Level
Pressure
Flow
Temperature
Liquid Analysis
Registration
Systems Components
Services
Solutions

Fossil Fuel Power Plants

Full range of measurement instrumentation and solutions

Endress+Hauser

People for Process Automation

Knowledge in Power

Endress+Hauser is a leading supplier of measurement instrumentation, services and solutions for power plants worldwide. We design and manufacture a full range of industry-optimized instruments for every step of the process. Endress+Hauser also offers more than 50 years of application know-how to help customers increase their process efficiency, reduce their production down-time and streamline their stockholding and logistics processes.

As a Swiss, family-owned company, Endress+Hauser is dedicated to instrumentation, plowing back all profits into the development of state-of-the-art process automation technologies. Since the beginning in 1953, Endress+Hauser has been a pioneer for cutting edge measurement and automation solutions.

Endress+Hauser sales centers and representatives are located in 85 countries. Innovative measurement and automation systems are manufactured in 23 production centers in Switzerland, Germany, France, the United Kingdom, Italy, China, Japan, India, Russia and the USA.

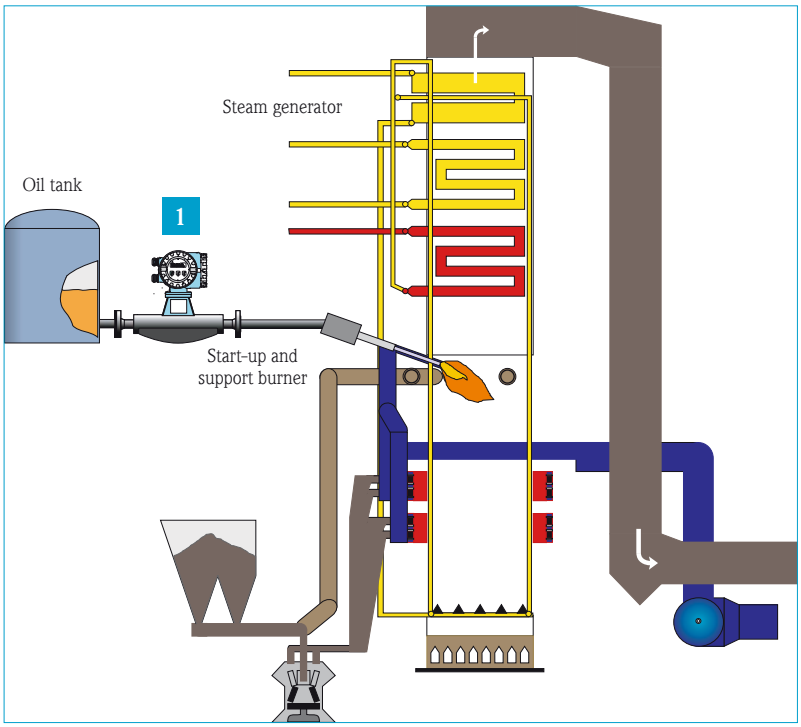
Endress+Hauser is powering its way to the top, providing solutions for fossil fuel (coal, gas and oil), waste-to-energy, nuclear and hydro power plants.

Overview diagram of a coal-fired power plant

Monitoring the start-up/support burner

Combination burners for coal and oil are used to fire the boiler. In order to initiate the combustion process and/or to support the coal fire, oil is used for the booster and supporting burner.

A precise mass measurement (kg/h), installed in the oil flow line, is required for the exact batching and control of the combustion process. The heavy oil is supplied to a ring heating system. This makes monitoring of the supply and feedback lines necessary.



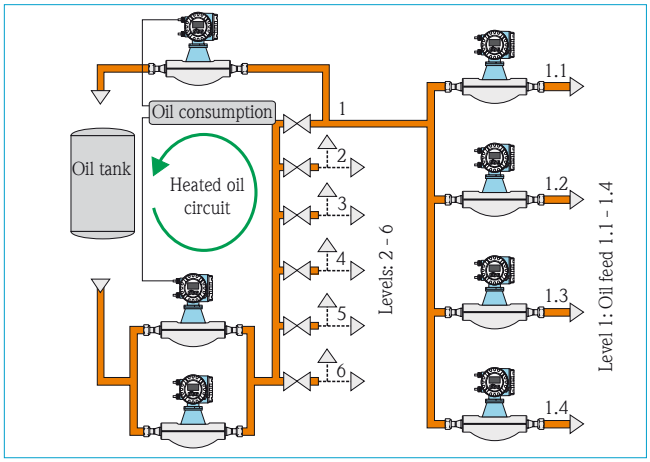
1 Promass – Coriolis mass flow meter

Promass is a compact transmitter for direct measurement of mass (kg/h), where additional instrumentation is not necessary.

- Replacement of mechanical systems, which can obstruct and block the furnace oil flow line
- No moving parts for unimpeded flow and operation of the furnace
- Safe measurement, even with poor quality oil

Promass Coriolis mass flow meter

Compact version already isolated due to heated oil circuit

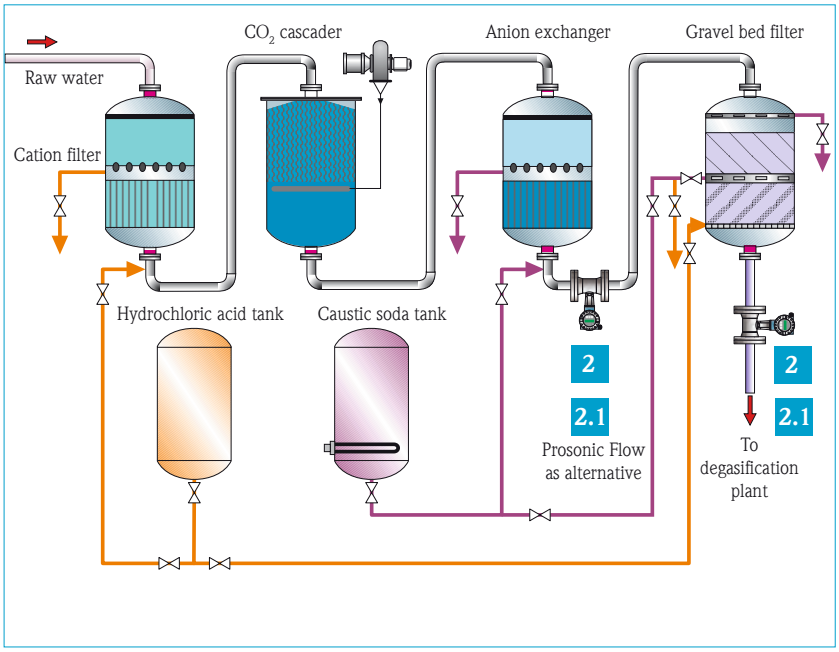


Oil supply system with various Promass flow meters

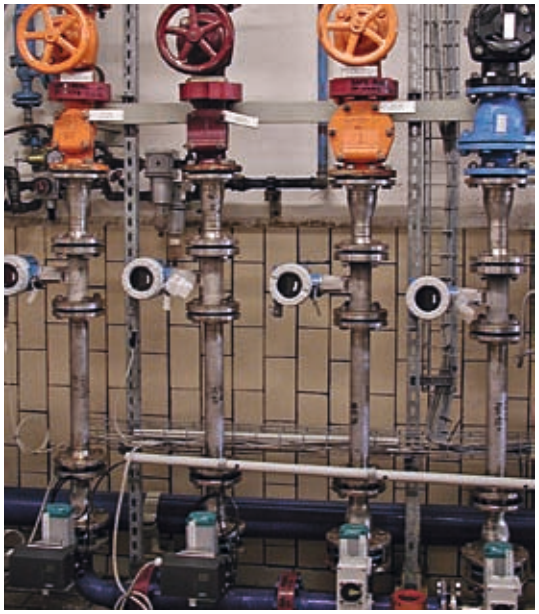
Volume measurement in desalination

Full desalination requires the production of pure water necessary for the operation of steam boilers. For this purpose, cation filters, carbon dioxide (CO_2) cascaders, anion exchangers and gravel bed filters are installed. After exhaustion of the cation filter and anion exchanger, these units are regenerated with hydrochloric acid or caustic soda.

After the raw water has run through the desalination plant, it is free of salt and has low conductivity and low silica content. Volumetric flow meters are required for the supply of deionized water in the water/steam circuit.



Prowirl vortex flow meter



Prowirl monitors the flow volume of the fully desalinated water

2 Prowirl – vortex flow meter

Prowirl is a compact flow meter for volume measurement in deionized water.

- Reliable measurement, independent of deionate conductivity
- Large measuring dynamics, i.e. high turndown
- Little pressure loss

2.1 Prosonic Flow – ultrasonic flow meter

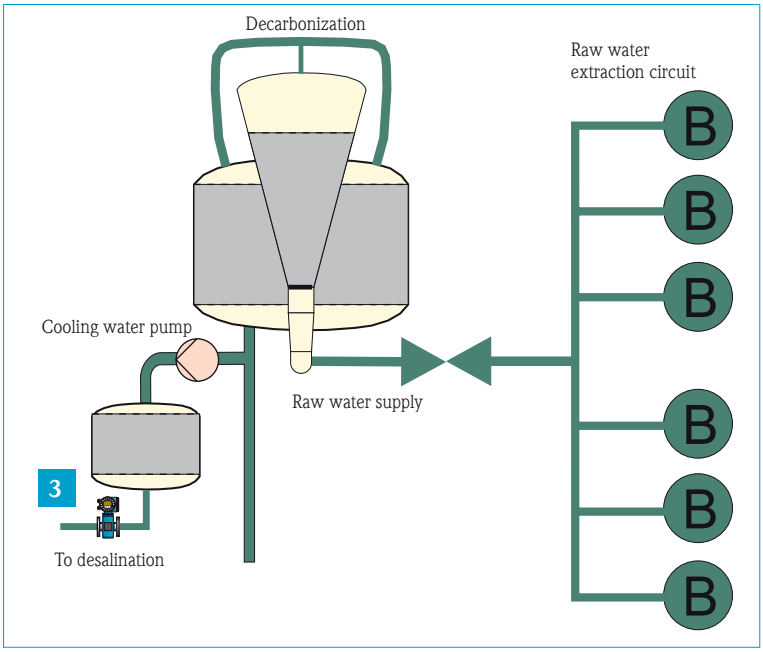
Prosonic Flow is ideally suited for applications in process control and utility measurement in energy production.

- Short inlet and outlet length reducing the space required for installation
- Loop powered transmitter
- Accuracy up to ±0.3 % (optional)
- Measures the flow of conductive and especially non-conductive liquids

Prosonic Flow
ultrasonic inline flow meter

Control of raw water supply

Additional water is required as replacement for the condensate loss in the cooling system and as replacement for the feedwater in the steam circuit. The raw water is taken from rivers. The extraction flow rate must be measured in order to control the chemical cleaning process, since raw water is not free of dirt particles.

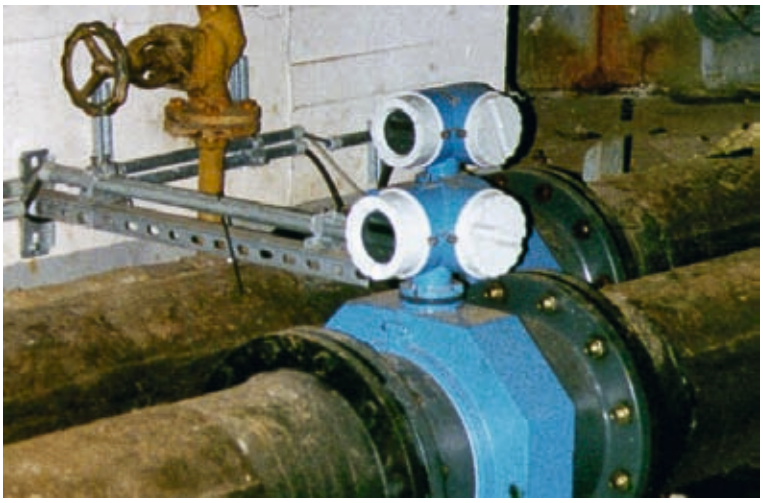


Promag electromagnetic flow meter

3 Promag – electromagnetic flow meter

The compact Promag flow meter, flanged version, is especially designed for raw water usage. It's available in sizes from 15 mm to 2000 mm.

- Simple commissioning with user-friendly quick setup
- Large display and plain language text
- Relay outputs can be configured for error indication, material and limit value monitoring
- Pulse and analog outputs are fitted as standard and are freely configurable



Promag electromagnetic flow meter registers the cooling water volumes

Water volumes in the main cooling water system

The flash steam from the turbine is condensed in the main condenser situated below the turbine. The condenser is a heat exchanger through which large volumes of cooling water flow. Following the laws of thermodynamics, great cooling capacities create a high degree of efficiency in the power plant. In order to measure these cooling water volumes, a measuring instrument is required which supplies reliable values even with large pipe diameters.

Prosonic Flow ultrasonic flow meter

Portable version

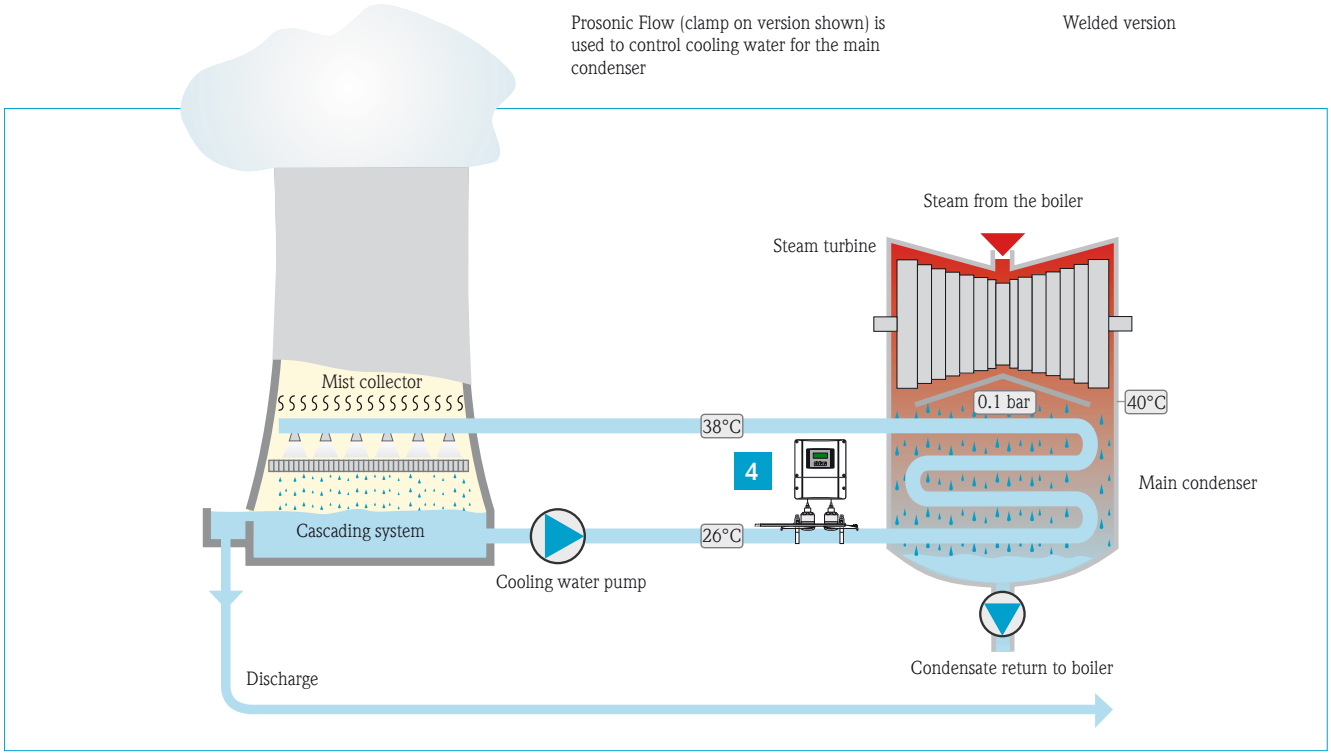
4 Prosonic Flow – ultrasonic flow meter

Prosonic Flow is an ultrasonic measuring instrument installed directly on pipelines via detecting sensors. The transmitter, which is mounted separately, completes the Prosonic Flow measuring system.

- External installation allowing easy retrofit with no intrusion into the pipe
- Maintenance free with no moving parts
- No obstructions in the pipeline and no pressure loss
- Economical alternative for large diameters up to 4000 mm
- Portable ultrasonic transmitter for temporary metering

Prosonic Flow (clamp on version shown) is used to control cooling water for the main condenser

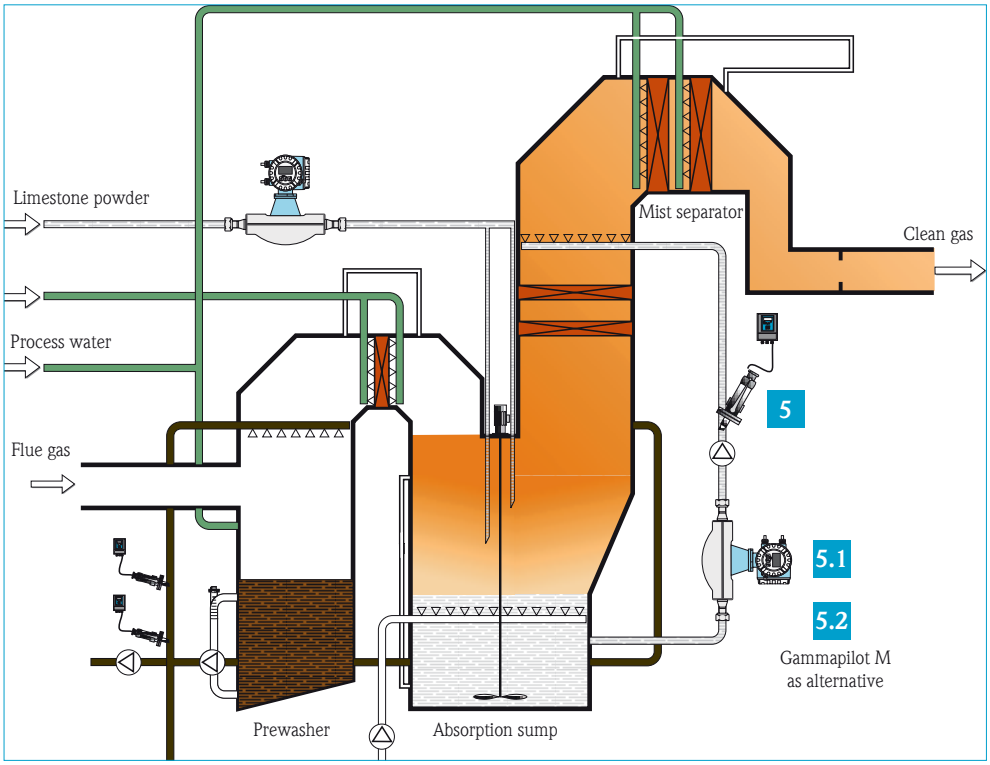
Welded version



pH measurement in desulphurization

In the flue gas desulphurization plant (FGD), flue gas is sprayed with a limestone suspension. The sulphur dioxide (SO_2) contained in the flue gases reacts with the limestone. A gypsum suspension is produced by injecting air. The FGD washer achieves an optimum desulphurization effect, as well as a high gypsum quality.

The main parameters to be controlled in this process are pH, density measurement and solid content in the suspension. Measurement of pH requires an optimum measuring system well-suited to the difficult process conditions.



TopCal system in pH measurement for automatic cleaning and calibration

5 Memosens – digital pH sensor

The most sensitive part in pH measurement is the electrode. Memosens, the world's first digital pH sensor, allows for precalibration in your office. An inductive coupling system ensures perfect digital signal communication between the pH sensor and the transmitter. The calibration values are stored inside the sensor. The metal free inductive coupling eliminates any contact influences of the conventional type.

- Safe, non-contact measurement without moisture problems
- Storage of process related data directly in the sensor
- Impossible to falsify measured data
- Calibrated in a lab, no need for field calibration
- Reduced measuring point downtime
- Easier installation without special cables
- Advanced diagnostics directly in the sensor system

Liquiline transmitter and pH sensor with Memosens technology together with Cleanfit retractable assembly for complete pH measurement

Density measurement in desulphurization

Density measurement of gypsum suspension is important for the efficiency of the FGD washer. If a certain concentration is achieved, the suspension will be grounded off.
Density measurement can be provided by Promass Coriolis or Gammapilot radiometric measurement.

5.1 Promass – Coriolis mass flow meter

- Measures density and quantity with one device (two signal outputs)
- Effective in aggressive and abrasive gypsum suspension
- Accuracy up to 0.0005 g/cm^3 for best controlling of the desulphurization plant
- Alternative to density measurement with radiometric measuring technology

Promass installed in the main absorption cycle

5.2 Gammapilot M – radiometric measurement

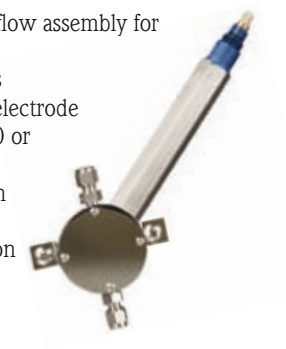
- Measures density from outside the pipe
- No down-times
- Free of maintenance
- Unaffected by aggressive media

Gammapilot installed in the main absorption cycle

Quality control in the water/steam system

6 PuriSys – pH measurement in ultrapure water

- Compact electrode with stainless steel flow assembly for
  - stable pH reading
  - elimination of flow dependency errors
- Simple maintenance-free replacement electrode
- Temperature compensation with Pt 100 or Pt 1000
- Gel reference electrode - no need for an external KCL reservoir
- Patented porous PTFE reference junction
- Easy installation

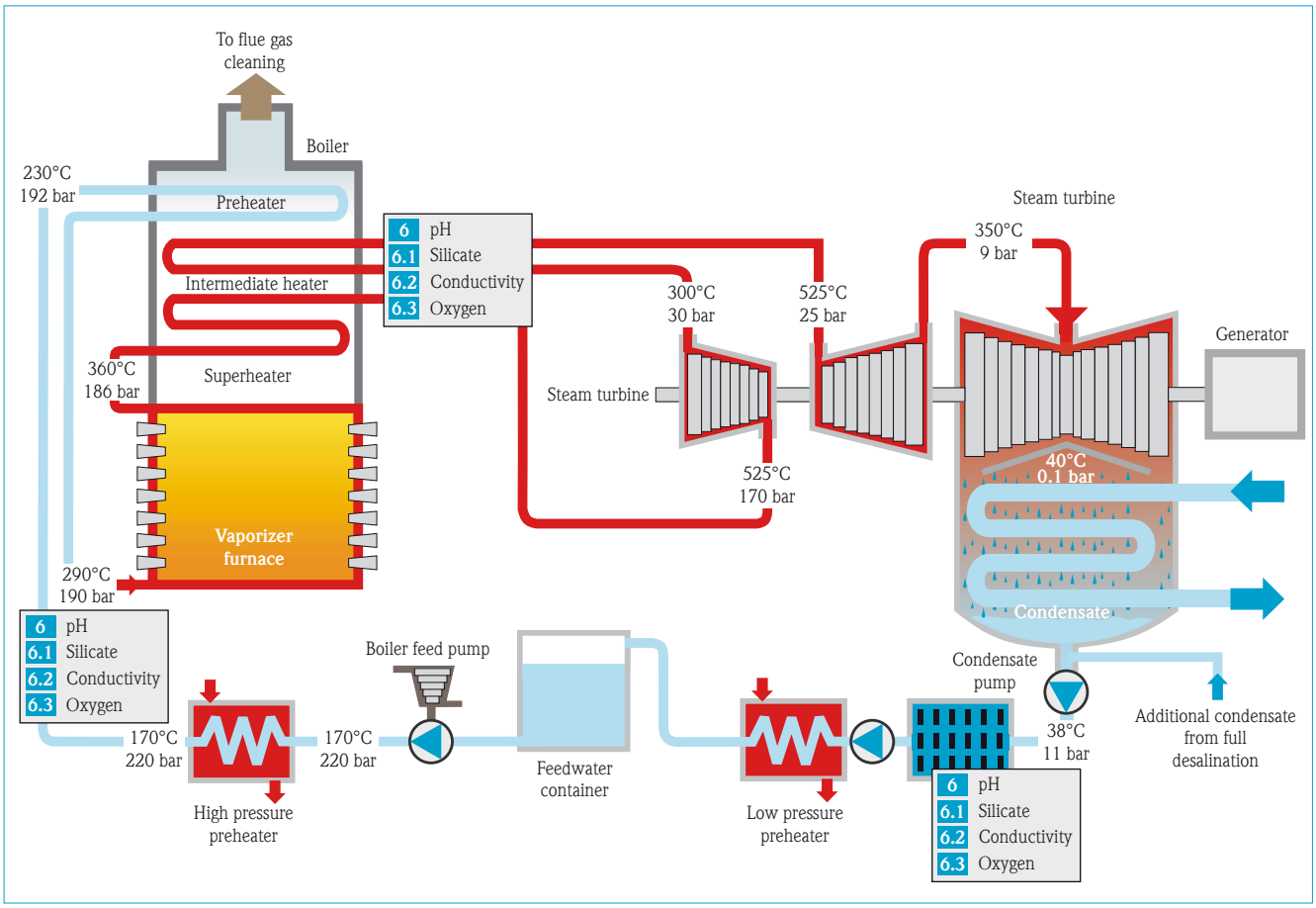


6.1 Stamolys – analyzer for silicate measurement

The Stamolys analyzer is a compact analysis system for the determination of silicate in ultrapure water and boiler feedwater. Silicate is determined using the photometric measuring principle.

- Direct reaction in photometer at constant temperature
- Fast response time due to low system volume and short distances
- Low reagent requirement
- Low sample requirement
- Two selectable measuring ranges
- User-friendly interface

Stamolys for the control of silicate to protect the turbine



Conductivity and oxygen measurement

6.2 Liquiline M – conductivity transmitter

Liquiline is a modular two-wire transmitter for all areas of process engineering. Depending on the ordered version, Liquiline can be connected to field buses as per FOUNDATION™ Fieldbus, PROFIBUS and HART® protocol. Liquiline is developed according to the international safety standard IEC 61508.

- Simple commissioning with Quick Setup and Navigator (multifunction button)
- Predictive maintenance system detects when a sensor has to be cleaned
- Active display of cable interruption with Memosens version
- User-guided commissioning, graphic display and plain text guidance
- Modular concept: sensor module replaceable

Its modular concept, in combination with the ConduMax W conductivity probe, allows for simple upgrading and easy adaptation to the measurement. The ConduMax W conductivity cell is suitable for high pressures and temperatures.

Liquiline transmitter and the ConduMax W conductivity measuring cell with Memosens technology

Oxygen measurement in boiler feedwater

6.3 Liquiline M – dissolved oxygen transmitter

The concentration of dissolved oxygen is at a rate of milligrams per liter, and a value of < 0.020 mg/l must be maintained. If the value is higher, the concentration of oxygen will help cause corrosion due to electrochemical reactions. The measurement of dissolved oxygen can also be used to control the degasifying and air-tightness of the feedwater and can be used to detect leakage of air in the condenser below the turbine because of vacuum.

The measuring system for dissolved oxygen consist of the OxyMax sensor and the two-wire Liquiline transmitter. The package provides the following features:

OxyMax oxygen sensor
- Memosens technology
- Storage of specific data in the sensor
- Laboratory calibration possible

Liquiline dissolved oxygen transmitter
- Oxygen content can be displayed as saturation (%) or concentration (mg/l, µg/l, ppm, ppb)
- Various calibration models enable direct calibration of installed sensors (input of relative humidity and absolute pressure)
- Counters for number of SIP cycles and calibrations
- Separate counters for sensor and membrane cap enable preventive maintenance

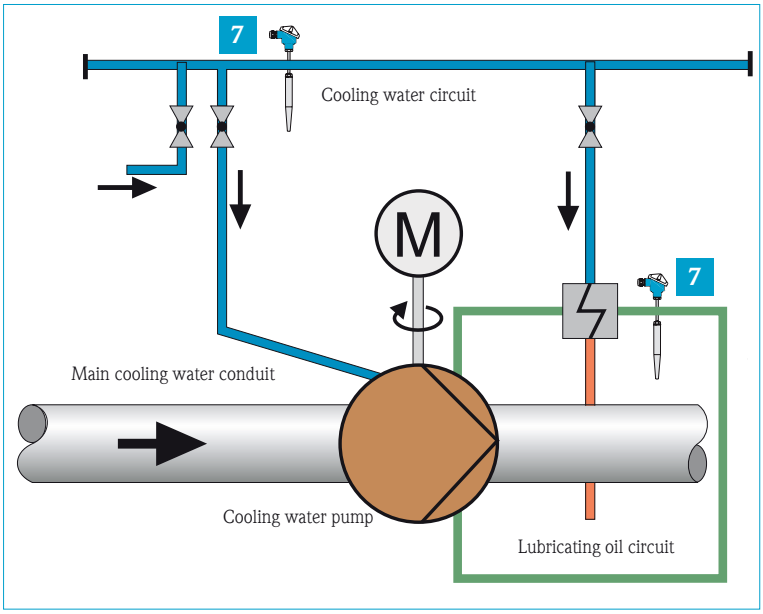
OxyMax oxygen sensor with Memosens technology

Sampling system with pH, conductivity and silicate

Temperature measurement

The cooling of water plays an important role in the power generation process. The pump designs are characterized by the water volume required for settling the turbine vapors. In order to ensure reliable operation, the axial and radial pumps must be adequately lubricated. The lubricating oil circuit must be monitored for pressure and temperature at all times in order to avoid damage to the pumps. Endress+Hauser is the complete supplier of temperature devices, including sensors and transmitters, and provides calibration of the complete measuring loop.

The Omnigrad resistance thermometer monitors the lubricating circuit at the cooling water pump



7 Omnigrad TR – resistance thermometer

Omnigrad robust, resistance thermometers are particularly suitable for applications with high pressures and high flows. They are made up of a measurement probe with a protection well made from a bar, and a housing, which may contain the transmitter for conversion of the variable measured.

Omnigrad offers three main advantages:
- High accuracy
- Excellent long-term stability
- High signal output level which allows transmission over long distances without ancillary equipment

The complete measuring point includes the thermometer and the option of iTemp head, rail or field transmitters.

7 Omnigrad TC – thermocouple thermometer

In order to monitor the temperature in the oil line and boiler burners, the Omnigrad thermocouple and a weld-in pipe are used. The complete measuring point includes a head, rail or field transmitter.

- Welded thermowells for high pressures and high temperatures
- Head, field or rail transmitter in 2-wire version with HART®, PROFIBUS and FOUNDATION™ Fieldbus protocols

Omnigrad thermometers monitor temperatures in the oil lines to the main surface

iTemp rail transmitters

Data acquisition

The central control panel is where all the important information from the power plant is collected and where the entire monitoring, control and regulation of the power generation process takes place.

Increasingly, paperless recorders are employed for data acquisition. These data managers are compatible with conventional paper recorders and can also be used as an electronic alternative for line and point recorders.

Control room of a modern power plant

Ecograph/Memograph data recorders installed in a control room

8 Ecograph /Memograph – data recorders

These cost-effective paperless recorders are compact data acquisition instruments, which save time and money. Data evaluation is by way of the powerful ReadWin 2000 software package.

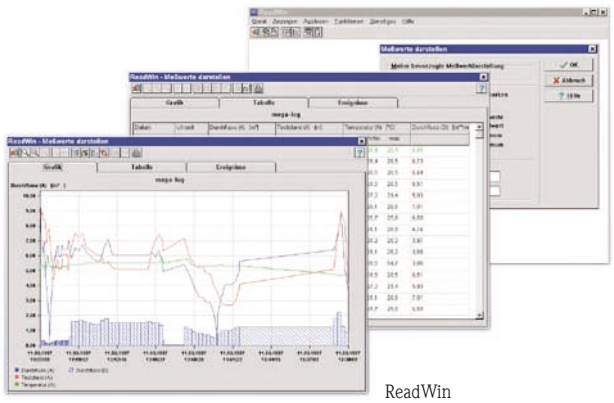
- Economical recording by replacing strip chart recorders
- Flexible display layout with multi-colored display, digital bar graph and curve display
- Monitoring set points
- Internal memory for data, as well as archiving, on compact flash
- Data recording speed easily adjustable

Ecograph

8.1 ReadWin – evaluation software

ReadWin software is designed for all Endress+Hauser registration instrumentation that can be interfaced. The software runs on Windows 2000/XP systems.

- Quick and easy configuration of registration instruments
- Ideal for configuration of multiple instruments
- Graphic display of measured values
- Display in curves, bars and tables
- Export of tables in table calculation programs (Excel, Lotus, etc.)



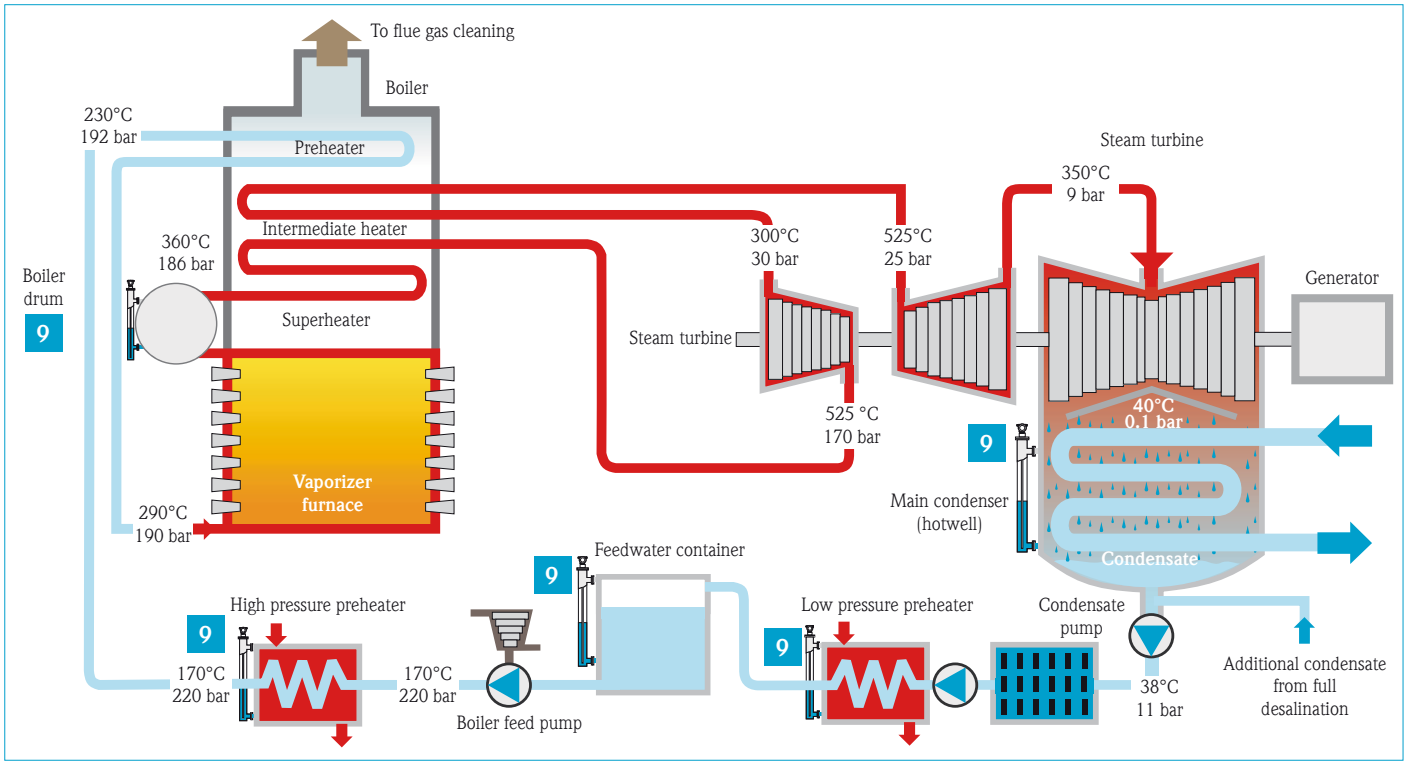
ReadWin

Innovation of level in the water/steam system

The boiler feedwater circulates within the water/steam circuit. This is the main component in the power plant. After the steam has condensed in the main condenser, pumps convey the feedwater through subsequent low- and high-pressure heaters into the boiler. When it arrives at the boiler, the feedwater is vaporized under high pressure (up to 260 bar) and high temperature (up to 550 °C). The steam is then supplied to the turbine in order to drive the generator.

Condensation in the main condenser begins again and the entire procedure is repeated.

For safe operation of the circuit, monitoring levels in the vessels, control of flow volumes in water and steam lines and over pressure measurement in all parts of the plant are of great importance. This is accomplished with level, pressure and differential pressure transmitters.



9 Levelflex M – guided microwave level measurement

Levelflex provides level measurement of condensed steam in front of the turbine in the main condenser (hotwell), as well as level measurement at the low pressure preheater, feedwater tank, high pressure preheater and boiler drum. Levelflex provides cyclic automatic gas phase compensation, the ideal solution for precise level measurement in all steam applications.
Levelflex is independent of:

- Density fluctuations
- Changing dielectric numbers
- Gas covering of steam
- Pressure and temperature changes
- Vacuum (e.g. in main condenser "hotwell")

This results in a better solution than differential pressure for level measurement, providing the benefits of:

- More reliable measurement
- Increased safety
- Easier installation

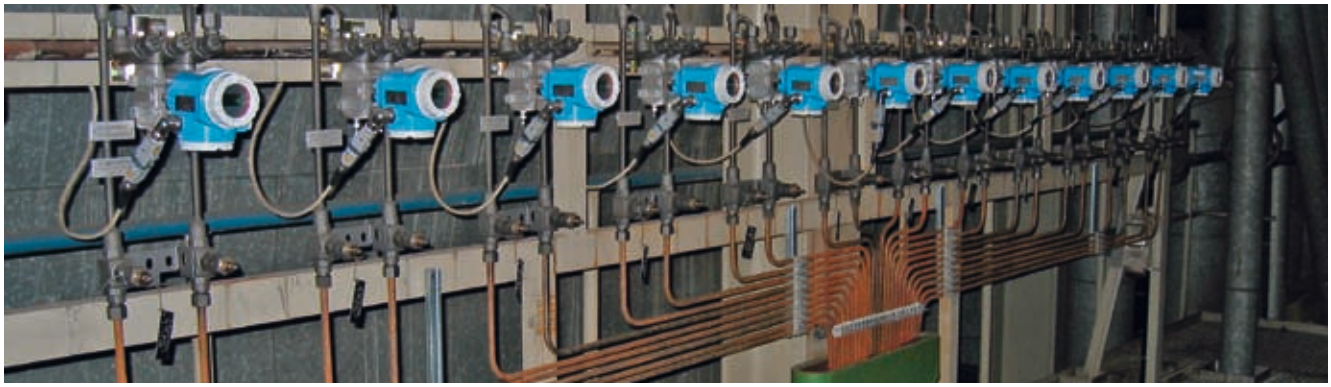
Levelflex is ideal as a displacer replacer. It has no mechanical moving parts and therefore, no wear and tear. Levelflex is suitable for pressures up to 400 bar or temperatures up to 400 °C.

Low pressure preheater

Feedwater container

Main condenser

dp Level/dp Flow in the water/steam system



2oo3 dp level impulse pipe installation
for low and high pressure preheaters

9.1 Deltabar S – differential pressure for level measurement

Deltabar S differential pressure transmitter is used as a standard for level measurement in the water/steam system.

Deltabar S –
differential pressure measurement

9.2 Deltatop – differential pressure for flow measurement

Deltatop constitutes the complete measuring system for flow measurement. It combines Deltabar S differential pressure together with orifice plates, pitot tubes and other primary elements for highly accurate flow measurement (volume or mass based) in gas, liquid and steam.

Deltatop – dp flow measurement

Deltatop (Deltabar S with primary element)
for measuring superheated steam

Pressure measurement in the water/steam system

10 Cerabar S – pressure transmitter

One example of pressure measurement in the water/steam system is the use of the Cerabar S pressure transmitter at the boiler drum. The boiler drum is the separating vessel between the water/steam phase in the circuit, and the highest system pressures are found here. For safety reasons, 2oo3 validation of pressure measurement is required. In order to protect against steam hammers, the instrument is fitted to a circular or U-shaped siphon.

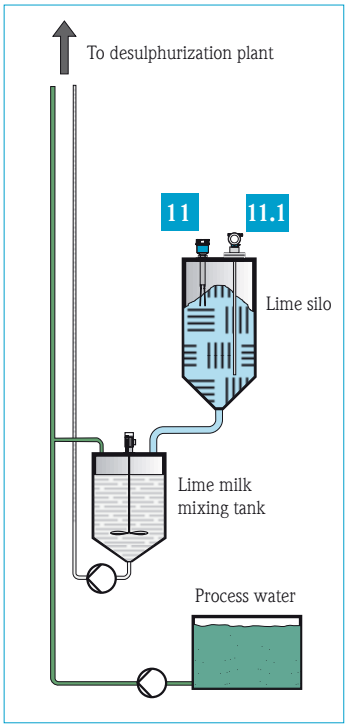
The Cerabar S compact pressure transmitter is particularly well-suited for use in the entire water/steam circuit.

- For pressures of 5 mbar to 400 bar
- Measuring ranges freely adjustable without calibration tools
- Turndown (measuring range spread) 100:1, standard linearity 0.075% (0.05% optional)
- Self-monitoring from sensor to electronics
- Compatible with Deltabar S – electronics for both instruments are interchangeable (reduced inventory)
- Use of additional functions via HART® protocol, PROFIBUS and FOUNDATION™ Fieldbus

Level measurement in the lime silo

Lime is a primary element and when mixed with water, is used to reduce SO_2 in flue gas desulphurization. The lime is stored in silos, where the level is measured continuously in order to ensure trouble-free operation. Limit switches are installed to protect against overfilling.

Levelflex monitors level and Soliphant measures maximum limit in the lime silo



11 Soliphant M – vibration limit switch for bulk materials

Soliphant is a rugged, compact level limit switch for silos containing fine grained or dusty bulk material. It is used as a high or low level indicator in the lime silo.

- Easy commissioning
- Maintenance free – no moving parts
- Compact design
- Simple and cost effective

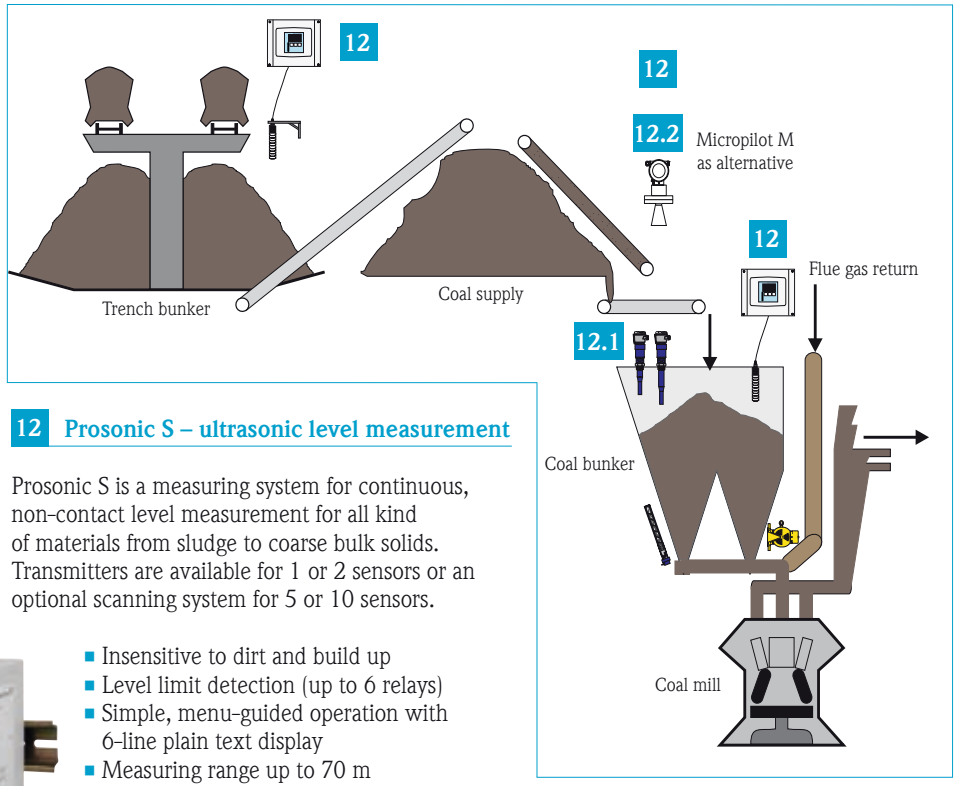
11.1 Levelflex M – guided microwave level measurement

Levelflex is a compact radar instrument for continuous measurement, especially for fine grained bulk material. It measures independently of changing product characteristics.

- Suitable for narrow silos or containers
- Ideal for fine grained bulk material such as lime, fly ash and pulverized coal
- Maintenance free – no moving parts
- Double safety due to automatic EOP (end of probe) measurement

Level measurement in coal

Coal that arrives by train or ship is collected in the coal plant for distribution. From the coal bunker (the storage area), it is passed on to the milling plant. Subsequently, the fine coal is injected into the boiler to be incinerated. The level in the coal bunker is decisive for steady loading of the coal mills. Thus, a continuous measurement device, as well as limit detection, are needed to monitor the level.



12 Prosonic S – ultrasonic level measurement

Prosonic S is a measuring system for continuous, non-contact level measurement for all kind of materials from sludge to coarse bulk solids. Transmitters are available for 1 or 2 sensors or an optional scanning system for 5 or 10 sensors.

- Insensitive to dirt and build up
- Level limit detection (up to 6 relays)
- Simple, menu-guided operation with 6-line plain text display
- Measuring range up to 70 m
- Ultra-compact panel mount transmitter

Prosonic S field and panel mount transmitters and sensors

12.1 Solicap M – capacitive level limit switch

The Solicap compact transmitter is used for level limit detection in bulk solids and can be operated in minimum or maximum fail-safe mode, e.g. in a coal storage bunker.

- Extremely robust design for harsh process conditions
- Easy and fast commissioning as calibration is performed at the press of a button
- Two-stage over voltage protection against static discharges inside the silo
- Two-point control (e.g. to control a screw conveyer)

Solicap min/max detection in coal bunker

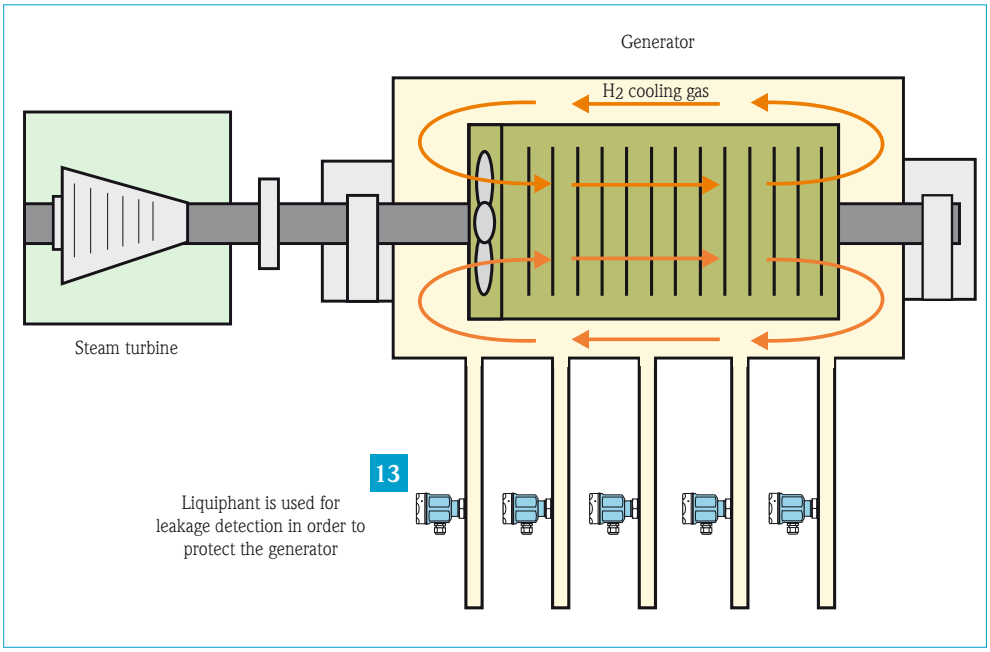
12.2 Micropilot M – microwave level measurement

Micropilot M performs continuous, non-contact level measurement for liquids to coarse bulk solids. Dust, filling noises, temperature and gas layers do not affect the measurement.

- Two-wire technology reduces wiring costs and allows easy implementation into existing systems
- Non-contact measurement reduces maintenance costs
- Easy on-site operation via menu-guided alphanumeric display
- Integrated air purge connection for extremely dusty conditions or media tending to create build-up

Leakage detection at the generator

Because of heat build up, generators in a power plant must be cooled. This is usually done with hydrogen cooling gas. Discharge lines are located at the generator housing. If lubricants reach the housing due to leakage in the thrust bearings, the rise in liquid is detected by the Liquiphant limit switch at the end of the discharge lines. The problem is then recognized and can be eliminated.



13 Liquiphant – level limit detection for liquids

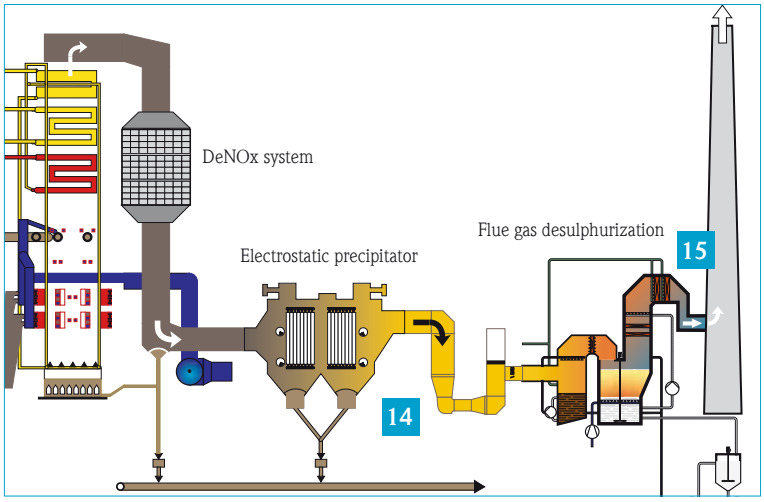
Liquiphant is a compact instrument for level limit detection in liquids using the vibration principle. Due to its very small fork size, it is the ideal solution for applications where space is limited.

- Leakage detection to protect generator
- Protects pump against running dry
- Simple commissioning
- Ex version for use in hazardous areas where hydrogen may be present
- Important component for generator protection
- Maintenance free – no moving parts

Liquiphant installed to protect the pump from running dry

Monitoring the lubrication circuit

The induced draught is an important component in the flue gas circuit. The feeding of the induced draught is to exhaust the flue gas out of the boiler to the stack, via the flue gas purification plant. In order to ensure lubrication of the bearings, the level of the lubrication oil must be continuously monitored and controlled.



14 Liquicap – capacitive probe

Liquicap is designed to measure level in very small containers. It monitors the oil level in the lubricant pump.

- Short measured value reaction time
- Monitors damage to insulation and rod or rope breaking
- Automatic monitoring of electronics
- Menu-guided local configuration via plain text display
- No need for recalibration after replacing electronics due to DAT storage module
- Build-up compensation

Level measurement in an hydraulic oil tank

Flue gas measurement

15 Deltatop Maxiclean – differential pressure with averaging pitot tube

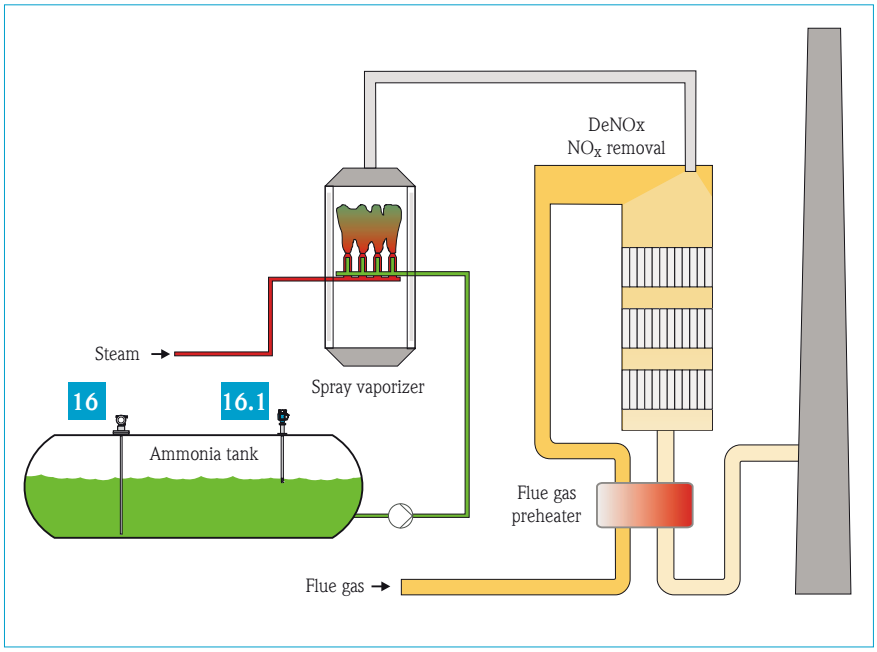
Deltatop offers advanced features, satisfying international environment regulatory bodies in order to monitor the volume or mass of gas emissions. For flue gas measurement, Deltatop comprises the Deltabar S transmitter with the Maxiclean averaging pitot tube.

- Apertures for internal mechanical cleaning
- Maxiclean system with large internal diameters enables dust free continuous operation
- Air purge system to prevent blockage (optional)
- Special materials against abrasion, corrosion and high temperatures
- Deltabar S offers easy and time saving commissioning
- Diameters up to 12 meters

Deltatop – Deltabar S with air purge system and Maxiclean averaging pitot tube

Level measurement in the ammonia tank

Nitrogen oxides in the flue gas are reduced in a DeNOx system. This is achieved through absorption in the catalyzer. The ammonia is stored in a tank, which must be continuously monitored.



Levelflex M and Liquiphant S high temperature versions offer a welded gas-tight feedthrough, preventing ammonia gas from penetrating through. This increases safety to personnel and to the electronics of the devices.

16 Levelflex M – guided microwave level measurement

Low frequency guided microwaves have proved to deliver very reliable measurement results in ammonia tanks. Levelflex can be mounted either in the tank or in a bypass. Levelflex is a compact, wave-guided radar instrument for continuous level measurement.

- Maintenance free, no moving parts
- Measurement is independent of changing density, temperature or dielectric constant
- Measurement also possible with foam on the surface
- Simple, menu-guided on-site operation with four-line plain text display
- With coax probes, the measurement is completely independent of internals in the tank and of the installation in the nozzle

16.1 Liquiphant S – level limit switch for all liquids

Liquiphant S is the ideal float switch for the ammonia tank. The device is not affected by flow, turbulence, bubbles, foam, vibration, solids content or build up.

- No calibration: quick, low-cost start-up
- No mechanically moving-parts: no maintenance, no wear, long operation life
- Self monitoring of fork for damage increases plant safety

Limit detection at the electrostatic precipitator

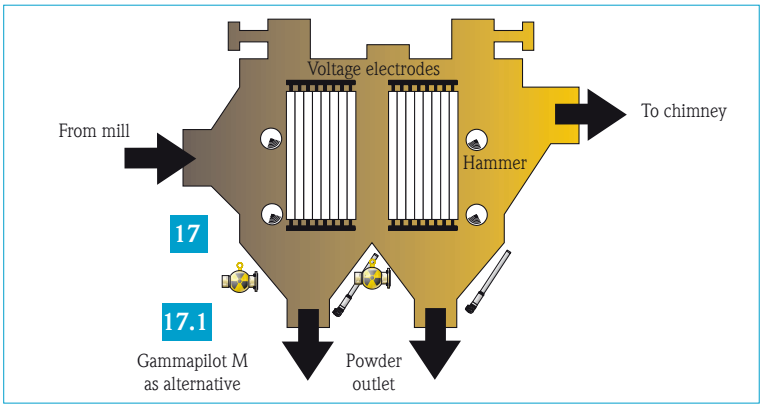
The electrostatic filter removes the incombustible parts of coal, which are carried in the flue gas stream as fly ash. Flue gas is created by plate formed, positively charged electrodes. Electrically isolated spray electrodes are suspended at which a negative voltage is applied. Under influence of the electrical field, the fly ash settles on positive plate electrodes. The filtered dust is shaken by an automatic, periodic vibration of a hammer mechanism from the plates, falls into the dust funnel and is subsequently led to the fly ash silos. From there, it is transported for further use as building material in the cement industry.

Capacitive sensor for maximum limit detection in the electrostatic filter

17 Solicap – capacitive level limit switch

Solicap is a compact and rugged limit switch for min/max detection in bulk solids, e.g. in the electrostatic filter.

- Extremely robust design for harsh and high temperature process conditions
- Easy and fast commissioning as calibration is performed at the press of a button



17.1 Gammapilot M – radiometric measurement

Gammapilot is used for limit detection of the fly ash in the electrostatic filter. Gammapilot helps control the outlet to avoid bridging and overfilling. The filter should be in “empty” condition to increase the efficiency and avoid swirling of the ashes.

- No down-times
- Independent of build-up at the walls and abrasive material
- No temperature limits
- Limit detection from outside

Gammapilot for maximum limit detection in the electrostatic filter

Solutions

Applicator – engineering with answers

There are many challenges in plant engineering. You must keep track of things during the planning process and harmonize application and instrumentation to arrive at safe decisions. Applicator from Endress+Hauser is a comfortable selection and dimensioning software to simplify your engineering processes.

Applicator provides clear process guidance and a straightforward module structure:

- Selection – determine the suitable measuring system for the application. Product areas include level, flow, density, pressure, analysis, temperature, registrations and system components
- Sizing – choose the correct dimensioning for the measuring device
- Administration – manage the project with a database to save your selection and dimensioning results and reproduce them, if required.

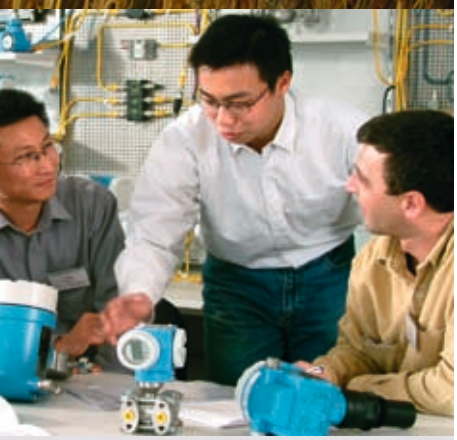
Applicator is available to you online (www.products.endress.com/applicator) or on CD.

FieldCare – Plant Asset Management

FieldCare is Endress+Hauser's Field Device Tool (FDT) based Plant Asset Management Tool. It can configure all intelligent field devices in your plant and supports you in managing them. By using status information, it also provides a simple but effective means of checking instrumentation.

- Supports Ethernet, HART®, PROFIBUS, FOUNDATION™ Fieldbus, etc.
- Operates all Endress+Hauser devices
- Integrates third-party devices such as actuators, I/O systems and sensors supporting the FDT standard
- Ensures full functionality for all devices with Device Type Managers (DTM)
- Offers generic profile operation for any third-party Fieldbus device that does not have a vendor DTM

FieldCare manages device life-cycle information and presents it quickly and clearly to the user.



System Integration - from individual sensor through to complete solutions

With the introduction of communication technologies such as HART®, PROFIBUS and FOUNDATION™ Fieldbus a little more than ten years ago, the barriers between field instrumentation and the systems level began to disappear. The instruments became more intelligent and an integral part of the automation architecture. Having recognized this development at an early stage, Endress+Hauser has been actively involved in standardization committees and user organizations from the introduction of fieldbus technology in order to ensure that our customers do not lose touch with new trends.

A fieldbus output is both an interface to the field instrument and a carrier of additional information from the field. Instrument status, maintenance and diagnostics information from the process to the control room increases plant availability.

Endress+Hauser ensures the integration of this information into the system environment.

W@M – Web-enabled Asset Management

To manage the asset you need to have the relevant data on the asset. The average user has no time to find and load this data into his asset management system. The latest instruments using HART®, PROFIBUS or FOUNDATION™ Fieldbus can readily exchange the information with an Asset Management system. But what about the existing installed base? What about the discreet devices – the low cost instruments that are important in the process but time consuming to find the data? This is the strength of W@M. We take care of all the data for you within our equipment record automatically.

Web-enabled asset management (W@M) is an open information management system providing data flow and archiving for the technical and operational management completely, conveniently and at any time and place. It comprises the processes from planning and initial design, engineering, procurement, installation and commissioning, to operation, maintenance and servicing of the plant. This is achieved by an open and flexible system, based on Intranet-/Internet technology, interlinking all tools, products and services from Endress+Hauser. W@M ensures fast access and perfect information flow to improve process safety, productivity and economic efficiency along the complete life cycle of your plant.

Service at all levels

Our network of service engineers spans the globe, ensuring that wherever you are based, you can benefit from our technical expertise and support. Our service departments offer comprehensive maintenance contracts, Instrument Management Solutions (IMS), workshop repairs, spares management, on-site commissioning, trouble shooting, small installations and a technical service helpline providing telephone advice and support.

Customer service at a glance

- Commissioning and installation
- Project management
- Preventive maintenance
- Spare part express service
- Training
- Helpdesk
- On-line documentation
- Asset management services
- Calibration services

Training: investing in people

Specialized training provides your personnel with the required technical and functional knowledge. We provide formal in-house training at our state-of-the-art classroom facilities, mobile training conducted at your location or distance learning courses and materials to suit your specific needs.

Integration Services

Regardless of your chosen solution, our support personnel are dedicated to solving complex problems with equipment and systems. Using this expertise, in open systems and proven technologies, we can provide you with trouble-free integration of all hardware and software into your existing operations.

Validation and calibration

Endress+Hauser provides regular maintenance, validation and calibration services from in-situ testing through to full, accredited factory calibration for all your process variables.

- Fully accredited
- Flow meters from diameter DN1 up to DN2000
- Pressure instruments from 0.001 mbar to 750 bar / 1.45 psi to 10,878 psi.
- Temperature instruments from -20°C to +1600°C/-4°F to +2912°F
- All services are available for third party instrumentation as well.

Endress+Hauser men and women work closely together with worldwide and local organizations, foundations and institutes, such as First Point Assessment Limited (FPAL) for cost reduction and performance improvement. Our instruments are designed and manufactured according to globally standardized certifications such as API, ISO, SIL and IP. Global approvals and certificates include:

Approvals for hazardous areas (Ex certificates)	Further approvals
■ ATEX	■ CE
■ FM	■ FCC
■ CSA	■ R&TTE
■ TIIS	
■ IECEx	
■ NEPSI	

Endress+Hauser – working with you every step of the way

Endress+Hauser offers a complete range of technologies to meet application requirements in Power and Energy. We cover all types of power plants, including steam (coal, gas and oil), combined cycle gas turbine, waste-to-energy, hydro and nuclear. All measurement instrumentation, including level, pressure, flow, temperature, analysis, etc., are manufactured to the highest quality standards, to guarantee consistent performance and compatibility.

An extensive, tight network of well-trained, service-minded product managers and sales representatives, together with local agents, gives Endress+Hauser a strong presence across global markets. We offer service, spare parts and advice to help customers achieve what is right for them.

The company owes its good reputation to industry know-how, and to the creativity and commitment of its employees. Endress+Hauser stands for financial strength and continuity, the broadest range in its industry, and long-term customer relationships.

www.power.endress.com

Instruments International

Endress+Hauser
Instruments International AG
Kägenstrasse 2
4153 Reinach
Switzerland
Tel. +41 61 715 81 00
Fax +41 61 715 25 00
http://www.endress.com
info@ii.endress.com

SO601B/27/en/01.07
71039304
SD/INDD CS2
Printed in Germany

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