

INTERCHANGEABLE

Designed for low flow rates, the **Model P** flow meter is a precision instrument embodying the inherent simplicity, versatility and economy of the classical rotameter. It is particularly suitable for metering carrier gases in chromatography, indicating and controlling gases in manufacturing processes, liquid and gas measurement in laboratories, pilot plants, flow and level indicating, etc.

Shipped completely assembled, flow meters include standard mounting fittings in a choice of materials, side plates, thick protective magnifying front shield and back plate, optional built-in control valve, and flow tubes selected from the Flow Capacities tables. Panel mounting style is convertible to bench mounting through the use of the optional acrylic tripod. The tripod has a built-in spirit leveler and leveling screws.

For multiple tube meters see pages 7 and 8.

design features

- ✓ Rib-guided or fluted metering tubes facilitate stable, accurate readings.
- ✓ Magnifier lens in front shield to enhance reading resolution.
- ✓ Interchangeability of flow tubes and floats.
- ✓ Ease of installation and exchange of flow tubes.
- ✓ "Non-rotating" adapter feature - glass flow tubes are prevented from turning during the tightening phase of the assembly procedure.
- ✓ OPTIGRAD™ scales minimize parallax and eye fatigue.
- ✓ Chemical compatibility.
- ✓ Simple means of panel mounting.

150 mm Meter with CV™ Valve



65 mm Meter with MFV™ Valve

BUILT-IN VALVES

Meters are available with built-in needle valves (CV™), high precision metering valves (MFV™) with “non-rising stems”, or with no valves. 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.

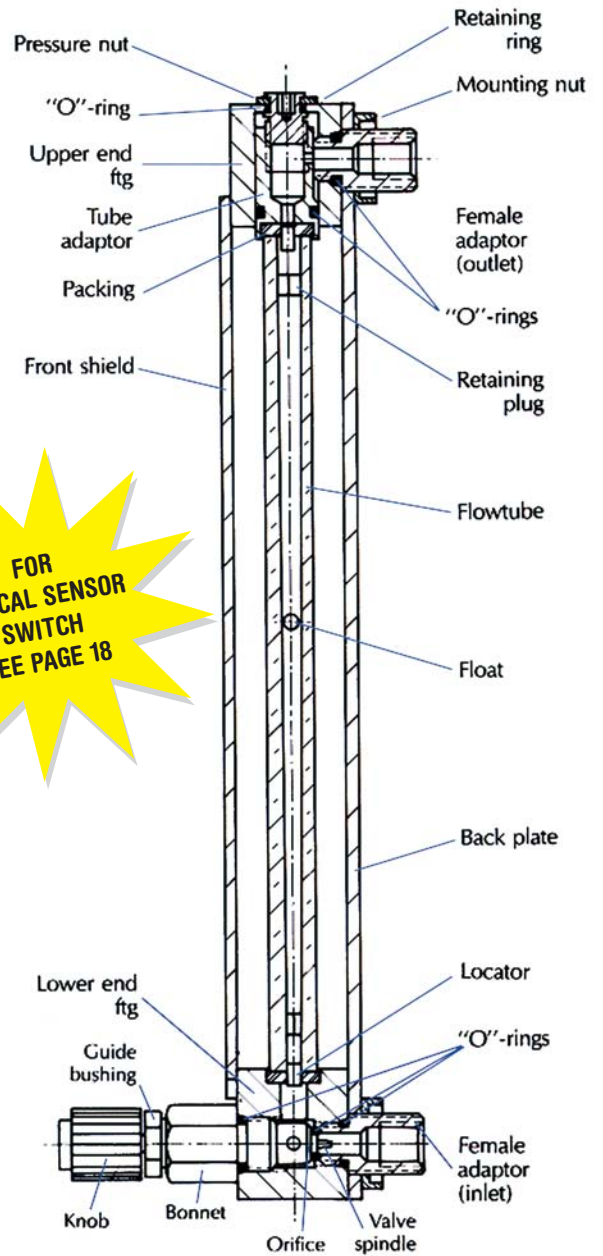
Generally, for gas metering it is recommended that valves are positioned at inlets (bottom) for liquids valves may be positioned either at inlets or outlets (top). For vacuum services, valves must be mounted at outlets. If unspecified at the time of ordering, meters will be shipped with valves mounted at the inlets.

Panel mounting is convertible to bench mounting through the use of an optional acrylic tripod base with spirit leveler (catalog No. TP1).

SPECIFICATIONS	
STANDARD ACCURACY	±2% FS mm scales except 042 flow tubes. ±5% FS direct reading scales and 042 flow tubes.
CALIBRATED ACCURACY	±1% FS optional.
REPEATABILITY	±0.25%.
USEFUL FLOW RANGE	10:1 minimum with one float and better than 20:1 with combination of two floats installed in meters.
MAXIMUM OPERATING PRESSURE	200 psig/13.8 bars.
MAXIMUM OPERATING TEMPERATURE	250 °F/ 121 °C.

**MATERIALS OF CONSTRUCTION	
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. Viton® o-rings in stainless steel meters. OPTIONAL Viton® PTFE Kalrez® and EPR.
CONNECTIONS	1/8" NPT female inlet and outlet connections. OPTIONAL 1/4" FNPT, hose and compression fittings are available.

Select flow tube consistent with requirements from flow capacity tables 6 to 22 (page 46 to 52).



Assorted flow tubes may be used in conjunction with a single mounting frame, an apparent benefit in many laboratory applications.

Ordering information see page 9.
Dimensional information see page 8.

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

The **Model Px** multiple tube flow meter line offers, the convenience and simplicity of 2, 3, 4, 5 and 6 tube meters, retaining most of the unique design features associated with single tube units. Multiple tube meters are available with 65mm or 150mm flow tubes same as used in single unit flow meters.

Px meters are convenient for applications where several streams of gases or liquids are to be metered in individual channels, or manifolded.

Shipped completely assembled, flow meters include standard mounting fittings in a choice of materials, side plates, thick protective front shield and back plate, optional built-in control valve, and flow tubes selected from the Flow Capacities tables.

Panel mounting style is convertible to bench mounting through the use of the optional acrylic tripod. The tripod has a built-in spirit leveler and leveling screws.

design features

- ✓ Rib-guided or fluted metering tubes facilitate stable, accurate readings.
- ✓ Interchangeability of flow tubes and floats.
- ✓ Manifolding at inlet or outlet.
- ✓ Ease of installation and exchange of flow tubes.
- ✓ "Non-rotating" adapter feature - glass flow tubes are prevented from turning during the tightening phase of the assembly procedure.
- ✓ OPTIGRAD™ scales minimize parallax and eye fatigue.
- ✓ Chemical compatibility.
- ✓ Simple means of panel mounting.



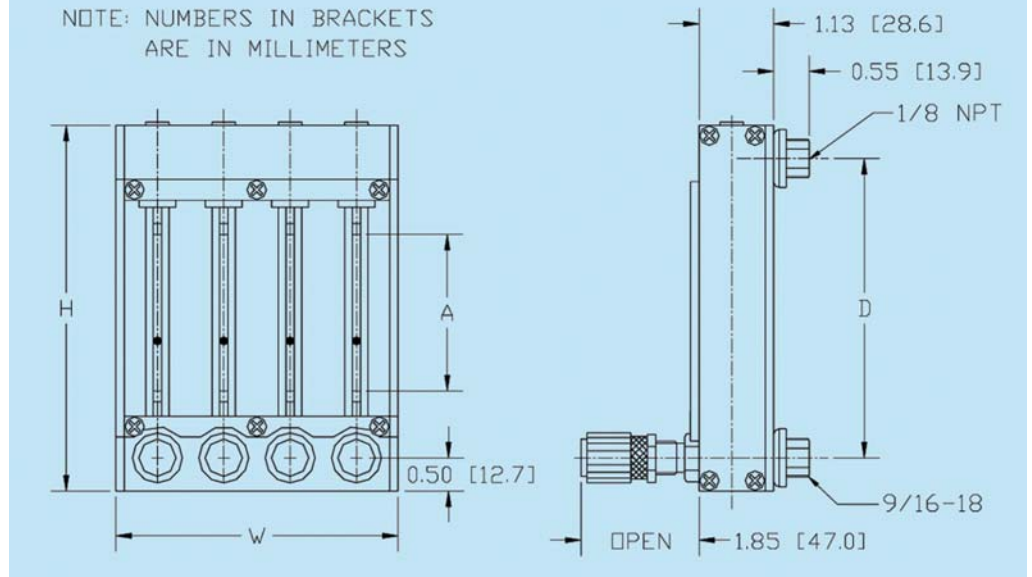
Four Tube Meter shown with MFV™ Valves



BUILT-IN VALVES

Meters may be supplied with built-in needle valves (CV™), high precision metering valves (MFV™) with “non-rising stems”, or with no valves. Generally for gas metering, it is recommended that valves are positioned at inlets (bottom) for liquids valves may be positioned either at outlets (top) or inlets. For vacuum service, valves must be mounted at outlets. If unspecified at the time of ordering, meters will be shipped with valves mounted at inlets.

MOUNTING DIMENSIONS



SPECIFICATIONS

STANDARD ACCURACY

±2% FS mm scales except 042 flow tubes.
 ±5% FS direct reading scales and 042 flow tubes.
 Conforming to ISA RP. 16-1.2.3 Specification 2-S-10. Manifoldd models excepted.

CALIBRATED ACCURACY

±1% FS optional.

REPEATABILITY ± 0.25%

USEFUL FLOW RANGES

10:1 minimum with one float. Better than 20:1 with combinations of two floats installed in meters.

MAXIMUM OPERATING PRESSURE

200 psig /13.8 bars.

MAXIMUM OPERATING TEMPERATURE

250 °F /121 °C.

**MATERIALS OF CONSTRUCTION

FLOW TUBES Heavy walled borosilicate glass.

CHOICE OF MOUNTING FITTINGS IN CONTACT WITH FLUIDS

- a) Aluminum, black anodized.
- b) 316 Stainless Steel.

SIDE PANELS Aluminum, black anodized.

FRONT SHIELD AND BACK PLATE

1/8" thick clear polycarbonate and white acrylics.

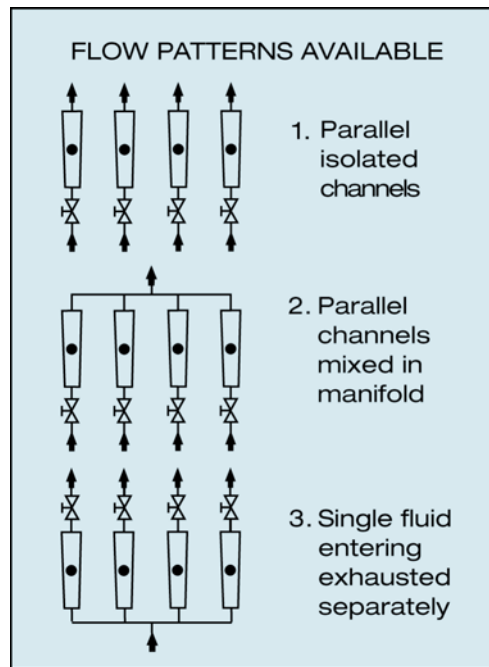
O-RINGS AND PACKING

Buna-N® o-rings in aluminum model.
 Viton® o-rings in stainless steel meters.
OPTIONAL Viton®, PTFE/Kalrez®, EPR.

CONNECTIONS 1/8" NPT female inlet and outlet connections.

OPTIONAL: 1/4" FNPT, hose & compression fittings are available.

Ordering information see page 9.



The built-in-valves are always installed in the end block opposite to the manifolded one.

Thus, if a meter is manifolded at the outlet, valves are installed at the inlets; if a meter is manifolded at the inlet, valves are installed at the outlets.

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



ORDERING INFORMATION MODEL P METERS

EXAMPLE

P	P STYLE METERS	
CODE	NUMBER OF CHANNELS	
1	SINGLE CHANNEL (ONE TUBE)	
2	TWO CHANNEL METER (TWO TUBES)	
3	THREE CHANNEL METER (THREE TUBES)	
4	FOUR CHANNEL METER (FOUR TUBES)	
5	FIVE CHANNEL METER (FIVE TUBES)	
6	SIX CHANNEL METER (SIX TUBES)	
CODE	SIZE	
6	65 mm	
1	150 mm	
CODE	MATERIAL	
A	ALUMINUM	
B	BRASS	
S	STAINLESS STEEL	
CODE	VALVE POSITION	
1	MFV (HIGH PRECISION) INLET	
3	NO VALVE	
4	CV (STANDARD CARTRIDGE) INLET	
5	MFV (HIGH PRECISION) OUTLET	
6	CV (STANDARD CARTRIDGE) OUTLET	
CODE	SEALS	
V	VITON® STANDARD ON STAINLESS METERS	
B	BUNA® STANDARD ON BRASS AND ALUMINUM	
E	EPR	
T	PTFE / KALREZ®	
CODE	FITTINGS	
A	1/8" FNPT (STANDARD)	
B	1/4" FNPT	
C	1/8" HOSE NIPPLE	
D	1/4" HOSE NIPPLE	
E	1/8" COMPRESSION	
F	1/4" COMPRESSION	
H	VCR FITTINGS	
CODE	MANIFOLD	
0	NONE (STANDARD FOR SINGLE CHANNEL)	
1	BOTTOM	
2	TOP	



Optional Accessories

TP1-Tripod for single channel meter.
TP2-Tripod for 2, 4 and 6 isolated channels or manifolding at top.
TP3-Tripod for 3 and 5 isolated channels or manifolding at bottom.
TP5-Tripod for 3 single tube meters.

Select tube from the following tables:

Tables 6 to 22. Pages 46 to 52.

TABLES OF STANDARD FLOW CAPACITIES P, Px, T, Tx AND S METERS

TABLE 6
150mm Flow tubes (See Table 8 for Gas Flow Capacities)

FLOW TUBE NUMBER	FLOW TUBE MAXIMUM FLOW RATE			
	AIR		WATER	
	[mL/min]	[scfh]	[mL/min]	[gph]
042-15-GL	19	0.040	0.19	0.003
042-15-SA	30	0.064	0.39	0.006
042-15-ST	61	0.128	0.94	0.015
042-15-CA	110	0.234	1.91	0.030
042-15-TA	121	0.257	2.13	0.033
032-41-GL	49	0.104	0.49	0.008
032-41-SA	73	0.155	0.98	0.016
032-41-ST	143	0.290	2.34	0.039
032-41-CA	246	0.521	4.7	0.078
032-41-TA	264	0.559	5.1	0.087
062-01-GL	92	0.195	0.9	0.013
062-01-SA	141	0.297	1.9	0.030
062-01-ST	264	0.559	4.7	0.075
062-01-CA	444	0.962	8.5	0.135
062-01-TA	484	1.025	9.2	0.146
112-02-GL	374	0.792	5.5	0.087
112-02-SA	513	1.087	10.0	0.159
112-02-ST	814	1.725	20.4	0.323
112-02-CA	1222	2.589	33.7	0.534
112-02-TA	1331	2.820	36.1	0.572
082-03-GL	844	1.748	16.5	0.262
082-03-SA	1093	2.316	26.1	0.414
082-03-ST	1682	3.564	44.6	0.729
082-03-CA	2423	5.133	70.5	1.117
082-03-TA	2576	5.458	75.6	1.198
092-04-GL	2313	4.900	54	0.848
092-04-SA	3079	6.523	78	1.233
092-04-ST	4562	9.665	133	2.067
092-04-CA	6621	14.02	201	3.180
092-04-TA	6932	14.68	212	3.357
102-05-GL	3922	8.07	84	1.336
102-05-SA	5188	10.60	126	2.002
102-05-ST	7825	16.08	217	3.433
102-05-CA	11371	22.94	329	5.219
102-05-TA	11965	24.10	353	5.589
034-39-GL	8505	18.38	210	3.32
034-39-SA	11357	24.05	306	4.84
034-39-ST	16737	35.46	506	8.02
034-39-CA	23752	50.32	747	11.84
034-39-TA	25252	53.50	790	12.52
044-40-GL	23742	47.7	541	8.58
044-40-SA	30711	62.6	806	12.77
044-40-ST	45227	87.9	1288	20.41
044-40-CA	66346	126.0	1881	29.81
044-40-TA	69940	132.6	2001	31.72

TABLE 7
65mm Flow tubes (See Table 9 for Gas Flow Capacities)

FLOW TUBE NUMBER	FLOW TUBE MAXIMUM FLOW RATE			
	AIR		WATER	
	[mL/min]	[scfh]	[mL/min]	[gph]
042-07-GL	6	0.013	0.07	0.001
042-07-SA	9	0.017	0.08	0.001
042-07-ST	19	0.036	0.28	0.004
042-07-CA	33	0.070	0.62	0.009
042-07-TA	36	0.072	0.66	0.010
032-15-GL	49	0.104	0.55	0.009
032-15-SA	74	0.153	0.98	0.016
032-15-ST	145	0.307	2.38	0.038
032-15-CA	246	0.528	4.60	0.073
032-15-TA	271	0.578	5.25	0.084
022-13-GL	104	0.220	1.8	0.028
022-13-SA	159	0.337	3.4	0.054
022-13-ST	299	0.633	5.8	0.122
022-13-CA	516	1.093	14.1	0.223
022-13-TA	530	1.123	15.5	0.246
012-10-GL	202	0.43	2.6	0.041
012-10-SA	300	0.64	4.7	0.074
012-10-ST	522	1.11	12.0	0.190
012-10-CA	818	1.73	20.8	0.330
012-10-TA	859	1.82	23.5	0.372
052-01-GL	986	2.09	20.5	0.325
052-01-SA	1299	2.75	34.0	0.539
052-01-ST	1946	4.12	55.6	0.881
052-01-CA	2827	5.99	88.5	1.403
052-01-TA	3020	6.40	94.0	1.490
023-92-GL	1249	2.65	25	0.428
023-92-SA	1623	3.44	37	0.586
023-92-ST	2520	5.34	71	1.125
023-92-CA	3680	7.80	104	1.648
013-88-GL	2040	4.32	40	0.63
013-88-SA	2704	5.73	61	0.97
013-88-ST	3990	8.45	108	1.71
013-88-CA	5739	12.16	170	2.69
365-02-GL	2678	5.67	52	0.82
365-02-ST	4922	10.40	150	2.38
014-96-GL	6318	13.4	147	2.33
014-96-SA	8145	17.3	217	3.44
014-96-ST	12058	25.5	364	5.77
014-96-CA	17153	36.3	540	8.56
014-96-TA	18213	38.6	568	9.00
054-17-GL	13153	27.9	309	4.90
054-17-SA	16980	36.0	456	7.23
054-17-ST	24680	52.3	745	11.8
054-17-CA	35320	74.8	1110	17.59
054-17-TA	37589	79.6	1182	18.73
064-63-GL	23169	49.1	522	8.27
064-63-SA	29218	61.9	798	12.65
064-63-ST	42094	89.2	1261	19.97
064-63-CA	58500	123.9	1866	29.58
064-63-TA	62100	131.6	2027	32.13

*SUFFIX REFERS TO FLOAT MATERIALS;

- GL = Black Glass
- SA = Sapphire (red)
- ST = 316 Stainless Steel
- CA = Carboloy®
- TA = Tantalum

TABLE OF STANDARD FLOW CAPACITIES P, Px, T, Tx AND S METERS

TABLE 8 - 150mm FLOW TUBES, GAS FLOW CAPACITIES OF ROUTINE GASES

FLOW TUBE MAXIMUM FLOW RATES												
FLOW TUBE NUMBER	ARGON		CARBON DIOXIDE		HELIUM		HYDROGEN		NITROGEN		OXYGEN	
	[mL/min]	[scfh]	[mL/min]	[scfh]	[mL/min]	[scfh]	[mL/min]	[scfh]	[mL/min]	[scfh]	[mL/min]	[scfh]
042-15-GL	15	0.033	23	0.050	16	0.034	37	0.078	20	0.041	17	0.036
042-15-SA	24	0.052	37	0.078	26	0.054	59	0.126	31	0.066	27	0.057
042-15-ST	49	0.104	72	0.153	53	0.112	123	0.260	62	0.132	54	0.115
042-15-CA	90	0.192	127	0.269	101	0.214	232	0.491	114	0.241	99	0.210
042-15-TA	99	0.211	139	0.294	112	0.238	256	0.543	125	0.265	109	0.231
032-41-GL	44	0.093	56	0.121	46	0.100	94	0.212	48	0.119	42	0.104
032-41-SA	60	0.127	84	0.178	69	0.148	149	0.318	76	0.161	70.4	0.149
032-41-ST	113	0.239	150	0.318	133	0.282	301	0.646	143	0.303	131	0.278
032-41-CA	202	0.428	251	0.532	260	0.551	567	1.258	255	0.540	228	0.483
032-41-TA	222	0.470	263	0.557	288	0.610	602	1.390	274	0.581	244	0.517
062-01-GL	76	0.161	103	0.218	90	0.191	208	0.441	92	0.195	81	0.172
062-01-SA	111	0.235	157	0.333	142	0.301	322	0.682	139	0.294	121	0.256
062-01-ST	218	0.462	281	0.595	283	0.600	627	1.328	271	0.574	233	0.494
062-01-CA	373	0.790	445	0.943	519	1.100	1120	2.373	462	0.979	407	0.862
062-01-TA	393	0.833	470	0.996	555	1.176	1225	2.595	495	1.049	433	0.917
112-02-GL	305	0.646	355	0.752	450	0.953	1021	2.163	382	0.809	340	0.720
112-02-SA	429	0.909	472	1.000	681	1.443	1497	3.172	520	1.102	472	1.000
112-02-ST	676	1.432	728	1.542	1290	2.733	2496	5.288	824	1.746	753	1.595
112-02-CA	1020	2.161	1072	2.271	2221	4.706	3876	8.212	1220	2.585	1131	2.396
112-02-TA	1085	2.299	1134	2.403	2356	4.992	4257	9.019	1310	2.775	1206	2.555
082-03-GL	687	1.46	725	1.54	1490	3.16	2620	5.55	827	1.75	772	1.64
082-03-SA	910	1.93	944	2.00	2059	4.36	3546	7.51	1110	2.35	1024	2.18
082-03-ST	1380	2.92	1420	3.01	3397	7.20	5547	11.75	1662	3.52	1545	3.27
082-03-CA	1996	4.23	2039	4.32	5120	10.85	8170	17.31	2405	5.10	2246	4.76
082-03-TA	2131	4.51	2163	4.58	5437	11.52	8717	18.47	2575	5.46	2364	5.01
092-04-GL	1949	4.13	2048	4.34	4880	10.34	7817	16.56	2395	5.07	2169	4.60
092-04-SA	2605	5.52	2620	5.55	6458	13.68	10455	22.15	3142	6.66	2860	6.06
092-04-ST	3903	8.27	3990	8.45	9770	20.70	15855	33.59	4685	9.93	4341	9.20
092-04-CA	5665	12.00	5743	12.17	14500	30.72	22790	48.28	6845	14.50	6307	13.36
092-04-TA	6040	12.80	6018	12.75	15420	32.67	24252	51.38	7080	15.00	6690	14.17
102-05-GL	3151	6.68	3374	7.15	7803	16.53	13105	27.76	3868	8.19	3485	7.38
102-05-SA	4175	8.85	4388	9.30	10336	21.89	16108	34.13	5090	10.78	4652	9.86
102-05-ST	6384	13.54	6308	13.36	15960	33.82	27804	58.91	7722	16.36	6992	14.81
102-05-CA	9069	19.21	9069	19.21	23509	49.81	37553	79.57	10973	23.25	10082	21.36
102-05-TA	9627	20.40	9475	20.07	25131	53.24	39998	84.74	11628	24.64	10741	22.76
034-39-GL	7366	15.61	7485	15.86	19426	41.16	29840	63.22	8916	18.89	8269	17.52
034-39-SA	9539	20.21	9557	20.25	25400	53.81	40006	84.76	11524	24.42	10706	22.68
034-39-ST	14131	29.94	14051	29.77	38576	81.73	59996	127.1	17021	36.06	15710	33.28
034-39-CA	20166	42.72	19854	42.06	56220	119.1	83052	175.9	24071	51.00	22432	47.53
034-39-TA	21414	45.37	21115	44.74	60596	128.3	90410	191.5	25709	54.47	23790	50.40
044-40-GL	19761	41.9	18989	40.2	53100	112.5	85812	181.8	23512	49.8	21350	45.2
044-40-SA	24563	52.0	23855	50.6	70100	148.5	110100	233.2	29930	63.4	27181	57.5
044-40-ST	35300	74.8	34287	72.6	103647	219.6	159699	338.3	43000	91.1	39567	83.8
044-40-CA	47890	101.4	46311	98.1	146500	310.4	221872	470.0	59580	126.2	54902	116.3
044-40-TA	51997	110.2	49009	103.8	189826	402.2	234423	496.6	63826	135.2	57960	122.8

*Suffix refers to float materials: G = black glass, S = sapphire (red), ST = 316 stainless steel, C = Carboloy®, T = tantalum.

Flow capacities shown in Tables 4, 5, 6 and 7 are based on calibrations at standard (STP) conditions (70 °F /21.1 °C and 14.7psia/1 atm abs). For fluids other than air or water at STP conditions see paragraph on METER SIZING on page 43. For special OEM requirements call toll free 1-800-866-3837.

for direct reading (engineering units) scale flow tubes contact the company or visit us at www.aalborg.com