Proline 300/500

The future-oriented flow measuring technology

For more safety, quality and availability in your plant

- Robust and reliable: multifunctional transmitter for the ultimate measuring performance in the process industry
- Complies with all industry requirements: Proline 300/500 is available with all our flowmeters, which have been proven in use for decades
- Fast commissioning: simple and intuitive operation via display, web server, WLAN, operating tools or fieldbuses
- Maximum operational safety:
  - Developed in accordance with SIL (IEC 61508)
  - Device verification with Heartbeat Technology during operation
  - Permanent self-diagnostics
  - Automatic recovery of device data (HistoROM)
- Seamless system integration: wide variety of communication protocols such as HART, PROFINET, EtherNet/IP, Modbus RS485, PROFIBUS PA/DP, FOUNDATION Fieldbus
- Proline 300/500 is ready for IIoT: embedded OPC-UA server via WLAN or Ethernet (Coriolis, electromagnetic)

Endress+Hauser

People for Process Automation

Proline
simply clever

Process monitoring is becoming more demanding and the need for maximum product quality is steadily increasing. This is why Endress+Hauser continues to provide industry-specific flow measurement solutions optimized for future technology requirements.

The current generation of our Proline flowmeters is based on a uniform device concept. This means time and cost savings, as well as maximum safety over the entire plant life cycle.

Perfect integration Proline can be integrated seamlessly into the plant asset management, providing reliable information for optimizing production and business processes.

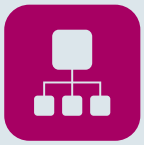
Innovative and proven in use Proline is based on a versatile, continually updated technology concept, guaranteeing that users are always implementing state-of-the-art technology.

Ingeniously simple Proline is user-friendly through and through, ensuring that the plant operator's process can be securely controlled with confidence.

Added value in every respect

HistoROM
- Automatic data storage ensures maximum plant safety
- Simple data restoration enables quick exchange of components
- Event logbook and data logger for quick failure analysis

Heartbeat Technology
- Permanent process and device diagnostics (Heartbeat Diagnostics)
- Documented device functionality without process interruption (Heartbeat Verification)
- Information for process optimization and predictive maintenance (Heartbeat Monitoring)



Seamless system integration
- Direct and transparent due to a wide range of fieldbuses
- Risk-free through extended host testing and certification
- Compatibility over the entire product life cycle enables device replacement without expert know-how

Simple operation
- Time-saving Endress+Hauser operating concept
- Optimal usability through guided parameterization
- User-specific menu structures and device access

Web server
- Time-saving local operation without additional software
- Comprehensive access to device, diagnostics and process information
- Fast data upload/download for maintenance and service

Proline – simply clever & more

Depending on the measuring principle, our Proline devices come with several specific add-ons.

Read more on ▸ pages 8 to 11

Proline 300/500

Innovation and practical experience combined

As modern challenges in the process industry have increased drastically, plant operators are subject to an increasing level of competition and cost pressure. In addition, there are more and more legal regulations to ensure process safety. This means that flexibility in planning plants, optimal plant efficiency and the highest level of product quality are key to defining the success of a company today.

These challenges are met by Proline 300/500 without compromise. This is because the Proline series is based on years of industry experience and the permanent development of our transmitter technology.

- Maximum level of safety, quality and availability in operation:
  - Designed in accordance with the SIL requirements
  - Unique diagnostic, monitoring and verification functions with Heartbeat Technology
  - Sophisticated data storage concept
- Industry-optimized device portfolio:
  - Worldwide valid approvals and certifications
  - Application-specific functions (dosing, density, etc.)
- Seamless system integration in process control and the Internet of Things:
  - Full access to process and diagnostic information: numerous, freely combinable I/Os and Ethernet
  - Reduced complexity and variety – freely configurable I/O functionality
  - Wireless LAN network access

Your benefits close-up

Proline 300/500 – for permanently increased safety, quality and availability in your plant

Safe all-around – you can count on that

Using Proline 300/500 flowmeters puts you in the right position from the very beginning to deal with the growing challenges of plant safety. In concrete terms, this means avoiding failures and property damage in plants, and thus avoiding hazards for people and the environment.

In this respect you can fully rely on our current generation of devices which is based on decades of experience in safety-related applications and long-standing partnerships with international testing, certifying and other organizations. As a result, the Proline 300/500 device design exceeds even the highest levels of safety standards:

- Ideal suitability for application in safety instrumented systems (Functional Safety applications)
- Optimum accessibility to all user interfaces via a single connection compartment from the front
- Permanent device diagnostics and verification thanks to Heartbeat Technology with an outstanding test coverage of over 95%
- Quick and secure remedying of device and process errors due to clear and unambiguous categorization of errors according to NAMUR NE107
- Digital networking abilities like Ethernet-APL or integrated OPC-UA server for SCADA visualization, cloud connectivity and predictive maintenance

High-quality – for smooth processes

The highest levels of process and product quality coupled with low maintenance effort and low total cost of ownership are increasingly important in any industry. Proline 300/500 was developed precisely for these requirements.

The sophisticated and unique diagnostics, monitoring, and verification concept of Heartbeat Technology allows for a comprehensive level of process monitoring. You benefit from this in several ways: through fewer failures, lower costs and thus sustainable competitiveness. Additionally, a safe data storage concept and state-of-the-art calibration facilities all over the world ensure reliable measurement around the clock.

- Reliable device/process monitoring and predictive maintenance thanks to Heartbeat Technology:
  - Continuous self-diagnostics according to NAMUR NE107
  - Early recognition of disturbances in the process, e.g., deposits, abrasion, corrosion, multiphase fluids, etc.
- Service-friendly data storage (HistoROM):
  - Automatic data storage for maximum plant safety
  - Automatic restoration of data after a case of service
  - Complete system integration compatibility through automatic restoration of firmware
- Highest measurement quality: each Endress+Hauser flowmeter is checked on accredited and traceable calibration rigs (ISO/IEC 17025)

Available at any time – process and device information

In large industrial plants with thousands of field devices, not only are the measured values accumulated, but often an endless amount of process and diagnosis information is also gathered and never used. Proline 300/500, with its wide variety of fieldbus interfaces, makes it possible to access all of this data directly and evaluate it in process control systems, thus ensuring optimal measuring operation.

The availability of process-critical measuring points is vital, particularly in safety-related or custody transfer applications. Proline 300/500 can check its own operational reliability using clever verification functions – wherever and whenever you want. Additionally, Proline offers numerous operating options for accessing device and diagnostic data directly during commissioning or service.

- Extensive access to process and diagnostic data using a broad range of fieldbuses, as well as Industrial Ethernet (EtherNet/IP and PROFINET)
- Reliable and traceable device verification during operation with Heartbeat Technology (attested by TÜV SÜD). No field presence is required; verification can be triggered at any time, even remotely
- Versatile operating options using display, web server (service interface), WLAN or fieldbus interfaces
- Operation via guided parameter configuration in over 17 languages
- Continuous monitoring of critical process and device parameters through IT connectivity in cloud-based applications

The Proline transmitter

Highlights at a glance

Hygienic housing (IP69)

- For hygienic and sterile applications
- Ideal for high-pressure cleaning
- Corrosion-proof (316L)
- Gap- and joint-free housing surface
- Gap-free sealing concept
- Non-glass cover

Stainless steel die-cast housing

- For environmentally demanding applications
- Ideally suited for offshore areas
- Robust, corrosion-resistant housing made of CF3M (316L) for harsh environments
- IP66/67 (Type 4X enclosure)

1 Transmitter housing – industry-optimized

- Robust housings (materials ▸ page 13)
- Compact version (Proline 300) with/without display, or remote display
- Remote version (Proline 500) can be installed up to 300 meters from the sensor

2 Two-chamber system – securely separated

- Connection compartment with all interfaces easily accessible from the front
- Separate electronics compartment:
  – Fully protected against dust
  – With modular electronics design concept

3 Inputs and outputs – seamless system integration

- Can be integrated into existing plants at any time using HART, PROFINET, EtherNet/IP, Modbus RS485, PROFIBUS PA/DP or FOUNDATION Fieldbus
- Numerous inputs/outputs available, including a freely configurable I/O module

4 Display acc. to NAMUR NE107 – precise fault identification

- Clear and unambiguous categorization of errors (NAMUR NE107) for precise correction of faults, thus preventing plant shutdowns
- History of plant and device statuses retrievable at any time (logbook with an "event counter")

5 HistoROM – simply unforgettable

- Maximum security due to an automatic data storage (3 data storage units)
- HistoROM device memory: complete system integration compatibility through automatic restoration of the original firmware in service cases
- Easy transfer of device configurations after device replacement

6 HMI operation concept – intuitive and secure

- Guided parameter configuration with plain text instructions
- Over 17 operating languages for worldwide use
- Standardized menu structures for all flow measuring technologies
  Advantage: Less training effort and higher safety in operation

7 WLAN connection – wireless service interface

- Full access to measured values, diagnostic data, process information and device parameter configuration
- WLAN (infrastructure modus) for integration into wireless networks

8 Web server – easy configuration in the field

- Time-saving operation via a standard Ethernet cable or WLAN
- Comprehensive access to all device, diagnosis and process information
- Fast upload/download of device configurations
- Embedded OPC-UA server – full IT connectivity:
  – Enables Industrial Internet of Things (IIoT) connectivity
  – For easy connectivity in SCADA applications

9 Proline sensors – robust and proven

- Industry-optimized sensors with high measuring accuracy even in long-term operation
- Proven in use – over 5 million sensors installed since 1977
- Robust against process and environmental influences (temperature, vibrations, dust, humidity)
- Guaranteed measurement quality thanks to traceable and worldwide accredited calibration rigs

All highlights (1–9) apply equally to the Proline 500 remote version

Approvals and certificates (examples)

SIL · Ex · FM APPROVED · CSA · Ex NEPSI · EAC Ex · IECEx · TIIS · A3 · FDA · OIML · PTB · NTEP · NMi · NSF · CE · HART COMMUNICATION PROTOCOL · Modbus · EtherNet/IP · PROFIBUS · PROFINET · ethernet-apl advanced physical layer · OPC UA

Industry-optimized sensors

For your application

Coriolis (gases, liquids)		
	**Promass F** Universally applicable ▪ High-accuracy measurement of liquids and gases under fluctuating process conditions ▪ DN 8 to 250 (⅜ to 10")	
	**Promass E** Minimum operating costs ▪ Accurate measurement of liquids and gases for a broad spectrum of standard applications ▪ DN 8 to 80 (⅜ to 3")	
	**Promass X** Four-tube device (up to 4100 t/h) ▪ For the highest flow rates and outstanding performance in onshore/offshore applications (oil and gas) ▪ DN 300 to 400 (12 to 16")	
	**Promass O** High-pressure measuring device ▪ High-precision measurement for very high process pressures in the onshore/offshore area (oil and gas) ▪ DN 80 to 250 (3 to 10")	
	**Promass H** For aggressive fluids ▪ Single-tube measuring device for the safe measurement of corrosive liquids and gases ▪ DN 8 to 50 (⅜ to 2")	
	**Promass P** For the life sciences industry ▪ Specifically for sterile processes in biotechnology ▪ DN 8 to 50 (⅜ to 2")	
	**Promass S** Drainable single-tube system ▪ Specifically for hygienic applications that require optimal cleaning ▪ DN 8 to 50 (⅜ to 2")	

Coriolis (gases, liquids)		
	**Promass Q** For demanding applications ▪ Highest accuracy for mass flow, volume flow and density measurement, especially in custody transfer or with gassy fluids ▪ DN 25 to 250 (1 to 10")	
	**Promass I** With in-line viscosity measurement ▪ Straight, single-tube measuring device for liquids and gases with low pressure loss ▪ DN 8 to 80 (⅜ to 3")	
	**Promass A** For the smallest flow rates ▪ Self-draining single-tube device for the accurate measurement of the smallest amounts of liquids and gases ▪ DN 1 to 4 (1/24 to ⅛")	
	**Cubemass C** Ultra-compact device ▪ For the accurate measurement of the smallest amounts of liquids and gases ▪ DN 1 to 6 (1/24 to ¼")	

Proline Promass – Simply clever & more

Superior entrained gas handling

Proline Promass devices can sustain operation even with liquids containing gas bubbles which are usually challenging for Coriolis flowmeters.

Gas Fraction Handler

The Promass Gas Fraction Handler provides a special signal processing for a more stable reading during two-phase flow. Diagnostic parameters help to get insight how severe the disturbance by gas bubbles is.

MFT (Multi-Frequency Technology)

MFT in Promass Q enables outstanding flow and density performance when measuring liquids with suspended bubbles (microbubbles) by active compensation in real time. Unique accuracy can be achieved even in foamed products.

Application packages for your industry

Application-specific packages offer software or sensor options tailored to specific industry needs and application challenges.

Petroleum package

The Promass Petroleum Package gives access to typical parameters used in the oil and petroleum industry based on specific algorithms.

- Straightforward selection of different medium groups according to API and ASTM standards
- Automatic correction functions for corrected volume flow, reference density, water cut, net volume flow, etc.
- Flow weighted density/temperature averages

Concentration package

For calculating fluid concentrations in binary mixtures by converting the measured density:

- Choice of predefined fluids (e.g., various sugar solutions, acids, alkalis, salts, ethanol, etc.)
- Common or user-defined units (°Brix, °Plato, % mass, % volume, mol/l, etc.) for standard applications
- Concentration calculation from user-defined tables

Electromagnetic (conductive liquids)		
	**Promag P** For very high temperatures ▪ For chemical and process applications with corrosive liquids and high fluid temperatures up to +180 °C (+356 °F) ▪ DN 15 to 600 (½ to 24")	
	**Promag H** For hygienic applications ▪ With temperature measurement and temperature-compensated conductivity measurement ▪ DN 2 to 150 (1/12 to 6")	
	**Promag W** The water specialist ▪ For demanding applications in the water and wastewater industry (optional: IP68/Type 6P) ▪ DN 25 to 3000 (1 to 120")	 © Wasserversorgung Stadt Zürich (CH)

Proline Promag – Simply clever & more

Reliable measurement independent of flow profile and mounting location

The option 0 x DN full bore allows for the installation of electromagnetic flowmeters in tight spaces by eliminating the need for inlet and outlet runs. High accuracy is ensured without restricting the measuring tube (full bore) and thus without pressure loss.

Improved process efficiency and product quality

The calibrated conductivity measurement of Proline Promag flowmeters is an additional measurement parameter to improve the process efficiency. It serves as an indicator for product quality by detecting media and process impurities, thereby preventing unexpected downtime.

Heartbeat Technology

Improved maintenance in applications with build-up

With the build-up index, build-up within the measuring tube of Proline Promag devices can be monitored reliably and continuously without interrupting the process, leading to an improved maintenance plan, optimized cleaning cycles, less downtime and higher efficiency in the process.

Increased confidence in the sensor integrity

Changes in the electromagnetic field strength of Proline Promag devices can be monitored continuously with the HBSI (Heartbeat Technology Sensor Integrity) parameter, detecting and quantifying magnetic interferences, mechanical defects in the magnetic system of the flowmeter. This leads to higher confidence in the flow measurement value.

The Heartbeat Technology build-up index allows to monitor build-up in the measuring tube

Proline Promag devices can be installed downstream of pipe bends

Thermal (gases, liquids)

t-mass F
Inline device for mass flow measurement of gases

- For utility and process gases (pure gases) and gas mixtures
- DN 15 to 100 (½ to 4")

t-mass I
Flow measurement of large gas volumes

- Insertion flowmeter for large pipes and rectangular ducts
- DN 80 to 1500 (3 to 60")

→ **Proline t-mass – Simply clever & more**

Detection of droplets and pulsating flow

Monitoring/warning function in the event of process disturbances, for example, water droplets forming on the sensor or the onset of pulsating flow

Bidirectional measurement for optimal balancing

- Patented sensor design for reverse flow detection
- Mass flow can be measured and totalized in both flow directions

Ultrasonic (gases, liquids)

Prosonic Flow G
Highly robust gas specialist

- For a wide range of applications with dry or wet gas; with integrated pressure/ temperature sensors and advanced gas analysis functions
- DN 25 to 300 (1 to 12")

Prosonic Flow P
For maximum performance at strongly reduced inlet runs

- Clamp-on flowmeter for flexible installation in confined spaces thanks to FlowDC function
- DN 15 to 4000 (½ to 160")

→ **Proline Prosonic Flow – Simply clever & more**

FlowDC function – Constantly high performance

Endress+Hauser's newly developed FlowDC function for clamp-on devices guarantees consistent (specified) measuring performance even downstream of flow disturbance generating fittings:

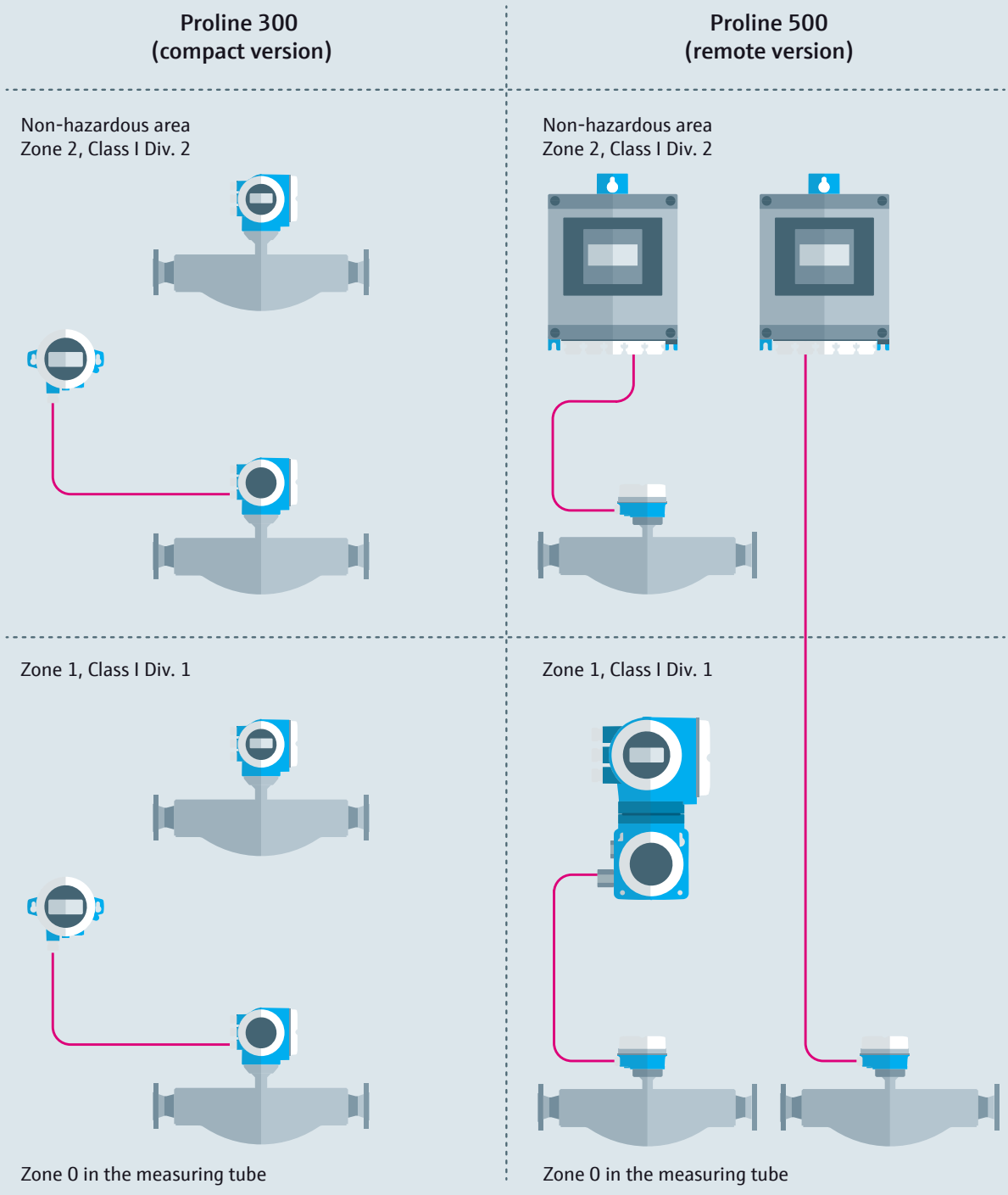
- Massive reduction of required inlet run from the usual min. 15 × DN down to just 2 × DN
- Ideal for installation after single/double pipe bends (in/ out of plane), pipe reducers or pipe expanders
- Maximum flexibility when planning process facilities where space for piping is at a minimum
- Simple retrofitting of measuring points with almost no limitations

Installation concept – Proline 300/500

For flexible installation and secure operation

Regardless of which application: You can integrate Proline 300/500 flowmeter systems perfectly into your plant and adapt them to your process conditions, thanks to the variety of designs, sensors, nominal diameters, fieldbusses and installation options.

Installation concept (with Promass F 300/500 as an example)



Sensors
– Promass (description ▸ page 8–9)
– Promag (description ▸ page 10)
– t-mass (description ▸ page 11)
– Prosonic Flow (description ▸ page 11)

Materials (housing)

Proline 300 transmitter (compact version)

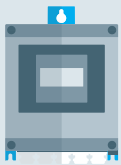
Compact housing:
– Aluminum
– Stainless steel die-cast
– Hygienic housing (316L)

Remote display (cable length up to 30 m):
– Aluminum
– Stainless steel die-cast

Proline 500 transmitter (remote version)

Wall-mount housing:
– Aluminum
– Stainless steel die-cast

Proline 500 transmitter (digital remote version)



Wall-mount housing (cable length up to 300 m):
– Aluminum
– Polycarbonate

Proline 500 sensor (remote version)

Connection housing:
– Aluminum
– Stainless steel die-cast
– Stainless steel, hygienic

Technical Data

		
Transmitter	**Proline 300 (compact)**	**Proline 500 (remote)**
Display	– 4-line backlit display with touch control (operation from outside) – Optional: with remote display	4-line backlit display with touch control (operation from outside)
Operation	Configuration via: display, web server, WLAN, as well as via various operating tools (DeviceCare, FieldCare, HART handheld, etc.)	
Housing material	Transmitter: Aluminum, stainless steel die-cast, stainless steel 316L (hygienic) Remote display: Aluminum, stainless steel die-cast	Proline 500 transmitter digital: Aluminum, polycarbonate Proline 500 transmitter: Aluminum, stainless steel die-cast
Power supply	AC 100 to 230 V (50/60 Hz); DC 24 V (50/60 Hz)	
Ambient temperature	Standard: –40 to +60 °C (–40 to +140 °F) Option (Coriolis only): –50 to +60 °C (–58 to +140 °F)	Standard: –40 to +60 °C (–40 to +140 °F) Option: –50 to +60 °C (–58 to +140 °F) Option (Coriolis only): –60 to +60 °C (–76 to +140 °F)
Degree of protection	IP66/67 (Type 4X enclosure), Option: IP69 (stainless steel, hygienic)	
Outputs Inputs Communication	**Port 1** (communication): HART (4–20 mA), PROFIBUS PA/DP, FOUNDATION Fieldbus, Modbus RS485, EtherNet/IP, PROFINET, PROFINET with Ethernet-APL **Port 2/3** (freely selectable): – Current outputs (4–20 mA) – Pulse/frequency/switch outputs – Status inputs – Current inputs (4–20 mA) – Relay outputs – Freely configurable in/outputs (I/O)	**Port 1** (communication): HART (4–20 mA), PROFIBUS PA/DP, FOUNDATION Fieldbus, Modbus RS485, EtherNet/IP, PROFINET, PROFINET with Ethernet-APL **Port 2/3/4** (freely selectable, Proline 500 digital): – Current outputs (4–20 mA) – Pulse/frequency/switch outputs – Status inputs – Current inputs (4–20 mA) – Relay outputs – Freely configurable in/outputs (I/O) Proline 500: With up to 3 inputs and outputs
Approvals	Hazardous area: ATEX, cCSAus, NEPSI, INMETRO, EAC, etc. SIL: Use for flow monitoring up to SIL 2 (single-channel architecture) or SIL 3 (multi-channel architecture with homogeneous redundancy); OIML R117; custody transfer approvals; CRN, PED; 3A, EHEDG, etc.	

Subject to modification

The Proline 300/500 measuring system fulfills the EMC requirements according to IEC/EN 61326 and NAMUR NE21. It also conforms to the requirements of the EU and ACMA directives and thus carries the CE and the mark.

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Endress+Hauser

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