terminals can pass a current of max. 400 mA.

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.



Side label


Terminal numbers
5
6
7
8
123456789
PR electronics A/S,
Lerbakken 10,
8410 Roende, Denmark
Phone +4586372677
www.prelectronics.com
DNV·GL
ISOLATED CONVERTER
3104
Loop-
Loop+
V-
V+
mA+
mA-
In
In
4
3
5
6
Out
Out
mA+
mA-
V+
V-
2
1
7
8
Supply+
Supply-
24 V ±30%
1.2W
Power Rail
Ex nA IIC T4 Gc
IECEx KEM 10.0068X
II 3 G Ex nA IIC T4 Gc
KEMA 10ATEX 0147X
CL I DIV2 GP A-D T4
CL I Zn2 GP IIC T4
CL I Zn2 AEx/Ex nA IIC T4
OPEN-TYPE PROCESS
CONTROL EQUIPMENT
3PLU
Ex nA II T4
0...20mA
4...20mA
0...10V
2...10V
0...5V
1...5V
0...20mA Loop
4...20mA Loop
= ON
In
Out
3104 -S107
-25°C< Ta <+70°C
4
3
2
1
Type no.
Pin connections
Approvals

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.

- 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
- 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 / FM division 2.
- Suitable for environments with high vibration stress, e.g. ships

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, DNV-GL, marine, EAC Ex	UL, safety, FM Div. 2, ATEX zone 2, IECEx zone 2, DNV-GL, marine, EAC Ex	UL, safety, DNV-GL, 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, DNV-GL, marine, EAC Ex	UL, safety, FM Div. 2, ATEX zone 2, IECEx zone 2, DNV-GL, marine, EAC Ex

Order

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

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	0.65
3104	0.55	1.20
3105	0.52	0.80
3108	0.48	0.75
3109	0.60	1.20

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
LVD	2014/35/EU
ATEX	2014/34/EU
RoHS	2011/65/EU

Approvals:

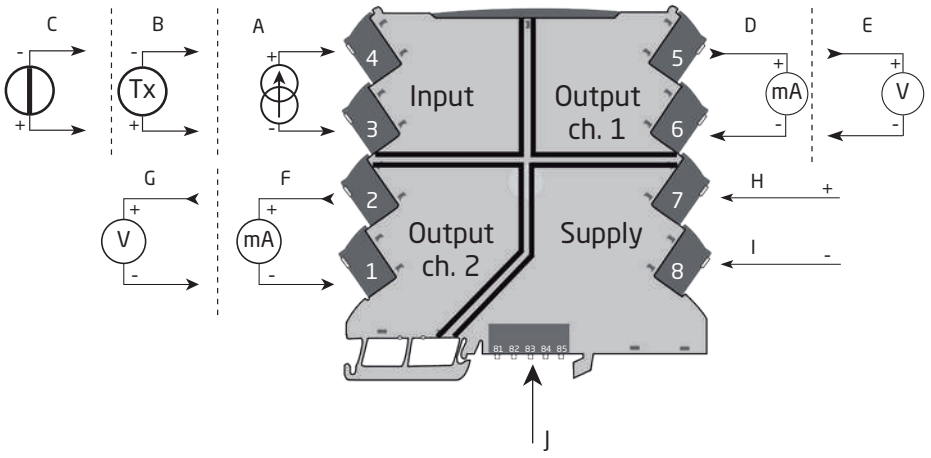
DNV-GL, Ships & Offshore	Standard for Certification No. 2.4
UL, Standard for Safety	UL 61010-1
Safe Isolation	EN 61140
EAC	TR-CU 020/2011
*EAC Ex	TR-CU 012/2011

I.S. / Ex approvals:

*ATEX 2014/34/EU	KEMA 10ATEX0147 X
*IECEx	KEM 10.0068 X
*c FM us	FM17US0004X / FM17CA0003X
*EAC Ex	RU C-DK.GB08.V.00410

* Does not apply to 3105

Connections

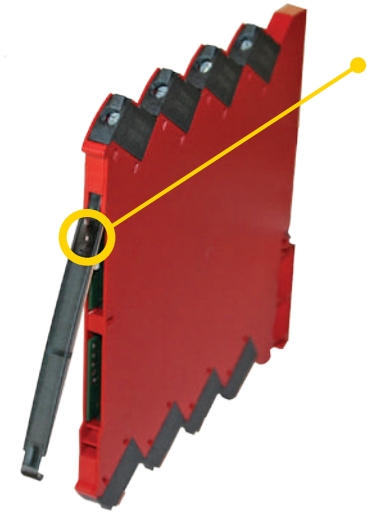


	Input signals	3103	3104	3105	3108	3109
A	Current	x	x	x	x	x
B	Tx		x			x
C	Voltage		x	x		x

	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

LED indication

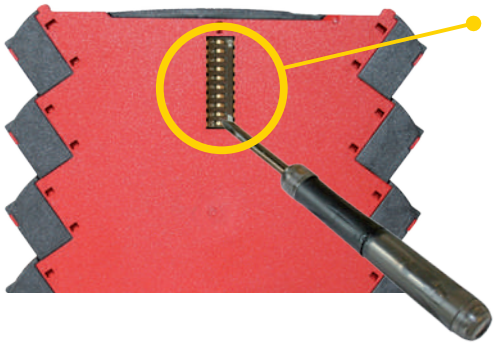


The device is equipped with a green power LED in the front to indicate the operation status, see the table below.

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

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							

(Power must be cycled after DIP-switch positions are changed).

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							

(Power must be cycled after DIP-switch positions are changed).

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 CCOE approval added
109	1939	CCOE approval discontinued Side label updated

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