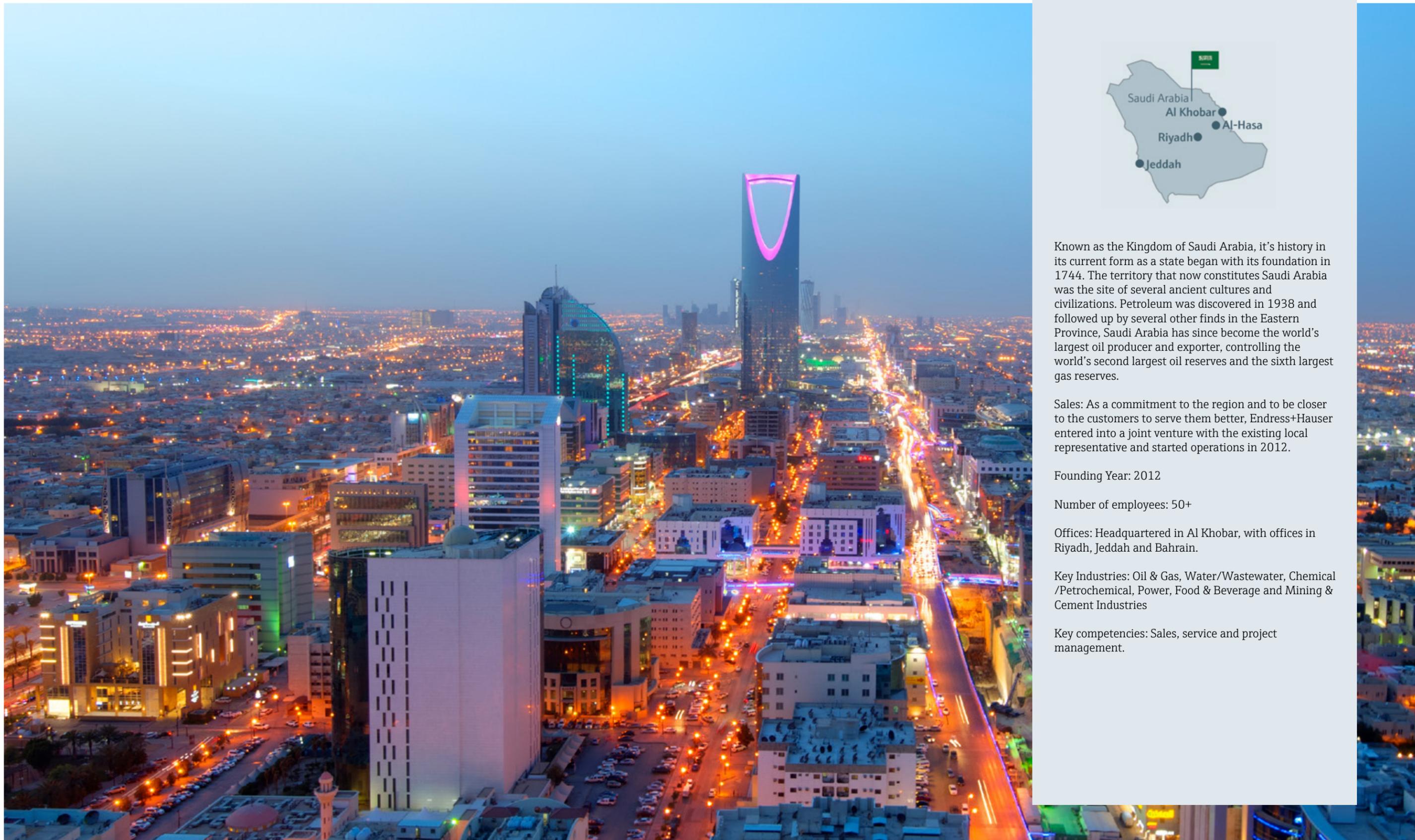


Meet all your calibration and training needs under one roof
State-of-the-art calibration and training center in Jubail, Saudi Arabia





Known as the Kingdom of Saudi Arabia, its history in its current form as a state began with its foundation in 1744. The territory that now constitutes Saudi Arabia was the site of several ancient cultures and civilizations. Petroleum was discovered in 1938 and followed up by several other finds in the Eastern Province, Saudi Arabia has since become the world's largest oil producer and exporter, controlling the world's second largest oil reserves and the sixth largest gas reserves.

Sales: As a commitment to the region and to be closer to the customers to serve them better, Endress+Hauser entered into a joint venture with the existing local representative and started operations in 2012.

Founding Year: 2012

Number of employees: 50+

Offices: Headquartered in Al Khobar, with offices in Riyadh, Jeddah and Bahrain.

Key Industries: Oil & Gas, Water/Wastewater, Chemical /Petrochemical, Power, Food & Beverage and Mining & Cement Industries

Key competencies: Sales, service and project management.

Importance of calibration

Regular calibration is essential to ensure that the measuring instruments controlling your quality-critical processes remain in spec and compliant to industry standards

Fluctuating measurements can have an impact on process stability and operating costs and potentially have legal and regulatory consequences. Yet the needs of every industry are different.

Therefore Endress+Hauser offers a full range of calibration services, from laboratory calibration to on-site calibration and verification. Whatever your requirements, you can count on us!

With regular calibration you can enjoy the following benefits:

Compliance

- Document accessibility & traceability
- Calibration quality according to ISO 17025 (based on local accreditation bodies),
- Advice on metrological specifications leading to reduced non-conformities.
- Root cause analysis of non-conformities
- 100% audit ready documentation
- Deviations managed, zero devices out of spec

Quality

- Maintaining the device accuracy during its life cycle
- No missed calibrations through adherence scheduled work orders
- Support to define metrological specifications with strong E+H application knowledge
- Support to define metrologic



Productivity

- Effective utilization of process shortage thanks to full basket of calibration services on-site
- Minimize production losses by keeping processes within tight tolerance limit during plant life cycle
- Cost effective remedies when necessary (e.g. repair, adjustment, quick replacement suggestions, check third party devices etc).
- Integrate relevant calibration information into business systems to
- make business processes more efficient
- enerate timely, complete, consistent and compliant asset information through KPIs dashboards allowing managerial decisions

Availability

- Utilization of planned plant downtime
- Optimize resource utilization
- Reduce calibration time per device
- Calibration activities aligned to production schedule

Safety

- Prevent human and environment damages with accurate process
- Proper calibration of devices to allow safe working environment

No matter where you are around the world and whatever the industry, we are always by your side. Our global service force of over 1,000 experts is strategically located worldwide ensuring active local presence to meet all your service needs – a unique offering`.

Receive the same high-level of performance worldwide

You can benefit from fully traceable on-site calibration and accredited laboratory calibration across a wide variety of measuring principles. The same calibration services, traceable to national standards, are available in more than 60 countries, covering all manufacturers' equipment.

More information at www.mesc.endress.com/services

State-of-the-art calibration and training center in Jubail, KSA

Meet all your calibration & training needs under one roof!

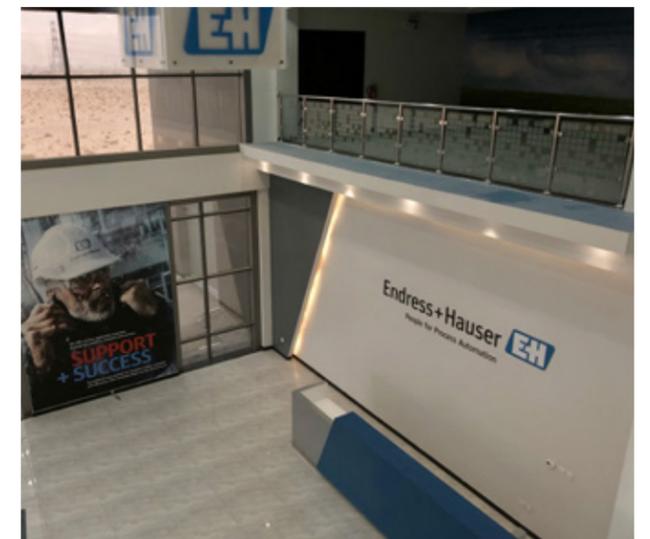
A smooth & safe running plant and costs down to a minimum is always a priority for our customers. We understand that this prerequisite is serious and measurement precision is critical.

Recognizing this need, Endress+Hauser has taken a step towards ensuring that this requirement is met quickly & effectively.

Spread across 2,700 sq mts of space, a state-of -the-art calibration & training center has been set up in Jubail, Saudi Arabia.

A dedicated team is available to take care of all your requirements including on-site calibration and verification. The service technicians are trained according to the industry standards.

The facility has been designed to stringent quality standards. This calibration and training center has the capacity and the capability to serve the entire GCC region – meeting all customer requirements of calibration & training under one roof!



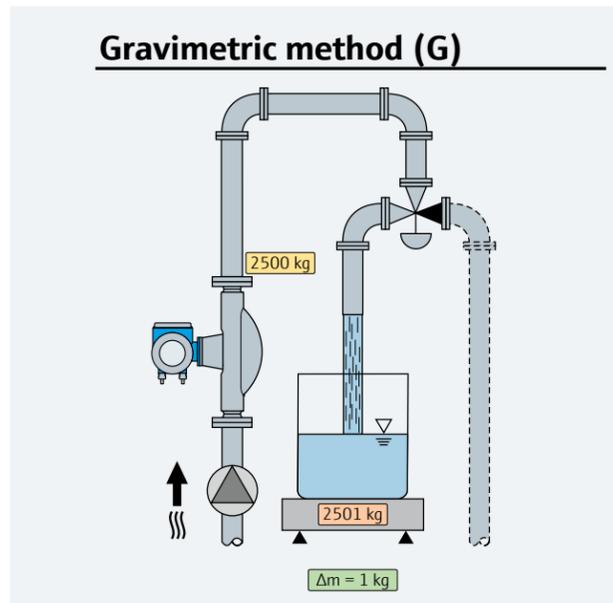
✓ **One & only vendor managed gravimetric calibration facility in the GCC region**
traceable to the highest international standards and accredited to ISO 17025*.

✓ **Gravimetric calibration offers many advantages:**

- Gives Best measurement uncertainties
- In line with API MPMS (Chap 5, sec. 6, appendix B)
- Traceability to international standards

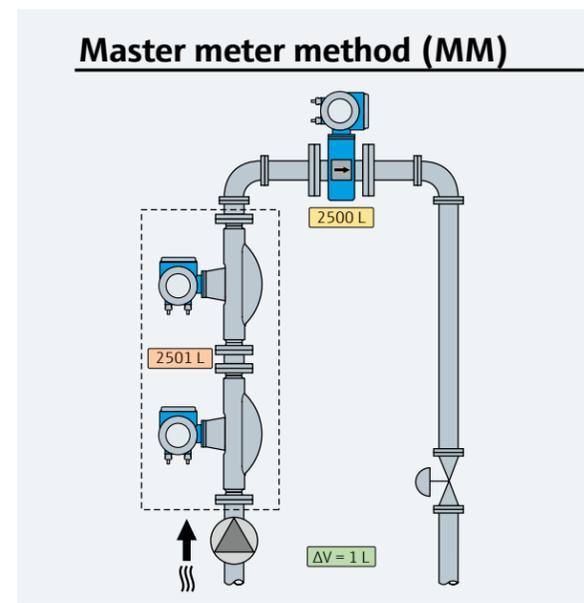
Laboratory calibration capabilities

Jubail, KSA



Gravimetric method (G) This measurement principle consists of a steady flow source, a test section of piping holding the Device Under Test (DUT), a flow diverter valve and a collection vessel mounted on a weighing system. The diverter directs the flow either to the collection vessel or to a supply tank.

Best measurement uncertainty: ±0.05%



Master meter method (MM) This method of a master meter calibration is quite suitable when a flowmeter and/or the user application does not demand the highest accuracy that is provided by gravimetric and/or volumetric primary standards.

Best measurement uncertainty: ±0.08%

Laboratory calibration capabilities

Parameter	Equipment	Uncertainty
Pressure	MC6Beamex	0.01% FS + 0.025%RGD = 0.035%
Temperature	MC6 + PT 100	0.2 C combined
Flow	Gravimetric	target value: ±0.05% (flow range: 0.2 dm ³ /s ... 10 dm ³ /s)

On-site calibration: save time, money and effort!

Located in Saudi Arabia

On-site calibration is performed by specialist, highly trained engineers. Convenient and cost-effective, it removes the need to send instruments off site as our specialists come to you, keeping downtime to an absolute minimum. It also offers the highest flexibility as calibration can be scheduled according to the availability of each of your devices. Our qualified and experienced field service engineers can diagnose faults there and then, performing adjustment and recalibration instantly where necessary. Having our engineers on your site also offers the benefit of direct communication with your staff and means that calibration takes place close to the operating conditions.

All Endress+Hauser on-site calibrations are traceable to international standards and calibration certificates are ISO 17025 compliant.



On-site calibration capabilities

Flow (Liquid)	Uncertainty	Equipment / Range
Mass (i.e. Coriolis)	±0.11%	Portable Mobile Rig Line Size 3/8" - 2"
Volumetric (i.e. Mag meter & Vortex)	±0.16%	(DN08 to DN50) Standard 2-point calibration

Benefits at a glance!

- Instruments remain at site – no logistics or packing required and plant availability is increased
- Fast turnaround time – calibration can include immediate adjustments, repairs, replacement suggestions and other maintenance work – this saves time and money
- Customer witness possible
- Calibration carried out by certified service experts

Develop your skills to work smarter

Meet all your training needs and enhance your performance under one roof!

Endress+Hauser recognizes the need to provide high quality skills training to help you optimize the effectiveness of your instruments over a long working life. Whether it's helping your staff understand the measurement principles or teaching advanced diagnostics and long-term asset management, we have the facilities and the expertise to work with you to meet all your training requirements.



Benefits:

- Modern, state-of-the-art training facilities offering both theoretical and practical, hands-on training.
- Training packages can be tailored to suit your needs.
- Training delivered by subject matter experts
- All your training needs catered for in one dedicated space

The training center includes:

- A 12-seater classroom with state-of-the-art audiovisual equipment to ensure a modern and comfortable learning environment. Interactive software and AV equipment allow all participants to actively take part.
- A purpose-built workshop allows you to get hands-on with the equipment. All power supplies, test equipment and measurement evaluation tools are close at hand. Learn to maintain, fault-find, repair and reconfigure instruments at your own pace.



Training Rig at the training center in Jubail, KSA

- ✓ Find out more about the courses we offer or to discuss your individual training requirements.

Our experts are always at hand to understand your needs and fulfill your necessities.

- More information at <https://www.mesc.endress.com/trainingME>

- ✓ Learn at your own convenience Ask questions, get answers!

Join us for our free webinars covering a wide range of process automation topics, anytime, anywhere

- More information at <https://www.mesc.endress.com/services>

Foundation fieldbus technology training

A hands-on based course, recognized in all industries



Number of participants
Max. 8

Duration
3 days

Location
On-site at location desired or
at Endress+Hauser Arabia LLC
Al Khobar 31952
Saudi Arabia

Contact and registration
Please contact
Mr. Naga Sekhar Chandagani
Service Manager
naga.chandagani@sa.endress.com
Mobile: + 966 59 721 96 02
or
Mr. Suresh Subramanyan
Training Manager
suresh.subramanyan@sa.endress.com
Mobile: +966 59 969 81 66



Target Group

- Technicians
- Maintenance Technicians
- Service/Support Specialists
- Supervisors
- Programmers/Device Configurators
- Engineers

Goal

At the end of the course you will be able to design and commission a FOUNDATION Fieldbus network. You will also understand the benefits of the technology and know the procedure for troubleshooting.

The training is Endress+Hauser certified.

Prerequisites

Basic knowledge of electronics and ability to use a computer.

Content

You will learn with the help of actual hands-on tasks, how FOUNDATION Fieldbus technology works in detail. Features like control in the field are shown as well as device configuration via DTM.



Theory

- Organization of the Fieldbus Foundation
- From analog to digital communication
- FOUNDATION Fieldbus physical layer (H1, HSE)
- Types of wires and components
- Grounding and shielding concept
- FISCO, Ex-concepts
- Segment calculation (voltage, current loads, number of devices)
- FOUNDATION Fieldbus communication method
- Device identification
- Device Descriptions (DDs)
- Link Active Scheduler (LAS) capabilities
- Device integration procedure
- Resource, transducer blocks
- Function block types and parameters

Practice

- Wiring of FOUNDATION Fieldbus segments
- Device integration
- Creating control strategies
- Device configuration via DD and DTM
- Signal measurement with oscilloscope
- Bus analysis with the latest tools
- Procedures for troubleshooting
- Device replacement

Fulfilling the needs of all industries



- Oil & gas industries**
- On-site flow calibration rigs up to 2"
 - Laboratory calibration of all kinds of custody transfer instruments
 - Laboratory calibration of flowmeters

- Water Waste Water industry**
- Verification of flowmeters
 - Laboratory calibration of custody transfer instruments
 - Laboratory calibration of flowmeters

- Food & beverage industries**
- Calibration within regulatory requirements
 - Calibration management strategies to support production costs concepts
 - Perform calibration of process measuring points

- Power industry**
- On-site flow calibration rigs up to 2"
 - Laboratory calibration of all kinds of custody transfer instruments
 - Laboratory calibration of flowmeters

- Chemical industries**
- On-site flow calibration rigs up to 2"
 - Laboratory calibration of flowmeters

- Renewable fuels industry**
- On-site flow calibration rigs up to 2"

Endress+Hauser performs instrument calibrations across a variety of measuring principles. We even extend our calibration service to third party equipment to reduce time, effort and cost in terms of coordination and documentation.



Parameter	Equipment type
Chart Cell Default	<ul style="list-style-type: none"> Resistance thermometer Probe, temperature transmitter Probe, display
Pressure	<ul style="list-style-type: none"> Manometers Pressure sensors Pressure transmitters
Flow	<ul style="list-style-type: none"> Electromagnetic flow Vortex flowmeters Coriolis flowmeters Ultrasonic flowmeters Mechanical flowmeters

Calibration and verification

Our services at a glance

	Calibration (Factory)	Calibration (Laboratory)	On-site calibration
Chart Cell Default			
Method / Test equipment	<p>Stationery calibration facilities</p> <ul style="list-style-type: none"> Gravimetric (G) measurement with weighing system Pressure sensors Master meter (MM) method with Coriolis flowmeters or mag meters as reference 	<p>Stationery calibration facilities</p> <ul style="list-style-type: none"> Gravimetric (G) measurement with weighing system Pressure sensors Master meter (MM) method with Coriolis flowmeters as reference 	<p>Mobile calibration facilities</p> <ul style="list-style-type: none"> Comparison with in series master meter Mobile calibration rig with Coriolis flowmeters as reference (mass, volume)
Traceability	To international standards (accreditation according to ISO/IEC 17025)	To international standards (accreditation according to ISO/IEC 17025)	Reference meter is traceable to ISO/IEC 17025
Maximum measurement uncertainty	G: ±0.015% (Premium Cal) ±0.05% (Standard) V: ±0.022 to ±0.05% MM: ±0.08%	Gravimetric: ±0.05% Master Meter: ±0.08%	Mass: ±0.11% Volume: ±0.16%
Calibration / Verification points	3 or 5 points (more on request)	3 or 5 points (more on request)	3 or 5 points (others on request)
Time required (per device)	2 to 5 days in house (depending on nominal diameter)	1 to 3 days in house (depending on nominal diameter)	1 to 2 hours per measuring point (depending on plant type, with/without bypass, nominal diameter, etc.)
Benefits	<ul style="list-style-type: none"> Highest level of accuracy Calibration over a wide range of nominal diameters 	<ul style="list-style-type: none"> Local presence in the KSA Shorter turnaround time 	<ul style="list-style-type: none"> Shorter turnaround time Local presence in KSA

i Heartbeat Technology

This verification functionality, integrated into all new Proline flowmeters, allows you to monitor your device permanently and verify its performance at any time - guaranteeing high measurement quality:

- Audited and attested self-monitoring and verification (by TUV)
- Without process interruption
- Metrologically traceable
- Seamless quality documentation according to ISO 9001



Confidence thanks to traceability

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

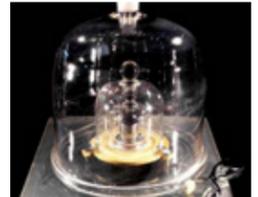
“Only fully traceable calibration rigs according to ISO/IEC 17025 can really be trusted.” Is that true? Yes, because comparisons between devices under test, calibration rig, test equipment and a country’s highest national standard are the only way of conclusively establishing

end-to-end traceability of measured values - and consequently, of the measurement uncertainty stated by the device manufacturer. This is one of the main reasons why Endress+Hauser has had all flow calibration rigs accredited.

	Calibration (Factory)	Calibration (Laboratory)	On-site calibration
Chart Cell Default			
Method / Test equipment	Heartbeat Verification <ul style="list-style-type: none"> ■ Verification function integrated into the measuring electronics ■ Available for flowmeters of the new Proline generation (Proline 100, 200, 300, 400, 500) 	Fieldcheck tester/simulator <p>Verification measurement with Fieldcheck (external tester and simulator)</p>	Ultrasonic clamp-on sensors <p>Control measurement from the outside with clamp-on ultrasonic flow sensors</p>
Traceability	Traceable, device-internal references	Traceable test instrument	Not traceable because clamp-on sensor and pipe do not form an entire unit.
Maximum measurement uncertainty	Verification ensures that measuring device operates within specified accuracy of diagnosis coverage > 95% (rate of undiscovered dangerous errors < 5% in compliance with IEC 61508)	Depending on process conditions	Depending on process conditions
Time required (per advice)	2 minutes	Approx. 15 to 45 minutes	Approx. 1 hour
Benefits	Regulation-compliant verification of the entire signaling chain: <ul style="list-style-type: none"> ■ Integrated function, always accessible ■ Simple handling ■ No process interruption ■ Output of electronic test report (Attestation by TUV for traceability) 	<ul style="list-style-type: none"> ■ Meter is not removed for testing ■ Results automatically logged ■ Traceable instrument ■ Conclusions can be drawn with regards to stability and operability of the device under test 	<ul style="list-style-type: none"> ■ Meter is not removed for testing ■ Measurement from outside, directly on the pipe ■ Particularly suitable for: <ul style="list-style-type: none"> - large-bore pipes - chemically aggressive fluids ■ Customer witness possible

The International Prototype Kilogram (at BIPM, France)

- International Prototype Kilograms (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 Sevres near Paris (France).
- In 1950, 1991 and 2003 comparison measurements for verification took place between the IPK and Switzerland’s replica no. 38.
- Measurement uncertainty: ±0.000001% (±10 micrograms)



±0.000001%

The national standard (national institute of metrology)

- Verification of 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)
- Measurement 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 to Switzerland’s replica no. 38 of the IPK every 10 years



±0.000001%

The gravimetric method (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)
- Measurement uncertainty of the reference weights (class F2): ±0.0016%



±0.0016%

The calibration rig (Endress+Hauser)

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



±0.0015%

The meter (in customer’s process plant)

- Promass F/Q for metering mass flow (example):
 - Exact balancing of fluids
 - Precise dosing of costly active ingredients
- Max. measured error: ±0.05%
- Reference meter for on-site calibration



±0.05%

The calibration certificate

Accuracy certified in black and white

Endress+Hauser subjects all its flowmeters to continuous quality checks throughout production and tests, calibrates and adjusts them on the world's most advanced calibration rigs. As proof of successful standards-compliant calibration, a certificate is issued for each meter. This certificate states the measuring accuracy achieved by the meter and contains information on the calibration factors determined by testing.

The standard calibration procedure calls for testing at two or three measuring points. If a calibration according to ISO/IEC 17025 is required, then this number is increased to five measurement points, or can be defined by the customer. All production and calibration data are saved and archived for a minimum of 10 years

Example of calibration certificate

- 1 **Flow calibration without adjustment:**
This is the relationship between the flow quantity provided by the reference system (calibration rig) and the measurement yielded by the flowmeter under test.
- 2 **Flow calibration with adjustment:**
Correction of the flowmeter's measurement offset once it is calibrated
- 3 Official stamp of the national accreditation body/calibration service. Proof that Endress+Hauser accredited as a calibration provider in accordance with ISO/IEC 17025 and undertakes calibration in compliance with applicable standards.
- 4 SAS is a member of ILAC (International Laboratory Accreditation Corporation)
- 5 Details of the meter/customer
- 6 Indication whether first-time calibration or recalibration
- 7 Measurement results
- 8 Additional information about the rig traceability and measuring uncertainty
- 9 Stamp/Signature Calibration provider/Operator
- 10 Full scale value (standard or customer-specific)
- 11 Calibration parameters
- 12 Expanded measurement uncertainty

Certificate
Flow Calibration with Adjustment
N° 10052063

ILAC-MRA **SWISS CALIBRATION**

3009255951
Purchase order number
ENDRESS+HAUSER
Customer
DE-3005197080-270 / Endress+Hauser Flowtec AG
Order #/Manufacturer
PROMASS 84 F 10*
Identification number
J6051B02000 / J6051B02000
Serial #
FT001
Tag #
New
Condition

Endress+Hauser

People for Process Automation

Swiss Calibration Service, Accreditation N° SCS 052
Calibration Laboratory accredited by the Swiss Accreditation Service (SAS) according to ISO/IEC 17025

FCP-7.1.5 / gravimetric
Reference: Calibration rig/Method
360 l/h (± 100%)
Calibrated full scale
Service Interface
Calibrated output
0.06333
Calibration factor
23
Zero point
24.9 °C
Water temperature
0.025 %
Expanded uncertainty of measurement

Flow (l)	Flow (l/h)	Duration (s)	Flow (l)	Flow (l/h)						
20.1	72.250	75.0	1.5059	1.5062	0.004	7.21				
34.8	125.105	43.0	1.4953	1.4952	-0.006	9.56				
49.5	178.030	50.5	2.4974	2.4974	0.003	11.91				
74.9	269.557	33.4	2.5020	2.5021	0.003	15.98				
99.6	358.428	35.2	3.5063	3.5064	0.002	19.93				

Measured error % o.u.

Stamp: 03.07.2014
Date of calibration

Operator: J. Kachirayll
Head: E. Mäder

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

Endress+Hauser Flowtec AG
Klingensmatt 7 / Rue de Fribourg 35
CH-4153 Reinach / F-48700 Cernay

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Endress+Hauser - Your reliable partner

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

Company-owned sales centers and dedicated representatives bring our expertise to markets and customers around the world. They take care of local sales, services and engineering.

Endress+Hauser supports its customers in optimizing their processes in terms of reliability, safety, economic efficiency and environmental impact across industries.

Our production centers are the knowledge hubs for their respective fields of activity. These entities are responsible for marketing, research and development and production. We produce in all major economic regions of the world. This allows us to quickly and flexibly supply our customers anywhere in the world.

Support and service centers enable this global network, which is managed and coordinated from Reinach in Switzerland, to deliver our services with the same quality all over the world.

At a glance!

- Family company founded in 1953
- Sales centers in 50 countries
- Representatives in over 70 other countries
- Production in 12 countries and at 26 locations
- Global workforce of 13,000
- Working closely with all industries
- 7000 patents and patent applications
- Holding company headquartered in Switzerland
- International and regional support structures
- Worldwide uniform quality standards

For more information, visit our website:

www.mesc.endress.com

Free and mobile access to your specific device information

Our operations app offers:

- Easy access to up-to-date product information wherever you are, whenever you need it.
- Active management of your installed base (information on phase-out instrumentation etc).
Available for iPhone, iPad on the App store and Android smartphones on Google play.



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CP01349H/59/EN/01.18