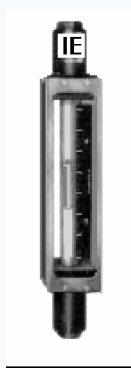


IE Glass Tube Variable Area Flow Meters

VARIABLE AREA FLOWMETERS – GLASS TUBE

Description

IE Glass Tube Variable Area Flow Meters are intended for general in line and bypass metering applications where operating conditions are within the limitations of glass metering tubes. A wide range of capacities and options is available. These packed gland meters are constructed to withstand the stresses and vibrations inherent in industrial piping installations.



IE GLASS TUBE VARIABLE AREA FLOW METERS

Design Features

- Dowel pin, side plate construction
- Detachable flow scales
- Precision bore ribbed borosilicate glass metering tubes
- Externally adjustable packing glands
- Connections can be rotated 360° at 90° intervals
- Laminated safety glass shielding
- 10 to 1 rangeability
- Scale length of 127 mm, 150 mm and 250 mm
- Standard floats are interchangeable in tubes of given flow meter size
- Wide choice of float types and capacity ranges

Specifications

WARNING: Do not operate this instrument in excess of the specifications listed below. Failure to heed warning may result in serious personal injury or damage to equipment. Glass metering tubes are designed for operation up to the maximum operating pressures and temperatures as specified herein. Due to the inherent brittle characteristics of glass and conditions beyond our control, breakage could result below specified operating conditions. Possible glass tube breakage represents a potential hazard to operating personnel; therefore, operator protection should be supplied where operating pressures may exceed 50 psig. A customer supplied safety shield constructed of 1/2- inch acrylic plastic may be used or the glass tube meter may be replaced with an all-metal meter.

Performance

Industrial Accuracy: +2% of full scale from 100% to 10% of scale reading. Calibrated Accuracy: +1% of full scale from 100% to 10% of scale reading. Repeatability: 0.5% of full scale

Table 1 - Pressure Ratings

Meter Size	Max. Operating Pressure (Kg/cm²g)
2	35.1
6	31.6
7	24.6
8	21.0
9	12.3
10	7.0
12	5
13	5

Table 2 - Connections

Meter Size	Model 1110 In & Out Horizontal (Screwed)	Model 1114 In & Out Vertical (Screwed)	Model 1140 In & Out Horizontal (Flanged)	Model 1144 In & Out Vertical (Flanged)
2 - 6	1/4"	1/4"	1/2"	1/2"
7 - 8	1/2"	1/2"	1/2"	1/2"
9	3/4"	3/4"	3/4"	3/4"
10	1"	1"	1"	1"
12	1-1/2"	1-1/2"	1-1/2"	1-1/2"
13	1-1/2"	2"	1-1/2"	2"

Pressure Drop

See Capacity Tables

Scales

Nominal lengths: 127mm, 150mm and 250 mm

Type: Standard: Detachable aluminium plate; Optional: Detachable 316 stainless steel plate

Graduations: Choice of direct reading, arbitrary millimetre or 0-100 linear with calibration curves or percentage of maximum flow with factor tag.

Materials of Construction

METERING TUBES

Borosilicate glass

FLOATS

Sizes 2-6: (Spherical) Tungsten Carbide, Glass or 316 Stainless Steel; Sizes 8-13: Standard: 316 Stainless Steel; Optional: Aluminium, Teflon or Hastelloy C

END FITTINGS

Steel, 316 stainless steel, hastelloy C, brass

PACKINGS

Standard: Neoprene; Optional: Viton, Teflon

O-RINGS

Standard: Neoprene; Optional: Viton, Teflon

SIDE PLATES

Standard: Steel; Optional: 316 Stainless Steel

GLAND RINGS

Standard: Steel; Optional: 316 Stainless Steel

WINDOW BEZELS

Standard: Aluminium; Optional: Stainless Steel

GLAND FOLLOWERS

Standard: Steel; Optional: 316 Stainless Steel

FASTNERS

304 Stainless Steel

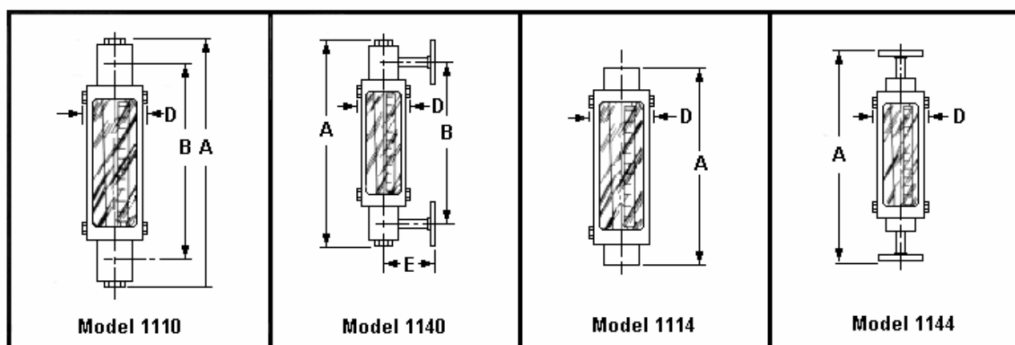
SIDE PLATE GASKETS

Asbestos

COATINGS (Optional)

Epoxy painting of external surfaces of end fittings, gland rings, gland followers and both surfaces of side plates. (Window frames, bolts and dowel pins not coated.)

Figure 1 – Dimensions in mm (for Certified Prints write to Factory)



Meter Size	Model 1110 & 1140						Model 1114		Model 1144		All Meters
	Nominal Scale Length						Nominal Scale Length		Nominal Scale Length		
	127 MM			250 MM			127 MM	250 MM	127 MM	250 MM	
	A	B	E	A	B	E	A	A	A	A	
2-6*	257.2	218.3	88.9	-	-	-	244.5	-	377.8	-	61.9
7&8	390.5	292.1	88.9	517.5	419.1	88.9	304.8	431.8	454	581	82.6
9	431.8	317.5	101.6	558.8	444.5	101.6	311.2	438.2	450.9	577.9	95.3
10	454	317.5	101.6	581	444.5	101.6	311.2	438.2	444.5	571.5	112.7
12	511.2	393.7	127	638.2	520.7	127	403.2	530.2	542.9	669.9	112.7
13	539.8	393.7	127	666.8	520.7	127	384.2	511.2	523.9	650.9	123.8

*Available in 150 MM scale length only and dimensions are identical to 127 MM meters.

Table 4 – Capacities (150mm Tubes)									Table 6 – Capacities (250mm Tubes Low Pressure Drop)									
Meter Size	Tube Number	Float Number	Maximum Flow Rates						Meter Size	Tube Number	Float Number	Float Material	Maximum Flow Rates					
			Water		Air	H ₂	He						Air	H ₂ O	ΔP			
			CCM	ΔP (iwc)				SLPM					SLPM	SLPM	SLPM	SLPM	(iwc)	
2	R-2-15-AAA	G2	0.54	0.1	0.049	0.102	0.0444	0.18	7	R-7M-25-1	SPO OL	Aluminum 316 SS	11.3	0.36	0.59			
		S2	2.49	0.58	0.146	0.322	0.144	0.67	8	R-8M-25-2	8-RV-2	Aluminum 316 SS	25.1	0.81	0.8			
		C2	4.9	1.16	0.245	0.594	0.268	1.24		R-8M-25-4		Aluminum 316 SS	44.6	1.44	1.61			
	R-2-15-AA	G2	1.11	0.1	0.096	0.209	0.0916	0.18		9	R-9M-25-1	SPO OL	Aluminum 316 SS	34.1	1.10	1.05		
		S2	4.93	0.58	0.265	0.631	0.293	0.67					Aluminum 316 SS	62.2	2.00	1.49		
		C2	9.33	1.16	0.43	1.12	0.533	1.24					Aluminum 316 SS	103.9	3.35	0.93		
	R-2-15-D	G2	5.75	0.1	0.37	1.03	0.491	0.18	10	R-10M-25-1	10-RV-15	Aluminum 316 SS	161.3	5.20	2.41			
		S2	20.6	0.58	0.82	2.52	1.39	0.67				Aluminum 316 SS	128.7	4.15	1			
		C2	33.2	1.16	1.22	3.88	2.28	1.24				Aluminum 316 SS	195.4	6.29	2.81			
	R-2-15-A	G2	18.3	0.1	0.95	2.63	1.54	0.18	12	R-12M-25-4	12-RV-65	Aluminum 316 SS	163.3	5.26	0.8			
		S2	52.1	0.58	1.9	5.57	3.42	0.67				Aluminum 316 SS	254.8	8.21	1.61			
		C2	81.8	1.16	2.8	8.2	5.16	1.24				Aluminum 316 SS	221.8	7.14	1.13			
	R-2-15-B	G2	52.8	0.1	2.35	8.01	5.02	0.18	13	R-13M-25-1	13-RV-168	Aluminum 316 SS	340.8	10.98	1.89			
		S2	133	0.58	4.6	15.9	10.3	0.67				Aluminum 316 SS	340.6	10.97	1.21			
		C2	199	1.16	6.6	22.9	14.9	1.24				Aluminum 316 SS	599.1	19.30	2.17			
	R-2-15-C	G2	84.6	0.1	3.8	12.9	8	0.18	13	R-13M-25-3	13-RV-168	Aluminum 316 SS	617.4	19.89	1.29			
		S2	218	0.58	7.6	26.1	16.7	0.67				Aluminum 316 SS	1087.7	35.03	2.57			
		C2	326	1.16	10.4	37.6	24.4	1.24				Aluminum 316 SS	700	22.55	1.81			
6	R-6-15-A	G6	200	0.2	8.6	29.9	19.2	0.36	13	R-13M-25-3	13-RV-168	Aluminum 316 SS	1310.3	42.20	3.72			
		S6	493	1.17	16.4	58.9	38.3	1.34				Aluminum 316 SS	1077	34.69	2.21			
		C6	726	2.32	23	83.3	55.2	2.49				Aluminum 316 SS	2091.1	67.35	4.9			
	R-6-15-B	G6	573	0.2	23.5	85.9	55.3	0.36				13	R-13M-25-3	13-RV-168	Aluminum 316 SS	1310.3	42.20	3.72
		S6	1350	1.17	43	160	109	1.34							Aluminum 316 SS	1077	34.69	2.21
		C6	1950	2.32	60	222	152	2.49							Aluminum 316 SS	2091.1	67.35	4.9

Table 5 Capacities (250mm Tubes)																						
Meter Size	Tube Number	Float Number	Maximum Flow Rates					Meter Size	Tube Number	Float Number	Maximum Flow Rates											
			Water			Air					Water			Air								
			LPM	ΔP (iwc)	VIS LIMIT	SLPM	ΔP (iwc)				LPM	ΔP (iwc)	VIS LIMIT	SLPM	ΔP (iwc)							
6	R-6M-25-1A	G6 S6	0.28 0.68	0.2 1.17	1 1	12.3 22.8	0.36 1.34	10	R-10M-25-1	10-RV-64 10-RV-138 ⁺ 10-RS-64 10-RS-138 ⁺ 10-LJ-238 ⁺	17.18 24.3 21.35 30.36 56.43	8 17 15 21 52	14 22 3.7 5 1	511.18 753.31 662.78 942.47 1752.15	9 19 17 23 59							
7	R-7M-25-1	G7 S7	0.58 1.48	- -	1 1	24 50	- -			R-10M-25-3	10-RV-64 10-RV-138 ⁺ 10-RS-64 10-RS-138 ⁺ 10-LJ-238 ⁺	23.77 33.46 29.67 41.37 87.43	11 23 15 29 98	15 23 3.7 5.5 1	729.52 1022.35 910.49 1284.44 2714.6	13 26 17 33 112						
8	R-8M-25-2	8-RV-3 8-RV-8 8-RV-14 8-RV-31 ⁺ 8-RS-8 8-RS-14 8-RS-31 ⁺ 8-LJ-48 ⁺	2.08 2.95 3.94 5.68 3.79 5 7.15 11.39	2 5 8 17 6 11 22 45	2 3.3 4.6 6 1.7 1.8 2.6 1	62.87 91.19 121.21 173.32 117.51 155.19 219.76 353.72	3 6 9 19 7 12 25 51				R-12M-25-4	12-RV-221 12-RV-343 ⁺ 12-RS-221 12-RS-343 ⁺ 12-LJ-740 ⁺	35.31 44.32 47.16 58.4 113.55	8 12 9 13 31	28 35 4 4.3 1	1070.78 1334.44 1434.41 1777.08 3491.86	9 14 10 15 36					
		R-8M-25-4	8-RV-3 8-RV-8 8-RV-14 8-RV-31 ⁺ 8-RS-8 8-RS-14 8-RS-31 ⁺ 8-LJ-48 ⁺	2.95 4.13 5.49 7.8 5.3 6.93 9.8 18.47	4 7 12 23 10 17 33 93	2 3.7 5.4 7 1.8 1.9 3.1 1	89.77 126.02 166.52 235.62 164.52 214.1 301.89 573.47					4 8 14 28 11 19 37 106	R-12M-25-5	12-RV-221 12-RV-343 ⁺ 12-RS-221 12-RS-343 ⁺ 12-LJ-740 ⁺	65.14 79.3 84.78 101.82 255.83	10 15 12 18 65	29 36 4.2 4.5 1	2022.44 2448.26 2601.19 3161.16 7944.05	11 17 14 20 75			
			9	R-9M-25-1	9-RV-33 9-RV-87 ⁺ 9-RS-33 9-RS-87 ⁺ 9-LJ-160 ⁺	7.19 11.66 9.54 15.29 26.04	5 12 7 14 31					10 15 2.4 3.4 1		223.28 355.7 296.23 476.91 808.5	6 14 8 16 35	R-13M-25-1	13-RV-510 13-RV-760 ⁺ 13-RS-510 13-RS-760 ⁺ 13-LJ-1394	75.47 90.05 101.78 120.55 206.66	12 18 15 21 46	40 50 7.3 9 1	2309.5 2718.72 3067.06 3709.92 -	14 20 17 24 -
					R-9M-25-3	9-RV-33 9-RV-87 ⁺ 9-RS-33 9-RS-87 ⁺ 9-LJ-160 ⁺	9.58 14.84 12.26 19.38 36.53		6 14 7 17 43			11 17 2.4 3.5 1		295.94 460.2 380.9 600.38 1134.02	7 16 8 20 49		R-13M-25-3	13-RV-510 13-RV-760 ⁺ 13-RS-510 13-RS-760 ⁺ 13-LJ-1394	120.29 142.32 153.29 187.55 373.2	17 24 23 32 92	42 52 6.6 9.3 1	3707.09 4395.27 4759.23 5822.89 -

* - These floats are not recommended for gas service unless operating pressure (downstream) exceeds 30 psig
 All gas flows are at 14.7 psia and 70°F

Table 7 - Capacities (127mm Tubes)								Table 8 - Capacities (127mm Tubes extension floats)								
Meter Size	Tube Number	Float Number	Maximum Flow Rate					Meter Size	Tube Number	Float Number	Maximum Flow Rates					
			Water			Air					Water			Air		
			LPM	DP IWC	VIS. LIMIT	SLPM	DP IWC				LPM	DP IWC	VIS. LIMIT	SLPM	DP IWC	
8	R-8M-127-1	8-RV-3	1.9	2	2	58.1	2	8	R-8M-127-1	8-EV-30	5.7	11	8.5	176.3	12.6	
		8-RV-8	2.8	3	3.3	85.2	4			8-EV-30	7.6	13	1.4	235	14.5	
		8-RV-14	3.6	6	4.6	111.9	6			8-EV-135*	12.1	46.7	13.8	376	52.5	
		8-RV-31*	5.2	11	6	158.6	13			8-ES-135*	15.1	52.9	2	470.1	64.9	
		8-RS-8	3.5	4	1.7	108	4		R-8M-127-4	8-EV-30	8.7	14	11.4	270.3	14.5	
		8-RS-14	4.6	6	1.8	142.5	7			8-ES-30	10.6	16	1.7	329	17.5	
		8-RS-31*	6.4	13	2.6	197.7	15			8-EV-135*	18.9	63.4	17.8	587.6	68	
		8-LJ-48*	9.8	22	1	304.2	25			8-ES-135*	21.6	66.4	2.5	669.8	75.2	
	R-8M-127-4	8-RV-3	2.7	2	2	83.3	2	9	R-9M-127-1	9-EV-60	10.6	8.1	12.8	329	9.5	
		8-RV-8	3.9	4	3.7	118.7	5			9-ES-60	14.4	9.1	2	446.6	10.6	
		8-RV-14	5.1	7	5.4	154.6	8			9-EV-190*	17	25	16.8	528.8	26.4	
		8-RV-31*	7	14	7	213.3	15			9-ES-190*	22.7	27.3	2.5	705.1	32.7	
		8-RS-8	4.9	5	1.8	152.7	6		R-10M-127-1	10-EV-100	22.7	10.2	19.5	705.1	12	
		8-RS-14	6.4	8	1.9	197.7	10			10-ES-100	28.4	12.4	2.8	881.4	14.3	
		8-RS-31*	8.7	16	3.1	267.6	18			10-EV-270*	34.1	25.5	24.5	1057.6	30.7	
		8-LJ-48*	16.7	35	1	512.6	40			10-ES-270*	49.2	31.1	3.8	1527.7	34.7	
9	R-9M-127-1	9-RV-33	6.4	4.6	10	198.2	6	10	R-10M-127-3	10-EV-100	30.3	13.2	23	940.1	15.3	
		9-RV-87*	10	11.5	15	310	13			10-ES-100	39.7	16.1	3.4	1233.9	17.3	
		9-RS-33	8.3	5.3	2.3	256.3	6			10-EV-270*	51.1	31.9	30	1586.5	35.7	
		9-RS-87*	13.1	13	3.4	406	15			10-ES-270*	68.1	38.2	4.4	2115.3	37.7	
		9-LJ-160*	22.4	26.6	1	694	31		R-12M-127-1	12-EV-285	41.6	9.9	27	1292.7	11.6	
R-10M-127-1	10-RV-64	16.2	7	14	502	8	12-ES-285			53	10.6	3.9	1645.2	12.6		
	10-RV-138*	22.5	14	22	697	16	12-EV-453*			56.8	15	32	1762.7	18.3		
	10-RS-64	20.4	8.4	3	634	10	12-ES-453*			75.7	17.3	4.7	2350.3	19.3		
	10-RS-138*	28.1	16.2	5	870	19	R-12M-127-3			12-EV-285	83.3	11.9	39	2585.3	14.2	
10-LJ-238*	51.7	36	1	1604	41	12-ES-285			106	17	44	3290.4	22.6			
R-10M-127-3	10-RV-64	22.8	9.2	15	689	11			12-EV-453*	113.6	13.9	5.8	3525.5	16.2		
	10-RV-138*	30.3	17.2	23	941	20			12-ES-453*	143.8	19	6.6	4465.6	24.6		
	10-RS-64	28.6	11.4	3.7	872.3	13		13	R-13M-127-1	13-EV-505	132.5	15.9	50	4113	17.9	
	10-RS-138*	37.6	21	5.5	1179	24	13-ES-505			170.3	19.9	7.2	5288.2	22.9		
10-LJ-238*	85.1	61	1	2640	70	13-EV-865*	174.1			23.1	59	5405.7	28.7			
12-RV-221	32.6	8	28	997.7	9	13-ES-865*	227.1			30.7	8.5	7050.9	33.7			
12	R-12M-127-1	12-RV-343*	40.7	12	35.5	1233.3	14	12	R-12M-127-1	12-EV-285	83.3	11.9	39	2585.3	14.2	
		12-RS-221	43.5	8	4	1333.9	10			12-ES-285	106	17	44	3290.4	22.6	
		12-RS-343*	52.9	13	4.3	1605.7	15			12-EV-453*	113.6	13.9	5.8	3525.5	16.2	
		12-LJ-740*	92	28	1	2826.3	32			12-ES-453*	143.8	19	6.6	4465.6	24.6	
	R-12M-127-3	12-RV-221	62.9	10	29	1915.9	11		R-13M-127-1	13-EV-505	132.5	15.9	50	4113	17.9	
		12-RV-343*	74.5	14	36	2274.1	17			13-ES-505	170.3	19.9	7.2	5288.2	22.9	
		12-RS-221	82.6	12	4.2	2540.3	13			13-EV-865*	174.1	23.1	59	5405.7	28.7	
		12-RS-343*	93.6	16	4.5	2883	19			13-ES-865*	227.1	30.7	8.5	7050.9	33.7	
12-LJ-740*	272.5	57	1	-	-											
13	R-13M-127-1	13-RV-510	73	12	40	2216	14		13	R-13M-127-1	13-EV-510	115.1	16	42	3540	18
		13-RV-760*	86.7	17	50	2628.1	20				13-RV-760*	132.1	22	52	4083.7	25
		13-RS-510	99.4	14	7.3	2982.1	16				13-RS-510	156.3	20	7.6	4853	23
		13-RS-760*	118.5	20	9	3571.2	23				13-RS-760*	176	27	9.3	5464	31
		13-LJ-1394*	179.6	38	1	-	-				13-LJ-1394*	355	70	1	-	-
	R-13M-127-3	13-RV-510	115.1	16	42	3540	18			R-13M-127-3	13-RV-510	115.1	16	42	3540	18
		13-RV-760*	132.1	22	52	4083.7	25				13-RV-760*	132.1	22	52	4083.7	25
		13-RS-510	156.3	20	7.6	4853	23				13-RS-510	156.3	20	7.6	4853	23

* - These floats are not recommended for gas service unless operating pressure (downstream) exceeds 30 psig
 All gas flows are at 14.7 psia and 70°F