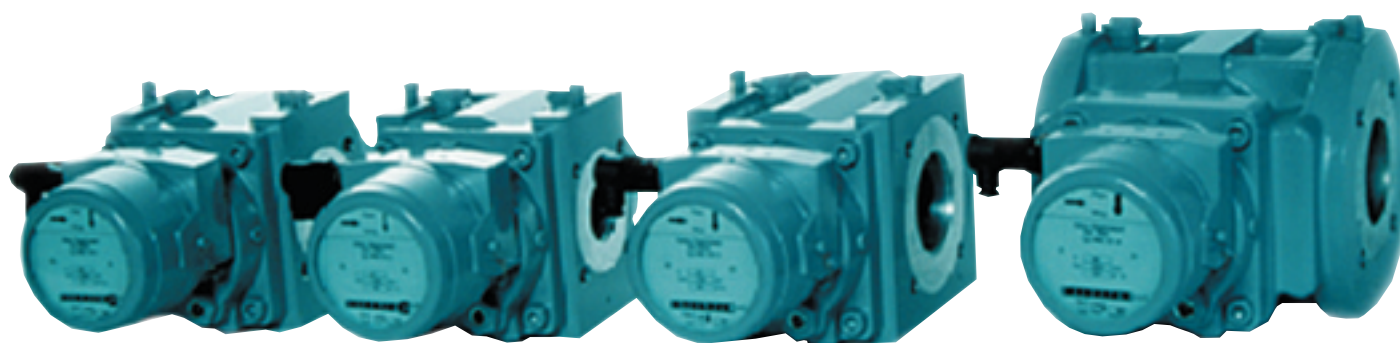


I Series Rotary Displacement Meters for Industrial/Commercial Applications



ALL the right tools, providing total solutions.



Metering Systems

Why Choose Invensys Metering Systems?

- Measurement and pressure regulation experts since 1886.
- Single source for total measurement and pressure regulation products and services.
- Worldwide network of knowledgeable sales and service representatives and distributors.
- Dedicated staff of technical service and training engineers who provide telephone and on-site support and training programs.
- A part of Invensys, the world's largest provider of automation and controls, which affords boundless presence and thinking.
- A member of the family of Invensys companies focused exclusively on intelligent controls systems, such as Foxboro, Nordstrom Valves, and Smith-Blair.



Why Choose a Rotary Meter?

- No flow straightening needed on upstream or downstream side.
- Handles vertical and horizontal flow directions.
- Double index at the mechanical totalizer for universal flow direction.
- Perfect for intermittent conditions.
- Large measuring rangeability.
- Compact housing.
- Easy installation and maintenance.



Why Choose an Invensys Metering Systems Rotary Meter?

- Design meets or exceeds all ANSI B109.3 and OIML-R-32 recommendations.
- Complies with ISO-9001 quality system.
- Five-year “bumper-to-bumper” warranty.
- Precision parts and fit increase rangeability and application flexibility.
- Aluminum construction creates a lightweight meter that installs easily in-line.
- Interconnected oil sumps allow faster, easier maintenance.
- End plate oil paths direct oil to impeller bearings for longer life.
- Non-lubricated totalizer reduces maintenance tasks.
- Multiple pulse outputs enable flexible configuration with LF outputs for remote totalization, rate indication, control, etc.
- Movable flow direction arrows make it easy to change meter orientation and flow direction.
- Visible flywheel through face plate window, indicating impeller rotation.
- Inlet and outlet taps for pressure and temperature measurement enable easy differential testing and accurate temperature measurement.
- Maintenance is easy with single-point lubrication and oil level indicator. In addition, the Meter’s two oil sumps, each lubricating the bearings at the impeller shaft ends, are interconnected, letting you check and add oil easily. Plus, the index components never need lubrication.
- You can change meter orientation and flow direction easily with the Meter’s rotatable flow direction arrows and unique dual indexes, and the meter still holds its proof. The indexes never need lubrication.



Index cover in place, with the flow arrows showing the horizontal and vertical directions of flow.



Index with its rotatable cover removed, showing the dual indexes.

Operating Principle – Rotary Displacement Meter

The measuring chambers of the I Series rotary displacement meter are formed by the meter body and the interlocking rotation of the two precision impellers, which are coupled by a pair of timing gears. During rotation, each impeller captures a known volume of gas and moves it from the meter inlet to the outlet:

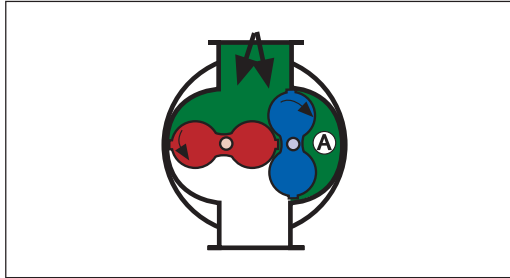


Figure 1: Starting position. The gas flow enters the meter, rotating the left impeller counterclockwise and the right impeller clockwise. Measuring chamber A has been filled with a known volume of gas.

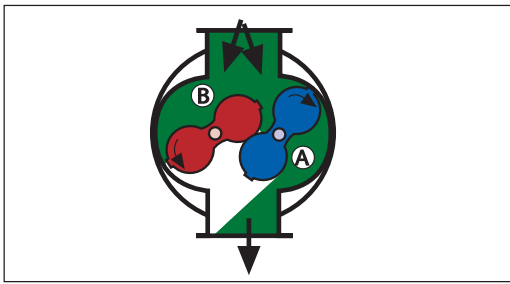


Figure 2: As the impellers rotate, measuring chamber A opens to the meter outlet, discharging its known volume of gas. Measuring chamber B starts to fill.

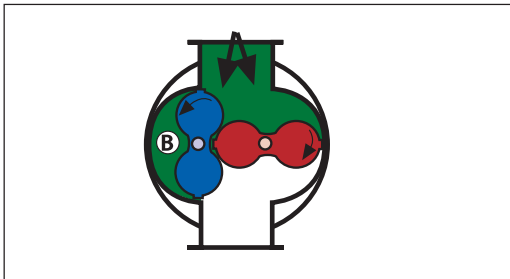


Figure 3: Measuring chamber B now has captured a known volume of gas.

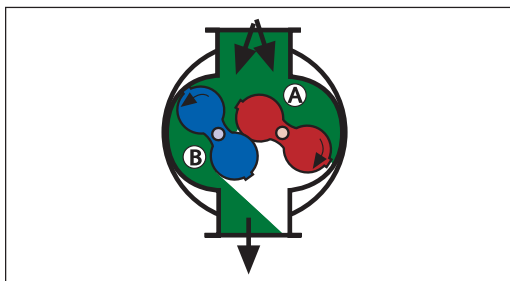


Figure 4: As the impellers continue to rotate, measuring chamber B opens to the meter outlet. Measuring chamber A starts to refill.

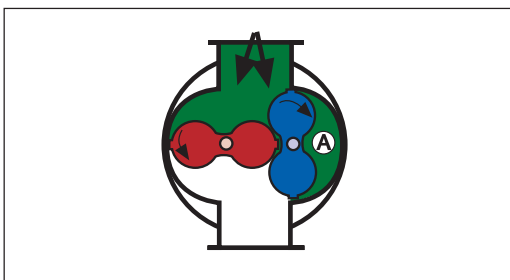


Figure 5: Each impeller has now made half a revolution. In a full revolution, four known volumes ($2A + 2B$) will be measured and counted. Rotation of the impellers is geared down and transferred via a magnetic coupling to a totalizer.

METER SIZING CHART

Sizing Instructions

If you are metering in imperial units (scfh), use the left side of the table. If using metric units (Nm³/h), use the right side of the table. Select the line pressure for your application. (Linear interpolation between the listed pressures can be used to determine the capacity at the exact pressure.) At the desired pressure, select the capacity that meets or exceeds the Qmax for the application. Select the model number by moving to the top of the table.

Determine the rangeability of the model by reviewing its specification on page 6. If your typical Qmin is within the rangeability of the meter selected, you can be assured of an accurate accountability of the total gas flow through the meter.

If it is anticipated that a large proportion of the volume of gas to be measured will be at low flow rates outside the acceptable accuracy limit of the meter, you may require a smaller I model or an alternative metering system. Call 1-800-375-8875 for additional application assistance.

Imperial Units (scfh)*					Metric Units (Nm ³ /h)**				
Model	I 2.3	I 3.5	I 5.6	I 8.8	Model	I 2.3	I 3.5	I 5.6	I 8.8
Base Flow Rate	2,300	3,500	5,600	8,800	Base Flow Rate	65,0	100,0	160,0	250,0
Corrected Flow Rates at Elevated Pressures									
Line Pressure (psig)					Line Pressure (kPa)				
1	2,420	3,680	5,890	9,250	7	68,3	105,1	168,2	262,8
5	3,040	4,630	7,410	11,640	34	86,0	132,3	211,7	330,8
10	3,820	5,820	9,310	14,630	69	108,1	166,3	266,1	415,8
25	6,180	9,400	15,040	23,640	172	174,6	268,6	429,8	671,5
50	10,110	15,380	24,610	38,680	345	285,7	439,5	703,2	1.098,8
60	11,680	17,780	28,450	44,700	414	330,2	508,0	812,8	1.270,0
75	14,040	21,390	34,220	53,780	517	397,2	611,1	977,8	1.527,8
100	18,020	37,420	43,880	68,950	689	509,3	783,5	1.253,6	1.958,8
125	22,000	33,480	53,560	84,170	862	621,7	956,5	1.530,4	2.391,3
150	25,990	39,550	63,280	99,440	103,4	734,5	1.130,0	1.808,0	2.825,0
175	30,460	46,360	74,180	116,570	120,7	862,8	1.312,9	2.100,7	3.301,1

Notes:

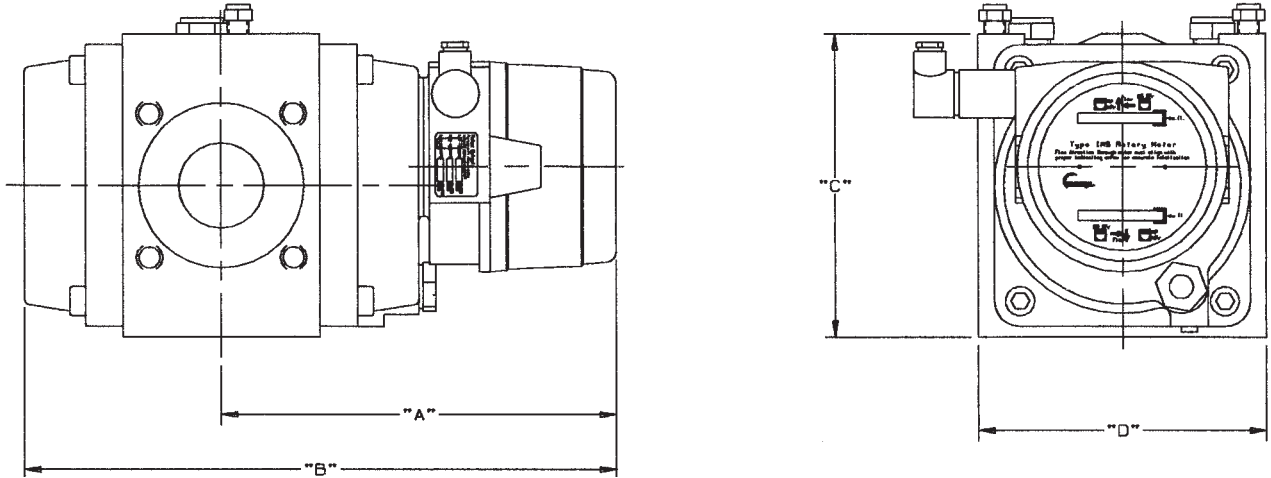
- * Imperial table is based on base conditions of Pb=14.73 psia, Tb=60° F, and average atmospheric pressure Pa=14.48 psia. Table incorporates effect of supercompressibility factor (Fpv) for 0.6 specific gravity natural gas at 60° F and 0% CO² and N² (per AGA Report No. 8).
- ** Metric table is based on base conditions of Pb=101.3 kPa, Tb=15° C, and average atmospheric pressure Pa=99.8 kPa. Table incorporates effect of supercompressibility factor (Fpv) for 0.6 specific gravity natural gas at 15.6° C and 0% CO² and N² (per AGA Report No. 8).

I Series Rotary Displacement Meters Specifications

Specification	Units	IMPERIAL				METRIC				
		I 2.3	I 3.5	I 5.6	I 8.8	Units	I 2.3	I 3.5	I 5.6	I 8.8
Base Rating (Qmax)	acfh	2300	3500	5600	8800	m ³ /h	65	100	160	250
Max. Operating Pressure	psig	175	175	175	175	kPa	1200	1200	1200	1200
Rangeability (± 1%)	none	50:1	65:1	80:1	100:1	none	50:1	65:1	80:1	100:1
Rangeability (± 2%)	none	100:1	160:1	160:1	160:1	none	100:1	160:1	160:1	160:1
Temperature Range	deg. F	-40° to +140°				deg. C	-40° to +60°			
Start Rate	acfh	<2.1	<2.1	<3.5	<5.6	m ³ /h	<0.06	<0.06	<0.10	<0.16
Stop Rate	acfh	<1.8	<1.8	<3.5	<5.6	m ³ /h	<0.05	<0.05	<0.10	<0.16
Pres. Differential (Qmax) Gas	inches w.c.	0.48	1.09	0.68	0.62	mbar	1.20	2.70	1.70	1.55
Flow Rate @ 1/2"										
w.c.(1.24 mbar), Gas	acfh	2300	2470	4830	7945	m ³ /h	65	70	136	225
Max. Pressurization Rate	psig/sec	5	5	5	5	kPa/sec	35	35	35	35
RPM @ Qmax	rpm	1625	2500	2500	2500	rpm	1625	2500	2500	2500
Over Range Capability*	% of Qmax	1.25	1.25	1.25	1.25	% of Qmax	1.25	1.25	1.25	1.25
Restricting Orifice (to 1.2 Qmax)	in.	0.48	0.60	0.76	0.95	mm	12.2	15.2	19.3	24.1
Displaced Volume/Rev.	cf/rev	0.024	0.024	0.038	0.059	m ³ /rev	0.0007	0.0007	0.0011	0.0017
Index Resolution	cf	0.02	0.02	0.02	0.2	m ³	0,002	0,002	0,02	0,02
Nominal Pipe Size	inches	2	2	3	3	mm	50	50	80	80
Flange Connection	ANSI	125	125	125	125	ANSI	125	125	125	125
Flange-to-Flange										
Dimension	inches	6¾	6¾	6¾	9½	mm	171	171	171	241
Bolts/Flange (ANSI/DIN)	quantity	4/4	4/4	4/8	4/8	quantity	4/4	4/4	4/8	4/8
Bolt Size		5/8 x 11 UNC					5/8 x 11 UNC			
Bolt Torque	ft-lb	59	59	59	59	N-m	80	80	80	80
Meter Oil Capacity–										
Vertical Flow	oz	9.1	9.1	9.1	9.1	ml	268	268	268	268
Meter Oil Capacity–										
Horizontal Flow	oz	1.5	1.5	1.5	1.5	ml	45	45	45	45
Net Weight – non-TC	lb	29	29	37	54	kg	13.1	13.1	16.8	24.5

*Meter safety factor allows occasional over-ranging for up to 30-minute periods without adverse affect on meter life.

DIMENSIONS



Model	A	B	C	D
I 2.3	9.11"	13.78"	7.09"	6.73"
I 3.5	9.11"	13.78"	7.09"	6.73"
I 5.6	10.49"	16.54"	7.09"	6.73"
I 8.8	12.62"	20.79"	8.46"	9.49"

SIMPLE TO INSTALL AND MAINTAIN

Please follow these basic guidelines when installing and maintaining I Series Meters:

- The meter is intended for indoor or outdoor installation and for use on clean gas.
- Vertical flow down arrangement is recommended, but vertical flow up and horizontal flow arrangements are acceptable.
- The flow axis of the meter must be within $\pm 1/16$ " of true vertical or horizontal.
- I Series meters are lightweight and can be mounted in-line without additional support.
- Interconnecting piping must not impose axial, radial, or torsional stress on the meter.
- Fill and check that the oil level is within the limits of the site glass. Change the oil every six years.

For complete safety, installation, and maintenance instructions, refer to publication MM-1040.

METER CONFIGURATION GUIDE

Instructions: Begin at Position A and select the meter model/size desired. Follow the vertical line up and enter the code selected in the corresponding entry at the top of the guide (refer to the example configuration shown below). Follow the same procedure for each succeeding step, choosing from boxes A-C to completely configure the meter.

METER CONFIGURATION

ABC
Meter Configuration Example
For I 3.5 with metric counter
and one low frequency output.

A. Meter Model/Size:		12.3	A1		
		13.5	A2		
		15.6	A3		
		18.8	A4		
B. Registration Units:		Imperial (cfh)	B1		
		Metric (M3/h)	B2		
C. Number of Low Frequency Pulse Outputs:		Zero	C0		
		One	C1		
		Two	C2		

Diagram showing the configuration code structure: A 3-digit code (e.g., A2 B2 C1) is formed by selecting options from the table. Vertical lines connect the selected options to their respective positions in the code.

Authorized Distributor:



Metering Systems

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Fax +1-814-375-8460
<http://www.energymetering.invensys.com>

LIMITED WARRANTY Seller warrants the Goods to be free from defects in materials manufactured by Seller and in Seller's workmanship for a period of **(five (5) year)** after tender of delivery (the "Warranty Period"). **THIS LIMITED WARRANTY (a) IS IN LIEU OF, AND SELLER DISCLAIMS AND EXCLUDES, ALL OTHER WARRANTIES, STATUTORY, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, OR OF CONFORMITY TO MODELS OR SAMPLES; (b)** does not apply to any Goods which have been (i) repaired, altered or improperly installed, (ii) subjected to improper use or storage; (iii) used or incorporated with other materials or equipment; after Buyer or anyone using the Goods has, or reasonably should have, knowledge of any defect or nonconformance of the Goods; or (iv) manufactured, fabricated or assembled by anyone other than the Seller; **(c)** shall not be effective unless Buyer notifies Seller in writing of any purported defect or nonconformance within **(thirty (30) days)** after Buyer discovers or should have reasonably discovered such purported defect or nonconformance; and (d) shall only extend to Buyer and not to any subsequent buyers or users of the Goods. Buyer shall provide Seller access to the Goods to which Buyer claims a purported defect or nonconformance; upon request by Seller, Buyer shall, at its own risk and expense, promptly return the Goods in question to Seller's Plant.