

The biggest thing  
*in signal conditioning*  
*is only 6 mm wide*

PERFORMANCE  
MADE  
SMARTER



**PR**  
electronics

**3000 series**

High performance temperature  
transmitters and signal devices

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

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# The cost-effective 3000 series *equipped with patented technologies*

Everything you need to perform - without compromise

Operating a precise, efficient process requires much more than just an accurate temperature transmitter or signal device. And with PR

electronics' unique 3000 series, you get **high accuracy, fast response time AND low temperature drift** in just 6 mm. Our 3000 series provides

exceptional performance for dedicated applications at a much lower total cost of ownership.



The 3000 series is equipped with many approvals for applications worldwide.





### High accuracy

- High basic 0.05% accuracy in all available signal ranges for reliable signals you can trust
- All units tested to ensure 2.5 kVAC isolation and have excellent noise immunity
- NAMUR NE21 burst A criteria



### Fast response time

- Transmits rapid changes in process measurements to your PLC/DCS for fast and accurate monitoring of critical signals
- Response time of  $< 5 / < 7$  ms ( $> 100$  Hz signal band width) for analog signals,  $< 30$  ms for temperature measurements and  $< 60$  ms for HART signals
- Accurate measurement of rapidly changing signals from torque, acceleration and thermocouple temperature sensors



### Low temperature drift

- Low temperature coefficient better than  $0.01\% / ^\circ\text{C}$  in a wide  $-25$  to  $+70^\circ\text{C}$  ambient temperature range for precise measurements
- Long term accuracy better than  $0.1\%$  / 3 years with no need for re-calibration



**SIGNAL  
DEVICES**

SIGNAL ISOLATORS  
SIGNAL SPLITTERS  
LOOP POWERED ISOLATORS  
SIGNAL CONVERTERS

PR 3109

PR 3185

PR 3186

# Temperature devices

## Accurately converting temperature signals to analog or digital, now with HART® technology

Temperature transmitters and converters have been our core business for four decades, and now this expertise extends to the 6 mm 3000 series. This wide range of high-performance temperature devices offers you reliable and accurate conversion of industry process temperature signals

to analog or digital outputs. The easy DIP-switch set-up allows for more than 1000 different pre-calibrated temperature range combinations.

### Unique additional features

Never seen before in a 6 mm series, the sensor error detection is conducted

simultaneously without disrupting the temperature measurement or response time.

The 3113 and 3337 devices even offer HART 7 protocol.





### 3101: Cost-effective TC transmitter



- Converts TC J and K temperature sensors to voltage or current outputs
- High accuracy, better than 1°C or 0.1% in all available ranges
- Selectable < 30 ms / 300 ms response time
- Excellent EMC performance and 50/60 Hz noise suppression

### 3102: Cost-effective Pt100 transmitter



- Converts Pt100 temperature sensors to voltage or current outputs
- Over 1000 pre-calibrated temperature ranges selectable
- High accuracy, better than 0.2°C or 0.1% in all available ranges
- Easily configurable via DIP-switches

### 3111: High performance TC transmitter



- Converts TC J and K temperature sensors to voltage or current outputs
- Top performance in harsh EMC environments
- Meets the NAMUR NE21 recommendations
- Greater than 0.5°C or 0.05% accuracy in all available ranges
- High galvanic isolation of 2.5 kVAC

### 3112: High performance Pt100 transmitter



- Converts Pt100 temperature sensors to voltage or current outputs
- Excellent accuracy, better than 0.1°C or 0.05% in all available ranges
- Pre-calibrated temperature ranges selectable via DIP-switches
- Selectable < 30 ms / 300 ms response time
- High galvanic isolation of 2.5 kVAC

### 3113: HART® Temperature transmitter



- Converts Pt100, TC J and K temperature sensors to an isolated active analog current and HART signal output
- Multiple pre-calibrated temperature ranges selectable
- Programmed by DIP-switches or by standard HART interface



### 3114: Multifunctional converter



- Converts RTD, TC, Ohm, potentiometer, mA or voltage input signals
- All operational parameters can be modified to suit almost any signal conversion
- High performance, flexible design
- Programming via 4501 display and Configmate 4590

### 3331: Loop powered temperature transmitter



- Converts Pt100, TC J and K temperature sensors to an isolated passive 4-20 mA current output
- Greater than 0.1°C or 0.05% accuracy in all available ranges
- Flexibly loop powered by 5.5-35 VDC
- High galvanic isolation of 2.5 kVAC

### 3333: Loop powered Pt100 transmitter



- Converts a standard 2, 3 or 4-wire Pt100 temperature sensor
- Provides a passive analog current output signal
- Flexibly loop powered by 3.3-35 VDC
- Wide ambient temperature range of -25 to +70°C

### 3337: HART® Loop powered temperature transmitter



- Converts Pt100, TC J and K temperature sensors to an isolated passive current output
- Loop powered 4-20 mA output with HART protocol
- More pre-calibrated temperature ranges are selectable
- Programmed by DIP-switches or by standard HART interface



# Signal devices

## Provides exceptionally high, safe isolation between the input, output and supply

Inside our slim 6 mm housing, this range of intelligent signal devices provides you with exceptionally high, safe isolation, no matter the signal. Easily DIP-switch or 4501 display (3114) programmable, all of our signal devices offer extremely high isolation levels of 2.5 kVAC and exceptional EMC performance.

These high-performance devices utilize our innovative microprocessor technology to provide high base accuracy, low power consumption, and maximum protection against error due to electromagnetic noise.



### 3103: Isolated signal repeater



- Isolation and 1:1 conversion of standard current signals
- Simple and cost effective
- Fast response time: < 7 ms
- Conversion range: 0-20 mA

### 3104: Flexible signal isolator and converter



- Isolation and conversion of standard active/passive current and voltage process signals
- 0.05% accuracy in all available DIP-switch selectable ranges
- Loop supply > 17 V for powering 2-wire transmitters

### 3105: Cost-effective isolation converter



- Isolation and conversion of standard analog process signals
- Ultra low cost
- Fast response time: < 7 ms
- DIP-switch configured

### 3108: Isolated signal splitter and repeater



- Isolation and signal repeating of 0-20 mA and 4-20 mA current signals
- Provides simple splitter function: 1 in - 2 out
- High accuracy <  $\pm 0.05\%$  of span
- Fast response time: < 7 ms

### 3109: Signal converter / splitter



- Isolation and conversion of standard active/passive current and voltage process signals
- Splitter function: 1 in - 2 out, each individually configurable
- Easy and fast DIP-switch programming for input and individual output set-up
- Loop supply > 17 V for powering 2-wire transmitters

### 3114: Multifunctional converter



- Conversion/isolation of analog signals for multiple applications
- Measures 2, 3, or 4-wire RTD, TC, linear resistance, potentiometer, current or voltage inputs
- Programming via 4501 display and Configmate 4590

### 3117: Bipolar isolated converter



- Converts bipolar voltage or current process signals to unipolar output signals
- Multiple ranges are selectable via DIP-switch
- High 0.05% accuracy in all available ranges

### 3118: Bipolar isolated converter/splitter



- Converts bipolar voltage or current process signals to 2 unipolar outputs or 1 bipolar output
- Fast response time: < 7 ms or < 44 ms
- Conversion range:  $\pm 20$  mA or  $\pm 10$  V

### 3185: Loop powered isolator



- 1- or 2-channel input loop powered isolator
- Signal 1:1 functional range 0-23 mA
- Galvanic isolation of current loop signals
- Competitive in terms of both price and technology

### 3186: 2-wire transmitter isolator



- 1:1 transmitter isolator with 2 wires
- Excellent accuracy in the range of 3.5-23 mA
- 1- or 2-channel versions
- 100 channels in just 30 cm

# More advanced features *in one compact device*

All the reliable, flexible and user-friendly features you need for top performance

Our ingenious 6 mm range enables you to have upwards of 50 units or 100 channels in just 30 cm.

## Power supply



The separate power devices can be energized by 16.8-31.2 VDC, and the output loop powered devices can be energized by 3.3-35 VDC. This flexibility provides high immunity to power dropouts and surges.

## Mounting



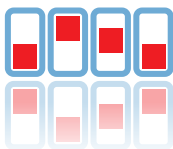
Devices can be mounted both vertically and horizontally with no air gap separation required. The devices snap onto a power rail or DIN rail and are easily detached by lifting the bottom lock.

## Side labels



All information relevant to installation and DIP-switch setting is printed on the sides of the housing for easy visibility.

## DIP-switch programming

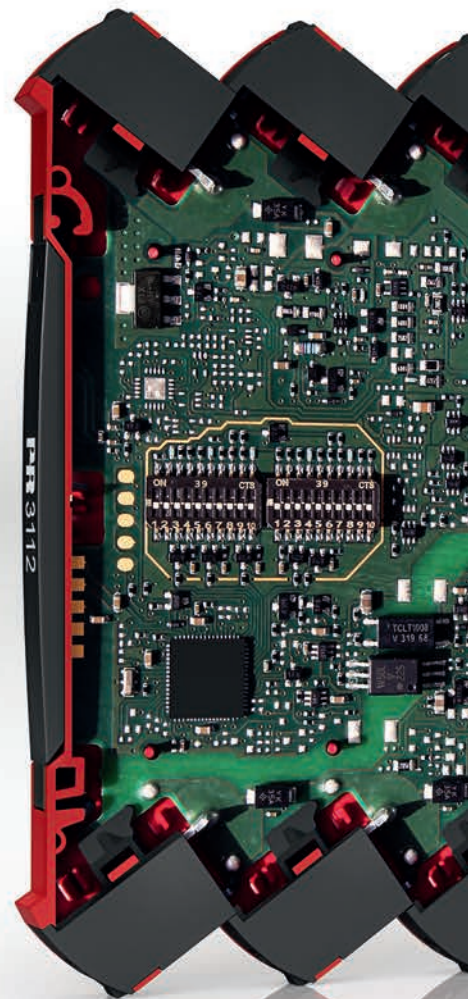


Re-calibration is not needed after changing the DIP-switch range settings. Just change the DIP-switch, cycle the power to the unit and obtain the new, pre-calibrated I/O range. HART programming is enabled for selected devices.

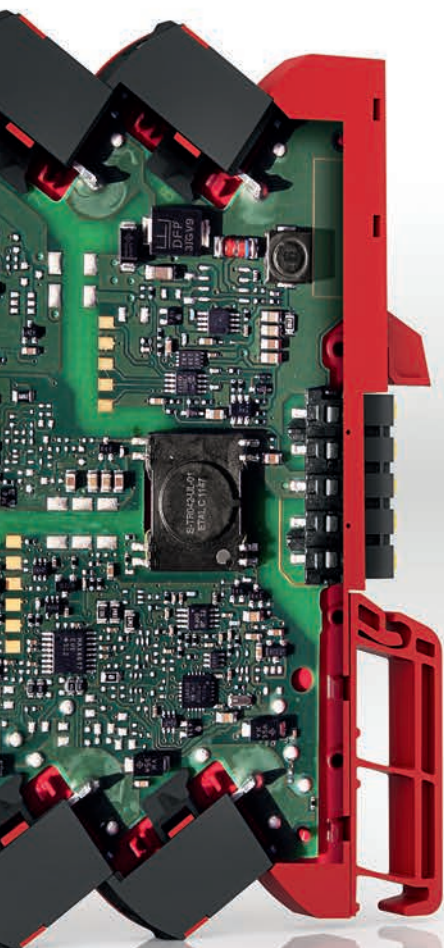
## High level of isolation



Safe galvanic isolation of 2.5 kVAC provides high noise immunity and prevents ground loops for accurate delivery of the process signal to your control system.

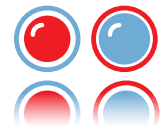






### Device status indicators

A front LED indicates device status, e.g. an error in the set-up, sensor or hardware.



### Power rail

Most of the devices can be energized on a power rail, enabling redundant power supplies and hot swapping. The 3405 and 9410 power connectors allow for easy connection of a 24 VDC source to the power rail.



### Over voltage- / polarity protection

All terminals can withstand up to  $\pm 31.2$  VDC, and are protected against incorrect supply wiring to ensure safe, error-free installation.



### Vibration test

Devices are vibration tested up to 4g via DNV and GL according to IEC 60068-2-6. The 9404 module stop provides additional support in heavy vibration applications, e.g. marine.



### Ambient temperature range

As temperature changes in your control panel, our units offer a low temperature coefficient (better than 0.01% / °C) over a wide temperature range of -25 to +70°C.





# Raising the *bar*

## Unique, patent-pending, state-of-the-art technology gives you a competitive advantage

Since 1974, we have been setting the benchmark, developing new and better standards within signal conditioning. And with the new 3000 series, we have done it again.

### **Patent for: Sensor error/wire breakage detection**

A method of continuous surveillance has been developed to ensure responsive sensor error/wire breakage detection, as well as extremely fast signal measurement. It is based on a continuous out-of-frequency band measurement of the connected sensor's impedance.

### **Patent for: Power supply with spread spectrum to reduce wire- conducted emissions**

A traditional high frequency switch mode power supply causes wire conducted emissions. However, continuous changing of the frequency (period by period) of the switch mode supply spreads the wire-conducted noise throughout the frequency domain, making the overall noise level well within what is required in the EMC directive.

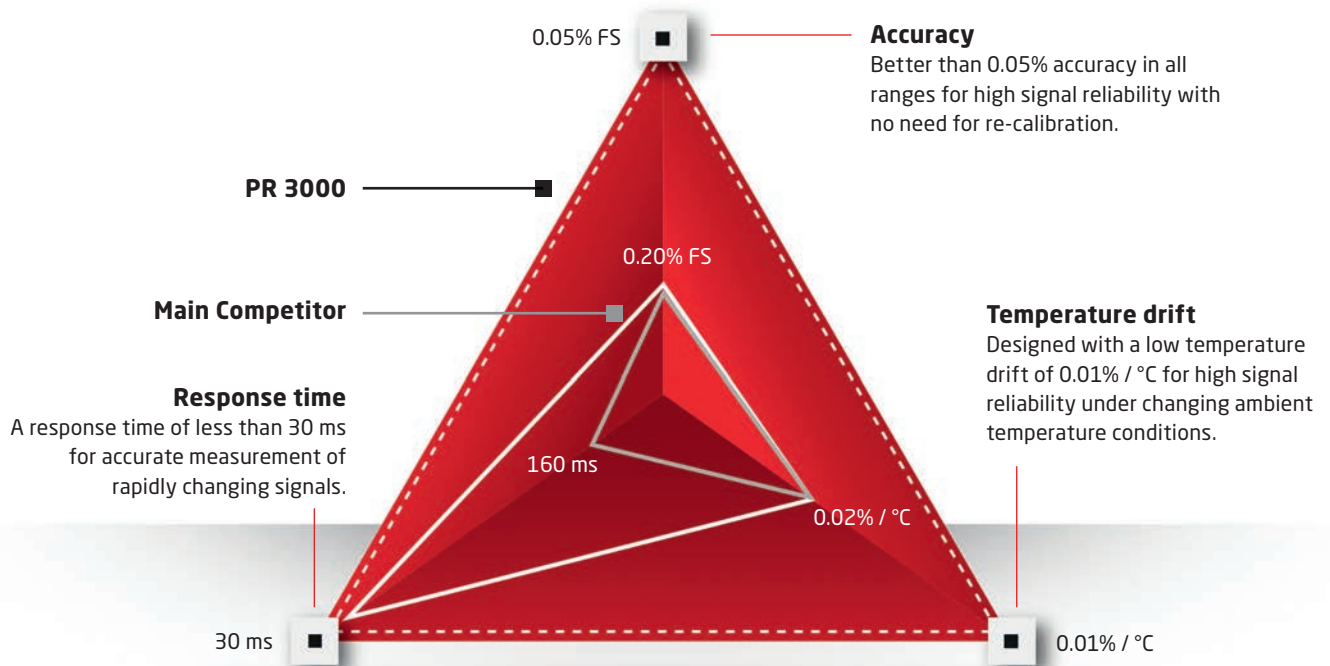
### **Patent for: Linearization technology for loop-powered transmitters**

The 3185 and 3186 loop-supplied isolated transmitters use a DC-current to AC-current conversion across the isolation barrier. A small micro-controller continuously measures the input current and voltage supply and uses a two dimensional matrix to select the correct compensation parameters without error or non-linearity.

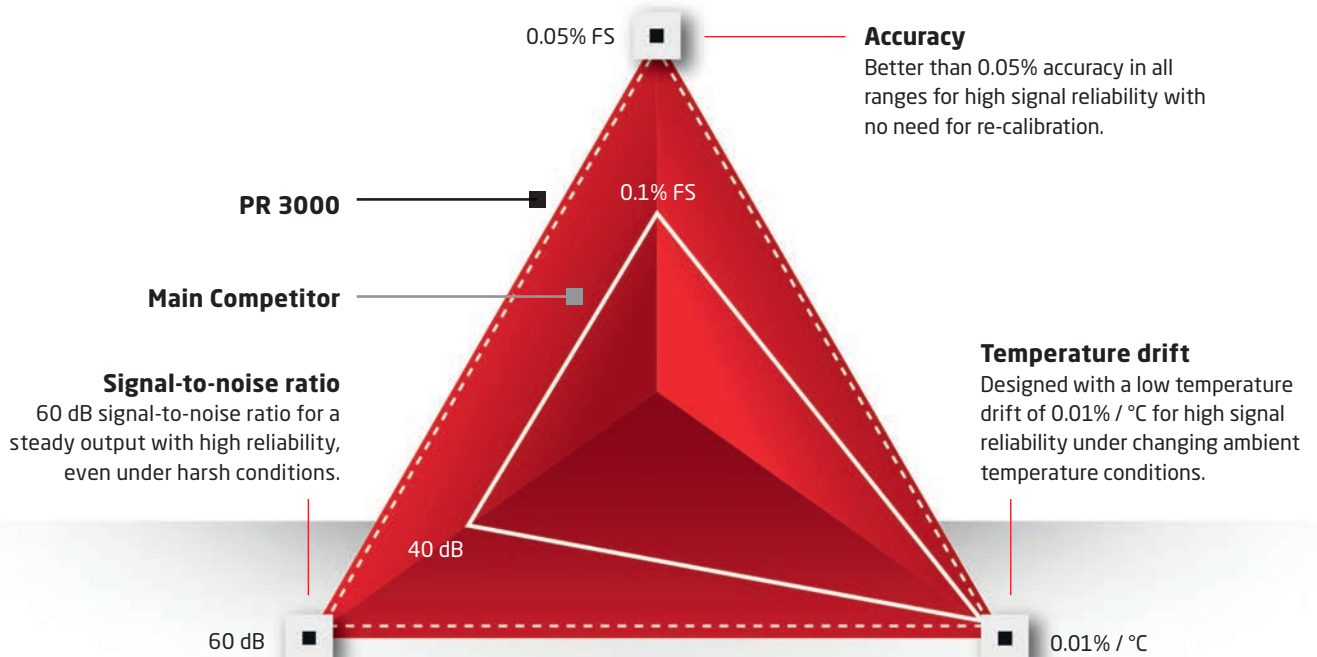


No other competing device can match our performance in all three areas - without compromise

### Temperature devices



### Signal devices



# Applicable to *many industries*

## High performance modules suitable for both process and factory automation

Our dedication to R&D and understanding of our customers' needs have enabled us to build our expertise across a wide range of industries, all with varying needs for process control and signal conditioning. And the 3000 series is no different. Our temperature transmitters and signal devices can be used in many factory and process automation industries, including: packaging, automotive, robotics, printing and paper, shipbuilding, water and wastewater, wood, building automation, HVAC, energy and more.

Many users value the fast, accurate measurements, long trouble-free lifetime and the minimal space requirements due to our narrow housing and flexible horizontal/vertical mounting options.

### Application examples

#### Energy

Measuring and isolating steam turbine bearing temperature sensor signals.

#### Water & Wastewater

Measuring and isolating liquid level sensors used in holding ponds.

#### Chemical & Petrochemical

Measuring and isolating rapidly changing temperature signals in bioreactors.

### Temperature devices

PR	INPUT				OUTPUT			FRONT LED	SUPPLY	HART	ISOLATION
	J & K	TC Int. CJC	Ext. CJC	Pt100 2-, 3-, 4-wire	Current Active	Current Passive	Voltage				
3101	●	●			●		●	●	24 VDC		
3102				●	●		●	●	24 VDC		
3111	●	●	●		●		●	●	24 VDC / Power rail		2.5 kV
3112				●	●		●	●	24 VDC / Power rail		2.5 kV
3113	●	●	●	●	●			●	24 VDC / Power rail	●	2.5 kV
3114*	●	●	●	●	●		●	●	24 VDC / Power rail		2.5 kV
3331	●	●	●	●		●			Loop powered		2.5 kV
3333				●		●			Loop powered		
3337	●	●	●	●		●			Loop powered	●	2.5 kV

### Signal devices

PR	INPUT				OUTPUT				FRONT LED	SUPPLY	ISOLATION
	mA Active	mA Passive	Voltage	Bipolar	Current Active	Current Passive	Voltage	Splitter 1 in - 2 out			
3103	●				●				●	24 VDC / Power rail	2.5 kV
3104	●	●	●		●		●		●	24 VDC / Power rail	2.5 kV
3105	●		●		●		●		●	24 VDC / Power rail	2.5 kV
3108	●				●			●	●	24 VDC / Power rail	2.5 kV
3109	●	●	●		●		●	●	●	24 VDC / Power rail	2.5 kV
3114*	●	●	●		●		●		●	24 VDC / Power rail	2.5 kV
3117	●		●	●	●		●		●	24 VDC / Power rail	2.5 kV
3118	●		●	●	●		●	●	●	24 VDC / Power rail	2.5 kV
3185	●				●					Input loop powered	2.5 kV
3186		●				●				Output loop powered	2.5 kV

\* 3114: Multifunctional converter - see data sheet for additional specifications

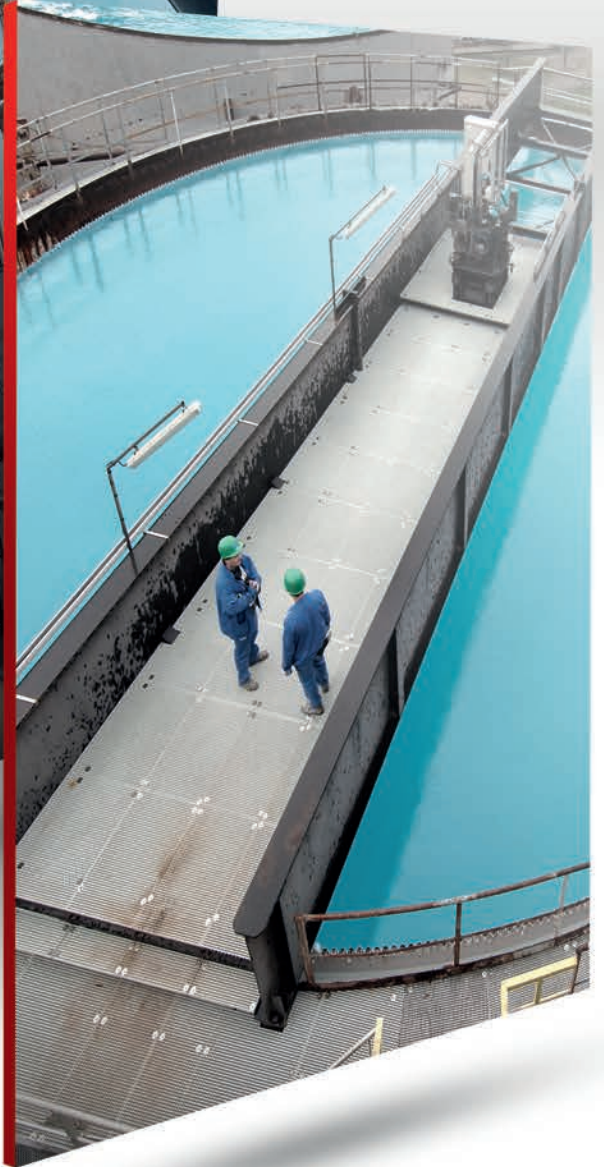




Energy



Chemical &  
Petrochemical



Water &  
Wastewater



PR core competences

# Low power consumption



## Economical, resource-saving solutions

One of PR's core competences is our ability to design and manufacture high precision technology with low power consumption. Our high performance devices not only deliver a positive impact on the environment, but also bring you tangible operational savings. Because they consume less power, they also emit less heat.

Our 3000 series is no different and is designed to deliver exceptional performance with low power consumption:

- No air-gap needed, which does not derate specs - horizontal and vertical mounting
- Mount 50 devices or 100 channels in only 30 cm
- Max power consumption < 0.65-1.2 W meaning less power needed for cabinet cooling, while increasing immunity to power dropouts

### How to reduce power consumption at your plant?

Selecting the right product can make all the difference in reducing power consumption at your plant, saving you money.

- **Competitor device:**

Power supply = 100 watts

Consumption per unit = 0.96 watts

Number of units installed with this power supply: **104 units**

- **PR 3112 device:**

Power supply = 100 watts

Consumption per unit = 0.70 watts

Number of units installed with this power supply: **142 units**

The 3112 consumes 0.26 watts less than competing products, significantly reducing your power consumption, or allowing you to install **38 more units** with the same supply.



# Excellent *EMC performance*



## Pushing standards in electromagnetic compatibility

PR has always been a pioneer in EMC and in 1991 we built our own in-house EMC laboratory. Since then, we have made significant advancements in designing products for high EMC performance that do not depend on using shielded enclosures, including:

- A sophisticated printed circuit board layout where wanted and unwanted signals are being intelligently routed
- Filters that protect from DC to GHz, from  $\mu\text{V}$  to  $\text{kV}$  and from  $\mu\text{A}$  to  $\text{A}$
- A maximum deviation of 0.5% of the specified range

Beyond our rigorous design process, we ensure high standards by subjecting our devices to more stringent testing compared to many competit-

ors. We test by 20 V/m (only 10 V/m required by the EMC Directive) and against A criteria (supply and output) and B criteria (input) mixing the toughest requirements for both emissions and immunity.

The result is exceptional EMC performance even in harsh environments, ensuring stable and accurate signal conditioning throughout your process.

Our 3000 series is no different and delivers exceptional EMC specifications:

- EMC immunity influence  $< \pm 0.5\%$  of the specified range
- NAMUR NE21 burst A criteria  $< \pm 1\%$  of the specified range
- Excellent 50/60 Hz noise suppression
- EN 61326-1 certification

**Benefit today from  
PERFORMANCE MADE SMARTER**

PR electronics is the leading technology company that specializes 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 that communicate, monitor and connect our customers' process measurement points to their process control systems.

Our innovative, patented technologies are derived from our extensive R&D facilities and our thorough 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.

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