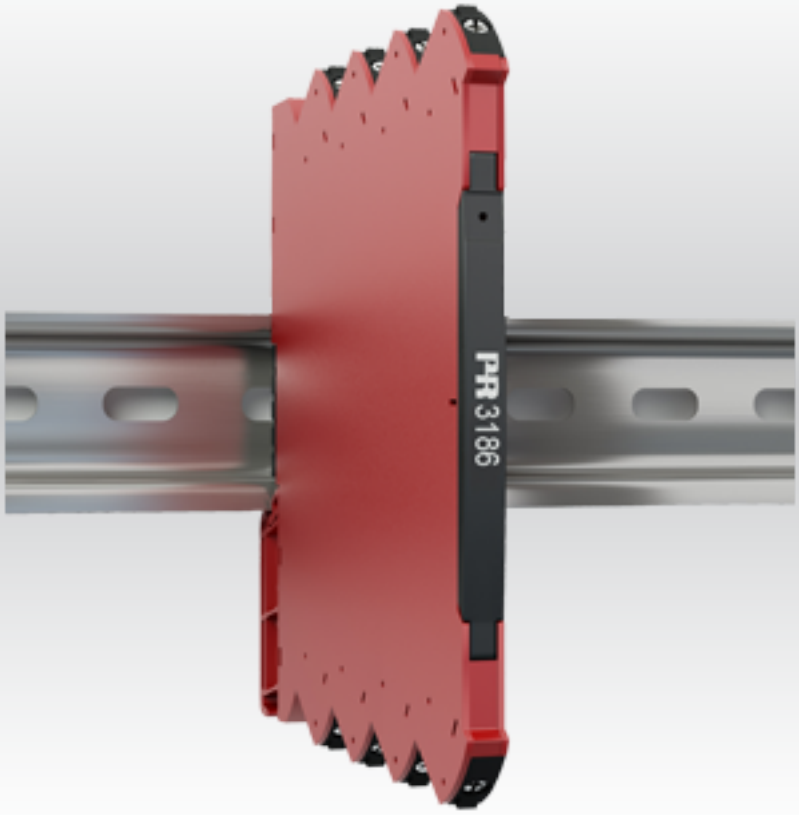
Product manual

3186

2-wire transmitter isolator / current isolator

PERFORMANCE MADE SMARTER



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

No. 3186V104-EN
From serial no.: 221319037

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 Portable Plant Supervisor (PPS) application, available for iOS, 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.

Table of contents

Warnings

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 in 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.

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.

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. See installation instructions.

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 troubleshoot the device in accordance with safety regulations.

Operators are personnel familiar with the contents of this manual and capable of safe operation of the device.

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 it 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 up to an altitude of 2 000 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, contact PR electronics A/S at 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 must be supplied from a Power Supply with electrical protection feature SELV or otherwise confirmed to have double or 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.

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

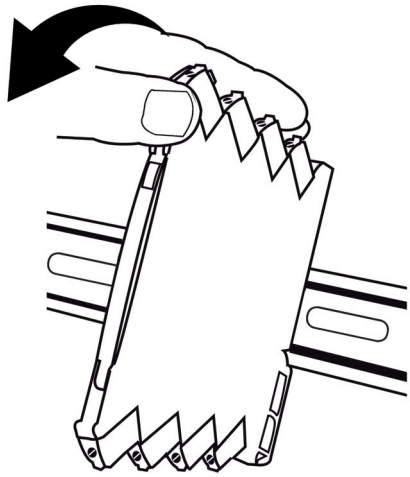
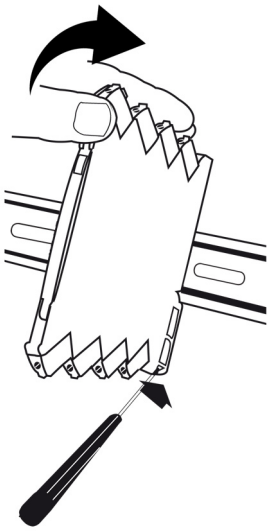
When disconnected, the device may be cleaned with a cloth moistened with distilled water.

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.

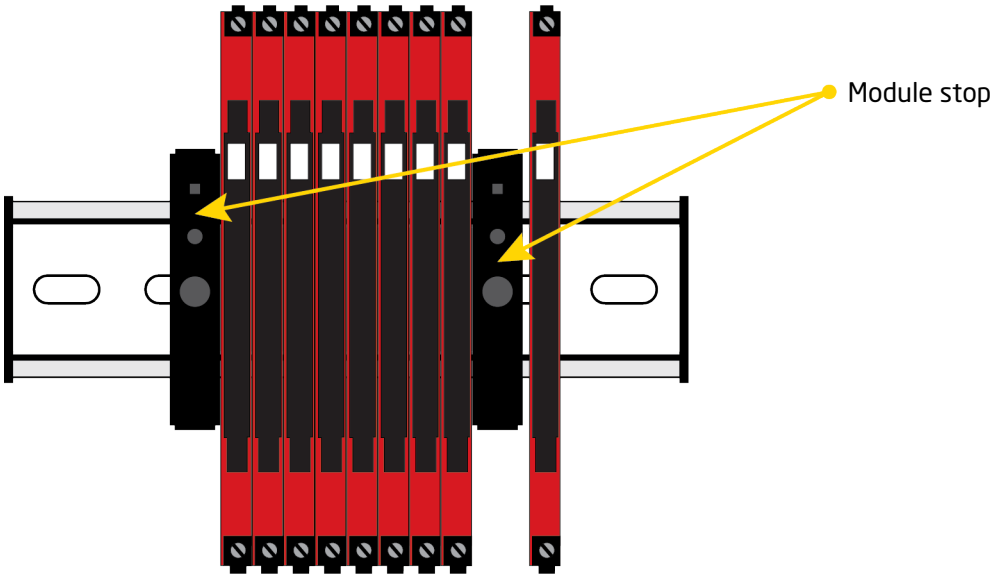
Installation

Mounting / demounting of system 3000

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

Installation on DIN rail

The device can be installed on a DIN rail.

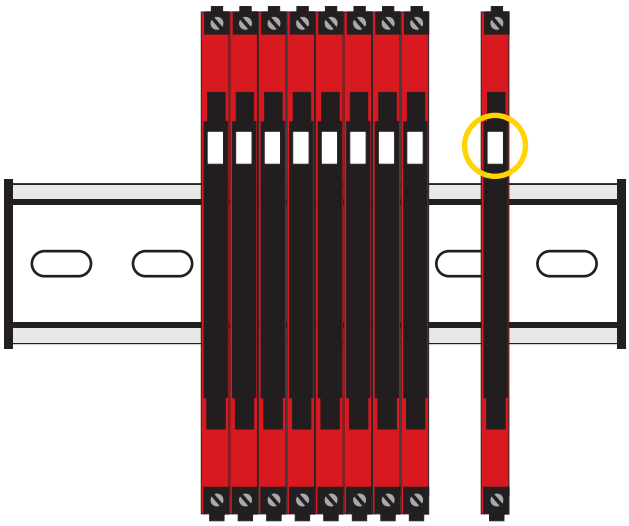


WARNING

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

Marking

The front cover of the device 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.



Product features

- 1 or 2 channel 2-wire transmitter isolator / current isolator
- Isolation and 1:1 conversion of standard current signals
- Excellent accuracy, better than 0.05% of span
- Low voltage drop and fast response time < 5 ms
- Slimline 6.1 mm housing

Functional highlights

- 3186A is a 1:1 output loop-powered 2-wire transmitter isolator that excites and measures passive input signals.
- 3186B is a 1:1 output loop-powered 2-wire current isolator that measures active input signals.
- High 4-port isolation provides surge suppression that protects the control system from transients and noise and eliminates ground loops.
- The device can be mounted in Safe area or in Zone 2 / Division 2 areas and is approved for marine applications.

Technical highlights

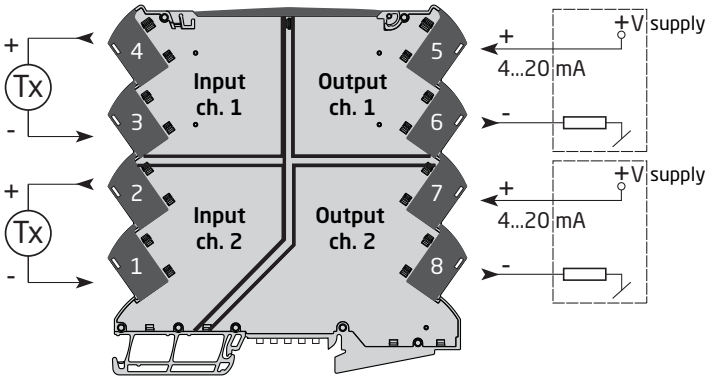
- The device is powered by the host loop voltage.
- Excellent conversion accuracy, better than 0.05% in the range 3.8...20.5 mA.
- Fast response time < 5 ms.
- Wide supply range from 6...35 V.
- Low input to output voltage drop typ. 2.5 V (3186A).
- Low input drop ≤ 3 V (3186B), even when no loop power is applied to the output terminals.
- NAMUR NE21, NE43.
- Excellent signal/noise ratio > 60 dB.
- High galvanic isolation of 2.5 kVAC.
- Inputs and outputs are floating and galvanically separated.
- Wide ambient temperature range: -25...+70°C.

Mounting / installation

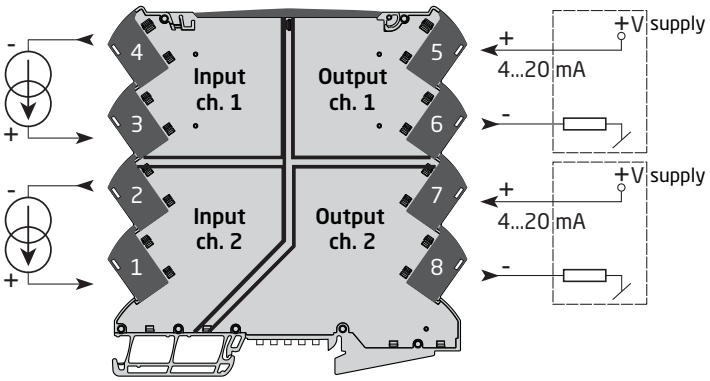
- The narrow 6.1 mm housing allows up to 163 units per meter.
- DIN rail mounting with up to 326 channels per meter.
- Units can be mounted side by side, horizontally and vertically, without air gap on a standard DIN rail, even at 70°C ambient temperature.

Connections

3186A



3186B



Specifications

Ordering information

Product variants

Type	Variant		Unit channels	
3186	2-wire transmitter isolator	: A	Single	: 1
	2-wire current isolator	: B	Double	: 2

Example: 3186B2 (2-wire current isolator, 2 channels)

Accessories

9404 = Module stop for rail

Technical specifications

Environmental conditions

Operating temperature	-25...+70°C
Storage temperature	-40...+85°C
Calibration temperature	20...28°C
Relative humidity	< 95% RH non condensing
Protection degree	IP20
Installation in	Pollution degree 2 & meas. / overvoltage cat. II

Mechanical specifications

Dimensions (HxWxD)	113 x 6.1 x 115 mm
Weight approx.	70 g
DIN rail type	35 x 15 mm DIN rail (EN 60715)
Wire size	0.13...2.5 mm2 / 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

Power supply	Output loop-powered
Supply voltage	6...35 VDC
Voltage drop, input to output typ. (3186A)	2.5 V
Input voltage drop typ. (3186B) Supplied and non-supplied unit	≤ 3 V
Isolation voltage, test	2.5 kVAC
Isolation voltage, working	300 VAC (reinforced) / 250 VAC (Zone 2, Div. 2)
Signal dynamics, input / output	Analog signal chain
Signal / noise ratio	> 60 dB
Response time (0...90%, 100...10%)	< 5 ms
Cut- off frequency (3 dB)	> 100 Hz

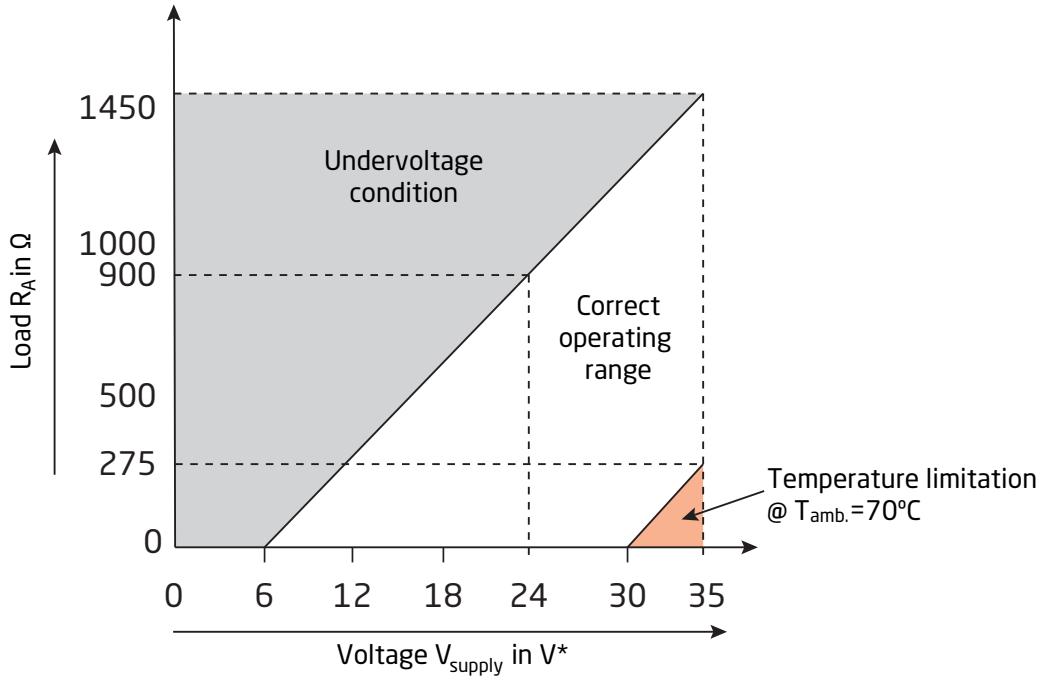
Power dissipation

3186A	50 mW per channel
3186B	$V_{terminal}$ x I per channel

In order to ensure that the maximum internal temperature is not exceeded, the following exceptions must be followed for the 3186B1 & B2.

3186B1

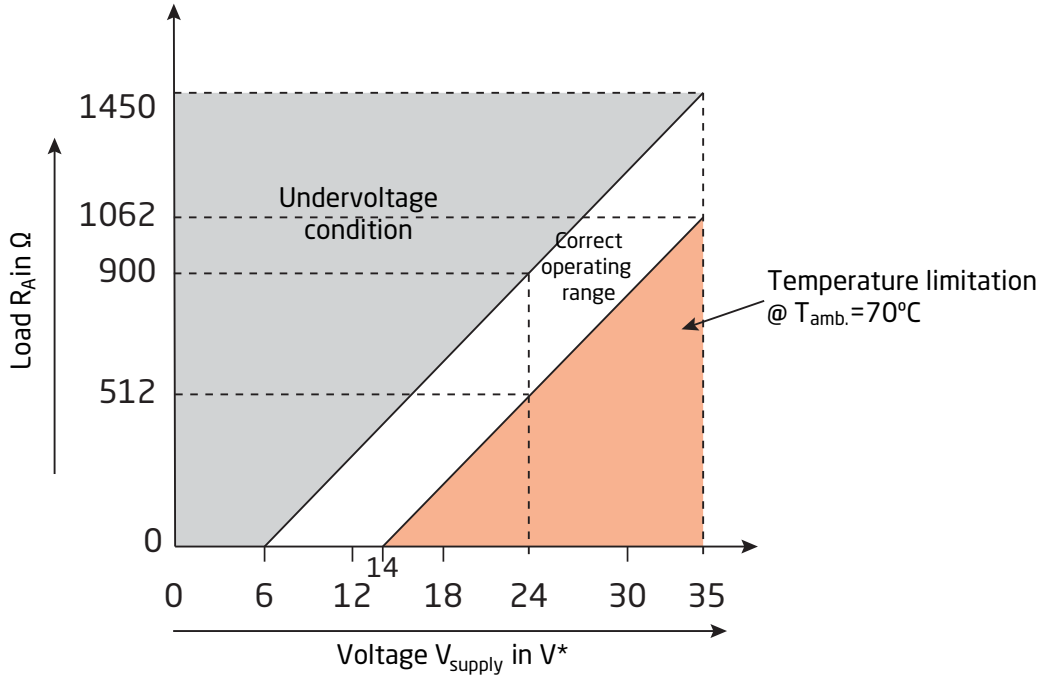
Power dissipation @ $T_{amb.}$ = 70°C:



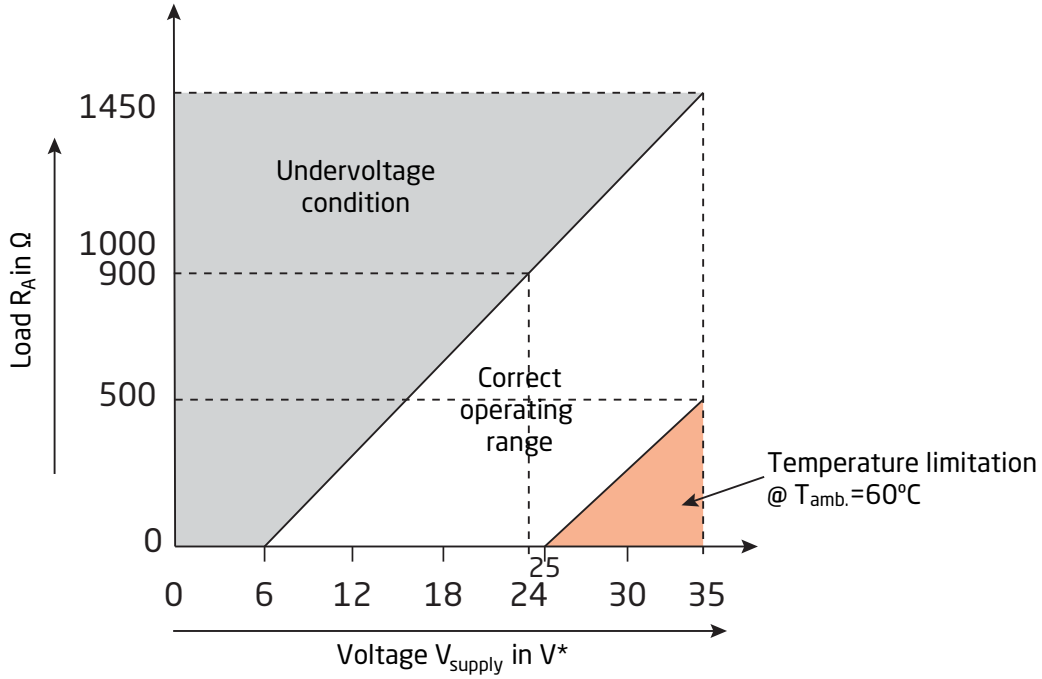
Power dissipation @ $T_{amb.}$ = 60°C . . . . . No limiting issues within operating range

3186B2

Power dissipation @ $T_{amb.}$ = 70°C:



Power dissipation @ $T_{amb.}$ = 60°C:



Power dissipation @ $T_{amb.}$ = 50°C . . . . . No limiting issues within operating range

* V_{supply}: The supply voltage for the loop covering both the 3186 output terminal voltage and the voltage across the load resistor R_A.
R_A = The input impedance in the PLC + the load in the loop (incl. the cable resistance).

Input and output specifications

Available input transmitter (Tx) supply (3186A)	3.5...32.5 V
Signal range, input to output	3.8...20.5 mA
Signal conversion	1:1
Signal range	3.5...23 mA
Output loop current limitation, typ.	24 mA
Current output overload, max.	50 mA

Accuracy values - 3186A				
Input type	Absolute accuracy	Temperature coefficient Δ°C = [$T_{amb.}$-25°C]		
mA	≤ ± 8 µA		$T_{amb.}$ > 25°C	$T_{amb.}$ < 25°C
		For $V_{terminal}$ ≤ 24 V	$T_{coeff.}$ = ±0.48 µA / °C	$T_{coeff.}$ = ±1.68 µA / °C
		For $V_{terminal}$ > 24 V	$T_{coeff.}$ = ±0.02 µA / °C x $V_{terminal}$**	$T_{coeff.}$ = ±0.047µA / °C x $V_{terminal}$**
Accuracy values - 3186B				
Input type	Absolute accuracy	Temperature coefficient Δ°C = [$T_{amb.}$-25°C]		
mA	≤ ± 8 µA		$T_{amb.}$ > 25°C	$T_{amb.}$ < 25°C
		For $V_{terminal}$ ≤ 24 V	$T_{coeff.}$ = ±0.48 µA / °C	$T_{coeff.}$ = ±1.12 µA / °C
		For $V_{terminal}$ > 24 V	$T_{coeff.}$ = ±0.02 µA / °C x $V_{terminal}$**	$T_{coeff.}$ = ±0.047µA / °C x $V_{terminal}$**
**$V_{terminal}$: Output terminal voltage measured in V at the 3186 device, i.e. voltage between terminal 5 and 6 for channel 1 and between terminal 7 and 8 for channel 2.				

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

of span = 4...20 mA

Approvals & certificates

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

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

I.S. / Ex approvals

ATEX	KEMA 10ATEX0147X
IECEx	KEM 10.0068X

UKEX	DEKRA 21UKEX0055X
c FM us	FM17US0004X / FM17CA0003X
EAC Ex	EAEU KZ 7500361.01.01.08756
CCC	2020322310003554

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	II 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
101	1710	Model 3186B added. Specifications for power dissipation added. PESO/CCOE approval added.
102	2108	PESO/CCOE approval discontinued. CCC approval added. ATEX and IECEx approvals updated - Ex na changed to Ex ec. Side label updated.
103	2205	UKEX approval added.
104	2448	New EAC Ex certificate.

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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.