Flow measurement in utilities

Energy management in your hands – customized solutions for compressed air, gas, steam and water
Endress+Hauser is a global provider of solutions for instrumentation and automation. Supplying the production and logistic sectors of the process industry, the company develops sensors and systems that obtain information from the process, transmits this data and processes it. High-quality products and cutting-edge services support our customers’ competitiveness with top-notch quality, dependability and efficiency.

Endress+Hauser works closely with universities and research institutes, and also cooperates with business partners and competitors. The company is committed to continuously expanding its industry-specific know-how and ensuring the competence of its sales, marketing and service. The closely knit network of affiliated production and marketing companies and regional representatives establishes and maintains the group’s powerful presence in all the world’s markets – in other words right on your doorstep.

Endress+Hauser is a byword for independence, continuity and long-term customer relationships. Our 50-plus years of application experience are the foundation on which we have built our wide range of products for metering flow, level, pressure and temperature, complete with liquid analysis, recording and system components.

Endress+Hauser is a single-source supplier, so you can always be confident that we will have the optimum solution for your measurement requirements.

**Flow measurement as competence**
Endress+Hauser 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 the global market within the last 28 years. High accuracy, dependable metering, simple commissioning and low maintenance outlay – these are only some of the properties that our customers can always rely on.
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 applications
- Competent planning, commissioning and maintenance (engineering, project management)
- 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 ⅛ in. leak in a compressed-air pipe will cost you $750 in energy losses per year?
- that the energy cost of compressed air goes up approximately 9% for every unnecessary 14.7 psig of pressure?
- that 18 to 30 ft/s is the recommended maximum flow velocity for economical operation in compressed-air distribution systems and that the corresponding figure for steam pipes is 75 ft/s?
- that leaks in outdated, underground distribution networks for steam or hot water can push energy costs up by as much as 50%?
You can control only what you measure!

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 his process as efficiently as possible.

Merely installing meters for flow, temperature or pressure is not enough to save energy. This is why Endress+Hauser has 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.

- Accurate and reliable measurement
- Continuous data collection
- Optimized evaluation
- Ensure long term competitiveness

Flowmeters from Endress+Hauser take high process temperatures and process pressures in their stride.
Monitoring utilities

Whether in heated or cooling systems, boilers or burners, whether compressed air or steam – the central tasks for monitoring utilities are always the same, regardless of the fluid or where it is measured:

- Distribution
- Delivery / End-user consumption
- Allocation
- Energy efficiency
- Monitoring (limit values, alarms)
- Leakage minimization
- Filter monitoring
Flowmeters in utilities

Vortex

Vortex meters are extremely robust. These versatile devices have long been in use for metering liquids, gases and steam in all industries. Frequently used in combination with a flow computer, pressure and/or temperature sensors for energy and heat metering.

Benefits at a glance
- High long-term stability and repeatability
- Installed base of more than 100,000 meters
- Low pressure loss
- Large turnover of 10:1 to 30:1 (gas/steam) or 40:1 (liquids)
- Mass and energy metering of liquids, gases and steam by a flow computer or optionally with an integrated temperature sensor (multivariable sensor)

Applications
- Universal measurement of gases, steam and liquids
- Nominal diameters: ¼” to 12" (DN 15 to 300)
- Process pressure: max. 3625 psi (250 bar)
- Temperature: −328 to +752°F (−200 to +400°C)

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 65 ft. (2 meters).

Benefits at a glance
- 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
- Combined with flow computers for mass, energy and volume measurement of liquids, gases and steam; and for increased turndown (split range)

Applications
- Universal measurement of gases, steam and liquids
- Nominal diameters: ⅛” to >80” (DN 10 to >2000)
- Process pressure: max. 5800 psi (400 bar)
- Temperature: −328 to +1832°F (−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. By comparison with other techniques, this principle allows the measurement of gases at very low flow rates and process pressures with high accuracy.

Benefits at a glance
- 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
- Large turndown up to 100:1
- Negligible pressure loss (<2 mbar)

Applications
- Direct mass flow measurement of gases, e.g. air, compressed air; clean gases (Ar, O₂, N₂, CO₂) or natural gas
- Nominal diameters: ⅛” to 60” (DN 15 to 1500)
- Process pressure: max. 580 psi (40 bar)
- Temperature: −40 to +266°F (−40 to +130°C)

Planning / Selection

Only correctly selected flowmeters ensure highest measuring accuracy during operation. This in turn prevents product losses generating unnecessary follow-up costs. Using Applicator, a software package proven for over 10 years, measuring locations can be easily designed and documented without a large amount of specialized knowledge.
Commissioning / Configuring
Besides commissioning via the local display, the ToF Tool – Fieldtool Package configuration and service program supports further process optimization and field support for flowmeters: device parameterization, data transfer, display of measured data, diagnostics and data monitoring, complete with evaluation and documentation.

Maintenance / Verification
In many processes, the function of flowmeters must be periodically checked and tested due to internal or legal requirements. Fieldcheck is a NIST traceable test and simulation device that permits in-situ checking of your installed flowmeters without their removal or process interruption.
Our solutions, your benefits

**Turnkey solutions**
Endress+Hauser has one of the world’s most comprehensive product portfolios for industrial instrumentation. Visualization and evaluation of process data, however, are the real keys to benefit fully from flow measurement. Therefore, Endress+Hauser provides you with a full range of special software packages long proven in the field. The choice includes P-View, ControlCare, ToF Tool – Fieldtool Package and FieldCare:

- Display of all measuring points and measured variables (building layout)
- Account balancing (consumption per hour, day, month or year)

**Allocation of consumption to cost centers**
- Efficiency comparisons (energy supply vs. consumption)

**Saving energy costs**
Maintaining an overview is crucial to efficient operation and cost optimization. The benefits are:

- 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

**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
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 systems in the world. These facilities combine 28 years of experience in the construction of calibration systems with cutting-edge metrology and automation technology. They are accredited by A2LA in the United States according to ISO/IEC 17025. 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 worldwide are:
- Traceability back to national standards
- Worldwide acceptance
- With official SCS, A2LA or CNAS certificate (ISO/IEC 17025)
- Periodic inspection by the national standard authorities

Global calibration concept
As an international player, Endress+Hauser operates in accordance with internationally accepted standards for the accreditation of its products and test methods. One unique facet of the company’s operations is that all Endress+Hauser’s flow calibration facilities are accredited by different national authorities – including for example SAS, A2LA and CNAS – in accordance with ISO/IEC 17025. Since all test resources are seamlessly traceable back to national standards, customers can invariably look to Endress+Hauser to provide the same uniformly high standard of quality, be it in product quality or in field testing of their process facilities.

The recently completed air calibration facility sets completely new conceptual and technological standards. Several adapter revolvers enable a rapid and precise clamping of the devices under test into the measurement section (½ to 4”/DN 15 to 100). Flow rates up to 22,046 lbs/h (10,000 kg/h) can be measured. A special climate control system keeps the air in the calibration room at exactly 71.6°F (22°C) – day and night. It comes as no surprise, therefore, that this commercial calibration facility measures air flows with one of the highest measuring accuracies in the world.
Always at your service

Around the world, any time of day

It is our aim that all devices manufactured by Endress+Hauser should ensure high measuring accuracy and operational safety – around the clock, seven days a week, throughout the entire life cycle of your plant. In order to keep things that way, we have established our own sales and service centers in more than 40 countries around the world. No matter whether you are located in Europe, Americas, Asia, Africa or Australia – we’re always close at hand!

Consulting and planning
Competent technicians, engineers and application consultants come on site to help you find the technically and economically ideal solution for your application.

Commissioning and maintenance
Need some fast advice on the phone, or support for a maintenance schedule? You decide what we should provide, because our sales and service centers are not only there to help in emergencies. They also maintain a helpdesk and ensure that spare parts and consumables are available whenever and wherever they are needed.

The services at your disposal include:
• Commissioning and configuration
• Inspection and maintenance (maintenance contracts)
• On-site, traceable calibration, control measurements
• Repair service, spare parts, conversion kits
• Individual maintenance concepts
  (IMS: Instrument Management Solutions)

Training and information
Being informed means being confident. We organize training courses and seminars to pass on our know-how:
• Industry-specific seminars • Service seminars
• Specialist seminars • Workshops • Technology forums
• Introductory seminars • Special-interest subjects

W@M
The web-based asset management W@M™ from Endress+Hauser is an open information system which provides technical and operative management tools with complete data transfer and archival – from commissioning to maintenance and service within a plant, at any time or location. This is attained within an open system based on Internet/Intranet technology, and incorporating software programs, products and services from Endress+Hauser.
Supplementary documentation

Flow Measurement
For Liquids, Gases and Steam
Products and Services at a Glance
FA005D/24/en

Flow Measurement
Selection Guide
CP001D/24/en

On-site calibration
Focusing on meeting the special needs of our customers through cost reduction and increasing process up-time
CP988H/24/en

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