

ROTARY METER SERIES

FMR 150



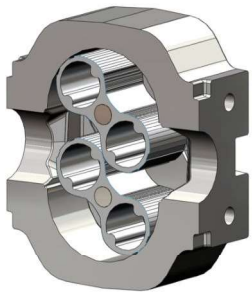
The best way to predict the future is to create it

Introduction

The FMR 150 Series is designed to accurately and reliably meet the highest demands of gas flow measurement. The meters are MID approved and fully comply with EN12480, OIML R137 and ANSI B109.3. 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. The entire aluminum casing of the FMR is designed for working pressures up to 290psig with a safety factor of 4. The square impellers, improved position of the main bearings and shafts, make the meter more resistant to overload and pressure shocks. The aluminum index and the protection of the standard installed, low frequency Reed contact with the associated magnets, make the meter more resistant to tampering or manipulation. Strong neodymium magnets can be used to manipulate meters, which is very difficult to detect or prove and a major concern for utility companies worldwide.



Principle



The FMR rotary gas meter is a positive displacement meter. The measurement of the gas is performed by two figure 8-shaped impellers (rotors) rotating within a measurement chamber. During a full revolution of the rotors, a fixed volume is displaced from the inlet to the outlet of the meter. The number of revolutions represents the amount of volume passed. The volume is displayed on a direct reading mechanical counter/odometer. Several low and high frequency sensors can be used for flow computation or control purposes.



Several low and high frequency sensors can be used for flow computation or control purposes.

Applications

The FMR 150 series is suitable for custody transfer measurement of all non-corrosive gases* such as natural gas, propane, butane, air, hydrogen, etc.

Typical applications include:

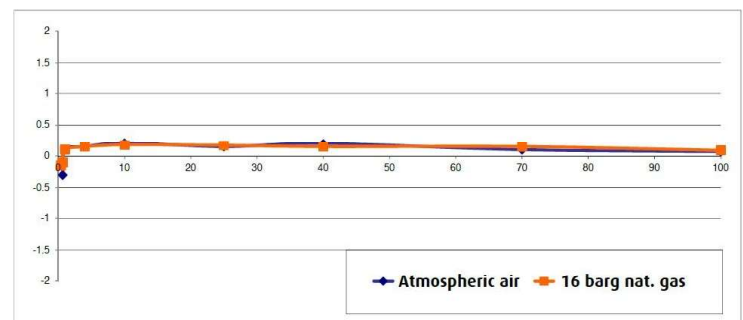
- Gas distribution in low to medium pressure networks
- Industrial applications
- Master meters for test benches

Accuracy

Each FMR rotary meter is tested with atmospheric air to traceable VSL (formerly NMI) calibrated references. It has been proven as part of the type approval testing that the difference between the accuracy at atmospheric air and at high pressure natural gas is negligible.

Typical metrological characteristics

- Accuracy 5% of Q_{max} to Q_{max} : $\pm 1\%$ or better
- Accuracy Q_{min} to 5% of Q_{max} : $\pm 2\%$ or better
- Repeatability: better than 0.1%



* not suitable for oxygen services of any kind

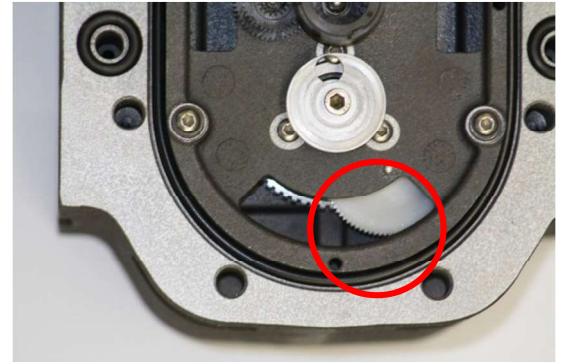
Robust Construction

In the new cartridge design, the impellers, timing gears and bearings are fixed and positioned by a SynchroPlate. With the SynchroPlate machined in one operation, the tolerances are maintained the very high level. This design and manufacturing process allow for equally divided clearances between meter body and impellers, making the meters more dirt and debris resistant. The short impeller and high strength shaft connecting the timing gear to the impeller overcomes flexing or bending of the impellers, making the meters more resistant to flow and pressure shocks. Severe intermittent on/off applications are typically handled without damage. A temporary overload up to 50% of maximum capacity without degradation of the metrological quality is possible.



Low Cost of Ownership

All FMR Series rotary meters use a fix gear ratio in the index head (no adjustment gears) making it a “one-fits-all” design. Together with the exchangeable cartridge design, the required parts for maintenance and repairs has been significantly lowered. The proprietary oiling system not only reduces wear and tear but keeps required oil changes over the meter’s lifespan to a minimum.



SPLASH VANES



OIL GEAR



Proprietary Oil Gear System vs. Conventional Splash Vanes



Security of Supply

Rotary gas meters are used in a wide variety of commercial and industrial applications due to their reliability and accuracy over an extremely large range. However, rotary meters can be blocked due to dirt or other circumstance, stopping the gas supply unless precautions are taken.

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

The FMR 150 series can be equipped with an automatic bypass. The bypass operates as a “reverse” safety shut-off valve, whereby the bypass valve is triggered by an accurate spring loaded diaphragm.

When triggered, the bypass allows for full meter capacity flow with a significantly lower pressure loss compared to spring loaded bypass systems.

The mechanism in the bypass works on a high force level (large diaphragm and strong springs) ensuring reliable operation over its expected lifetime. With two reed switches (one normally closed, one normally open) the status of the valve can be monitored by an EVC like the Elcor Series, a Flow Computer, RTU or Scada System. It occasionally happens that an operator will open the inlet or outlet valves too fast, triggering the bypass and after depressurization, a removable plug provides access to the reset mechanism without special tools. To comply with local regulations, this plug can be wire sealed.

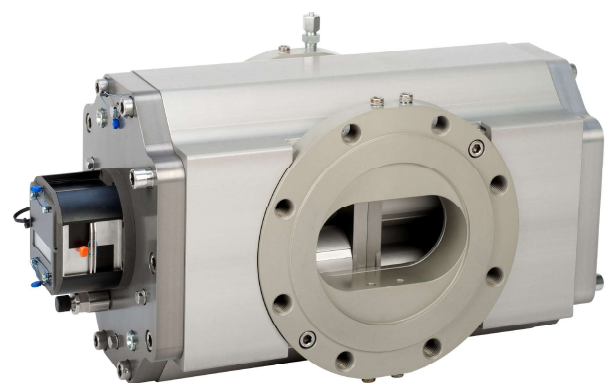
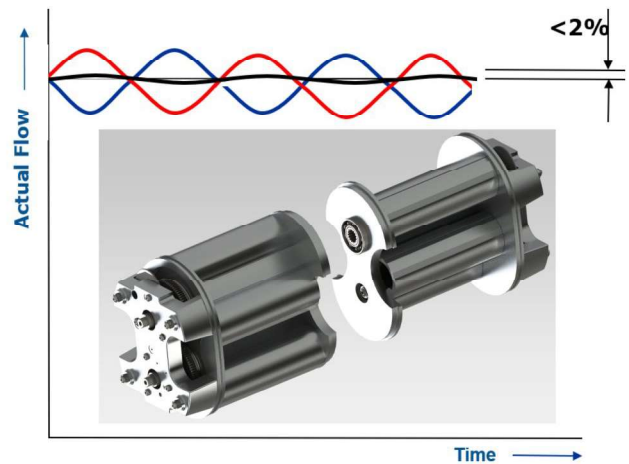


Bypass Technical Data

Materials:
 Pressure containing parts: Aluminum
 Others: Stainless Steel
 Diaphragm: NBR
 Available set points: 1.5, 3.0, 6.0psi

FMR 150 DUAL Series (pulsation free)

Turbine meters have a limited range and depending on local regulations, must be calibrated close to the operating conditions (high pressure natural gas). This limited range and higher costs of calibration, make the larger rotary meters more popular as replacement for turbine meters. However, larger rotary meters in certain applications, 11M and bigger, have the drawback of pulsation and high resonance. As a solution, FMG rotary meters are also available as pulsation free meters. The pulsation free series DUAL rotary meters use two phase shifted pairs of impellers to fully eliminate the pulsations by countering the characteristic sine wave and its resultant resonance making the DUAL meters extremely quiet and accurate. Another advantage of the pulsation free rotary meters are the relatively short impellers that will not deform easily and provide reliable long-term performance. Because pulsation free meters can be less resistant to load changes between the two sets of impellers, the FMG DUAL meters use a significantly stronger spline and spline shaft connecting the impeller pairs.



Configurations

Like the FMR 150 Series meters, the DUAL versions are available in a wide variety of configurations including all types of FMR index heads, low and high frequency sensors and even a bypass can be pre-installed.

Applications

The FMR 150 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.

Typical applications include:

- Gas distribution in low to medium pressure networks, city gate stations
- Industrial applications, low noise environments (hospitals, etc.)
- Master meters for test benches



Main Features

- Flow range 7cfh – 38,000cfh
- Diameters 1-1/2" up to 6"
- Pressure rates ANSI 150
- Compliant with ANSI B109.3
- Compliant with OIML R137 1&2 (2014)
- Temperature range -40F to +158F
- Large rangeability > 1:160
- Robust construction
- Square impeller technique
- Cartridge design
- Proprietary Oiling System
- Standard Low Freq. Output (Reed contact or Wiegand)
- Optional High Freq. Output
- Multi position
- Tamper proof, exchangeable index

FMR 150 and 150 DUAL General Technical Specification

Flow Rates:	7cfh up to 38,000cfh
Nominal Diameters:	1-1/2" to 6"
Flange Connections:	ANSI 150 FF, Threaded Version 1-1/2" NPT
Max. Operating Pressure:	290psi
Temperature Range:	-40F to +158F
Mounting Position:	Horizontally or Vertically
Metrological Approvals:	OIML R137 1&2 (2014) EN12480:2002 EN12480:2015 MID 2014/32/EU
Electrical Compliance:	UL, FM, CSA, ATEX
Body:	ANSI B109.3, PED 2014/68/EU

Materials:

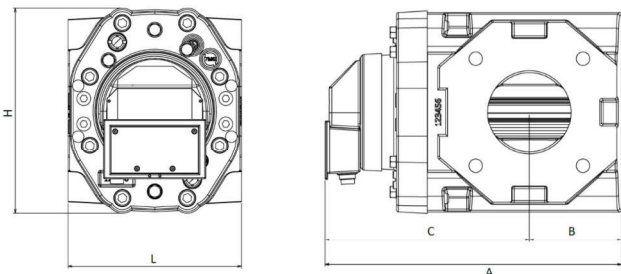
Body:	Aluminum	Shafts:	Stainless steel	Timing Gears:	Carbon Steel
Impellers:	Aluminum	Gears:	Delrin	Bearings:	Carbon Steel / Stainless Steel
Cartridge:	Aluminum	Index frame:	Aluminum	Index cover:	Polycarbonate ECI

FMR Series 150 Technical Specifications

MAOP: 290psig Temperature Range: -40F to +158F								
Displaced Volume	Model	Base Rating (Qmax)	Qmin	Nominal Pipe Size	Flange to Flange	ΔP	Start Rate	Stop Rate
		Atm. Air cf	Atm. Air cf					
cf				in	in	in.w. c.	cfh	cfh
0.0088	8C	800	17.7	1-1/2" (Threaded NPT)	6"	0.193	<1.77	<1.77
	1.5M	1,500	17.7	1-1/2" (Threaded NPT)	6"	0.482	<1.77	<1.77
0.0215	8C	800	23.0	1-1/2" or 2"	6"	0.100	<1.77	<1.77
	1.5M	1,500	23.0	1-1/2" or 2"	6"	0.257	<1.77	<1.77
	8C	800	23.0	1-1/2" or 2"	6-3/4"	0.100	<1.77	<1.77
	1.5M	1,500	23.0	1-1/2" or 2"	6-3/4"	0.257	<1.77	<1.77
	2.5M	2,500	23.0	1-1/2" or 2"	6-3/4"	0.682	<1.77	<1.77
0.0254	2.5M	2,500	23.0	1-1/2" or 2"	6-3/4"	0.341	<1.77	<1.77
	3.5M	3,500	23.0	1-1/2" or 2"	6-3/4"	0.803	<1.77	<1.77
0.0410	5.5M	5,500	35.3	3"	6-3/4"	0.763	<2.47	<2.47
0.0505	7M	7,000	56.5	3"	6-3/4"	2.550	<3.53	<3.53
	9M	9,000	56.5	3"	6-3/4"	3.121	<3.53	<3.53
	9M	9,000	56.5	3"	9-1/2"	3.121	<3.53	<3.53
0.1119	11M	11,000	56.5	4"	9-1/2"	0.862	<3.53	<3.53
	16M	16,000	141.3	4"	9-1/2"	0.923	<5.30	<5.30
0.1819	23M	23,000	141.3	6"	9-1/2"	1.124	<7.06	<7.06
	23M	23,000	141.3	6"	10-1/4"	1.124	<7.06	<7.06

FMR Series 150 DUAL Technical Specifications

MAOP: 290psig Temperature Range: -40F to +158F								
Displaced Volume	Model	Base Rating (Qmax)	Qmin	Nominal Pipe Size	Flange to Flange		Start Rate	Stop Rate
		Atm. Air cf	cf					
cf				in	in		cfh	cfh
0.07915	9M	9,000	88	4"	9-1/2"		<8.83	<8.83
	11M	11,000	88	4"	9-1/2"		<8.83	<8.83
	16M	16,000	88	4"	9-1/2"		<14.13	<14.13
0.13998	16M	16,000	141	6"	10-1/4"		<14.13	<14.13
	23M	23,000	141	6"	10-1/4"		<23.0	<23.0
0.22397	23M	23,000	230	6"	10-1/4"		<23.0	<23.0
	38M	38,000	230	6"	10-1/4"		<35.3	<35.3

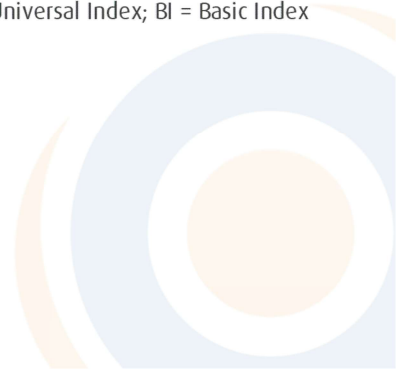
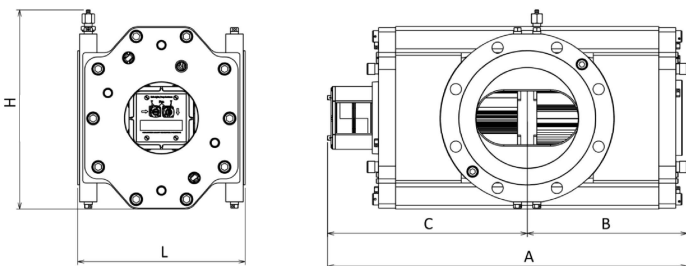


Dimensions (in) & Weight (lbs)									
L	H	A			B	C			Weight
		Index Head				Index Head			
		ID	UI	BI		ID	UI	BI	
6"	6.42	11.10	7.95	7.17	1.30	9.80	6.65	5.87	12.1
6"	6.42	11.10	7.95	7.17	1.30	9.80	6.65	5.87	12.1
6"	6.42	12.28	9.13	8.35	2.68	9.61	6.46	5.67	17.6
6"	6.42	12.28	9.13	8.35	2.68	9.61	6.46	5.67	17.6
6-3/4"	6.42	12.28	9.13	8.35	2.68	9.61	6.46	5.67	17.6
6-3/4"	6.42	12.28	9.13	8.35	2.68	9.61	6.46	5.67	17.6
6-3/4"	6.42	12.28	9.13	8.35	2.68	9.61	6.46	5.67	17.6
6-3/4"	7.95	13.82	10.67	9.88	2.83	10.98	7.83	7.05	26.5
6-3/4"	7.95	13.82	10.67	9.88	2.83	10.98	7.83	7.05	26.5
6-3/4"	7.95	15.87	12.72	11.93	3.62	12.24	9.09	8.31	30.9
6-3/4"	0.00	16.69	13.54	12.76	0.00	12.05	8.90	8.11	44.1
6-3/4"	7.95	16.69	13.54	12.76	4.65	12.05	8.90	8.11	44.1
9-1/2"	7.95	16.69	13.54	12.76	4.65	12.05	8.90	8.11	44.1
9-1/2"	7.95	16.69	13.54	12.76	4.65	12.05	8.90	8.11	44.1
9-1/2"	11.34	17.95	14.80	14.02	6.30	11.65	8.50	7.72	86.0
9-1/2"	11.34	22.48	19.33	18.54	8.58	13.90	10.75	9.96	112.4
10-1/4"	11.34	22.48	19.33	18.54	8.58	13.90	10.75	9.96	112.4

Note: ID = Instrument Drive; UI = Universal Index; BI = Basic Index

Dimensions (in) & Weight (lbs)									
L	H	A			B	C			Weight
		Index Head				Index Head			
		ID	BI	UI		ID	BI	UI	
9-1/2" 10-1/4"	11.34	20.83	16.9	17.7	7.32	13.5	9.6	10.4	90.4
9-1/2" 10-1/4"	11.34	20.83	16.9	17.7	7.32	13.5	9.6	10.4	90.4
9-1/2" 10-1/4"	11.34	20.83	16.9	17.7	7.32	13.5	9.6	10.4	90.4
9-1/2" 10-1/4"	11.34	25.08	21.1	21.9	9.80	15.3	11.3	12.1	123.5
9-1/2" 10-1/4"	11.34	25.08	21.1	21.9	9.80	15.3	11.3	12.1	123.5
9-1/2" 10-1/4"	11.34	30.51	26.6	27.4	12.52	18.0	14.1	14.8	165.3
9-1/2" 10-1/4"	11.34	30.51	26.6	27.4	12.52	18.0	14.1	14.8	165.3

Note: ID = Instrument Drive; UI = Universal Index; BI = Basic Index



Corrected Capacity at Metering Pressure in SCFH

PSIG	Model	8C	1.5M	2.5M	3.5M	5.5M	7M	9M	11M	16M	23M	38M
atm. Pr.		800	1,500	2,500	3,500	5,500	7,000	9,000	11,000	16,000	23,000	38,000
1		854	1,602	2,670	3,738	5,873	7,475	9,611	11,747	17,086	24,561	40,580
5		1,072	2,009	3,349	4,688	7,367	9,376	12,055	14,734	21,431	30,807	50,899
10		1,343	2,518	4,197	5,876	9,234	11,752	15,110	18,468	26,862	38,614	63,798
15		1,615	3,027	5,046	7,064	11,101	14,128	18,165	22,202	32,293	46,422	76,697
20		1,886	3,537	5,894	8,252	12,968	16,504	21,220	25,936	37,724	54,229	89,595
25		2,158	4,046	6,743	9,440	14,835	18,881	24,275	29,669	43,155	62,036	102,494
30		2,429	4,555	7,592	10,628	16,702	21,257	27,330	33,403	48,587	69,843	115,393
40		2,972	5,573	9,289	13,004	20,436	26,009	33,440	40,871	59,449	85,458	141,191
50		3,516	6,592	10,986	15,381	24,169	30,761	39,550	48,339	70,311	101,072	166,988
60		4,059	7,610	12,683	17,757	27,903	35,513	45,660	55,807	81,173	116,686	192,786
70		4,602	8,628	14,381	20,133	31,637	40,265	51,770	63,274	92,035	132,301	218,584
80		5,145	9,647	16,078	22,509	35,371	45,018	57,880	70,742	102,897	147,915	244,382
90		5,688	10,665	17,775	24,885	39,105	49,770	63,990	78,210	113,760	163,530	270,179
100		6,231	11,683	19,472	27,261	42,839	54,522	70,100	85,678	124,622	179,144	295,977
110		6,774	12,702	21,169	29,637	46,573	59,274	76,210	93,145	135,484	194,758	321,775
120		7,317	13,720	22,867	32,013	50,307	64,026	82,320	100,613	146,346	210,373	347,572
130		7,860	14,738	24,564	34,389	54,040	68,779	88,430	108,081	157,208	225,987	373,370
140		8,404	15,757	26,261	36,765	57,774	73,531	94,540	115,549	168,071	241,601	399,168
150		8,947	16,775	27,958	39,142	61,508	78,283	100,650	123,016	178,933	257,216	424,965
160		9,490	17,793	29,655	41,518	65,242	83,035	106,760	130,484	189,795	272,830	450,763
170		10,033	18,812	31,353	43,894	68,976	87,788	112,870	137,952	200,657	288,445	476,561
180		10,576	19,830	33,050	46,270	72,710	92,540	118,980	145,420	211,519	304,059	502,358
190		11,119	20,848	34,747	48,646	76,444	97,292	125,090	152,887	222,382	319,673	528,156
200		11,662	21,867	36,444	51,022	80,178	102,044	131,200	160,355	233,244	335,288	553,954
210		12,205	22,885	38,142	53,398	83,911	106,796	137,310	167,823	244,106	350,902	579,752
220		12,748	23,903	39,839	55,774	87,645	111,549	143,420	175,291	254,968	366,517	605,549
230		13,292	24,922	41,536	58,150	91,379	116,301	149,530	182,758	265,830	382,131	631,347
240		13,835	25,940	43,233	60,526	95,113	121,053	155,640	190,226	276,692	397,745	657,145
250		14,378	26,958	44,930	62,903	98,847	125,805	161,749	197,694	287,555	413,360	682,942
260		14,921	27,977	46,628	65,279	102,581	130,557	167,859	205,162	298,417	428,974	708,740
270		15,464	28,995	48,325	67,655	106,315	135,310	173,969	212,629	309,279	444,589	734,538
280		16,007	30,013	50,022	70,031	110,049	140,062	180,079	220,097	320,141	460,203	760,335
290		16,550	31,032	51,719	72,407	113,782	144,814	186,189	227,565	331,003	475,817	786,133

Contact Us

FMG Inc. 565 South Mason Rd., Suite #174,
Katy Texas 77450, USA
E: info@flowmetergroup.us, W: flowmetergroup.us



rev.000
Copyright © FMG Inc. 2019. All rights reserved
Subject to change without prior notice