

# Measurement

Volume conversion and data transfer



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# Contents

## **Non-custody transfer measurements**

MQM Quantometer 3

MQMe Quantometer with electronic totaliser 5

## **Measurements subject to verification**

MTM Turbine meter 7

MRM Rotary piston gas meter 10

MEC 500 13

MCG 500 16

# MQM Quantometer



The MQM Quantometer is a turbine gas meter for operational natural gas volume measurement and for other non-aggressive gases such as propane, butane, air, CO<sub>2</sub> or inert gases used in internal accounting and controlling processes of various types, especially in industrial thermal processing facilities.



## Main features of the MQM:

- › Meter sizes from G 10 to G 1000
- › Flow rates from 1.6 to 1600 m<sup>3</sup>/h
- › Nominal sizes from Rp 1" 25 to DN 150
- › Pressure class PN 4/16
- › Measuring ranges up to 1:20
- › Maintenance free based on permanent lubrication of the bar bearings
- › Meter body made of anodised high-strength aluminum
- › Meter index head made of plastic as standard, aluminum as an option
- › Optional: Manual lubrication of the ball bearings via the oil pump
- › Rotating index head (355°)
- › Recommended straight inlet pipe ≥ 3DN and outlet pipe ≥ 2DN
- › Horizontal and vertical mounting position
- › Approval according to DGRL/PED 2014/68/EU (Pressure Equipment Directive)
- › Low-frequency pulse output as standard:  
HF pulse generator as an option

## Dimensions, weights, connections

Rp / DN	Housing dimensions (mm)							Weight (kg)
	L <sub>1</sub>	L <sub>2</sub>	A	B	C	H <sub>1</sub>	H <sub>2</sub>	
1" threaded	185	240	64	64	128	152	55	5.0
1 ½" threaded	210	280	64	64	128	152	55	6.4
25	150	-	64	64	128	152	55	4.0
50	60	-	60	72	132	178	52	2.8
80	120	-	75	97	172	201	71	5.0
100	150	-	80	107	103	213	80	6.8
150	180	-	122	123	245	242	105	11.6

## Technical specifications

The MQM Quantometer is a turbine gas meter that registers the operating volume using an eight-digit mechanical counter. Information on the operating volume is sent to an electronic volume corrector via a pulse generator and it is converted to normal or standard conditions. The MQM Quantometer is a volume flow meter.

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 connected to a speed-reducing gear train and transmitted via a magnetic coupling from the gas-pressurized area to the adjustable roller counter in the atmospheric environment.

## Connections

Rp		
1" threaded	ISO 7/1	
1 ½" threaded	ISO 7/1	
DN		
25		
50	4xM16	DIN EN 1092-1PN 16
80	8xM16	DIN EN 1092-1PN 16
100	8xM16	DIN EN 1092-1PN 16
150	8xM20	DIN EN 1092-1PN 16

Type	G-Type	DN / Rp	Type of connection	Measuring range Operating volume flow Qb [m³/h]		Measuring range Ratio	pe max. gas	HF [imp/m³] * external pulse gen.	NF [imp/m³] internal pulse gen.	Pressure loss (mbar)
				Q min.	Q max.					at Qmax and p=1 bar abs.
MQM	10	Rp 1"	Rp Internal thread	1.6	16	1:10	4 bar	185,000 - 195,000	10	5
MQM	16	Rp 1"	Rp Internal thread	2.5	25	1:10	4 bar	185,000 - 195,000	10	5
MQM	25	Rp 1"	Rp Internal thread	4	40	1:10	4 bar	185,000 - 195,000	10	5
MQM	40	Rp 1"	Rp Internal thread	6.5	65	1:10	4 bar	185,000 - 195,000	10	5
MQM	40	Rp 1 ½"	Rp Internal thread	6.5	65	1:10	4 bar	185,000 - 195,000	10	5
MQM	10	DN25	Flange	1.6	16	1:10	16 bar	185,000 - 195,000	10	5
MQM	16	DN25	Flange	2.5	25	1:10	16 bar	185,000 - 195,000	10	5
MQM	25	DN25	Flange	4	40	1:10	16 bar	185,000 - 195,000	10	5
MQM	40	DN25	Flange	6.5	65	1:10	16 bar	185,000 - 195,000	10	5
MQM	40	DN50	Flange	6.5	65	1:10	16 bar	101,000 - 107,000	10	3
MQM	65	DN50	Flange	5	100	1:20	16 bar	101,000 - 107,000	10	4
MQM	100	DN80	Flange	8	160	1:20	16 bar	26,400 - 27,200	1	2
MQM	160	DN80	Flange	12.5	250	1:20	16 bar	26,400 - 27,200	1	2
MQM	250	DN80	Flange	20	400	1:20	16 bar	26,400 - 27,200	1	4
MQM	160	DN100	Flange	12.5	250	1:20	16 bar	13,100 - 13,900	1	3
MQM	250	DN100	Flange	20	400	1:20	16 bar	13,100 - 13,900	1	3
MQM	400	DN100	Flange	32	650	1:20	16 bar	13,100 - 13,900	1	6
MQM	400	DN150	Flange	32	650	1:20	16 bar	5,100 - 5,400	1	10
MQM	650	DN150	Flange	50	1000	1:20	16 bar	5,100 - 5,400	1	10
MQM	1000	DN150	Flange	80	1600	1:20	16 bar	5,100 - 5,400	1	10

\* The absolute number of HF pulses depends on the counter size and the individual counter. The specified values are typical values. The exact values of a counter determined from the calibration can be found on the type plate.

# MQMe Quantometer

with electronic index

The MQMe Quantometer is a turbine gas meter that registers the operational natural gas volume measurement and other non-aggressive gases such as propane, butane, air, carbon dioxide (CO<sub>2</sub>) or inert gases using an electronic index for internal accounting and controlling processes of various types, especially in industrial thermal processing facilities.



## Main features of the MQMe:

- › Meter sizes from G 10 to G 1000
- › Flow rates from 1.6 to 1600 m<sup>3</sup>/h
- › Nominal sizes from Rp 1" to DN 150
- › Pressure class PN 4/16
- › Measuring ranges up to 1:20
- › Maintenance free based on permanent lubrication of the ball bearings
- › Meter body made of anodised high-strength aluminum
- › Optional: Manual lubrication of the ball bearings via the oil pump
- › Lithium battery, with optional external power supply
- › Integral volume corrector (AGA NXD-19) as an option
- › Connection of an external pressure and temperature measurement sensor is possible
- › Communication (options): Serial RS 485 interface (Modbus), M-Bus, 4 to 20 mA analog output, 1 HF or 1 LF pulse output (optional)
- › Electronic index Rotating
- › Index head (180°)
- › Recommended straight inlet pipe ≥ 3DN and outlet pipe of ≥ 2DN
- › Horizontal and vertical mounting position
- › Approval according to DGRL/PED 2014/68/EU (Pressure Equipment Directive)
- › ATEX / IECEx Ex-Zone 1: Ex ia II C T4 Ga

## Dimensions, weights, connections

Rp / DN	Housing dimensions (mm)							Weight (kg)
	L <sub>1</sub>	L <sub>2</sub>	A	B	C	H <sub>1</sub>	H <sub>2</sub>	
1" threaded	185	240	64	64	128	222	55	6.8
1 ½" threaded	210	280	64	64	128	222	55	7.9
25	150	-	64	64	128	222	55	5.8
50	60	-	60	72	132	253	54	4.2
80	120	-	75	97	172	272	72	6.9
100	150	-	80	107	103	283	81	8.6
150	180	-	122	123	245	311	107	13.2

## Technical specifications

The MQMe Quantometer is a turbine gas meter that registers the operating volume using a nine-digit electronic index. The MQMe Quantometer is a volume flow meter. 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.

## Connections

Rp		
1" threaded	ISO 7/1	
1 ½" threaded	ISO 7/1	
DN		
25		
50	4xM16	DIN EN 1092-1PN 16
80	8xM16	DIN EN 1092-1PN 16
100	8xM16	DIN EN 1092-1PN 16
150	8xM20	DIN EN 1092-1PN 16

Type	G-Type	DN / Rp	Type of connection	Measuring range Operating volume flow Qb [m³/h]		Measuring range Ratio	pe max. gas	HF [imp/m³] * external pulse gen.	HF [imp/m³] internal pulse gen.	NF [imp/m³] internal pulse gen.	Pressure loss (mbar) at Qmax and p=1 bar abs.
				Q min.	Q max.						
MQMe	10	Rp 1"	Rp Internal thread	1.6	16	1:10	4 bar	185,000 - 195,000	15,080 - 16,250	10	5
MQMe	16	Rp 1"	Rp Internal thread	2.5	25	1:10	4 bar	185,000 - 195,000	15,080 - 16,250	10	5
MQMe	25	Rp 1"	Rp Internal thread	4	40	1:10	4 bar	185,000 - 195,000	15,080 - 16,250	10	5
MQMe	40	Rp 1"	Rp Internal thread	6.5	65	1:10	4 bar	185,000 - 195,000	15,080 - 16,250	10	5
MQMe	40	Rp 1 ½"	Rp Internal thread	6.5	65	1:10	4 bar	185,000 - 195,000	15,080 - 16,250	10	5
MQMe	10	DN25	Flange	1.6	16	1:10	16 bar	185,000 - 195,000	15,080 - 16,250	10	5
MQMe	16	DN25	Flange	2.5	25	1:10	16 bar	185,000 - 195,000	15,080 - 16,250	10	5
MQMe	25	DN25	Flange	4	40	1:10	16 bar	185,000 - 195,000	15,080 - 16,250	10	5
MQMe	40	DN25	Flange	6.5	65	1:10	16 bar	185,000 - 195,000	15,080 - 16,250	10	5
MQMe	40	DN50	Flange	6.5	65	1:10	16 bar	101,000 - 107,000	8,416 - 8,916	10	3
MQMe	65	DN50	Flange	5	100	1:20	16 bar	101,000 - 107,000	8,416 - 8,916	10	4
MQMe	100	DN80	Flange	8	160	1:20	16 bar	26,400 - 27,200	1,885 - 2,266	1	2
MQMe	160	DN80	Flange	12.5	250	1:20	16 bar	26,400 - 27,200	1,885 - 2,266	1	2
MQMe	250	DN80	Flange	20	400	1:20	16 bar	26,400 - 27,200	1,885 - 2,266	1	4
MQMe	160	DN100	Flange	12.5	250	1:20	16 bar	13,100 - 13,900	935 - 992	1	3
MQMe	250	DN100	Flange	20	400	1:20	16 bar	13,100 - 13,900	935 - 992	1	3
MQMe	400	DN100	Flange	32	650	1:20	16 bar	13,100 - 13,900	935 - 992	1	6
MQMe	400	DN150	Flange	32	650	1:20	16 bar	5,100 - 5,400	318 - 386	1	10
MQMe	650	DN150	Flange	50	1000	1:20	16 bar	5,100 - 5,400	318 - 386	1	10
MQMe	1000	DN150	Flange	80	1600	1:20	16 bar	5,100 - 5,400	318 - 386	1	10

\* The absolute number of HF pulses depends on the counter size and the individual counter. The specified values are typical values. The exact values of a counter determined from the calibration can be found on the type plate.

# MTM turbine meter



The MTM turbine meter can be used for the custody transfer volume measurement of gases – especially natural gas – in natural gas transfer stations, in power plants and the gas networks of municipal utilities, in biogas feed-in plants and in a wide variety of industrial plants where equivalent measuring accuracy is required. The MTM turbine gas meter registers the operating volume with the aid of an eight-digit mechanical register. Information on the operating volume is sent to an electronic volume corrector via a pulse generator and it is converted to normal or standard conditions.


The MTM turbine meter is approved for custody transfer according to MID (2004/22/EC) / OIML.



## Main features of the MTM:

- › Meter sizes from G 65 to G 4000
- › Flow rates from 5 to 6500 m<sup>3</sup>/h
- › Nominal sizes from DN 50 to DN 300
- › Pressure ratings PN 10 to PN 100 and ANSI Class 150, 300 and 600
- › Measuring range 1:20 as standard, optionally 1:30
- › Meter housing made of anodised high-strength aluminum, cast steel or as a welded steel construction
- › DN 50 to DN 150 up to 16 bar operating pressure - permanently lubricated bearings as standard, optional manual lubrication using an oil pump
- › From DN 200 or for operating pressures above 16 bar, manual lubrication using an oil pump as standard
- › Meter head made of plastic as standard, optionally made of aluminum
- › Rotatable totalizer (355°)
- › Compact installation due to straight inlet section of  $\geq 2$  DN and outlet section of  $\geq 1$  DN with low pre-interference. Heavy pre-interference requires an additional inlet section of 2 DN
- › Horizontal and vertical installation positions
- › Approvals in accordance with MID (2004/22/EC), OIML, PED (2014/68/EC), ATEX

## Technical specifications

MTM	
Gas temperature	+5 °C to +55 °C
Ambient temperature	+5 °C to +55 °C
Storage temperature	-20 °C to +55 °C
Maximum operating pressure	100 bar maximum, depending on housing specification
Protection class	IP 65
Meter materials	<ul style="list-style-type: none"> <li>› Meter housing: Aluminum alloy, cast steel, steel</li> <li>› Turbine wheel: Aluminum alloy</li> <li>› Meter head: Plastic (standard)</li> </ul>
PED approval	Hpi / 222-103-Q-01
ATEX approval	Ex-Zone 1-  II 2 G c II T4-TÜV-94/9/EC Annex 8
MID approval	T10660-NMi Certin
OIML recommendation	The gas meter type MTM complies with the requirements of OIML R 137-1&2: 2014 "Gasmeters", confirmed by NMI
Reproducibility	<0,1 %
Short-term	overload up to 1.25 Q <sub>max</sub>
Pressure change rate	<0.35 bar/s
Totalizer	mechanical roller counter with 8 rollers
Pulse outputs	1 LF pulse generator (reed contact) and 1 anti-tamper contact Option: 1 HF pulse generator or 2 HF pulse generators
Connections	<ul style="list-style-type: none"> <li>› Pressure: 1 connection with ¼" NPT thread</li> <li>› Temperature: 1 immersion sensor pocket with G ¼" thread (option)</li> </ul>
According to DIN EN 12261 maximum permissible error limits	$Q_{\min} < Q < 0.2 * Q_{\max} : \pm 2.0 \%$ $0.2 * Q_{\max} \leq Q \leq Q_{\max} : \pm 1.0 \%$



## Performance data

DN	G-Size	Q <sub>max</sub> (m <sup>3</sup> /h)	Measuring range 1:20 Pressure range		Measuring range 1:20 Pressure range		Measuring range 1:50** Pressure range		HF* (Imp/m <sup>3</sup> )	NF* (Imp/m <sup>3</sup> )	Pressure loss at Q <sub>max</sub> (m <sup>3</sup> /h) and p=1 bar abs.	
			1-100 bar	8-100 bar	8-100 bar	16-100 bar	8-100 bar	30-100 bar			Air (ρ=1.2 kg/m <sup>3</sup> )	Natural gas (ρ=0.83 kg/m <sup>3</sup> )
			Q <sub>min</sub> (m <sup>3</sup> /h)	Q <sub>min</sub> (m <sup>3</sup> /h)	Q <sub>min</sub> (m <sup>3</sup> /h)	Q <sub>min</sub> (m <sup>3</sup> /h)	Q <sub>min</sub> (m <sup>3</sup> /h)	Q <sub>min</sub> (m <sup>3</sup> /h)				
50	65	100	5		3.3				105000	10	13.7	8.81
80	100	160		8		5		3.2	26000	1	4.4	2.83
80	160	250	12.5		8		5		26000	1	8.7	5.60
80	250	400	20		13		8		26000	1	22.1	14.22
100	160	250		12.5		8.3		5	13500	1	5.0	3.22
100	250	400	20		13		8		13500	1	9.6	6.18
100	400	650	32.5		20		13		13500	1	25.0	16.09
150	400	650		32.5		22		13	5000	1	3.6	2.32
150	650	1000	50		33		20		5000	1	10.4	6.69
150	1000	1600	80		53		32		5000	1	21.4	13.77
200	650	1000		50		33		20	2200	1	1.1	0.71
200	1000	1600	80		53		32		2200	1	2.8	1.80
200	1600	2500	125		83		50		2200	1	6.5	4.18
250	1000	1600		80		53		32	1900	0.1	6.2	3.99
250	1600	2500	125		83		50		1900	0.1	12.5	8.04
250	2500	4000	200		133		80		1900	0.1	12.8	14.67
300	1600	2500		125		83		50	1200	0.1	4.6	2.96
300	2500	4000	200		133		80		1200	0.1	10.0	6.43
300	4000	6500	325		216		130		1200	0.1	22.1	14.22

\* The pulse value can vary and is precisely determined for the meter during calibration

\*\* in preparation

## Dimensions, weights, connections

DN (mm)	Approx. Weights (kg)							
	PN 16	PN 25	PN 40	PN 63	PN 100	ANSI 150	ANSI 300	ANSI 600
50	7	15	15	17	31	13	15	22
80	10	25	25	27	58	23	26	47
100	13	36	36	38	51	35	39	56
150	77	123	123	140	168	120	135	176
200	94	139	151	173	203	136	161	210
250	140	170	194	218	285	164	203	302
300	163	193	230	262	368	195	249	356

DN (mm)	Flanges with threaded holes						
	DIN EN 1092-1				ANSI B 16.5		
	PN 16	PN 25	PN 40	PN 100	ANSI 150	ANSI 300	ANSI 600
50	4 x M12	4 x M16	4 x M16	4 x M24	4 x 5/8"	8 x 5/8"	8 x 5/8"
80	4 x M16	8 x M16	8 x M16	8 x M24	4 x 5/8"	8 x 3/4"	8 x 3/4"
100	8 x M16	8 x M16	8 x M16	8 x M27	8 x 5/8"	8 x 3/4"	8 x 7/8"
150	8 x M16	8 x M20	8 x M20	12 x M30	8 x 3/4"	12 x 3/4"	12 x 1"
200	8 x M20	8 x M24	12 x M24	12 x M33	8 x 3/4"	12 x 7/8"	12 x 11/8"
250	12 x M24	12 x M27	12 x M30	12 x M36	12 x 7/8"	16 x 1"	16 x 11/4"
300	12 x M24	16 x M27	16 x M30	16 x M39	12 x 7/8"	16 x 11/8"	20 x 11/4"

# MRM rotary gas meter



The MRM rotary piston gas meter is a high-precision measuring device for gas volume measurement and flow measurement of natural gas and other non-aggressive gases in gas systems. The MRM rotary gas meter is used in residential and office buildings as well as commercial and industrial plants. The MRM rotary gas meter registers the operating volume with the aid of an eight-digit mechanical register. Information on the operating volume is sent to an electronic volume corrector via a pulse generator and it is converted to normal or standard conditions. The MRM rotary gas meter is approved for custody transfer according to MID (2004/22/EC) / OIML.

Rotary piston gas meters work according to the displacement principle. One housing contains two 8-shaped rotating pistons that roll against each other. The measuring chambers are filled and emptied regularly by the rotation. With each four crescent-shaped volumes are moved through the measuring chamber, whereby the speed is proportional to the gas flow rate. A gear drive outside the measuring chamber synchronizes the movement of the rotary pistons (\* except DN 100).



The operating volume flow can be controlled via low-frequency, generated by means of a reed contact NF pulses to electronic volume correctors or data storage devices. The totalizer head is also equipped with an anti-tampering contact.

Rotary gas meters are characterized by a very compact design and very high measuring accuracy. The MRM rotary gas meter requires no inlet or outlet sections and is insensitive to strong fluctuations in the gas flow (discontinuous operation).

## Main features of the MRM:

- › Numerator sizes from G 10 to G 1000
- › Flow rates from 0.5 to 1600 m<sup>3</sup>/h
- › Nominal sizes from DN 25 to DN 200
- › Pressure ratings PN 16 ANSI Class 150
- › Measuring range standard 1:50 (G25 1:40), optionally up to 1:200
- › Payer housing made of anodised high-strength aluminum
- › Numbering mechanism head made of plastic as standard, optionally made of aluminum
- › Rotatable counter mechanism (355°)
- › Use without infeed and outfeed section
- › Horizontal and vertical installation positions
- › Approvals according to MID (2004/32/EC), OIML, PED (2014/68/EC), ATEX

## Technical specifications

MRM										
Gas temperature	-25 °C to +55 °C									
Ambient temperature	-25 °C to +55 °C									
Storage temperature	-25 °C to +55 °C									
Maximum operating pressure	20 bar (depending on enclosure specification)									
Protection class	IP 67									
Meter materials	<ul style="list-style-type: none"> <li>➤ Meter housing: Aluminum alloy</li> <li>➤ Piston: aluminum alloy</li> <li>➤ Synchronizing gears: stainless steel</li> <li>➤ Counter head: plastic (standard), optional aluminum</li> </ul>									
PED approval	Hpi / 222-103-Q-01									
ATEX approval	Ex zone									
MID approval	T10660-NMi Certin									
OIML recommendation	The MRM gas meter complies with the requirements of OIML R 137-1&2: 2014 "Gasmeters", certified by NMI									
Reproducibility	<0.1 %									
Short-term overload	up to 1.25 Q <sub>max</sub>									
Pressure change rate	<0.35 bar/s									
Totalizer	mechanical roller counter with 8 rollers									
Pulse outputs	1 NF pulse generator (reed contact) and 1 anti-tamper contact. Option 1 HF pulse generator or 2 HF pulse generators, 1 output with ¼" NPT thread									
Connections	<ul style="list-style-type: none"> <li>➤ Pressure: 1 connection with ¼" NPT thread</li> <li>➤ Temperature: 2 immersion sensor pockets with G ¼" thread (option)</li> </ul>									
According to DIN EN 12480 maximum Permissible error limits	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>G-Type</th> <th>Qt</th> </tr> </thead> <tbody> <tr> <td><math>Q_{min} \leq Q &lt; Q;</math> ±2.0 %</td> <td>G 10, G 16</td> <td>0.1 Q<sub>max</sub></td> </tr> <tr> <td><math>Q, \leq Q \leq Q_{max};</math> ±1.0 %</td> <td>G 25 bis G 100</td> <td>0.05 Q<sub>max</sub></td> </tr> </tbody> </table>		G-Type	Qt	$Q_{min} \leq Q < Q;$ ±2.0 %	G 10, G 16	0.1 Q <sub>max</sub>	$Q, \leq Q \leq Q_{max};$ ±1.0 %	G 25 bis G 100	0.05 Q <sub>max</sub>
	G-Type	Qt								
$Q_{min} \leq Q < Q;$ ±2.0 %	G 10, G 16	0.1 Q <sub>max</sub>								
$Q, \leq Q \leq Q_{max};$ ±1.0 %	G 25 bis G 100	0.05 Q <sub>max</sub>								

## Performance data

DN (mm)	G-Type	Q <sub>max</sub> (m³/h)	Qmin (m³/h)								V (dm³/h)	NF (Imp/m³)
			1:20	1:40	1:50	1:65	1:80	1:100	1:160	1:200		
25	10	16	0.8	0.4	-	-	-	-	-	-	0.177	10
50	16	25	1.2	0.6	0.5	-	-	-	-	-	0.210	10
50	25	40	2.0	1.0	0.8	0.6	0.5	-	-	-	0.283	10
50	40	65	3.2	1.6	1.3	1.0	0.8	0.65	-	-	0.566	10
50	65	100	5.0	2.5	2.0	1.5	1.3	1.0	0.6	0.5	0.708	10
80	100	160	8.0	4.0	3.2	2.5	2.0	1.6	1.0	0.8	1.05	1
80	160	250	12.5	6.3	5.0	3.9	3.1	2.5	1.6	-	2.78	1
100	160	250	12.5	6.3	5.0	3.9	3.1	2.5	1.6	-	2.78	1
100	250	400	20.0	10.0	8.0	6.1	5.0	4.0	2.5	2.0	4.2	1
100	400	650	32.5	16.3	13.0	10.0	8.1	6.5	4.1	3.2	5.66	1
150	400	650	32.5	16.3	13.0	10.0	8.1	6.5	-	-	10.5	1
150	650	1000	50.0	25.0	20.0	15.4	12.5	10.0	-	-	15.7	1
200	1000	1600	80.0	40.0	32.0	24.6	20.0	16.0	-	-	19.7	1

## Pressure loss

DN (mm)	G-Type	Pressure loss at $Q_{max}$ (m <sup>3</sup> /h) and p=1 bar abs.	
		Air ( $\rho=1.2$ kg/m <sup>3</sup> )	Natural gas ( $\rho=0.83$ kg/m <sup>3</sup> )
25	10	0.5	0.4
50	16	0.7	0.5
50	25	1.3	0.9
50	40	1.3	0.9
50	65	1.6	1.1
80	100	1.9	1.3
80	160	3.2	2.1
100	160	3.2	2.1
100	250	5.5	3.6
100	400	6.5	4.3
150	400	3.5	2.3
150	650	4.9	3.2
200	1000	5.5	3.6

## Dimensions, weights, connections

G-Type	DN (mm)	Housing dimensions (mm)				Weight (kg)
		C (mm)	A (mm)	H (mm)	B (mm)	
10	25	295	195	122	130	4.8
16	50	320	200	148	171	6.5
25	50	360	220	148	171	8.0
40	50	365	220	176	171	10.0
65	50	395	235	176	171	11.5
100	80	470	270	176	171	15.0
160-3	80	495	285	240	241	27.5
160	100	495	285	240	241	28.0
250	100	620	350	240	241	38.5
400	100	746	415	240	241	48.5
400	150	675	377	462	450	102
650	150	812	445	462	450	125
1000	200	918	498	462	600	145

## Connections

DN (mm)	Flanges with threaded holes	
	DIN EN 1092-1	ANSI B 16.5
	PN 16	Class 150
25	4 x M12	4 x 1/2"
50	4 x M16	4 x 5/8"
80	8 x M16	4 x 5/8"
100	8 x M16	8 x 5/8"
150	8 x M20	8 x 3/4"
200	12 x M20	8 x 3/4"

# MEC 500

Gas volume and energy electronic conversion device with integrated GSM 2G/3G/4G LTE modem.

MEC500 is a gas volume corrector that enables PTZ, PT or T conversion. The device is designed to measure volume, energy and flow of gas. Primarily battery powered with the possibility to connect external power supply. The device converts the volume of gas counted by the gas meter (turbine, rotary, ultrasonic) into the base conditions. Gas compressibility factor is calculated with the use of algorithms SGERG-88, MGERG-88, AGA8-92DC, AGA8-G1, AGA8-G2, AGA NX-19 mod or constant value of relative compression factor. MEC500 is an intrinsically safe device ready to be installed in explosive hazardous zone 0.



## Main features of the MEC 500:

- › Industrial housing cooperates with various types of gas meters like turbine, rotary, ultrasonic directly by LF, HF, Namur, Encoder, Wiegand
- › 3 independent serial transmission ports (2 x RS485 + OPTICAL INTERFACE 62056-21)
- › Built-in GSM/GPRS modem (option)
- › Backlight graphic display
- › 2 configurable binary NAMUR Ex inputs (operating on battery mode)
- › Binary and frequency outputs
- › Internal or external pressure transducers available
- › More than 10 years of archive registered data storage (with monthly sampling interval)

## Technical specification

MEC 500	
Dimensions / weight	206 x 194 x 76 mm / 1.3 kg
Housing material	Polycarbonate (version 1) or metal (version 2)
Relative humidity	Max. 95 % at 70 °C
Ambient temperature range	-25 °C to 70 °C
Housing protection class	IP 66 (for outdoor installation)
Keyboard	6 push-buttons (version 1) or 18 push-buttons (version 2)
Display	4-inch LCD display with backlight
Ex classification	Ex II 1G Ex ia IIB T4 Ga
Internal EVC supply	D-size lithium battery 3.6 V/17 Ah (up to 3 batteries in versions without modem), operating time: One battery: 5 years

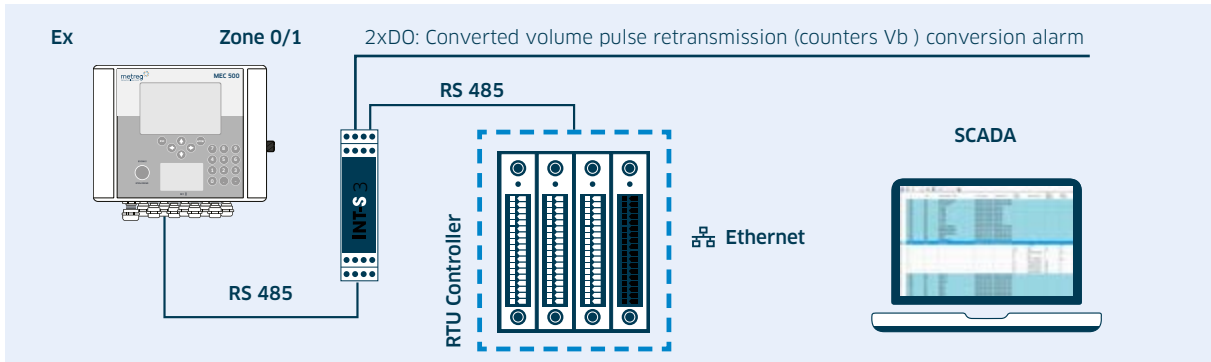
<b>MEC 500</b>									
Internal GSM supply	Two D-size lithium batteries 3.6 V/17 Ah, operating time: 5 years (two communications per day)								
External supply	Intrinsically safe power supply and transmission interface INT-S3 (RS485, Supply output 5.7 V, 2 digital inputs/outputs, Supply input 11-30 V DC)								
Transmission ports	<ul style="list-style-type: none"> <li>&gt; 2 independent serial transmission ports, speed up to 256 000 b/s: COM1, COM2 standard RS-485</li> <li>&gt; Optical Interface IEC 62056-21</li> <li>&gt; GSM/GPRS 2G/3G/4G LTE</li> </ul>								
Transmission protocols	MODBUS RTU, MODBUS TCP (in version with internal modem), MODBUS RTU (MASTER MODE), GAZMODEM, GAZMODEM (MASTER MODE). Other protocols can be used on request.								
Environment conditions class (Mechanical/Electromagnetic)	M2/E2								
Base conditions	Adjustable by authorized service personnel, available options: <ul style="list-style-type: none"> <li>&gt; Base pressure (absolute) pb: range (1.00-1.02) bar, default 1.01325 bar</li> <li>&gt; Base temperature Tb: range (270-300) K, default 273.15 K (0 °C)</li> <li>&gt; Reference temperature for combustion process T1: range (270-300) K, default 298.15 K (25 °C)</li> </ul>								
The maximum permissible error (MPE) according to standard „EN 12405-1”	0.5 % at reference conditions, 1 % at nominal operating conditions, typical error < 0.15 %								
The maximum permissible error (MPE) according to standard „EN 12405-2”	ECD class A								
Used algorithms for calculations of compression factor	SGERG-88, MGERG-88, AGA8-92 Detailed Composition, AGA8-G1, AGA8-G2, AGA NX-19 mod constant compression factor K1								
Registration periods	<ul style="list-style-type: none"> <li>&gt; Data registered periodically: logging interval from 1 up to 60 minutes - 24000 records</li> <li>&gt; Hourly data: more than 2 years</li> <li>&gt; Daily data: more than 3 years</li> <li>&gt; Monthly data: more than 10 years</li> <li>&gt; Events memory: approximately 4000 records (segmented for 2 sectors)</li> </ul>								
Meets the requirements of standard 2014/32/EU (MID)	DE-19-MI002-PTB005 - PTZ converter, T converter								
Inputs	<ul style="list-style-type: none"> <li>&gt; 6 Ex digital inputs - to cooperate with Potential-free junctions, shared with: <ul style="list-style-type: none"> <li>- 2 LF inputs, frequency 0-60 Hz, reed contact, WIEGAND</li> <li>- 1 TS tamper protection switch (closed by default)</li> </ul> </li> <li>&gt; 2 Ex digital inputs, NAMUR type, shared with: <ul style="list-style-type: none"> <li>- 2 HF inputs, frequency 0-5000 Hz EN60947-5-6, a possibility of temporary work on battery</li> <li>- 1 ENCODER (NAMUR type)</li> </ul> </li> <li>&gt; 1 SCR ENCODER</li> <li>&gt; Pressure sensor p1 (internal or external) - measurement range in standard option - up to 6 bar. End of the sensor is a metric screw thread M12 x 1.5 (Ermeto), pressure ranges: 0.8-6 / 0.8-10 / 2-10 / 4-20 / 7-35 / 4-70 / 10-70 / 10-100 / bar abs. Maximum permissible errors for measurements of p <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 50%; text-align: center;">20 °C ( ±3 °C)</td> <td style="width: 50%; text-align: center;">(-25-55) °C</td> </tr> <tr> <td style="text-align: center;">± 0.2 % of measured value</td> <td style="text-align: center;">± 0.35 % of measured value</td> </tr> </table> </li> <li>&gt; Temperature sensor Pt1000 class A or B, 2-wire or 4-wire (with the cable length compensation), diameter 5,7 mm. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 50%; text-align: center;">20 °C ( ±3 °C)</td> <td style="width: 50%; text-align: center;">(-25-70) °C</td> </tr> <tr> <td style="text-align: center;">± 0.08 %</td> <td style="text-align: center;">± 0.13 %</td> </tr> </table> </li> <li>&gt; Pressure sensor p2 (internal, optional) - absolute or gauge, ranges from 0-100 mbar g to 10-100 bar abs</li> <li>&gt; 2 digital pressure or temperature transducers (external, working on battery mode)</li> </ul>	20 °C ( ±3 °C)	(-25-55) °C	± 0.2 % of measured value	± 0.35 % of measured value	20 °C ( ±3 °C)	(-25-70) °C	± 0.08 %	± 0.13 %
20 °C ( ±3 °C)	(-25-55) °C								
± 0.2 % of measured value	± 0.35 % of measured value								
20 °C ( ±3 °C)	(-25-70) °C								
± 0.08 %	± 0.13 %								
Control outputs	<ul style="list-style-type: none"> <li>&gt; 4 Ex digital outputs (separated): <ul style="list-style-type: none"> <li>- 1x configurable - binary or frequency (0-5000 Hz), Counters: <math>V_p, V_m, E</math></li> <li>- 3x configurable binary</li> </ul> </li> </ul>								

## Communication

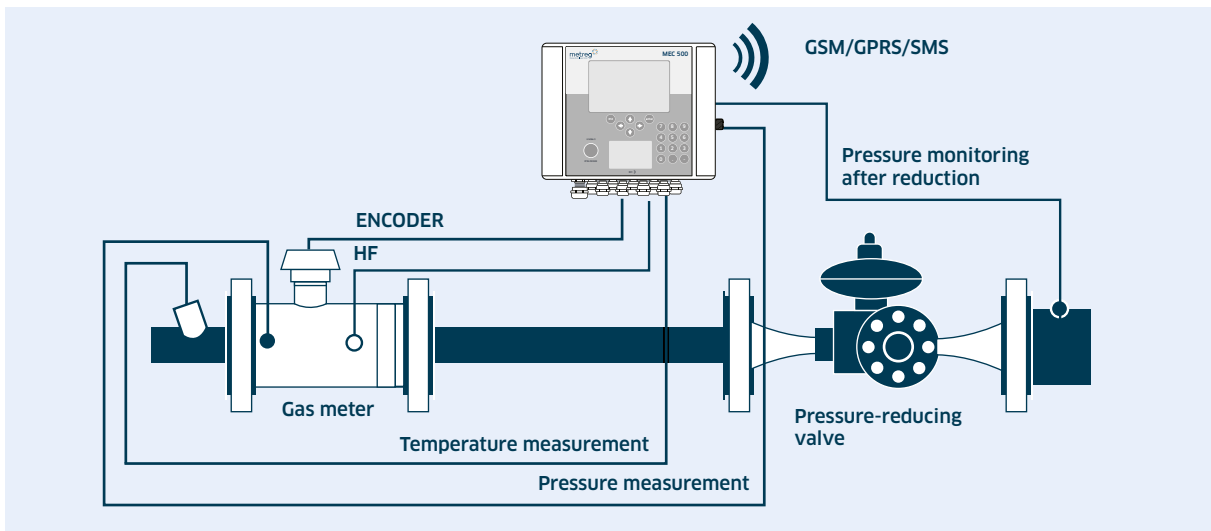
1. Direct transfer of data to system-Data readout through internal GSM/GPRS modem with the use of internal batteries



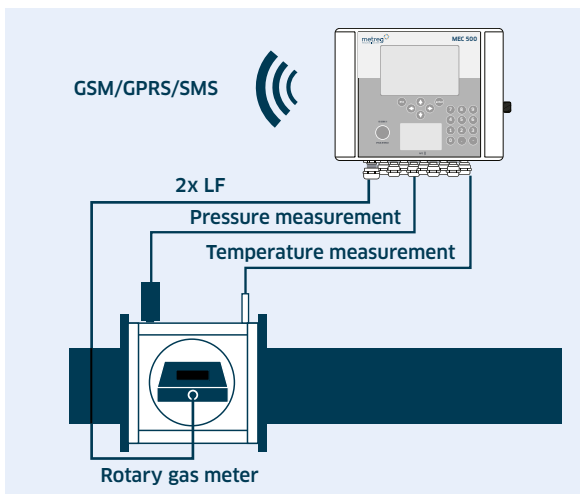
2. Remote data readout - connection through communication interfaces INT-S3, RTU controller independently



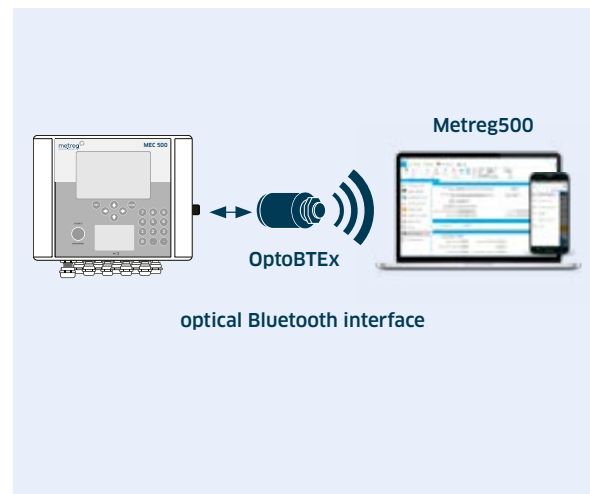
3. Process of measurement using MEC500 and turbine gas meter



4. Process of measurement using MEC500 (with external pressure sensor) and rotary gas meter



5. Local readout and configuration



# MCG 500

## Modbus-DSfG-Gateway with integrated LTE-Module

MCG 500 is for Modbus capable measuring devices a gateway into the world of DSfG and represents - from the DSfG point of view - the instance RDT as well as, depending on the connected Modbus device, corrector or similar. MCG 500 can (after firmware adaptation) make any Modbus devices retrievable by standard DSfG polling software and connect to a DSfG bus as participant or control station. As DSfG participant the MCG 500 offers an automatic baud rate detection, which simplifies the commissioning into existing networks considerably. The device has a local USB and Ethernet interface and is expandable for remote data transmission via LTE or a second Ethernet interface.

Via TCP from the local network or directly via the front USB interface MCG 500 can be operated and conveniently accessed and configured remotely via optional LTE module and secured VPN tunnel. Besides, it can be used in the field as a service interface for other devices. MCG 500 offers a variety of archives such as, hourly, daily, monthly, yearly and event archive for measured values of the external Modbus device, as well as (fault) message archive, parameter and connection logbook of the RDT unit. Via the two existing, optionally expandable



potential-free digital inputs and outputs, various applications such as pulse and status inputs and outputs can be realized.

### Variant MCG 500 Compact

Via the optionally available analog outputs, values such as operating flow, standard flow, pressure, temperature, condition number, K-number or similar can be output via a selection list.

### Main features of the MCG 500:

- › Allows data access to Modbus capable devices in the measuring system via polling software
- › 4 independent transmission ports: Pluggable communication module, Ethernet, RS485/422 (external Modbus device) and USB-C (service)
- › Integrated LTE modem (optional)
- › Archive data storage for more than 5 years of operation (according to specification)
- › Is intended for use in the NON-Ex area



## Technical specification MCG 500

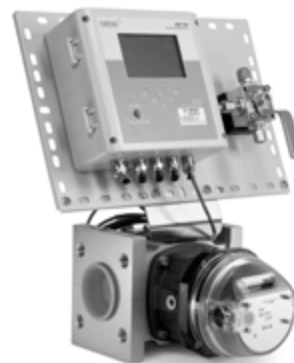
	MCG 500 Compact	MCG 500 19" cassette
Dimensions	264 x 234 x 141 mm / weight: 1 kg	130 x 71 x 171 mm / weight: 1 kg
Housing material	plastic	aluminium - anodized
Ambient temperature range	-25 °C to 55 °C	5 °C to 55°C
Housing protection class	IP 54	IP 20
Operation	Via supplied operating SW - as well as standard call-off SW of various manufacturers	
Explosion class	NON-Ex	
Power supply	10-36V DC	
Communication interfaces	DSfG bus, RS485/422 (2/4-wire), Ethernet, USB-C, optional LTE	
Communication protocols	DSfG-A, DSfG-B, M900, Modbus RTU, Modbus TCP	
Digital inputs	1 standard, externally expandable to 5	1 standard
Digital outputs	1 collective fault signal, 1 standard, externally expandable to 5	1 collective fault signal, 1 standard
Analog outputs	Optional 2 external	-
Archive	Data are recorded periodically: Hourly data: over 1 year Daily data: over 5 years Monthly data: over 5 years Event memory: 1000 entries Parameter logbook: 500 entries Calibration logbook: 200 entries	
Memory	Micro-SD	



SUPERSTRUCTURE IN POLYCARBONATE  
MTM WITH MEC 500



TURBINE GAS METER  
MTM



SUPERSTRUCTURE IN POLYCARBONATE  
MRM WITH MEC 500