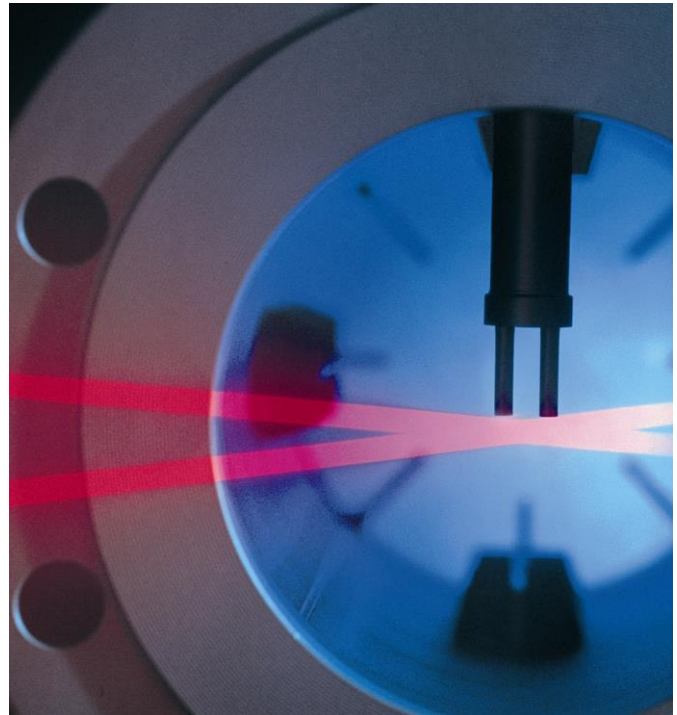


COMBIMASS[®]

Technical Data

COMBIMASS[®] eco

Version 2014-02



THE SYSTEM COMBIMASS®

The field transmitters of the COMBIMASS® eco series are suitable for gas flow measurement and cover a wide range of different applications. The instruments can be employed for process temperatures up to 220°C and are available in explosion proof versions. The flow transmitters apply thermal dispersion technology in order to measure directly in dry gases the standard volumetric or gas mass flow, regardless of the operating pressure and temperature of the medium.

All units of the COMBIMASS® series are characterized by high-performance digital signal processing. Important features of the transmitter electronics for the purposes of practical operation are the temperature compensation and the opportunity to select different measuring modes (choice between constant current or constant temperature principle).

The electronics of the COMBIMASS® eco is located in a compression-proof dual compartment stainless steel enclosure. Optionally a 10 digits LED display with control panel is available for indication of actual flow rate or totalized flow as well as for field programming of the flow meter.

For transmission of the flow signal an isolated 4-20 mA analog output as well as a field selectable pulse output are available. For intrinsically safe operation a dedicated process interface module has been developed for the power supply of the flow transmitter. In such a case, the signal output is done via an I/O module installed downstream of the process interface module. The circuitry of the process interface module and the I/O module is located in a top DIN-rail housing for easy switch cabinet assembly. Also an optionally available graphic display can be installed there.

The flow transmitter can be combined with a wide range of different sensors of the COMBIMASS® family and assembled individually according to the specific application. Each flow meter will be tested prior to shipment and calibrated at our CAMASS® calibration centre under actual operating conditions (piping layout, gas composition, pipe diameter, flow direction,...).

A special application is the measurement of wet biogas from digesters in sewage treatment plants or from landfills. The dampness portion will be measured too. Therefore the gas mass flow at standard conditions according DIN 1343 paper cannot be measured directly, since the request of 0% relative humidity is not fulfilled. The maximum waterdamp portion at saturation point depends only on gas temperature and is represented by a well-known equation. The temperature information of the non-heated reference sensor is used to determine and compensate the humidity in the biogas directly in the electronic part of the housing.

Thus the dry gas mass flow can be determined at standard conditions finally, if the installation point is chosen well at a place where gas is waterdamp saturated. If not, special additional and expensive dew-point probes must be used for humidity correction. Thermal dispersion technology is suited particularly well for the use in wet biogas compared to other technologies (e.g. Vortex, ultrasonic, mechanical counters), since even at small gas speeds the measurement is very precise. A further substantial advantage is that all necessary compensations can take place directly in that one measuring instrument. The installation is not more simply at lower costs, the failure probability is lower than using a combination of three measuring instruments (temperature, pressure and flow) and no error summarization will take place.

SMART FEATURES

- Thermal flow meter for direct measurement of normal volumetric or gas mass flows in dry gases
- Flow rate measurement unaffected by pressure and temperature fluctuations
- integrated humidity correction for digester gas flow meter
- Pressure-proof dual compartment stainless steel enclosure
- Compact and rugged design for exceptional reliability
- Easy to install and service
- Unmatched accuracy due to digital signal processing
- Temperature compensated flow rate measurement
- Choice of different measuring modes
- Expandable due to modular design
- Wide range of different sensors for each specific application
- EEx [ed] Zone 1 / EEx [ia] Zone 0 optionally available

APPLICATION VERSATILITY

- Compressed air – flow rate measurement and balancing
- Air and technical gases
- Combustion gases such as methane, propane, natural gas, etc.
- Exhaust air and waste gases
- Combustion air in incineration plants
- Biogas in sewage treatment, landfill and environmental installations
- Process gases
- Gases and gas mixtures of known composition

SPECIFICATIONS

Measuring principle	Gas flow measurement based on thermal dispersion technology
Applications	Compressed air, air, technical gases, inert gases, supply gases, combustion gases, process gases, explosive gases, gases and gas mixtures of known composition, depending on choice of sensor
Measured parameter	<ul style="list-style-type: none"> • Gas mass flow [kg/h] • Standard volumetric flow [Nm³/h] • Standard flow velocity [Nm/s]
Signal processing	Microprocessor based, fully digital signal processing
Measuring mode	<p>Constant current or constant temperature principle</p> <p><u>Note:</u> The measuring mode will be selected by our qualified technicians depending on the application requirements during calibration of the flow meter and may not be changed by the operator.</p>

TECHNICAL DATA

Calibration	<p>One calibration group with advanced temperature compensation</p> <p>Following different types of calibration for COMBIMASS® and VACOMASS® products are available:</p> <p>Type 1: Standard-Calibration of a single-point COMBIMASS® flow meter under actual operating conditions in our CAMASS® Calibration Lab. This standard calibration will be done under the assumption that sufficient inlet and outlet straight pipe runs are available for installation of the COMBIMASS® flow meter. Process parameters like temperature, pressure, installation details of piping and gas composition will be considered to achieve a high accuracy of flow metering.</p> <p>Type 2: Calibration of the COMBIMASS® multi-point flow meter system under actual operating conditions in our CAMASS® Calibration Lab. Process parameters like temperature, pressure, installation details of piping and gas composition will be considered to achieve a high accuracy of flow metering.</p> <p>Type 3: Calibration of a COMBIMASS® flowmeter under consideration of the actual piping isometry (scale 1:1). Process parameters like temperature, pressure, installation details of piping and gas composition will be considered to achieve a high accuracy of flow metering.</p> <p>Type 4: Calibration of a COMBIMASS® flowmeter in combination with the COMBIMASS® flow conditioner as a complete unit to reduce/eliminate influences due to flow pulsations or flow swirls. Process parameters like temperature, pressure, installation details of piping and gas composition will be considered to achieve a high accuracy of flow metering.</p> <p>Type 5: Calibration of a COMBIMASS® flowmeter as a real gas calibration (calibration loop is filled with real gas). Process parameters like temperature, pressure and installation details of piping will be considered to achieve a high accuracy of flow metering.</p> <p>Type 6: Calibration takes place in comparison with master calibration devices (and according to contractual requirements) on an DAkkS-certified (German accredited Institute) Calibration Lab using measuring equipment, which is regularly and traceable recalibrated by the PTB (Physikalisch Technische Bundesanstalt).</p> <p>Type 7: Further pipe elements like valves are considered during calibration, incl. flow profile distortion.</p>
Enclosure	Pressure proof dual compartment enclosure, 1.4571, Ø 50 mm
Protection class	IP68
Explosion protection	<p>Approvals according to ATEX (optional):</p> <ul style="list-style-type: none"> • EEx [ed] – Zone 1 • EEx [ia] – Zone 0
Power consumption	max. 1,1 Watt
Ambient conditions	Ambient temperature -40°C to 80°C, 80% Relative humidity

TECHNICAL DATA

Power supply	18-36 VDC (power supply via standard supply units possible) For intrinsically safe operation – EEx [ia] – power supply via process interface module
Reproducibility (electronics)	0,125% of reading
System accuracy (electronics)	0,25% of reading + 0,025% of full scale
Measuring accuracy (depending on application and calibration)	2,5% of reading + 0,2% of full scale (1% of reading + 0,1% of full scale as an option only and if straight inlet and outlet pipe lengths are according DIN 5167-1)
Flow range (1013 mbar, 0°C)	0,46 – 46 Nm/s (standard) 0,08 – 400 Nm/s (optional)
Turndown ratio	10:1 to 100 : 1
Field display / control (option only)	<ul style="list-style-type: none"> • 10 digits, alphanumeric LED display for field indication of actual flow rate or totalized flow • Integrated totalizer • Control pad for field programming of the flowmeter using a magnetic pin • easy-to-use menu for transmitter set-up
Graphic display (optional)	<ul style="list-style-type: none"> • remote graphic display (wall or switch cabinet mounting) • simultaneous indication of flow rate and totalized flow • Integrated totalizer • touch pad for easy programming of the flowmeter • easy-to-use menu for transmitter set-up
Signal output (isolated)	1 x analog output: 4-20 mA, active load < 400 Ohm, 10 Bit resolution 1 x impulse output: field selectable, max. 2 impulse/s
Choice of sensors (option)	Transmitter can be combined with different sensors of the COMBIMASS® series: Sensor geometry: 2 Pin Process temperature: max. 220°C Operating pressure: max. 60 bar Diameter of sensor rod: 12 mm, 18 mm, 25 mm Materials: 1.4571 (standard), 1.4435 (option) Approvals: PED test certificate, modules B+F or module G (optional) Certificates: 3.1B material certificate (optional) Type of flow element: Insertion flow element/ Inline flow element Process connections: Compression fitting, butt weld, screw, flange (DIN, ANSI) Hot tapping: manually actuated with ball valve Special feature: integrated humidity correction

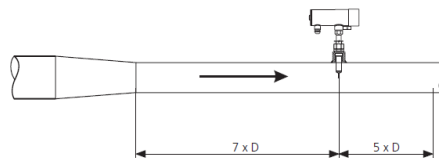
INLET AND OUTLET STRAIGHT PIPE RUNS

General information To achieve high accuracy in flow rate measurement as specified, consideration of sufficient inlet and outlet straight pipe runs according to DIN ISO 5167-1 is crucial during installation of the flow transmitter. Reasonable measuring results can also be achieved with shortened inlet and outlet straight pipe runs according to the specifications below.

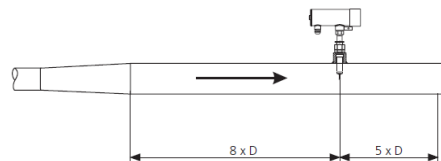
If sufficient inlet and outlet straight pipe runs are not available, please call factory. It might be possible to achieve the required measurement accuracy, if a special calibration can be carried out at our CAMASS® calibration centre by simulating the actual operating conditions, the range of flow rates and the piping.

Alternatively, the installation of a COMBIMASS® flow conditioner or use of multiple sensors may allow, to achieve accurate measuring results when straight inlet and outlet pipe run is restricted.

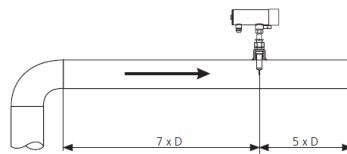
Reduction pieces



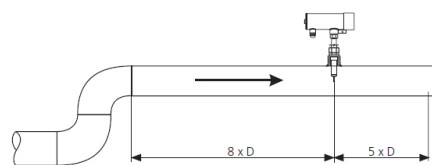
Extension pieces



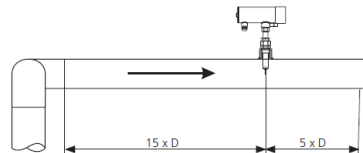
One 90° elbow



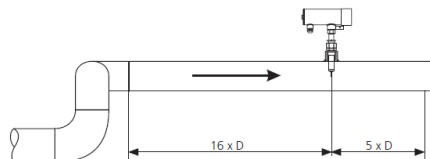
Two 90° elbows in one plane



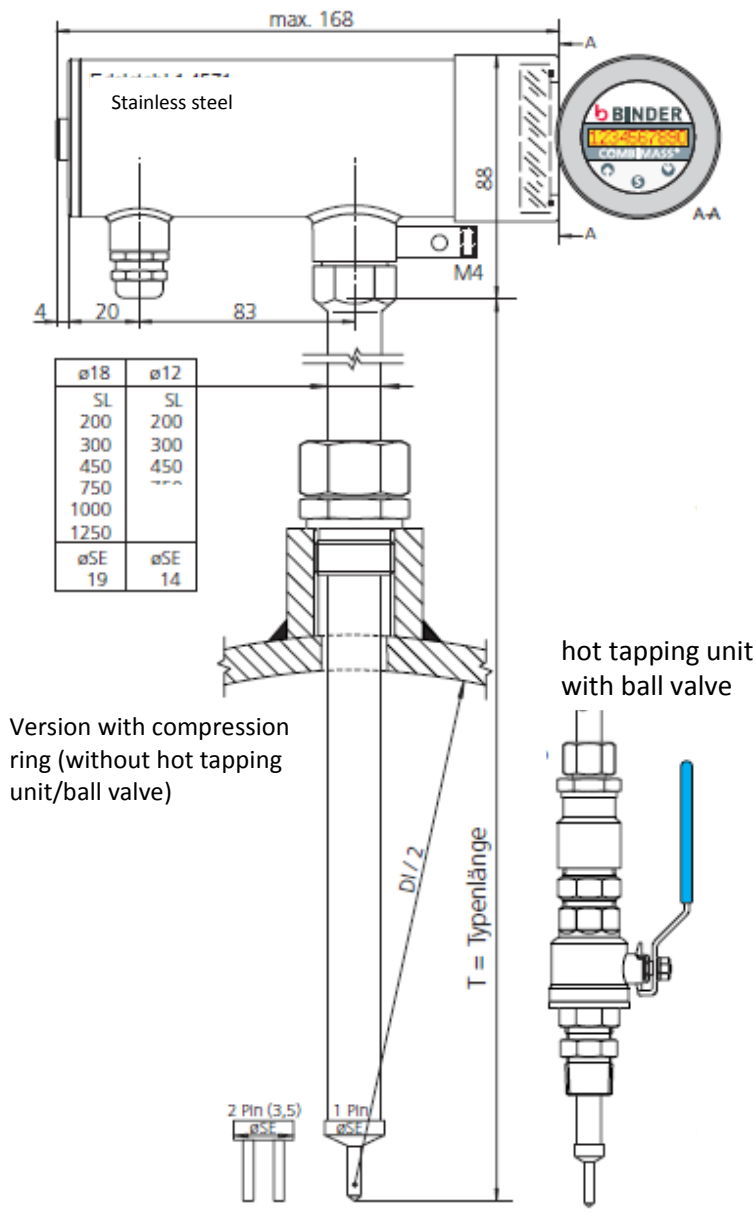
Two 90° elbows in two planes



Three 90° elbows in three planes



DIMENSIONS



IMPRESSUM

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Technical Data
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COMBIMASS Eco