SIGNALS THE BEST

Energy

Powerful Solutions for the Energy Sector

A complete range of signal conditioning modules with universal AC/DC power supplies, high galvanic isolation and high EMC immunity

Efficient energy production requires

In the energy sector, even small measurement errors can have large consequences, so signal conditioning modules used in these processes must be of the highest quality. Signal conditioners used in power plants must remain accurate even when subjected to high levels of electrical noise, high vibration, and other disturbances. These are just a few of the reasons why energy producers all over the world have selected PR electronics as their preferred supplier.

In thermal and hydroelectric power plants, signal conditioners from PR electronics are used in applications relating to the monitoring and control of boilers, turbines, generators, condensers, pumps etc. Our modules are also used to optimize the operation of wind turbines, solar heating plants and solar power plants.

This is how we create the best energy solutions
At PR electronics we know the energy sector from the inside out. Many of our employees are experts in the energy sector, with many years of professional experience. During new product development, our engineers keep in close contact with customers from the energy sector, to ensure that our modules meet the latest needs of the industry. Therefore, PR electronics' products are based on a strong combination of energy expertise and more than 35 years of experience developing modules for signal conditioning and process control. For you as a customer, this means outstanding signal conditioning modules and technical consultancy.

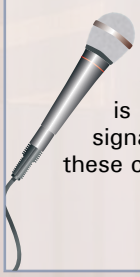
Powerful customer advantages
Reliability, flexibility and user-friendliness are the primary characteristics of PR electronics' signal conditioning modules. Here is just some of what our range of products offer:

- Extremely high galvanic isolation (up to 3.75 kVAC) and state-of-the-art EMC immunity ensure accurate signal conditioning and effective protection against electrical noise, ground potentials and transients.
- Programmable modules with universal power supplies, universal inputs and up to four independent, multi-functional relays, allowing you to add extra alarms to your control system.
- Many of our modules are rated for use in SIL 2 applications.
- Our modules can provide you alarms for cable and sensor error.
- Modules for DIN rail mounting, allowing them to be installed at a safe distance from heat and vibrations from boilers, turbines, generators etc.
- Many modules have been vibration-tested and earned the DNV marine approval.
- Our units have a wide variety of I.S. approvals: FM, IECEx, ATEX, CSA, GOST and UL.
- Each module is individually tested, with a 5 year product guarantee.
- Easy configuration via detachable front-mounted LCD display or PC.
- Competitive prices.

Contents

STATEMENT FROM THE ENERGY SECTOR

Mr. Ko van der Lee and Mr. Daniel de Jager, Maintenance Group Cluster Utrecht. NUON Power Generation B.V., The Netherlands:
"The products from PR electronics are multi-functional, reliable and usable for many applications. For us at NUON this is an important issue, because of our various machinery, which contains old and new DCS systems, so we are able to make a seamless connection. NUON attempts to realise standardization, long lifetime, quality and guarantee, and the PR products fulfil these demands for us. One of our applications is to convert temperature signals from thermocouples into mA output signals. Our control and safeguarding system of the gas turbine rely on these converters."



efficient signal conditioning

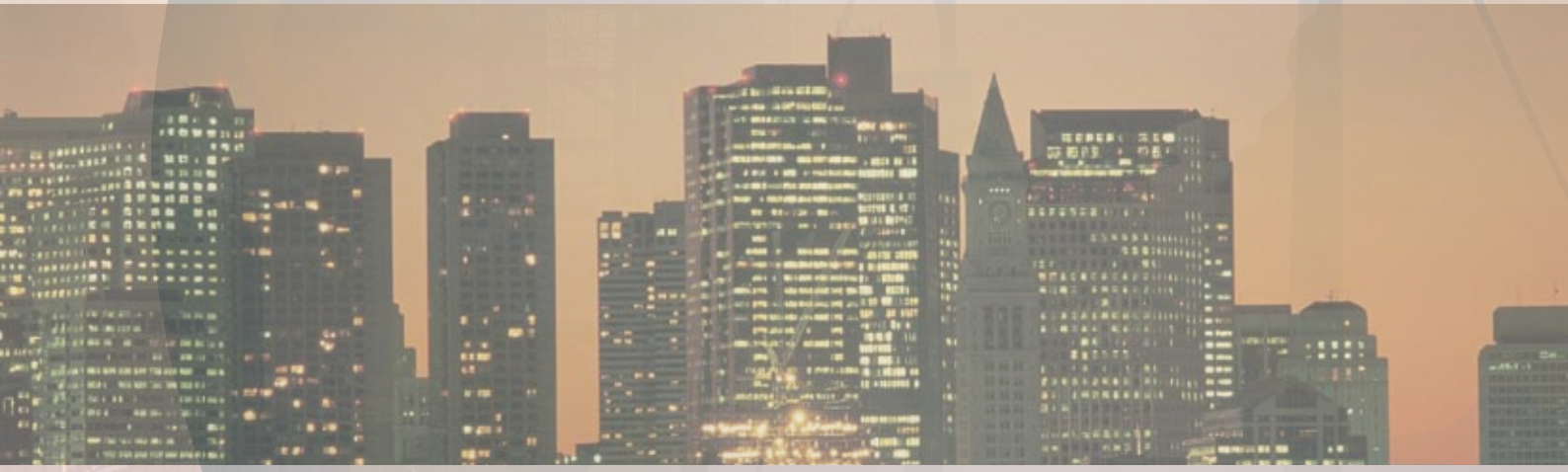
First with the latest
At PR electronics we are traditionally among the first to implement the changes mandated by the latest directives and standards. So by choosing products from PR electronics, you are creating a future-oriented installation – both technically and environmentally.

Signal conditioning with belt and braces
In 2008, PR electronics was certified according to IEC 61508 as a developer of modules for SIL 2 safety functions. Additionally, we are one of the first companies in the world to develop products which meet the SIL 2 "Full Assessment" criteria, which require that we follow the strictest procedures during the development and verification of our products in relation to functional safety (Full Assessment according to IEC 61508).

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

In the following pages you will find examples of how we contribute to increased efficiency and safety in the energy sector.

Photo above, left: The Avedøre power plant, courtesy of Dong Energy. Right: Nysted offshore wind farm, courtesy of ENERGI E2 and SEAS Transmission. Other photos: Corbis.



Signal conditioning for eve

I.S. interfaces

I.S. interfaces from PR electronics are connected between the sensors mounted in the process and the plant control system, and are designed to comply with the strictest requirements pertaining to signals originating in areas with flammable gas and dust. Because of their flexible features such as universal input, universal power supply, complete programmability, etc., we can offer you a user-friendly product for nearly every application, involving analog, digital or HART® signals. The interface range carries IECEx, ATEX, CSA, FM, GOST and UL approvals, thus facilitating world-wide application. All our I.S. interfaces have high galvanic isolation and high immunity to electrical disturbances.

Universal transmitters

These versatile DIN rail mounted modules handle all commonly used types of industrial signals. They are ideally suited for signal isolation, conversion, scaling, amplification, surveillance, and control, and also function as interfaces, limit switches etc. These modules are highly reliable, even in environments with high levels of electrical noise. The transmitters are easily configured by PC or the detachable front-mounted display, model 450 This removable display features scrolling h texts in seven languages, and with the dis you can copy a module's configuration to modules, display input and output and easily gain access to a large advanced functions.

Temperature transmitters

PR electronics' range of temperature transmitters covers every application requiring conversion of RTD and TC sensor signals to mA, V, HART®, PROFIBUS® PA and FOUNDATION™ Fieldbus communications. Our transmitters can be mounted in the sensor head, on DIN rail or plug into an 11-pole socket. We offer features such as automatic switching between PROFIBUS® PA and FOUNDATION™ Fieldbus protocols, fast response times, automatic calibration, RTD cable compensation, automatic CJC, sensor error detection, complete programmability as well as a high degree of accuracy even during strong electrical disturbances and temperature variations.

PR electronics' range of signal conditioning modules is tailor-made for the energy sector's operational environments, signal types, and demands regarding supply voltage, communication protocols, special functions, etc.

ry need

Signal isolators

PR electronics' range of isolators accepts nearly all process signals, including analog, digital and HART® signals. The majority of our isolators have an extremely high isolation level of up to 3.75 kVAC and exceptional EMC immunity. The result is accurate signal conditioning and a minimized risk of operational errors related to the transmission of signals from sensors and transmitters to PLC and DCS systems. Our complete product range features loop-powered isolators and externally powered isolators and includes both DIN rail and socket-mounted modules. These modules are typically used for galvanic isolation, signal conversion, elimination of ground loops, scaling of process values, potential separation, and noise filtration.

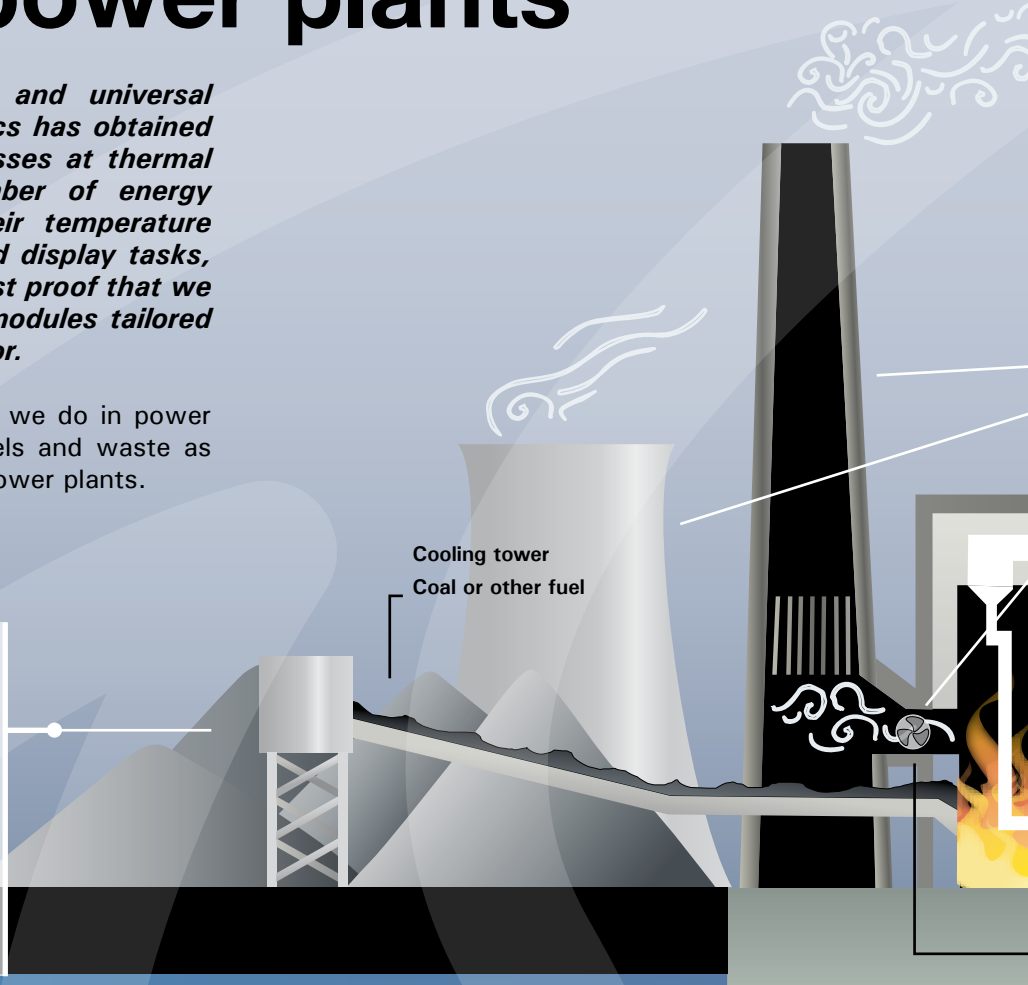
Displays

Panel-mounted displays from PR electronics provide a reliable readout of your process. Our displays can measure virtually any kind of process signal, and several models are capable of controlling complex process sequences via a built-in analog output and up to four relay outputs. Our displays are especially easy to specify in your applications because of features like our universal power supply, easy programming, multipoint linearization, offset, special input ranges and advanced relay functionality (e.g. on/off delay, switching on sensor failure).

Thermal power plants

Through reliable, user-friendly and universal signal conditioning PR electronics has obtained a solid foothold in many processes at thermal power plants. The large number of energy producers who entrust all their temperature applications, signal isolation and display tasks, etc. to PR electronics are the best proof that we have succeeded in developing modules tailored to the needs of the energy sector.

Below are some examples of what we do in power plants based on fossil fuels, biofuels and waste as well as in nuclear and geothermal power plants.



I.S. signal conditioning

Complete range of I.S. modules for analog, digital and HART® signals.

Frequently applied I.S. interfaces: The 5000 series (e.g. 5116 and 5131). The new 9000 series is also well suited for I.S. applications.

Each generating unit: For example several hundred I.S. channels in connection with storage and transport of coal.

Steam generated 1) via combustion of fossil fuels/biofuels/waste, 2) via nuclear fission in a reactor or 3) via heat from within the earth. Naturally, PR electronics also supplies signal conditioning ideal for **gas turbine power plants and power plants with combined gas turbine and steam turbine (combined-cycle).**

STATEMENTS FROM THE POWER PLANTS

Poul Henning Olsen, electronics mechanic, DONG Energy, Skærbæk power plant, Denmark:
"We have been using several different suppliers of signal conditioning modules and the modules from PR electronics are the only ones that have never failed. For instance, all of our 573 temperature transmitters (PR type 5331) have been running without faults for more than ten years now. Owing to PR electronics' quality, prices and customer service we will be installing more PR modules in our processes."

Fraser Gordon, Cockenzie Power Station, Scotland:
"As the Lead C&I Engineer at Cockenzie Power Station I have used PR electronics modules for several years and they are a cost effective replacement for many of our existing systems and I also use them on new installations. They have been very reliable and are easily configured."

Jean-Luc Vandevelde, instrumentation technician at the EDF Power Station in Porcheville, France:
"We use PR electronics' modules because they are universal, reliable and easy to program, and because of the competent technical advising and short delivery time."

Hans Venema, Teamleader Maintanance, Eemscentrale, Electrabel Nederland N.V., The Netherlands:
"We decided to choose the products of PR electronics because of the user-friendliness, together with the distinct data sheets. Swift delivery and good technical support also played a part in the decision-making process."

Temperature: PR electronics covers every application within conversion of RTD and TC sensor signals into mA, V, HART® and bus communication. Applications include: measurement, readout, monitoring and control (metal, water, steam, smoke, lifting oil, hydraulic oil, and bearings).

Frequently applied DIN rail products: 6300 series, 4100 series and 5100 series. Frequently applied head-mounted products: 5300 series.

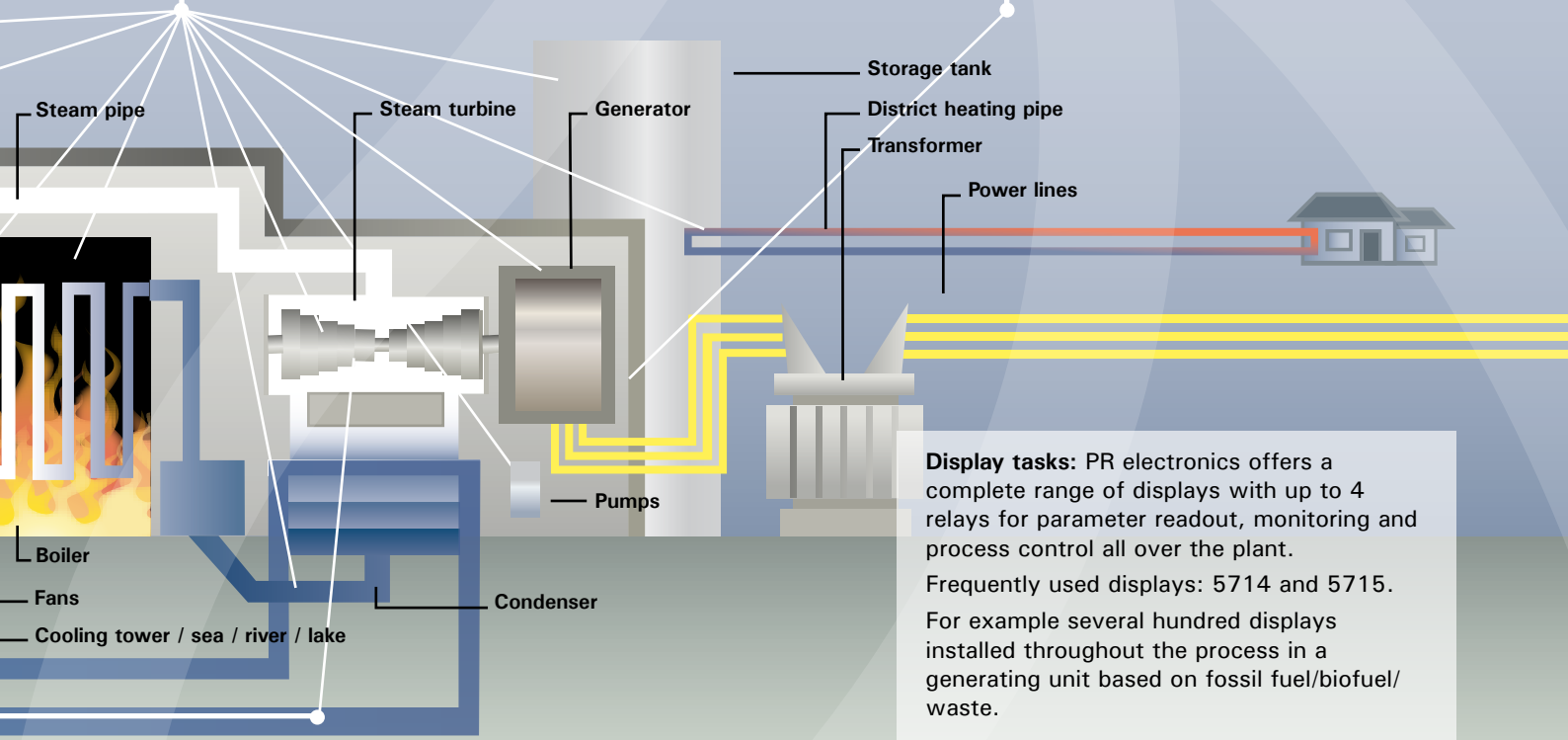
Each generating unit (fossil fuel/biofuel/waste), for example: Boiler: Many hundred transmitters (the 6300 series for boiler wall, the 5300 series for water and steam). Turbine-generator: About 100 transmitters (the 6300 series). BOP: About 100 transmitters (the 5300 series). Accumulation tank (district heating water): 50-100 measurements (e.g. with 5331 / 5335).

Signal isolation (generators, frequency converters, external installations, etc.).

PR electronics covers any form of signal isolation whether it involves analog, digital or HART® signals.

Frequently applied modules: 6185, 2204, 2284, 5104, 5106 and the 4100 series.

For example several hundred isolators per generating unit based on fossil fuel/biofuel/waste.



Display tasks: PR electronics offers a complete range of displays with up to 4 relays for parameter readout, monitoring and process control all over the plant.

Frequently used displays: 5714 and 5715.

For example several hundred displays installed throughout the process in a generating unit based on fossil fuel/biofuel/waste.

Other examples

Geothermal steam for turbine
Measurement and readout of steam temperature and pressure with universal transmitter 4114 / 4116 or display 5714.

Coal feeding
Monitoring of coal feeding with vibration probes, f/I converter 5225 and display 5714 (alarm when feeding rate is low).

Boiler
Redundant temperature measurement in e.g. boiler with signal calculator 5115 (separate output for sensor error reaction and difference between two sensors).

Gas turbine
Measurement and monitoring of gas pressure for gas turbine with universal transmitter 4116 via pressure transmitter.

Transformer
Monitoring of voltage and frequency with AC/DC transmitter 2279, f/I-f/f converter 5223 and display 5714 / 5715.

Nuclear reactor
Backup monitoring of gas circulator vibration with trip amplifier 2231.

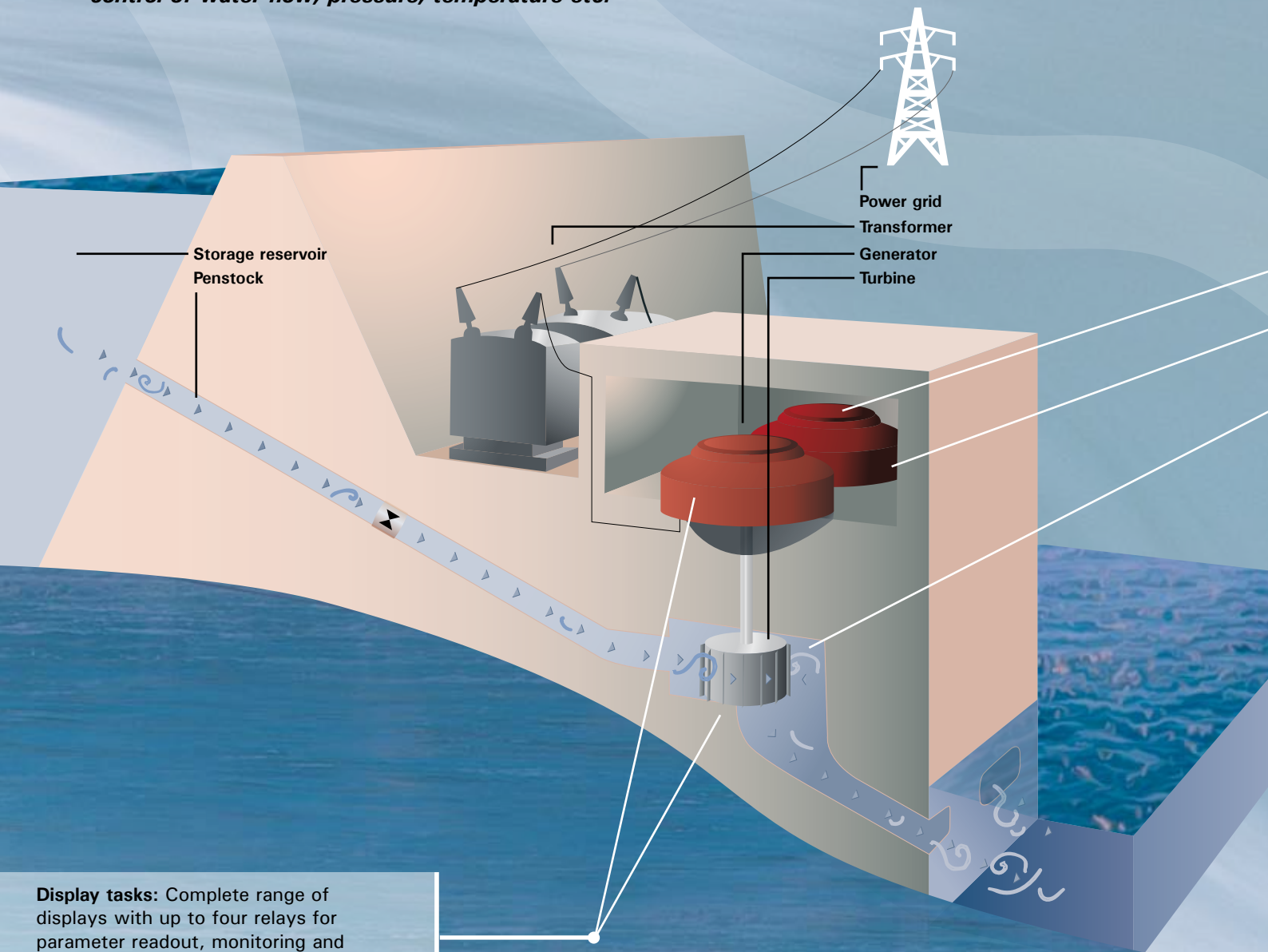
Flue gas
Linearized oxygen measurement in flue gas with lambda probe and universal transmitter 5116 (monitoring) or display 5715 (readout and monitoring).

Steam turbine
Measurement of pressure, valve positions and temperature with universal transmitter 4116.

Storage tank
Temperature measurements in storage tank for district heating water with 2-wire transmitter 5331 / HART® transmitter 5335.

Hydroelectric plants

All over the world the forces of rivers transform into electricity, assisted by red signal conditioning modules that contribute to the monitoring and control of water flow, pressure, temperature etc.



Display tasks: Complete range of displays with up to four relays for parameter readout, monitoring and process control.

Frequently used displays: 5714 and 5715.

One module for all tasks (A2A Milano, Italy):
At A2A Milano's seven hydroelectric power stations all signal conditioning is performed by the signal calculator 5115 from PR electronics. The module carries out a wide range of functions, such as galvanic isolation, temperature conversion, analog signal adaptation, duplication, and amplification. There are more than 700 units of 5115 installed at A2A's power stations and through their reliability and flexibility they ensure an efficient interaction between the turbines and the control room.

Signal isolation (generators, frequency converters, external installations etc.).

PR electronics covers any form of signal isolation whether it involves analog, digital or HART® signals.

Frequently used modules: 4114, 5104, 5106, 5115 and 6185.

Temperature: PR electronics covers all temperature applications at hydroelectric plants.

Applications: measurement, readout, monitoring and process control (metal, cooling water, oil and bearings).

Frequently used modules: 4114, 4116, 5115, 5116, 5714 and 5715.

Example: 30-50 temperature measurements per turbine-generator group.

Photo courtesy of NC GreenPower, Raleigh, North Carolina.

Photo courtesy of Stanwell Corporation Limited, Australia.

Other examples

Turbine
Start-up: Isolation and V-mA conversion of thyristor signals from soft starter with isolator 2284 (short response time).

Turbine and generator
Redundant temperature measurement with signal calculator 5115 (separate output for sensor error reaction and difference between two sensors).

Turbine and generator
Readout and monitoring of oil pressure with display 5714 or universal transmitter 4114 / 4116 / 5116. (5116: monitoring).

Turbine and generator
Local redundant readout and control of bearing oil temperature with display 5715 (4 relays) or universal transmitter 4116 (2 relays).

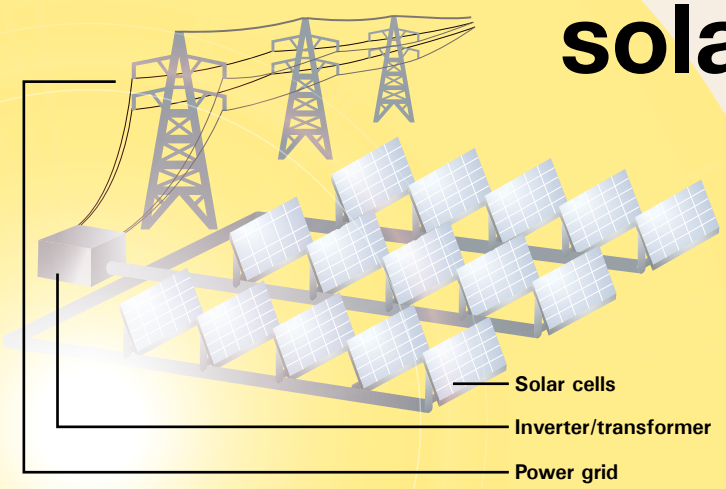
Turbine
Speed monitoring with f/I-f/f converter 5225 via inductive sensor in the turbine rotor.

Water supply for turbine
Readout of distributor position with display 5714 or universal transmitter 4114.

Penstock
Readout and monitoring of water pressure in the penstock with display 5714.

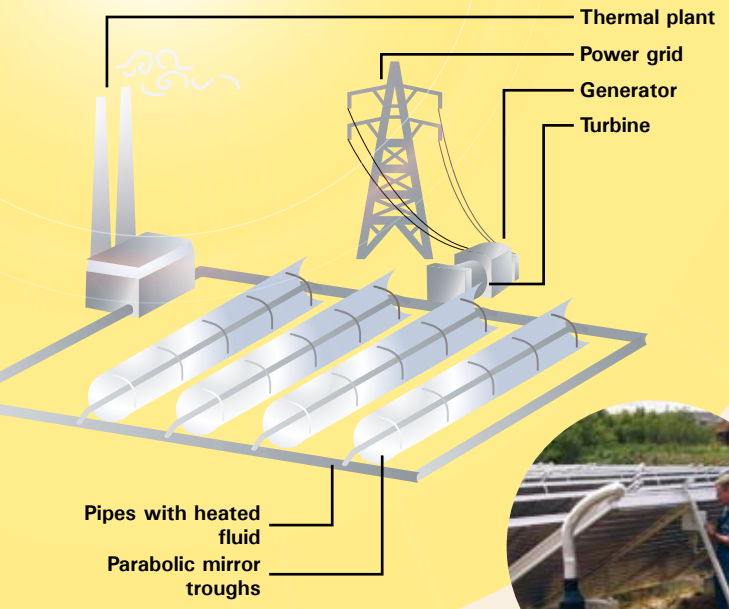
Photo above from left: 1 and 2: Itaipu, Paraguay, courtesy of www.7is7.com. Third photo: Corbis. Fourth photo: Alta, Norway.

Solar heating plants and solar power plants

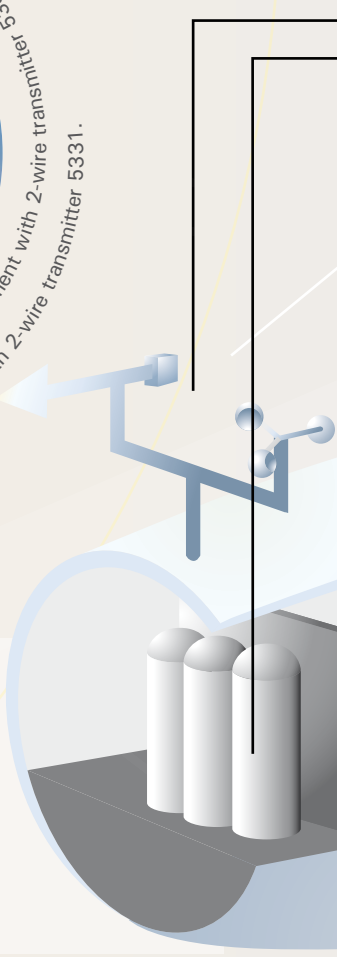


In the processes that transform solar energy into district heating and electricity, signal conditioning modules from PR electronics contribute by isolating signals as well as by converting analog and digital signals.

On this page you will find some examples of the tasks performed by modules from PR electronics at solar heating plants and solar power plants.



Solar power tower plants: Boiler temperature measurement with 2-wire transmitter 5333. mV/mA conversion of signals from pyrometers with 2-wire transmitter 5331.



Parabolic trough solar power plants

Measurement of oil temperature in the primary circuit and water temperature in the secondary circuit with 2-wire transmitter 5333.

Solar heating plants

Measurement of water temperature in solar heat collectors and water tank with 2-wire transmitter 5333 / 5331.

Isolation of temperature signals (cables from solar heat collectors to pumping station and control panel) with transmitter 4114 / 5114 or signal isolator 5104 / 2284.

Photovoltaic solar power plants

Readout of wind speed and control of the solar trackers with display 5714.

Solar energy in general

Temperature: The 2-wire transmitters 5331, 5333 and 5335.

Signal isolation: The transmitters 4114 and 5114 plus the isolators 5104 and 2284.

Local readout and process control: Display 5714.

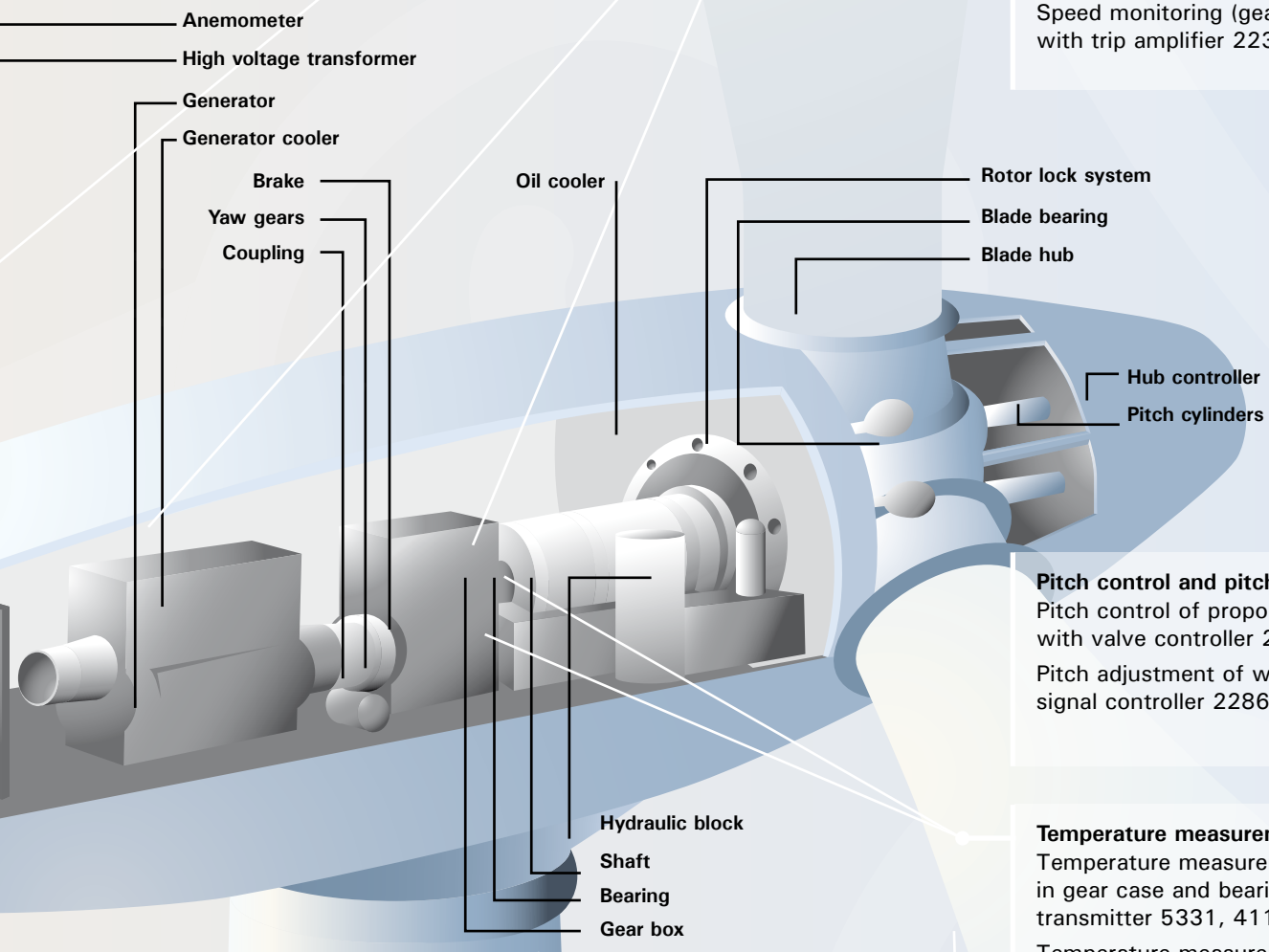
Wind turbines

A reliable wind turbine is a wind turbine with reliable signal conditioning.

The need for reliable signal conditioning modules for wind power production increases steadily because wind turbines get bigger and are increasingly placed at sea. Here are some examples of how PR electronics contributes to keeping the wind turbines fit.

STATEMENT FROM THE WIND TURBINE INDUSTRY
Henrik Bredtoft Jacobsen, kk-electronic a/s, Denmark:

"In our production of control panels for the wind turbine industry we use several different modules from PR electronics. We have chosen PR electronics as our supplier because of the high supply security and product quality. The products are easy to program and their high reliability makes them very well suited for wind turbines; - this reliability is even more important at offshore wind farms as maintenance here is extremely costly."



f/I conversion and I/f conversion
f/I conversion of pulse signals from anemometer with f/I-f/f converter 5223 or 5225.

I/f conversion of analog signals from anemometer with I/f converter 4222.

Signal isolation
Signal isolation (generator etc.) with transmitter 4114 or isolator 2284 / 5104.

Speed monitoring
Speed monitoring (gear box etc.) with trip amplifier 2231.

Pitch control and pitch adjustment
Pitch control of proportional valve with valve controller 2224.

Pitch adjustment of wings with signal controller 2286 or 2289.

Temperature measurement
Temperature measurement (oil in gear case and bearings) with transmitter 5331, 4114 or 5114.

Temperature measurement with transmitter 4114, 5331 or 5131 during casting and hardening of wings.

Stress measurement
Stress measurement (wings and tower) with load cell amplifier 2261.

Robust signal conditioning
PR electronics offers you signal conditioning modules that, due to their high EMC immunity, continue to operate unaffected in the presence of frequency converters and generators.

Offshore wind farm, Middelgrund, Denmark.

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Energy production with PR electronics

PR electronics is one of the world's leading manufacturers of modules used in industrial signal conditioning and process control. Our solutions for the energy sector are based on a thorough knowledge of the processes and demands of the industry combined with more than 35 years of experience in developing and manufacturing industrial instrumentation.

This is why PR electronics always...

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