Rotameters

Please see the following pages for more information on Variable Area Flow Meters

- Rib-guided or fluted metering tubes facilitate stable, accurate readings.
- Magnifier lens in front shield enhances reading resolution.
- Easy-to-install flow tubes.
- "Non-rotating" adapter feature glass flow tubes are prevented from turning during the tightening phase of the assembly procedure.

Stainless Steel 150mm Flow Meter

Single Tube Glass Flow Meters

Designed for low flow rates, these single tube flow meters are precision instruments embodying the inherent simplicity, versatility and economy of the classical variable area meter. They are particularly suitable for metering carrier gases in chromatography, in manufacturing processes, liquid and gas measurements in laboratories, pilot plants, flow and level indicating and controlling gases.

Shipped completely assembled, flow meters include standard mounting fittings in a choice of materials, side plates, thick protective front shield and back plate, with or without control valves.

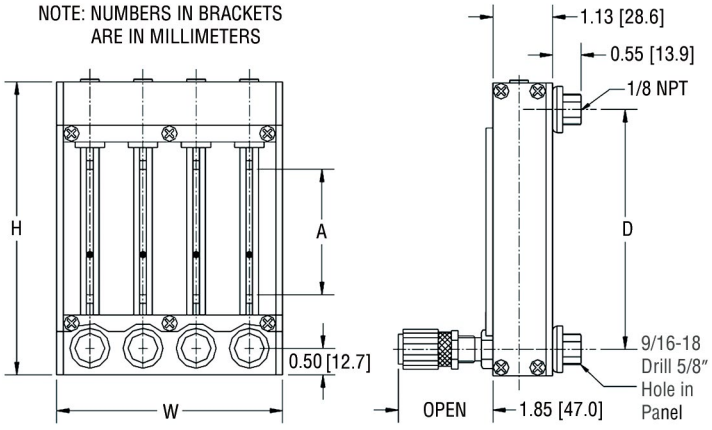
Single Tube PTFE Glass Flow Meters

The PTFE glass flow meter is designed for use with corrosive gases and liquids and for applications where contamination free flow passages are required. Fluids contact only PTFE, PCTFE and borosilicate glass.

The unique design combines the rigidity of an aluminum structural frame with the desirable chemical inertness of PTFE components. Uses standard 65mm and 150mm flow tubes. Meters are equipped with built-in PTFE needle valves with Kel-F® valve spindles. Valves may be positioned either at inlet or outlet side of flow meter.

65mm - 150mm PTFE Flow Meter

NOTE: NUMBERS IN BRACKETS ARE IN MILLIMETERS



DIMENSIONS FOR P STYLE METERS								
SCALE LENGTH (A)	ALL P METERS		WIDTH (W)					
	HEIGHT (H)	CENTER TO CENTER (D)	1 TUBE	2 TUBE	3 TUBE	4 TUBE	5 TUBE	6 TUBE
65mm	5.500	4.500	1.250	2.250	3.250	4.250	5.250	6.250
150mm	9.813	8.813	1.250	2.250	3.250	4.250	5.250	6.250

SPECIFICATIONS FOR SINGLE TUBE FLOW METERS

USEFUL FLOW RANGE: 10:1 minimum with one float and better than 20:1 with combination of two floats installed in meters.
STANDARD ACCURACY: ±2% of full scale (mm), 5% of full scale (direct reading).
CALIBRATED ACCURACY: ±1% of full scale.
REPEATABILITY: ±0.25%.
MAX. OPERATION PRESSURE: 200 psig/13.8 bars (PTFE 60 psig/4.13 bars).
MAX. OPERATION TEMPERATURE: 250 °F/121 °C (PTFE 150 °F/66 °C).
FLOW TUBES: Heavy walled borosilicate glass.
FLOATS: Glass, Sapphire, 316 Stainless Steel, Carboloy® and Tantalum.
CHOICE OF MOUNTING FITTINGS IN CONTACT WITH FLUIDS:
A) Aluminum, black anodized.
B) Brass, chrome plated.
C) 316 Stainless Steel.
SIDE PANELS: Aluminum, black anodized.
FRONT SHIELD: Lexan® with longitudinal magnifier lens for enhanced reading resolution.
BACK PLATE: 1/8" thick white acrylics.
O-RINGS AND PACKING: Buna-N® O-rings in aluminum/ brass model. FKM O-rings in stainless steel meters. ***OPTIONAL:*** FKM PTFE FFKM and EPR.
CONNECTIONS 1/8" NPT female inlet and outlet connections. ***OPTIONAL:*** 1/4" FNPT, hose and compression fittings are available.

⚠ *The selection of materials of construction, is the responsibility of the customer. The company accepts no liability.*

- Interchangeability of flow tubes and floats. Assorted flow tubes may be used in conjunction with a single mounting frame.
- Simple panel mounting - convertible to bench mounting through use of an optional acrylic tripod base with built-in spirit leveler and leveling screws.

OPTIGRAD™ scales minimize parallax and eye fatigue.

For Accessories See Below

Calibrations for other fluids available.

Tripod Base available!

Multi-tube Flow Meters also Available!

TABLE 16, STANDARD **65MM** FLOW METERS **WITHOUT** VALVES

MAXIMUM FLOW RATE					FRAME MATERIAL		
AIR		WATER		FLOAT MATERIAL	ALUMINUM	BRASS	STAINLESS STEEL
mL/min	scfh	mL/min	gph		MODEL NO.	MODEL NO.	MODEL NO.
5.8	0.013	N/A		Glass	6AP0101N6	6AP1101N6	6AP2101N6
9	0.017			Sapphire	6AP0102N6	6AP1102N6	6AP2102N6
19	0.036			316 S.S.	6AP0103N6	6AP1103N6	6AP2103N6
33	0.070			Carboloy®	6AP0104N6	6AP1104N6	6AP2104N6
49	0.104	0.55	0.009	Glass	6AP0105N6	6AP1105N6	6AP2105N6
74	0.153	0.98	0.016	Sapphire	6AP0106N6	6AP1106N6	6AP2106N6
145	0.307	2.38	0.038	316 S.S.	6AP0107N6	6AP1107N6	6AP2107N6
246	0.528	4.60	0.073	Carboloy®	6AP0108N6	6AP1108N6	6AP2108N6
107	0.22	1.24	0.019	Glass	6AP0109N6	6AP1109N6	6AP2109N6
167	0.35	2.47	0.039	Sapphire	6AP0110N6	6AP1110N6	6AP2110N6
314	0.66	5.75	0.091	316 S.S.	6AP0111N6	6AP1111N6	6AP2111N6
517	1.09	10.58	0.160	Carboloy®	6AP0112N6	6AP1112N6	6AP2112N6
216	0.46	2.8	0.045	Glass	6AP0113N6	6AP1113N6	6AP2113N6
320	0.68	5.3	0.079	Sapphire	6AP0114N6	6AP1114N6	6AP2114N6
538	1.14	11.2	0.170	316 S.S.	6AP0115N6	6AP1115N6	6AP2115N6
826	1.75	19.5	0.302	Carboloy®	6AP0116N6	6AP1116N6	6AP2116N6
1036	2.20	20	0.327	Glass	6AP0117N6	6AP1117N6	6AP2117N6
1383	2.93	33	0.523	Sapphire	6AP0118N6	6AP1118N6	6AP2118N6
2088	4.42	57	0.903	316 S.S.	6AP0119N6	6AP1119N6	6AP2119N6
3007	6.37	89	1.410	Carboloy®	6AP0120N6	6AP1120N6	6AP2120N6
1249	2.65	25	0.396	Glass	6AP0121N6	6AP1121N6	6AP2121N6
1623	3.44	36.7	0.581	Sapphire	6AP0122N6	6AP1122N6	6AP2122N6
2520	5.34	70.7	1.121	316 S.S.	6AP0123N6	6AP1123N6	6AP2123N6
3680	7.80	103.5	1.641	Carboloy®	6AP0124N6	6AP1124N6	6AP2124N6
2030	4.3	39.5	0.61	Glass	6AP0125N6	6AP1125N6	6AP2125N6
2655	5.62	63.2	0.99	Sapphire	6AP0126N6	6AP1126N6	6AP2126N6
4041	8.56	111.7	1.75	316 S.S.	6AP0127N6	6AP1127N6	6AP2127N6
5769	12.22	172	2.72	Carboloy®	6AP0128N6	6AP1128N6	6AP2128N6
2522	5.35	54.7	0.86	Glass	6AP0129N6	6AP1129N6	6AP2129N6
4917	10.42	143	2.26	316 S.S.	6AP0130N6	6AP1130N6	6AP2130N6
6318	13.4	147	2.33	Glass	6AP0131N6	6AP1131N6	6AP2131N6
8145	17.3	217	3.44	Sapphire	6AP0132N6	6AP1132N6	6AP2132N6
12058	25.5	364	5.77	316 S.S.	6AP0133N6	6AP1133N6	6AP2133N6
16943	35.9	540	8.56	Carboloy®	6AP0134N6	6AP1134N6	6AP2134N6
12860	27.2	307	4.86	Glass	6AP0135N6	6AP1135N6	6AP2135N6
16617	35.2	449	7.11	Sapphire	6AP0136N6	6AP1136N6	6AP2136N6
24452	51.8	723	11.46	316 S.S.	6AP0137N6	6AP1137N6	6AP2137N6
34507	73.1	1049	16.63	Carboloy®	6AP0138N6	6AP1138N6	6AP2138N6
21969	46.5	550	8.71	Glass	6AP0139N6	6AP1139N6	6AP2139N6
28518	60.4	811	12.85	Sapphire	6AP0140N6	6AP1140N6	6AP2140N6
41289	87.4	1297	20.56	316 S.S.	6AP0141N6	6AP1141N6	6AP2141N6
58348	123.6	1895	30.04	Carboloy®	6AP0142N6	6AP1142N6	6AP2142N6

Aluminum 65mm Flow Meter without valve

For Materials of Construction see page 15

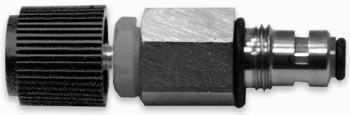
ACCESSORIES FOR 65MM AND 150MM FLOW METERS

Tripod Base with built-in spirit leveler and leveling screws (fits all standard and PTFE flow meters.) 600999

Rotameters

Multi-tube Flow Meters also Available!

The simple construction of CV™ valves incorporate a Valve Spindle with conical ends and compound angles for optimal resolution.



CV™ Valve Cartridge

CV™ Valve Cartridges are designed for adjusting flow rates in applications where high resolution metering regulation is not essential.

The VALVE NEEDLE turns as it travels into or out of the VALVE ORIFICE. In conjunction with the cylindrical cross section, the conical front tip of the VALVE SPINDLE increases or decreases the annular flow area. The cartridge serves as a bubble-tight "shut-off" valve when the tip of the VALVE SPINDLE comes into a stop position against the VALVE ORIFICE.

TABLE 17, CV™ VALVE FLOW CAPACITIES 10 PSIG (69KPA) INLET PRESSURE, ATMOSPHERIC EXHAUST

MODEL NO.	AIR std. mL/min	WATER std. mL/min	ORIFICE [IN]	CV
CVL	5000	350	0.052	0.03
CVM	20000	1200	0.082	0.10
CVH	60000	3500	0.120	0.30

For Materials of Construction see page 15

Available in three ranges, CV™ valves represent a relatively inexpensive option.

Tripod Base Available! See Bottom of Page 16 & 19

Calibrations for other gases available.

Aluminum 65mm Flow Meter with CV™ Valve

TABLE 17-1, STANDARD 65MM FLOW METERS **WITH CARTRIDGE VALVE [CV™]**

MAXIMUM FLOW RATE					FRAME MATERIAL		
AIR		WATER		FLOAT MATERIAL	ALUMINUM	BRASS	STAINLESS STEEL
mL/min	scfh	mL/min	gph		MODEL NO.	MODEL NO.	MODEL NO.
5.8	0.013	N/A		Glass	6AP0101C6	6AP1101C6	6AP2101C6
9	0.017			Sapphire	6AP0102C6	6AP1102C6	6AP2102C6
19	0.036			316 S.S.	6AP0103C6	6AP1103C6	6AP2103C6
33	0.070			Carboloy®	6AP0104C6	6AP1104C6	6AP2104C6
49	0.104	0.55	0.009	Glass	6AP0105C6	6AP1105C6	6AP2105C6
74	0.153	0.98	0.016	Sapphire	6AP0106C6	6AP1106C6	6AP2106C6
145	0.307	2.38	0.038	316 S.S.	6AP0107C6	6AP1107C6	6AP2107C6
246	0.528	4.60	0.073	Carboloy®	6AP0108C6	6AP1108C6	6AP2108C6
107	0.22	1.24	0.019	Glass	6AP0109C6	6AP1109C6	6AP2109C6
167	0.35	2.47	0.039	Sapphire	6AP0110C6	6AP1110C6	6AP2110C6
314	0.66	5.75	0.091	316 S.S.	6AP0111C6	6AP1111C6	6AP2111C6
517	1.09	10.58	0.160	Carboloy®	6AP0112C6	6AP1112C6	6AP2112C6
216	0.46	2.8	0.045	Glass	6AP0113C6	6AP1113C6	6AP2113C6
320	0.68	5.3	0.079	Sapphire	6AP0114C6	6AP1114C6	6AP2114C6
538	1.14	11.2	0.170	316 S.S.	6AP0115C6	6AP1115C6	6AP2115C6
826	1.75	19.5	0.302	Carboloy®	6AP0116C6	6AP1116C6	6AP2116C6
1036	2.20	20	0.327	Glass	6AP0117C6	6AP1117C6	6AP2117C6
1383	2.93	33	0.523	Sapphire	6AP0118C6	6AP1118C6	6AP2118C6
2088	4.42	57	0.903	316 S.S.	6AP0119C6	6AP1119C6	6AP2119C6
3007	6.37	89	1.410	Carboloy®	6AP0120C6	6AP1120C6	6AP2120C6
1249	2.65	25	0.396	Glass	6AP0121C6	6AP1121C6	6AP2121C6
1623	3.44	36.7	0.581	Sapphire	6AP0122C6	6AP1122C6	6AP2122C6
2520	5.34	70.7	1.121	316 S.S.	6AP0123C6	6AP1123C6	6AP2123C6
3680	7.80	103.5	1.641	Carboloy®	6AP0124C6	6AP1124C6	6AP2124C6
2030	4.3	39.5	0.61	Glass	6AP0125C6	6AP1125C6	6AP2125C6
2655	5.62	63.2	0.99	Sapphire	6AP0126C6	6AP1126C6	6AP2126C6
4041	8.56	111.7	1.75	316 S.S.	6AP0127C6	6AP1127C6	6AP2127C6
5769	12.22	172	2.72	Carboloy®	6AP0128C6	6AP1128C6	6AP2128C6
2522	5.35	54.7	0.86	Glass	6AP0129C6	6AP1129C6	6AP2129C6
4917	10.42	143	2.26	316 S.S.	6AP0130C6	6AP1130C6	6AP2130C6
6318	13.4	147	2.33	Glass	6AP0131C6	6AP1131C6	6AP2131C6
8145	17.3	217	3.44	Sapphire	6AP0132C6	6AP1132C6	6AP2132C6
12058	25.5	364	5.77	316 S.S.	6AP0133C6	6AP1133C6	6AP2133C6
16943	35.9	540	8.56	Carboloy®	6AP0134C6	6AP1134C6	6AP2134C6
12860	27.2	307	4.86	Glass	6AP0135C6	6AP1135C6	6AP2135C6
16617	35.2	449	7.11	Sapphire	6AP0136C6	6AP1136C6	6AP2136C6
24452	51.8	723	11.46	316 S.S.	6AP0137C6	6AP1137C6	6AP2137C6
34507	73.1	1049	16.63	Carboloy®	6AP0138C6	6AP1138C6	6AP2138C6
21969	46.5	550	8.71	Glass	6AP0139C6	6AP1139C6	6AP2139C6
28518	60.4	811	12.85	Sapphire	6AP0140C6	6AP1140C6	6AP2140C6
41289	87.4	1297	20.56	316 S.S.	6AP0141C6	6AP1141C6	6AP2141C6
58348	123.6	1895	30.04	Carboloy®	6AP0142C6	6AP1142C6	6AP2142C6

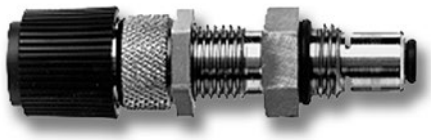
Multi-tube Flow Meters also Available!

TABLE 18, MFV™ VALVE FLOW CAPACITIES 10 PSIG (0.7 KG/CM²) INLET PRESSURE, ATMOSPHERIC EXHAUST						
ORIFICE NUMBER	AIR		HELIUM		WATER	
	std. mL/min	scfh	std. mL/min	scfh	std. mL/min	scfh
1	200	0.42	400	0.85	6	0.095
2	400	0.85	850	1.80	12	0.190
3	1000	2.12	1800	3.81	26	0.412
4	2500	4.87	6000	12.71	80	1.268
5	6200	13.14	16000	33.90	200	3.170
6	21500	45.55	55000	116.55	650	10.303

Tripod Base Available! See Bottom of Page 16 & 19

For Materials of Construction see page 15

MFV™ flow capacities are offered to be matched with individual flow meter ranges



MFV™ Valve Cartridge

TABLE 18-1, STANDARD 65MM FLOW METERS **WITH HIGH PRECISION VALVE [MFV]**							
MAXIMUM FLOW RATE					FRAME MATERIAL		
AIR		WATER		FLOAT MATERIAL	ALUMINUM	BRASS	STAINLESS STEEL
mL/min	scfh	mL/min	gph		MODEL NO.	MODEL NO.	MODEL NO.
5.8	0.013	N/A		Glass	6AP0101M6	6AP1101M6	6AP2101M6
9	0.017			Sapphire	6AP0102M6	6AP1102M6	6AP2102M6
19	0.036			316 S.S.	6AP0103M6	6AP1103M6	6AP2103M6
33	0.070			Carboloy®	6AP0104M6	6AP1104M6	6AP2104M6
49	0.104	0.55	0.009	Glass	6AP0105M6	6AP1105M6	6AP2105M6
74	0.153	0.98	0.016	Sapphire	6AP0106M6	6AP1106M6	6AP2106M6
145	0.307	2.38	0.038	316 S.S.	6AP0107M6	6AP1107M6	6AP2107M6
246	0.528	4.60	0.073	Carboloy®	6AP0108M6	6AP1108M6	6AP2108M6
107	0.22	1.24	0.019	Glass	6AP0109M6	6AP1109M6	6AP2109M6
167	0.35	2.47	0.039	Sapphire	6AP0110M6	6AP1110M6	6AP2110M6
314	0.66	5.75	0.091	316 S.S.	6AP0111M6	6AP1111M6	6AP2111M6
517	1.09	10.58	0.160	Carboloy®	6AP0112M6	6AP1112M6	6AP2112M6
216	0.46	2.8	0.045	Glass	6AP0113M6	6AP1113M6	6AP2113M6
320	0.68	5.3	0.079	Sapphire	6AP0114M6	6AP1114M6	6AP2114M6
538	1.14	11.2	0.170	316 S.S.	6AP0115M6	6AP1115M6	6AP2115M6
826	1.75	19.5	0.302	Carboloy®	6AP0116M6	6AP1116M6	6AP2116M6
1036	2.20	20	0.327	Glass	6AP0117M6	6AP1117M6	6AP2117M6
1383	2.93	33	0.523	Sapphire	6AP0118M6	6AP1118M6	6AP2118M6
2088	4.42	57	0.903	316 S.S.	6AP0119M6	6AP1119M6	6AP2119M6
3007	6.37	89	1.410	Carboloy®	6AP0120M6	6AP1120M6	6AP2120M6
1249	2.65	25	0.396	Glass	6AP0121M6	6AP1121M6	6AP2121M6
1623	3.44	36.7	0.581	Sapphire	6AP0122M6	6AP1122M6	6AP2122M6
2520	5.34	70.7	1.121	316 S.S.	6AP0123M6	6AP1123M6	6AP2123M6
3680	7.80	103.5	1.641	Carboloy®	6AP0124M6	6AP1124M6	6AP2124M6
2030	4.3	39.5	0.61	Glass	6AP0125M6	6AP1125M6	6AP2125M6
2655	5.62	63.2	0.99	Sapphire	6AP0126M6	6AP1126M6	6AP2126M6
4041	8.56	111.7	1.75	316 S.S.	6AP0127M6	6AP1127M6	6AP2127M6
5769	12.22	172	2.72	Carboloy®	6AP0128M6	6AP1128M6	6AP2128M6
2522	5.35	54.7	0.86	Glass	6AP0129M6	6AP1129M6	6AP2129M6
4917	10.42	143	2.26	316 S.S.	6AP0130M6	6AP1130M6	6AP2130M6
6318	13.4	147	2.33	Glass	6AP0131M6	6AP1131M6	6AP2131M6
8145	17.3	217	3.44	Sapphire	6AP0132M6	6AP1132M6	6AP2132M6
12058	25.5	364	5.77	316 S.S.	6AP0133M6	6AP1133M6	6AP2133M6
16943	35.9	540	8.56	Carboloy®	6AP0134M6	6AP1134M6	6AP2134M6
12860	27.2	307	4.86	Glass	6AP0135M6	6AP1135M6	6AP2135M6
16617	35.2	449	7.11	Sapphire	6AP0136M6	6AP1136M6	6AP2136M6
24452	51.8	723	11.46	316 S.S.	6AP0137M6	6AP1137M6	6AP2137C6
34507	73.1	1049	16.63	Carboloy®	6AP0138C6	6AP1138M6	6AP2138M6
21969	46.5	550	8.71	Glass	6AP0139M6	6AP1139M6	6AP2139M6
28518	60.4	811	12.85	Sapphire	6AP0140M6	6AP1140M6	6AP2140M6
41289	87.4	1297	20.56	316 S.S.	6AP0141M6	6AP1141M6	6AP2141M6
58348	123.6	1895	30.04	Carboloy®	6AP0142M6	6AP1142M6	6AP2142M6

Meters are available with built-in high precision metering valves (MFV) with "non-rising stems". The higher cost of MFV valves is justified whenever high sensitivity control and resolution are desirable, particularly in conjunction with metering tubes of very low flow rates. Generally, for gas metering it is recommended that valves are positioned at inlets (bottom). For liquids, valves may be positioned either at inlets or outlets (top). For vacuum services, valves must be mounted at outlets. If unspecified at time of ordering, meters will be shipped with valves mounted at the inlets.

Calibrations for other gases available.

Aluminum 65mm Flow Meter with MFV valve

Multi-tube Flow Meters also Available!

Calibrations for other gases available.

Stainless Steel 150mm Flow Meter without valve

Tripod Base available! For Accessories See Below

- Interchangeability of flow tubes and floats. Assorted flow tubes may be used in conjunction with a single mounting frame.
- Simple panel mounting - convertible to bench mounting through use of an optional acrylic tripod base with built-in spirit leveler and leveling screws.
- OPTIGRAD™ scales minimize parallax and eye fatigue.

TABLE 19, STANDARD 150MM FLOW METERS **WITHOUT VALVES**

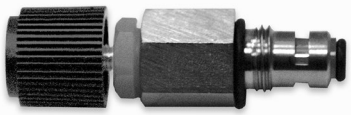
MAXIMUM FLOW RATE				FLOAT MATERIAL	FRAME MATERIAL FLOW TUBE		
AIR		WATER			ALUMINUM	BRASS	STAINLESS STEEL
mL/min	scfh	mL/min	gph		MODEL NO.	MODEL NO.	MODEL NO.
11.6	0.024	N/A		Glass	6AP0101N1	6AP1101N1	6AP2101N1
18.3	0.038			Sapphire	6AP0102N1	6AP1102N1	6AP2102N1
34	0.07			316 S.S.	6AP0103N1	6AP1103N1	6AP2103N1
62.8	0.13			Carboloy®	6AP0104N1	6AP1104N1	6AP2104N1
46.6	0.098	0.50	0.007	Glass	6AP0105N1	6AP1105N1	6AP2105N1
73.1	0.154	0.99	0.015	Sapphire	6AP0106N1	6AP1106N1	6AP2106N1
138.3	0.293	2.36	0.037	316 S.S.	6AP0107N1	6AP1107N1	6AP2107N1
239.1	0.506	4.60	0.072	Carboloy®	6AP0108N1	6AP1108N1	6AP2108N1
91.6	0.194	1.13	0.020	Glass	6AP0109N1	6AP1109N1	6AP2109N1
144.3	0.306	2.19	0.035	Sapphire	6AP0110N1	6AP1110N1	6AP2110N1
262.2	0.556	4.97	0.079	316 S.S.	6AP0111N1	6AP1111N1	6AP2111N1
431.7	0.915	9.23	0.146	Carboloy®	6AP0112N1	6AP1112N1	6AP2112N1
370.6	0.784	5.71	0.090	Glass	6AP0113N1	6AP1113N1	6AP2113N1
513.3	1.087	10.00	0.158	Sapphire	6AP0114N1	6AP1114N1	6AP2114N1
816.0	1.729	19.2	0.301	316 S.S.	6AP0115N1	6AP1115N1	6AP2115N1
1216.9	2.579	31.6	0.500	Carboloy®	6AP0116N1	6AP1116N1	6AP2116N1
817	1.731	15.2	0.240	Glass	6AP0117N1	6AP1117N1	6AP2117N1
1093	2.316	24.9	0.394	Sapphire	6AP0118N1	6AP1118N1	6AP2118N1
1665	3.528	44.3	0.702	316 S.S.	6AP0119N1	6AP1119N1	6AP2119N1
2405	5.096	69.0	1.094	Carboloy®	6AP0120N1	6AP1120N1	6AP2120N1
2214	4.690	49.9	0.792	Glass	6AP0121N1	6AP1121N1	6AP2121N1
2975	6.300	77.7	1.234	Sapphire	6AP0122N1	6AP1122N1	6AP2122N1
4494	9.520	132.5	2.092	316 S.S.	6AP0123N1	6AP1123N1	6AP2123N1
6467	13.70	203.2	3.218	Carboloy®	6AP0124N1	6AP1124N1	6AP2124N1
3780	8.00	89	1.411	Glass	6AP0125N1	6AP1125N1	6AP2125N1
4942	10.47	134	2.124	Sapphire	6AP0126N1	6AP1126N1	6AP2126N1
7720	16.35	226	3.582	316 S.S.	6AP0127N1	6AP1127N1	6AP2127N1
10780	22.84	343	5.437	Carboloy®	6AP0128N1	6AP1128N1	6AP2128N1
8555	18.12	200	3.170	Glass	6AP0129N1	6AP1129N1	6AP2129N1
11140	23.60	301	4.771	Sapphire	6AP0130N1	6AP1130N1	6AP2130N1
16493	34.94	498	7.893	316 S.S.	6AP0131N1	6AP1131N1	6AP2131N1
23001	48.73	736	11.67	Carboloy®	6AP0132N1	6AP1132N1	6AP2132N1
23105	48.95	579	9.177	Glass	6AP0133N1	6AP1133N1	6AP2133N1
29410	62.30	833	13.2	Sapphire	6AP0134N1	6AP1134N1	6AP2134N1
42860	90.80	1339	21.22	316 S.S.	6AP0135N1	6AP1135N1	6AP2135N1
60212	127.5	1972	31.26	Carboloy®	6AP0136N1	6AP1136N1	6AP2136N1

For Materials of Construction see page 15

ACCESSORIES FOR 65MM AND 150MM FLOW METERS

Tripod Base with built-in spirit leveler and leveling screws (fits all standard and PTFE flow meters.) 600999

Multi-tube Flow Meters also Available!



CV™ Valve Cartridge

Available in three ranges, CV™ valves represent a relatively inexpensive option

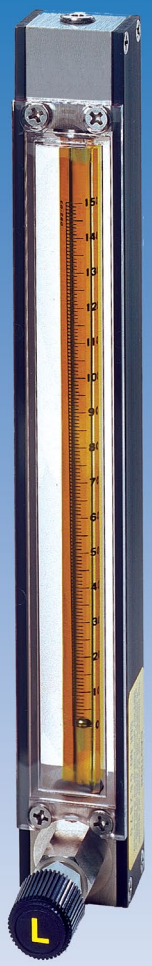
TABLE 20, CV™ VALVE FLOW CAPACITIES 10 PSIG (69KPA) INLET PRESSURE, ATMOSPHERIC EXHAUST				
MODEL NO.	AIR	WATER	ORIFICE [IN]	CV
	std. mL/min	std. mL/min		
CVL	5000	350	0.052	0.03
CVM	20000	1200	0.082	0.10
CVH	60000	3500	0.120	0.30

Tripod Base Available! See Bottom of Page 16 & 19

CV™ Valve Cartridges are designed for adjusting flow rates in applications where high resolution metering regulation is not essential.

The simple construction of CV™ valves incorporate a Valve Spindle with conical ends and compound angles for optimal resolution. The VALVE NEEDLE turns as it travels into or out of the VALVE ORIFICE. In conjunction with the cylindrical cross section, the conical front tip of the VALVE SPINDLE increases or decreases the annular flow area. The cartridge serves as a bubble-tight "shut-off" valve when the tip of the VALVE SPINDLE comes into a stop position against the VALVE ORIFICE.

Calibrations for other gases available



Brass 150mm Flow Meter with CV™ valve

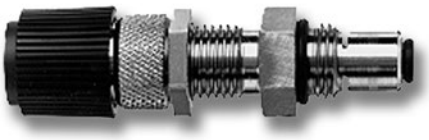
TABLE 20-1, STANDARD 150MM FLOW METERS WITH CARTRIDGE VALVE [CV™]							
MAXIMUM FLOW RATE					FRAME MATERIAL FLOW TUBE		
AIR		WATER		FLOAT MATERIAL	ALUMINUM	BRASS	STAINLESS STEEL
mL/min	scfh	mL/min	gph		MODEL NO.	MODEL NO.	MODEL NO.
11.6	0.024	N/A		Glass	6AP0101C1	6AP1101C1	6AP2101C1
18.3	0.038			Sapphire	6AP0102C1	6AP1102C1	6AP2102C1
34	0.07			316 S.S.	6AP0103C1	6AP1103C1	6AP2103C1
62.8	0.13			Carboloy®	6AP0104C1	6AP1104C1	6AP2104C1
46.6	0.098	0.50	0.007	Glass	6AP0105C1	6AP1105C1	6AP2105C1
73.1	0.154	0.99	0.015	Sapphire	6AP0106C1	6AP1106C1	6AP2106C1
138.3	0.293	2.36	0.037	316 S.S.	6AP0107C1	6AP1107C1	6AP2107C1
239.1	0.506	4.60	0.072	Carboloy®	6AP0108C1	6AP1108C1	6AP2108C1
92	0.195	0.9	0.013	Glass	6AP0109C1	6AP1109C1	6AP2109C1
141	0.297	1.9	0.030	Sapphire	6AP0110C1	6AP1110C1	6AP2110C1
264	0.559	4.7	0.075	316 S.S.	6AP0111C1	6AP1111C1	6AP2111C1
444	0.962	8.5	0.135	Carboloy®	6AP0112C1	6AP1112C1	6AP2112C1
370.6	0.784	5.71	0.090	Glass	6AP0113C1	6AP1113C1	6AP2113C1
513.3	1.087	10.00	0.158	Sapphire	6AP0114C1	6AP1114C1	6AP2114C1
816.0	1.729	19.2	0.301	316 S.S.	6AP0115C1	6AP1115C1	6AP2115C1
1216.9	2.579	31.6	0.500	Carboloy®	6AP0116C1	6AP1116C1	6AP2116C1
817	1.731	15.2	0.240	Glass	6AP0117C1	6AP1117C1	6AP2117C1
1093	2.316	24.9	0.394	Sapphire	6AP0118C1	6AP1118C1	6AP2118C1
1665	3.528	44.3	0.702	316 S.S.	6AP0119C1	6AP1119C1	6AP2119C1
2405	5.096	69.0	1.094	Carboloy®	6AP0120C1	6AP1120C1	6AP2120C1
2214	4.690	49.9	0.792	Glass	6AP0121C1	6AP1121C1	6AP2121C1
2975	6.300	77.7	1.234	Sapphire	6AP0122C1	6AP1122C1	6AP2122C1
4494	9.520	132.5	2.092	316 S.S.	6AP0123C1	6AP1123C1	6AP2123C1
6467	13.70	203.2	3.218	Carboloy®	6AP0124C1	6AP1124C1	6AP2124C1
3780	8.00	89	1.471	Glass	6AP0125C1	6AP1125C1	6AP2125C1
4942	10.47	134	2.124	Sapphire	6AP0126C1	6AP1126C1	6AP2126C1
7720	16.35	226	3.582	316 S.S.	6AP0127C1	6AP1127C1	6AP2127C1
10780	22.84	343	5.437	Carboloy®	6AP0128C1	6AP1128C1	6AP2128C1
8555	18.12	200	3.170	Glass	6AP0129C1	6AP1129C1	6AP2129C1
11140	23.60	301	4.771	Sapphire	6AP0130C1	6AP1130C1	6AP2130C1
16493	34.94	498	7.893	316 S.S.	6AP0131C1	6AP1131C1	6AP2131C1
23001	48.73	736	11.67	Carboloy®	6AP0132C1	6AP1132C1	6AP2132C1
23105	48.95	579	9.177	Glass	6AP0133C1	6AP1133C1	6AP2133C1
29410	62.30	833	13.2	Sapphire	6AP0134C1	6AP1134C1	6AP2134C1
42860	90.80	1339	21.22	316 S.S.	6AP0135C1	6AP1135C1	6AP2135C1
60212	127.5	1972	31.26	Carboloy®	6AP0136C1	6AP1136C1	6AP2136C1

For Materials of Construction see page 15

TABLE 21, MFV VALVE FLOW CAPACITIES 10 PSIG (0.7 KG/CM²) INLET PRESSURE, ATMOSPHERIC EXHAUST						
ORIFICE NUMBER	AIR		HELIUM		WATER	
	std. mL/min	scfh	std. mL/min	scfh	std. mL/min	scfh
1	200	0.42	400	0.85	6	0.095
2	400	0.85	850	1.80	12	0.190
3	1000	2.12	1800	3.81	26	0.412
4	2500	4.87	6000	12.71	80	1.268
5	6200	13.14	16000	33.90	200	3.170
6	21500	45.55	55000	116.55	650	10.303

The higher cost of MFV valves is justified whenever high sensitivity control and resolution are desirable, particularly in conjunction with metering tubes of very low flow rates. MFV flow capacities are offered to be matched with individual flow meter ranges.

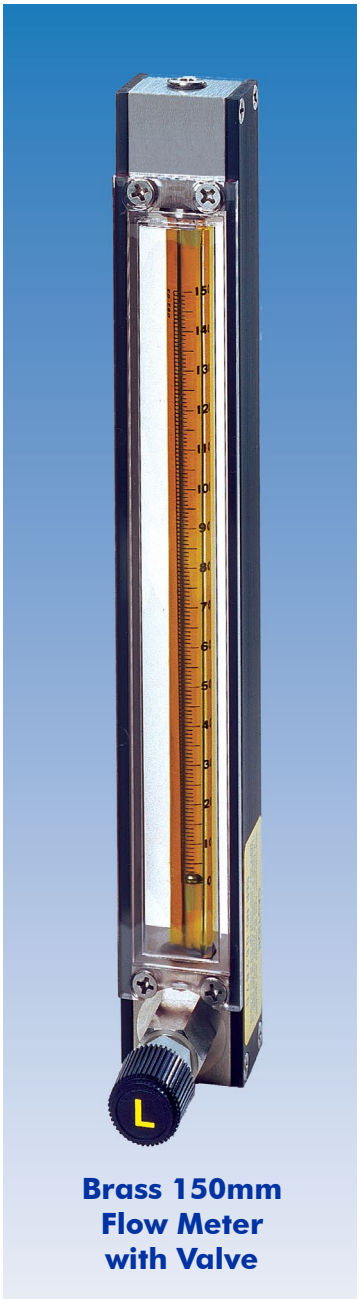
This unique design comprises rectilinear motion valve needles, with non-rising stems



MFV™ Valve Cartridge

As the needle advances into and out of high precision cylindrical orifices, the flat tapered surface of the needle gradually, without turning, uncovers the flow area. Generally, for gas metering it is recommended that valves are positioned at inlets (bottom). For liquids, valves may be positioned either at inlets or outlets (top). For vacuum services, valves must be mounted at outlets. If unspecified at time of ordering, meters will be shipped with valves mounted at the inlets. Meters are available with built-in high precision metering valves (MFV) with "non-rising stems".

For Materials of Construction see page 15



Brass 150mm Flow Meter with Valve

TABLE 21-1, STANDARD 150MM FLOW METERS WITH **HIGH PRECISION VALVE [MFV]**							
MAXIMUM FLOW RATE					FRAME MATERIAL FLOW TUBE		
AIR		WATER		FLOAT MATERIAL	ALUMINUM	BRASS	STAINLESS STEEL
mL/min	scfh	mL/min	gph		MODEL NO.	MODEL NO.	MODEL NO.
11.6	0.024	N/A		Glass	6AP0101M1	6AP1101M1	6AP2101M1
18.3	0.038			Sapphire	6AP0102M1	6AP1102M1	6AP2102M1
34	0.07			316 S.S.	6AP0103M1	6AP1103M1	6AP2103M1
62.8	0.13			Carboloy®	6AP0104M1	6AP1104M1	6AP2104M1
46.6	0.098	0.098	0.007	Glass	6AP0105M1	6AP1105M1	6AP2105M1
73.1	0.154	0.154	0.015	Sapphire	6AP0106M1	6AP1106M1	6AP2106M1
138.3	0.293	0.293	0.037	316 S.S.	6AP0107M1	6AP1107M1	6AP2107M1
239.1	0.506	0.506	0.072	Carboloy®	6AP0108M1	6AP1108M1	6AP2108M1
91.6	0.194	0.194	0.020	Glass	6AP0109M1	6AP1109M1	6AP2109M1
144.3	0.306	0.306	0.035	Sapphire	6AP0110M1	6AP1110M1	6AP2110M1
262.2	0.556	0.556	0.079	316 S.S.	6AP0111M1	6AP1111M1	6AP2111M1
431.7	0.915	0.915	0.146	Carboloy®	6AP0112M1	6AP1112M1	6AP2112M1
370.6	0.784	0.784	0.090	Glass	6AP0113M1	6AP1113M1	6AP2113M1
513.3	1.087	1.087	0.158	Sapphire	6AP0114M1	6AP1114M1	6AP2114M1
816.0	1.729	1.729	0.301	316 S.S.	6AP0115M1	6AP1115M1	6AP2115M1
1216.9	2.579	2.579	0.500	Carboloy®	6AP0116M1	6AP1116M1	6AP2116M1
817	1.731	1.731	0.240	Glass	6AP0117M1	6AP1117M1	6AP2117M1
1093	2.316	2.316	0.394	Sapphire	6AP0118M1	6AP1118M1	6AP2118M1
1665	3.528	3.528	0.702	316 S.S.	6AP0119M1	6AP1119M1	6AP2119M1
2405	5.096	5.096	1.094	Carboloy®	6AP0120M1	6AP1120M1	6AP2120M1
2214	4.690	4.690	0.792	Glass	6AP0121M1	6AP1121M1	6AP2121M1
2975	6.300	6.300	1.234	Sapphire	6AP0122M1	6AP1122M1	6AP2122M1
4494	9.520	9.520	2.092	316 S.S.	6AP0123M1	6AP1123M1	6AP2123M1
6467	13.70	13.70	3.218	Carboloy®	6AP0124M1	6AP1124M1	6AP2124M1
3780	8.00	8.00	1.411	Glass	6AP0125M1	6AP1125M1	6AP2125M1
4942	10.47	10.47	2.124	Sapphire	6AP0126M1	6AP1126M1	6AP2126M1
7720	16.35	15.82	226	316 S.S.	6AP0127M1	6AP1127M1	6AP2127M1
10780	22.84	22.84	5.437	Carboloy®	6AP0128M1	6AP1128M1	6AP2128M1
8555	18.12	18.12	3.170	Glass	6AP0129M1	6AP1129M1	6AP2129M1
11140	23.60	23.60	4.771	Sapphire	6AP0130M1	6AP1130M1	6AP2130M1
16493	34.94	34.94	7.893	316 S.S.	6AP0131M1	6AP1131M1	6AP2131M1
23001	48.73	48.73	11.67	Carboloy®	6AP0132M1	6AP1132M1	6AP2132M1
23105	48.95	48.95	9.177	Glass	6AP0133M1	6AP1133M1	6AP2133M1
29410	62.30	62.30	13.2	Sapphire	6AP0134M1	6AP1134M1	6AP2134M1
42860	90.80	90.80	21.22	316 S.S.	6AP0135M1	6AP1135M1	6AP2135M1
60212	127.5	127.5	31.26	Carboloy®	6AP0136M1	6AP1136M1	6AP2136M1

www.dakotainstruments.com ✉ e-mail: info@dakotainstruments.com ☎ Toll Free in U.S.A. and Canada 1.800.879.7713

Multi-tube Flow Meters also Available!

PTFE Flow Meters

PTFE flow meters incorporate the principles of traditional variable area flow technology

MATERIALS OF CONSTRUCTION

FLOW TUBES:	Heavy walled borosilicate glass.
FITTINGS IN CONTACT WITH FLUIDS:	Virgin PTFE PCTFE.
SIDE PANELS:	Aluminum, black anodized.
FRONT SHIELD AND BACK PLATE:	1/8" thick clear polycarbonate and white acrylics.
O-RINGS:	PTFE.
CONNECTIONS:	1/8" NPT female inlet and outlet connections.
OPTIONAL:	Glass hose or compression fittings.

⚠ *The selection of materials of construction, is the responsibility of the customer. The company accepts no liability.*

SPECIFICATIONS FOR SINGLE TUBE PTFE GLASS FLOW METERS

STANDARD ACCURACY: ±2% FS (mm scales) except 042 and 032 flow tubes. ±5% FS (direct reading scales) 042 and 032 mm.
REPEATABILITY: ± 0.25%
USEFUL FLOW RANGES: 10:1 minimum with one float.
MAXIMUM OPERATING PRESSURE: 100 psig/6.7 bars.
MAXIMUM OPERATING TEMPERATURE: 150 °F/ 65 °C.
LEAK INTEGRITY: Individually pressure and leak tested and certified to a rating of 1 x 10^{-7} sccs Helium.

⚠ *The selection of materials of construction, is the responsibility of the customer. The company accepts no liability.*

Wetted inert components are surrounded by structurally rigid anodized aluminum.

These rugged PTFE-Glass flow meters offer solutions to low to medium flow range measurements of highly corrosive or ultra-pure liquids and gases.

The resultant design represents a unique combination of a rugged mechanically rigid frame and chemically inert wetted parts.

65mm PTFE Flow Meter with cartridge valve

TABLE 22, 65MM PTFE FLOW METERS

MAXIMUM FLOW RATE					VALVE OPTION		
AIR		WATER		FLOAT MATERIAL	NO VALVE	CARTRIDGE VALVE CVT	HIGH PRECISION VALVE (HRT)
mL/min	scfh	mL/min	gph		MODEL NO.	MODEL NO.	MODEL NO.
5.8	0.013	N/A		Glass	6AT3101N6	6AT3101C6	6AT3101M6
9	0.017			Sapphire	6AT3102N6	6AT3102C6	6AT3102M6
19	0.036			316 S.S.	6AT3103N6	6AT3103C6	6AT3103M6
33	0.070			Carboloy®	6AT3104N6	6AT3104C6	6AT3104M6
49	0.104	0.55	0.009	Glass	6AT3105N6	6AT3105C6	6AT3105M6
74	0.153	0.98	0.016	Sapphire	6AT3106N6	6AT3106C6	6AT3106M6
145	0.307	2.38	0.038	316 S.S.	6AT3107N6	6AT3107C6	6AT3107M6
246	0.528	4.60	0.073	Carboloy®	6AT3108N6	6AT3108C6	6AT3108M6
107	0.22	1.13	0.020	Glass	6AT3109N6	6AT3109C6	6AT3109M6
167	0.35	2.19	0.035	Sapphire	6AT3110N6	6AT3110C6	6AT3110M6
314	0.66	4.97	0.079	316 S.S.	6AT3111N6	6AT3111C6	6AT3111M6
517	1.09	9.23	0.146	Carboloy®	6AT3112N6	6AT3112C6	6AT3112M6
216	0.46	5.71	0.090	Glass	6AT3113N6	6AT3113C6	6AT3113M6
320	0.68	10.00	0.158	Sapphire	6AT3114N6	6AT3114C6	6AT3114M6
538	1.14	19.2	0.301	316 S.S.	6AT3115N6	6AT3115C6	6AT3115M6
826	1.75	31.6	0.500	Carboloy®	6AT3116N6	6AT3116C6	6AT3116M6
1036	2.20	20	0.327	Glass	6AT3117N6	6AT3117C6	6AT3117M6
1383	2.93	33	0.523	Sapphire	6AT3118N6	6AT3118C6	6AT3118M6
2088	4.42	57	0.903	316 S.S.	6AT3119N6	6AT3119C6	6AT3119M6
3007	6.37	89	1.410	Carboloy®	6AT3120N6	6AT3120C6	6AT3120M6
1249	2.65	25	0.396	Glass	6AT3121N6	6AT3121C6	6AT3121M6
1623	3.44	36.7	0.581	Sapphire	6AT3122N6	6AT3122C6	6AT3122M6
2520	5.34	70.7	1.121	316 S.S.	6AT3123N6	6AT3123C6	6AT3123M6
3680	7.80	103.5	1.641	Carboloy®	6AT3124N6	6AT3124C6	6AT3124M6
2030	4.3	39.5	0.61	Glass	6AT3125N6	6AT3125C6	6AT3125M6
2655	5.62	63.2	0.99	Sapphire	6AT3126N6	6AT3126C6	6AT3126M6
4041	8.56	111.7	1.75	316 S.S.	6AT3127N6	6AT3127C6	6AT3127M6
5769	12.22	172	2.72	Carboloy®	6AT3128N6	6AT3128C6	6AT3128M6
2522	5.35	54.7	0.86	Glass	6AT3129N6	6AT3129C6	6AT3129M6
4917	10.42	143	2.26	316 S.S.	6AT3130N6	6AT3130C6	6AT3130M6
6318	13.4	147	2.33	Glass	6AT3131N6	6AT3131C6	6AT3131M6
8145	17.3	217	3.44	Sapphire	6AT3132N6	6AT3132C6	6AT3132M6
12058	25.5	364	5.77	316 S.S.	6AT3133N6	6AT3133C6	6AT3133M6
16943	35.9	540	8.56	Carboloy®	6AT3134N6	6AT3134C6	6AT3134M6
12860	27.2	307	4.86	Glass	6AT3135N6	6AT3135C6	6AT3135M6
16617	35.2	449	7.11	Sapphire	6AT3136N6	6AT3136C6	6AT3136M6
24452	51.8	723	11.46	316 S.S.	6AT3137N6	6AT3137C6	6AT3137M6
34507	73.1	1049	16.63	Carboloy®	6AT3138N6	6AT3138C6	6AT3138M6
21969	46.5	550	8.71	Glass	6AT3139N6	6AT3139C6	6AT3139M6
28518	60.4	811	12.85	Sapphire	6AT3140N6	6AT3140C6	6AT3140M6
41289	87.4	1297	20.56	316 S.S.	6AT3141N6	6AT3141C6	6AT3141M6
58348	123.6	1895	30.04	Carboloy®	6AT3142N6	6AT3142C6	6AT3142M6

Carboloy® is only recommended for ultra pure fluids and is NOT recommended for corrosive fluids.

PTFE Flow Meters

Multi-tube Flow Meters also Available!

PTFE flow meters are available with built-in needle valves (CVT™), high precision metering valves (HRT™) with "non-rising stems", or with no valves.

The higher cost of HRT™ valves is justified whenever high sensitivity control and resolution are desirable, particularly in conjunction with metering tubes of very low flow rates.

When meters with valves are ordered, the valve cartridges are installed at the inlet. For vacuum service, it is recommended that meters are ordered with valves at the outlet.

MATERIALS OF CONSTRUCTION

FLOW TUBES: Heavy walled borosilicate glass.
FITTINGS IN CONTACT WITH FLUIDS: Virgin PTFE PCTFE.
SIDE PANELS: Aluminum, black anodized.
FRONT SHIELD AND BACK PLATE: 1/8" thick clear polycarbonate and white acrylics.
O-RINGS: PTFE.
CONNECTIONS: 1/8" NPT female inlet and outlet connections.
OPTIONAL: *Glass hose or compression fittings.*

⚠ *The selection of materials of construction, is the responsibility of the customer. The company accepts no liability.*

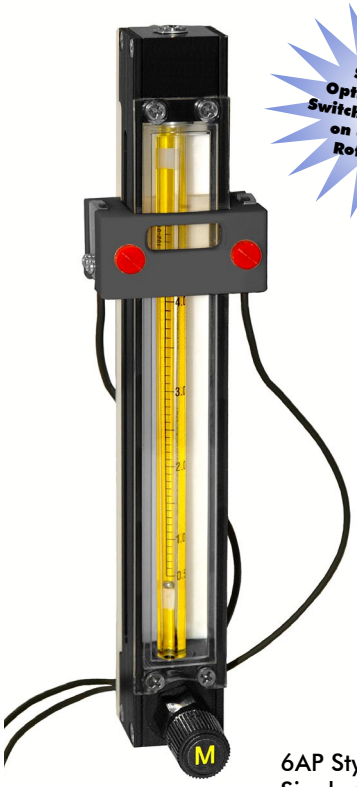
150mm PTFE Flow Meter with HRT valve

TABLE 23, 150MM PTFE FLOW METERS

MAXIMUM FLOW RATE					VALVE OPTION		
AIR		WATER		FLOAT MATERIAL	NO VALVE	CARTRIDGE VALVE CVT	HIGH PRECISION VALVE (HRT)
mL/min	scfh	mL/min	gph		MODEL NO.	MODEL NO.	MODEL NO.
11.6	0.024	N/A		Glass	6AT3101N1	6AT3101C1	6AT3101M1
18.3	0.038			Sapphire	6AT3102N1	6AT3102C1	6AT3102M1
34	0.07			316 S.S.	6AT3103N1	6AT3103C1	6AT3103M1
62.8	0.13			Carboloy®	6AT3104N1	6AT3104C1	6AT3104M1
46.6	0.098	0.50	0.007	Glass	6AT3105N1	6AT3105C1	6AT3105M1
73.1	0.154	0.99	0.015	Sapphire	6AT3106N1	6AT3106C1	6AT3106M1
138.3	0.293	2.36	0.037	316 S.S.	6AT3107N1	6AT3107C1	6AT3107M1
239.1	0.506	4.60	0.072	Carboloy®	6AT3108N1	6AT3108C1	6AT3108M1
91.6	0.194	1.13	0.020	Glass	6AT3109N1	6AT3109C1	6AT3109M1
144.3	0.306	2.19	0.035	Sapphire	6AT3110N1	6AT3110C1	6AT3110M1
262.2	0.556	4.97	0.079	316 S.S.	6AT3111N1	6AT3111C1	6AT3111M1
431.7	0.915	9.23	0.146	Carboloy®	6AT3112N1	6AT3112C1	6AT3112M1
370.6	0.784	5.71	0.090	Glass	6AT3113N1	6AT3113C1	6AT3113M1
513.3	1.087	10.00	0.158	Sapphire	6AT3114N1	6AT3114C1	6AT3114M1
816.0	1.729	19.2	0.301	316 S.S.	6AT3115N1	6AT3115C1	6AT3115M1
1216.9	2.579	31.6	0.500	Carboloy®	6AT3116N1	6AT3116C1	6AT3116M1
817	1.731	15.2	0.240	Glass	6AT3117N1	6AT3117C1	6AT3117M1
1093	2.316	24.9	0.394	Sapphire	6AT3118N1	6AT3118C1	6AT3118M1
1665	3.528	44.3	0.702	316 S.S.	6AT3119N1	6AT3119C1	6AT3119M1
2405	5.096	69.0	1.094	Carboloy®	6AT3120N1	6AT3120C1	6AT3120M1
2214	4.690	49.9	0.792	Glass	6AT3121N1	6AT3121C1	6AT3121M1
2975	6.300	77.7	1.234	Sapphire	6AT3122N1	6AT3122C1	6AT3122M1
4494	9.520	132.5	2.092	316 S.S.	6AT3123N1	6AT3123C1	6AT3123M1
6467	13.70	203.2	3.218	Carboloy®	6AT3124N1	6AT3124C1	6AT3124M1
3780	8.00	89	1.411	Glass	6AT3125N1	6AT3125C1	6AT3125M1
4942	10.47	134	2.124	Sapphire	6AT3126N1	6AT3126C1	6AT3126M1
7720	16.35	226	3.582	316 S.S.	6AT3127N1	6AT3127C1	6AT3127M1
10780	22.84	343	5.437	Carboloy®	6AT3128N1	6AT3128C1	6AT3128M1
8555	18.12	200	3.170	Glass	6AT3129N1	6AT3129C1	6AT3129M1
11140	23.60	301	4.771	Sapphire	6AT3130N1	6AT3130C1	6AT3130M1
16493	34.94	498	7.893	316 S.S.	6AT3131N1	6AT3131C1	6AT3131M1
23001	48.73	736	11.67	Carboloy®	6AT3132N1	6AT3132C1	6AT3132M1
23105	48.95	579	9.177	Glass	6AT3133N1	6AT3133C1	6AT3133M1
29410	62.30	833	13.2	Sapphire	6AT3134N1	6AT3134C1	6AT3134M1
42860	90.80	1339	21.22	316 S.S.	6AT3135N1	6AT3135C1	6AT3135M1
60212	127.5	1972	31.26	Carboloy®	6AT3136N1	6AT3136C1	6AT3136M1

Carboloy® is only recommended for ultra pure fluids and is NOT recommended for corrosive

www.dakotainstruments.com ✉ e-mail: info@dakotainstruments.com ☎ Toll Free in U.S.A. and Canada 1.800.879.7713



Picture Showing Optical Sensor Switches Installed on a Typical Rotameter

6AP Style Meter with
Single Optical Sensor Switch

GENERAL DESCRIPTION

The **Optical Sensor Switch** is a non-invasive means for detection of either HI **or** LOW flow. This sensor is ideal for signaling an alarm, cutoff valve or other device when the float passes the detector. **Note:** Alarm, valve, power supply etc. are not included. The Optical Sensor Switch helps protect processes and equipment from damage caused by extreme flow rates. Used in conjunction with 6AP and 6AT Flow Meters.

PRINCIPLE OF OPERATION

A self-contained miniature photoelectric sensor (Thrubeam type) consisting of a transmitter and receiver are mounted at opposite sides of the flow tube on a solid carrier. The float inside the flow tube is detected as it passes across the beam of light. The sensor can be used to detect the float passage beyond the set-point of the sensor and can also be set to monitor the float position at a specific level, signaling when the float is outside of the range of the sensor light beam.

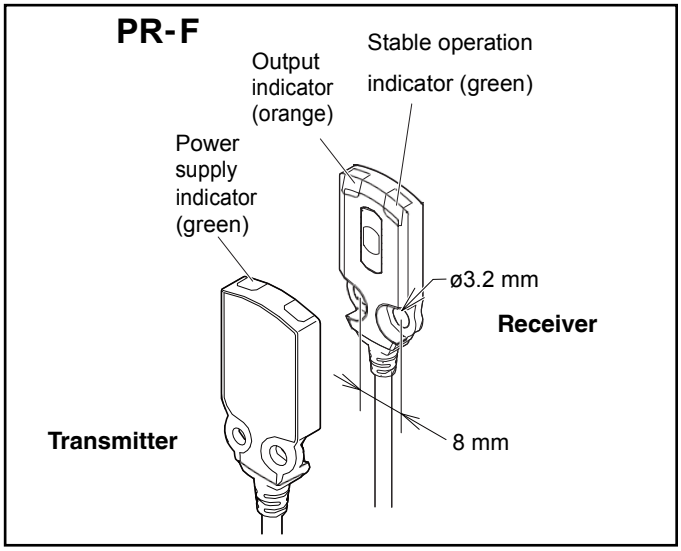
The sensor consists of two parts: transmitter and receiver. When power is properly connected the power supply indicator (green LED) on the transmitter is constantly on.

The receiver has two indicators:

Stable operation indicator (green LED) turns on with a stable incoming beam and with a stable blocked light. Output indicator (orange LED) turns on when the beam from emitter is blocked by the float.

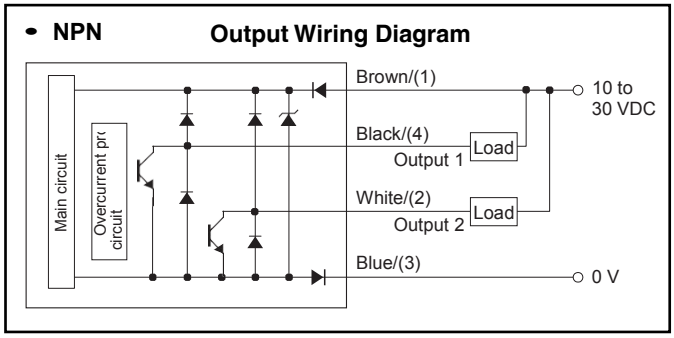
OPTICAL SENSOR SWITCH CONNECTION	
WIRE LEAD COLOR	**CONNECTION**
BLACK	Positive Power Lead (+10 to 30 VDC)
YELLOW	Negative Power Lead
GREEN	NPN output #1
RED	NPN output #2 (Complementary to Output #1)

TROUBLESHOOTING FOR SINGLE AND DOUBLE OPTICAL SENSOR SWITCH		
PROBLEM	**CAUSE**	**CHECK & ACTION**
All indicators are off.	The power supply is not connected.	Connect the power supply.
The output indicators turn on and off but output does not turn on or off.	Incorrect wiring.	Check the wiring for the output wires.
	The input device has failed.	Try connecting the sensor output to a separate input Sensor output has failed or an output wire is broken device.
	Sensor output has failed or an output wire is broken	
The output indicator is flashing.	Over-current has passed through an output.	Check that the rated current for the input device has not exceeded 50 mA.
		Check that the output wires are not shorted by any other wires.
	The sensor is affected by ambient light.	When there are light sources nearby (sensors, lighting), adjust the sensor installation.



ORDERING INFORMATION FOR SINGLE AND DOUBLE OPTICAL SENSOR SWITCH	
PART NUMBER	**DESCRIPTION**
6APOSV1-6P	Optical Sensor Switch for 65mm 6AP Style Meter
6APOSV1-1P	Optical Sensor Switch for 150mm 6AP Style Meter
6APOSV1-6T	Optical Sensor Switch for 65mm 6AT Meter
6APOSV1-1T	Optical Sensor Switch for 150mm 6AT Meter

ORDERING INFORMATION FOR SINGLE AND DOUBLE OPTICAL SENSOR SWITCH ACCESSORIES	
PART NUMBER	**DESCRIPTION**
6APOSSM	Optical Sensor Switch Module
6APSGMNA-12	Power Supply 110Vac /12 Vdc (North America)
6APSGMEU-12	Power Supply 230 Vac /12Vdc (Europe)
6APSGMAU-12	Power Supply 240 Vac /12Vdc (Australia)
6APSGMUK-12	Power Supply 240 Vac /12Vdc (United Kingdom)



Hi-Lo Optical Sensor Switch

GENERAL DESCRIPTION

The Hi-Lo Optical Sensor Switch is a non-invasive means for detection of Hi **and** LOW flow. This set of sensors is ideal for signaling an alarm, cutoff valve or other device when the float passes the detector. **Note:** Alarm, valve, power supply etc. are not included. The Optical Sensor Switch helps protect processes and equipment from damage caused by extreme flow rates. Its compact design and ease of operation make it a non-obtrusive, simple to use addition to your flow meter. Perfect for OEM applications, use whenever maximum or minimum flow levels need to be monitored automatically. It also can be used in conjunction with a control relay to power alternate equipment or monitoring devices. Used in conjunction with 6AP and 6AT Flow Meters.

PRINCIPLE OF OPERATION

The Hi-Lo Optical Sensor Switch consists of two self-contained mini-slim photoelectric sensors (Thrubeam type). Every sensor has a transmitter and receiver. Two sets of sensors are mounted on two solid carriers on opposite sides of the flow tube. The float inside the flow tube is detected as it passes across the beam of light.

The sensors can be used to detect the float passage beyond the set-point of the sensor and can also be set to monitor the float position at a specific level, signaling when the float is outside of the range of the sensor light beam.

Each sensor consists of two parts: transmitter and receiver. When power is properly connected the power supply indicator (green LED) on the transmitter is constantly on.

The receiver has two indicators:

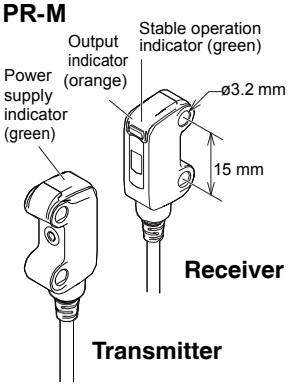
Stable operation indicator (green LED) turns on with a stable incoming beam and with a stable blocked light. Output indicator (orange LED) turns on when the beam from emitter is blocked by the float.

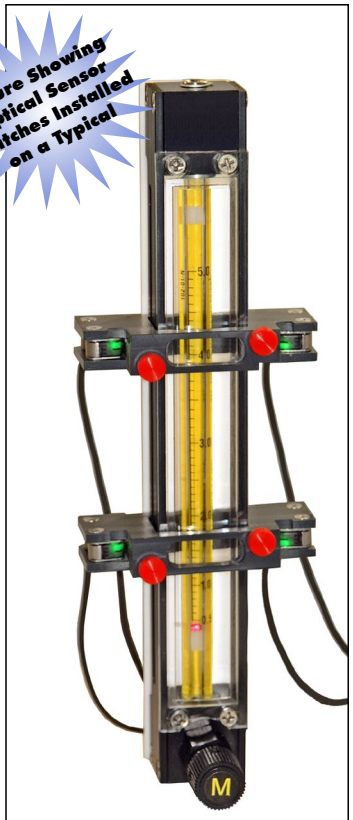
MOMENTARY OR LATCH OPERATION

Optionally the, Hi-Lo Optical Sensor Switch could be supplied with OSSM Module, allowing each sensor to be separately set for momentary or latch operation of buzzer, LED and relay.

The OSSM module is equipped with the 8 position DIP switch and requires a +12 VDC power-supply with a minimum current rating of 250 mA.

PR-M

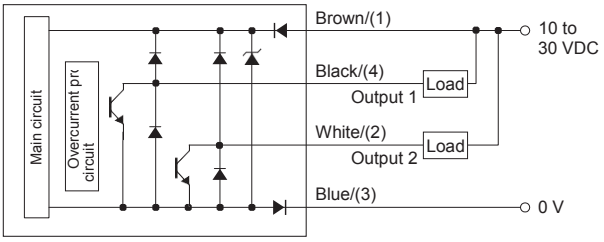




6AP Style Meter with Double Optical Sensor Switch

Output Wiring Diagram

- **NPN**



ORDERING INFORMATION FOR OPTICAL SENSOR SWITCH	
PART NUMBER	**DESCRIPTION**
6APOSV2-6P	Hi-Lo Optical Sensor Switch for 65mm 6AP Style Meter
6APOSV2-1P	Hi-Lo Optical Sensor Switch for 150mm 6AP Style Meter
6APOSV2-6T	Hi-Lo Optical Sensor Switch for 65mm 6AT Style Meter
6APOSV2-1T	Hi-Lo Optical Sensor Switch for 150mm 6AT Style Meter

ORDERING INFORMATION FOR SINGLE AND DOUBLE OPTICAL SENSOR SWITCH ACCESSORIES	
PART NUMBER	**DESCRIPTION**
6APOSSM	Optical Sensor Switch Module
6APSGMNA-12	Power Supply 110Vac /12 Vdc (North America)
6APSGMEV-12	Power Supply 230 Vac /12Vdc (Europe)
6APSGMAU-12	Power Supply 240 Vac /12Vdc (Australia)
6APSGMUK-12	Power Supply 240 Vac /12Vdc (United Kingdom)

OPTICAL SENSOR SWITCH CONNECTION	
WIRE LEAD COLOR	**CONNECTION**
BLACK	Positive Power Lead (+10 to 30 VDC)
YELLOW	Negative Power Lead
GREEN	NPN output #1
RED	NPN output #2 (Complementary to Output #1)

SPECIFICATIONS

MODE OF DETECTION:	Red LED Thrubeam type.
POWER REQUIREMENTS:	10 to 30 Vdc @50 mA max.
OUTPUT TRANSISTORS:	NPN source up to 50 mA.
RESPONSE TIME:	0.5 MS.
LIGHT IMMUNITY:	4 Element, point light source, red LED 650 nm.
AMBIENT TEMPERATURE:	25 degree C to +55 degree C.
SENSOR CONSTRUCTION:	Heavy duty metal housing, IP-6® protection.
SENSOR CERTIFICATION	
UL:	File #: E301717; Category: NRKH2/NRKH8; Enclosure type: 1 (UL50)
CE:EMC DIRECTIVE: (2004/108/EC):	Applicable Standard: EMI: EN60947-5-2, Class A/EMS:EN60947-5-2

The selection of materials of construction, is the responsibility of the customer. The company accepts no liability.

TROUBLESHOOTING FOR SINGLE AND DOUBLE OPTICAL SENSOR SWITCH		
PROBLEM	**CAUSE**	**CHECK & ACTION**
All indicators are off.	The power supply is not connected.	Connect the power supply.
The output indicators turn on and off but output does not turn on or off.	Incorrect wiring.	Check the wiring for the output wires.
	The input device has failed.	Try connecting the sensor output to a separate input device.
	Sensor output has failed or an output wire is broken.	
The output indicator is flashing.	Over-current has passed through an output.	Check that the rated current for the input device has not exceeded 50 mA.
		Check that the output wires are not shorted by any other wires.
	The sensor is affected by ambient light.	When there are light sources nearby (sensors, lighting), adjust the sensor installation.

In-Line and Panel Mount Flow Meters

Incorporating traditional variable area precision glass technology, these rugged brass or stainless steel flow meters offer accurate and economical solutions to medium flow range measurements. These meters are designed with unique rotatable scales of dual air-water direct reading graduations showing SCFM and SLPM (air), as well as GPM and LPM (water) markings.

Graduations reflect both metric and English systems.

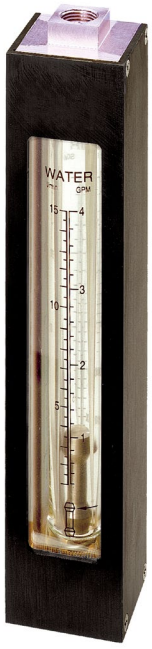
Dual, rotatable direct reading scales for air and water.

Rigid, compact construction.

Vertical In-Line or panel mount.

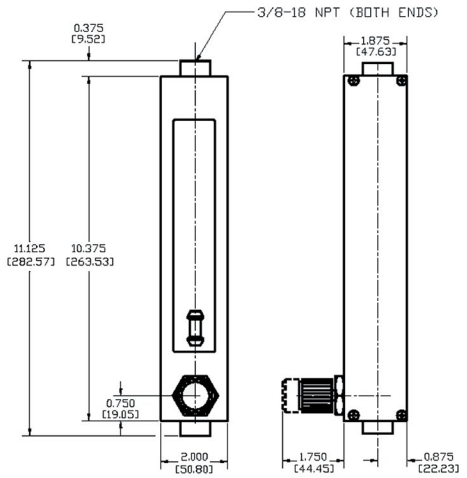
Overlapping flow ranges available from 4-20 LPM water and 140 L/min to 900 L/min air.

Precision formed borosilicate glass.

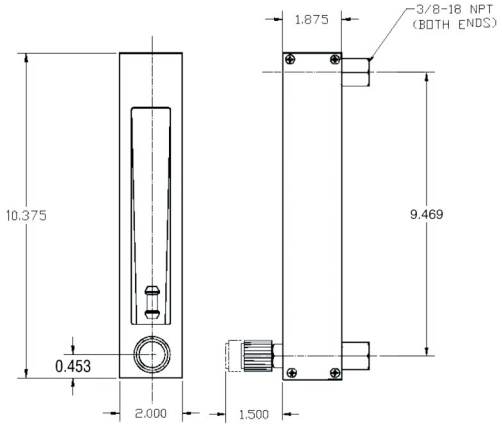


Vertical In-Line Flow Meters

Panel Mount Flow Meters



Dimensions for Vertical In-Line Flow Meters



Dimensions for Panel Mount Flow Meters

SPECIFICATIONS FOR MEDIUM RANGE FLOW METERS

TUBE SHIELDS:	Polycarbonate.
FLOW TUBES:	Heavy walled precision formed borosilicate glass.
FLOATS:	Type 316 stainless steel.
WETTED PARTS:	Brass or type 316 stainless steel.
SEALS:	FKM.
CONNECTIONS:	3/8" NPT female In-Line or horizontal rear.
SCALES:	Rotatable, direct reading air, (SCFM-L/min) and water (GPM-LPM).
ACCURACY:	±5% of full scale.
MAXIMUM TEMPERATURE:	250 °F (121 °C).
MAXIMUM PRESSURE:	150 PSIG (@ 200 °F).
CONNECTIONS:	3/8" NPT female In-Line or horizontal rear.

⚠ *The selection of materials of construction, is the responsibility of the customer. The company accepts no liability.*

TABLE 26, MEDIUM RANGE VERTICAL IN-LINE FLOW METERS

MAXIMUM FLOW RANGES					IN-LINE MOUNT		PANEL MOUNT	
AIR		WATER		END FITTING MATERIAL	NO VALVE	VALVE	NO VALVE	VALVE
SCFM	SLPM	GPM	LPM		MODEL NO.	MODEL NO.	MODEL NO.	MODEL NO.
5	140	1.2	4	Brass	6AV5101BNI	6AV5101BVI	6AV5101BNP	6AV5101BVP
10	280	2	8	Brass	6AV5102BNI	6AV5102BVI	6AV5102BNP	6AV5102BVP
15	425	3	11.5	Brass	6AV5103BNI	6AV5103BVI	6AV5103BNP	6AV5103BVP
20	575	4	15	Brass	6AV5104BNI	6AV5104BVI	6AV5104BNP	6AV5104BVP
30	900	5	20	Brass	6AV5105BNI	6AV5105BVI	6AV5105BNP	6AV5105BVP
5	140	1.2	4	316 S.S.	6AV5101SNI	6AV5101SVI	6AV5101SNP	6AV5101SVP
10	280	2	8	316 S.S.	6AV5102SNI	6AV5102SVI	6AV5102SNP	6AV5102SVP
15	425	3	11.5	316 S.S.	6AV5103SNI	6AV5103SVI	6AV5103SNP	6AV5103SVP
20	575	4	15	316 S.S.	6AV5104SNI	6AV5104SVI	6AV5104SNP	6AV5104SVP
30	900	5	20	316 S.S.	6AV5105SNI	6AV5105SVI	6AV5105SNP	6AV5105SVP

Medium Range PTFE Flow Meters

Incorporating traditional variable area precision glass technology, these rugged PTFE flow meters offer accurate and economical solutions to medium flow range measurements. These meters are designed with unique rotatable scales of dual air-water direct reading graduations showing SCFM and L/min (air), as well as GPM and LPM (water) markings.

LEAK INTEGRITY

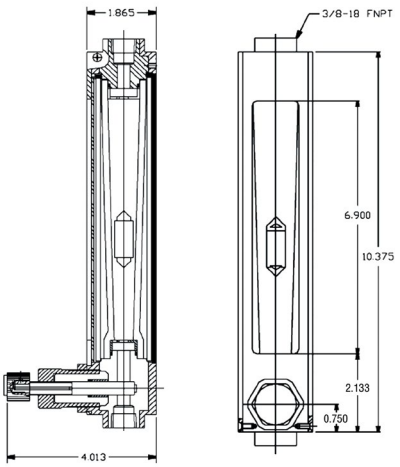
Flow meters are individually tested on a Mass Spectrometer Leak Detector and certified to a leak integrity rating of 1 x 10^{-7} sccs Helium or better.

SPECIFICATIONS FOR PTFE FLOW METERS

TUBE SHIELDS:	Polycarbonate.
FLOW TUBES:	Heavy walled precision formed borosilicate glass.
FLOATS:	PTFE.
WETTED PARTS:	PTFE, PCTFE.
SEALS:	PTFE.
SCALES:	Rotatable, direct reading air, (SCFM-L/min) and water (GPM-LPM). Scale length is 127mm (nominal).
ACCURACY:	+5% of full scale.
MAXIMUM TEMPERATURE:	150 °F (65 °C.)
MAXIMUM PRESSURE:	100 PSIG (6.7) bars.
CONNECTIONS:	3/8" NPT female In-Line or horizontal rear.
LEAK INTEGRITY:	Individually leak tested and certified.

The selection of materials of construction, is the responsibility of the customer. The company accepts no liability.

Dimensions In-Line Model



Dimensions Panel Mount Model

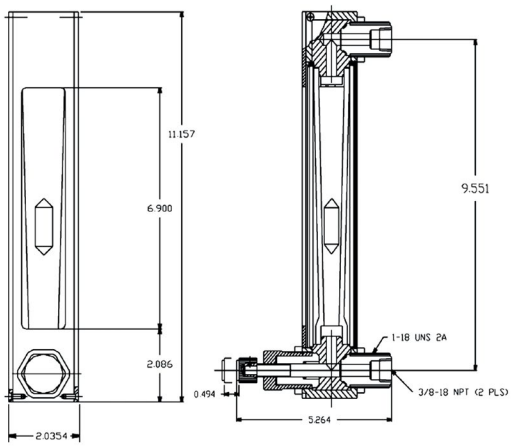


TABLE 27, MEDIUM RANGE PTFE FLOW METERS

MAXIMUM FLOW RANGES				IN-LINE MOUNT		PANEL MOUNT	
AIR		WATER		NO VALVE	VALVE	NO VALVE	VALVE
SCFM	SLPM	GPM	LPM	MODEL NO.	MODEL NO.	MODEL NO.	MODEL NO.
3.5	100	0.8	3.0	6AV9101TNI	6AV9101TVI	6AV9101TNP	6AV9101TVP
7.0	200	1.5	5.75	6AV9102TNI	6AV9102TVI	6AV9102TNP	6AV9102TVP
10.5	300	2.2	8.25	6AV9103TNI	6AV9103TVI	6AV9103TNP	6AV9103TVP
14.0	400	2.9	11.0	6AV9104TNI	6AV9104TVI	6AV9104TNP	6AV9104TVP
17.5	500	3.5	13.25	6AV9105TNI	6AV9105TVI	6AV9105TNP	6AV9105TVP
22.0	625	4.1	16.0	6AV9106TNI	6AV9106TVI	6AV9106TNP	6AV9106TVP

FEATURES

- ✓ **Heavy duty stainless steel.**
- ✓ **Thick polycarbonate safety shields.**
- ✓ **Fluted or plain tapered tubes.**
- ✓ **Direct reading metric and English system scales.**
- ✓ **Unique design facilitates ease of maintenance cleaning processes.**

Heavy-duty flow meters are fully enclosed in a brushed stainless steel case. Ideal for industrial applications with flow rates of up to 116 GPM / 440 L/min and 250 SCFM /7080 L/min. Used for flow measurements of liquids (water) and gases (air). Meters are graduated for direct reading of water and air.

Flow meters come with FNPT or flanged end fittings for easy in-line installation. Wetted parts include borosilicate glass flow tubes, Fkm O-rings, and 316 Stainless steel fittings, guide rods, floats and float stops.

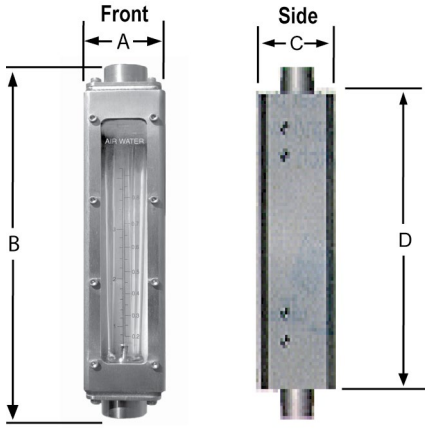
Flanged Style Meter

SPECIFICATIONS

ACCURACY:	±3% of full scale.
MINIMUM FLOW RATE:	Approximately 10% of maximum flow rate.
REPEATABILITY:	±0.5% of full scale.
MAXIMUM PRESSURE AT 200 °F (93 °C):	200 psig / 9.6 bars (tube sizes 3, 4, 5 and 6). 125 psig / 14.8 bars (tube sizes 8 and 9).
MAXIMUM OPERATING TEMPERATURE:	200 °F (93 °C).
FLOW TUBES:	Heavy walled borosilicate glass.
FITTINGS IN CONTACT WITH FLUIDS:	316 Stainless Steel.
FRONT SHIELD:	Thick clear polycarbonate and white acrylics.
O-RINGS:	FKM .
OPTIONAL:	PTFE/ FFKM, EPR.
CONNECTIONS:	**IN-LINE:** 1/2", 1", 2", NPT. **150 ANSI FLANGED:** 3/4", 1-1/2", 2-1/2".

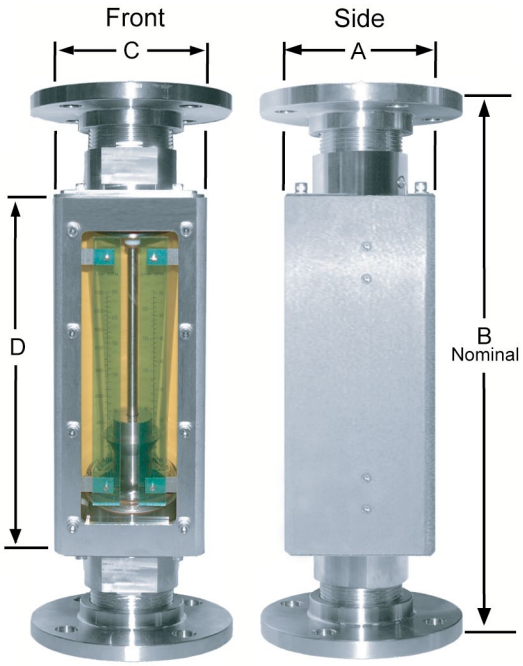
⚠ *The selection of materials of construction, is the is the responsibility of the customer. The company accepts no liability.*

Industrial Stainless Steel Meters



DIMENSIONS FOR IN-LINE INDUSTRIAL STAINLESS STEEL METERS

NPT (F)	A	B	C	D
½"	2	9.54	2.25	8.04
1"	3.5	13.69	3.75	10.50
2"	5	15.59	5.25	11.55



DIMENSIONS FOR FLANGED INDUSTRIAL STAINLESS STEEL METERS

NPT (F)	A	B (Nominal)	C	D
¾"	2	9.58	2.25	8.04
1½"	3.5	14.15	3.75	10.50
2½"	5	17.98	5.25	11.55

TABLE 31, IN-LINE METERS

CATALOG NUMBER	MAX FLOW RATE				PRESSURE DROP ("OF H_2O)	TUBE SIZE	NPT CONNECTION
	WATER (GPM)	AIR (SCFM)	WATER (L/min)	AIR (L/min)			
6AM6101MJ	0.25	1.2	.95	35	3	3	1/2"
6AM6102MJ	0.36	1.9	1.3	54	3	3	
6AM6103MJ	0.76	3.3	3.0	90	7	3	
6AM6104MJ	1.0	4.2	3.8	120	8	4	
6AM6105MJ	1.5	6.5	5.6	180	11	4	
6AM6106MJ	2.2	8.5	8.2	250	14	4	
6AM6107MK	3.8	16	14	480	14	5	1"
6AM6108MK	5.0	22	18	650	20	5	
6AM6109MK	6.0	25	22	725	7	6	
6AM6110MK	7.4	34	27.5	950	8	6	
6AM6111MK	9.6	40	36	1200	14	6	
6AM6112MK	11	47.5	42	1400	18	6	
6AM6113MK	15	62.5	52.5	1800	34	6	
6AM6114MK	20	90	80	2600	55	6	
6AM6115MK	22	90	85	2550	23	8	2"
6AM6116MK	25	-	95	-	99	6	1"
6AM6117MK	41	170	155	4600	7	9	2"
6AM6118MK	44	180	165	5000	42	8	
6AM6119MK	60	250	230	7000	23	9	
6AM6120MK	62	250	230	7000	70	8	
6AM6121MK	86	-	320	-	35	9	
6AM6122MK	116	-	440	-	56	9	

TABLE 31-1, FLANGED METERS

CATALOG NUMBER	MAX FLOW RATE				PRESSURE DROP ("OF H_2O)	TUBE SIZE	FLANGE CONNECTION
	WATER (GPM)	AIR (SCFM)	WATER (L/min)	AIR (L/min)			
6AM8101MJ	0.25	1.2	.95	35	3	3	3/4"
6AM8102MJ	0.36	1.9	1.3	54	3	3	
6AM8103MJ	0.76	3.3	3.0	90	7	3	
6AM8104MJ	1.0	4.2	3.8	120	8	4	
6AM8105MJ	1.5	6.5	5.6	180	11	4	
6AM8106MJ	2.2	8.5	8.2	250	14	4	
6AM8107MK	3.8	16	14	480	14	5	1½"
6AM8108MK	5.0	22	18	650	20	5	
6AM8109MK	6.0	25	22	725	7	6	
6AM8110MK	7.4	34	27.5	950	8	6	
6AM8111MK	9.6	40	36	1200	14	6	
6AM8112MK	11	47.5	42	1400	18	6	
6AM8113MK	15	62.5	52.5	1800	34	6	
6AM8114MK	20	90	80	2600	55	6	
6AM8115MK	22	90	85	2550	23	8	2½"
6AM8116MK	25	-	95	-	99	6	1½"
6AM8117MK	41	170	155	4600	7	9	2½"
6AM8118MK	44	180	165	5000	42	8	
6AM8119MK	60	250	230	7000	23	9	
6AM8120MK	62	250	230	7000	70	8	
6AM8121MK	86	-	320	-	35	9	
6AM8122MK	116	-	440	-	56	9	

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