Flow

Refueling and filling made easy

Accurate flow measurement for natural gas (CNG), liquefied gas (LPG, LNG) and AdBlue

Endress+Hauser
People for Process Automation

Safe, compact and highly accurate

Our measuring technology for eco-friendly natural and liquefied gas

The trend towards greater mobility is growing continually, and along with it, emissions from burning fossil fuels. For this reason, refueling with environmentally-friendly natural or liquefied gas is becoming increasingly common. Worldwide, over 43 million vehicles are currently powered by alternative fuels. In the major urban areas of many countries, natural gas-fueled buses, taxis or entire truck fleets have already become a part of everyday life. Simultaneously, the network of natural gas stations and dispensers has expanded continuously.

Whether in dispensers or on tank trucks – measuring natural and liquefied gas is a great challenge for metrology. Therefore, Endress+Hauser has developed special flowmeters for such applications that feature outstanding safety, robustness and excellent accuracy.

Moreover, as a single-source supplier in process automation, we offer everything from “one hand”:

- First-class measuring devices with national/international custody transfer approvals
- In-house accredited calibration facilities for traceable measurement results
- Worldwide recognized Ex approvals
- Customized solutions for your application
- Many years of industry experience
- Expert consulting from certified specialists
- Worldwide service network

Coriolis flow measurement technology

Our complete device portfolio can be found at www.endress.com

Coriolis flowmeters are being used increasingly widespread for refueling and filling. This is no surprise, as these devices are able to measure multiple process variables simultaneously, such as mass flow, density and temperature. Whether mass or volume flow – temperature-compensated conversions are possible at any time without need for additional measuring devices. Compared to conventional volume counters, Coriolis flow measurement technology also offers other advantages that are difficult to beat:

Your benefits:

- Independence of physical fluid properties such as conductivity, pressure, temperature, density or viscosity
- Simultaneous measurement of mass flow, density and temperature
- Direct on-site calculation of temperature-compensated volumes
- Direct density measurement for monitoring product quality
- Maintenance-free measuring devices without moving parts
- Compact and robust design compared to mechanical filling systems
- High vibration resistance and durability, e.g. for operation on tank trucks
- Seamless integration into plant systems via Modbus RS485, PROFIBUS PA/DP, FOUNDATION Fieldbus, HART as well as current, relay or pulse/frequency output

LPGmass CNGmass (Ex d) CNGmass (Ex i) LNGmass

Compressed natural gas (CNG)

CNGmass – for pressures up to 350 bar (5080 psi)

Compressed natural gas, which consists of 75 to 95 percent methane (CH_4), has long become established as an alternative fuel for vehicles. Enormous reserves exist in underground stores, and the production of biogas will also open up new possibilities over the long term. Compressed natural gas is currently considered the cleanest fossil fuel for combustion engines. In countries such as Argentina, Brazil, China, Pakistan, India, Iran and Italy – to name just a few – compressed natural gas is an indispensable part of mobility. Worldwide, over 20 million of these vehicles are on the road, most of them taxis and buses.

The global network of natural gas stations, which currently includes over 23 000, means increasing availability. When refueling with environmentally-friendly compressed natural gas, one factor is key: accuracy. Only the highest accuracy guarantees correct billing of the quantity filled on site. Here, you can depend on the CNGmass without exception. This flowmeter allows mass flow measurement – independent of pressure and temperature – with the highest precision, such as in mother-daughter stations or dispensers. Our product range also includes pressure and temperature sensors that have proven their worth in these applications for decades.

Our measurement technology

Flow
For measuring the refueled gas quantity at dispensers:
- Direct measurement of mass flow up to 150 kg/min (330 lb/min)
- Up to 350 bar (5080 psi)
- DN 8 (3/8"), DN 15 (1/2"), DN 25 (1")
- Accuracy: typical ≤0.5% during the refueling process

Pressure
To measure the system pressure (absolute/gauge pressure):
- Between compressor and tank cascade
- In tank cascades

CNGmass (Ex d / Ex i)
- Ex approvals: ATEX, IECEx, FM, CSA, TIIS, NEPSI, etc.
- Custody transfer approvals: PTB, NMi, NTEP, MC, METAS, BEV, etc.
- Interfaces: Modbus RS485; 2 pulse/ frequency outputs (phase-shifted), switch output
- Ex i version: CNGmass (D8CB) in a compact design, only with Modbus RS485

CNGmass DCI (Ex d)
- Illuminated display for measured value display and device configuration (via Touch Control)
- Ex approvals: ATEX, CEC, NEC, etc.
- Custody transfer approvals: PTB, NMi, NTEP, MC, METAS, BEV, etc.
- Interfaces: Modbus RS485, 2 pulse/ frequency outputs (phase-shifted), current and relay output, status input

Cerabar PMP71
- Pressure measuring device with extended functionality
- Local display (operation via push buttons) for measured value display and device configuration
- 5 mbar to 700 bar (0.073 to 10 153 psi)
- Ex approvals: ATEX, FM, CSA, NEPSI, IECEx, TIIS, GOST, etc.
- High reference accuracy: ±0.075% (standard) ±0.05% (PLATINUM version)

Temperature
For measuring the natural gas temperature in dispensers

Omnigrad S TR66

- Modular resistance thermometer
- Interchangeable insert
- Optionally with display (TID10)
- −200 to +600 °C (−328 to +1112 °F)
- Up to 500 bar (7252 psi)
- Ex approvals: ATEX, IECEx, NEPSI, etc.
- Accessories: active barrier, surge arrester, process indicator

"Tanking up with environmentally-friendly natural gas is already a daily occurrence in China. Our company manufactures high-quality dispensers for this fuel. Our customers include the largest natural gas companies in China. One of the factors in our success is the collaboration with Endress+Hauser.

We have installed CNGmass devices in thousands of dispensers, for example, and they have shown themselves to be safe, accurate and totally robust flowmeters. We are also very pleased with the customer service provided by Endress+Hauser. We have always been able to rely on prompt support and reliable advice."

Jiang Tao
General Manager

Chengdu Huaqi Houpu Machine Electricity Technology Co. Ltd. (China)

Mother-daughter stations

In many cases, regions without a gas infrastructure and gas pipelines get their compressed natural gas from special transport trailer vehicles. These vehicles, equipped with pressure vessels, transport the compressed natural gas from the "mother" station to smaller "daughter" stations, for example to compressed natural gas stations in remote towns and villages.

More and more trailers are using the CNGmass for a highly accurate measurement of the filled or delivered gas quantity. Thanks to its high vibration resistance and accuracy, it is the ideal flowmeter for such applications.

Madhukar Puniani
Business Development Manager
(Natural Gas Systems)

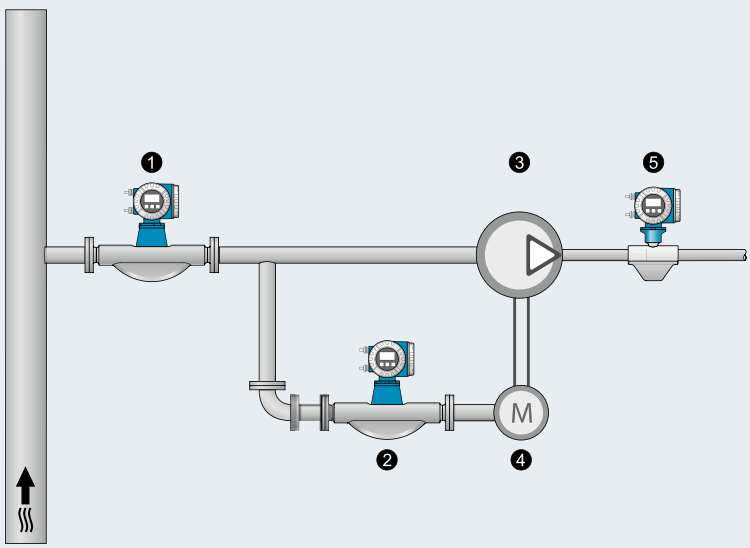
Parker Hannifin Corporation
(USA)

„Parker is a trusted and well-known supplier of hoses, filters, fittings and valves for the CNG market. Recently customers have been asking us to provide complete packages, including CNG flowmeters. It was our wish to provide packages only of the highest quality, working together with companies that we felt confident would support our customers in the field. The competency and support offered by Endress+Hauser has allowed us to meet our customers' expectations and deliver these complete packages."

Monitoring compressors

Compressed natural gas stations have compressors that condense the gas taken from the main pipe to a pressure of 250 to 300 bar (3625 to 4350 psi). These compressors, which are powered by combustion engines or electric motors, do not always reach maximum efficiency due to leaks, and consume a great deal of energy.

Targeted measurement of the individual gas flows can be used to continuously monitor efficiency and detect any possible losses due to leaks. The efficiency, in turn, is calculated from the consumption of operating resources (gas, electricity) for the compressor and the volume of compressed natural gas generated.



1 Measuring the gas quantity taken from the main line
2 Measuring the operating resource consumption (gas) for the compressor drive
3 Compressor
4 Engine
5 Measuring the quantity of compressed natural gas (CNG)

Liquefied natural gas (LNG)

LNGmass – robust measurement down to –196 °C (–320 °F)

Though production is very cost-intensive, liquefied natural gas has specific advantages and clearly defined application possibilities. Because its storage volume after being liquefied to –161 °C (–258 °F) is some 600 times less than that of compressed natural gas, liquefied natural gas is particularly ideal for storage and transport purposes due to its higher energy density. For distances greater than 3000 kilometers (1864 miles) between the natural gas source and consumer, transport by ship, for example, is more cost-effective than by pipeline. Particularly in regions with no existing natural gas network, this type of natural gas is gaining importance for fueling vehicles and ships – for example in China, South Korea, USA and Australia as well as in Norway, Sweden and the Netherlands. In 2011, 35% of all worldwide natural gas transports were carried out in liquefied form. The trend is increasing, one reason being that liquefied natural gas can be converted back into compressed natural gas using evaporators (LCNG systems).

At –161 °C (–258 °F), the requirements for the instrumentation are exceptionally high. Whether measuring flow, pressure, temperature or level – our robust devices have long proven themselves ideal in applications for liquefied natural gas.

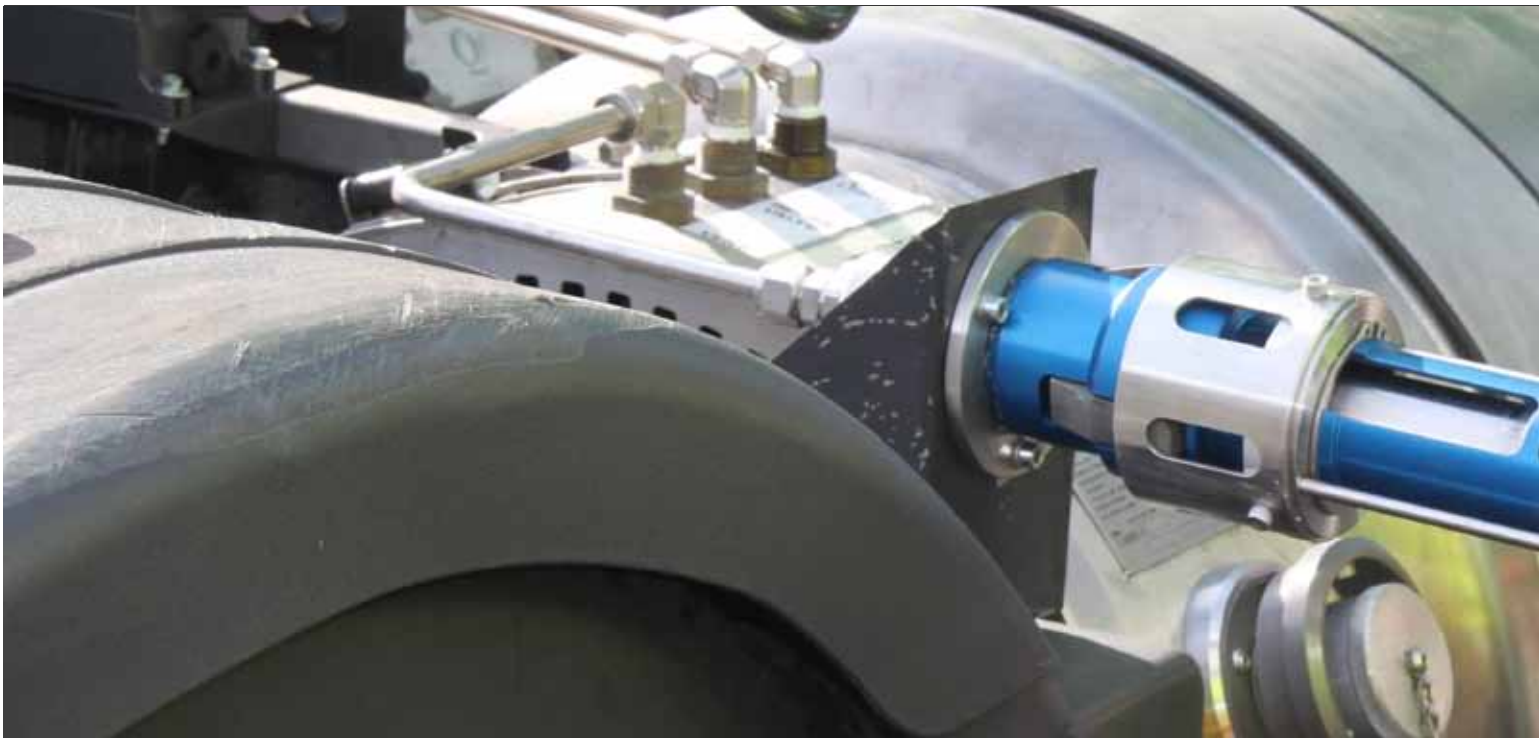
Jiang Tao
General Manager

Chengdu Huaqi Houpu Machine Electricity Technology Co. Ltd. (China)

"In China, liquefied natural gas (LNG) is being increasingly used as a fuel for trucks or commercial vehicles. However, LNG at a temperature of −161 °C (−258 °F) places extremely stringent demands on measuring systems.

Therefore, in our LNG dispensers, we have been using the Promass F flowmeter from Endress+Hauser for some time now. We were impressed by its robustness and field accuracy. The decisive factor was that Promass F guaranteed error-free measurement results, even under the most difficult temperature conditions.

We value our many years of constructive cooperation with Endress+Hauser highly, as well as their solution-oriented onsite support."



Our measurement technology

Flow
For measuring mass flow of cryogenic fluids:
▪ In dispensers ▪ On tank trucks ▪ Downstream of cryogenic pumps

LNGmass

- Smallest flowmeter especially for LNG dispensers worldwide
- DN 8 (3/8"), DN 15 (1/2"), DN 25 (1")
- −196 to +125 °C (−321 to +257 °F)
- Max. 300 kg/min (660 lb/min)
- Max. 40 bar (580 psi)
- Custody transfer approval: MI-005
- Accuracy: Class 2.5, suitable for systems measuring cryogenic liquids in accordance with OIML R81 as well as Class 1.5 according to OIML R117
- Ex approvals: ATEX, IECEx, INMETRO, NEPSI, cCSAus
- Interfaces: Modbus RS485

Promass F

- DN 8 to 250 (3/8 to 10"), remote version
- −196 to +100 °C (−321 to +212 °F)
- Max. 100 bar (1450 psi)
- Max. 36 667 kg/min (80 837 lb/min)
- Ex approvals: ATEX, FM, CSA, NEPSI, etc.
- Custody transfer approval: MI-005
- Accuracy: Class 2.5, suitable for systems measuring cryogenic liquids in accordance with OIML R81 as well as Class 1.5 according to OIML R117
- Interfaces: Modbus RS485, PROFIBUS PA/DP, FOUNDATION Fieldbus, HART; 2 pulse/frequency outputs (phase-shifted), current and relay output, status input

Pressure
For measuring system pressure (absolute/gauge pressure):
▪ On tank trucks ▪ In storage tanks
▪ Upstream/downstream of cryogenic pumps ▪ In dispensers

Cerabar PMP71

- Pressure measuring device with extended functionality
- Local display (operation via push buttons) for measured value display and device configuration
- 5 mbar to 700 bar (0.073 to 10 153 psi)
- Ex approvals: ATEX, FM, CSA, NEPSI, IECEx, TIIS, GOST, etc.
- High reference accuracy: ±0.075% (standard) ±0.05% (PLATINUM version)

Temperature
For measuring the fluid temperature:
▪ Of cryogenic pumps ▪ In dispensers

Omnigrad M TR10

- Modular thermometer
- Fast response time (T90 time < 7.5 s)
- Interchangeable insert
- Optionally with local display
- −200 to +600 °C (−328 to +1112 °F)
- Up to 75 bar (1088 psi)
- Ex approvals: ATEX, IECEx, NEPSI, etc.
- Accessories: active barrier, surge arrester, process indicator

Level
For measuring the level:
▪ On tank trucks ▪ In storage tanks

Deltabar PMD75

- Hydrostatic level measurement with extended functionality
- Local display (operation via push buttons) for measured value display and device configuration
- Operational reliability even in low temperatures (installation according to HAMPSON)
- Ex approvals: ATEX, FM, CSA, NEPSI, IECEx, TIIS, GOST, etc.
- High reference accuracy: ±0.075% (standard) ±0.05% (PLATINUM version)

Liquefied petroleum gas (LPG)

LPGmass – with direct calculation of temperature-compensated volumes on site

Liquefied gas, which consists primarily of propane and butane, is generated as a wet "produced gas" during crude oil recovery or as a by-product in refineries. For decades, liquefied gas – like compressed natural gas – has proven its value as a fossil fuel for vehicles. Some 23 million liquefied gas-powered vehicles and over 50 000 gas stations exist world-wide. Liquefied gas is transported by ship, rail tank car and tank trucks.

Accurate measurement of delivered or refueled liquefied gas places stringent demands, as gas stored in pressure vessels reacts very quickly to fluctuations in temperature and can evaporate. This calls for specially designed flowmeters, which provide absolutely correct measurement of the gas quantity in custody transfer operations. The LPGmass from Endress+Hauser fulfills these metrological requirements without compromises, as it measures several process variables simultaneously:

- Mass flow
- Fluid density
- Fluid temperature

Therefore, using the LPGmass permits temperature-compensated volumes (API 53) to be calculated directly on site; without additional measuring devices. As a single-source supplier, Endress+Hauser provides you with everything from "one hand": pressure and temperature sensors as well as level measuring devices for storage tanks.

Our measurement technology

Flow
For measuring mass or volume flow:
- On tank trucks
- In dispensers

LPGmass
- Direct measurement of mass flow, density and fluid temperature
- Direct on-site calculation of temperature-compensated volumes (API 53)
- Up to 40 bar (580 psi)
- DN 8 (3/8"), DN 15 (1/2") DN 25 (1"), DN 40 (1 1/2")
- Ex approvals: ATEX, FM, CSA, etc.
- Custody transfer approvals: MID 005, NTEP, MC, etc.
- Accuracy: ±0.2% (mass), ±0.3% (volume)
- Interfaces: Modbus RS485; 2 pulse/frequency outputs (phase-shifted), switch output

Pressure
For measuring system pressure (absolute/gauge pressure): ▪ In storage tanks ▪ In the supply line to the dispenser

Cerabar PMP71
- Pressure measuring device with extended functionality
- Local display (operation via push buttons) for measured value display and device configuration
- 5 mbar to 700 bar (0.073 to 10 153 psi)
- Ex approvals: ATEX, FM, CSA, NEPSI, IECEx, TIIS, GOST, etc.
- High reference accuracy: ±0.075% (standard) ±0.05% (PLATINUM version)

Temperature
For measuring fluid temperature: ▪ On tank trucks ▪ In dispensers

Omnigrad M TR10
- Modular thermometer
- Fast response time (T90 time < 7.5 s)
- Interchangeable insert
- Optionally with local display
- −200 to +600 °C (−328 to +1112 °F)
- Up to 75 bar (1088 psi)
- Ex approvals: ATEX, IECEx, NEPSI, etc.
- Accessories: active barrier, surge arrester, process indicator

Level
For detecting level in storage tanks

Levelflex FMP50
- Safe and reliable continuous level measurement
- Easy commissioning and operation (various local languages, envelope curve display on site, etc.)
- Interchangeable probe rod and probe cable (various lengths)
- Ex approvals: ATEX, FM, CSA, TIIS, NEPSI, IECEx, etc.

Lutz Jeremias
General Manager

FAS Flüssiggas-Anlagen GmbH, Salzgitter (Germany)

"FAS Flüssiggas-Anlagen GmbH is one of Europe's leading manufacturers of liquefied gas fittings and plant components for storing, refilling and transporting propane and butane. Thanks to the LPGmass from Endress+Hauser, we were able to bring an entirely new generation of natural gas dispensers to market.

As API tables are programmed as standard in the LPGmass, which also features integrated temperature measurement, we can now calculate temperature-compensated volumes directly on site with high accuracy and without additional measuring equipment. This provides greater assurance and trust for us and the consumer."

"Since 1993, our company has been building and supplying system solutions for the storage, transport and distribution of liquefied gases. As an innovative company, we made an early decision to introduce maintenance-free Coriolis flowmeters on LPG tank trucks. With the LPGmass from Endress+Hauser, we have now found a robust flowmeter that not only provides a highly accurate mass measurement but also determines actual and corrected volumes.

The fact that Endress+Hauser mass flowmeters, as a rule, come with a MID declaration of conformity greatly simplifies the custody transfer approval process for our measuring systems. We are therefore able to sell our measuring systems in all EU countries without any problems for both mobile and stationary applications."

Ryszard Dodacki
General Manager

Aurex LPG
(Poland)

Our measurement technology

Flow
For measuring mass or volume flow:
- On tank trucks
- In dispensers

LPGmass
- Direct measurement of mass flow, density and fluid temperature
- DN 8 (3/8"), DN 15 (1/2"), DN 25 (1"), DN 40 (1 1/2")
- Up to 40 bar (580 psi)
- Direct calculation of operating volume
- Ex approvals: ATEX, FM, CSA, etc.
- Custody transfer approvals: MID, NTEP, MC, etc.
- Accuracy: ±0.2% (mass) ±0.3% (volume)

Level
For detecting level in storage tanks

Liquicap FMI21
- Capacitance two-rod probe for continuous level measurement of conductive liquids
- Cost-effective solution with high-quality, corrosion-resistant materials
- −40 to +100 °C (−40 to +212 °F)
- Ex approvals: ATEX, CSA, etc.

AdBlue for efficient pollutant reduction

Precise measurement of minimal flows

Increasingly stringent pollution laws, such as EURO 4, EURO 5 and EURO 6, demand a significant reduction of soot and nitrogen oxide emissions. By using AdBlue – an aqueous urea solution – emissions can now be cleaned even more efficiently and the nitrogen oxide emissions can be cut by up to 90%. For this purpose, in diesel combustion engines, AdBlue is sprayed into the exhaust stream, which converts nitrogen oxide into nitrogen and water in the SCR catalyst.

In many countries, AdBlue is already prescribed as a standard requirement for commercial vehicles. In many European countries, lower road usage fees are in place as an incentive to use AdBlue. AdBlue is particularly attractive for operators of public bus lines or transport companies. Many gas station operators, such as Aral, Total, Shell and Avia, currently offer AdBlue – be it in canisters or dispensers.

Using the LPGmass from Endress+Hauser, AdBlue can be measured reliably and with high accuracy – when delivering to gas stations or when refueling at dispensers. However, our product range also includes high-quality devices for reliable capacitance level measurement in storage tanks.

Uwe Koslowsky
Engineering Project Manager

Gilbarco GmbH & Co. KG
(Germany)

"As the leading manufacturer of dispensers and gas station equipment, quality is our top priority. In dispensers for AdBlue, for example, we have been using the LPGmass from Endress+Hauser for a long time, as this device can measure even the smallest amounts with great precision.

Our experience has shown that the LPGmass features outstanding reliability and long service life. For gas station operators, another decisive factor is that this flowmeter is almost maintenance-free and thus means lower costs in operation."

Bunker fuel metering systems

Our certified solution creates maximum transparency

Day after day, vast quantities of bunker oil are pumped into the fuel tanks of passenger ships, container ships, tankers and bulk carriers. Even the slightest measurement inaccuracies during this bunkering process causes shortages in the "cash register" and time-consuming disputes.
As we all know, the traditional quantity measurement via tank gauging, for example, can be associated with a great amount of uncertainty due to error prone volume to mass calculation as well as not considered air content caused by tank stripping and the "cappuccino effect". Very often, this leads to incorrect billing and unwanted bunker disputes between supplier and buyer.

Endress+Hauser has therefore developed a patented bunker fuel metering system that guarantees a reliable and efficient bunkering process.

Improved profitability
- Accurate billing thanks to the high accuracy (±0.5%)
- No time-consuming manual tank sounding necessary
- Maintenance-free measuring system without moving parts

High transparency
Continuous and simultaneous monitoring of process parameters, such as:
- Mass flow (bidirectional)
- Bunker fuel quantity
- Density, pressure and temperature
- Air index (proportion of air)

Sustainable efficiency
- Up to 3 hours time savings for each bunkering operation
- Shorter idle times in the port
- Direct and quick mass measurement without converting volume due to the Coriolis flow measuring principle

Guaranteed system integrity
- All relevant system components are sealed by independent agencies
- Certified measuring system in accordance with MID (MI-005)
- Approved for commercial use by the Maritime and Port Authority of Singapore (MPA)

Simple operation
- Separate control panel with intuitive user interface
- Important process parameters are visible at a glance
- Includes Autostart function – the measuring system is ready to start at all times

High measurement quality worldwide

Your expectations benchmark our endeavors

Calibration directly on site (with a master meter)

In custody transfer applications, measuring systems for fuel volume require regular calibration. This includes, for example, discharge stations, tank trucks and dispensers. These re-approvals are usually costly and time-consuming. For this reason Endress+Hauser has developed a portable calibration box that enables – in consultation with the responsible authorities – traceable onsite calibration of flowmeter systems:

- Portable calibration unit with reference master and custody transfer approval
- Calibration possible without interrupting the refueling process
- Massive savings of time and costs compared to conventional calibration methods
- Easy operation and user-friendly control panel
- Fast installation – usually between dispenser and automobile

Custody transfer approvals (for flowmeters)

Wherever you operate your filling or refueling systems – our flowmeters have a wide variety of custody transfer approvals based on the OIML recommendations:

▪ PTB (Germany) ▪ NMi (Netherlands) ▪ NTEP (USA)
▪ METAS (Switzerland) ▪ BEV (Austria), etc.

Global calibration concept

We have 35-plus years of experience in developing and building high-tech calibration rigs for correct and traceable verification of flowmeter accuracy. Working from that baseline, we have developed a global calibration concept that offers you maximum confidence and security:

- Worldwide accreditation of all flow calibration rigs
- Periodic inspection by national accreditation bodies
- Complete traceability back to national standards according to ISO/IEC 17025 (e.g. PTB, METAS, NPL, NIST, LNE, CN)
- Calibration service in more than 40 countries

Endress+Hauser calibration concept movie

Ueli Oester
General Manager, Apex AG (Switzerland)

"The Swiss Federal Institute of Metrology (METAS) requires reapproval of compressed natural gas dispensers every 2 years. Such follow-up measurements have been carried out successfully in Switzerland by Apex AG in cooperation with cantonal calibration authorities since 2003.

Dispensers that measure fuel mass using a Promass or CNGmass rarely, if ever, require recalibration. Coriolis flowmeters from Endress+Hauser have proven ideal for use in natural gas dispensers due to their exceptionally long-term stability and repeatability."

Confidence thanks 100% traceability

All our calibration facilities are accredited (ISO/IEC 17025)

At Endress+Hauser, each flowmeter is subjected to rigorous testing on accredited and fully traceable calibration facilities. Comparisons between device under test, calibration rig, test equipment and a country's hierarchically highest "national standard" are the only way of conclusively establishing the end-to-end traceability of values measured – and consequently of the measuring uncertainty stated by the device manufacturer.

This is one of the main reasons why Endress+Hauser has had all flow calibration rigs accredited by official bodies in accordance with ISO/IEC 17025. This is unique and a confirmation of the high confidence placed in us by the respective national accreditation authorities in different countries. No other manufacturer of flowmeters can lay claim to this ultimate proof of quality.

The International Prototype Kilogram (at BIPM, France)

- International Prototype Kilogram (IPK) = global reference and basic unit of mass. The Bureau International des Poids et Mesures (BIPM), founded in 1875, keeps the IPK under lock and key in a vault on its premises in Sèvres near Paris (France).
- In 1950, 1991 and 2003 comparison measurements for verification took place between the IPK and Switzerland's replica No. 38.
- Measuring uncertainty: ±0.000001% (±10 micrograms)

±0.000001%

The national standard (national institute of metrology)

- Verification of the reference weights used by Endress+Hauser every 5 years by the Swiss Federal Institute of Metrology METAS, using a mass comparator and national reference weights (national reference standards)
- Measuring uncertainty of the METAS 500 kg reference weight (set 502, class E2): ±0.0001% (0.5 gram to 500 kg)
- Periodic comparison of the reference weights against Switzerland's replica No. 38 of the IPK every 10 years

±0.0001%

The gravimetric scales (Endress+Hauser)

- Gravimetric scales of the PremiumCal calibration rig for measuring the reference flow values
- Regular verification of the scales every 2 weeks with calibrated reference weights (= internal reference standard)
- Measuring uncertainty of the calibrated reference weights (class F2): ±0.0016%

±0.0016%

The calibration rig (Endress+Hauser)

- PremiumCal calibration rig for testing Promass 83F/84F (as an example)
- Measuring uncertainty: ±0.015%
- Accredited to ISO/IEC 17025 by the Swiss Accreditation Service (SAS)
- Annual SAS audits of the facility

±0.015%

The meter (in customer's production plant)

- Promass 83F/84F for metering mass flow (example):
  - Exact balancing of material flows
  - Precise dosing of costly active ingredients
- Measuring accuracy: ±0.05%
- Reference meter for onsite calibration

±0.05%

(Measuring uncertainty conforming to k = 2)

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
- Consulting, design, engineering
- Planning and advice from consultants, engineers and expert technicians onsite
- 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.

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

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

www.addresses.endress.com

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Endress+Hauser

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