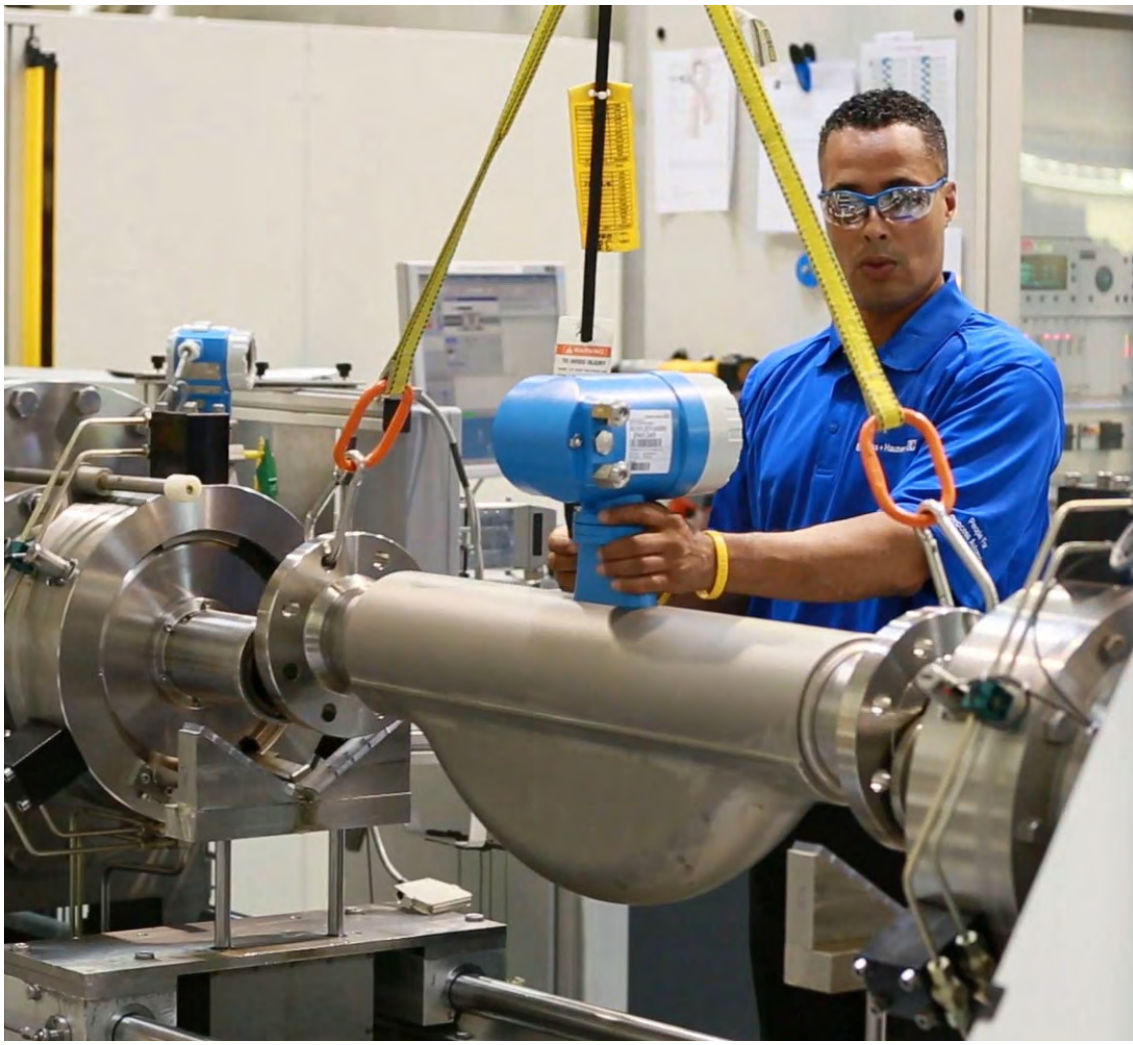
Calibration services

Ensure compliance with minimal process interruptions



Endress+Hauser

People for Process Automation

Calibration services

Endress+Hauser is the only process instrument manufacturer with the ability to provide accredited calibrations in both the laboratory and on-site for our own and other manufacturers' products.

Calibration is a necessary action that ensures your instrument measurements are accurate. For some applications in the process industries, periodic calibration to the National Institute of Standards and Technology, or NIST, standards are a requirement to comply with quality and safety standards. We can help you stay in compliance while reducing your costs and increasing the process uptime.

Accreditation is the formal recognition of an organization's technical competence in performing specific services such as calibration. This recognition is issued by authorized bodies, often a national metrology authority working in strict compliance with comprehensive international codes of practice.

Endress+Hauser performs instrument calibrations across a variety of measuring principles. We provide accredited calibrations in both our Greenwood, Indiana and Houston, Texas laboratories and accredited on-site calibration with our mobile calibration rigs. We even extend our calibration services to third-party equipment and some non-traditional flow disciplines to reduce time, effort and cost in terms of coordination and documentation.

Calibration services for Flow, pressure and tempertaure

Calibration Measurement Parameters

Parameter	Equipment type	Calibration location
Temperature	▪ Resistance thermometer ▪ Probe, temperature transmitter ▪ Probe, display	On-site In the laboratory
Pressure	▪ Manometer ▪ Pressure sensor ▪ Pressure transmitter	On-site In the laboratory
Flow	▪ Electromagnetic flowmeter ▪ Vortex flowmeter ▪ Coriolis flowmeter ▪ Ultrasonic flowmeter ▪ Thermal flowmeter ▪ Mechanical flowmeter	On-site In the laboratory
Conductivity	Conductivity measuring chain including cell, transmitter and cable	On-site In the laboratory
pH	pH measuring chain including cell, transmitter and cable	On-site In the laboratory
Other parameters	On request, we can calibrate other parameters. Please contact your local Endress+Hauser partner for further information	

Accredited facilities

Thanks to accredited laboratories installed in our factories and our service organization, we can offer the accredited calibration of:

- Flow
- Pressure
- Temperature measurement devices
- Voltage, current

On-site calibration

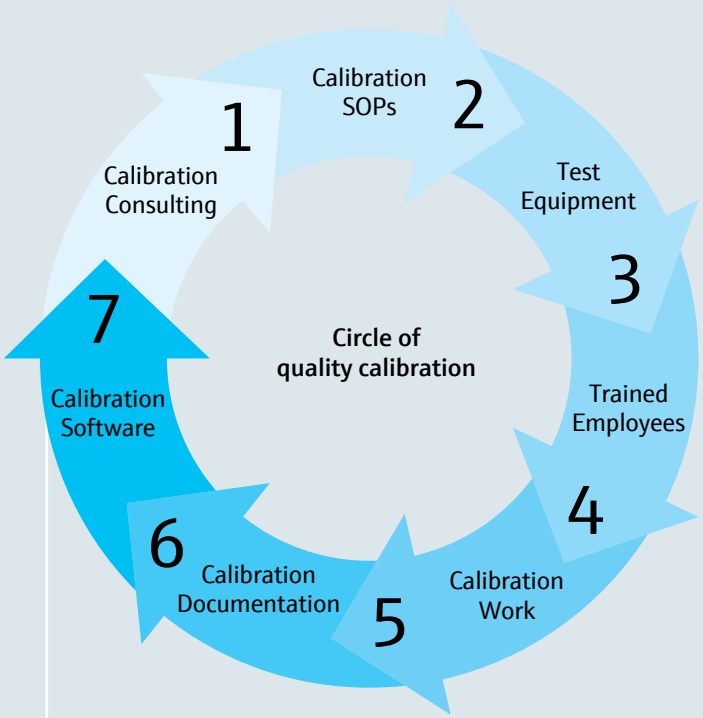
Having also invested in mobile reference tools and in the deployment of competent service organizations in many countries, Endress+Hauser can also perform on-site calibration — ask your local Sales Center about any specific requests.

ACCREDITED
Acc. to ISO 17025
Cert #1897.01/3041.01/3041.02

Quality calibration for your process lifecycle

Thanks to our numerous calibration laboratories and primary facilities, we have carried out more than one million calibrations.

Above all, we see our calibration service as part of your repair and maintenance planning. Our aim is to provide you with complete calibration management solutions. At the forefront of this is the tuning of calibration cycles, planning dates for carrying out calibration work, the coordination of personnel and certified calibration equipment.



1 Calibration consulting

Endress+Hauser will help you to assess your metrology plan by establishing your calibration specifications per parameter (maximum permissible errors, periodicities) or by defining the right reference tools according to their uncertainty. Together, we will work out which parameters have to be calibrated on-site and, in the case of high accuracy requirements, which instruments need laboratory calibration.

2 Calibration SOPs

We offer a full range of Standard Operating Procedures to support our on-site work. SOPs ensure that our work is repeatable all over the world. We also provide site specific SOP's noting which measuring parameters have to be calibrated on-site and in case of high acccuracy requirements, which need calibrating in the laboratory.

3 Test equipment

Local service centers provide a one-stop calibration and repair service to a wide range of test, measurement and process control instrumentation. So whether you need pressure, analytical, temperature or flow calibration, look no further. All of our facilities are traceable to national and international standards. This means you are guaranteed the highest level of service compliant with the ISO 17025 standard.

4 Trained employees

On-site calibration is performed by specialist, highly trained staff. This relieves your in-house maintenance staff from routine time-consuming tasks and allows them to focus on improving plant availability. For you this means reliable advice, optimum performance of your instruments and true cost-effectiveness.

5 Calibration work

Our primary calibration facilities operate and are accredited to ISO 17025 and are located around the world. We own and operate more calibration laboratories than any other instrumentation supplier. As a leading supplier of field instrumentation we not only can calibrate, but also quickly and efficiently adjust, repair or replace equipment that is failing to meet the specified criteria. Our specialists have the necessary skills and equipment to calibrate all makes of instruments.

6 Calibration documentation

We support our service with certified and traceable documentation. A calibration certificate compliant with the ISO 17025 standard is issued. It details all required data in form that is easy to understand. Importantly, it also satisfies all relevant authorities.

7 Calibration and Life Cycle Management software

Custom software tool that helps to control the scheduling activity around your installed base, providing traceable and auditable records.

Laboratory and on-site accredited calibrations

Endress+Hauser provides accredited calibrations in our laboratories in Greenwood, Indiana and Pearland, Texas. Accredited on-site calibration is also performed nationwide, using our mobile calibration rigs.

Calibration ensures that instrument measurements are accurate. For some processes, periodic calibration to NIST standards is a requirement to comply with quality and safety standards. We can help you stay in compliance with reducing your costs and increasing process up-time.

As a customer of Endress+Hauser, you can be sure that we are thoroughly familiar with all your needs regarding every aspect of calibration and measuring accuracy.

Experience in many industries over many years is reflected in our calibration service. Calibration is performed on Endress+Hauser instruments and various other manufacturers' as well.

What is accreditation

Accreditation is the formal recognition of a body's technical competence in performing specific services such as calibration. This recognition is issued by authorized bodies, often a national metrology authority working in strict compliance with comprehensive international codes of practice.

Acc. to ISO 17025
Cert #1897.01/3041.01/3041.02

ISO 17025 ISO/IEC 17025 is an internationally accepted standard, covering "general requirements for the competence of testing and calibration laboratories." ISO/IEC 17025 outlines the stringent requirements calibration facilities must meet to achieve and keep the accreditation which includes demonstrating that they operate a quality system, are technologically competent and are able to generate accurate results.

Scope of Accreditation The scope of accreditation includes the principles of flow, pressure and temperature for both laboratory and on-site calibration. Also included within the scope are electrical parameters associated with current, voltage, resistance and frequency pertaining to internal laboratory calibration. Please refer to the Scope of the Accreditation for specific measuring capabilities by visiting a2la.org (search "accredited organizations" for "Endress+Hauser").

The Calibration Certificate

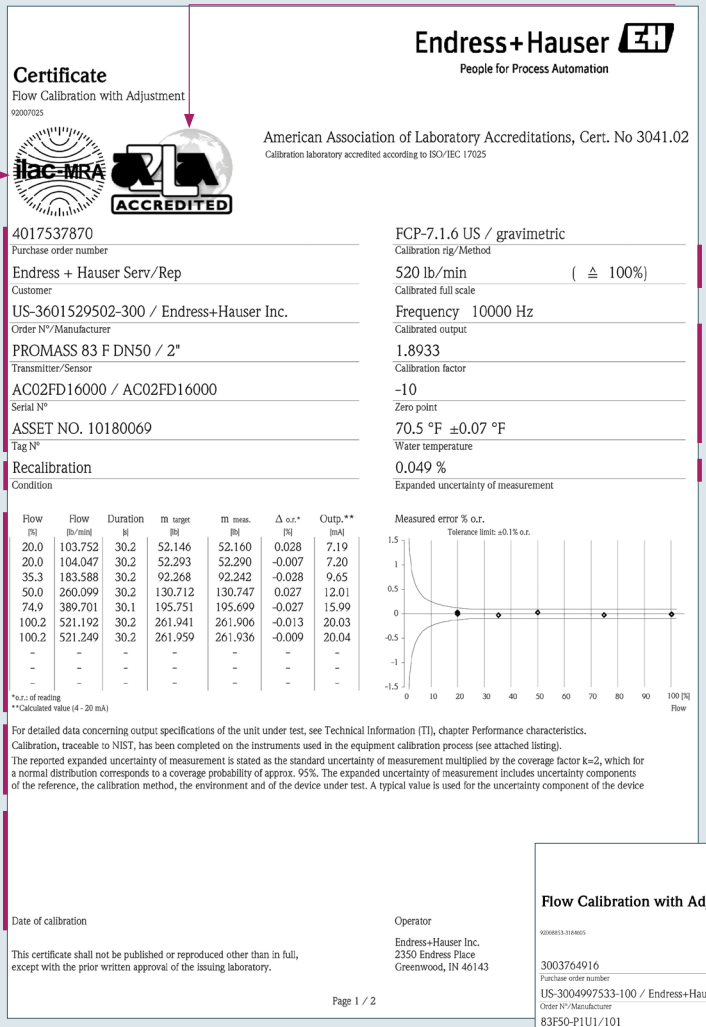
Often a meter will need an official calibration certificate, i.e. flow metering in regulated industries or for volume measure in large-bore water pipelines. For this reason, Endress+Hauser is an officially accredited calibration provider for the measured variable "flow" and performs calibration with A2LA, SCS or CNAS certification. These certificates are accepted in all ISO member states and consequently are invariably recognized and accepted by national authorities and in quality audits

Flow, Pressure and Temperature	Accredited Certificate	Standard Certificate
Accrediting Body ILAC Seal	✔	
Official Stamp of the National Authority/Calibration Service	✔	
Details of the Meter/Customer	✔	✔
Initial Calibration of Recalibration	✔	
All Results of Measurement	✔	✔
Additional Information About the Calibration References	✔	
Traceability and Measuring Uncertainty	✔	
Stamp/Signature Calibration Provider/Operator	✔	✔
Full Scale Value	✔	✔
Details on Calibration Measurement	✔	✔

Accredited Certificate

Official stamp of the national authority/calibration service. Proof that Endress+Hauser is accredited as a calibration provider in accordance with ISO/IEC 17025 and undertakes calibration in compliance with the applicable standards.

Accrediting body is a member of ILAC (International Laboratory Accreditation Cooperation)



Endress+Hauser
People for Process Automation

Certificate
Flow Calibration with Adjustment
92007025

American Association of Laboratory Accreditations, Cert. No 3041.02
Calibration laboratory accredited according to ISO/IEC 17025

4017537870 — Purchase order number
Endress + Hauser Serv/Rep — Customer
US-3601529502-300 / Endress+Hauser Inc. — Order N°/Manufacturer
PROMASS 83 F DN50 / 2" — Transmitter/Sensor
AC02FD16000 / AC02FD16000 — Serial N°
ASSET NO. 10180069 — Tag N°
Recalibration — Condition

FCP-7.1.6 US / gravimetric — Calibration rig/Method
520 lb/min (≙ 100%) — Calibrated full scale
Frequency 10000 Hz — Calibrated output
1.8933 — Calibration factor
-10 — Zero point
70.5 °F ±0.07 °F — Water temperature
0.049 % — Expanded uncertainty of measurement

Flow [%]	Flow [lb/min]	Duration [s]	m target [lb]	m meas. [lb]	Δ o.r.* [%]	Outp.** [mA]
20.0	103.752	30.2	52.146	52.160	0.028	7.19
20.0	104.047	30.2	52.293	52.290	-0.007	7.20
35.3	183.588	30.2	92.268	92.242	-0.028	9.65
50.0	260.099	30.2	130.712	130.747	0.027	12.01
74.9	389.701	30.1	195.751	195.699	-0.027	15.99
100.2	521.192	30.2	261.941	261.906	-0.013	20.03
100.2	521.249	30.2	261.959	261.936	-0.009	20.04
–	–	–	–	–	–	–
–	–	–	–	–	–	–
–	–	–	–	–	–	–

*o.r.: of reading
**Calculated value (4 - 20 mA)

Measured error % o.r.
Tolerance limit: ±0.1% o.r.
Flow

For detailed data concerning output specifications of the unit under test, see Technical Information (TI), chapter Performance characteristics.
Calibration, traceable to NIST, has been completed on the instruments used in the equipment calibration process (see attached listing).
The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approx. 95%. The expanded uncertainty of measurement includes uncertainty components of the reference, the calibration method, the environment and of the device under test. A typical value is used for the uncertainty component of the device

Date of calibration

Operator
Endress+Hauser Inc.
2350 Endress Place
Greenwood, IN 46143

This certificate shall not be published or reproduced other than in full, except with the prior written approval of the issuing laboratory.

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Details of the meter/customer

Initial calibration or recalibration

All results of measurement

Additional information about the rig, traceability and measuring uncertainty

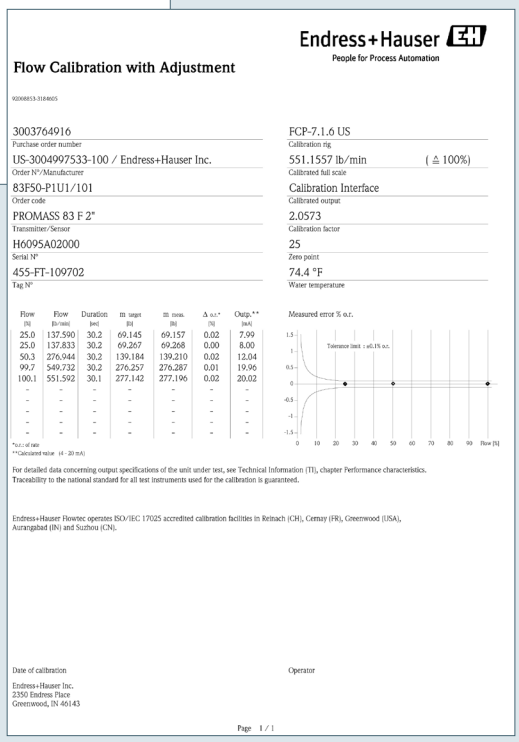
Stamp / Signature Calibration provider / Operator

Full scale value (standard or customer-specific)

Details on calibration measurement

Measuring uncertainty of calibration rig plus reproducibility of the meter tested

Standard Certificate



Endress+Hauser
People for Process Automation

Flow Calibration with Adjustment
92008853-316805

3003764916 — Purchase order number
US-3004997533-100 / Endress+Hauser Inc. — Order N°/Manufacturer
83F50-P1U1/101 — Order code
PROMASS 83 F 2" — Transmitter/Sensor
H6095A02000 — Serial N°
455-FT-109702 — Tag N°

FCP-7.1.6 US — Calibration rig
551.1557 lb/min (≙ 100%) — Calibrated full scale
Calibration Interface — Calibrated output
2.0573 — Calibration factor
25 — Zero point
74.4 °F — Water temperature

Flow [%]	Flow [lb/min]	Duration [sec]	m target [lb]	m meas. [lb]	Δ o.r.* [%]	Outp.** [mA]
25.0	137.590	30.2	69.145	69.157	0.02	7.99
25.0	137.833	30.2	69.267	69.268	0.00	8.00
50.3	276.944	30.2	139.184	139.210	0.02	12.04
99.7	549.732	30.2	276.257	276.287	0.01	19.96
100.1	551.592	30.1	277.142	277.196	0.02	20.02
–	–	–	–	–	–	–
–	–	–	–	–	–	–
–	–	–	–	–	–	–
–	–	–	–	–	–	–
–	–	–	–	–	–	–

*o.r.: of rate
**Calculated value (4 - 20 mA)

Measured error % o.r.
Tolerance limit ±0.1% o.r.
Flow [%]

For detailed data concerning output specifications of the unit under test, see Technical Information (TI), chapter Performance characteristics.
Traceability to the national standard for all test instruments used for the calibration is guaranteed.

Endress+Hauser Flowtec operates ISO/IEC 17025 accredited calibration facilities in Reinach (CH), Cernay (FR), Greenwood (USA), Aurangabad (IN) and Suzhou (CN).

Date of calibration

Operator

Endress+Hauser Inc.
2350 Endress Place
Greenwood, IN 46143

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Laboratory calibrations

Our laboratory calibration facilities are located in Greenwood, Indiana (near Indianapolis), and Pearland, Texas (near Houston). These facilities house state-of-the-art calibration tools in order to provide the most accurate calibration results. We work in collaboration with our production centers and our authorized service providers to ensure reliable outcomes for our customers.

Greenwood, Indiana

Calibration Capabilities

Flow (Liquid)

Principle	Min. MPE (o.r.)	Size	Uncertainty (o.r.)	Certificate
Coriolis	±0.1%	½" to 10" (DN15 to DN250)	±0.05%	1
	±0.1%	1/24" (DN01)	±0.05%	
Coriolis – Premium*	±0.015%/0.05%	1/12" to 10" (DN02 to DN250)	±0.015%*	2
Electromagnetic	±0.2%	½" to 12" (DN15 to DN300)	±0.1%	1
	±0.2%	1/12" to 42" (DN02 to DN 1050)	±0.1%	2
Vortex	±0.75%	½" to 12" (DN15 to DN300)	±0.25%	1
Ultrasonic – In-line	±0.5%	1" to 6" (DN25 to DN150)*	±0.2%	1
	±0.5%	14" to 48" (DN350 to DN1200)	±0.2%	2
Ultrasonic – Clamp On	±2%	2" to 4" (DN0 & DN100)	±0.5%	Verification only

*Coriolis – Premium calibration can only be executed on Endress+Hauser flowmeters
MPE = Maximum Permissible Error
o.r. = of reading

1. Certificate #3041.02 – Service Center Greenwood – All manufacturers
2. Certificate #1897.01 – Production Center Greenwood – Endress+Hauser flowmeters only

Flow Range

Location	Type	Min*	Max*
Service Center	Mass Flow Rate	13.2 lb./m (0.1 kg/s)	25,133 lb./m (190 kg/s)
	Volume Flow Rate	1.58 gal./m (0.1 l/s)	3,021 gal./m (190 l/s)
	Low Flow Rate	8 ml/min	100 ml/min
Production Center	Mass Flow Rate	2.65 lb./m (0/02 kg/s)	87,303 lb./m (660 kg/s)
	Volume Flow Rate	0.32 gal./m (0.02 l/s)	10,493 gal./m (660 l/s)

*Minimum and maximum flow ranges are line size dependent

Flow (Air)

Uncertainty	≤± 0.3%
Flow Rates	0-8265 lb./hour (0-3750 kg/hour)
Pressure	± 0.72 psia (±50 mbarA)
Temperature	≤± 0.54 °F (≤± 0.3 °C)
Relative Humidity	≤45%
Line Sizes	½" to 4" (inline devices) DN15- DN100; ≥4" (insertion devices) ≥DN100
Instruments Support	T-mass A150, t-mass B 150 t-mass 65F, t-mass 65I

Pressure

Principle	Min. MPE	Size	Uncertainty
Gauge – Pneumatic	±0.040% o.f.s.	-13.1 to 1500 psig (130 bar)	±0.013% o.f.s.
Absolute	±0.040% o.f.s.	1.6 to 1515 psia (110 mbarA to 104 barA)	±0.013% o.f.s.
Differential	±0.040% o.f.s.	-15 to 1500 psid (-1 to 103 bard)	±0.013% o.f.s.
Gauge – Hydraulic	±0.040% o.f.s.	600 to 10,000 psi (41 to 689 bar)	±0.013% o.f.s.

Temperature

Principle	Min. MPE	Size	Uncertainty
Transmitter with RTD/ Thermocouple"	±0.45 °F (0.25 °C)	-22 to 392 °F (-30 to +200 °C)	±0.06 °F (0.03 °C)

o.f.s= of full scale
MPE= Maximum Permissible Error

Pearland, Texas

Calibration Capabilities

Flow (Liquid)

Principle	Min. MPE (o.r.)	Size	Uncertainty (o.r.)	Certificate
Coriolis	±0.1% o.r.	1/12" to 10" (DN02 to DN250)	±0.05% o.r.	3
Coriolis – Premium*	±0.05% o.r.	1 1/2" to 3" (DN40 to DN80)	±0.015% o.r.	3
Electromagnetic	±0.2% o.r.	1/8" to 12" (DN04 to DN300)	±0.1% o.r.	3
Vortex	±0.75% o.r.	½" to 4" (DN15 to DN100)	±0.25% o.r.	3
Ultrasonic – In-line	±0.5% o.r.	1" to 6" (DN25 to DN150)	±0.2% o.r.	3
Ultrasonic – Clamp On	±2% o.r.	2", 4", & 6" (DN50, DN100, & DN150)	±0.5% o.r.	Verification only

*Coriolis – Premium calibration can only be executed on Endress+Hauser flowmeters
o.r. = of reading
3. Certificate #3041.01- Service Center Pearland – All Manufacturers

Flow Range

Location	Type	Min*	Max*
Service Center	Mass Flow Rate	0.1097 lb./m (0.00083 kg/s)	17,196 lb./m (130 kg/s)
	Volume Flow Rate	0.01316 gal./m (0.00083 l/s)	2060 gal./m (130 l/s)

*Minimum and maximum flow ranges are line size dependent

Pressure

Principle	Min. MPE	Size	Uncertainty
Gauge – Pneumatic	±0.040% o.f.s.	-14.5 to 600 psig (41.3 barg)	±0.013% o.f.s.
Absolute	±0.040% o.f.s.	0.13 to 615 psia (8.9 mbarA to 42 bara)	±0.013% o.f.s.

Temperature

Principle	Min. MPE	Size	Uncertainty
Transmitter with RTD/ Thermocouple"	±0.45 °F (0.25 °C)	-22 to 392 °F (-30 to +200 °C)	±0.06 °F (0.03 °C)

o.f.s= of full scale
MPE= Maximum Permissible Error

Nationwide on-site calibration

Endress+Hauser, in collaboration with its Authorized Service Providers, executes on-site calibration by using the state-of-the-art calibration technologies installed in our mobile calibration rigs. On-site calibrations can take place across the nation, through our elaborate network of certified calibration technicians and over 20 mobile calibration rigs.

On-Site Calibration Capacities

Flow (Liquid)

Principle	Min. MPE	Equipment/ Range	Uncertainty
Mass (Coriolis)	±0.25% o.r.	Portable In-line care, Line Size 1/12"-3" (DN02-DN80) Standard 2-point calibration	±0.12% o.r.
Volumetric (Magmeter & Vortex)	±0.5% / ±1.5% o.r.	Portable Mobile Rig, Line Size 3/8"-2" (DN08- DN50) Standard 2-point calibration	±0.17% o.r.
Flow Verification	With Heartbeat Technology® or Ultrasonic Clamp-on (liquid only)		

Pressure and Temperature

Principle	Min. MPE	Equipment/ Range	Uncertainty
Pressure	±0.14% o.f.s.	With Mobile Calibrations –15 to 5,000 psig (-1 to 345 bar) Standard 1- or 2-point calibration	±0.044% o.f.s.
Temperature	±0.48°F	With Mobile Calibrators 23 to 707 °F (-5 to 375 °C) Standard 1- or 2-point calibration	±0.16 °F

MPE= Maximum Permissible Error
o.r.= of reading
o.f.s.= of full scale

1. Accuracy statement based on best uncertainty of reference equipment test (UUT) with a calibration measurement capacity of at least 2:1
2. Depending on customer's capabilities
3. Pressure minimum MPE is dependent on range, may be lagrer in draft ranges
4. Temperature minimum MPE is based on oil bath, may be larger in dry block

Fulfilling the needs of all industries

Does the instrumentation that controls your critical quality processes need regular checking, validation and calibration? Do you need cost-effective service that is fast, high quality, traceable and accredited? Do you need clear and concise calibration certificates?

Endress+Hauser covers all these critical aspects and can perform and advise on all aspects of calibration from in-situ testing to sully accredited factory calibration. We calibrate your equipment at just the right time for you. This ensures optimal process performance at minimum cost.






Oil & gas industries
- On-site flow calibration rigs up to 2" (3" in-line)
- Laboratory calibration of all kinds of custody transfer devices
- Laboratory calibration of flowmeters up to 48"

Enviromental industry
- Verification of flowmeters
- Laboratory calibration of custody transfer instruments
- Laboratory calibration of flowmeters up to 48"

Life sciences industry
As a compliant partner, we:
- Perform calibration of process measuring points according to cGMP regulations and universal guidelines
- Document any service provided
- Prove traceability by ensuring the conformity to Standard Operating Procedures
- Keep service staff trained to GMPs and SOPs.

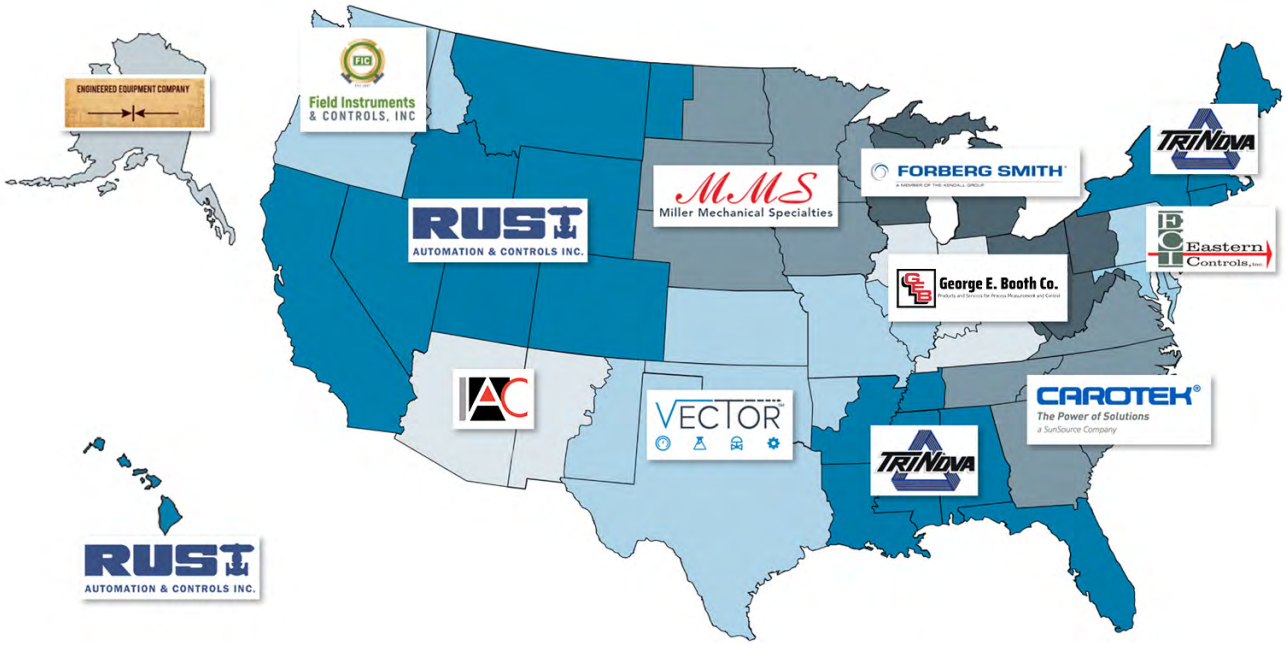
Food & beverage industries
- Calibration within regulatory requirements
- Calibration management strategies to support production costs concepts

Chemical industries
- On-site flow calibration rigs up to 2" (3" in-line)
- Perform calibration of process measuring points
- Laboratory calibration of flowmeters up to 48"

Renewable fuels industry
- On-site flow calibration rigs up to 2" (3" in-line)

How to get started with Endress+Hauser calibration services

It's easy!



Choose any of the following options to get started:

Contact your local sales representative

Visit Calibration services for Flow, pressure and tempertaure webpage

- Fill out our online Calibration Inquiry Form
- Download a calibration data sheet

www.addresses.endress.com

CP01428H/60/EN/02.22

Endress+Hauser

People for Process Automation