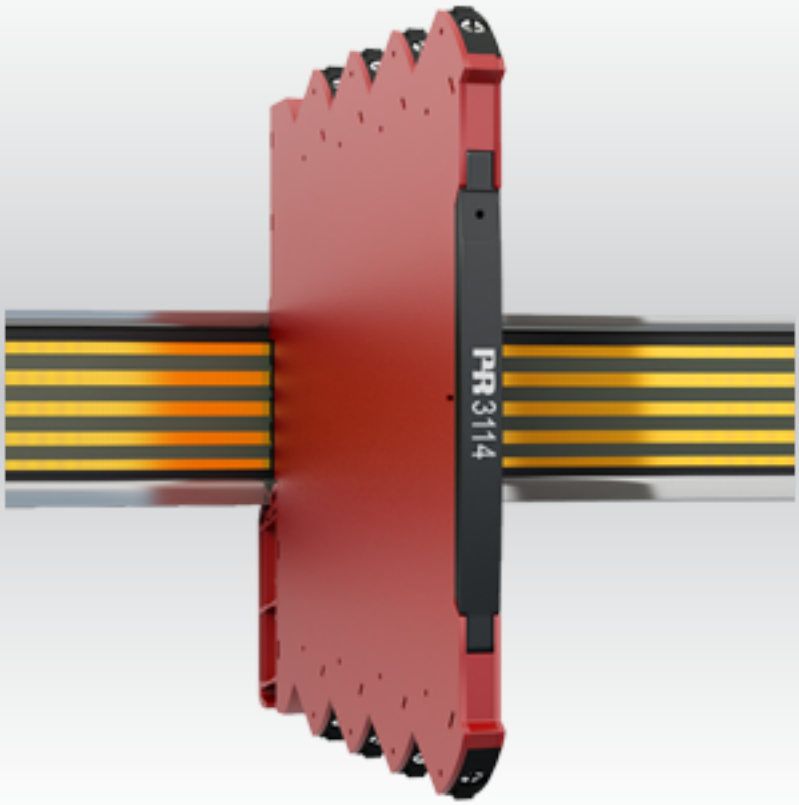
PERFORMANCE MADE SMARTER

# Product manual

# *3114*

# *Isolated universal converter*




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

No. 3114V106-EN
From serial no.: 211696077

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.

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

## HAZARDOUS VOLTAGE

The user service port for programming behind the front cover is an integrated part of the input circuit and may carry dangerous voltages.

## 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

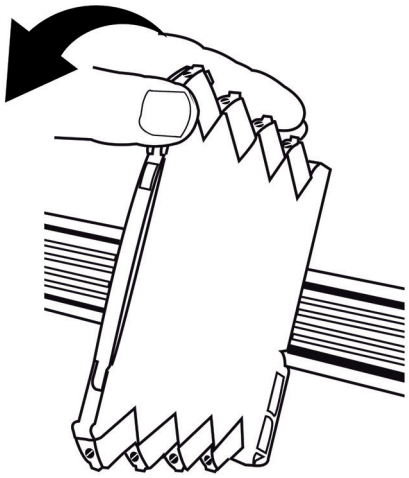
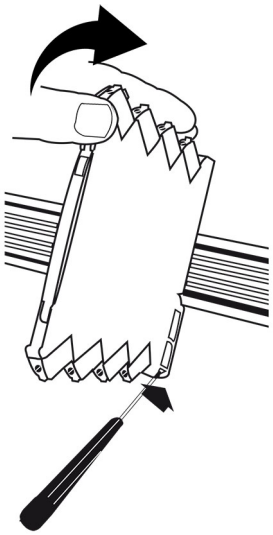
When disconnected, the device may be cleaned with a cloth moistened with distilled water.

## 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.

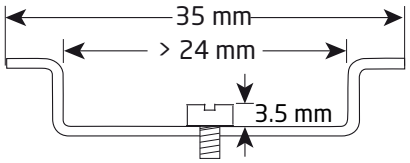
# Installation

## 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 |
|  |  |

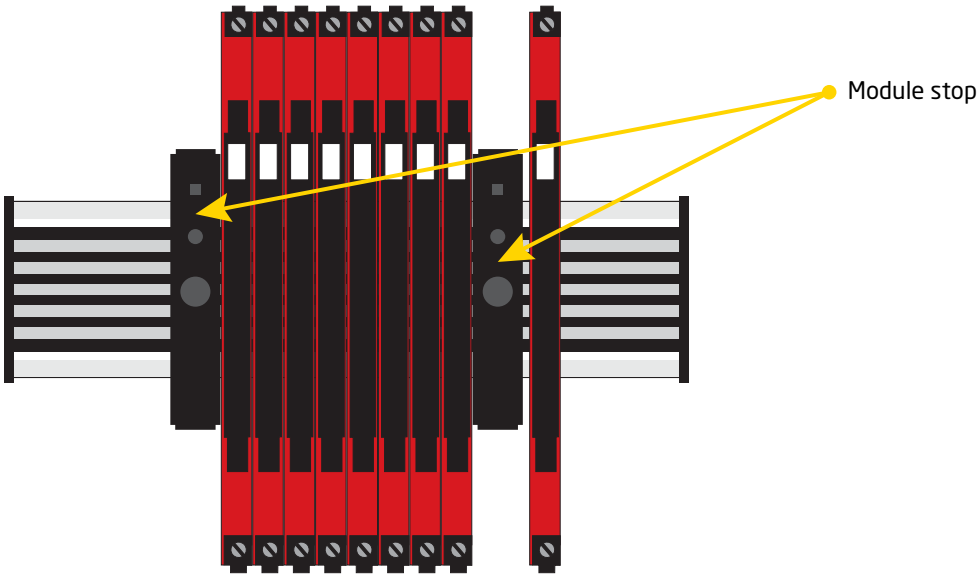
**WARNING**

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

The device can be installed on a DIN rail or on a power rail.



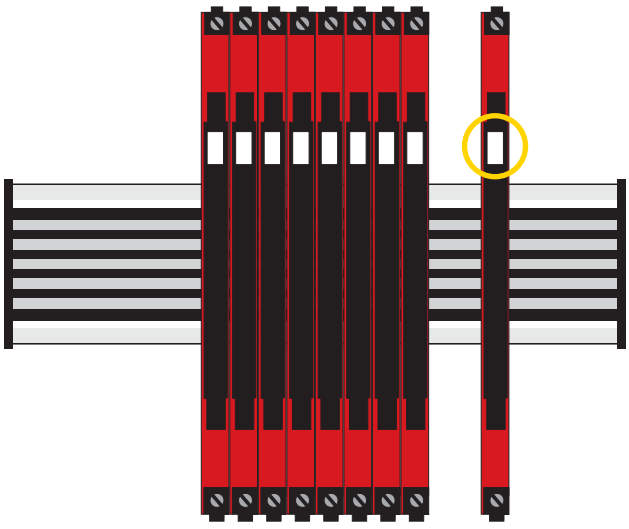

Power supply units can be mounted on the power rail according to customer requirements.

**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.



## Flexible supply

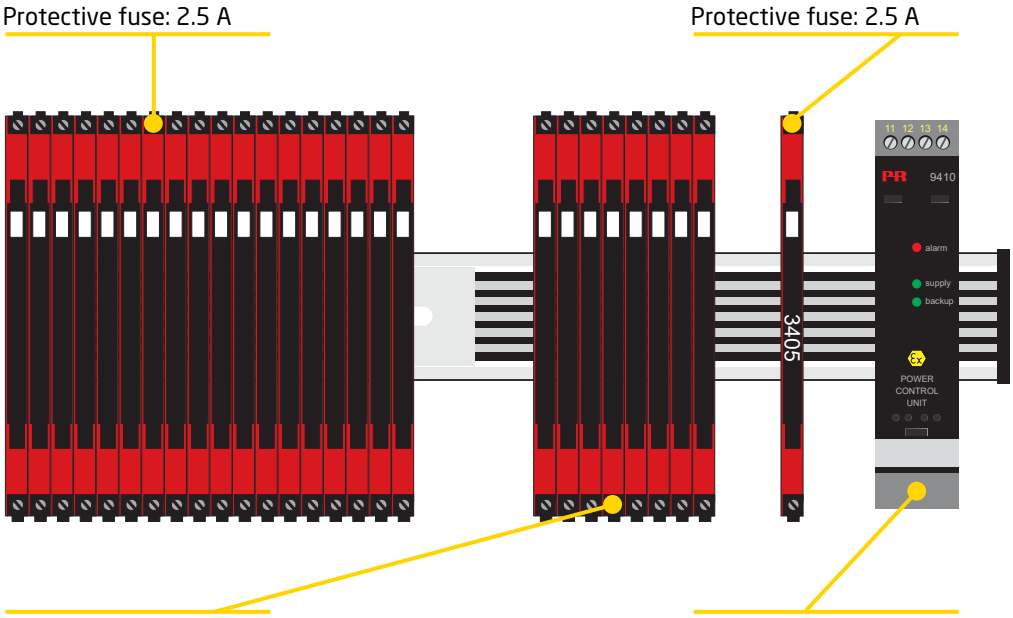
The technical specifications specify the maximum required power at nominal operating values, e.g. 24 V supply voltage, 60°C ambient temperature, 600 Ω load, and 20 mA output current. External protective fuses may be required depending on power source selected. Protective fuse ratings are specified below.

**DIN rail solution - device daisy chain:**

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

**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.




**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 #3:**

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

**Note**

Device types 3xxx-N do not have power rail connectors and can only be supplied 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.

# Product features

- Input: RTD, TC, Ohm, potentiometer, mA and V
- Output: Current and voltage
- Loop supply > 15 V
- Power supply 16.8 VDC...31.2 VDC
- Slimline 6.1 mm housing

## Functional highlights

- Conversion of linear resistance variation to a standard analog current / voltage signal, e.g. from solenoids and butterfly valves or linear movements with attached potentiometer.
- Galvanic separation of analog current and voltage signals.
- Linearised, electronic temperature measurement with RTD or TC sensor.
- High 3-port isolation provides surge suppression that protects the control system from transients and noise and eliminates ground loops.
- Power supply and signal isolator for 2-wire transmitters.
- Process control with standard analog output.
- All terminals are over-voltage protected, polarity protected and short-circuit protected.
- The device can be mounted in Safe area or in Zone 2 / Division 2 areas and is approved for marine applications.

## Technical highlights

- Flexible 24 VDC (±30%) supply via power rail or connectors.
- Excellent conversion accuracy in all available ranges, better than 0.1% of span.
- Continuous check of vital stored data for safety reasons.
- Excellent signal / noise ratio > 60 dB.
- High galvanic isolation of 2.5 kVAC.
- A green front LED indicates normal operation, status of the input sensor and malfunction.
- Wide ambient temperature range: -25...+70°C.

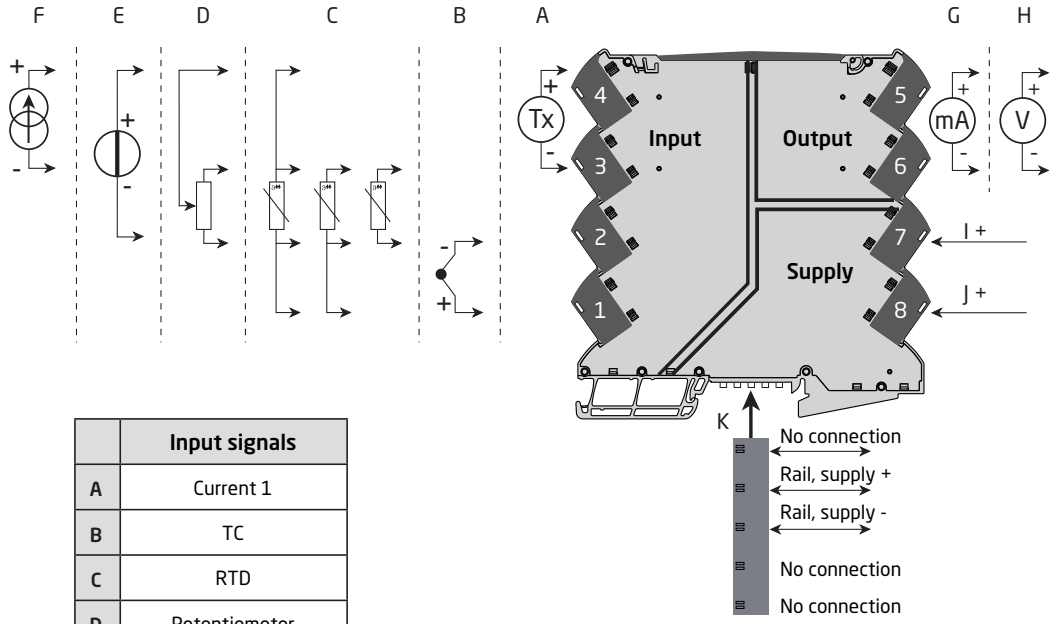
## Programming

- Configuration, monitoring, and diagnostics using PR 4500 detachable communication interfaces via the PR 4590 ConfigMate. As the device is designed with electronic hardware switches, it is not necessary to open the device for setting of DIP switches.
- All programming can be password protected.
- Scrolling help text in 7 languages.

## Mounting / installation

- The narrow 6.1 mm housing allows up to 163 units 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.
- Units can be supplied separately or installed on PR 9400 power rail.

# Connections




| | Input signals |
|---|---|
| A | Current 1 |
| B | TC |
| C | RTD |
| D | Potentiometer |
| E | Voltage |
| F | Current 2 |

| | Output signals |
|---|---|
| G | Current |
| H | Voltage |

| | Supply |
|---|---|
| I | Supply + |
| J | Supply - |
| K | Power rail connections (Only type 3114 with power rail option) |

# Specifications

## Ordering information

### Product variants

| Type | Version | | |
|---|---|---|---|
| 3114 | Isolated universal converter | With power rail connector / terminals | : - |
| | | Supplied via terminals | : -N |

Example: 3114-N (Isolated universal converter, supplied via terminals)

### Accessories

9404 = Module stop for rail
9421 = Power supply

### Accessories for power rail devices

3405 = Power rail connector unit
9400 = Power rail - 7.5 or 15 mm high
9410 = Power control unit

### Accessories for programming

4510 = Display / programming front
4511 = Modbus communication enabler*
4512 = Bluetooth communication enabler*
4590 = ConfigMate
*Note: PR 4511 and PR 4512 communication interfaces support display programming only. Modbus communication, Bluetooth and datalogging are not supported. PR 4512 requires PR 4590 ConfigMate with serial number > 211394001.

## 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

| | |
|---|---|
| Supply voltage | 16.8...31.2 VDC |
| Max. required power | 1.2 W |
| Max. power dissipation | 0.65 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.*

| | |
|---|---|
| Fuse | 400 mA SB / 250 VAC |
| Isolation voltage, test | 2.5 kVAC |
| Isolation voltage, working | 300 VAC (reinforced) / 250 VAC (Zone 2, Div. 2) |
| Double isolation | Input / output / supply |
| Signal dynamics, input | 24 bit |
| Signal dynamics, output | 16 bit |
| Signal / noise ratio | > 60 dB |
| Response time (0...90%, 100...10%) Temperature input | 1 s |
| Response time (0...90%, 100...10%) mA / V input | 400 ms |
| Programming | PR 4500 communication interfaces / PR 4500 ConfigMate |

Accuracy - the greater of basic and absolute values:

| General values | | |
|---|---|---|
| Input type | Absolute accuracy | Temperature coefficient |
| All | ≤ ±0.1% of span | ≤ ±0.01% of span / °C |

| Basic values | | |
|---|---|---|
| Input type | Basic acccuracy | Temperature coefficient |
| mA | ≤ ±16 µA | ≤ ±1.6 µA / °C |
| 0 ...1 V & 0.2...1 V | ≤ ±0.8 mV | ≤ ±0.08 mV / °C |
| 0...5 V, 1...5 V, 0...10 V & 2...10 V | ≤ ±8 mV | ≤ ±0.8 mV / °C |
| Pt100, Pt200, Pt 1000 | ≤ ±0.2°C | ≤ ±0.02°C / °C |
| Pt500, Ni100, Ni120, Ni 1000 | ≤ ±0.3°C | ≤ ±0.03°C / °C |
| Pt50, Pt400, Ni50 | ≤ ±0.4°C | ≤ ±0.04°C / °C |
| Pt250, Pt300 | ≤ ±0.6°C | ≤ ±0.06°C / °C |
| Pt20 | ≤ ±0.8°C | ≤ ±0.08°C / °C |
| Pt10 | ≤ ±1.4°C | ≤ ±0.14°C / °C |
| TC type: E, J, K, L, N, T, U | ≤ ±1°C | ≤ ±0.1°C / °C |
| TC type: R, S, W3, W5, LR | ≤ ±2°C | ≤ ±0.2°C / °C |
| TC type: B 160...400°C | ≤ ±4.5°C | ≤ ±0.45°C / °C |
| TC type: B 400...1820°C | ≤ ±2°C | ≤ ±0.2°C / °C |

| | |
|---|---|
| Conducted RF/LF immunity influence | < ±0.5% of span |
| Extended EMC immunity:<br>ESD / HF / Burst / Surge immunity influence | < ±1% of span |
| Auxiliary supplies:<br>2-wire supply (terminal 3 and 4) | 25...15 VDC / 0...20 mA |

## Input and output specifications

### RTD, linear resistance and potentiometer input

| Input type | Min. value | Max. value | Standard |
|---|---|---|---|
| Pt100 | -200°C | +850°C | IEC 60751 |
| Ni100 | -60°C | +250°C | DIN 43760 |
| Linear resistance | 0 Ω | 10000 Ω | - |
| Potentiometer | 10 Ω | 100 kΩ | - |

Input for RTD types:

Pt10, Pt20, Pt50, Pt100, Pt200, Pt250, Pt300, Pt400, Pt500, Pt1000 Ni50, Ni100, Ni120, Ni1000

| | |
|---|---|
| Cable resistance per wire (max.), RTD | 50 Ω |
| Sensor current; RTD. | Nom. 0.2 mA |
| Effect of sensor cable resistance (3- / 4-wire), RTD. | < 0.002 Ω / Ω |
| Sensor error detection, RTD | Yes |
| Short circuit detection, RTD | < 15 Ω |

### TC input

| Type | Min. temperature | Max. temperature | Standard |
|---|---|---|---|
| B | 0°C | +1820°C | IEC 60584-1 |
| E | -100°C | +1000°C | IEC 60584-1 |
| J | -100°C | +1200°C | IEC 60584-1 |
| K | -180°C | +1372°C | IEC 60584-1 |
| L | -200°C | +900°C | DIN 43710 |
| Lr | -200°C | +800°C | GOST 3044-84 |
| N | -180°C | +1300°C | IEC 60584-1 |
| R | -50°C | +1760°C | IEC 60584-1 |
| S | -50°C | +1760°C | IEC 60584-1 |
| T | -200°C | +400°C | IEC 60584-1 |
| U | -200°C | +600°C | DIN 43710 |
| W3 | 0°C | +2300°C | ASTM E988-96 |
| W5 | 0°C | +2300°C | ASTM E988-96 |

Cold junction compensation (CJC):

| | |
|---|---|
| via internal CJC sensor | ±(2.0°C + 0.4°C * Δt)<br>Δt = internal temperature - ambient temperature |
| Sensor error detection, all TC types | Yes |

Sensor error current:

| | |
|---|---|
| When detecting | Nom. 2 µA |
| Else | 0 µA |

### Current input

| | |
|---|---|
| Measurement range | 0...23 mA |
| Programmable measurement ranges | 0...20 / 4...20 mA |
| Input resistance | Nom. 20 Ω + PTC 50 Ω |
| Sensor error detection: Loop break 4...20 mA | Yes |

### Voltage input

| | |
|---|---|
| Measurement range | 0...12 VDC |
| Programmable measurement ranges | 0...1 / 0.2...1 / 0...5 / 1...5 / 0...10 / 2...10 VDC |
| Input resistance | Nom. 10 MΩ |

### Current output

| | |
|---|---|
| Signal range (span) | 0...23 mA |
| Programmable signal ranges | 0...20 / 4...20 / 20...0 / 20...4 mA |
| Load | ≤ 600 Ω |
| Load stability | ≤ 0.01% of span / 100 Ω |
| Sensor error detection | 0 / 3.5 / 23 mA / none |
| NAMUR NE 43 Upscale/Downscale | 23 mA / 3.5 mA |
| Output limitation on 4...20 and 20...4 mA signals | 3.8...20.5 mA |
| Output limitation on 0...20 and 20...0 mA signals | 0...20.5 mA |
| Current limit | ≤ 28 mA |

### Voltage output

| | |
|---|---|
| Signal range | 0...10 VDC |
| Programmable signal ranges | 0...1 / 0.2...1 / 0...10 / 0...5 / 1...5 / 2...10 / 1...0 / 1...0.2 / 5...0 / 5...1 / 10...0 / 10...2 V |
| Load (min.) | > 10 kΩ |

of span = of the currently selected measurement range

## 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 |

# Programming

## Default configuration

### Input

| | |
|---|---|
| Input type | Temperture |
| Voltage input | 0...10 V |
| Current input | 4...20 mA |
| Sensor connection (RTD+resistance) | 3-wire |
| R input range | 0...1000 |
| Temperature unit | °C |
| Temperature type | Pt |
| Pt type | Pt100 |
| Ni type | Ni100 |
| TC type | K |
| Display unit | °C |
| Decimal point | 000.0 |
| Display low | 0.0 |
| Display high | 100.0 |

### Output

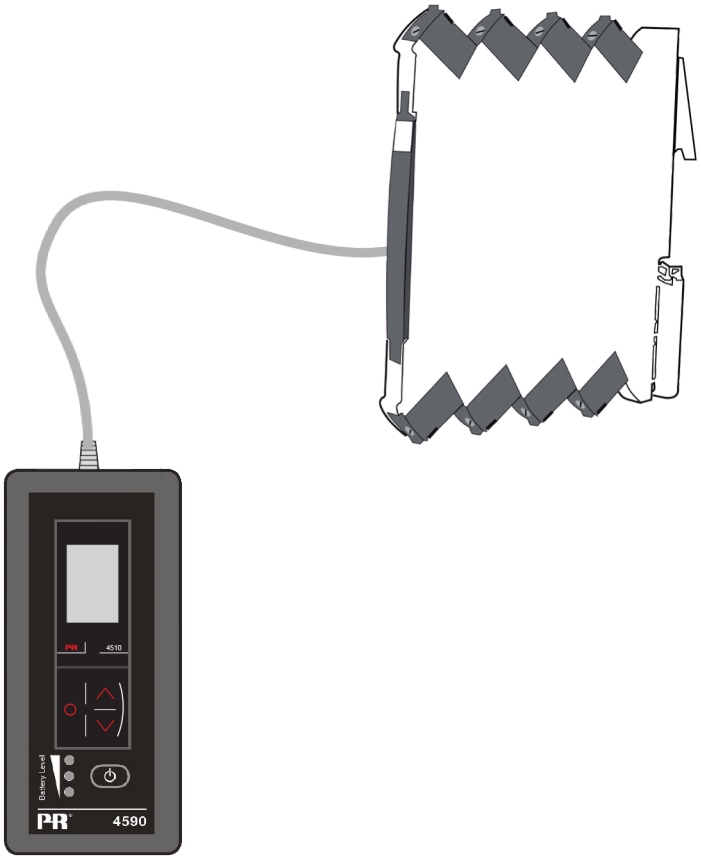
| | |
|---|---|
| Output type | Current |
| Voltage output | 0...10 V |
| Current output | 4...20 mA |
| Analog out on error | 23 mA |
| Analog out low | 0 |
| Analog out high | 150 |
| Output limit | No |

### Advanced

| | |
|---|---|
| LCD contrast | 3 |
| LCD backlight | 4 |
| TAG | TAG NO. |
| Line 3 function | Analog out |
| Use calibration | No |
| Enable password protection | No |
| Calibration range | 0.0 / 100.0 |
| Calibration point | 0.0 / 100.0 |
| Language | UK |

## PR 4590 ConfigMate programming

Connect the adapter by opening the front plate on the 3114 and inserting the jack into the plug.




A reference for the complete menu structure and programming options can be found in the section 'Routing diagram'. For further information on how to navigate and operate the PR 4500 communication interfaces, please refer to www.prelectronics.com/4500/.

## Display readout on the PR 4500 of sensor error detection and input signal outside range

| Configuration | Sensor error detection |
|---|---|
| OUT.ERR=NONE. | OFF |
| Else: | ON |

| Outside range readout (IN.LO, IN.HI): If the valid range of the A/D converter or the polynomal is exceeded | | | |
|---|---|---|---|
| Input | Range | Readout | Limit |
| VOLT | 0...1 V / 0.2...1 V | IN.LO | < -25 mV |
| | | IN.HI | > 1.2 V |
| | 0...10 V / 2...10 V | IN.LO | < -25 mV |
| | | IN.HI | > 12 V |
| CURR | 0...20 mA / 4...20 mA | IN.LO | < -1.05 mA |
| | | IN.HI | > 25.05 mA |
| LIN.R | 0...800 Ω | IN.LO | < -10 Ω |
| | | IN.HI | > ca. 1075 Ω |
| | 0...10 kΩ | IN.LO | <-10 Ω |
| | | IN.HI | > 11 kΩ |
| POTM | 0...100% | IN.LO | < -0.5% |
| | | IN.HI | > 100.5% |
| TEMP | TC / Pt100 | IN.LO | < temperature range -2°C |
| | | IN.HI | > temperature range +2°C |

| Display readout below min. / above max. (-1999, 9999) | | | |
|---|---|---|---|
| Input | Range | Readout | Limit |
| All | All | -1999 | Display readout <-1999 |
| | | 9999 | Display readout >9999 |

## Sensor error detection limits

| Sensor error detection (SE.BR, SE.SH): | | | |
|---|---|---|---|
| Input | Range | Readout | Condition |
| CURR | Loop break (4...20 mA) | SE.BR | <= 3.6 mA; > = 21 mA |
| POTM | All, SE.BR on all 3-wire | SE.BR | > ca. 126 kΩ |
| LIN.R | 0...800 Ω | SE.BR | > ca. 875 Ω |
| | 0...10 kΩ | SE.BR | > ca. 11 kΩ |
| TEMP | TC | SE.BR | > ca. 750 kΩ / (1.25 V) |
| | RTD, 2-, 3-, and 4-wire<br>No SE.SH for Pt10, Pt20 and Pt50 | SE.BR | > ca. 15 kΩ |
| | | SE.SH | < ca. 15 Ω |

## Error indications

| Error search | Readout | Cause |
|---|---|---|
| CJC sensor error - check device temperature | CJ.ER | Defect internal CJC sensor or CJC temperature out of allowed range** |
| Flash memory error - default configuration is loaded | FL.ER | Error in FLASH (configuration)* |
| No communication | NO.CO | No communication |
| Input error - check input connection and reset power | IN.ER | Error levels on measurement inputs* |
| Programming mode only - no output signal | PROG. | Offline configuration mode (3114 powered by communications interface)*** |
| Invalid configuration type or version | TY.ER | Configuration read from EEprom has invalid type or rev. no. |
| Hardware error | RA.ER | RAM memory error* |
| Hardware error | EE.ER | EEPROM memory error* |
| Hardware error | NO.CA | Device not factory-calibrated |
| Hardware error | AD.ER | A/D converter error* |
| Hardware error | EF.SU | External Flash error* |
| Hardware error | IF.ER | Internal Flash error* |

| | |
|---|---|
| ! | All error indications in the display flash once per second. The help text explains the error. If the error is a sensor error, the display backlight flashes as well - this is acknowledged (stopped) by pushing the 'OK' button. |
| * | Error is acknowledged by entering the menu and saving or by resetting the device power. |
| ** | Error can be disregarded by selecting input type different than TC. |
| *** | Error indication does not flash. Error is acknowledged by connecting device power. |

## Advanced settings menu

**Memory (MEM):** In the memory menu you can save the configuration of the device in the PR 4500 communication interface, and then move the PR 4500 communication interface onto another device of the same type and download the configuration in the new device. Calibration parameters and relay latch status (where applicable) are device-specific and will not be included in the saved configuration.

**Display setup (DISP):** Here you can adjust the brightness contrast and the backlight. Setup of TAG numbers with 6 alphanumerics. Selection of functional readout in line 3 of the display - choose between readout of analog output or tag no.

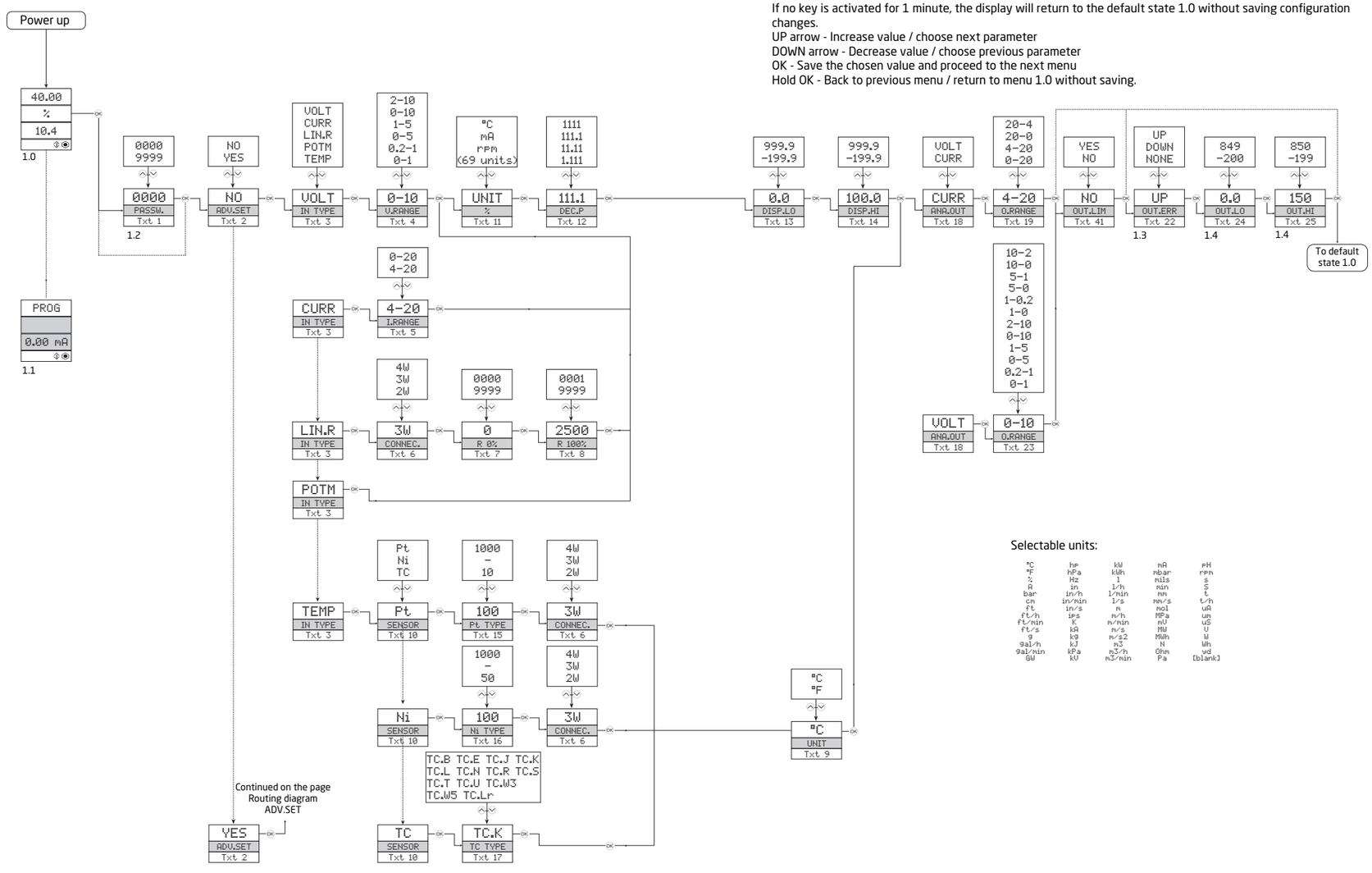
**Two-point process calibration (CAL):** The device can be process-calibrated in 2 points to fit a given input signal. A low input signal (not necessarily 0%) is applied and the actual value is entered via the PR 4500 communication interface. Then a high signal (not necessarily 100%) is applied and the actual value is entered via the PR 4500 communication interface. If you accept to use the calibration, the device will work according to this new adjustment. If you later reject this menu point or choose another type of input signal the device will return to factory calibration. Process-calibration is cleared if you edit either of the parameters: input type, input low, input high, display low or display high. Process calibration data are not saved to the configuration repository of the PR 4500 communication interface.

**Process simulation function (SIM):** Simulation of process value is possible via the up and down arrows, thus controlling the output signal. You must exit the menu by pressing OK (no time-out). The simulation function exits automatically if the PR 4500 communication interface is detached.

**Password protection (PASS):** Programming access can be blocked by assigning a password. The password is saved in the device in order to ensure a high degree of protection against unauthorized modifications to the configuration. If the configured password is not known, please contact PR electronics support - www.prelectronics.com/contact.

**Language (LANG):** In the menu "LANG" you can choose between 7 different language versions of help texts that will appear in the menu. You can choose between UK, DE, FR, IT, ES, SE and DK.

## Routing diagram




1.0 Default state. Line 1 shows input signal. Line 2 shows UNIT. By pressing the UP and DOWN arrows simultaneously line 3 alternates between A.Out and TAG. (Setting is volatile - use DISP setup menu to change and store Line 3 function.) Line 4 shows communication status.

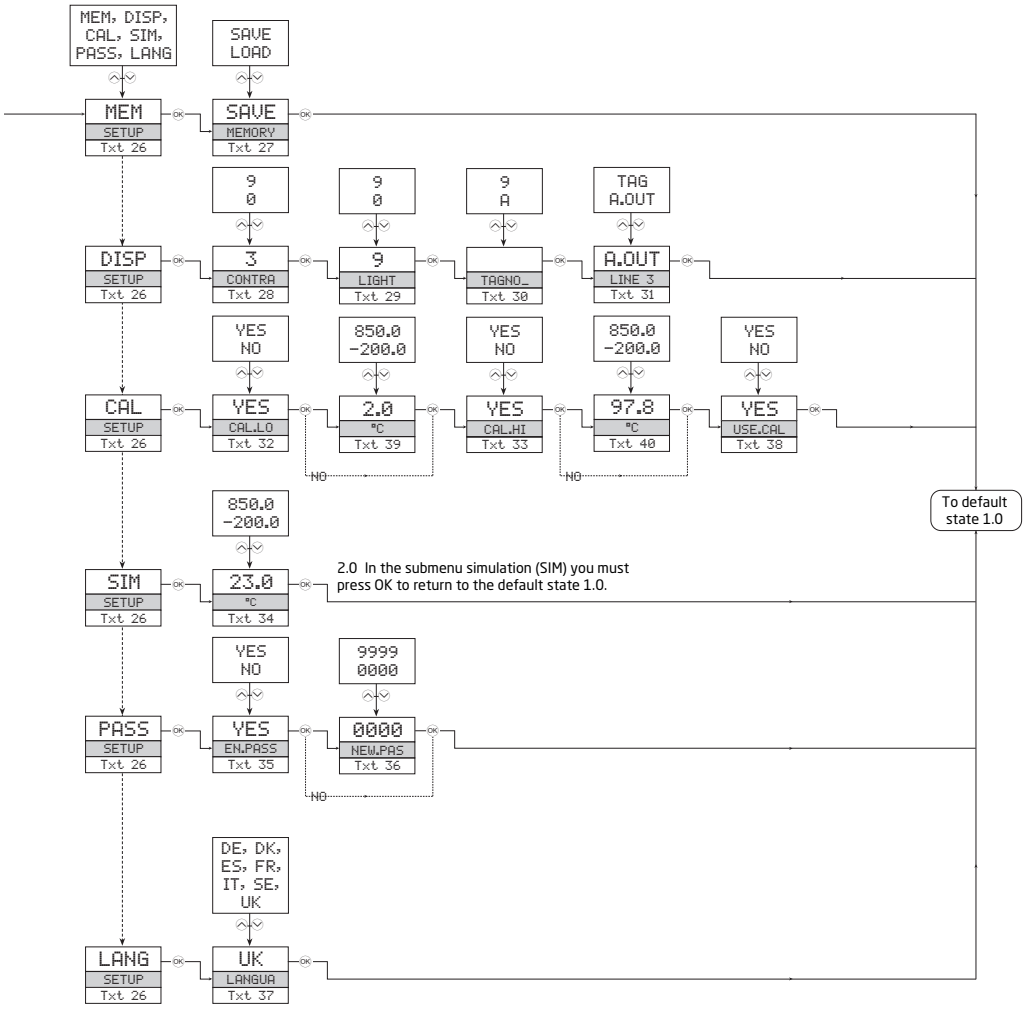
1.1 The 4500 communication interface will power off if no key is activated for 1 minute.

1.2 Only if password is enabled.

1.3 Downscale to 0 mA / 3.5 mA or 0 V. Upscale to 23 mA or 110% of Vout high. Only if input type supports sensor error check. Not valid for these input signals: 0...20 mA and voltage.

1.4 Only if input signal is temperaure.

## Routing diagram, advanced settings (ADV.SET)



## Help text overview

| | | | |
|---|---|---|---|
| [01] | Set correct password | [17] | Select TC-B as sensor type |
| [02] | Enter advanced setup menu? | | Select TC-E as sensor type |
| [03] | Select temperature input | | Select TC-J as sensor type |
| | Select potentiometer input | | Select TC-K as sensor type |
| | Select linear resistance input | | Select TC-L as sensor type |
| | Select current input | | Select TC-N as sensor type |
| | Select voltage input | | Select TC-R as sensor type |
| [04] | Select 0.0-1 V input range | | Select TC-S as sensor type |
| | Select 0.2-1 V input range | | Select TC-T as sensor type |
| | Select 0-5 V input range | | Select TC-U as sensor type |
| | Select 1-5 V input range | | Select TC-W3 as sensor type |
| | Select 0-10 V input range | | Select TC-W5 as sensor type |
| | Select 2-10 V input range | | Select TC-Lr as sensor type |
| [05] | Select 0-20 mA input range | [18] | Select current as analog output type |
| | Select 4-20 mA input range | | Select voltage as analog output type |
| [06] | Select 2-wire sensor connection | [19] | Select 0-20 mA output range |
| | Select 3-wire sensor connection | | Select 4-20 mA output range |
| | Select 4-wire sensor connection | | Select 20-0 mA output range |
| [07] | Set resistance value low | | Select 20-4 mA output range |
| [08] | Set resistance value high | [22] | Select no error action - output undefined at error |
| [09] | Select Celsius as temperature unit | | Select downscale at error |
| | Select Fahrenheit as temperature unit | | Select upscale at error |
| [10] | Select TC sensor type | [23] | Select 0.0-1 V output range |
| | Select Ni sensor type | | Select 0.2-1 V output range |
| | Select Pt sensor type | | Select 0-5 V output range |
| [11] | Select display unit | | Select 1-5 V output range |
| [12] | Select decimal point position | | Select 0-10 V output range |
| [13] | Set display range low | | Select 2-10 V output range |
| [14] | Set display range high | | Select 1-0.0 V output range |
| [15] | Select Pt10 as sensor type | | Select 1-0.2 V output range |
| | Select Pt20 as sensor type | | Select 5-0 V output range |
| | Select Pt50 as sensor type | | Select 5-1 V output range |
| | Select Pt100 as sensor type | | Select 10-0 V output range |
| | Select Pt200 as sensor type | | Select 10-2 V output range |
| | Select Pt250 as sensor type | [24] | Set temperature for analog output low |
| | Select Pt300 as sensor type | [25] | Set temperature for analog output high |
| | Select Pt400 as sensor type | [26] | Enter language setup |
| | Select Pt500 as sensor type | | Enter password setup |
| | Select Pt1000 as sensor type | | Enter simulation mode |
| [16] | Select Ni50 as sensor type | | Perform process calibration |
| | Select Ni100 as sensor type | | Enter display setup |
| | Select Ni120 as sensor type | | Perform memory operations |
| | Select Ni1000 as sensor type | | |

| | | | |
|---|---|---|---|
| [27] | Load saved configuration into device | | |
| | Save configuration in display front | | |
| [28] | Adjust LCD contrast | | |
| [29] | Adjust LCD backlight | | |
| [30] | Write a 6-character device TAG | | |
| [31] | Analog output value is shown in display line 3 | | |
| | Device TAG is shown in display line 3 | | |
| [32] | Calibrate input low to process value? | | |
| [33] | Calibrate input high to process value? | | |
| [34] | Set the input simulation value | | |
| [35] | Enable password protection? | | |
| [36] | Set new password | | |
| [37] | Select language | | |
| [38] | Use process calibration values? | | |
| [39] | Set value for low calibration point | | |
| [40] | Set value for high calibration point | | |
| [41] | Limit output values to output range | | |
| [42] | Programming mode only - no output signal | | |

# 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(s).

## Status indicator front LED


| Indicator pattern | Condition | Output and loop supply | Action required |
|---|---|---|---|
| OFF | No power supply or internal device failure | De-energized | Connect supply / replace device |
| ON / OFF | Power-up or restart | De-energized | - |
| 13 Hz, 15 ms | Normal operation | Energized | - |
| 1 Hz, 15 ms | Sensor error | De-energized | Correct setting and re-power device |
| 1 Hz, 0.5 s | Restarting due to:<br>Supply error / hardware.<br>RAM or program flow error. | 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 | 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<br>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 |
|---|---|---|
| 102 | 1741 | Model 3114-N added.<br>Specifications for max. required power and power dissipation added.<br>PESO/CCOE approval added |
| 103 | 2037 | PESO/CCOE approval discontinued. |
| 104 | 2108 | CCC approval added.<br>ATEX and IECEx approvals updated - Ex na changed to Ex ec.<br>Side label updated. |
| 105 | 2217 | UKEX approval added. |
| 106 | 2448 | New EAC Ex certificate. |

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