




**PR**  
electronics

## Oil & Gas

Safe & Reliable Solutions  
for the Oil & Gas Industry

A complete range of signal conditioning devices with universal AC/DC supply, high galvanic isolation and high EMC immunity, supplemented by DNV/GL, Ex and SIL



# Drilling ahead

with PR electronics' signal conditioning products

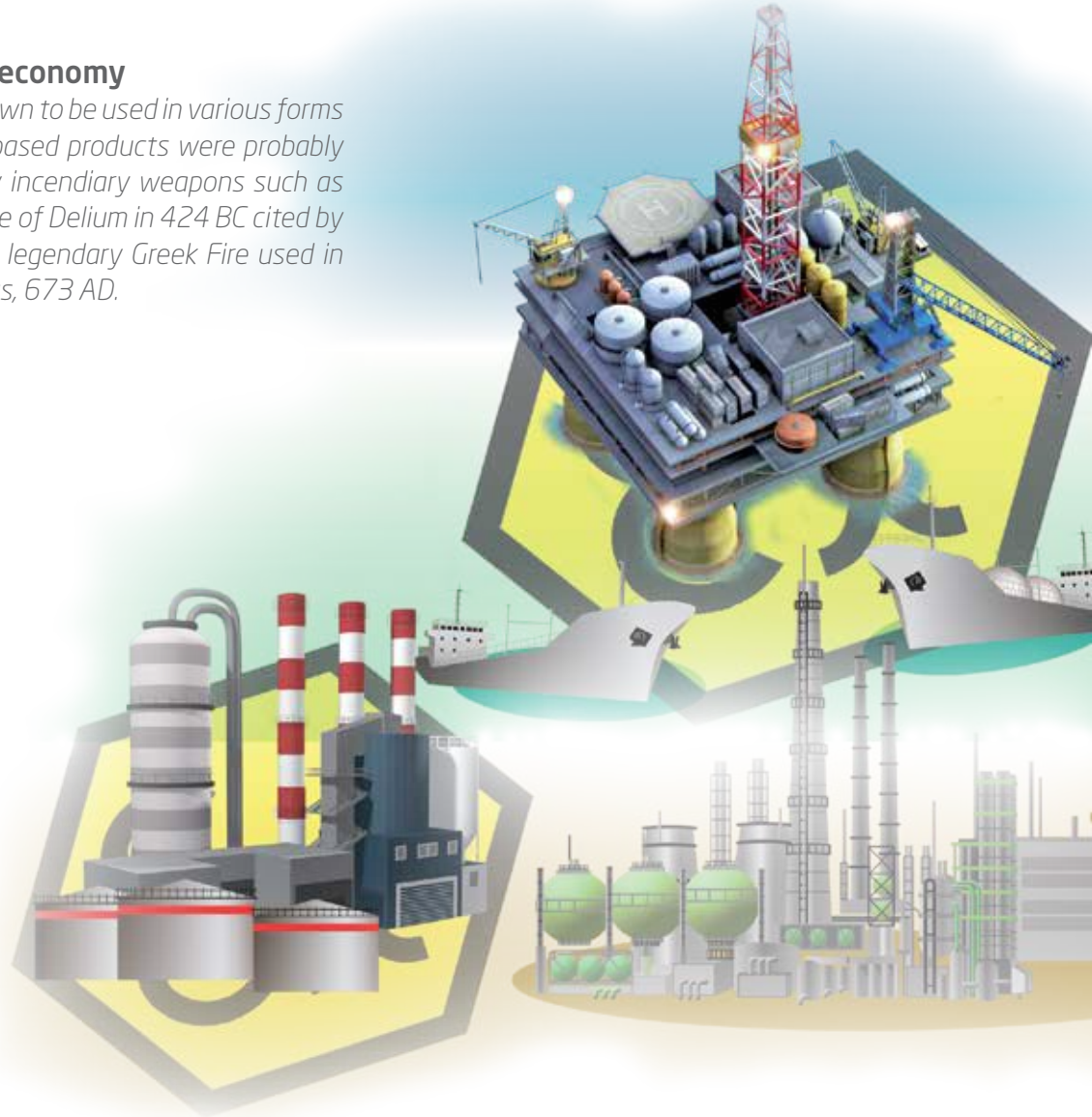
## » Powering the global economy

*Oil and Gas have been known to be used in various forms for millennia. Petroleum-based products were probably behind some of the early incendiary weapons such as flamethrowers in the siege of Delium in 424 BC cited by Thucydides and the later legendary Greek Fire used in the naval Battle of Cyzicus, 673 AD.*

### CUSTOMER STATEMENT

*At Bebcu Industries, we have been using the PR electronics 5202B Pulse Isolators on our Hazardous Area Air Conditioning products for several years. We like the input power flexibility (AC or DC), extreme reliability in harsh environments and cost effectiveness. We would highly recommend PR products.*

*- James Pagel  
Manufacture Engineer*



However, it was the early practical applications such as lighting, cooking fuels, even waterproofing boats with bitumen that probably drove "primitive" production. In 1859 "Colonel" Edwin Drake implemented a method of driving an iron pipe through the ground to prevent the walls of the hole collapsing on the drilling machinery, thereby producing a method of extraction that could be easily replicated. In the relatively short time since Drake's well, Oil and Gas now truly power the "engines" of the global economy. Together they currently contribute to over 50% of the Total Primary Energy Supply (TPES) globally; even with increased environmental regulation and the rise of renewable energy, this still looks set to continue for the foreseeable future.

*"Total Primary Energy Supply (TPES) in 2008 was 12.3 billion tonnes, with 33.2% for Oil and 21.1% for Gas. Looking at projections for 2030, even with the 450 Policy Scenario where percentages of renewable and nuclear increase, estimates for Oil and Gas contribution to an estimated TPES of 14.4 billion tonnes are 29.5% for Oil and 20.4% for Gas. (IEA 2010)."*

With this continued reliance on Oil and Gas as the cornerstone of future energy supplies, comes the responsibility of ensuring safe and efficient extraction and production.



**Safe** - The oil and gas industry is inherently dangerous given the flammable nature of hydrocarbons. Equipment with approvals such as Ex, IECEx and increasingly SIL (Hardware or Full Assessment) help support a safety first culture.



**Efficient** - We have a moral duty to our future generations to ensure that every drop counts. Accuracy and reliability of equipment therefore become important enabling features.

PR has a range of products that tick the boxes in these important areas. With over 40 years of experience of developing signal conditioning devices, you can rely on us to quickly deliver products, supported with a 5 years guarantee, and a team of technically experienced staff ready to support you with free advice.

**Buy it ... Install it ... Forget about it! - Our 5 Year Guarantee means worry free! Safety first ... and second ... and ...**



PR electronics was one of the first electronics manufacturers in the world to be certified as a developer of signal conditioning devices for SIL 2 applications in accordance with the Functional Safety standard IEC 61508. We are in charge of all development and production and are therefore in complete control of quality, this has allowed us to achieve Full Assessment on many of our latest products. We NEVER use the "Proven in-use" approach, which has no proved quantitative guidelines, and requirements that can be interpreted differently. In addition to SIL, you can find IECEx, ATEX, for gas and dust atmospheres, CSA, FM, EAC Ex and UL approved products with Det Norske Veritas (DNV) and/or Germanischer Lloyd (GL) standards for marine-based extraction.

## Black gold from red devices with green production

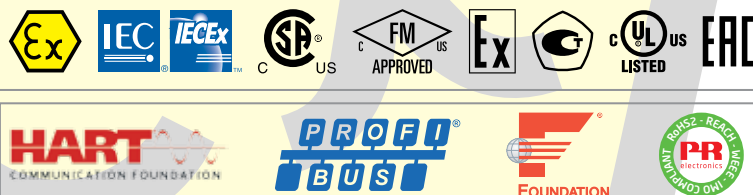
PR electronics has a long history of innovation with our product characteristics of reliability, accuracy, flexibility and user friendliness.

### Our product range offers:

- Temperature transmitters, multifunctional devices, isolators, I.S. interfaces, displays and much more.
- Programmable devices with universal power supply and universal input and up to four independent relays for process surveillance and control.
- DIN rail, socket and Form B head mounted devices.
- IECEx, ATEX, CSA, FM, EAC Ex and UL I.S. approvals.
- SIL 2-certified devices (Full Assessment according to IEC 61508).
- DNV and GL marine approvals.
- Uniquely high galvanic isolation (up to 3.75 kVAC).
- EMC immunity.
- Easy configuration via front display or PC.
- Alarms in case of cable and sensor errors.
- Individually tested devices with a 5-year guarantee.
- Protocols: 4...20 mA, HART, PROFIBUS and FOUNDATION Fieldbus.
- Competitive prices.

All backed up with a network of sales subsidiaries and distributors ensuring global access to PR electronics' wide range of analog and digital signal conditioning devices.

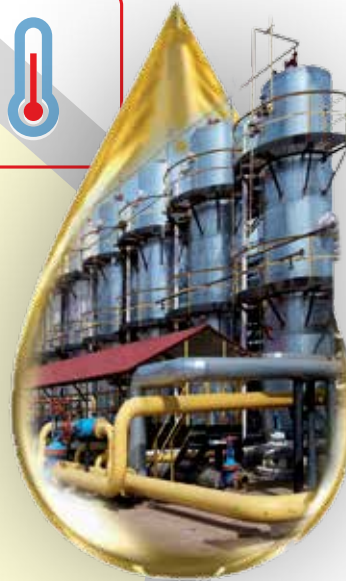
PR electronics' production is 100% lead-free, and we were one of the first companies in the business to comply with the RoHS directive aiming to protect the environment.





» PR electronics' range of signal conditioning devices is built to provide reliable, accurate, and flexible features with user-friendly interfaces. With ATEX and SIL approvals, PR has a portfolio of Intrinsically Safe products ready for use in the Hazardous Environments found throughout the Oil and Gas Industry.

Other products also include pulse / frequency devices, limit switches, power supplies and devices for special functions.



### Temperature transmitters

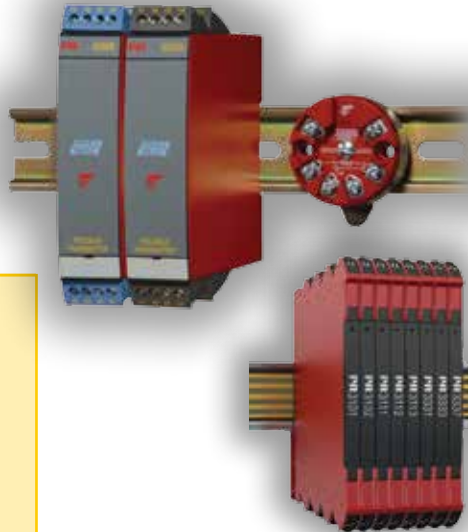
PR electronics offers a range of head, DIN rail and 11-pole socket mounted reliable and accurate temperature transmitters converting RTD and TC sensor signals to mA, V, HART, PROFIBUS PA and FOUNDATION Fieldbus communication, with advanced features such as automatic switch between PROFIBUS PA and FOUNDATION Fieldbus, PID control and LAS or Basic functionality.



### Multifunctional transmitters

Quality over Quantity - With just a few product variants of our reliable and versatile multifunctional devices, you can cover hundreds of applications and signal types, with inbuilt support for NE43 (sensor error), LVD, advanced EMC with NAMUR 21 (burst) to name but a few.

Not only ideally suited for signal isolation, they also offer a wealth of other features such as conversion, scaling, amplification, surveillance, control and simple calibration. Interfaces include limit switches with advanced set-points and windows.



Programming is made easy with the detachable 4511 or 4501 displays available on the 4000 and 9000 series products featuring scrolling help texts in seven languages allowing you to copy the configuration to other devices, display process and output values and easily gain access to a large number of advanced functions. When used with the 4590 adaptor, the 4511/ 4501 can upload its configuration to a PC for archiving purposes, or have configurations downloaded directly to it.

# Red process pr



### I.S. interfaces

Whenever use "Proven In Use" as a means to achieving SIL as PR electronics takes safety seriously! Instead you will find FULL ASSESSMENT on many of our SIL-certified products, giving you the assurance that you need when calculating your safety loops. Our wide range of user-friendly universal products covering analog, digital or HART signals comply with the strictest requirements for measurements in hazardous areas such as gas and dust, with all of our I.S. interfaces using intrinsically safe isolation barriers.



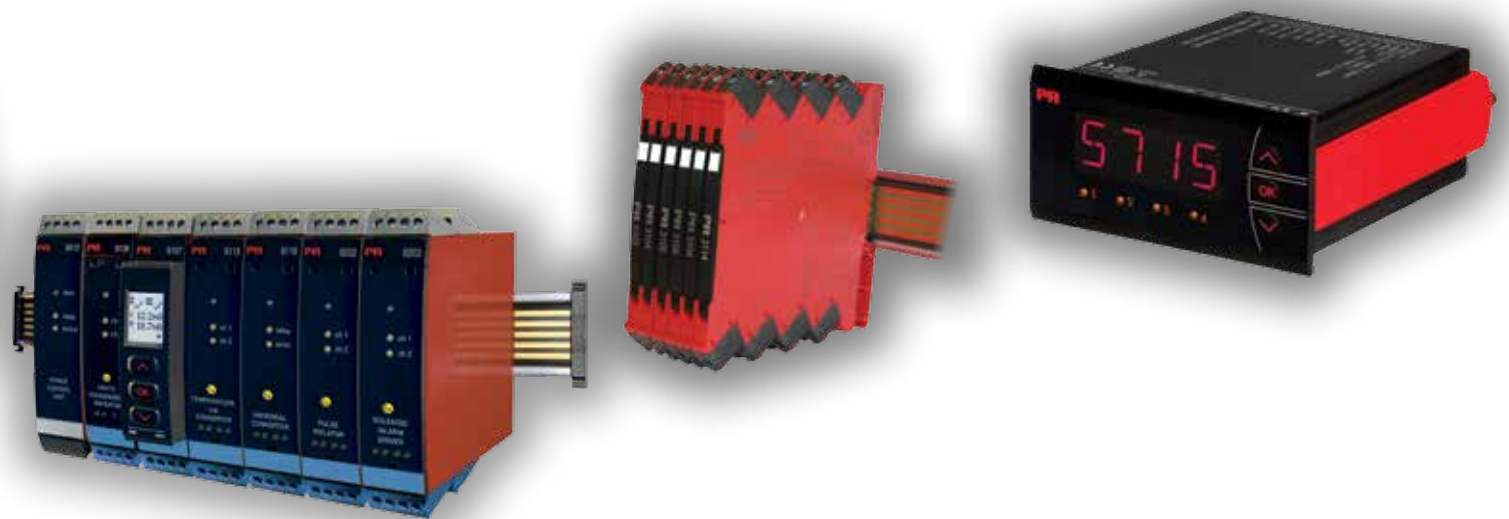
### Isolators

Protect your process against noise with our STREAM SHIELD technology ensuring a high basic accuracy. PR electronics' range of 11-pole socket and DIN rail mounted isolators offers extremely high isolation levels of up to 3.75 kVAC and exceptional EMC immunity on all forms of signals including analog, digital or HART. Flexible features include active or passive signal conditioning, loop or external supply and protection on inputs and outputs. Our standard products are quick; however, in our 6 mm wide 3000 series you will also find incredibly fast response times.



### Displays

Our displays include many of the universal features found in our transmitters including: universal supply, universal input, a wide range of sensor support, a high degree of galvanic isolation and easy programming with 8 languages and scrollable help text. Advanced options such as linearization, offset, special input ranges and advanced relay settings, e.g. delay, are also available allowing hundreds of applications with a few variants. IP65 seals and optional splash proof covers are also available for the harsh environments.



# omoters



# Upstream production

»» A "Christmas Tree" is not just for decoration on an oil or gas well. The "tree" is used to control the flow into or out of the well with chokes providing critical pressure control to prevent slugging, and other valves providing safety functions such as preventing blowouts.

Safety is a key factor on a drilling rig, especially where returning mud may contain potentially flammable materials, mandating Ex-certified equipment in and around any mud pump, shaker and mud pits. This is also true of the multi-stage production separators which separate out gas, oil and water, while also stepping down the pressure at each stage thus avoiding flash vaporization associated with large pressure drops.

Instrumentation such as monitor gauges and alarms used in these processes will also typically be Ex-certified, and when dealing with offshore applications, approvals such as DNV may also be mandated.

PR has a portfolio of reliable, certified products that can be readily installed in upstream processes, with Ex, SIL, DNV and GL approvals and superior isolation.



## Multifunctional

A very wide range of applications can be covered with a small number of variants of PR's universal products. Reducing the number for stocking spare parts provides a cost effective overall solution, especially on remote locations such as off-shore oil and gas platforms.





### Isolation

Excellent signal isolation to allow accurate signal conversion, elimination of ground loops, scaling of process values, potential separation and noise filtration is one of the key demands of an oil and gas rig instrumentation installation. You can be sure to minimise the risk of operational errors due to contaminated signals when you choose from PR's range of isolators.



### I.S. Interfaces

PR has a broad portfolio of I.S. functionality to meet the varied processes encountered in the oil and gas industry, with zone 0 approvals and SIL assessments providing the documented assurance needed for hazardous zones. From the drill head to production separators and storage, PR will have an I.S. part that you can truly rely on.



### Display

PR universal displays used in conjunction with isolated splitters and converters provide the capability of local and remote displaying of information. For Ex zone 0 applications our 5531 loop-powered LCD indicator is an excellent choice to give you local information where you need it.

### Drill choke position feedback

Safely monitor the 4...20 mA drill choke position feedback output by isolating it using a 5104B isolator, optionally in conjunction with a 5420B2 power supply.

### Slow PLC

The 5223B f/I-f/f converter can also be used to buffer or divide high speed fast pulse trains and relay these pulses to a "slower" PLC.

### Lamps and horns

Lamps and horns located in the hazardous zone can be driven with the 5203B or 9203B solenoid / alarm drivers.

### Mud pump

The mud pump stroke can be monitored using the pulse output of a NAMUR or proximity switch in a hazardous zone and isolated using the 5202B or 9202B pulse isolators. Alternatively, the pulse can be converted to 4...20 mA using the 5223B f/I-f/f converter and displayed with the 5531B display.

### I.S. gauges

The 4...20 mA output of various I.S. pressure gauges found on the manifold, degasser and drilling units can be isolated using the 5104B isolator.

### Production separators

The output temperatures of multi-stage production separators can be monitored with the 5116B/9116B universal converters using the relay function to switch on second/third stage oil heaters to reheat the oil/water/gas mixture to make it easier to separate out the water.

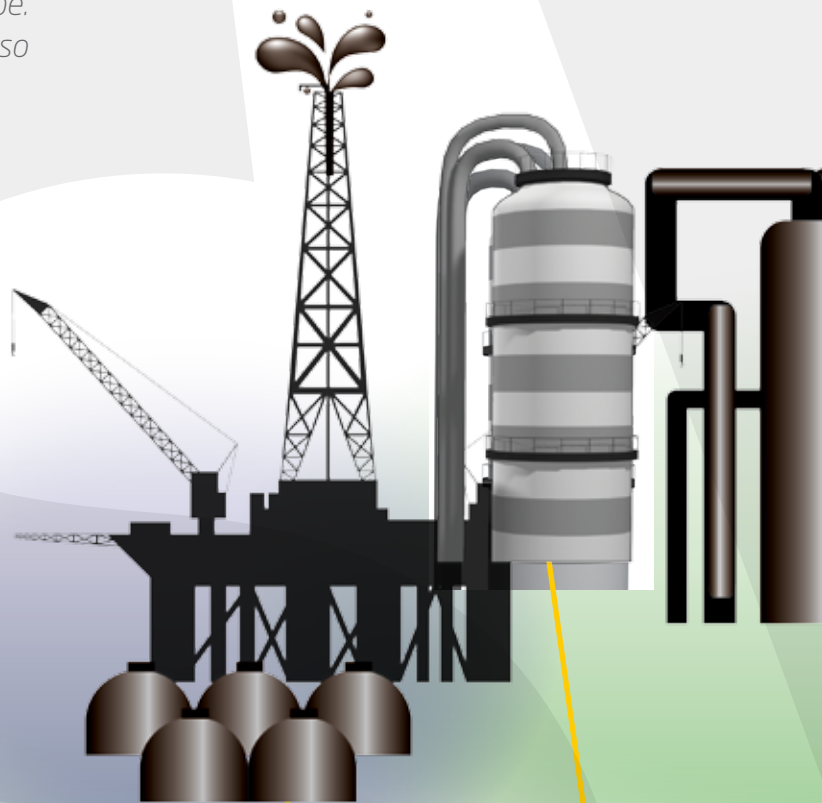


# Midstream production

» *Transferring crude oil or gas from extraction to a point of processing is not just a simple process of sending it straight down a pipe. As well as local storage, local processing is also needed before any transfer.*

Gas trains include processing stages to prepare the gas for efficient transport, including scrubbing and reboiling to remove water and hydrocarbons prior to compression and transfer through the pipeline to the decompression station. Maximising the operational life of these pipelines is important in order to minimise expensive downtime, with processes such as cathodic protection playing an important part.

PR has a range of products to support these processes, and to help maximise the efficiency of your plant.



## Offshore storage

Balance the ballast and buoyancy of offshore floating storage tanks using the linearization function of tank level to volume of the 5343B level transmitter in conjunction with 5104B / 5114B / 5116B Ex barriers.

## Scrubber & reboiler

Control and monitor the temperature of multi-stage glycol reboilers using a 5115B configured as a splitter to convert the temperature for display locally with a 5531B display and remotely to the control room.





### Multifunctional

Our multifunctional products have many advanced features such as latches with window functions, hysteresis and delay which can be used to monitor temperature and control heaters such as in reboilers. Linearization is also a much-loved feature, which can allow the output of nonlinear sensors to be linearised or tank level to be calculated with the use of custom linear interpolation, polynomial or loaded point linearization options.



### Isolation

Isolation products are widely used within the oil and gas industry. Signals are often routed to PLCs and local displays via isolators, repeaters, splitters and converters to give remote and local indications. In this often harsh environment the cornerstones of PR's products of exceptional performance, accuracy and reliability are traits that are in high demand. If it is speed you need, then our 3000 series offer you a range of fast response and space options with GL and DNV approvals.



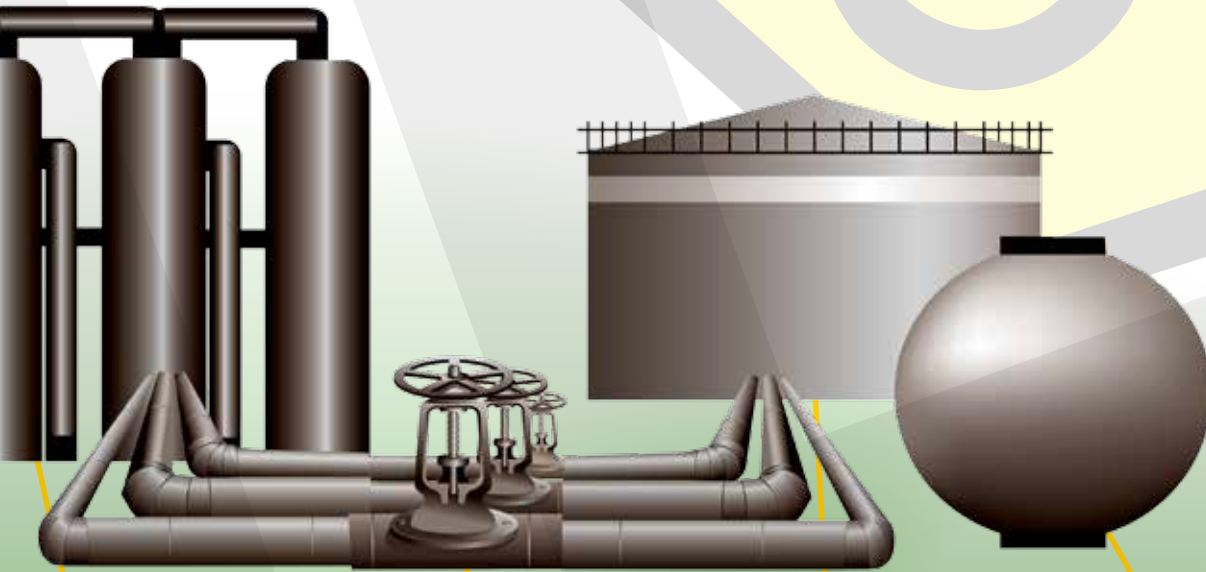
### I.S. interfaces

You can safely use our products for hazardous areas and processes such as gas compression because at PR electronics we take safety seriously. All of our I.S. interfaces use intrinsically safe isolation barriers rather than zener barriers. This method ensures high galvanic isolation and high immunity to electrical disturbances. We also offer advanced features such as built-in safety concepts like hardware monitoring in addition to a plethora of global approvals.



### Temperature

PR's range of accurate and reliable temperature transmitters support a wide selection of RTD and TC sensors. Support can be found for a number of analog, digital and bus communications including mA, V, HART, PROFIBUS PA and FOUNDATION Fieldbus communication, and of course we offer Ex versions with SIL approvals for use in the many hazardous locations found in the oil & gas industry.



### Compressors

Measurement of pressure before and after the compressor station with HART transparent repeater 9106B.

Measurement of gas temperature, gas chromatography, gas flow and gas pressure with universal converter 9116B and 2-wire programmable temperature transmitter 5333D.

### Cathodic protection of pipelines

Provide cathodic protection of pipelines with the aid of the 9116B universal converter measuring 0...5 V input to detect corrosion.

### Decompressors

Measurement of gas temperature and gas flow with universal converter 9116B and 2-wire programmable temperature transmitter 5331D.

### LNG liquification

Monitor the temperature of the Multi-Component Refrigerant (MCR) cryogenic heat exchangers using the 5331D or 5131B / 6331B for the control of refrigerant gas.

# Downstream

## production

» Of the many downstream processes perhaps the most important is the refining process - converting the "Black Gold" to valuable end products.

The real value is added in processes such as "the Cat" - the Fluid Catalytic Cracking (FCC) unit which cracks the lower value heavy hydrocarbons into more valuable lighter hydrocarbons such as light olefin-rich products and in particular gasoline.

Since gasoline is the prime valuable end product, further processing such as reforming and alkylation are used to maximise its production. However, with the use of acid catalysts such as sulfuric acid ( $H_2SO_4$ ) which are corrosive and highly toxic, especially in the case of hydrofluoric acid (HF), safety becomes an increasingly important factor.

When it comes to safety, PR cuts no corners. Our SIL products are either Hardware Assessed or Fully Assessed - we NEVER use Proven In Use ... should you?

### Fractionation (distillation)

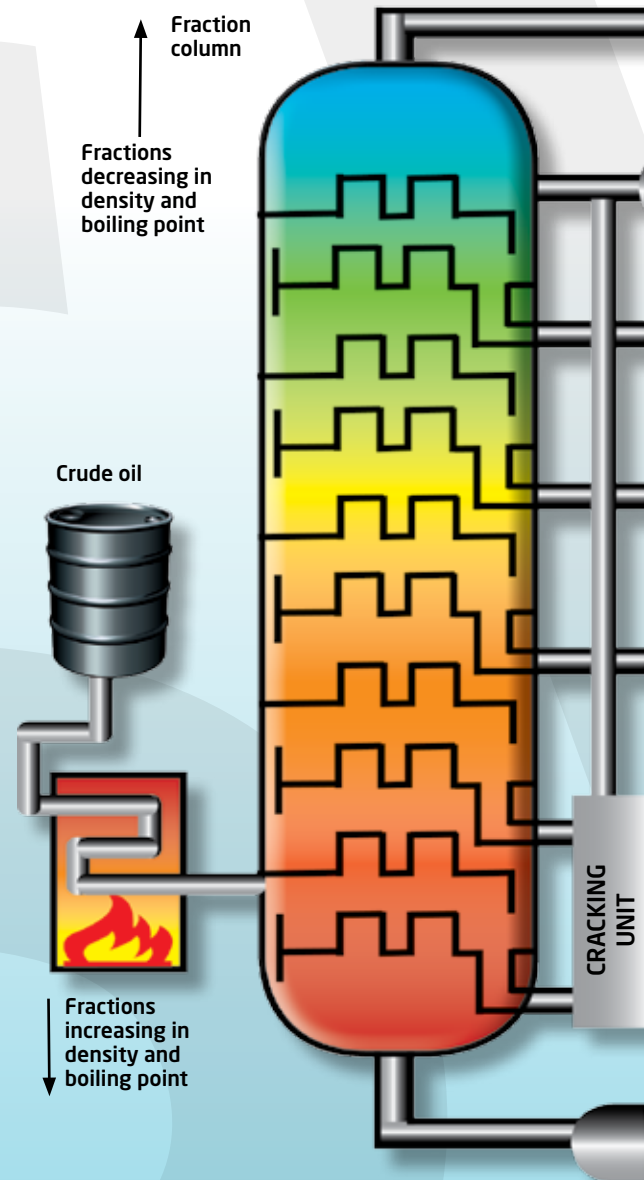
Use the HART 5335D or 6335D temperature transmitters with the 5106B / 9106B HART transparent repeater to measure temperature of the various fractions avoiding multiple cable runs. Also benefit from the extra diagnostic information that HART brings for preventive maintenance schemes. Where PROFIBUS PA or FOUNDATION Fieldbus is needed, use the 5350B or 6350B for measuring the fraction temperatures.

### Fluid catalytic cracking and coking

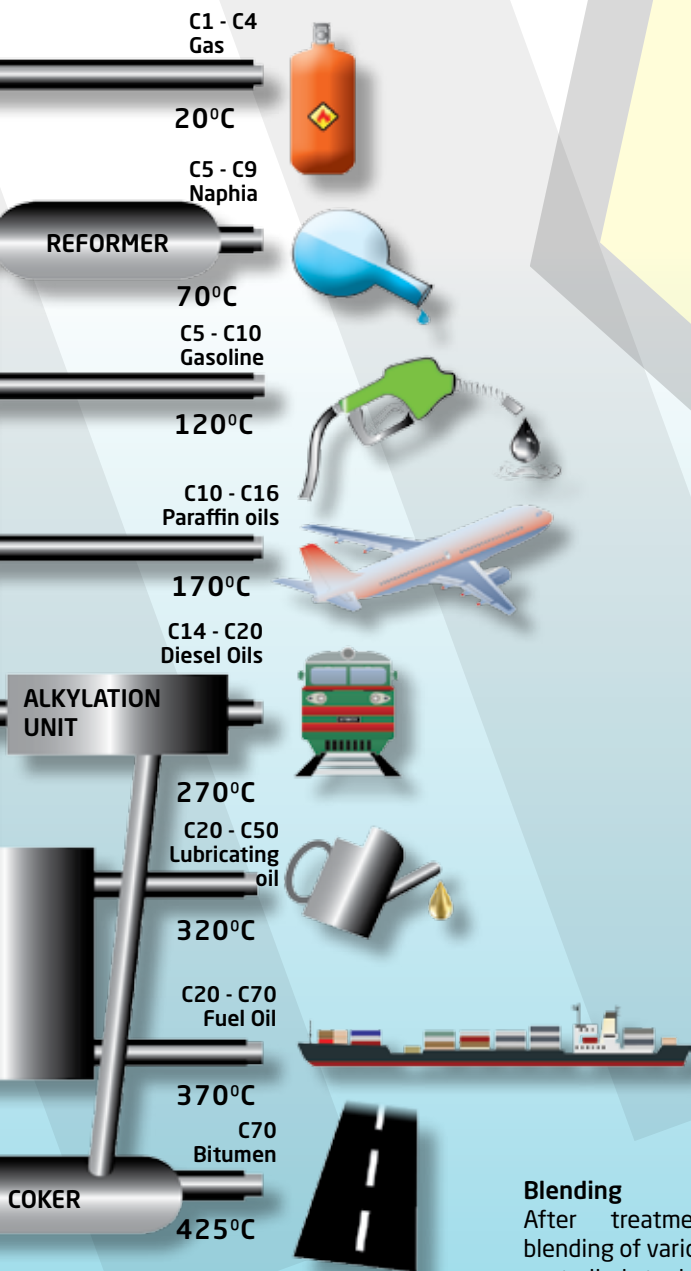
Use temperature transmitters such as 5333D / 5334B / 6333B / 6334B with universal transmitters such as the 9113B and displays such as 5714 to indirectly measure pressures throughout the cracking and coking processes to help control and balance the energy use.

### Conversion - alkylation

As part of a safety redundancy system, when implementing mitigation strategies for rapid deinventory or water spray systems, use the 5105B or 5107B / 9107B (HART) Ex-isolated drivers as part of the remote activation of these systems.







**Conversion - catalytic reforming process**  
 Use several 5116B or 9116B programmable universal transmitters with relays to monitor the temperature of the multiple fixed-bed catalyst reactors of the catalytic reforming process. The heaters for their respective heat exchangers can be controlled using relays in conjunction with advanced functions such as programmable trip set-point or window with adjustable hysteresis and delay.

**Blending**  
 After treatment, automatic batch blending of various fractions in thermally controlled tanks, to produce valuable end products of various mixtures, can be accurately produced with the help of PR's product range.  
 The temperature, level and weight of individual fractions as well as the speed of rotation of any agitator can be measured with PR products such as 5331D temperature transmitter, 5343B level indicator with linearization to indicate tank volume, 2261 load cell mV transmitter, and the 5223B f/l converter measuring speed of rotation or number of revolutions.

**Multifunctional**  
 PR's multifunctional products do not only have a wealth of support for different input types, but also include advanced features such as process calibration, linearization and auto-diagnosis. Products with different configuration options such as bi-direct input, easy software configuration or local displays such as the 4511 / 4501, give you the possibility of covering a wide range of applications with a relatively small number of product variants.

**Temperature**  
 PR's range of temperature transmitters cover traditional analog output, digital output in the form of HART and bussed output transmitters supporting PROFIBUS and FOUNDATION Fieldbus.  
 Our 6350B and 5350B transmitters support PROFIBUS and FOUNDATION Fieldbus in one device that can automatically switch between protocols. Advanced features such as LAS functionality and approvals such as Fieldbus Intrinsically Safe Concept (FISCO) Certification are also the norm.

**Isolation**  
 With some of the highest galvanic isolation on the market, at 3.75 kVAC, you can be sure that products from PR will safely keep your plant measurements accurate. Isolation is found right across our portfolio of products covering various signal types that you are likely to encounter in the oil and gas industry including digital, analog and HART transparent repeaters.

**I.S. interfaces**  
 PR is amongst the first suppliers to be able to provide FULL ASSESSMENT on many of our SIL-rated products such as our flagship 9000 series, thus verifying all of our processes associated with designing, producing and supplying our products. When combined with global Ex certificates, our products are ideal for the hazardous zone applications.

**Bussed plants**  
 Bussed plants can save on installation costs, however with PR's products you can also save space and money on products without compromising safety or quality. In 2-wire sensor applications, we not only offer advanced features such as redundancy or the difference or average of two sensors; with our PROFIBUS / FOUNDATION Fieldbus you can also access the individual sensor information. Two sensors per channel for our 5350B, and in the case of 6350B you can have two channels giving you access to 4 sensors.



**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.