

Proline t-mass F/I 300/500

The flowmeter with long-term stability and a keen sense for utility gases

New with bidirectional gas measurement for all industries

- Wide range of applications:
 - For utility and process gases (pure gases) and gas mixtures
 - For consumption measurement, leak detection, process control, cost allocation and energy management
- Robust thermal sensor:
 - Made of stainless steel for low-maintenance, long-term operation
 - Inline and insertion versions: DN 15 to 1500 (½ to 60")
- Reliable process monitoring:
 - With warning function if condensate or pulsating flow occurs
 - With reverse flow detection and bidirectional measurement
- Flexible and convenient programming: 22 standard gases selectable and corresponding gas mixtures with up to 8 components (special gases on request)
- High level of process control: premium measuring accuracy ($\pm 1.0\%$) and repeatability ($\pm 0.25\%$)
- Maximum safety thanks to SIL-compliant device development (IEC 61508)
- Heartbeat Technology for diagnostics, monitoring and device verification without process interruption



t-mass F/I 300/500
on your smart device



3D

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 new 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.



Webserver

Time-saving local operation without additional hard-/software



Heartbeat Technology

For permanent self-monitoring, diagnostics and device verification



Simple operation (HMI)

Time-saving operating concept with guided parameterization



HistoROM

Automatic data storage and data restoration



W@M Life Cycle Management

Open information system for device documentation and management



Seamless system integration

Direct and transparent through digital communication



t-mass F/I 300/500

The versatile instrument for pure gases and gas mixtures

Endress+Hauser has successfully installed over 100 000 t-mass flowmeters in compressed air and gas applications worldwide. Therefore, anyone who wants to record gas flows with proven and robust state-of-the-art measuring technology no longer has to make any compromises.

The ingenious sensor design of t-mass and its one-of-a-kind monitoring functions leave nothing to be desired in terms of a comprehensive and reliable operation control. Whether the process conditions fluctuate slightly or heavily: t-mass measures gas flows with premium accuracy:

- Low-maintenance, long-term operation: robust industrial design for rough ambient conditions and for dirty and corrosive applications
- High operating reliability: Heartbeat Technology for self-diagnostics, process monitoring and device verification during operation
- Comprehensive process control: one-of-a-kind monitoring and alarm functions
- Flexible programming: 22 gases selectable, as well as mixtures of these gases (with up to 8 components)
- High flexibility during operation and configuration: Local display, web-server, WLAN, operating tools (FieldCare, HART handheld terminal) or digital communication (HART, Modbus RS485)



E-book – t-mass F/I 300/500 for your tablet

With additional information, application examples, measuring principle film and device information at a glance.

Simple, flexible and robust

t-mass proves its worth – again and again

Bidirectional measurement for optimal balancing

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

Process reliability around the clock

- Increased plant availability thanks to SIL 2 (device development in accordance with IEC 61508)
- Heartbeat Technology for reliable device and process monitoring:
 - Permanent self-diagnostics according to NAMUR NE107
 - Clear categorization and display of device faults or process errors, inclusive counter measures
 - Device verification during operation without process interruption
 - Monitoring/warning function in the event that drops of condensate form on the sensor or pulsating flow occurs

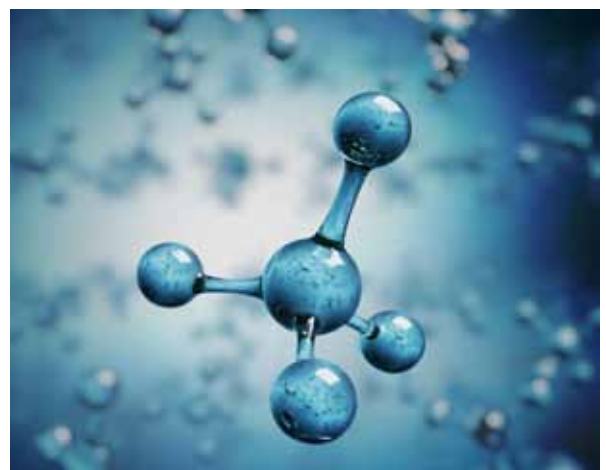
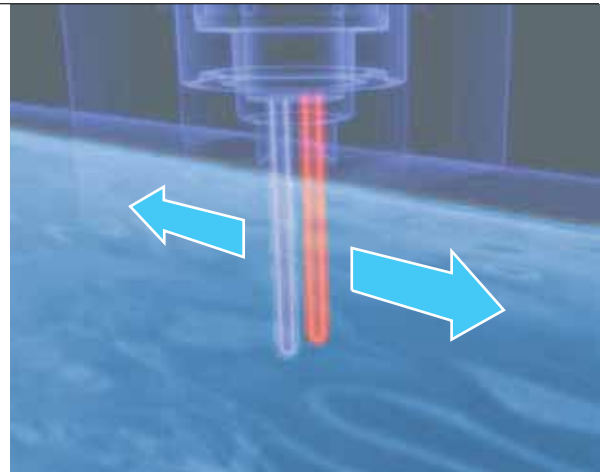
Robust sensor design

- Made of stainless steel for low-maintenance, long-term operation
- Maximum robustness against pipe vibrations, solid particles and process fluctuations
- Consistently high measurement quality thanks to patented sensor with long-term stability
- Corrosion-resistant: wetted parts according to NACE MR0175/ MR0103
- Easy removal/reinsertion, e.g. for cleaning in case of fouling

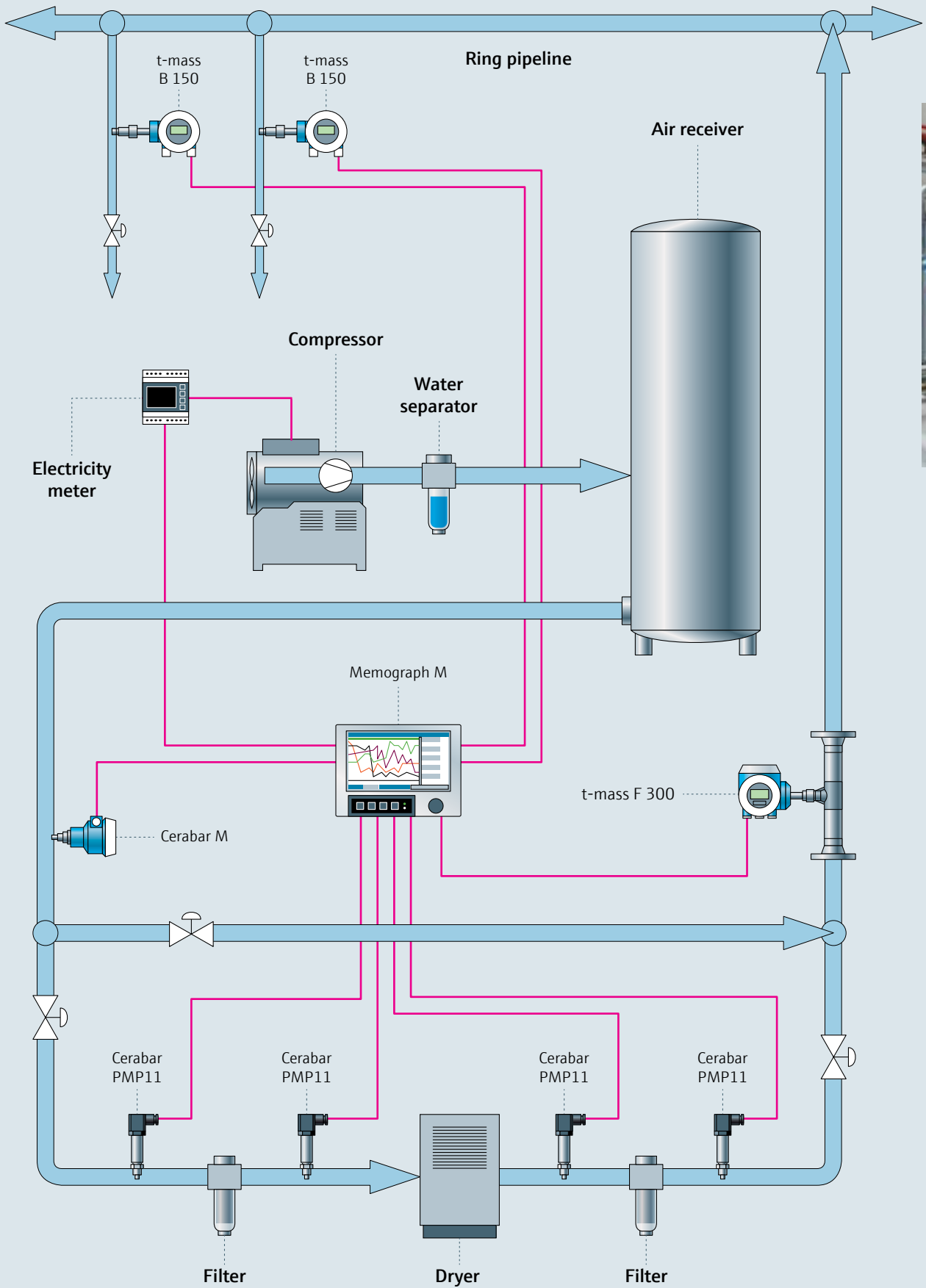
Gas Engine – for highest flexibility in the process

The Gas Engine from Endress+Hauser is a software-based data set consisting of typical standard gases and their properties. Gas Engine calculates, for example, the properties of mixed gases in accordance with their percentages for up to 8 gas components. It also allows for the following:

- Exact measurement of pure and mixed gases:
 - 22 standard gases selectable as well as mixtures of these gases
 - Also selectable: ozone (O_3), ozone-oxygen blends (O_3/O_2), water vapor, as well as special gases on request
- Calculating flow velocity, density, corrected volume or energy flow for current operating conditions
- Dynamic correction of pressure and temperature changes
- Changing programmed gases without recalibration
- Switch function for two predefined gas groups via status input, e.g. for flushing processes with other gases



Energy management in compressed air systems



For any industry and any application

t-mass F/I 300/500 fits everywhere



Compressed air – utilities



Carbon dioxide (CO₂) – for beverage production and cooling



Nitrogen (N₂) – protective gas, e.g. in oil tanks (or in the food industry)



Natural gas – fuel for steam generation



Hydrogen (H₂) – for cooling electricity generators



Air – fresh air in ventilation ducts



Ozone (O₃), chlorine (Cl₂) – disinfection of water





Air (O₂) – aeration of activated sludge basins (wastewater treatment plants)



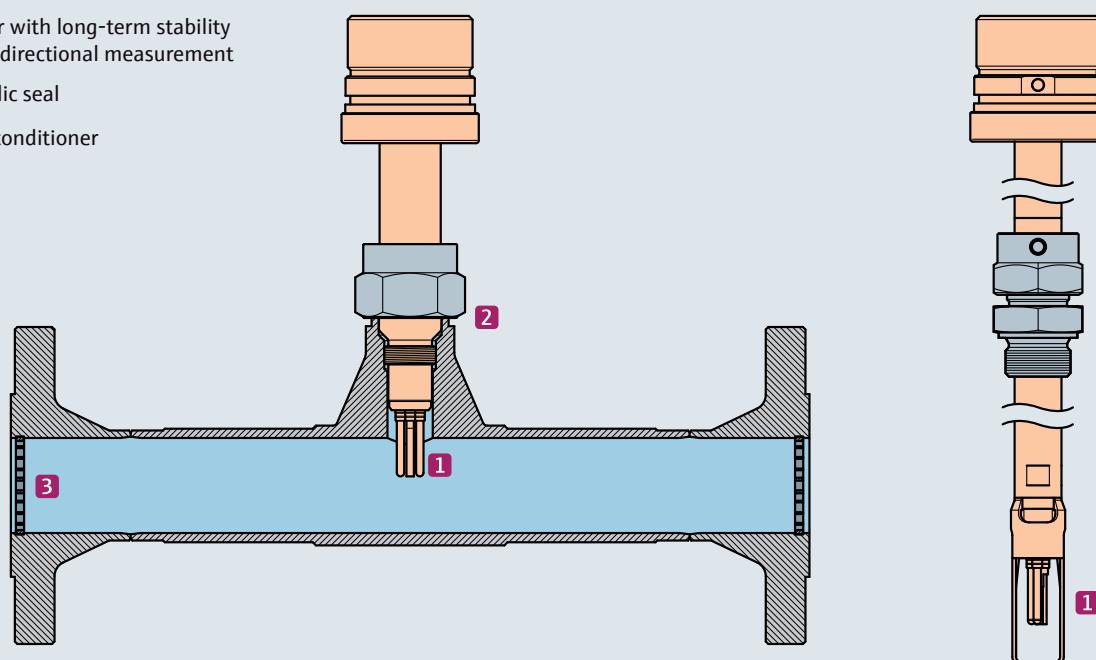
Argon (Ar) – inert gas for steel production

Technical data

Transmitter		
		
	Proline 300 (compact)	Proline 500 (remote)
Display	<ul style="list-style-type: none"> – 4-line backlit display with Touch Control (operation from outside) – Option: with remote display 	4-line backlit display with Touch Control (operation from outside)
Operation	Via local display, web server or WLAN as well as various operating tools (FieldCare, HART handheld terminal, etc.)	
Materials (transmitter housing)	<ul style="list-style-type: none"> – Transmitter: Aluminum – Remote display: Aluminum, stainless steel die-cast 	<ul style="list-style-type: none"> – Transmitter (digital): Aluminum, polycarbonate (in prep.) – Sensor connection housing: 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: –50 to +60 °C (–58 to +140 °F)	
Degree of protection	IP66/67 (Type 4X enclosure)	
Outputs Inputs Communication	<p>Port 1 Current output (4–20 mA, HART) or digital communication via HART and Modbus RS485</p> <p>Port 2/3 Freely configurable I/O modules:</p> <ul style="list-style-type: none"> – Current output (4–20 mA) – Pulse/frequency/switch output – Pulse output – Relay output – Current input (4–20 mA) – Status input 	<p>Port 1 Current output (4–20 mA, HART) or digital communication via HART and Modbus RS485</p> <p>Port 2/3/4 (Proline 500 digital): Freely configurable I/O modules:</p> <ul style="list-style-type: none"> – Current output (4–20 mA) – Pulse/frequency/switch output – Pulse output – Relay output – Current input (4–20 mA) – Status input
Approvals	<ul style="list-style-type: none"> – ATEX, IECEx, cCSAus, EAC, NEPSI, INMETRO – SIL: Use for flow monitoring up to SIL 2 (single-channel architecture) or SIL 3 (multi-channel architecture with homogeneous redundancy) – Radio approval 	


Cross section – t-mass F (left), t-mass I (right)

- 1 Sensor with long-term stability and bidirectional measurement
- 2 Metallic seal
- 3 Flow conditioner



Sensor

Nominal diameter	<ul style="list-style-type: none"> ▪ t-mass F: DN 15 to 100 (½ to 4") ▪ t-mass I: DN 80 to 1500 (3 to 60")
Process connections	<ul style="list-style-type: none"> ▪ t-mass F: flanges (EN, ASME, JIS), threads (EN 10226-1/ISO 7-1, ASME MNPT) ▪ t-mass I: compression fittings G / NPT (¾", 1")
Min./max. flow (air)	t-mass F: 0.38 to 2900 Nm ³ /h (0.23 to 1800 sft ³ /min) t-mass I: 1613 to 567 236 Nm ³ /h (1020 to 358 474 sft ³ /min)
Process pressure	max. PN 40 (Class 300)
Process temperature	–40 to +180 °C (–40 to +356 °F)
Degree of protection	Standard: IP66/67 (Type 4X enclosure) Option (Proline 500): IP68 (Type 6P enclosure)
Max. measured error (mass flow)	±1.0% o.r. (10 to 100% o.f.s.) ±0.1% o.f.s. (1 to 10% o.f.s.)
Repeatability	±0.25% o.r.
Turndown	Up to 1000:1
Materials (wetted parts)	1.4404/1.4435 (316L), Alloy C22
Pressure loss	Negligible
Approvals Conformity	– ATEX, IECEx, cCSAus, EAC, NEPSI, INMETRO – PED, CRN – NACE MR0175/MR0103

The t-mass F/I 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.



Calibration measuring technology for premium accuracy

Precision that pays for itself

At Endress+Hauser, all flowmeters are subjected to strict quality controls and are checked, calibrated and adjusted on the most state-of-the-art calibration facilities in the world. Our air calibration facilities ensure that you can rely on t-mass F/I 300/500 for maximum measuring performance in your plant:

- Accredited by the Swiss Accreditation Service (SAS) according to ISO/IEC 17025
- Fully traceable to national standards
- Measuring range: 0.05 to 10 000 kg/h (0.11 to 22 046 lb/h)
- Maximum measurement uncertainty: $\pm 0.3\%$ o.r.
- Reference instruments: nozzles, rotary pistons and turbine gas meters

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