

Flow measurement in utilities

Customized energy management solutions for compressed air, gas, steam and water



Proline

simply clever

Process monitoring is becoming more demanding and the need for maximum product quality is steadily increasing. This is why Endress+Hauser continues to provide industry-specific flow measurement solutions optimized for future technology requirements.

The new generation of our Proline flowmeters is based on a uniform device concept. This means time and cost savings, as well as maximum safety over the entire plant life cycle.

Consistent and uniform

Proline increases the safety and efficiency of operation

Optimal application solutions

Proline optimizes your plant availability

Innovative and proven in use

Proline guarantees state-of-the-art technology

Ingeniously simple

Proline is user-friendly through and through

Perfect integration

Proline optimizes production and business processes

Added value in every respect



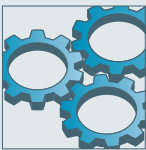
HistoROM

- Automatic data storage ensures maximum plant safety
- Simple data restoration enables quick exchange of components
- Event logbook and data logger for quick failure analysis



Heartbeat Technology™

- Permanent self-monitoring for all Proline measuring technologies
- Diagnostics for reduced maintenance and quick remedy
- Verification of measuring point, e.g. printing documents for quality reporting (e.g. ISO 9001)



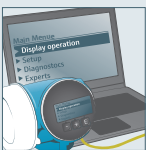
Seamless system integration

- Direct and transparent due to a wide range of fieldbuses
- Risk-free through extended host testing and certification
- Compatibility over the entire product life cycle enables device replacement without expert know-how



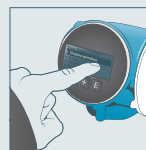
W@M Life Cycle Management

- Open information system for device documentation and management
- Device-specific information for everyday work
- Quality of information unparalleled in scope and depth



Web server

- Time-saving local operation without additional software
- Comprehensive access to device, diagnostics and process information
- Fast data upload/download for maintenance and service



Simple operation

- Time-saving Endress+Hauser operating concept
- Optimal usability through guided parameterization
- User-specific menu structures and device access

Saving energy and costs – together

Today and tomorrow

Are you the maintenance technician, engineer or plant manager whose job it is to maintain competent support for the gas, steam or water utilities of your company? Are you the process or finance manager who has to balance the “trade-off” between increasing plant efficiency and reducing operating overheads and energy costs? Do you find that the dictates of quality audits, standard operating procedures and environmental protection require ever-stricter process monitoring?

Yes? Then you can count on Endress+Hauser fully and completely in regard to “Energy and Cost Savings”! As a single-source supplier of process instrumentation we can offer the all-inclusive solutions package you need:

- Wide range of premium flowmeters
- Customized solutions for your energy applications
- Competent planning, commissioning and maintenance
- Professional support from specialists in all sectors
- Worldwide service network

! Did you know ...

- that electricity accounts for 75% of the total operating costs for air compressors over a ten year period?
- that a 3 mm leak in a compressed-air pipe will cost you 640 EUR (750 USD) in energy losses per year?
- that the energy cost of compressed air goes up approximately 9% for every unnecessary bar of pressure?
- that 6 to 10 m/s is the recommended maximum flow velocity for economical operation in compressed-air distribution systems and that the corresponding figure for steam pipes is 25 m/s?
- that leaks in outdated, distribution networks for steam or hot water can push energy costs up by as much as 50%?





Measure – Evaluate – Save

Monitoring utilities

Utilities such as gas, steam and water provide energy for plant operation in all sectors of industry. Vast quantities of energy are expended in producing, transporting and distributing fluids, e.g. compressed air, saturated steam, natural gas, cooling or heated water. Every plant operator's goal must therefore be to run and control their process as efficiently as possible.

Merely installing meters for flow, temperature or pressure is not enough to save energy. This is why Endress+Hauser offers a comprehensive product range for the recording and evaluating of data. These tools enable the objective assessment of energy consumption and plant efficiency as a first step towards leveraging improved plant performance that will translate into measurable energy savings.

Endress+Hauser offers you high quality meters, system components and intelligent solutions – matched to your application, matched to your needs.



Your benefits throughout the life cycle

- Centralized availability of measured data
- Transparency of all fluid and energy flows
- Detection of energy losses (leakage)
- Reliable allocation for cost centers
- Security by continuous monitoring of plant operation and process variables

Evaluate energy data – Highlight potential savings

One piece of software does it all

Visualization and evaluation of process data, are the real keys to benefit fully from measurement technology. The web-based energy monitoring software we use in many different industries permits access to the entire management system in your plant from anywhere via an intranet or the internet. In addition, this software can be used to analyze measurement data and to create energy reports.

- Fully web-based software solution
- Worldwide or local usage via intranet or internet
- Simple operation
- Easy-to-use interface with drop-down menus
- Automatic data import from data loggers, SCADA systems, production systems or building management systems
- Simple integration into any existing operating data recording system
- Modular software design, customization possible at all times

Energy analysis

- Monitor energy consumption
- Efficiency assessment
- Target/actual comparison of energy data
- Identify peak values during energy consumption

Cost analysis

- Create diagrams and displays
- Create and monitor budget plans
- Cost comparisons
- Profitability calculations (ROI, Return on Investment)

Reporting

- Tailor-made reports via SSRS (SQL Server Reporting Services)
- Produce cumulative curves or comparative displays
- Automatic sending of energy reports (PDF files) via e-mail or server

Deviation analysis

- Trigger warning messages via e-mail or SMS
- Set limit values
- Prioritize warning messages

Simulation/calculation

- Calculate characteristic values using mathematical functions



www.endress.com/energy-solutions

Energy analysis



Monitor the specific energy consumption



Simple reporting provides transparency



Consumption profile of a measuring point across various days of the week



Allocate energy consumption to cost centers

Flowmeters in utilities

For each application the right solution



Vortex

Vortex meters are extremely robust. These versatile devices have long been in use for measuring liquids, gases and steam in all industries. Vortex meters are frequently used together with pressure and temperature sensors as well as flow computers for energy and heat metering.

Prowirl



- High long-term stability and repeatability
- Lifetime calibration factor
- Over 300 000 installed devices
- Large operable flow range:
 - Gas/steam: 10:1 to 30:1
 - Liquids: up to 40:1
- Mass and energy measurement by an optionally integrated flow computer and temperature sensor
- Reading in external measured values (e.g. pressure, second temperature value)
- Increased safety and efficiency thanks to wet steam detection (optional)

Benefits at a glance

Applications

- Universal measurement of gases, steam and liquids
- DN 15 to 300 (½ to 12")
- Process pressure: max. 250 bar
- Temperature: –200 to +400 °C (+450 °C optional)



Differential pressure

Thanks to the large wealth of experience, differential-pressure flow metering has been accepted and widely used for over 100 years throughout the world. Some primary elements, e.g. orifices, can be replaced or calibrated at any time under operating conditions, even in pipes with nominal diameters larger than 2 meters.

Deltatop



- Worldwide standards (since 1929)
- Long tradition in metrology, widely accepted
- Robust and application-specific designs (orifice, nozzle, Venturi, Pitot)
- Pitot tube for reduced pressure loss
- Combinable with flow computers for mass, energy and volume measurement of liquids, gases and steam; and for increased turndown (split range)

- Universal measurement of gases, steam and liquids
- DN 10 to >2000 (¼ to >80")
- Process pressure: max. 400 bar
- Temperature: –200 to +1000 °C



Thermal

The principle of thermal mass flow measurement has become widely accepted by industry in recent years and is used successfully in many applications involving gases and liquids. By comparison with other techniques, this principle allows the measurement of gases at very low flow rates and process pressures with high accuracy.

t-mass



- Simultaneous measurement and output of mass flow and fluid temperature (multivariable sensor)
- Suitable for leakage detection
- Cost-effective insertion sensors for very large pipe diameters
- Negligible pressure loss (<2 mbar)
- Large operable flow range up to 100:1
- Available measuring accuracies:
 - Main meter: ±1.5%
 - Submetering: ±3 to 5%

- Direct mass flow measurement of utility gases, e.g. air, compressed air, argon, O₂, N₂ or CO₂ (and gas mixtures with t-mass 65)
- DN 15 to 1500 (½ to 60")
- Process pressure: max. 40 bar
- Temperature: –40 to +130 °C



Coriolis

Maximum accuracy is the outstanding feature of this measuring principle for liquids and gases. Another feature is the ability to measure multiple process variables simultaneously: mass flow, volume flow, density and temperature. This opens up new perspectives for optimizing and monitoring utilities (e.g. burner control).



Electromagnetic

From just a few litres to over 100 000 cubic meters per hour – for measuring electrically conductive liquids like cooling water or hot water, this measuring principle has proven itself as a standard worldwide in all industries for over 50 years.



Ultrasonic

The ultrasonic transit time differential method allows measuring liquids regardless of their electrical conductivity, e.g. hot water, cold water and demineralized water. The portable clamp-on sensors can be directly strapped to the piping.

Promass



- Multivariable measurement: several process parameters are simultaneously measured
- High measuring accuracy
- Independent of the fluid's properties
- No inlet/outlet runs necessary
- Approvals for custody transfer
- Combinable with flow computers for gas and liquid energy metering

- Direct mass flow measurement of liquids and gases, e.g. fuels, oils, natural gas, liquefied gas or technical gases, etc.
- DN 1 to 250 (1/26 to 10")
- Process pressure: max. 350 bar
- Temperature: -50 to +350 °C

Promag



- High degree of measuring reliability and repeatability
- Good long-term stability
- Over 1.7 million installed devices
- Free pipe cross-section, no pressure loss
- Very high operable flow range
- Approvals for custody transfer
- Combinable with flow computers and temperature sensors for delta-heat applications (energy)

- Volume measurement of all electrically conductive liquids, e.g. cooling water, hot water or saline solutions
- DN 2 to 2400 (1/2 to 90")
- Process pressure: max. 40 bar
- Temperature: -40 to +180 °C

Prosonic Flow



- Cost-effective flow measurement
- Ideal for retrofitting without process interruption
- Suitable for temporary measurement, e.g. for crosschecking flowmeters without uninstalling
- Free pipe cross-section, no pressure loss
- Not affected by process pressure
- Combinable with flow computers and temperature sensors for delta-heat applications (energy)

- Volume measurement of all liquids, e.g. boiler feedwater, cooling water, hot water or demineralized water
- Suitable for sonically conductive pipes and homogeneous liquids
- DN 15 to 4000 (1/2 to 156")
- Temperature: -40 to +170 °C

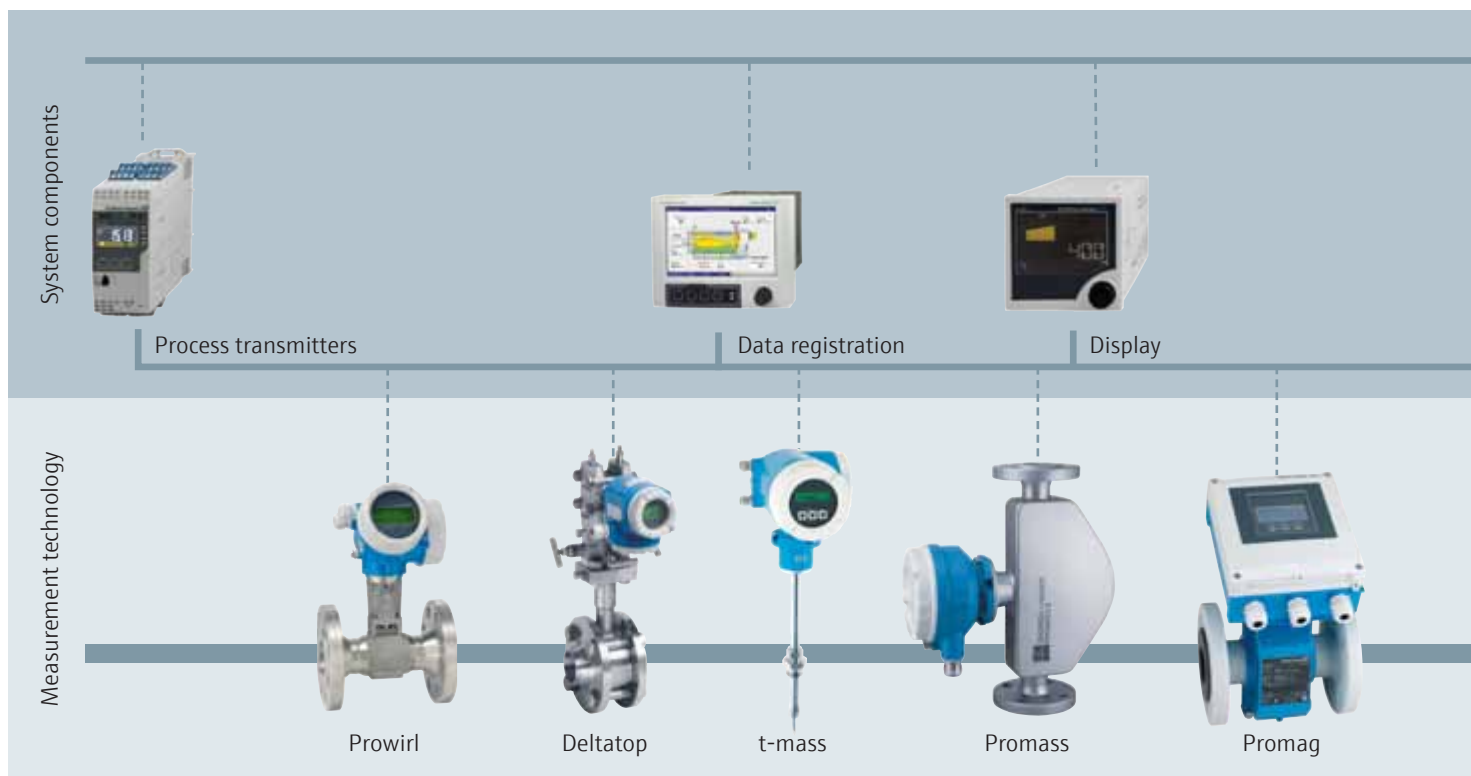
Seamless system integration

Turnkey solutions

Endress+Hauser has one of the world's most comprehensive range of measurement and control technology products. We supply everything you need to objectively assess energy consumption and plant efficiency: Consulting, engineering, project management, sophisticated measuring technology, data transmission and software for energy management.

The right device installed correctly at the right place permits the accurate metering of flow, pressure, temperature and other important process values. The outstanding field accuracy and long-term stability of Endress+Hauser devices form the basis for all subsequent evaluations and analysis – and therefore also for planned energy-saving measures.

Our modular and open energy management system guarantees seamless integration of many different components, such as flowmeters, electricity and gas meters, data loggers, energy computers and recording devices. The data is transferred via HART as well as fieldbuses (PROFIBUS, FOUNDATION Fieldbus, Modbus RS485, EtherNet/IP) or wirelessly if the measuring point is difficult to access.





Fieldbus technology

Value adding through more information

Modern flowmeters like those from Endress+Hauser deliver a wealth of information on process-related parameters. Digital signal transmission by fieldbus, however, enables process data to be transferred and utilized along with device parameters. The benefits are:

- Advanced diagnostics
- More efficient process management
- Fewer downtimes
- Maximum process reliability
- Higher system accuracy

HART
COMMUNICATION PROTOCOL

PROFIBUS[®]

EtherNet/IP

FOUNDATION

Modbus-IDA
the architecture for distributed automation



Flow/energy computer



Electrical energy meters



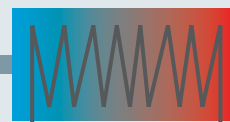
Prosonic Flow



Pressure



Temperature



Temperature

Our calibration competence sets standards

Traceable and highly accurate

Flowmeters with long-term stability and guaranteed, traceable accuracy are essential for monitoring utilities. These are the reasons why Endress+Hauser subjects all its flowmeters to continuous quality checks throughout production and tests, calibrates and adjusts them on most state-of-the-art calibration facilities in the world. These facilities combine over 35 years of experience in the construction of calibration systems with cutting-edge metrology and automation technology.

All our calibration rigs are accredited by the respective national authorities according to ISO/IEC 17025, e.g. by accreditation bodies in Switzerland (SAS), in US (A2LA) and in China (CNAS). This is one-of-a-kind and confirms the high confidence placed in Endress+Hauser's measurement technology. That enables us to perform certified and traceable calibrations within the framework of ISO 9000 for our customers.

The advantages of recognized, accredited calibration facilities are:

- Traceability back to national standards (e.g. METAS, PTB, LNE, NIST, CN)
- Worldwide acceptance
- With official SCS, A2LA or CNAS certificate (ISO/IEC 17025)
- Periodic inspection by the national standard authority

i Endress+Hauser provides its customers with comprehensive service for factory and onsite calibrations. The recalibration measurements carried out during this process confirm that the calibration factor of our flowmeters has changed only slightly or not at all, even after years of operation.



Accreditation certificates



A2LA (USA), CNAS (China), SAS (Switzerland)



Endress+Hauser calibration concept movie





W@M Life Cycle Management

Complete and instantly available device information is a key to any successful production plant operation. Endress+Hauser's W@M Life Cycle Management is an intelligent information platform designed to support you end-to-end throughout your facility's life cycle.

Data for actuators and sensors are continuously generated when designing and procuring components, during installation and commissioning and finally during operation and maintenance. This kind of information can be retrieved worldwide with W@M Life Cycle Management – wherever and whenever you want. Your benefits: Increased process reliability and product quality around the clock; and service technicians receive quick and targeted assistance in the event of disruptions or during maintenance:

W@M Life Cycle Management ...

- is an open information system based on intranet and internet technology
- brings together software, products and services from Endress+Hauser
- ensures the worldwide availability of equipment and plant data
- puts an end to time-consuming searches for device information in archive



Plant Asset Management (W@M Portal)

- Managing the installed base
- Worldwide requesting/ordering of spare parts, software versions, device data, documentation, etc.

Configuring/parameterizing devices

- With FieldCare (software for Plant Asset Management)
- With Field Xpert (handheld terminal)
- Quick local operation thanks to the integrated **web server** and uniform **operating concept**
- Quick restoration of device data in case of service (**HistoROM**)

Calibration management

- CompuCal: Software for the administration of maintenance and calibration tasks
- Device on-site verification with FieldCheck (test instrument) or **Heartbeat Verification** (device function)

➔ **Proline** ▶ Page 2

Finding documentation quickly

Downloadable online in multiple languages via "Device viewer" or the "Operations App":

- Technical information brochures
- Operating manuals
- Approvals
- Calibration certificates, etc.

Defining products

- Selecting, sizing and documenting measuring instruments using "Applicator"
- Project documentation

Configuring products

- Generating product codes with the "Product Configurator"
- Customer-specific pre-configuration

Finding spare parts

- With the Spare Part Finder (SPF)

Ordering online

- Ordering standard products, services and spare parts
- Pricing information
- Delivery times
- Order status and shipping status





Selecting the right device

Applicator is a proven selection and sizing program from Endress+Hauser. Applicator incorporates 30 years of industry experience and expert knowledge:

- Targeted product search by measuring task, measured variable, approvals, process data, communication, etc.
- Dependable sizing without specialized knowledge
- Display and depiction of important parameters such as optimal nominal diameter, pressure loss, etc.
- Direct link to Product Configurator and online shop
- Cost-saving administration and documentation of plant projects (project module)
- Language versions: English, German, French, Spanish, Russian, Chinese and Japanese



Applicator online version / Newsletter:
<http://www.endress.com/applicator>

Calibration management

In certain industries, measuring devices have to be inspected regularly due to regulations or internal directives. This also includes recalibrating quality-critical measuring points within the installed base. CompuCal is a program that provides optimal assistance in this process:

- Planning, monitoring and documenting calibration, inspection and maintenance cycles
- Complete traceability in conjunction with the test equipment used by Endress+Hauser
- Comprehensive, global data access thanks to web-based software
- Conforms completely to FDA 21 CFR Part 11 – Electronic Records; Electronic Signatures Validation

Operations App

The Operations App from Endress+Hauser offers fast access to the latest product information bulletins and device details, including order codes, availability, spare parts, successor products and general product information – wherever you are, whenever you need the data. Just key in the serial number or scan the 2D code on the device to download the information.



Easy commissioning and maintenance

The modular FieldCare software from Endress+Hauser provides users with an extensive toolset for field support of their measuring points (Plant Asset Management).

Basic functions

- Configuring and commissioning via fieldbuses or service interface
- Detecting and rectifying errors
- Documenting measuring points (data printout/export)
- Comparing measuring point parameters (set/actual value)
- Backing up/archiving data (upload/download)

Expansion functions

- Presenting the measured values graphically
- Calling up service functions
- Monitoring diagnostic data
- Evaluating verification results



Always at your service

It is our aim that all devices manufactured by Endress+Hauser guarantee high measuring accuracy and operational safety – around the clock, seven days a week, throughout the entire life cycle of your plant.

Our sales and customer service centers in over 45 countries ensure that everything runs smoothly for you. Whether you are based in Europe, America, Asia, Africa or Australia – we are always by your side!

This is how Endress+Hauser supports you:

- First-class field measurement technology for all process variables (flow, analysis, level, etc.)
- Planning and delivery of all common control, visualization and process control systems
- Planning and advice from consultants, engineers and expert technicians onsite
- Consulting, design, engineering
- Professional management of national and international projects
- Installation, commissioning and configuration
- Inspection and maintenance (maintenance contracts)
- Factory and onsite calibrations, control measurements
- Repair service, spare parts, conversion kits
- Individual maintenance concepts (Installed Base Audit)
- Training courses and qualifications
- Worldwide service



Endress+Hauser – Your partner

Endress+Hauser is a global leader in measurement instrumentation, services and solutions for industrial process engineering.

With dedicated sales centers and a strong network of partners, Endress+Hauser guarantees competent worldwide support. Our production centers in twelve countries meet customers' needs and requirements quickly and effectively. The Group is managed and coordinated by a holding company in Reinach, Switzerland. As a successful family-owned business, Endress+Hauser is set to remain independent and self-reliant.

Endress+Hauser provides sensors, instruments, systems and services for level, flow, pressure and temperature measurement as well as analytics and data acquisition. The company supports customers with automation engineering, logistics and IT services and solutions. Our products set standards in quality and technology.

We work closely with the chemical, petrochemical, food and beverage, oil and gas, water and wastewater, power and energy, life science, primary and metal, renewable energy, pulp and paper and shipbuilding industries. Endress+Hauser supports customers to optimize their processes in terms of reliability, safety, economic efficiency and environmental impact.

Flow measurement as competence

The Endress+Hauser group is a global player. Within the group, Endress+Hauser Flowtec AG ranks internationally as one of the leading producers of industrial flowmeters for liquids, gases and steam. As a competence center, we have achieved a top position in global market for over 35 years. Endress+Hauser Flowtec AG currently employs a workforce of more than 1400 at six production facilities in Reinach (Switzerland), Cernay (France), Greenwood (USA), Aurangabad (India), Suzhou (China) and Itatiba (Brazil).



Reinach, Switzerland



Cernay, France



Greenwood, USA



Aurangabad, India



Suzhou, China



Itatiba, Brasil



To learn more about Endress+Hauser, visit:
www.endress.com

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