ROTARY PISTON METER

For the reliable measurement of gaseous media

PIPELINE EQUIPMENT

ROTARY PISTON METER
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ROTARY PISTON METER.
PRECISION TECHNOLOGY FOR THE ENERGY SUPPLY.

The rotary piston meters are built for the pressure stages pmax 10 bar, 16 bar. The pressure bearing casing components consist of spheroidal graphite cast iron, the rotary pistons manufactured up to the sizes G 1000 are made of anodized light metal, above these sizes they are made of grey cast iron. The anodised coating effects an essentially higher resistance to wear of the surface of the pistons. Generously sized bearings, tempered and ground gears provide smooth and quiet running. The rotary motion is transferred from a rotary piston shaft via a magnetic coupling pressure-sealed contact free from the pressure chamber to the counter shaft drive. The latter bears the magnetic core and drives the counter transmission situated in the pressure free counter casing with its finally graduated adjustment transmission and the 8 digit dual roller. The counters up to G 400 are manufactured in pot maximum design, larger counters have screwed-on stands. All RMA gas counters comply with the construction requirements of the DVGW worksheet G 492/II as well as DIN 30690 T 1, DIN 3230 T 5 and the pressure equipment directive RL2014/68/EU and undergo the strength tests and leakage tests required in the directive. The construction materials of the casing comply with the requirements of DIN EN 13445-2 with PED-QM certification with acceptance test certificate EN 10204/3.1. of the DVGW worksheet G 492/II as well as DIN 30690 T 1, DIN 3230 T 5 and the pressure equipment directive RL2014/68/EU and undergo the strength tests and leakage tests required in the directive.
RMA rotary displacement gas meters meet the requirements of the European rotary Displacement Gas Meters Standard EN 12480. On request a manufacturer's certificate can be issued for tests according to EN 12480.

Modus Operandi
The rotary piston gas meter is a volumetric measuring counter to measure gas in closed piping. If there is a drop of pressure from the inlet nozzle to the outlet nozzle, this causes a rotational torque at the rotary piston. Once it exceeds the steady-state torque of the parts to be moved, the rotary pistons start moving in the direction of the arrow. During the rotary movement, the chambers forming between rotary piston and casing fill and empty, so that the rotation of the pistons is a value for the volume flown through. This rotary movement is transferred to a counter mechanism by an adjusting gearing mechanism which continuously counts the gas volume in working cubic meters. There is no metallic contact in the measuring chamber, so that the rotary pistons run very smoothly. Start of measurement at $\Delta p < 0{,}1$ mbar und $Q \sim 1/1000\ Q_{max}$

Indispensable for gas suppliers and bulk purchasers

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Applications

- precise recording of gas quantities to delivery stations and measuring station for:
- local authorites and public institutions (schools, hospitals combined heat and power unit)
- control of process gases (chemical industry)
- ascertainment volumes of intake air on engine test stations
- consumption measuring of volumes of compressed air
- ultimate consumer with a high energy requirement such as steelworks, brick manufactures or the glass industry
- biogas processing and many morer

Industries

- municipal gas supply
- chemistry and process engineering
- automotive industry, power stations
- steelworks, brick manufactures
- compressed air technology
- glass industry and many more

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RELIABLE FOR DECADES.

16 YEARS WITHOUT RE-CALIBRATION

Rising gas prices and the consequential demand for higher measuring accuracy and measuring certainty have given the volumetric measuring rotary piston meter advantages facing other counter systems. The reproducibility of the measured values is excellent and is still warranted after decades at a normal modus operandi.

Calibration accuracy, Resistance during Operation

Recalibrations of RMA rotary piston meters, which had been running up to 50 years, showed in part practically no deviations from the error curve when new. With the measuring system working according to the "Roots principal" the most narrow manufacturing tolerances at the highest precision are achieved by a special manufacturing process.Thus measuring ranges of up to 1:160 are possible in series.

An optimisation of the bearings and the cogs provides smooth running and little loss of pressure Δp. It changes in rough approximation proportionally with the gas density and quadratically with the counter load. The Δp values for the separate meter sizes at Qmax are listed in the table on page 13.

Measurement Errors

RMA rotary piston meters are calibratable measuring devices. On customers request they are officially calibrated in-house according to the existing national or EU guidelines under official supervisions. We deliver them accordingly, factory tested with the officially approved measuring equipment.

The measuring system shows the following advantages:

- large measuring ranges at low error margins
- good reproducibility (approximately 0.1 %)
- practically no hysteresis
- great measuring certainty also with non-continuous volume flow rates, as they prevail, for instance, in heating facilities
- no follow-up movement as, for instance, with turbine flowmeters
- great measuring certainty also with non-continuous volume flow rates, as they prevail, for instance, in heating facilities
- good high-pressure behaviour, i.e. no typical high-pressure mismatch

Gas Type

All non-aggressive gases can be measured according to DVGW work sheet G 260, as well as natural gas, city gas, coke oven gas, refinery gas, propane, routine, liquid gas/air mixture, methane, ethylene, hydrogen and other gases.

Operating Temperature

The standard range of the gas temperature should be between - 10°C and + 40°C. For gases with higher or lower temperatures please contact us. The counters can be stored at temperatures between -20°C bis + 60°C.

High Temperature Resistance (HTR - 5 bar)

As in case of fire no additional hazard must emanate from the gas counters, the RMA rotary piston meters in the sizes G 40 to G 400 are built in a way that they meet the HTB requirements according to DIN 3374 and EN 12480.

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FOR THE EXTRA BIT OF FLEXIBILITY :

THE DESIGN OF THE COUNTER

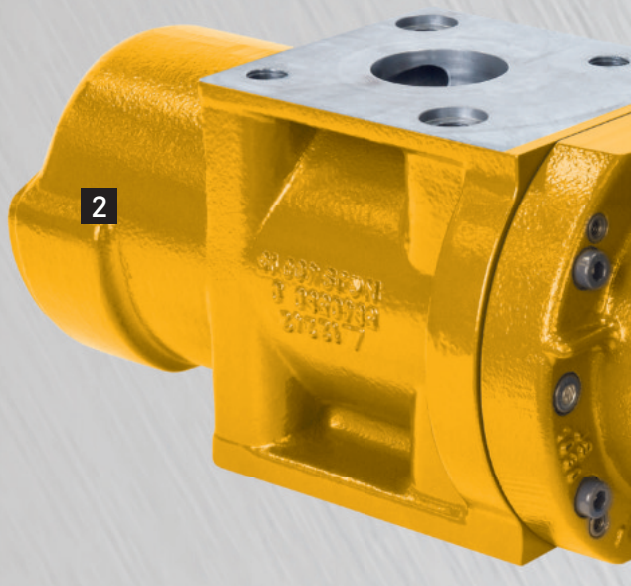
The RMA rotary piston meters are equipped with a dual roller counter which, when put into operation, enables an adaptation to the direction of flow without an intervention in the counter and without official supervision of calibration. Hereby the stock keeping is reduced primarily as well as the costs for short-term alterations of planned plants.

1 **Universal installation position by rotatable counter casing.**
The RMA gas counters are arranged for horizontal and vertical flow direction, the rotation of the counter mechanism can be done without official supervision of calibration.

2 **Assembly and Maintenance**
Rotary piston meters do not need any inlet zones. The gas and the pipeline must be clean, the temporary mounting of a start-up screen is recommended. The meters are oil bath lubricated. The oil level can be checked by a level indicator screw. In standard operation a change of oil is necessary every 5 years (for the measurement of gases of highest purity only every 16 years). The counter mechanism does not need any special maintenance for several years. Please check the operating manual for further details.

Sizes G 40 to G 400
The level indicator screws are positioned for a horizontal and vertical installation position. Thus the gas meters can be rotated by 90°, whereat only the casing of the counting mechanism has to be rotated to the new operating position (without official supervision of calibration).

Sizes G 650 to G 4000
The fastening bases can be readjusted for a horizontal and vertical installation position. Thereby the meters can be rotated by 90°, whereat the oil level indicator and the fastening bases can be re-adjusted, and the casing of the counting mechanism can be rotated (without official supervision of calibration).



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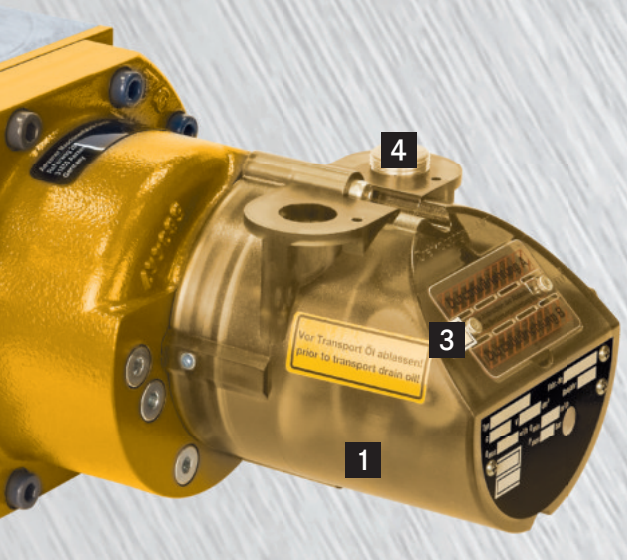

3 **Dual Roller Counter Mechanism**

The on site adaptation to the desired direction of flow can be done easily and without any tools. The counter mechanism has two counter-rotating displays, which are covered by a label as-delivered. After determining the direction of flow the corresponding display is exposed by removing the cover. If required the counter hedge can be rotated by 90° by by loosening two hexagon socket head screws.

Further features:

- 1 peace NF pulse generator built in as standard
- further pulse generators (HF or NF) installable
- mechanical driveline according to DIN 33800 retrofittable

4 **Mechanical Driveline**

All metre sizes can be operated with a mechanical drive 9 without limiting the measuring ranges!

For connecting accessory devices a mechanical driveline can be live at ex-factory or it can be upgraded on site under official under supervision of calibration. The connection sizes for the devices to be connected comply with DIN 33800. The rotation values are listed in the (page 12). The mechanical drive can, for instance, be used for adding the following equipment, Mmax has to be taken into account:

- pulse generator (according to table)
- electronic volume corrector (also devices from other manufacturers)
- encoder counter mechanism

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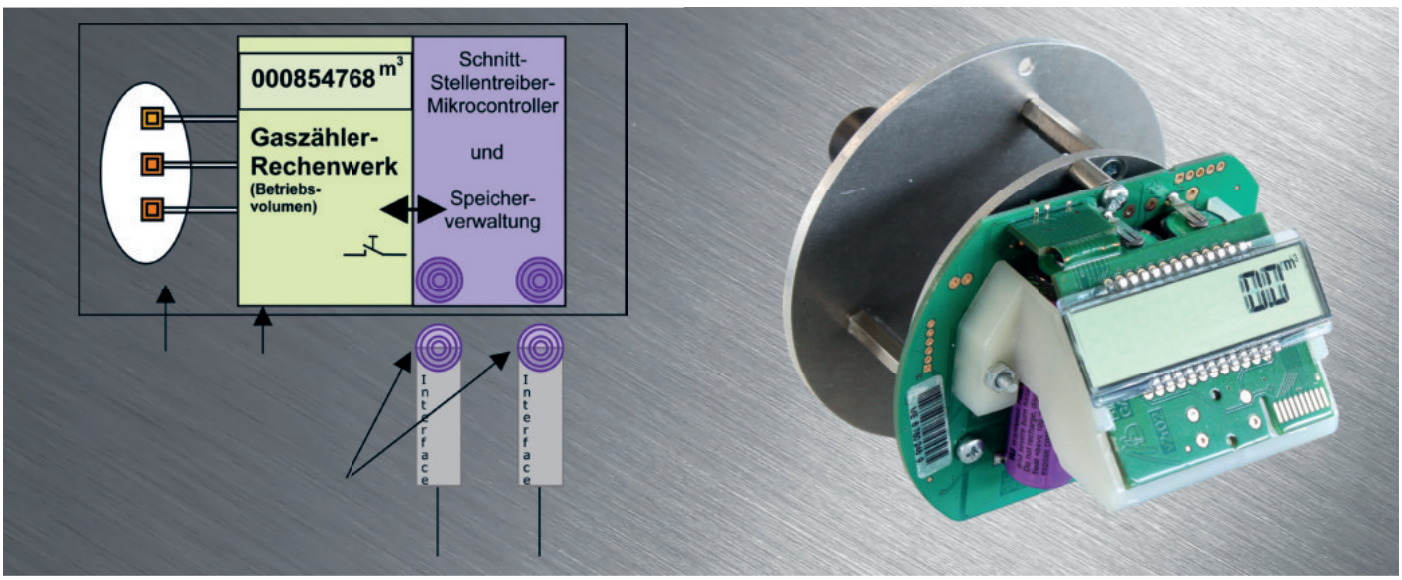
WELL PREPARED FOR THE FUTURE

THE ELECTRONIC COUNTER GAZ.

The networked industry demands integrated solutions. The consequence for the RMA gas metres: providing the measuring results to the electronic components which can be integrated future-proof into existing networks via universal interfaces. For this purpose RMA has developed the electronic counter GAZ.

Product Data and Functional Description:
The counter is a battery-operated electronic component with 2 microcontrollers and a 9 digit LCD display. The gas counter controller has a scanner, which, independent from all functions and in real-time registers the rotation of the gas metre piston and that's reliably measures the operating volume. This processor controls the LCD at the same time. A second controller takes over the control of the interfaces.
The counter can be mounted to the existing interface for the previous counter, i.e. connecting points of the casing as well as the transfer via the magnetic coupling are 100 % compatible.
The GAZ has its own two inductive interfaces with equal rights, so that all established interfaces of the customers can be realised with individual interfaces.
This makes the GAZ very flexible in particular in view of future demands.

INTERFACES:
All essential data are transferred to the interfaces why are two interfaces of the device with equal rights. There they are converted into the desired data interface protocol.



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Recognition of the Direction of Rotation
The arithmetic-logic unit automatically defines the direction of flow as the positive direction of flow with which 3000 rotations of the rotary piston have been counted since the initial commissioning.

Reset
The entire arithmetic and logic unit can be reset into the initial condition by authorised persons unless it is locked.

Linearization
The following chart shows the typical course of a measuring error curve of rotary piston meters. Within the electronics of the counter mechanism an inverse function of this curve is deposited in order to compensate the measuring error (in particular with small flow rates). Hereby there is a measuring result which almost completely eliminates the measuring errors over the entire measuring range by compensating the calibration curve. The advantage for the supplier is a maximum of measuring accuracy and thus safety in the face of the customer.

Parametrization
Before the gas meter starts the standard measuring operation it must be to parametrized factory-provided and configured, respectively. This procedure is possible only in an “unlocked state“. The to parametrizing / configuring is possible only via the inductive USB interface supported by a PC program.
The following values can be configured:
- serial number of the gas meter
- day of first calibration
- number of positions after decimal point 40 volume displays
- Value for the operating volume (counter reading)
- counting point denomination
- access password
- pulse ration of the NF interface

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WITH THE BEST CONNECTIONS.

THE USB-INTERFACE

The USB-Interface MI-USB enables communication between a PC and the gas meter. The PC-Software „GAZ Control ANW“ visualises the contents of the data of the RMA gas meter and makes it possible to alter data in the gas metre according to determined authorisations.

USB Module (parametrization)

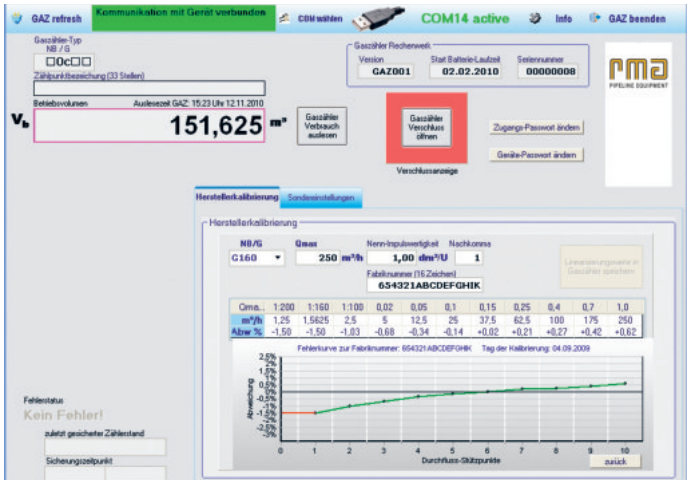
The RMA gas meter has two communication ports with equal rights, the docking points A and B. The USB interface MI-USB is fastened by docking and screwing down at one of the two docking points. The connection to the PC is done via the firmly connected USB connector cable. Using the “GAZ Control ANW“ you can alter the user specific data in the gas meter arithmetic and logic units. To prevent undesired manipulation, corresponding protective measures have been taken. With this software no data relevant to the calibration can be altered. There is a “user version” as well as a “version for the inspection authority ”with different, password protected user rights.

Smart ENCODER Modul (Namur)

The Smart ENCODER Interface MI-AEC is an active module which establishes a data link between the RMA gas meter and a downstream volume converter.

After the docking of the power supply the Smart EN-CODER Interface reads out the display value error free from the gas meter via the inductive interface of the device and transfers this value together with a check number to the volume converter.

The MI-AEC receives the consumption value from the gas meter in synchronisation to the scanning cycle of the volume converter, at a maximum of once every 20 seconds. Within this interval a requiring volume converter always receives the same measuring value.



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Impulse Modul (NF)
The impulse interface module MI-IMP is an active component with a long-life battery. An SO interface according to DIN 43864 is implemented in the module for the pulse output. The pulse ration is deposited in the gas meter.
The following values can be adjusted by the gas supplier (irrespective of the design size):
V = OFF
V = 0,01 m^3 / Imp
V = 0,10 m^3 / Imp
V = 1,00 m^3 / Imp
V = 10,0 m^3 / Imp

Technical Data	
ATEX approval according to. 94/9/EG	Suited to be deployed in the zone 1 (EEx ib IIC T4)
Environmental conditions	-10°C to +40°C
Display	9 digit, LCD, permanent, including identification of running direction
Interface	2 inductive interfaces for the optional connection to various interfaces, e.g.: USB (parametrization), Namur (external volume converter), impulse (NF volume impulse)

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CONNECTIVITY OPTIONS, EXTRAS
AND MEASUREMENT RANGES WITH MECHANICAL COUNTERS

Impulse generator, built in in the casing of the counting mechanism

This RMA gas meter model range is by default equipped with a NF- impulse generator type IZ 9 (optional dual-impulse generator IZ 9-2). Additionally, the following impulse generators can be installed.

- **HF- Impulsgeber Typ IZ 6**
- **NF- Impulsgeber Typ IZ 4**
- **NF- Impulsgeber Typ IZ 8**

Meter type size	Type	Built-in impulse generator				output (option)		attached impulse generator (Option) to be fitted to the drive				
		Inductive switch		Reed-switch		Rotation value Ua	Permissible torque M_{max}	Inductive switch		Reed-switch		Diode no ex approval
		Option Type IZ 4	Option Type IZ 6	Standard Type IZ 9	Option Type IZ 8			Type IZ 10	Type IZ 11	Type IZ 50	Type IZ 51	Type IZ 111
		[m³/Imp]	f bei Q_{max}	[m³/Imp]	[m³/Imp]	[m³/U]	[N_{mm}]	[m³/Imp]	[m³/Imp]	[m³/Imp]	[m³/Imp]	[m³/Imp]
G 40	Zc 038.05	0.01	360 Hz	0.1	0.01	0.01	2	0.001 oder 0.010	0,01 x Ua up to 100 x Ua	0.010	0,1 x Ua up to 100 x Ua	0,0005 x Ua up to 1 x Ua
G 65	Zc 038.06	0.01	400 Hz	0.1	0.01	0.01						
G 100	Ze 039.0	0.1	400 Hz	1.0	0.1	0.1	5	0.010 oder 0.10		0.10		
G 160	Ze 039.1	0.1	460 Hz	1.0	0.1	0.1						
G 250	Zc 11.3	0.1	400 Hz	1.0	0.1	0.1						
G 400	Zc 11.4	0.1	440 Hz	1.0	0.1	0.1						
G 650	Za 13.f7	0.1	250 Hz	1.0	0.1	0.1						
G 1000	Za 13.8	1.0	280 Hz	10.0	1.0	1.0	20	0.10 oder 1.0		1.0		
G 1600	Za 15.11	1.0	170 Hz	10.0	1.0	1.0						
G 2500	Za 16.f13	1.0	120 Hz	10.0	1.0	1.0						
G 4000	Za 16.13	1.0	170 Hz	10.0	1.0	1.0						

Impulse generator added to the mechanical output.

In addition to the built-in impulse generator another impulse generator can be attached according to the table supported by the pictured output.

Mechanical output connection dimension DIN 33800 (pictured for U_a = 0,1 m³)

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Measuring ranges, types, pressure drops, rotation value Up.

Nominal size	Size of metre	Type	Measuring ranges, can be calibrated						Pressure drop Δp at Q_{max} and p = 1 kg/m³	Smallest counter element U_p
			EC approval EEC 1.33-3271.3-AEM-E01							
			Q_{max}	1 : 20 Q_{min}	1 : 30 Q_{min}	1 : 50 Q_{min}	1 : 100 Q_{min}	1 : 160 Q_{min}		
DN	-	-	[m³/h]	[m³/h]	[m³/h]	[m³/h]	[m³/h]	[m³/h]	[mbar]	[Imp./m³]
50	G 40	Zc 038.05	65	3	2	1.3	0,65	-	3	0.1
50	G 65	Zc 038.06	100	5	3	2	1	0,6	3	0.1
80	G 65	Ze 039.0	100	5	3	2	1	0,6	3	0.1
80	G 100	Ze 039.0	160	8	5	3	1.5	1	4	1.0
80	G 160	Ze 039.1	250	13	8	5	2.5	1,6	4	1.0
100	G 160	Ze 039.1	250	13	8	5	2.5	1,6	4	1.0
100	G 250	Zc 11.3	400	20	13	8	4	2,5	5	1.0
150	G 250	Zc 11.4	400	20	13	8	4	2,5	5	1.0
150	G 400	Zc 11.4	650	32	20	13	6.5	4	5	1.0
150	G 650	Za 13.f7	1000	50	32	20	10		5	1.0
200	G 1000	Za 13.8	1600	80	50	32	16		6	10.0
250	G 1600	Za 15.11	2500	130	80	50			5	10.0
300	G 2500	Za 16.f13	4000	200	130	80			5	10.0
300	G 4000	Za 16.13	6500	320	200	130			11	10.0

All meter sizes have to be operated with a mechanical output without limiting the measuring ranges.
Q_{max} = maximally permissible gas volume flow
In the operating state of the gas Q_{min} = minimally permissible Kas volume flow
In the operating state of the gas Δ_p = pressure loss of the meter, measured from the entry nozzle to the exit nozzle U_p = = rotation value of the first (right side) role of the roller counter

1 **Pulse transmission form IZ 9 or IZ 9/2**

2 **Pulse transmission of the optionally built in pulse**

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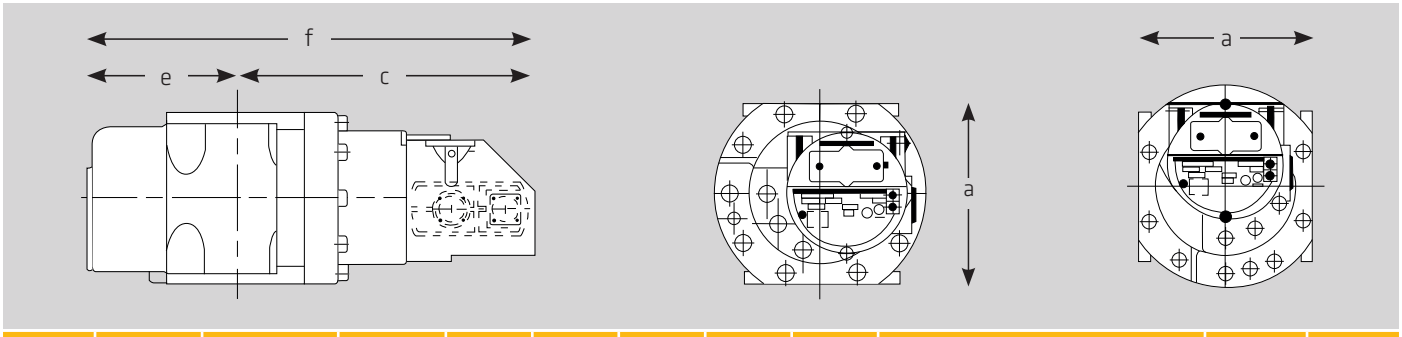
SLIMLINE DESIGN AND FLEXIBLE ASSEMBLY

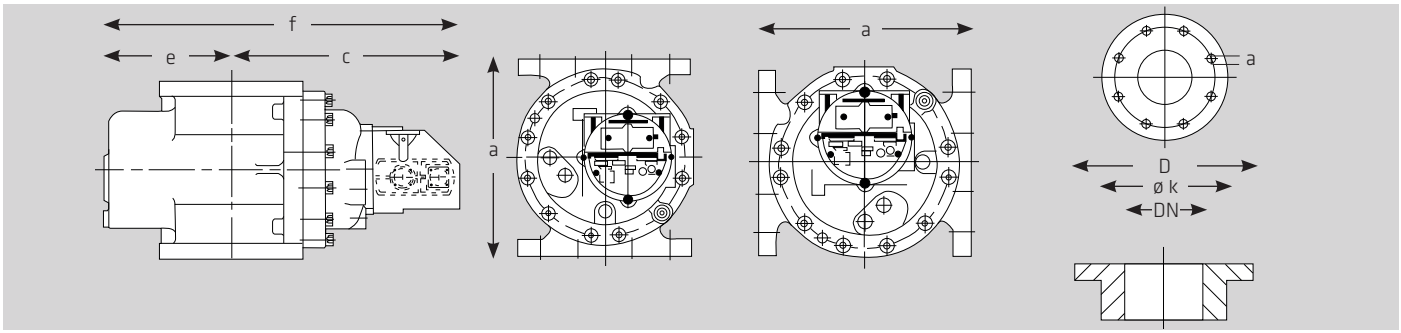
THE MEASUREMENT TABLES

Gas metre sizes G 40 and G 65, PN 16, casing GGG-40. Rotatable dual roller counter.



Nominal with DN	Metre size	Type	Pressure stage PN	* a mm	c mm	e mm	f mm	h³ mm	Drilling pattern of the drilling patterns according to EN 1092-2				S Flange thickness	Approximate weight kg
									ø k	D	*** d_2	Number d_2		
50	G 40	Zc 038.05	16	150	261	131,5	392	80	125	-	M 16	4	20	22
50	G 65	Zc 038.06	16	150	291	161,5	452	80	125	-	M 16	4	20	26

Gas metre sizes G 40 and G 100, PN 16, casing GGG-40. Rotatable dual roller counter electronic counter.



Nominal with DN	Metre size	Type	Pressure stage PN	* a mm	c mm	e mm	f mm	h³ mm	Drilling pattern of the drilling patterns according to EN 1092-2				S Flange thickness	Approximate weight kg
									ø k	D	*** d_2	Number d_2		
80	G 100	Ze 039.0	16	230	294	164	458	80	160	210	M 16	8	20	38
80	G 160	Ze 039.1	16	230	349	164	513	80	160	210	M 16	8	20	45
100	G 160	Ze 039.1	16	230	349	164	513	80	180	229	M 16	8	20	45
100	G 250	Zc 11.3	16	340	333	189	522	85	180	229	M 16	8	20	90
150	G 400	Zc 11.4	16	340	383	239	622	85	240	285	M 20	8	24	110

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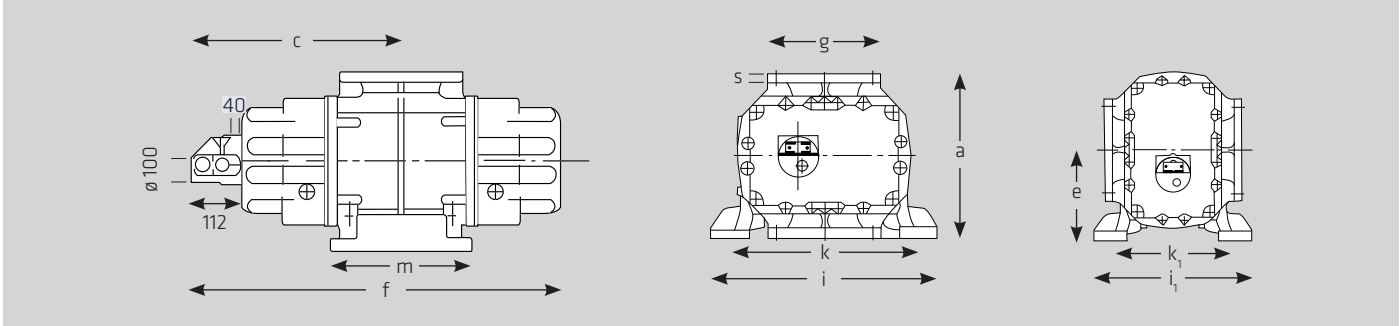
Gas metre sizes G 650 to G 4000, PN 10, PN 16, type series 324 „base design“, casing GGG-40. Dual roller counter or electronic.

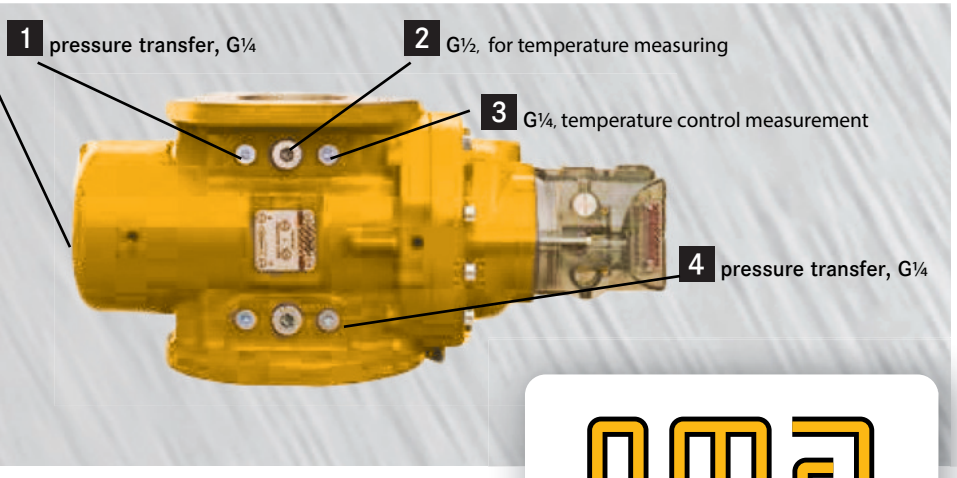


Nominal with DN	Metre size	Type	Pressure stage PN	* a mm	c mm	e mm	f mm	h^3 mm	Dimensions of the machine base					Drilling patterns of the connecting flanges according to EN 1092-2				S	Approximate weight kg
									m mm	i mm	k mm	i_1 mm	k_1 mm	ø k	D	*** d_2	Number d_2		
150	G 650	Za 13.f7	10	400	452	268	862	100	270	570	510	440	380	240	285	23	8	23	265
			16	630	502	315	902	150	440	640	550	640	550	240	318	23	8	37	415
200	G 1000	Za 13.8	10	400	522	268	1002	100	410	570	510	440	380	295	340	23	8	26	310
			16	630	572	315	1042	150	580	640	550	640	550	295	381	23	12	41	580
250	G 1600	Za 15.11	10	630	592	420	1092	150	410	800	720	580	510	350	395	23	12	28	650
			16	900	642	465	1202	200	620	870	770	870	770	355	445	27	12	48	1360
300	G 2500	Za 16.f13	10	710	752	490	1372	200	525	910	830	640	560	400	445	23	12	24	1020
			16	900	792	465	1452	250	860	870	770	870	770	410	460	27	12	51	1600
300	G 4000	Za 16.13	10	710	812	490	1502	200	655	910	830	640	560	400	445	23	12	24	1060
			16	900	852	465	158	250	990	870	770	870	770	410	460	27	12	51	1800

Structural length according to standard, ** recommended distance from wall for maintenance works, * through-hole threads/ threaded blind holes (depth = s), measures non-binding*

Manual control mechanism

After removing the ceiling screw (under seal) the free movement of the rotary pistons can be manually controlled at standstill, with pressure-compensated metre by turning using a box spanner werden. Useful for installation and malfunctions.



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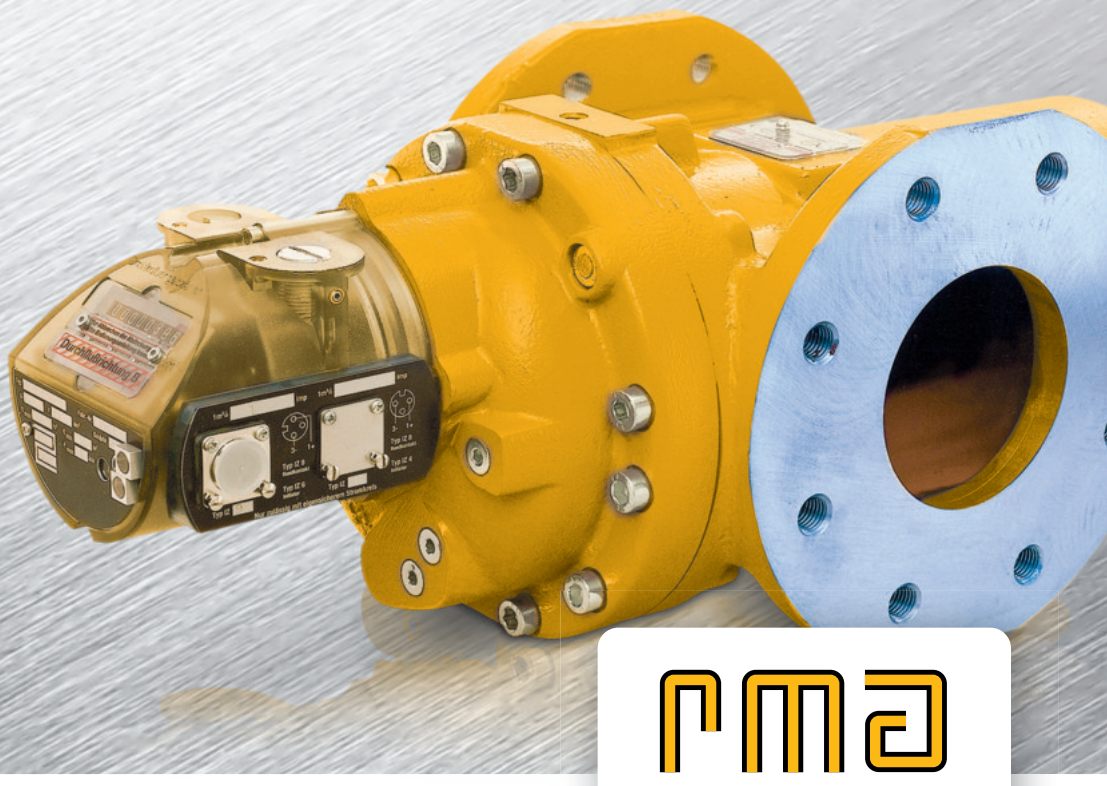

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PIPELINE EQUIPMENT

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