

**Solutions for steam,
compressed air,
heating, cooling and
industrial gases**



Tap to navigate

Energy savings in utilities

Key applications

Saving energy in key utilities applications

Industrial energy efficient solutions for steam, compressed air, heating, cooling and industrial gases starts with proper instrumentation.

Often, a lack of data or comprehensive energy management system comes from the absence of process measurement. Companies looking to reduce operating costs and increase competitiveness need to consider saving energy.

Many opportunities exist for savings in steam, compressed air, heating, cooling and industrial gases utility networks. Comprehensive energy monitoring can cut energy consumption anywhere from 5 to 15%.

Endress+Hauser is an all-in-one provider with various instruments to meet your comprehensive energy monitoring from a single source.

Today, Endress+Hauser offers:

- Various solutions for multiple energy applications
- Professional energy monitoring system planning, commissioning and maintenance
- Project management and engineering for simple solutions, including boiler efficiency monitoring directly to system solutions
- Precise, robust and reliable measuring instruments
- Data logging and transfer with smart devices
- Accurate measurement – with calibrated instrumentation – for energy flows
- Expert advice
- A global service network



Monitoring and measuring

Monitoring and measuring – a symbiotic relationship

Gas, steam and water are vital for plant operations across every industry in utilities. Energy is used to produce, transport and distribute compressed air, steam, natural gas and cooling or hot water. With that said, efficiency is critical. Therefore, measuring equipment must objectively measure energy flows and consumption and process data and present those results as energy performance indicators (EnPI), according to ISO 50001/ ISO 50006. At Endress+Hauser, we have everything you need to complete these tasks with top-of-the-line measuring devices, system components and intelligent solutions to suit your application.



What is ...

... ISO 50001?

This standard specifies that organizations wishing to implement an energy management system must capture energy performance indicators. These indicators must be regularly reported, checked and compared against an energy baseline. Potential areas for savings are then evaluated and improvement measures are initiated in plans, buildings or factories.

... ISO 50006?

This standard provides step-by-step guidance to companies on establishing robust energy performance indicators and a solid energy baseline for later comparison. This standard also contains several real-life examples since it's often difficult to identify the relevant variables in an energy system and adequately factor them in when determining energy performance indicators. Variables include weather conditions, balance period, plant size, variations in production or the energy source.



Examples of energy performance indicators

- Total primary energy consumption
- Improvement in energy intensity for the baseline year
- Adjustment for primary energy demand
- Energy savings for the current year
- Energy savings since the baseline year
- Improvement in energy intensity for the current year
- Total consumed primary energy
- Electricity, water or fuel consumption (total values, peak loads, etc.)
- Specific energy consumption, i.e., energy consumption per quantity of produced medium: compressed air, steam, hot water
- Efficiency of steam boilers



How to measure material and energy flows for sustainable energy management

- Define the desired “functional area” (e.g., factory complex, building, floor, manufacturing department, process)
- Measure/evaluate the actual material and energy flows (raw materials, fuel, water, electricity, steam, compressed air, etc.)
- Analyze the values measured (data basis)
- Create energy performance indicators
- Define energy optimization measures (using the energy baseline)
- Control and monitor efficiency improvements achieved



Steam, boiler and heat exchanger

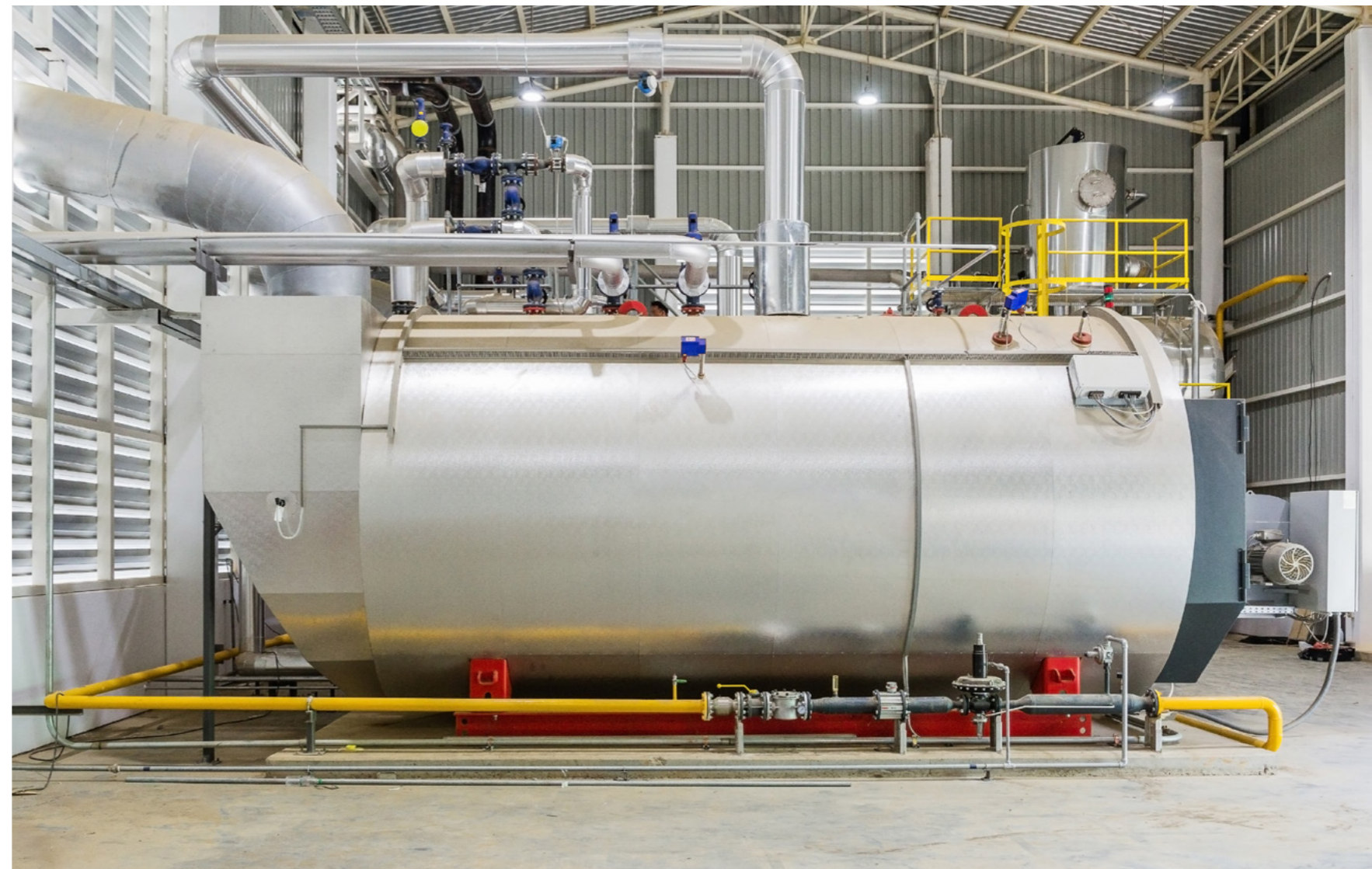


Measurement for steam,
boiler and heat exchanger
quantity and quality

Application

Efficiently transfer energy to industrial processes

Steam is routinely used for heating and power generation in turbines and cleaning purposes. However, boilers use 40% of fossil fuels for steam generation. Today, steam management covers more than just checking water levels, conductivity, pH value, temperature and pressure in the boiler. Fortunately, steam systems allow for numerous options for saving, re-using and reclaiming energy in terms of generation, distribution, billing and boiler efficiency.



Products

iTHERM ModuLine TM131

(temperature measurement)

- Universal range of application
- **Measuring range:** -200 to +1100 °C
(-328 to +2012 °F)
- **Pressure range:** up to 100 bar (1450 psi)
- **Degree of protection:** up to IP68
- Vibration-resistant sensor elements up to 60 g
- Improved ease of maintenance (sensor replacement without process shutdown), easy and safe recalibration of the measuring point
- **iTHERM QuickSens:** fastest response times
1.5 seconds for optimum process control



Additional information

Liquiline CM448

(liquid analysis measurement)

- One controller for all parameters and applications, intuitive user interface, automatic sensor recognition, hot plug and play with pre-calibrated Memosens sensors
- Eight channels in one device provide the highest flexibility for every measuring task
- Unique portfolio of communication standards suits every distributed control system (DCS)
- Saving configuration on SD card enables fast set-up on duplicate installations
- Integrated optional web server that allows the operator to remotely view diagnostic data, perform configurations, or access device parameters in any web browser – even via smartphone

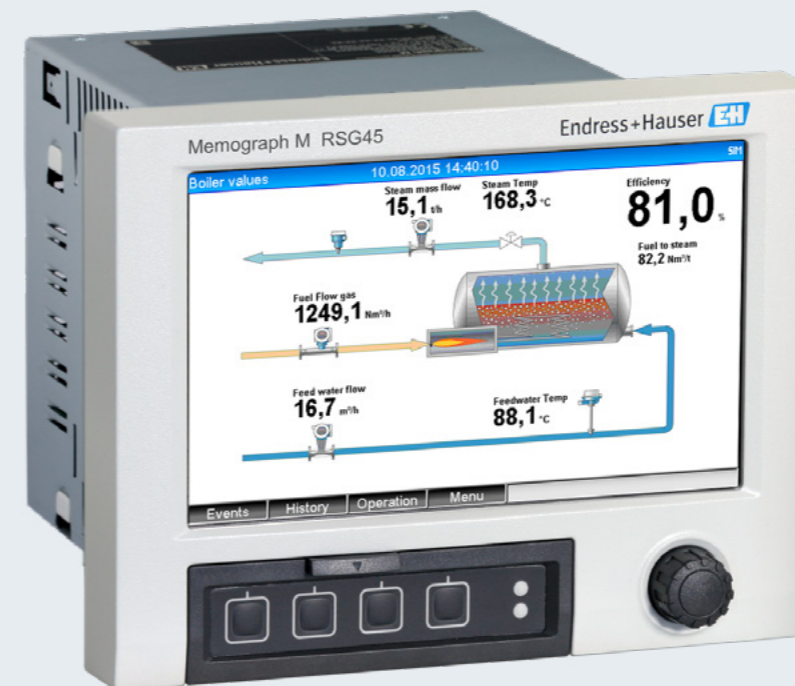


Additional information

Memograph M RSG45

(data manager)

- Tamper-proof data storage and personalized access authorization with electronic signature (FDA 21 CFR 11)
- Sensors directly connected provide accurate process values for calculation and logging
- Optional stainless-steel front with touch operation: trouble-free operation in demanding environments
- DIN rail version: compact device with small dimensions for cabinet mounting or remote field applications
- Supports common fieldbuses (Modbus, PROFIBUS DP, PROFINET, EtherNet/IP) for fast integration into diverse systems
- Remote access to device operation and visualization for lower maintenance costs
- Files saved on SD card transmitted directly to a PC via HTTP without any additional software



[Additional information](#)

Compressed air systems



Measurement for
compressed air systems

Application

Active reduction of energy loss and leakage

Nearly 10% of industry electricity consumption is used to generate compressed air using compressors. Unfortunately, approximately 95% of that is lost due to unproductive waste heat. Furthermore, 30% of the compressed air generated is lost due to leakages in the supply network. However, proper measurement can reduce this by up to 10%, lower power consumption, and save you tens of thousands of dollars each year. Endress+Hauser instrumentation allows you to reliably identify weaknesses and improve your savings potential in your compressed air system.



Products

Proline t-mass I 300/500

(flow measurement)

- Monitoring/warning function if drops of condensate form on the sensor or pulsating flow occurs
- High turndown ($\geq 100:1$)
- Flexible, convenient programming based on 21 standard gases or freely definable gas mixtures
- High level of process control – premium measuring accuracy and repeatability
- Reliable monitoring – detection of process disturbances and reverse flow
- Flexible installation – suitable for large dimensional range and circular pipes or rectangular ducts
- Full access to process and diagnostic information – numerous, freely combinable I/Os and fieldbuses
- Reduced complexity and variety – freely configurable I/O functionality
- Integrated verification
- Optional bidirectional measurement



Additional information

Proline Prowirl F 200

(flow measurement for wet compressed air)

- Easy energy management – integrated temperature and pressure measurement for steam and gases
- Space-saving engineering – inlet run compensation
- Same accuracy down to Reynolds number 10 000 – most linear Vortex meter body
- Long-term stability – robust drift-free capacitive sensor
- Convenient loop-powered device wiring – separate connection compartment
- Safe operation – no need to open the device due to display with touch control, background lighting



Additional information

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1.5 seconds for optimum process control



Additional information

Cerabar PMP71B

(pressure measurement)

- Simplicity and reduced time for commissioning associated with Bluetooth, SmartBlue and Commissioning Wizard
- For reliable monitoring of compressed air system pressure in generation, distribution and at the point of end-use
- Minimize systematic faults with remote SIL locking and monitoring of safety relevant parameter settings using a guided software assistant
- Fitted with shutoff valve and siphon (accessories)
- Large display with backlight for excellent readability

Additional information



Cerabar PMP21 (pressure measurement)

- Cost-effective and time-saving installation and set up within the plant due to very compact construction and factory customizable measuring ranges
- Designed to withstand the harsh conditions in the process industry with ingress protection grades up to IP 68 and high-quality materials like 316L
- Can be used in most areas as it offers various certifications like hazardous area or marine certificates
- Analogue 4-20 mA or IO-Link communication options
- Process temperature: -40 to +100°C (-40 to +212°F)
- Process pressure: 400mbar to +400bar (6 to 6,000psi)
- Accuracy: $\pm 0.3\%$ of span



Additional information



Web

Heating systems

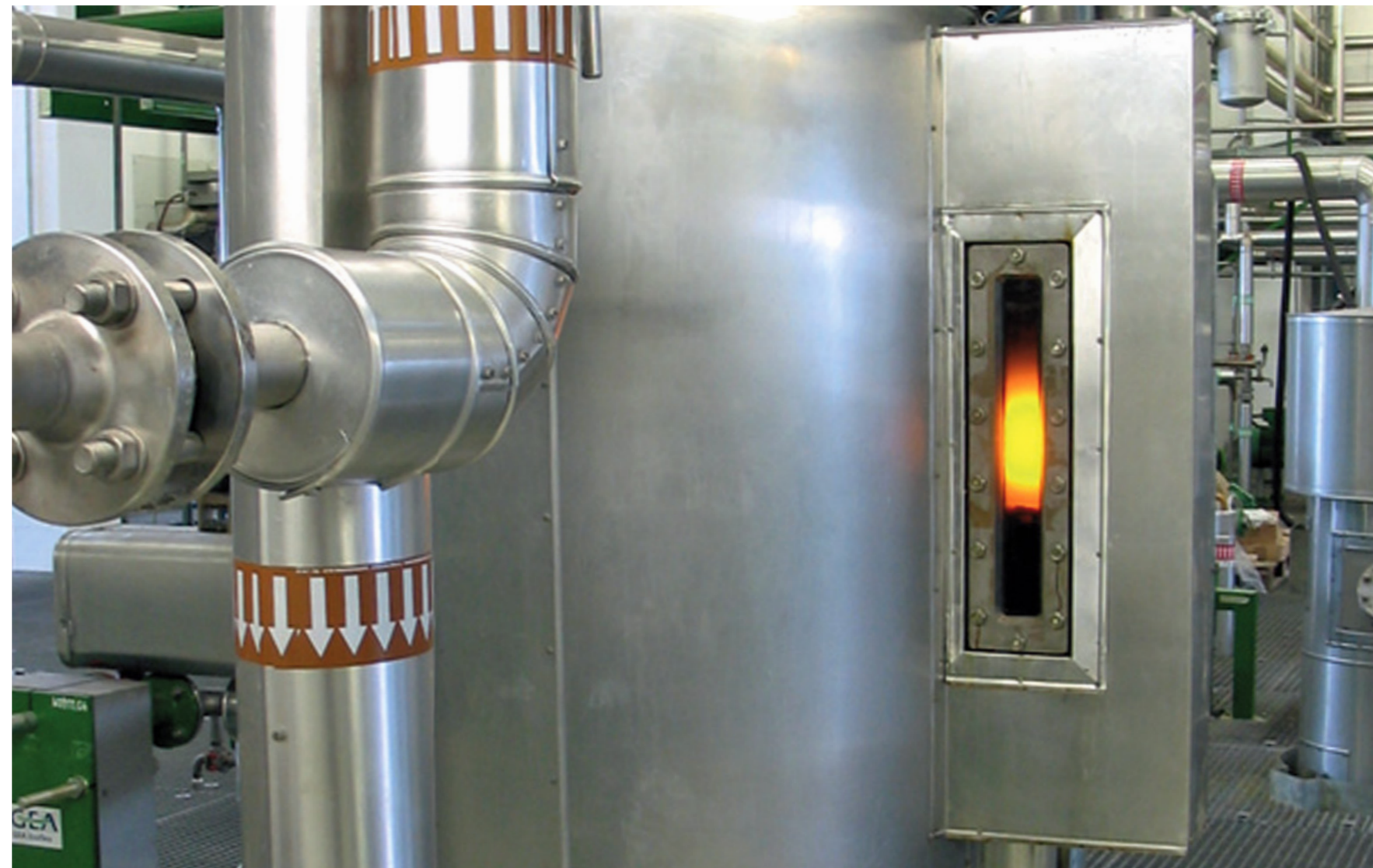


Measurement for
heating systems

Application

Lower heating costs with efficient energy management

Energy loss is relatively high in boilers and furnaces, leading to inefficient combustion, incorrect operation or poor maintenance and servicing. Efficiency measurement is the simplest way to gauge losses and learn what actions need to be taken. Monitoring fuel consumption, combustion air, flue gas temperature or the transmission rate of thermal energy allows users to obtain clarity of heat generation efficiency. Proper measurement in heating systems can cut energy consumption by up to 55%.



Products

Cerabar PMC71B

(pressure measurement)

- Easy to use with smart technology and productivity enhancements
- With Heartbeat Verification you can verify the health of the device while the process is running
- Simple indication of device status and displays changes from green to red when diagnostic messages occur
- Reduce systematic failures with error-free SIL commissioning and instrument guided proof testing
- Wireless control of the device in hard-to-reach process areas
- Large display with backlight for excellent readability

Additional information



Optical oxygen sensor Memosens COS81E

(liquid analysis measurement)

- Precalibrate the sensor in your lab and then swap it into your process with plug & play. It does not need polarization time and is immediately ready to measure
- A built-in reference LED compensates for the ageing of the measuring LED, ensuring precise measured values
- Memosens COS81E does not have a difficult-to-handle electrolyte or sensitive membrane. Just exchange the sensor cap, perform a calibration and you are done
- Perfectly suited for inertization processes thanks to its approvals for hazardous and dust-explosive areas
- Memosens 2.0 offers extended storage of calibration and process data, enabling better trend identification and providing a future-proof basis for predictive maintenance and enhanced IIoT services



Additional information

Conductivity sensor Memosens CLS82E

(liquid analysis measurement)

- Absolute loop safety thanks to Memosens and unique detection of build-up on electrodes
- The broad measuring range enables monitoring of core processes and final rinse with one sensor, saving costs
- Its compact design makes the sensor suitable for small pipe diameters and narrow, space-limited installations
- Quality certificate stating the individual cell constant allows precise adjustment of the measurement
- Non-contact, inductive signal transmission ensures high process and data integrity.
- IIoT ready



Additional information

EngyCal RH33

(energy computer)

- Certified BTU meter suitable for custody transfer measurement
- Wide range of calculation functions:
e.g., power, volume, density, enthalpy, enthalpy differential, mass, temperature differential, energy, deficits or total amounts
- Electronic pairing of temperature sensors using CvD (Callendar-van-Dusen) coefficients



Additional information

Cerabar PMP21

(pressure measurement)

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Additional information



Web

Cooling systems



Measurement for cooling systems

Application

Enhance your cooling water process

The production of cooling energy requires a significant amount of energy, accounting for roughly 10% of electricity consumption across all industries. The slightest reduction in energy consumption can deliver substantial cost savings. However, an efficient cooling system requires more than simply efficient components. With smart energy solutions, systems and processes can be optimized to ensure cooling systems are energy efficient.



Products

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(pressure measurement)

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- Reduce systematic failures with error-free SIL commissioning and instrument guided proof testing
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Additional information



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- Non-contact, inductive signal transmission ensures high process and data integrity
- IIoT ready



Additional information

Chlorine dioxide sensor Memosens CCS50D

(liquid analysis measurement)

- The right sensor version for every application: From trace measurement up to chlorine dioxide concentrations of 200 mg/l
- Fast response time provides accurate process view and enables prompt reaction to process changes as well as efficient process control
- Increased process safety: precise and long-term stable measurement ensures consistent process monitoring and allows for lowest disinfectant concentration
- More process up-time thanks to fast sensor exchange: precalibrate the sensor in your lab and then swap it into your process with plug & play



Additional information

EngyCal RH33

(energy computer)

- Certified BTU meter suitable for custody transfer measurement
- Wide range of calculation functions:
e.g., power, volume, density, enthalpy, enthalpy differential, mass, temperature differential, energy, deficits or total amounts



Additional information

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Additional information



Web

Industrial gas plants

Measurement for industrial gases



Application

How to enhance cost-effectiveness and accuracy in industrial gas plants

Process industry utilities use copious amounts of hydrogen, carbon dioxide, oxygen, nitrogen, argon and many other industrial gases for welding, shielding, purging and modified atmosphere packaging. Therefore, avoiding energy loss in industrial gas plants is critical. However, there's more to it than just measuring the total industrial gas consumption. Gases must be monitored efficiently by measuring flow in the distribution line or directly at the consumer. Instruments such as thermal flowmeters are effective submeters and allow for a detailed allocation of costs to buildings, floors, departments, production processes and more.



Products

Proline Promass F 500 (flow measurement)

- For highly accurate measurement of mass flow, density and volume flow of cryogenic liquefied gases such as nitrogen, argon or liquefied natural gas
- Applicable down to -196 °C (-321 °F)
- No straight inlet runs required
- Suitable for custody metering
- Multivariable: including monitoring of density



Additional information

Proline t-mass I 300/500

(flow measurement of industrial gases)

- Monitoring/warning function if drops of condensate form on the sensor or pulsating flow occurs
- High turndown ($\geq 100:1$)
- Flexible, convenient programming based on 21 standard gases or freely definable gas mixtures
- High level of process control – premium measurement accuracy and repeatability
- Reliable monitoring – detection of process disturbances and reverse flow
- Optional bidirectional flow measurement
- Flexible installation – suitable for large dimensional range and circular pipes or rectangular ducts
- Full access to process and diagnostic information – numerous, freely combinable I/Os and fieldbuses
- Reduced complexity and variety – freely configurable I/O functionality
- Integrated verification
- Suitable for the measurement of air, CO₂, nitrogen and argon



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1.5 seconds for optimum process control



Additional information

Proline t-mass A 150/B 150

(flow measurement in submetering)

- For direct mass/corrected volume measurement of industrial gases without pressure or temperature compensation
- Negligible pressure loss compared with mechanical flowmeters
- High turndown (up to 100:1), ideal for identifying leaks
- No moving parts
- Low-cost insertion version (t-mass B 150) or in-line version
- Suitable for the measurement of air, CO₂, nitrogen and argon



Additional information

Cerabar PMP21 (pressure measurement)

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Additional information



Web

Did you know?

Endress+Hauser guarantees high measuring accuracy and operational safety – around the clock and for the entirety of your plant's life cycle – for each of its devices. With a dedicated team of sales and customer service representatives spread across the world, Endress+Hauser ensures you are always up and running and have optimal solutions for energy management.

No matter where you are in the world, Endress+Hauser is always close at hand.

