

MQMe Quantometer with electronic index



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Metreg Technologies GmbH

MQMe Quantometer with electronic index

Applications

The MQMe Quantometer is a turbine meter for operational natural gas - volume measurement and for other non-aggressive gases such as propane, butane, air, carbon dioxide (CO₂) or inert gases used in internal and controlling processes of various types, especially in industrial thermal processing facilities.

Key features

- Meter size G 16 to G 1000
- Flow rates from 25 to 1600 m³/h
- Nominal sizes from DN 25 (1") to DN 150 (6")
- Pressure class PN 10/16 and ANSI Class 150
- Measuring range up to 1:20
- Meter body made of anodized high strength Aluminum
- Maintenance free based on permanent lubrication of the ball bearings
- Manual lubrication of the ball bearings by means of oil pump as option
- Electronic index head standard made of Aluminum
- Lithium battery with a calculated life time under standard conditions of 5 years
- Integral electronic volume corrector (AGA NX-19) and data storage as option
- Connection of an external pressure and temperature measurement is possible
- Communication options: serial RS 485 interface, Modbus, M-Bus, 4 to 20 mA analog output, high frequency or low frequency pulse output, pressure and temperature inputs
- Rotating index head (180°)
- Parameterization via a PC based software (HMI)
- Recommended straight inlet pipe $\geq 3DN$ and outlet pipe $\geq 2DN$
- Horizontal and vertical mounting position
- Approval according to PED (PED 97/23/EG)
- ATEX / IECEx Ex-Zone 1; Ex II 1G Ex ia IIC T4

Description and operation

The MQMe Quantometer is a turbine gas meter that registers the operating volume using a nine-digit electronic index. The flow of the gas to be measured causes the turbine rotor to rotate. The gas flow is narrowed on an annular cross section, is accelerated and directed onto the smooth-running Aluminum rotor. The number of rotations is proportional to the measured gas volume; the frequency of rotations is proportional to the actual gas flow.

The rotation of the rotor is transmitted via a magnetoresistance sensor from the gas pressurized area to the electronic index which is in the atmospheric environment. The CPU is receiving the high frequency signal for the magnetoresistance sensor to calculate the gas flow and gas volume under operating conditions. If the optional electronic volume corrector function is installed the gas flow and gas volume under standard conditions will be calculated according AGA NX-19. The calculation can be based on fixed factors for temperature and pressure or on optionally installed temperature and pressure sensors. The MQMe is designed to have one external temperature and one external pressure transmitter installed directly in the meter.

The MQMe has several options to transmit the measured and calculated data to a digital control system (DCS) or SCADA. The MQMe is by standard equipped with alternatively RS 485 or M-Bus interface and one high frequency (HF) or one low frequency (LF) pulser. If an external power supply is connected to the MQMe one 4 to 20 mA – configurable signal is available. The rotation of the rotor can be scanned additionally with one external high frequency (HF) sensor as an option. The HF-sensor signal allows the determination of the actual gas flow in high-resolution and can be transmit to any digital control system (DCS) or SCADA for flow control purposes.

MQMe Quantometer

Performance data

DN [mm/ inch]	G-Typ	Q _{min} [m ³ /h]	Q _{max} [m ³ /h]	HF* [imp/m ³]	NF [imp/m ³]	Pressure loss [mbar] at Q _{max} and ρ=1 bar abs.	
						Air (ρ=1.2 kg/m ³)	Natural gas (ρ=0.83 kg/m ³)
25 / 1"	16	2,5	25	140000	10	10	5
25/1"threaded	25	4	40	140000	10	25	15
50 / 2"	40	3,25	65	104000	10	8	3
50 / 2"	65	5	100	104000	10	20	7
80 / 3"	100	8	160	27000	1	6	3
80 / 3"	160	12,5	250	27000	1	15	6
80 / 3"	250	20	400	27000	1	25	16
100 / 4"	160	12,5	250	13500	1	5	1
100 / 4"	250	20	400	13500	1	12	3
100 / 4"	400	32	650	13500	1	25	9
150 / 6"	400	32	650	5400	1	6	3
150 / 6"	650	50	1000	5400	1	16	6
150 / 6"	1000	80	1600	5400	1	25	16

* The absolute number of the pulses depends on the meter size and the single meter itself. The stated values are of typical size. Exact values are determined during calibration of the meter are stated on the nameplate.

The Quantometer MQMe show very stable and reproducible measurement results. The measurement cartridge has been designed to be assembled into the pressure containing housing positioned by soft O-rings. This makes the MQMe meter very robust against any torsional and bending stresses resulting out of installation conditions. The meters can withstand far more than double the specified torsional and bending stresses implied through the installation as defined for example in EN 12261.

The lifetime durability of the Quantometer MQMe is very stable due to the large dimensioned high precision ball bearings "made in Germany" along with the high precision machining of the body and all moving parts. All MQMe Quantometers are equipped with machined aluminum turbine wheels. After machining all aluminum parts, especially the turbine wheel, are hard anodized for less friction and higher resistance to mechanical wear and tear or chemical influences.

In case of contaminations or dust in the measured gas it is recommended to install an optional oil lubrication pump and a filter in the pipe for longer meter lifetime.

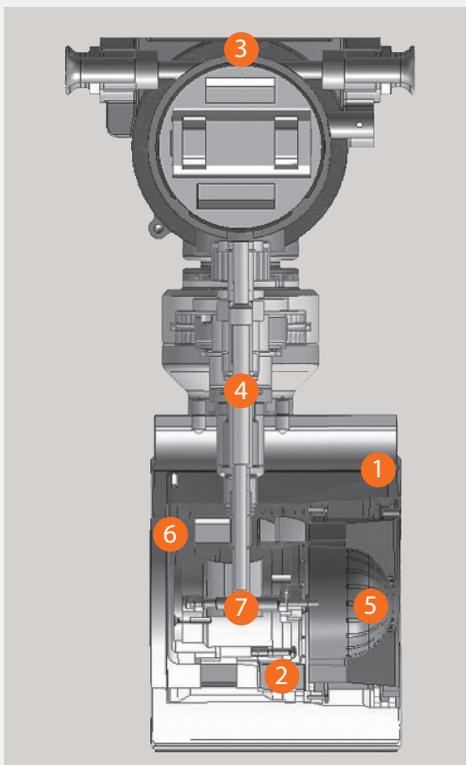
Meter design

The pressure containing housing (1) is very robust against torsional or bending forces due to the large cross sections. The aluminum turbine wheel (2) is machined out of full material on a 5 axis machine, dynamically precision balanced, and hard anodized. The computer optimized profile of the helical turbine blades in combination with the fluid dynamic optimized inlet flow straightener (5) provide for a very stable measurement characteristic also under elevated operating pressure conditions.

The high precision ball bearings “made in Germany” ensure minimal friction under all operating conditions. The complete measuring cartridge (6) is positioned in the housing by O-rings. This design feature also creates a circular room with absolute static operating pressure for very precise pressure measurement without any dynamic flow influences. The turning of the turbine wheel is transmitted via a pressure stable and leak tight magneto-resistance sensor (4) to the nine-digit electronic counter (3) with an environmental protection class of IP 65. The Quantometer MQMe can be installed horizontally and vertically up or down due to the 180° turnable index head.

The optional oil lubrication of the ball bearings is ensured through the lubrication pump. The complete design of the MQMe Quantometer has been aimed to be very robust in combination with highest measurement performance. The electronic index of the MQMe can optionally be equipped with an electronic volume corrector. In this case the gas flow and gas volume under standard conditions will be calculated according AGA NX-19. For this calculation an external pressure and temperature transmitter has to be installed to the MQMe. The MQMe is designed to have one external temperature and one external pressure transmitter installed to the meter. If there is no external pressure and temperature sensor is installed fixed values for the calculations due to AGA NX-19 will be used.

The MQMe has several options to transmit the measured and calculated data to a digital control system (DCS). The MQMe is by standard equipped with RS 485 or M-Bus interface and one high frequency (HF) or one low frequency (LF) pulser. If an external power supply is connected to the MQMe one 4 to 20 mA – signal is available. The rotation of the rotor can be scanned additionally with one frequency (HF) sensor as an option. The HF-sensor signal allows the determination of the actual gas flow in high-resolution and can be transmit to any digital control system (DCS) for flow control purposes.

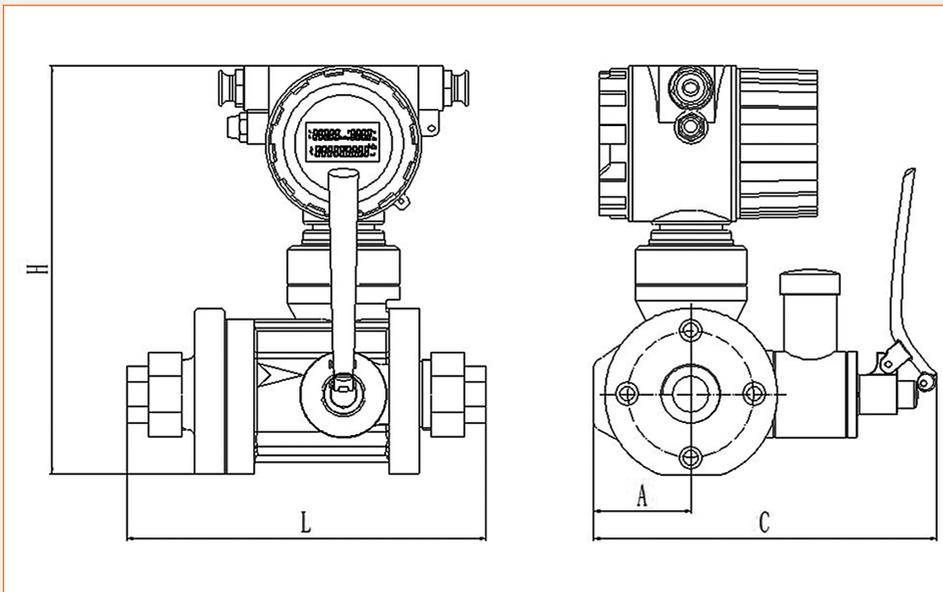


- 1 Pressure containing housing
- 2 Turbine wheel
- 3 Electronic counter / index
- 4 Magneto-resistance sensor
- 5 Inlet flow straightener
- 6 Measuring cartridge
- 7 Measuring unit

MQMe Quantometer

Dimensions and weights

DN [mm / inch]	Housing dimensions [PN 16 / ANSI 150]							Weight without pump [kg]	Weight with pump [kg]
	L [mm]	A [mm]	B no pump [mm]	B with pump [mm]	C no pump [mm]	C with pump [mm]	H [mm]		
25 / 1"	150	65	55	165	120	230	275	5,4	6,1
25/1"threaded	240	65	55	165	120	230	275	6,0	6,8
50 / 2"	75	55	65	175	120	230	305	4,3	5,1
80 / 3"	120	70	90	200	160	270	340	6,7	7,4
100 / 4"	150	90	100	210	190	300	365	8,4	9,2
150 / 6"	180	120	120	230	240	350	415	13,0	13,8



The pressure loss of the MQMe Quantometer is minimized through a fluid dynamically optimized inlet diffusor, very low manufacturing tolerances and the high precision, low friction ball bearings.

The optimized flow conditions allow a minimal straight inlet pipe of ≥ 3 DN. If the installation conditions allow or in case of severe flow perturbations acc. to OIML a straight inlet length of ≥ 5 DN is recommended.

Connections

DN [mm / inch]	DIN EN 1092-1 PN 16	ANSI B 16.5 Class 150
25/1" Flange with threaded holes	4 x M12	4 x 1/2"
25/1" threaded	G 1"	G 1"
50 / 2"	4 x M16	4 x 5/8"
80 / 3"	8 x M16	4 x 5/8"
100 / 4"	8 x M16	8 x 5/8"
150 / 6"	8 x M20	8 x 3/4"

MQMe Quantometer housings are manufactured without flanges as a "sandwich" design to be installed between the two inlet and outlet pipe flanges on a standard basis with raised face (RF) flanges according to DIN/EN 1092-1 or ANSI B 16.5 for class 150 with a maximum operating pressure of 20 bar/ 2,0 MPa. The MQMe DN 25 /1" is designed as flange version with threaded holes or as a threaded pipe version with a thread of G1".

More technical details, especially for commissioning and operation, please refer to the operation manual of the MQMe turbine meter.





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