

Rotary gas meters

EMR series



Highlights

- Sizes DN 40-150 G 10-650 PN 16-100/ANSI 150-600
- Measuring range up to 1:160
- Accuracy 1%
- Compliant with MID or OIML
- Robust and reliable design
- Aluminum body for PN 16/ANSI 150



Introduction

The ELGAS series of rotary gas meters are designed to meet the highest demands of reliable and accurate measurement and OIML R137 1&2 (2014). The compact exchangeable aluminum cartridge allows local repair and on-site cleaning. The robust design of the casing and the cartridge make the meter less sensitive to installation stresses caused by the connecting piping. A significant amount of misalignment of the connecting piping/flanges can be tolerated by the meter without affecting the meter performance by jamming the impellers.

The aluminum casing of the EMR (body and front plate) is designed for working pressures up to 20 barg with a safety factor of 4. The square impellers and the improved position of the main bearings and shafts, make the meter less sensitive to overload and pressure shocks. The aluminum index and the protection of the LF pulsers with the associated magnets, make the meter less sensitive to manipulation by externally applied magnets or other external forces.

Tampering of meters with strong neodymium magnets is one of the major concerns of utility companies, as this kind of manipulation is very difficult to detect or prove. In order to protect the meter, the index can also be equipped with an intelligent encoder.

The unique proprietary oiling system, where the oil is distributed directly to the timing gears by means of a disc, eliminates oil loss at high rotor speeds and will lubricate the timing gears at very low loads. All plugs and oil sight glasses are in the front of the meter, allowing the meter to be installed in very compact installations.

The EMR series of rotary meters is suitable for custody transfer gas measurement of all non-corrosive gases such as natural gas, propane, butane, air, hydrogen, etc. Special constructions can be supplied for use under extreme conditions like higher temperatures and corrosive gases.



Main features

- Flow range 0.5 – 650 m³/h
- Diameters DN 40 – DN 150 (6/4" – 6")
- Pressure rates PN 16 – 100, ANSI 150 – 600
- Accuracy:
 - Qt to Qmax: ± 1% or better
 - Qmin to Qt: ± 2% or better
- Repeatability: better than 0.1%
- Mounting position: Horizontally or vertically
- Compliant with: EN12480:2002
EN12480:2015
OIML R137 1&2 (2014)
MID 2014/32/EU
- Temperature Range:
 - ATEX: -25°C to +70°C
 - MID: -25°C to +70°C
(lower temperatures on request)
 - PED: -20°C to +70°C
(lower temperatures on request)
- Large rangeability
- Removable cartridge design
- Robust construction
- Multi position
- Square impeller technique
- Compact installation
- Easy local repair
- On-site cleaning
- Tamper proof exchangeable index
- Seals according EN 549
(seals for gas appliances and gas equipment)

Superior metrological performance

Meters are approved according to EN12480:2002, EN12480:2015 and OIML R137 1&2 (2014) for rangeabilities up to 1:160. In situations where the installation or gas conditions are severe, the risk of rejection is greater when recalibration is done against in-service tolerances. The designation of class 1.5 (instead of 1.0), while still maintaining the class 1.0 accuracy limits, could be of interest since the in-service tolerances of a class 1.5 meter are significantly larger than the class 1.0 tolerances.

Cartridge design

All EMR meters consist of an aluminum cartridge inserted in a meter body. The cartridge can be removed and inserted with the body remaining installed. This allows local repairs such as replacement of the main bearings and on-site cleaning to be carried out without removing the meter body. Particular owners of older networks, suffering from dirt and/or condensate, will benefit from the ability to remove the cartridge.

Robust construction

In the new cartridge EMR design, the impellers, timing gears and bearings are fixed and positioned by a synchroplate.



- ATEX approvals:
 - Sensors compliant with Ex ia IIC T4... T6 Gb
(-40°C ≤ Ta +70°C)
 - Encoder compliant with Ex ib IIB T3... T6 Gb
(-25°C ≤ Ta +55°C)
- Body: Compliant to Pressure Equipment Directive 2014/68/EU

Since this synchroplate is machined in one operation, the tolerances can be controlled and maintained at a very high level. As a consequence, the clearance between the impellers and the meter body is equally divided and as such maximized, making the meters less sensitive to dirt and debris.

The short impeller and high strength shaft connecting the timing gear to the impeller overcomes flexing or bending of the impellers, hence the meters are less sensitive to flow and pressure shocks. Severe intermittent on/off applications are typically handled without damage. Temporarily overloading the meter up to 50% of the maximum capacity will not cause any degradation of the metrological quality.

Basic Index (standard)

The basic index consists of a UV-resistant polycarbonate cover glued to an aluminum frame. The aluminum frame will give strength to the index and as such sufficient protection against mechanical interference (Tampering). The index is 100% sealed (IP67) by multiple layers of glue. The index can be rotated over 350° for flow directions right-left, left-right and top-down. The index is equipped with multiple LF switches and normally closed tamper contacts.

Universal Index

The extremely strong double walled, aluminum index is designed to withstand any external interference. To protect against large forces applied to the index window, an additional glass window is mounted beneath the polycarbonate window. This glass window will break in case excessive force is applied to the index.

On request the index can be sealed up to IP67. Four slots in the outer extrusion can be used for various add-ons such as multiple connectors, additional outgoing shafts, marking plates with bar codes, etc.



The rotation of the outgoing shaft is equal to one m³ or CF or (sub) multiple thereof. A single or double counter can be added to the instrument drive.

The instrument drive can be rotated over 350°, hence allowing both horizontal and vertical installation.

The instrument drive can be equipped with low frequency pulsers, an encoder as well as a reverse flow lock, preventing meters from registering backwards as a result of tampering.

On request the index can be supplied as side reading (without instrument drive) allowing the meter to be installed in an extremely high or low position. The rotating direction of the output shaft can be changed on site.

Options for Indexes and Instrument Drive

The index or instrument drive can be equipped with several options making the meter prepared for the future:

- Magnetic Field Protection Reverse Flow Lock
- Wiegand Pulsers
- Intelligent Index/Encoder
- High Frequency Pulsers
- Tamper Proof

Installation

Installation of ELGAS rotary meters can be horizontal or vertical. Since the meter is designed for multi position, consideration need only be given to the arrows showing the flow direction. After the meter is installed, the index can be rotated to the correct position. The index can be rotated over 350°. ELGAS rotary meters can be metrological sealed to suit various conditions from total flexibility to highly tamper proof.



Maintenance

ELGAS rotary gas meters have a rotating disc for distributing the oil directly to the timing gears.

The mechanism is designed to prevent oil loss at high loads or from pressure variations and maintains sufficient oiling at low flows. Since the oil system operates between 40% and 120% of the maximum flow, sizing of the installation is no longer critical. The oil supplied with the meter is suitable for 10 years of operation under normal conditions.

Cleaning / Easy repair

After removing the front cover of the meter, the entire cartridge can be removed for cleaning. During this cleaning process, the meter body can remain in line. For cleaning purposes the seals of the front cover have to be removed. The construction of the ELGAS rotary gas meters allows local repair or replacement of all the main bearings without special tools. If the main bearings are to be replaced, the critical timing of the impellers will be maintained. It is recommended that replacement of the main bearings (mounted in the synchroplate) is performed by a skilled technician in a clean environment. The rear bearings can be replaced with the meter body on site. In a situation where a meter is locked by dirt, the cartridge can be removed for cleaning.

The use of a cartridge (pre-calibrated) and the accessibility of the front and rear bearings without the need for removing the timing gears, make the ELGAS series of rotary meter unique in terms of repair. Any repair shop can repair or re-condition the meters without special skills and tools. When regulation permits, a new, calibrated cartridge can be installed.

EVC mounting

ELGAS rotary meters can be equipped (optional) with two thermo wells and two pressure tapping points. Therefore the rotary meters can be supplied with an Electronic Volume Corrector (EVC). ELGAS offers a large variety in conversion devices so all required data can be provided and the best solution for every project can be assembled. Refer to the special brochure for more information about the Electronic Volume Conversion Devices ELGAS is able to supply or contact a local supplier.

Materials

Body: Aluminum	Shafts: Stainless steel
Impellers: Aluminum	Gears: Delrin
Cartridge: Aluminum	Index frame: Aluminum
Timing gears: Carbon steel	Index cover: Polycarb.ECI
Bearings: Carbon steel / stainless steel	

Integrated bypass (security of supply)

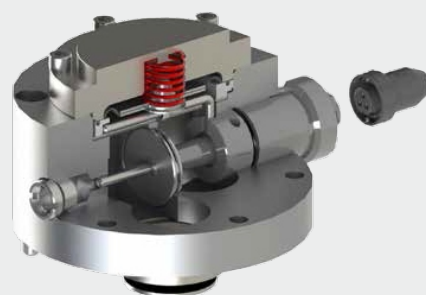
Rotary meters are used in a wide variety of industrial applications due to their reliability and accuracy over an extremely large range. Unlike other meter types such as turbine meters and ultrasonic meters, a rotary meter is always accurate unless the rotors become jammed.

In reality, the rotary meter is a digital device, it runs and is accurate or it stops. The only drawback of a rotary meter is that when it stops (locks up), the gas flow is interrupted. As such, there is no security of supply unless precautions are taken.

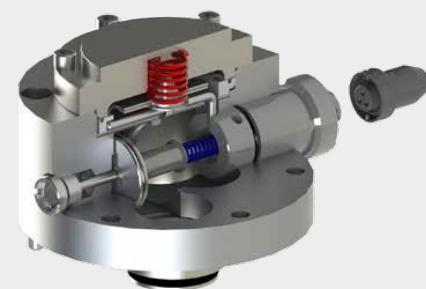
The most convenient and reliable precaution is to have an automatic bypass valve integrated in the meter. This provides security of supply as the bypass opens automatically when the differential pressure over the meter reaches a certain pre-set level (various springs for different set points are available).

The ELGAS series of rotary meters can be equipped with an automatic bypass (MID approved). The bypass operates as a "reverse" safety shut-off valve, whereby the bypass valve is triggered by an accurate spring loaded diaphragm. When operated, the opened bore allows the full flow of gas to bypass the locked impellers with a significantly lower pressure loss compared to spring loaded bypass systems.

Bypass closed



Bypass open



The mechanism in the bypass works on a high force level (large diaphragm and strong springs) and as such, the bypass is very reliable over its expected life time. With two reed switches (one normally closed, one normally open) the status of the valve can be monitored (e.g. by an EVC). It occasionally happens that an operator will open the inlet or outlet valves too fast and activate the bypass. In such a case, the bypass can be re-set onsite. A removable plug provides access to the reset mechanism. Note: In some countries local authorities require this plug to be sealed.

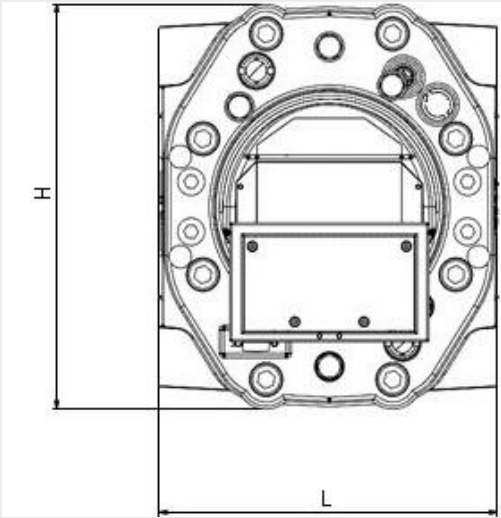
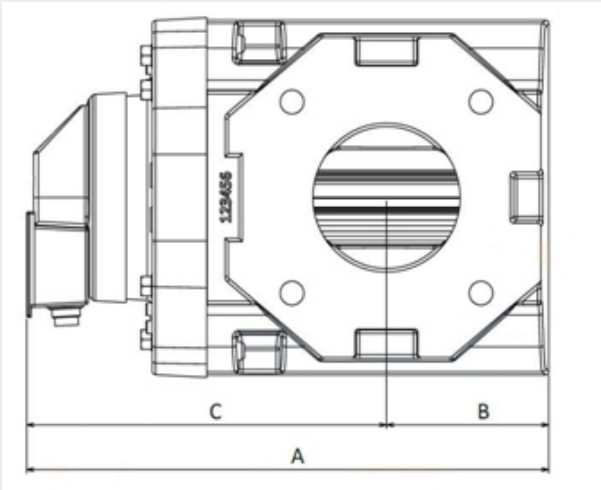
Technical specifications

	Performance							
Volume Vc [dm³]	G-value [-]	Qmax [m³/h]	Qmin*	Qt	Diameter	Pmax [bar]	ΔP** [Pa]	Basic Transfer*** [rev·m³]
			Atm. Air [m³/h]	Atm. Air [m³/h]	D [mm]			
0.25	-	-	-	-	-	-	-	-
	G10	16	0.5	1.6	Thr. BSP/NPT	21	20	4004.325
	G16	25	0.5	2.5	Thr. BSP/NPT	21	18	4004.325
	G25	40	0.5	4	Thr. BSP/NPT	21	120	4004.325
0.39	G10	16	0.65	1.6	40 or 50	21	12	2574.268
	G16	25	0.65	2.5	40 or 50	21	28	2574.268
	G25	40	0.65	4	40 or 50	21	72	2574.268
	G40	65	0.65	6.5	40 or 50	21	190	2574.268
0.61	G16	25	0.65	2.5	40 or 50	21	25	1638.163
	G25	40	0.65	4	40 or 50	21	64	1638.163
	G40	65	0.65	6.5	40 or 50	21	170	1638.163
	G65	100	0.65	10	40 or 50	21	400	1638.163
	G40	65	0.65	6.5	Thr. BSP 50	21	170	1638.163
0.97	G65	100	1	10	80	21	100	1023.851
	G100	160	1	16	80	21	258	1023.851
0.72	G16	25	0.65	2.5	40 or 50	21	13	1378.968
	G25	40	0.65	4	40 or 50	21	32	1378.968
	G40	65	0.65	6.5	40 or 50	21	85	1378.968
	G65	100	0.65	8	40 or 50	21	200	1378.968
	G100	160	1.6	16	50	12	512	1378.968
1.16	G40	65	1	6.5	80	21	80	861.8609
	G65	100	1	8	80	21	100	861.8609
	G100	160	1	16	80	21	258	861.8609
1.43	G100	160	1.6	16	80 or 100	21	240	689.4840
	G160	250	1.6	25	80 or 100	21	635	689.4840
3.17	G160	250	2.5	25	100	21	90	315.3520
	G250	400	2.5	40	100	21	230	315.3520
5.15	G250	400	4	40	100 or 150	21	106	194.0625
	G400	650	4	65	100 or 150	21	280	194.0625

* Wider range on request in given sizes
** ΔP is measured under atmospheric conditions with natural gas with relative density of 0.6 (air = 1)
*** Values may vary 5% due to machining tolerances

Dimensions

	G-value	Performance							
Volume Vc [dm³]	G-value [-]	L	H	A		B [mm]	C		Weight ALU [kg]
		[mm]	[mm]	Univ. [m³/h]	Basic [mm]		Univ. [mm]	Basic [mm]	
0.25	-	-	-	-	-	-	-	-	-
	G10	150	163	234	182	33	166	149	5
	G16	150	163	234	182	33	166	149	5
	G25	150	163	234	182	33	166	149	5
0.39	G10	171	163	259	242	68	191	174	7
	G16	171	163	259	242	68	191	174	7
	G25	171	163	259	242	68	191	174	7
	G40	171	163	259	242	68	191	174	7
0.61	G16	150/171	163	259	242	68	191	174	7.5
	G25	150/171	163	259	242	68	191	174	7.5
	G40	150/171	163	259	242	68	191	174	7.5
	G65	150/171	163	259	242	68	191	174	7.5
	G40	171	163	259	242	68	191	174	7.5
0.97	G65	171	215	336	319	90	246	90	12
	G100	171	215	336	319	90	246	90	12
0.72	G16	171	202	268	251	72	196	179	12
	G25	171	202	268	251	72	196	179	12
	G40	171	202	268	251	72	196	179	12
	G65	171	202	268	251	72	196	179	12
	G100	171	202	268	251	72	196	179	12
1.16	G40	171	202	320	303	92	228	211	14
	G65	171	202	320	303	92	228	211	14
	G100	171	202	320	303	92	228	211	14
1.43	G100	171/241	202	371	354	118	253	236	15
	G160	171/241	202	371	354	118	253	236	15
3.17	G160	241	288	403	386	160	243	226	38/41
	G250	241	288	403	386	160	243	226	38/41
5.15	G250	241/260	288	518	501	218	300	283	48/51
	G400	241/260	288	518	501	218	300	283	48/51

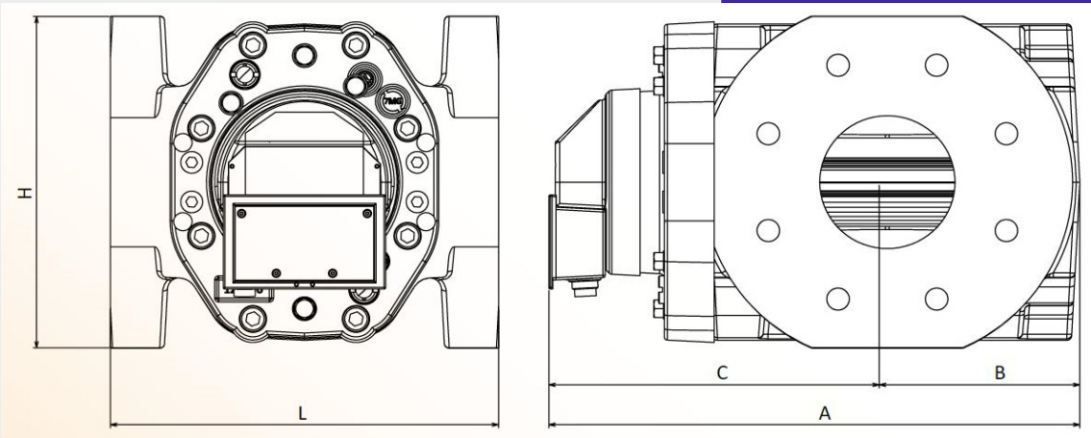


EMR series for pressures up to 30 bar

The rotary meters are developed with an optimized body construction. Due to the special design and the strength of the aluminum construction the rotary meters can be used with higher pressures. Since this development has been done as an optimization for the standard aluminum bodies there is no need of a steel body for pressure up to 30 bar.

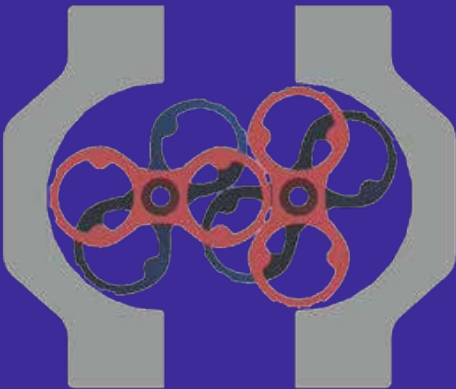


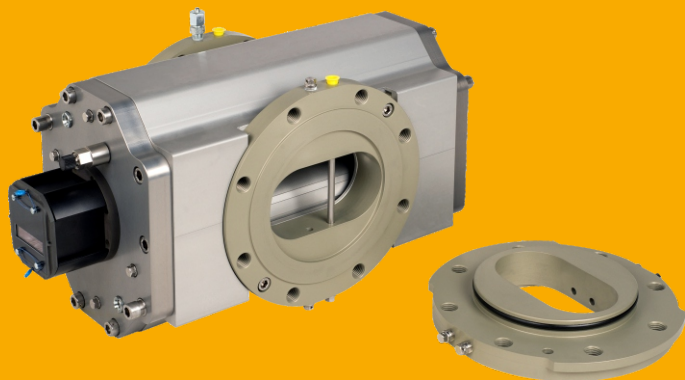
	Performance PN25 & ANSI300					Dimensions PN25 & ANSI300							
Volume Vc [dm³]	G-value [-]	Qmax [m³/h]	Qmin	Qt	Diameter	L [mm]	H [mm]	A		B [mm]	C		Weight ALU [kg]
			Atm.Air [m³/h]	Atm.Air [m³/h]	D [mm]			Univ. [mm]	Basic [mm]		Univ. [mm]	Basic [mm]	
1.16	G25	40	0.65	3.2	50	171	202	320	303	92	228	211	11
	G40	65	0.65	3.2	50	171	202	320	303	92	228	211	11
	G65	100	0.65	5	50	171	202	320	303	92	228	211	11
1.43	G100	160	1.6	3.2	80 or 100	241	202	371	354	118	253	236	15
	G160	250	2.5	5	80 or 100	241	202	371	354	118	253	236	15
5.15	G250	400	4	20	100	260	288	518	501	218	300	283	51
	G400	650	4	32	100	260	288	518	501	218	300	283	51



EMR-Dual Series (pulsation free)

Turbine meters have a limited range and must preferably be calibrated close to the operating conditions (high pressure natural gas). This limitation and the higher costs due to the calibration, make the larger rotary meters more popular as replacement for the turbine meter. To overcome the drawback of conventional rotary meters (pulsations and resonance), pulsation free rotary meters have been developed. These pulsation free rotary meters, using two phase shifted pairs of impellers, fully eliminate the pulsations by countering the characteristic sine wave and its resultant resonance. As a result the pulsation free rotary meters series DUAL are extremely quiet and accurate.





Another advantage is the use of relatively short impellers. Shorter impellers will not deform easily and as such provide reliable long term performance. The weak point of pulsation free meters can be the connection of the two impeller pairs as this mechanical coupling is very sensitive to load differences between the two sets of impellers. The ELGAS DUAL meter uses a significantly stronger spline and spline shaft to connect the two pairs of impellers.

Exchangeable flanges

By using exchangeable flanges, the installation connection of the meter can easily be changed from DIN to ANSI or from DN100 (4") to DN150 (6").

Performance & dimensions EMR-dual Series

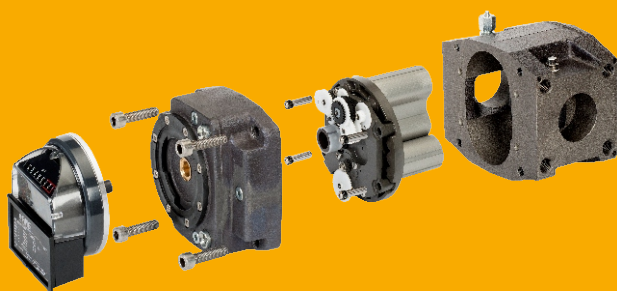
	Performance					Dimensions Dual							
Volume V [dm³]	G-value [-]	Qmax [m³/h]	Qmin	Qt	Diameter	L [mm]	H [mm]	A		B [mm]	C		Weight STEEL [kg]
			Atm.Air [m³/h]	Atm.Air [m³/h]	D [mm]			Univ. [mm]	Basic [mm]		Univ. [mm]	Basic [mm]	
2.41	G160	250	2.5	16	100	241	288	446	429	186	260	243	32
	G250	400	2.5	25	100	241	288	446	429	186	260	243	32
3.96	G250	400	4	25	150	260	288	554	537	249	305	288	41
	G400	650	4	40	150	260	288	554	537	249	305	288	41
6.34	G400	650	6.5	40	150	260	288	692	675	318	374	357	51
	G650	1000	6.5	65	150	260	288	692	675	318	374	357	51

EMR-HP series (for pressures up to 100 bar)

The EMR-HP series of rotary gas meters is designed to meet the highest demands of reliable and accurate measurement of gas flow under high pressure conditions. The meters fully comply with the EN12480:2002, EN12480:2015 and OIML R137 1&2 (2014) and as such can be used for all custody transfer applications.

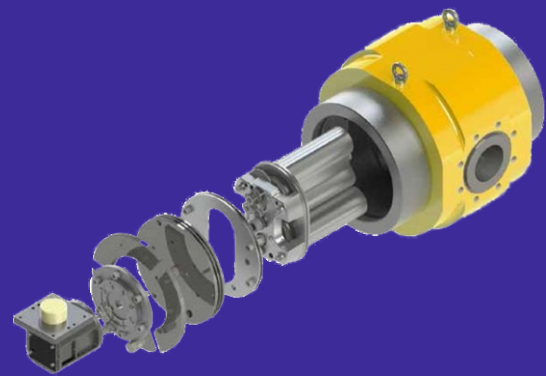
The actual meter body is made from aluminum and is kept in position by steel meter housing. This housing holds the meter body, without any stress, in position between the adjacent flanges. Since the meter body is not affected by stress from the flanges or the piping, the clearances between the impellers and the body are optimized. As such the superb metrological performance achieved in the low pressure ELGAS rotary meter is maintained under high pressure conditions as well.

Due to the large rangeability of 1:100, the EMR-HP rotary meter is very suitable for small city gate stations as the actual load of this type of station varies widely. Square impellers and improved position of the main bearings makes the cartridge very robust and less sensitive to flow and pressure shocks. Unlike other approved flow metering devices, such as turbine meters and ultrasonic meters, a rotary meter can be installed close to regulators and without the need for extended straight pipe or specially prepared inlet sections.



Bypass for security of supply

The EMR-HP series can be equipped with a spring loaded bypass valve. If a meter locks, the differential over the bypass valve will increase and the valve will open allowing gas to pass. This security of supply feature makes the EMR-HP suitable for use in critical installations where gas flow cannot be interrupted. The opening of the bypass can be monitored by measuring the differential over the meter.



Performance & dimensions EMR-HP series

Performance						Dimensions High Pressure (STEEL)							
Volume V [dm³]	G-value [-]	Qmax [m³/h]	Qmin Atm.Air [m³/h]	Qt Atm.Air [m³/h]	Diameter D [mm]	L [mm]	H [mm]	A		B [mm]	C		Weight STEEL [kg]
								Univ. [mm]	Basic [mm]		Univ. [mm]	Basic [mm]	
0.39	G10	40	0.4	4	40 or 50	240	240	364	347	150	214	197	65
	G16	40	0.4	4	40 or 50	240	240	364	347	150	214	197	65
0.61	G25	65	0.65	6.5	40 or 50	240	260	353	323	114	239	209	65
	G40	65	0.65	6.5	40 or 50	240	260	353	323	114	239	209	65
0.72	G40	65	1	6.5	50	273	260	353	323	114	239	209	65
0.85	G65	100	1	10	50	240	260	404	374	118	286	256	73
1.16	G65	100	1	10	50	273	260	404	374	118	286	256	73
1.45	G100	160	2.5	16	80	273	260	436	406	134	302	272	85
3.17	G160	250	4	25	80 or 100	375	363	493	463	215	278	248	168

