# ABB INSTRUMENTATION BOOK OF INNOVATIONS

Driving the future of measurement technology



ENGINEERED
TO OUTRUN

## INTRO

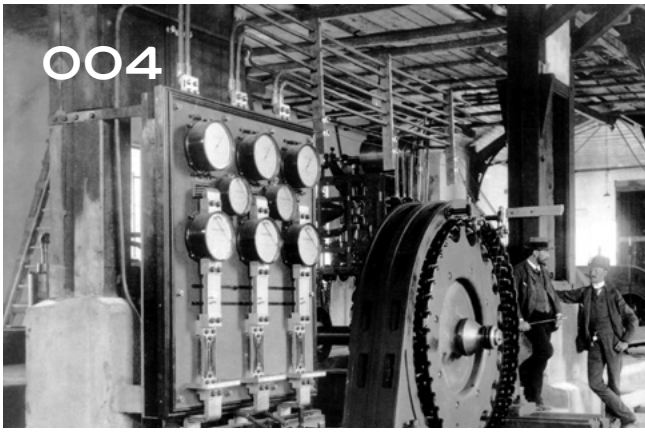
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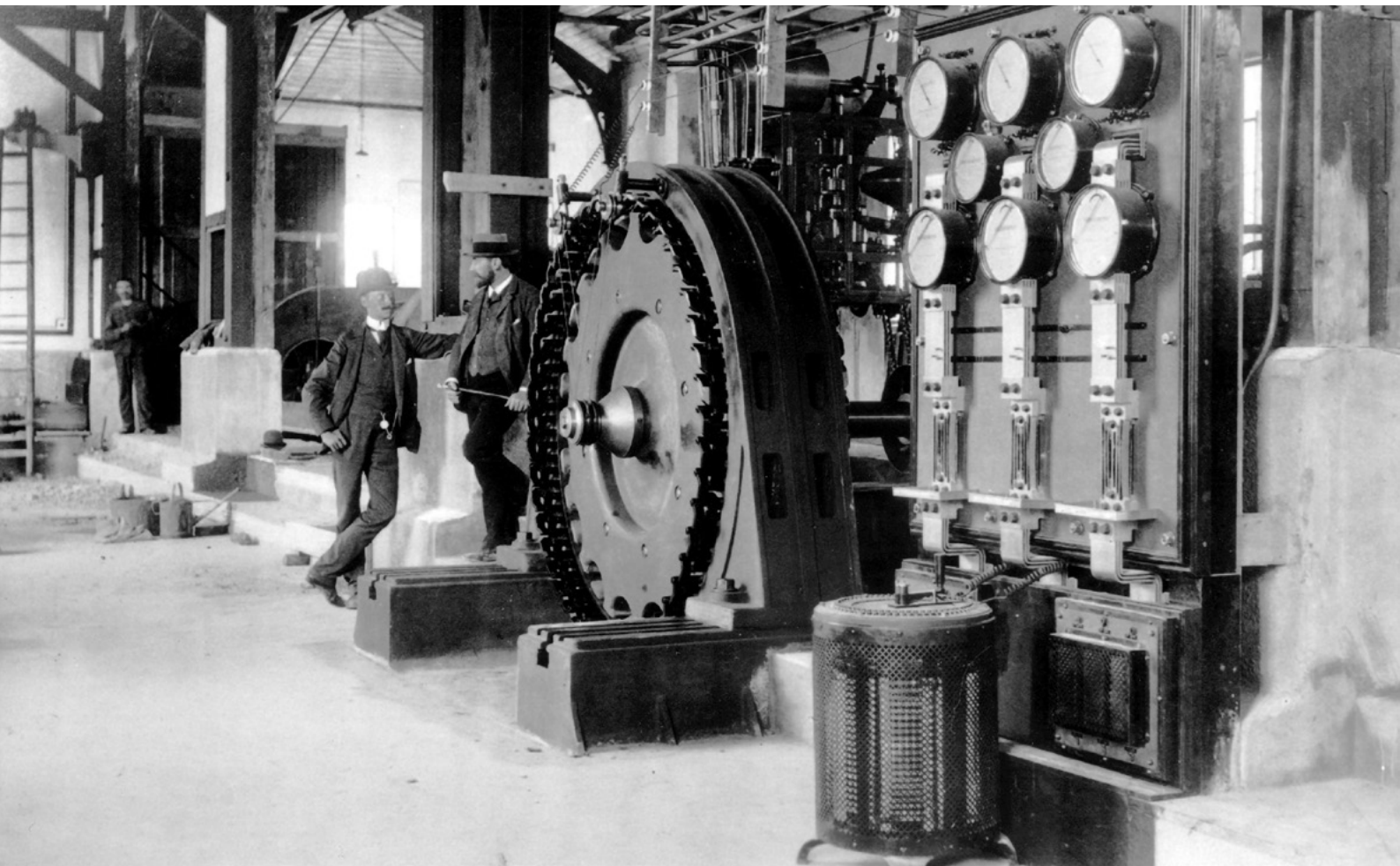


With a rich heritage in advancing industrial measurement solutions spanning over a century, ABB has been at the forefront of providing reliable and innovative measurement products that meet the ever-changing needs of global industries.

# MEASURED INNOVATION

Today's industrial landscape is more demanding than ever. Faced with rising energy and materials costs, increased regulations, changing customer demands, and a drive to sustainability, companies are seeking new ways to become more productive, cost-efficient, compliant, and competitive.

Meeting all these goals starts with measurement. By gathering accurate data on key parameters like pressure, flow, temperature, and level, our latest generation of sensors and transmitters provides the starting point for optimizing process performance and sustainability.



# A HERITAGE BUILT ON EXCELLENCE

With a rich heritage in advancing industrial measurement solutions spanning over a century, ABB has been at the forefront of providing reliable and innovative measurement products that meet the ever-changing needs of global industries.

From the early days of mechanical and electromechanical instruments to today's sophisticated digital sensors, we have striven not just to meet market needs, but to stay one step ahead.

Whether it's improving accuracy, reliability or simplicity, our history is full of innovations that have raised the bar to deliver new levels of performance and set new standards.

In the following pages, you will see how we've applied this dedication to innovation to create a new breed of solutions enabling the next generation of interconnected, intelligent industrial plants.



Advances like smart sensors, together with the integration of advanced analytics and AI-driven technologies, provide operators with continuous insights into process conditions, allowing them to make data-driven decisions in real-time. Combined with innovations in product design, these technologies have led to smaller, more energy-efficient, and more durable instruments that can be deployed in even the most challenging environments,

Together, these technologies promise exciting new possibilities for predicting and managing maintenance needs, maximizing resource allocation, and increasing overall process performance.

As industries continue to face pressures for greater efficiency, flexibility and sustainability, the role of advanced instrumentation is more important than ever. In this guide, we will look at some of ABB's latest measurement innovations and how they can offer new levels of performance, control, and productivity to help you thrive in an increasingly competitive landscape.

## DID YOU KNOW?

**Our 120-year history is full of world firsts in instrumentation. We currently hold 574 patents, including pioneering breakthroughs in flow, temperature and pressure. And we're not stopping there. With 3,127 patent applications currently in process, we're committed to continuing to find innovative new ways to help you get even more from your measurement instruments.**

# TRANSFORMING INDUSTRIES

**From chemical processing and oil & gas to power generation, low-carbon energy, and water industries, ABB delivers cutting-edge instrumentation solutions for a wide range of applications.**

Our highly accurate, reliable, and safety-certified smart measuring devices – paired with advanced asset performance tools – ensure safe, efficient, and optimized operations across the entire industry value chain.

ABB's smart instrumentation continuously monitors temperature, pressure, and flow, providing critical insights for oil & gas production, petrochemicals, chemical processing, water treatment, storage facilities, and distribution networks. Whether it's managing loading and unloading operations or ensuring precise fiscal custody transfer metering, our solutions enhance efficiency at every stage.

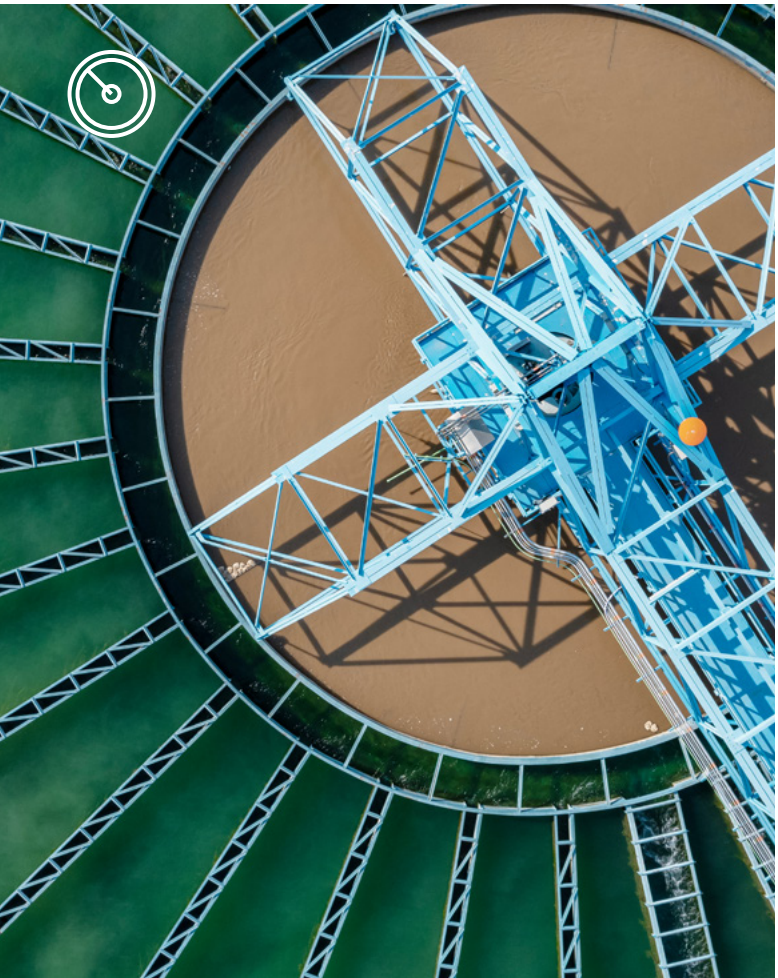




As industries transition toward a greener future, ABB is at the forefront, supporting the shift from fossil fuels to low-carbon energy sources such as low-emission hydrogen, green ammonia, biofuels, and e-fuels.

Our smart instruments play a crucial role in enabling low-carbon technologies, including water electrolysis, carbon capture, utilization, and storage (CCUS), paving the way for a more sustainable industrial landscape.

With ABB, industries gain the intelligence, precision, and reliability they need to navigate today's challenges while building a cleaner, more efficient tomorrow.





# REVOLUTIONIZING FIELD MEASUREMENTS WITH ETHERNET-APL CONNECTIVITY

Ethernet is the backbone of industrial communication, widely used for data collection and remote control via protocols like PROFINET and Modbus. However, before the era of the Advanced Physical Layer (APL), deploying Ethernet at the field instruments level in hazardous locations was impossible due to concerns around safety, cost, and limitations on cable length that have made it difficult to establish communication networks across large industrial facilities.



In 2024, we introduced our first flowmeters with Ethernet-APL connectivity – the FSS400 Swirl and FSV400 Vortex. These advanced devices enable fast, seamless data collection and analysis, transforming process and diagnostic data into actionable insights. As essential tools in chemical plants, oil & gas operations, and hydrogen facilities, they simplify connectivity and enhance efficiency.

Ethernet-APL provides high-speed, scalable networking as well as unlocks valuable process data for optimization. With the SwirlMaster and VortexMaster leading the way, we are gradually integrating Ethernet-APL across our entire portfolio – starting with the next solutions launching later this year.

## LEARN MORE

Ethernet comes to the field

# 01



# NINVA™

World’s first SIL2-certified non-invasive temperature sensor




# NINVA™

World’s first SIL2-certified non-invasive temperature sensor

## Product description

NINVA™ is the game-changing, non-invasive temperature sensor that’s redefining industrial temperature measurement. A breakthrough in simplicity, safety, and efficiency, NINVA enables precise, real-time temperature readings without the hassle or safety risks of shutting down operations, drilling holes, or installing thermowells.

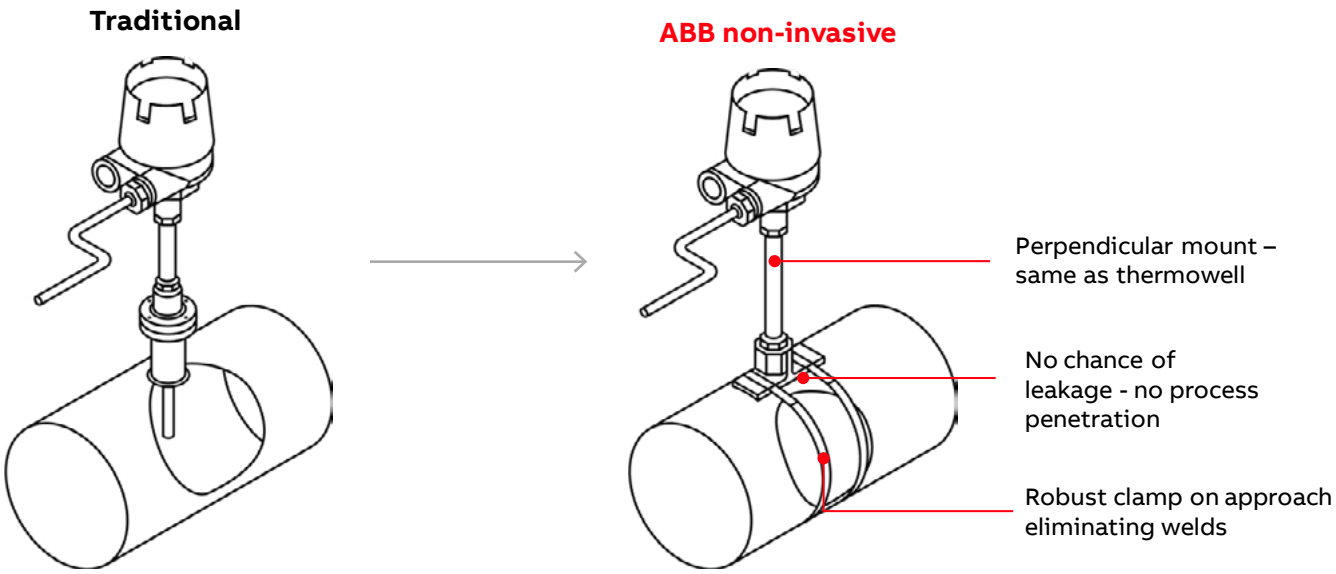
At the heart of NINVA is the combination of our innovative dual-sensor architecture and advanced calculation algorithm, that together deliver uncompromising accuracy while cutting installation costs.

To ensure it meets a full spectrum of application requirements, we’ve expanded NINVA™’s capabilities to tackle the toughest measurement challenges in industries like chemical processing and oil and gas. As the first clamp-on, non-invasive temperature sensor fully assessed to IEC 61508 standards, it meets the rigorous requirements for SIL 2 compliance, enabling it to deliver reliable performance and unmatched risk reduction in safety-critical environments.

## Certifications

**SIL2 certificate** **IECEx** **ATEX Ex**

## Temperature measurements: traditional vs. non-invasive




## Key customer benefits

**Safer**
No process penetration. No threat of undetected welding defects.

**Lower cost of ownership**
No need for turnaround thermowell checks. Eliminate hundreds of thermowell variants.

**Simpler**
Single device for all piping diameters. An accurate measurement point in minutes.

**High performance**
Using time-tested and proven sensors. Keep your measurement performance.

## Key target industries

**Chemical**

**Oil & Gas**

**Power generation**

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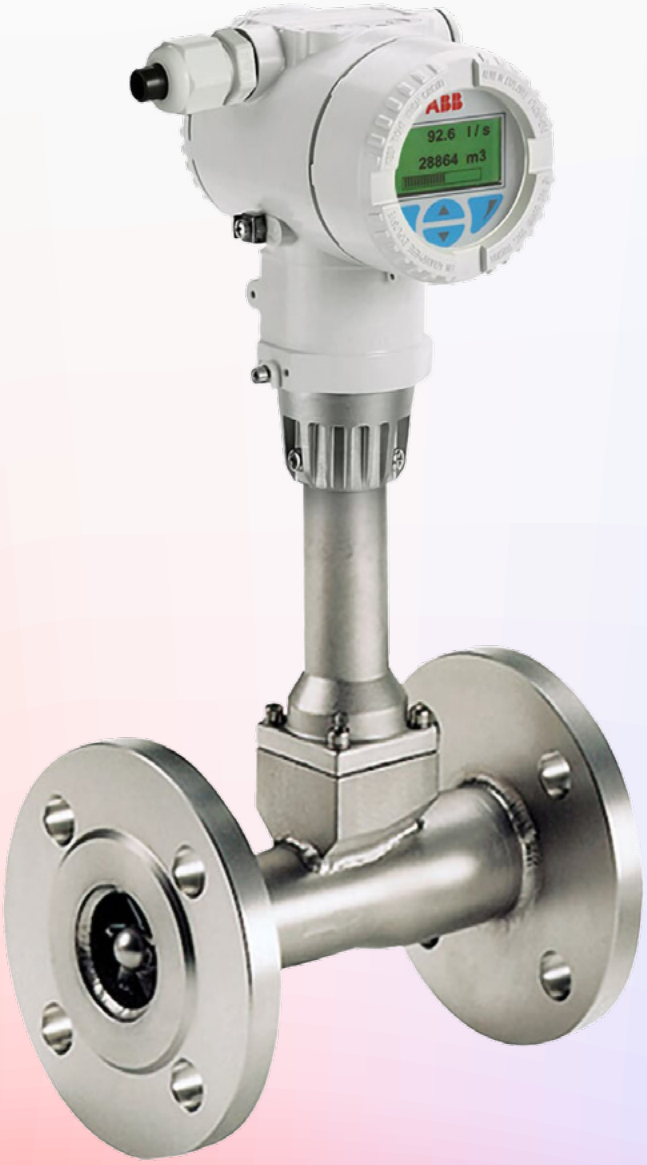
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Data sheet

# 02




# SwirlMaster with Ethernet-APL




# SwirlMaster with Ethernet-APL

Versatile flow measurements at the speed of light

## Product description

SwirlMaster flowmeters bring next-level accuracy to measuring gases, liquids, and steam across a wide range of applications. Using digital signal processing (DSP) and advanced filtering, they maximize flow signal detection while eliminating interference from hydraulic noise and pipeline vibration.

Designed for precision and adaptability, SwirlMaster excels at measuring low-viscosity liquids like demineralized water, industrial gases, and direct steam mass flow.

With minimal straight-pipe requirements and optimized performance for modern flow velocities, they fit effortlessly into brownfield upgrades and greenfield installations alike.

The FSS430 and FSS450 models keep you connected with Modbus TCP, Profinet via Ethernet-APL, Modbus RTU, Profibus PA, and FOUNDATION Fieldbus, while a 4-20 mA / HART 7 transmitter ensures smooth integration into traditional setups.

## Certifications

**Ethernet-APL certificate**

**Global Hazardous approvals**

## Key customer benefits

**Versatile communications**
Multiple communication protocols in one device.

**Simple to fit, easy to use**
Easy installation and system implementation.

**Configure anywhere**
Integrated web server for easy configuration and verification.

**Ideal for steam**
Direct mass and energy flow in steam applications.

## Key target industries

**Chemical**

**Oil & Gas**

**Power generation**

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Data sheet

Application note

# 03




# AquaMaster4



# AquaMaster4

## Unmatched flow measurement accuracy for the smallest leak detection

### Product description

AquaMaster4 is the latest breakthrough in high-accuracy water flow measurement, offering unmatched precision across a wide flow range. Its zero pipe diameter upstream and downstream reduced bore sensor eliminates hydraulic disturbances, ensuring superior performance, especially for measuring low night-time flows.

With an integrated high-speed data logger and optional cellular connectivity, AquaMaster4 captures flow and pressure activity in unprecedented detail, enabling step testing, leakage detection, and network optimization while reducing costs and energy waste.

The Velox Interface app makes configuration effortless—just tap to upload, adjust settings offline, and update seamlessly.

ABB's 'Fit-and-Flow' data storage ensures hassle-free installation by automatically replicating all calibration and site-specific settings. Powered by standard lithium cells for up to 10 years or renewable energy sources, AquaMaster4 is sustainable, smart, and built for the future of water management.

### Certifications

**OIML/MID/NMI M10/SASO/PAC**

**NSF/ACS/WRAS/ AZ NZS 4020**

**FCC/IC/SRRC/ ACMA**

## Key customer benefits

**Everything you need**
Single Box DMA Solution (Measure Flow & Pressure with inbuilt logger and mobile communica-tions for IoT Connectivity).

**Measures every drop**
Reduce losses from the bottom line – minimize NRW by detecting small leakages such as filling a glass of water.

**Detailed data insights**
Access to high-resolution data remotely allowing for night flow investigation, and remote con-figuration/verification.

**Widest flow range**
Widest flow range (Rangeability of R=1000) with highest accuracy of ±0.2% ±0.5mm/sec.

## Key target industries

**Water & wastewater**

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Brochure

Leaflet (1)

Leaflet (2)

# 04




# P-Series




# P-Series

## The flexible solution for the toughest pressure challenges

### Product description

Available in three key models, the ABB P-Series represents the next leap in precision pressure, level, and flow measurement, offering unrivaled accuracy and advanced functionality. Engineered for versatility, the range spans pressures from 0.05 kPa (0.2 in $H_2O$) for differential applications up to 105 MPa (15,000 psi) in high-pressure environments, ensuring precise control across a wide variety of industrial applications.

With exceptional accuracy – up to 0.02% for P-500, 0.055% for P-300, and 0.075% for P-100– the P-Series guarantees reliability in even the harshest conditions. It features industry-driven NACE and ASME approvals, M26 manifold mounting, and multiple certifications, making integration effortless.

P-Series transmitters incorporate a range of features that help streamline usability and maintenance, including a new backlit display with optional Bluetooth, Digital Advanced Diagnostic feature, and a QR code on the product label that links you to product and service advice.

Built with S26 high-performance diaphragm seals, the P-Series is the ultimate industrial measurement solution. Thanks to ABB's All-Welded technology, a wide choice of filling fluids and wetted parts, and the unique H-Shield coating, it can withstand extreme process challenges.

The PGS300 is ABB's first instrumentation product to feature an Environmental Product Declaration (EPD). EPDs provide a valuable insight into a product's lifelong environmental impact, from manufacture to end-of-life, enabling you to compare the sustainability performance of different products and their overall environmental footprint.

### Certifications

**NACE, ASME/EN, ISA**

**DNV, ABS, KR**

**NSF61, WRAS, DM174**

**EHEDG, 3A**

**NAMUR**

## Key customer benefits

**Improved visibility**
High visibility thanks to wide display with backlight option.

**Increased lifetime**
H-Shield coating increases the resistance against hydrogen permeation.

**Reduce downtime**
Dynamic QR codes displayed on error or faulty conditions.

**Circularity**
Pre-Environmental Product Declaration (EPD Type III) declaration of the device's environmental impact from resource extraction to end-of-life.

## Key target industries

**Chemical**

**Oil & Gas**

**Water & waterwaste**

**Power generation**

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Brochure

Data sheet (1)

Data sheet (2)

# 05










# Digital Positioners




# Digital Positioners

## Smart valve control, combining precision, reliability, and minimal commissioning

### Product description

Whether for new installations or upgrades, ABB's digital positioner solutions ensure smooth operation, improved efficiency, and superior performance in demanding industrial environments.

The EDP300 and TZIDC electro-pneumatic valve positioners deliver precise, reliable valve control for pneumatic linear or rotary actuators. Featuring a compact, modular design they offer an exceptional cost-to-performance ratio while ensuring seamless integration with control systems.

Their electronic configurability and advanced communication capabilities enable real-time diagnostics and easy interoperability. With fully automatic determination of control parameters, the EDP300 and TZIDC adapt effortlessly to any valve assembly, optimizing control behavior and significantly reducing setup time.

The TZIDC and TZIDC-200 digital positioners now feature advanced 360° non-contact sensors as an optional variant, powered by TMR (Tunnel Magneto-Resistance) technology. These enhancements improve accuracy, reliability, and durability while eliminating mechanical wear and tear, resulting in greater precision, extended performance, and reduced maintenance needs.

## Key customer benefits

**Compact design**
Compact and modular construction: Customized option combinations to meet application re-quirements.

**Fast and easy setup**
Single button Auto-Adjust commissioning: Time-saving with fast and easy setup.

**Optimized valve control**
Adaptive Control Mode: Real-time optimization of control valve performance to reduce process variability.

**Saves energy, cuts carbon**
Low air consumption at a steady state: Reduced energy cost and carbon footprint.

## Key target industries

**Chemical**

**Oil & Gas**

**Power generation**

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Operating instr. (1)

Operating instr. (2)

Commissioning instr. (1)

Commissioning instr. (2)

# 06




# CoriolisMaster




# CoriolisMaster

## Accuracy and stability for custody transfer measurements – now with Ethernet connectivity

### Product description

Whether for process control, batching, or custody transfer, ABB's CoriolisMaster series delivers unmatched precision and efficiency, making it the ultimate solution for reliable mass flow measurement.

The CoriolisMaster FCB400, FCH400, and FCD450 redefine mass flow measurement with cutting-edge digital signal processing (DSP) technology. Designed for accuracy, efficiency, and reliability, these flowmeters deliver precise mass flow and density readings while eliminating signal interference through direct digital conversion.

Their robust, space-saving design means they fit seamlessly into any system, while a variety of process connections and a flexible, modular output concept and Ethernet communication enable easy integration into modern industrial networks.

With exceptional long-term stability, absolute zero-point stability, and built-in self-diagnostics, ABB's CoriolisMaster flowmeters ensure consistent, worry-free performance. The DSP-powered transmitter enhances signal clarity and speed, optimizing measurement accuracy across a range of demanding applications.

### Certifications

**ATEX, IECEx, cF-Mus, INMETRO, and NEPSI**

**OIML and MID for custody transfer**

**SIL**

**DNVGL, DNVSE, BV**

## Key customer benefits



**Accurate and versatile**
High-precision measurement of mass and volume flow, density, temperature, and concentration with just one device.



**Verification ensures performance**
ABB Ability™ Verification – VeriMass: Detection of measurement errors through identification of deposits, erosion, and corrosion. Continuous self-monitoring instead of just a one-off check.



**Intelligent performance**
ECC (Enhanced Coriolis Control) utilizes a predictive state-of-the-art control algorithm: Fast changes in flow rate are precisely detected, and Interference signals (e.g. gas bubbles) are sup-pressed. Very fast density and concentration measurement.



**Versatile network connectivity**
Integrated Ethernet interface for various communication protocols.

## Key target industries



**Chemical**



**Oil & Gas**



**Carbon-neutral energy**

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Data sheet (1)

Data sheet (2)

# 07




# LLT100




# LLT100

## Pinpoint accuracy with infrared laser pulses, even in the toughest applications

### Product description

Featuring cutting-edge laser technology that delivers pinpoint accuracy in even the toughest environments, ABB's non-contact laser level transmitters are revolutionizing industrial level measurement.

Using advanced time-of-flight calculations, the LLT100 fires invisible, eye-safe infrared laser pulses to measure distances with incredible precision. With an ultra-narrow beam (<0.3° divergence), it avoids interference from vessel structures, ensuring unmatchable reliability with no need for reconfiguration or downtime.

Designed for both solids and liquids, including transparent ones, the LLT100 measures up to 100 meters (330 feet) for solids and 30 meters (100 feet) for liquids. Its powerful signal processing and laser pulse control guarantee consistent results, reducing lifetime costs.

Compact and powered by a simple 2-wire system, the LLT100 is quite simply a game-changing device engineered for accuracy, efficiency, and ease of use.

### Certifications

**FM Approvals US HazLoc Certificate FM16US0106X**

**FM Approvals ATEX Certificate FM16ATEX0032X (EU-Type Examination)**

**IECEx Certificate FMG 16.0023X**

**3A Certificate Authorization Number 3500**

## Key customer benefits

**Easy setup**
Fast and flexible installation.

**Simple, efficient diagnostics**
Diagnostics using only the signal amplitude.

**Easy data access**
Multiple connectivity avenues: TTG, HART Modem, DCS.

**Cuts commissioning time**
Useful on multiple applications in the same plant using the same model: No reconfiguration when the environment changes. Single product configuration works for many applications.

## Key target industries

**Chemical**

**Petrochemical**

**Water & waterwaste**

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White paper

Application note

# 08



# SensyMaster





# SensyMaster

## The smarter way to accurate and reliable gas flow measurement

### Product description

Whether for standard or advanced applications, ABB's SensyMaster FMT430 and FMT450 thermal mass flowmeters present an intelligent, future-ready solution for precise gas flow measurement. Designed for low to medium pressure conditions, the FMT430 delivers accurate, cost-effective performance for standard industrial applications, while the FMT450 adds superior accuracy and advanced functionality for more demanding environments.

Built with high-grade thermal sensor elements, SensyMaster flowmeters ensure long-term stability and reliability. Features include ABB's intuitive operator interface with through-the-glass operation and easy to navigate menu structures.

The cutting-edge software includes ApplicationSelector, allowing on-site parameter adjustments and new application creation, and VeriMass, a fingerprint-based sensor verification function for ultimate accuracy. Clear diagnostic messages enhance operator efficiency and help to simplify set-up and maintenance.

With integral and remote mount options, local display choices, HART communication, and SmartSensor compatibility, SensyMaster is the smart, adaptable choice for gas flow measurement.

### Certifications

**ATEX** **IECEx** **FM** **DVGW**

## Key customer benefits

**Precise performance**
Precise and dynamic direct mass flow measurement.

**Flexible by design**
Flexible use in different applications.

**Highly accurate**
High accuracy and repeatability.

**Highly reliable**
Onboard diagnostics with sensor verification.

## Key target industries

**Chemical**

**Oil & Gas**

**Hydrogen**

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Handbook

# 09




# ABB Ability™ SmartMaster




# ABB Ability™ SmartMaster

Ground-breaking solution for remote verification and monitoring of field instrumentation

## Product description

Get an instant insight into your entire fleet of field instrumentation with the ABB Ability™ SmartMaster next-generation verification and condition monitoring platform.

Designed to integrate with a wide range of both ABB and third-party field devices, SmartMaster provides the detailed insights needed to ensure peak performance, reliability, and efficiency.

With real-time condition monitoring, SmartMaster verifies device health and performance with precision. The licensed software version allows you to generate and store test reports locally for in-depth analysis. A built-in trending function also enables you to compare results over time, helping you spot potential issues before they become costly problems.

SmartMaster's intuitive interface makes diagnostics effortless, boosting operational efficiency and minimizing downtime.

Whether you're managing a single device or an entire fleet, this powerful tool provides actionable insights, ensuring your installed instrumentation is delivering maximum measurement performance.

## Key customer benefits

**Zero disruption**
Seamless device verification without interrupting processes.

**Detailed insights**
Comprehensive reporting and data analysis.

**Accurate and consistent**
Enhanced accuracy with fingerprint technology.

**Proactive prevention**
Proactive condition monitoring with trending features.

## Key target industries

**Chemical**

**Oil & Gas**

**Water & wastewater**

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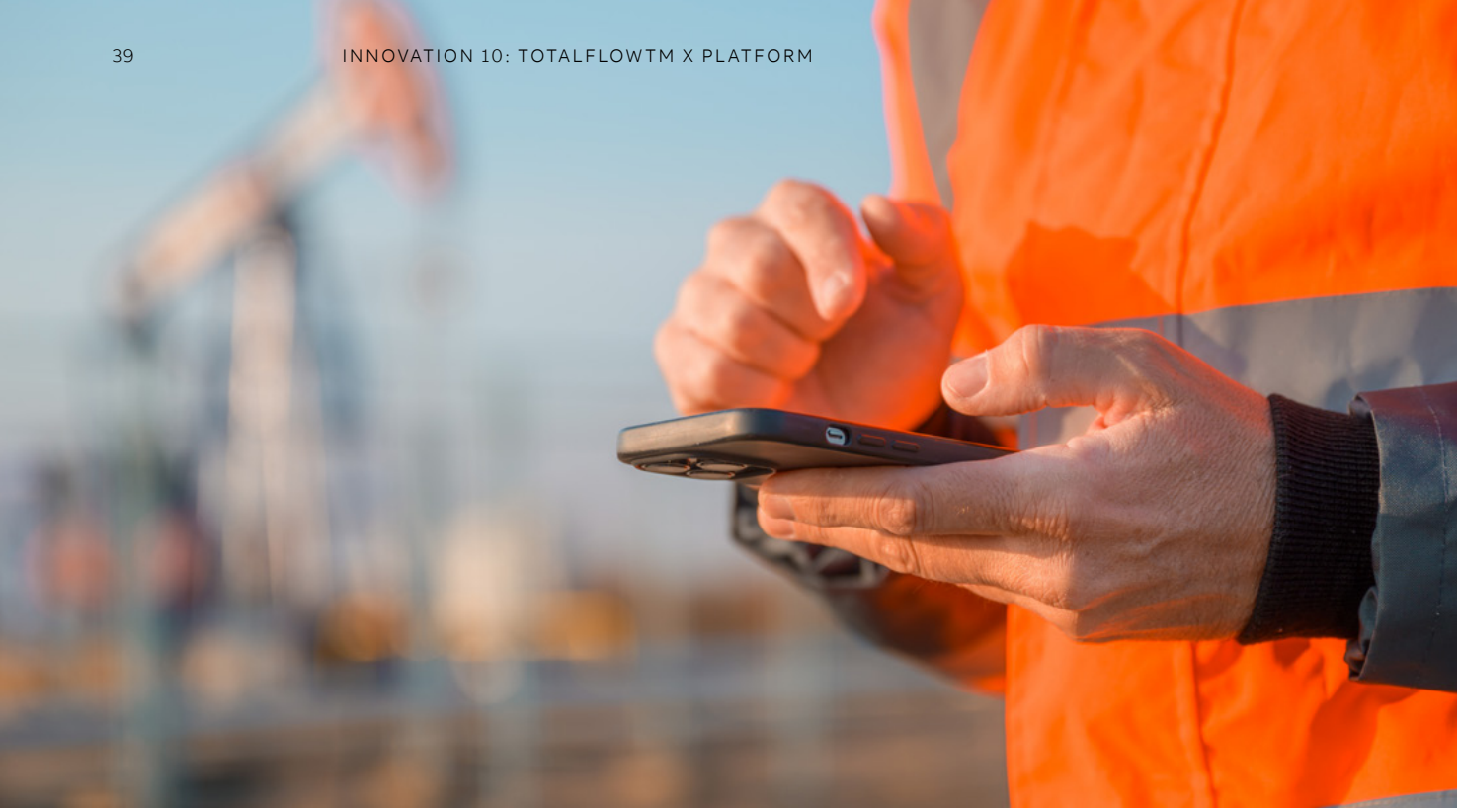
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Brochure

# 10

# Totalflow™ X Platform

Coming soon



# TotalflowTM X Platform

Next-generation flow computer platform for unprecedented user experience, flexibility, and customization possibilities

**Coming soon**

## Product description

The Totalflow™ X Platform is the new versatile and user-friendly software platform for ABB Flow Computers and RTUs.

Totalflow™ X simplifies flow computing and remote control, making automation more accessible and convenient.

Designed for maximum flexibility and efficiency, it adapts to each customer's needs. Its modular design makes it easy to scale and operate, while its inbuilt web server provides the choice of local or remote management using just an internet browser, with no extra software required.

## Key customer benefits

**Unleashing the power of digital**
A software platform focused on enhancing customers' operations with a new digital platform that transforms to be future-proof.

**Designed for changing needs**
Hardware agnostic and Forward-looking, designed to support future applications over the next decade.

**Secure operation**
New interoperability features to focus on cybersecurity and standard industry protocols, such as MQTT, OPC-UA, Internet IP, and multiple interfaces APIs.

## Key target industries

**Oil & Gas**

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# SUMMARY – AN ONGOING JOURNEY

The cutting-edge innovations featured in this guide are just some examples of how we're using the latest digital technologies to meet the growing demands for smarter, more sustainable operations.

As digitization progresses, we will stay committed to developing new solutions that help you stay one step ahead. Through the integration of cloud-based platforms, wireless communication, and AI-driven insights into our instruments, we'll help you build complete digital ecosystems that will deliver all-round continuous improvement in productivity, safety, and sustainability.

Explore how ABB's innovations can transform your operations and drive your success in a digitally driven, sustainable future, whatever your measurement needs.

For more information and to see how ABB can optimize your processes, visit our website.



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