

MRM

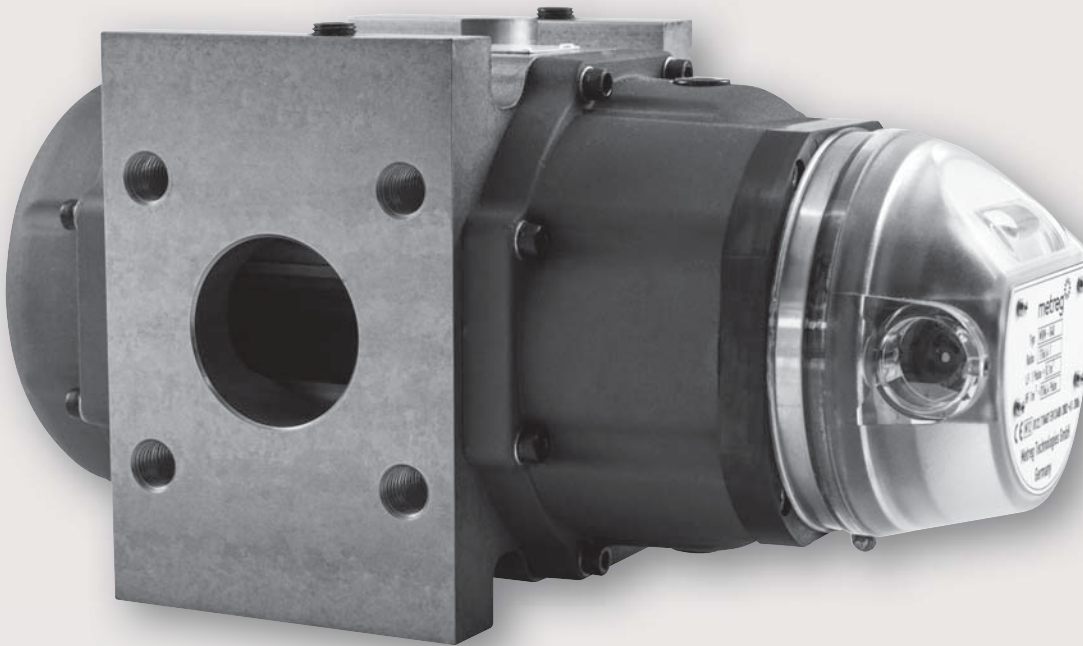
# Rotary Displacement Gas Meter



livinggas.

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Metreg Technologies GmbH

# MRM Rotary Displace Gas Meter



## Applications

The MRM rotary displacement gas meter is a high precision instrument for gas volume measurement and flow measurement of natural gas and other non-aggressive gases in gas stations and plants. The MRM rotary gas meter is applicable in residential and office buildings as well as commercial and industrial plants.

## Key features

- Meter sizes 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 class PN 10/16 and ANSI Class 150
- Measuring range standard 1:50 (G 25 1:40), optional up to 1:200
- Meter housing made of anodized high strength Aluminum
- Index head by default made of synthetic material, optional made of Aluminum
- Rotating counter (355 °)
- No inlet or outlet section required
- Horizontal and vertical mounting position
- Approvals according to MID (2004/22/EC), OIML, PED (PED 97/23/EC), ATEX

## Description and operation

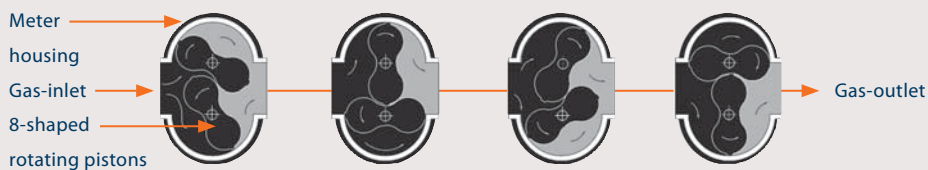
The MRM rotary gas meter registers the operating volume using an eight-digit mechanical counter. Via pulses the operating volume can be transferred to an electronic volume corrector and converted to normal or standard conditions.

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

Rotary gas meters are operating according the displacement principle. In the meter housing are two 8-shaped coordinated rotating pistons without touching each other. The measuring chamber is regularly filled and emptied by the rotation. During each revolution four crescent-shaped volumes are moved through the measuring chamber, in which the rotation speed is proportional to the gas flow. The rotation of the pistons is synchronized by a gear train outside the measuring chamber.

The actual volume flow can be transmitted to electronic volume correctors or data loggers via low frequency (LF-) pulses generated by Reed contacts. In the meter's index head is also located an anti-tampering contact.

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



### Technical specifications

<b>as temperature:</b>	-25 °C to +55 °C
<b>Ambient temperature:</b>	-25 °C to +55 °C
<b>Storage temperature:</b>	-25 °C to +55 °C
<b>Operating pressure:</b>	16 bar (g) maximum
<b>Protection class:</b>	IP 67
<b>Materials:</b>	
• Meter housing:	Aluminum Alloy
• Pistons:	Aluminum Alloy
• Synchronization wheels:	Stainless steel
• Meter index head:	Synthetic material (standard), optional Aluminum
<b>PED-Approval:</b>	Hpi / 222-103-Q-01
<b>ATEX-Approval:</b>	Ex-Zone 1
<b>MID – Approval:</b>	T10658
<b>OIML – Recommendation:</b>	The gas meter of the type MRM meets the requirements of OIML R137-1 & 2: 2012 „gas meters“, confirmed by NMI
<b>Reproducibility:</b>	< 0.1 %
<b>Overload:</b>	Short term up to 1.25 Q <sub>max</sub>
<b>Pressure change rate:</b>	< 0.35 bar/s
<b>Counter:</b>	Eight-digit mechanical roller counter
<b>Meter index head:</b>	Standard plastic, made of aluminum as option
<b>Pulse output:</b>	1 LF-pulser (Reed contact) and 1 anti-tampering contact Option: 2 LF-pulsers (Reed contacts) and 1 anti-tampering contact
<b>Connections:</b>	
• Pressure:	2 connections (1 inlet and 1 outlet) with ¼" NPT – thread
• Temperature:	2 x thermowell (1 inlet and 1 outlet) with G ¼" – thread (option)

# MRM Rotary Displace Gas Meter

## Error limits and typical error curve

According to EN 12480 maximum permissible error limits:

$$Q_{\min} \leq Q < Q_t: \pm 2.0 \%$$

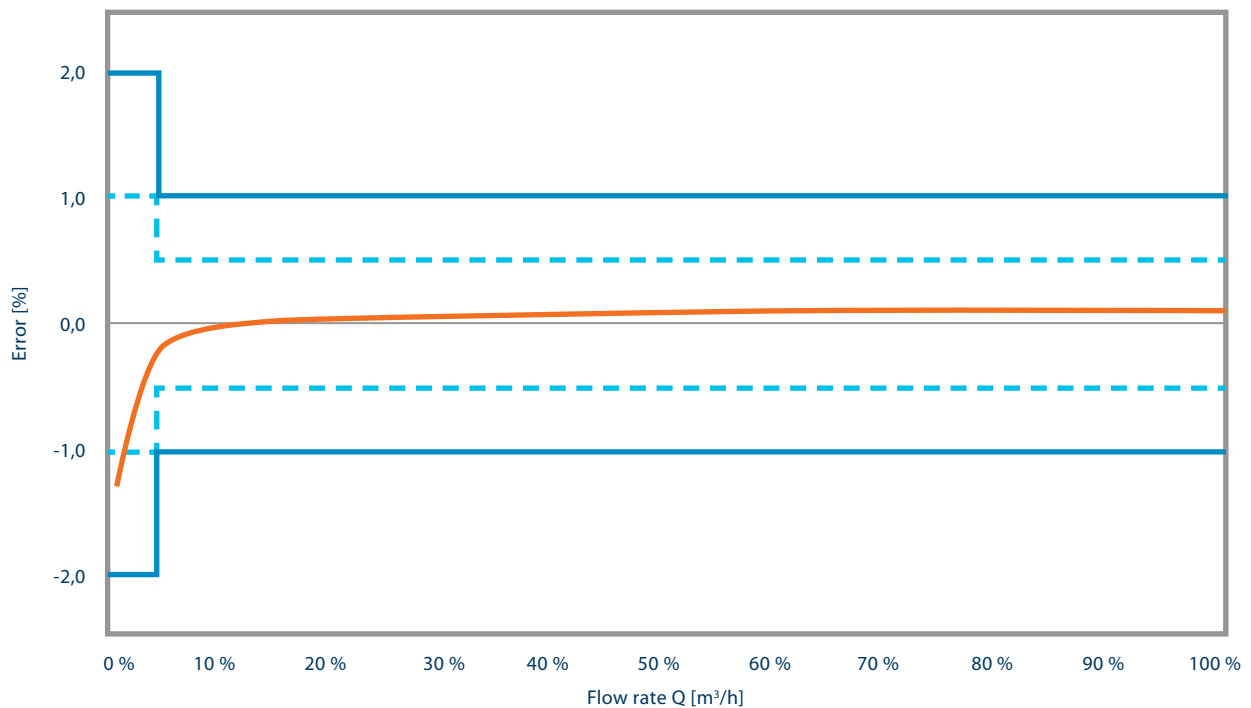
$$Q_t \leq Q \leq Q_{\max}: \pm 1.0 \%$$

$Q_t$  = depends on the measuring range:

The initial calibration of the rotary meter MRM will always render results smaller than the maximum permissible errors defined by the international standards of EN 12480 and OIML. Lower calibration errors with only half the maximum permissible errors are available upon special request.

G-Typ	$Q_t$
G 10, G 16	$0,1 Q_{\max}$
G 25 bis G 1000	$0,05 Q_{\max}$

Typical error curve



The rotary meters MRM show very stable and reproducible measurement results. The design of the housings and pressure containing parts has been optimized especially for robustness under torsional and bending stresses. The meters can withstand more than double the specified torsional and bending stresses implied through the installation as defined in EN 12480.

The lifetime durability of the MRM rotary meter 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 on state of the art machines "made in Germany". After machining all aluminum parts are hard anodized for less friction and higher resistance to wear and tear.

## Performance data

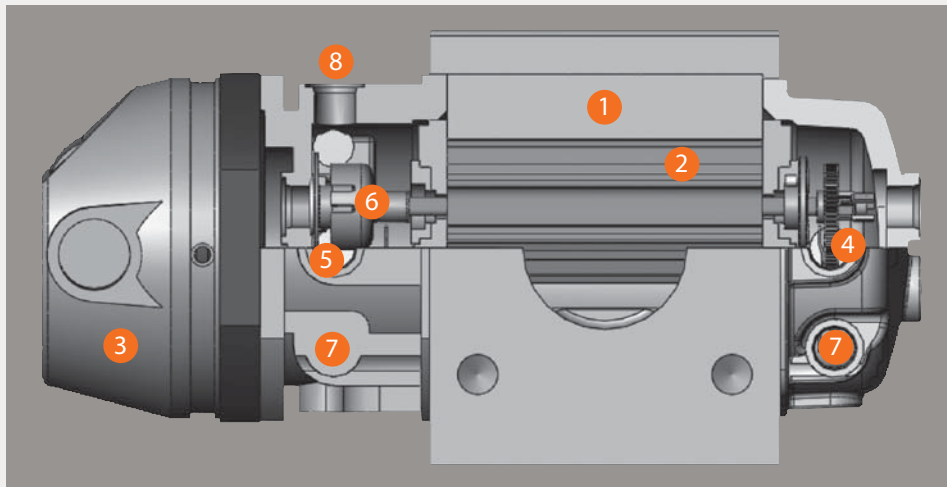
DN [mm]	G-Typ	Q <sub>max</sub> [m³/h]	Q <sub>min</sub> [m³/h]								V [dm³]	NF [Imp/m³]
			1:20	1:40	1:50	1:65	1:80	1:100	1:160	1:200		
25	10	16	0,8	0,4	-	-	-	-	-	-	0,177	10
50	16	25	1,2	0,6	0,5	-	-	-	-	-	0,210	10
50	25	40	2,0	1,0	0,8	0,6	0,5	-	-	-	0,283	10
50	40	65	3,2	1,6	1,3	1,0	0,8	0,65	-	-	0,566	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

The rotary meters MRM are manufactured with large measurement ranges due to the precision machining of the parts and a very reproducible assembly process. The standard calibrated measurement range for the MRM is 1:50. Extended measurement ranges up to 1:200 are optionally available according to approved and certified measurement ranges as shown in the table.

DN [mm]	G-Typ	Pressure loss [mbar] at Q <sub>max</sub> and p = 1 bar abs.	
		Air (ρ = 1,2 kg/m³)	Natural gas (ρ = 0,83 kg/m³)
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

The pressure loss of the MRM meters is extremely low due to the very small manufacturing tolerances and the high precision, low friction parts. With the very low pressure loss the MRM rotary meters are very well suited for use in low pressure applications for burners or other processes requiring very tight process parameters.

# MRM Rotary Displace Gas Meter



## Meter set up

- 1 Meter housing
- 2 Piston
- 3 Meter index head
- 4 Synchronization wheel
- 5 Oil lubricated bearings
- 6 Magnetic coupling
- 7 Oil inspection window
- 8 Oil filter

The pressure containing housing (1) is high resistance to torsion and bending forces due to the large high strength aluminum cross sections. The profiles of the precision machined and dynamically balanced rotating impellers (2) have been computer optimized to produce a stable, small gap between the moving parts for best measurement results under all operating conditions. The high precision ball bearings „made in Germany“ (5) with minimized tolerances are the basis for a very smooth operation and high bearing loads for rough operating conditions.

The synchronizing gears (4) made out of high strength stainless steel are providing for a very smooth operation of the meter. The lubrication oil is inserted into the front and back oil chambers through the filling plugs (8) before commissioning of the meter. The correct filling level can be checked through the oil gauge glasses (7). The rotation of the rotary impellers is transmitted by means of a mechanical gear train and the magnetic coupling (6) to the 8 digit mechanical counter with an environmental protection class of IP 65.

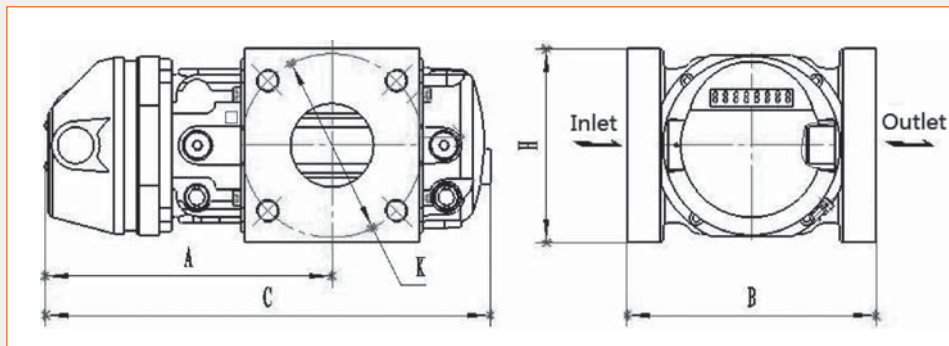
The exchangeable low frequency (LF) switch in combination with an anti- tampering contact provides for the electrical connection to an electronic volume corrector and a possible further AMR device. The mechanical counter is 355° rotatable and thus the meter is installable both vertically and horizontally. The complete design of the meter is aimed at maximum robustness and long lifetime under operation at highest measurement accuracy.

## Dimensions, weights and connections

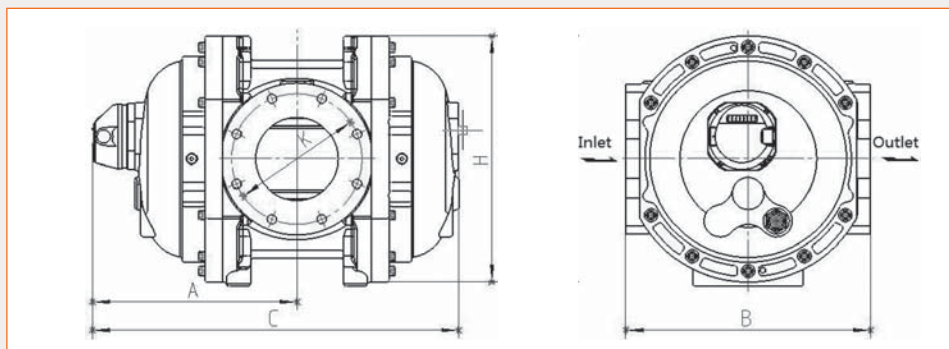
G-Type	DN [mm]	Housing dimensions				Weight [kg]
		C [mm]	A [mm]	H [mm]	B [mm]	
10	25	295	195	122	130	4,8
16	50	320	200	148	171	6,5
25	50	360	220	148	171	8,0
40	50	365	220	176	171	10,0
65	50	395	235	176	171	11,5
100	80	470	270	176	171	15,0
160-3	80	495	285	240	241	27,5
160	100	495	285	240	241	28,0
250	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



#### Housing dimensions for MRM rotary gas meters of G 10 to G 400 (DN 100):



#### Housing dimensions for MRM rotary gas meters of G 400 (DN 150) to G 1000:



#### Connections

DN [mm]	Flanges with threaded holes	
	DIN EN 1092-1 PN 16	ANSI B 16.5 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"

MRM rotary meters have a standard flange hole pattern according to PN 16 DIN/EN 1092-1. Optionally upon customer request the MRM meters can also be supplied with flange hole patterns according to ANSI B 16.5 class 150 for a maximum operating pressure of 16 bar/ 1,6 MPa.

Further specific technical details, especially for commissioning and operation are describe in the operation manual for MRM rotary meters.



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