TECHNICAL INFORMATION

FLOW CAPACITIES
Spare valve cartridges P, Px and S meters

TABLE 1 - MFV™ VALVE FLOW CAPACITIES 10 psig (0.7 kPa gauge) INLET PRESSURE, ATMOSPHERIC EXHAUST

SIZE	AIR		HELIUM		WATER	
	[mL/min]	[scfh]	[mL/min]	[scfh]	[mL/min]	[gph]
1	200	0.42	400	0.85	6	0.095
2	400	0.85	850	1.80	12	0.190
3	1020	2.15	2100	4.45	28	0.444
4	2600	5.50	6050	12.80	85	1.347
5	8900	18.85	20800	44.05	270	4.279
6	35000	74.15	84500	179.10	1070	16.960
7	63000	133.50	156000	330.50	1930	30.590

TABLE 2 - CV™ VALVE FLOW CAPACITIES 10 psig (0.7 kPa gauge) INLET PRESSURE, ATMOSPHERIC EXHAUST

SIZE	AIR		HELIUM		WATER	
	[mL/min]	[scfh]	[mL/min]	[scfh]	[mL/min]	[gph]
L	5050	10.70	11500	24.35	360	5.70
M	30000	63.55	71500	151.50	1760	27.90
H	76000	161.05	180000	381.40	4500	71.33

FLOW CAPACITIES
Spare valve cartridges T and Tx meters

TABLE 1a - MVT™ VALVE FLOW CAPACITIES 10 psig (0.7 kPa gauge) INLET PRESSURE, ATMOSPHERIC EXHAUST

SIZE	AIR		HELIUM		WATER	
	[mL/min]	[scfh]	[mL/min]	[scfh]	[mL/min]	[gph]
1	600	1.25	1250	2.65	36	0.57
2	3000	6.35	6900	14.60	180	2.85
3	30000	63.55	71500	151.50	1800	28.53

TABLE 2a - CVT™ VALVE FLOW CAPACITIES 10 psig (0.7 kPa gauge) INLET PRESSURE, ATMOSPHERIC EXHAUST

SIZE	AIR		HELIUM		WATER	
	[mL/min]	[scfh]	[mL/min]	[scfh]	[mL/min]	[gph]
L	2400	5.10	5300	11.23	130	2.05
H	55000	116.55	135000	286.05	2800	44.40

METER SIZING FOR P, Px, T, Tx AND S METERS

Flow capacity tables 6, 7, 8, 9 and 10 (pages 55 to 58) are based on calibrations at standard conditions, meaning 14.7 psia (1 atm) pressure and 70 °F (21.1 °C).

Tables list maximum flow rates of flow tubes. The usable range of meters is at least 10:1, often more. Thus, as a rule of thumb, to estimate the minimum metering limit divide the flow rates listed, by ten.

For gases or liquids with fluid properties not greatly different from the calibration media, tables apply directly, when working pressure and temperature are also approximately standard.

Where the above conditions do not apply the maximum flow rates of the metered fluids are converted to equivalent standard flow rates of air or water.

To do this calculate "K" as shown in charts, multiply the maximum flow rate with this factor, and select the appropriate flow tube size from the Flow Capacity tables 6, 7, 8, 9 and 10 (pages 55 to 58).

gas flow

$$Q_{air} = K_{gas} \times Q_{gas}$$

$$K_{gas} = \sqrt{G \times \frac{T_{act}}{T_o} \times \frac{P_o}{P_{act}}}$$

where:

Q_{air} = equivalent air flow capacity at Standard Conditions (SPT).
Q_{gas} = maximum flow of metered gas.
G = specific gravity of metered gas (from table 5).
T_{act} = absolute temperature at flow condition, deg R or deg K.
T_o = absolute temperature at Standard Conditions. (STP) deg R (530) or deg K (294).
P_{act} = pressure at flow conditions, psia.
P_o = pressure at Standard Conditions (STP), (14.7 psia).

liquid flow

$$Q_{water} = K_{liq} \times Q_{liq}$$

$$K_{liq} = \sqrt{\frac{(d_F - d_W)}{(d_F - d_L)} \times \frac{d_L}{d_W}}$$

where:

Q_{water} = equivalent water flow capacity at Standard Conditions (STP).
Q_{liq} = maximum flow of metered liquid.
d_F = density of float selected, (see table 3), (g/ml).
d_L = density of metered liquid, (g/ml).
d_W = density of water at Standard Conditions (STP) (1.0 g/ml).

CALCULATION VS. CALIBRATION FOR P, Px, S, T and Tx METERS

In case of liquid flows at each major point along the scale, sample volumes are collected in a buret of a volumetric flask during measured time intervals. Volumes are interpolated to a unit of time such as for example [mL/min] or [cu. ft/hr] etc. A table or a graph is then constructed to establish a complete set of calibration data. In case of gas flows, calibration data can be similarly developed, except that collection of sample volumes is accomplished by means of gas sampling devices, the simplest of which is a "soap bubble" meter.

It is very important that the correction factors as calculated from the accompanying equations are used for sizing only. These relationships are greatly simplified and will not provide precise predictable flow corrections. It is always best practice to calibrate meters for non-standard conditions on site, by using reliable means of calibration.

TABLE 3 - FLOAT DENSITIES

MATERIAL	DENSITY [g/ml]
GLASS	2.53
SAPPHIRE	3.98
STAINLESS STEEL	8.04
CARBOLOY	14.98
TANTALUM	16.58

TABLE 4 - CONVERSION FACTORS

MULTIPLY	BY	TO OBTAIN
atm	14.70	lbs/sq. in.
atm	1.0333	kg/sq. cm.
lbs/square inch	0.07031	kg/sq. cm.
ml/min	0.001	liters/min.
ml/min	3.531×10^{-5}	cu. ft/min.
ml/min	1.585×10^{-2}	gal/hr.
cubic ft/hr	472	ml/min.
gal/min	3785	ml/min.
g/ml	62.43	lbs/cu. ft.
g/ml	0.03613	lbs/cu. in.
cc/mn	1	mL/min.
cfm (ft^3/min)	28.31	L/min.
cfm (ft^3/min)	1.699	m^3/hr.
oz/min	29.57	mL/min.

PRESSURE

MULTIPLY	BY	TO OBTAIN
PSI	27.71	in. H_2O
PSI	2.036	in. Hg
PSI	703.1	mm/H_2O
PSI	51.75	mm/Hg
PSI	.0703	kg/cm^2
PSI	.0689	bar
PSI	68.95	mbar
PSI	6895	Pa
PSI	6.895	kPa

TEMPERATURE

$^{\circ}F = (1.8 \times {}^{\circ}C) + 32$
$^{\circ}C = ({}^{\circ}F - 32) \times 0.555$
$^{\circ}Kelvin = {}^{\circ}C + 273.2$

LENGTH

MULTIPLY	BY	TO OBTAIN
Multiply	2.54	cm
Inch	12	inch
Ft.	0.305	meter
Yard	1.094	meter
Angstrom	10^{10}	meter

TABLE 5- DENSITY, VISCOSITY & SPECIFIC GRAVITY OF GASES

GAS	DENSITY [g/ml]	VISCOSITY [centipols]	SPECIFIC GRAVITY G [air=1.0]
Acetylene	0.001090	0.00988	0.9073
Air	0.001200	0.01812	1.0000
Ammonia	0.000716	0.00994	0.5963
Argon	0.001660	0.02220	1.3796
Butane	0.002484	0.00848	2.0854
Carbon Dioxide	0.001835	0.01470	1.5290
Carbon Monoxide	0.001163	0.01750	0.9671
Chlorine	0.002983	0.01330	2.4860
Ethane	0.001260	0.00901	1.0493
Ethylene	0.001170	0.00994	0.9749
Helium	0.0001656	0.01980	0.13804
Hydrogen	0.0000834	0.00885	0.06952
Hydrogen Chloride	0.001512	0.01560	1.2678
Methane	0.0006653	0.01099	0.5544
Nitrogen	0.001160	0.01756	0.96724
Nitrous Oxide	0.001833	0.01453	1.5297
Oxygen	0.001326	0.02030	1.10527
Propane	0.001874	0.00805	1.5620
Sulfur Dioxide	0.002717	0.01270	2.2638

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 MAXIMUM FLOW RATES

FLOW TUBE NUMBER	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	46.6	0.098	0.50	0.007
032-41-SA	73.1	0.154	0.99	0.015
032-41-ST	138.3	0.293	2.36	0.037
032-41-CA	239.1	0.506	4.60	0.072
032-41-TA	258.7	0.548	5.10	0.080
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	3780	8.00	89	1.336
102-05-SA	4942	10.47	134	1.336
102-05-ST	7467	15.82	226	3.433
102-05-CA	10780	22.84	343	5.219
102-05-TA	11287	23.92	361	5.589
034-39-GL	8555	18.12	200	3.170
034-39-SA	11140	23.60	301	4.771
034-39-ST	16493	34.94	498	7.893
034-39-CA	23001	48.73	736	11.67
034-39-TA	24540	51.99	784	12.43
044-40-GL	23105	48.95	579	9.177
044-40-SA	29410	62.30	833	13.2
044-40-ST	42860	90.80	1339	21.22
044-40-CA	60212	127.5	1972	31.26
044-40-TA	65625	139.0	2144	33.98

*SUFFIX REFERS TO FLOAT MATERIALS;

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

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

FLOW TUBE MAXIMUM FLOW RATES

FLOW TUBE NUMBER	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	109	0.23	1.29	0.015
022-13-SA	169	0.35	2.65	0.031
022-13-ST	312	0.66	6.13	0.095
022-13-CA	510	1.08	11.22	0.174
022-13-TA	547	1.15	12.23	0.190
012-10-GL	204	0.43	2.8	0.045
012-10-SA	303	0.64	5.3	0.079
012-10-ST	518	1.09	11.2	0.170
012-10-CA	809	1.71	19.5	0.302
012-10-TA	851	1.80	20.7	0.320
052-01-GL	1056	2.23	20.8	0.329
052-01-SA	1399	2.96	33.3	0.527
052-01-ST	2125	4.50	58.7	0.930
052-01-CA	3059	6.48	90.0	1.426
052-01-TA	3245	6.87	94.0	1.537
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	2006	4.25	39.5	0.61
013-88-SA	2680	5.67	63.2	0.99
013-88-ST	4060	8.6	111.7	1.75
013-88-CA	5798	12.28	172	2.72
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

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	38.1	0.080	55.1	0.116	41.1	0.087	95	0.201	48	0.101	42	0.088
032-41-SA	59.1	0.125	83	0.175	66	0.139	151	0.319	74	0.156	65	0.137
032-41-ST	114	0.241	153	0.324	136	0.288	304	0.644	142	0.300	125	0.264
032-41-CA	197	0.417	255	0.540	254	0.538	553	1.171	246	0.521	217	0.459
032-41-TA	215	0.455	276	0.584	281	0.595	609	1.29	268	0.567	237	0.502
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	4.50	6307	13.36
092-04-TA	6040	12.80	6018	2.75	15420	32.67	24252	51.38	7080	15.00	6690	14.17
102-05-GL	3148	6.67	3266	6.92	8526	18.07	13164	27.89	3824	8.10	3549	7.52
102-05-SA	4185	8.86	4314	9.14	10384	22.00	17434	36.94	5033	10.66	4672	9.89
102-05-ST	6329	13.41	6288	13.32	15906	33.70	26770	56.72	7603	16.11	7069	14.98
102-05-CA	9082	19.24	8976	19.02	23416	49.62	39080	82.81	10974	23.25	10185	21.58
102-05-TA	9573	20.28	9351	19.81	24794	52.54	40968	86.81	11490	24.35	10697	22.67
034-39-GL	7266	15.39	7304	15.47	19040	40.33	29795	63.12	8695	18.42	8091	17.14
034-39-SA	9373	19.85	9406	19.92	24810	52.56	39101	82.84	11270	23.87	10535	22.31
034-39-ST	13977	29.61	13728	29.08	39280	83.22	58968	124.9	16794	35.58	15610	33.07
034-39-CA	19580	41.48	19296	40.88	54965	116.4	84023	178.0	23444	49.66	22000	46.61
034-39-TA	20938	44.36	20543	43.52	60207	127.5	89109	188.7	25084	53.14	23500	49.78
044-40-GL	19472	41.25	19220	40.72	53552	113.4	83730	177.3	23432	49.64	21832	46.25
044-40-SA	24878	52.70	24263	51.40	71100	150.6	106992	226.6	29798	63.13	27937	59.26
044-40-ST	36564	77.46	35541	75.29	106151	224.8	157719	334.1	43607	92.38	41076	87.02
044-40-CA	51689	109.5	50243	106.4	161232	341.5	224353	475.3	61653	130.6	57480	121.7
044-40-TA	55248	117.0	53771	113.9	171090	362.4	243016	514.8	66954	141.8	61892	131.1

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

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

TABLE 9 - 65mm 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]
042-07-GL	4	0.01	6.5	0.01	5.5	0.01	9.6	0.02	5.6	0.01	5	0.01
042-07-SA	7.7	0.02	10	0.02	8	0.02	15.3	0.03	8.5	0.02	7	0.01
042-07-ST	14	0.03	20	0.04	16	0.03	32.3	0.07	18	0.04	15	0.03
042-07-CA	28	0.06	39	0.08	30	0.06	53.6	0.11	34	0.07	29	0.06
042-07-TA	29	0.06	40	0.08	32	0.07	64.8	0.14	34	0.07	30	0.06
032-15-GL	38	0.08	59	0.13	47	0.10	100	0.21	51	0.11	46	0.10
032-15-SA	63	0.13	90	0.19	71	0.15	150	0.32	78	0.17	72	0.15
032-15-ST	122	0.26	160	0.34	146	0.31	314	0.67	149	0.32	132	0.28
032-15-CA	214	0.45	263	0.56	274	0.58	593	1.26	264	0.56	239	0.51
032-15-TA	224	0.47	279	0.59	294	0.62	654	1.39	276	0.58	248	0.53
022-13-GL	89	0.18	125	0.26	107	0.22	240	0.50	112	0.23	98	0.20
022-13-SA	140	0.29	185	0.39	175	0.37	393	0.83	177	0.37	153	0.32
022-13-ST	260	0.55	321	0.68	335	0.70	775	1.64	319	0.67	289	0.61
022-13-CA	418	0.88	502	1.06	600	1.27	1332	2.82	523	1.10	470	0.99
022-13-TA	456	0.96	531	1.12	665	1.40	1441	3.05	561	1.18	504	1.06
012-10-GL	169	0.35	218	0.46	207	0.43	496	1.05	210	0.44	187	0.39
012-10-SA	251	0.53	305	0.64	331	0.70	768	1.62	310	0.65	277	0.58
012-10-ST	432	0.91	501	1.06	665	1.40	1399	2.96	531	1.12	478	1.01
012-10-CA	677	1.43	729	1.54	1194	2.52	2298	4.86	828	1.75	751	1.59
012-10-TA	712	1.50	771	1.63	1273	2.69	2426	5.13	870	1.84	789	1.67
052-01-GL	886	1.87	939	1.98	2070	4.38	3294	6.98	1086	2.30	1003	2.12
052-01-SA	1185	2.51	1227	2.59	2852	6.04	4477	9.49	1419	3.00	1344	2.84
052-01-ST	1794	3.80	1838	3.89	4573	9.68	7061	14.96	2164	4.58	2022	4.28
052-01-CA	2573	5.45	2629	5.56	6762	14.32	10394	21.93	3105	6.57	2912	6.16
052-01-TA	2742	5.80	2774	5.87	7190	15.23	11056	23.43	3293	6.97	3094	6.55
023-92-GL	1065	2.26	1110	2.35	1990	4.22	3923	8.31	1293	2.74	1165	2.47
023-92-SA	1395	2.96	1500	3.18	2950	6.25	5258	11.14	1710	3.62	1575	3.34
023-92-ST	2124	4.50	2190	4.64	4970	10.53	8602	18.22	2610	5.53	2360	5.00
023-92-CA	3125	6.62	3210	6.80	7675	16.26	12850	27.22	3820	8.09	3485	7.38
013-88-GL	1687	3.57	1787	3.78	3344	7.08	6255	13.25	2048	4.33	1876	3.97
013-88-SA	2240	4.74	2338	4.95	4966	10.52	8506	18.02	2737	5.79	2493	5.28
013-88-ST	3426	7.25	3508	7.43	8258	17.49	13435	28.46	4112	8.71	3817	8.08
013-88-CA	4928	10.44	4957	10.50	12672	26.84	19783	41.91	5943	12.59	5494	11.63
365-02-GL	2171	4.60	2237	4.74	4853	10.28	9410	19.94	2624	5.56	2323	4.92
365-02-ST	4172	8.84	4225	8.95	10947	23.19	16857	38.06	5026	10.65	4733	10.03
014-96-GL	5290	11.21	5470	11.59	13750	29.13	21712	46.00	6380	13.52	5880	124.5
014-96-SA	6900	14.62	6980	14.79	18500	39.19	28211	59.77	8280	17.54	7640	16.19
014-96-ST	10175	21.56	10150	21.50	27300	57.84	42040	89.07	12200	25.85	11250	23.83
014-96-CA	14150	29.98	14200	30.08	39500	83.69	58498	123.9	17050	36.12	15875	33.63
014-96-TA	15300	32.42	15050	31.89	41400	87.71	63804	135.1	18250	38.67	16700	35.38
054-17-GL	11125	23.57	11156	23.64	29762	63.1	47100	99.8	13412	28.42	12341	26.15
054-17-SA	14389	30.49	14256	30.20	38731	82.1	61715	130.7	17351	36.76	16047	34.00
054-17-ST	21116	44.74	20798	44.06	58472	123.8	90323	191.3	25311	53.63	23322	49.41
054-17-CA	30126	63.83	29156	61.77	84632	179.3	130805	277.1	35830	75.91	33287	70.52
054-17-TA	31622	67.00	31126	65.94	88862	188.2	139224	294.9	37724	79.92	35738	75.72
064-63-GL	19817	42.0	19379	41.1	51380	108.8	80752	171.0	23506	49.80	21686	45.9
064-63-SA	24597	52.1	24630	52.2	67754	143.5	106000	224.5	30337	64.27	27901	59.1
064-63-ST	37441	79.3	35100	74.4	104600	221.6	154750	327.8	43487	92.13	40053	84.9
064-63-CA	50200	106.3	47950	101.5	148114	313.8	220500	467.1	60618	128.4	55539	117.6
064-63-TA	52850	111.9	53200	112.7	156500	331.5	222300	470.9	64051	135.7	58300	123.5

TABLE OF FLOW CAPACITIES at 50 PSIG for GAS PROPORTIONERS

TABLE 10 - 150mm FLOW TUBES, GAS FLOW CAPACITIES FOR GAS PROPORTIONERS at 50 PSIG

FLOW TUBE MAXIMUM FLOW RATES							
FLOW TUBE NUMBER	**AIR [mL/min]**	**ARGON [mL/min]**	**CARBON DIOXIDE [mL/min]**	**HELIUM [mL/min]**	**HYDROGEN [mL/min]**	**NITROGEN [mL/min]**	**OXYGEN [mL/min]**
042-15-GL	83	67	97	73	169	85	74
042-15-SA	127	104	146	117	267	131	114
042-15-ST	242	200	265	241	535	249	218
042-15-CA	415	343	437	450	967	426	376
032-41-GL	191	161	203	195	399	197	166
032-41-SA	270	229	279	302	662	283	246
032-41-ST	460	383	478	573	1185	471	442
032-41-CA	743	625	702	1094	2013	771	719
062-01-GL	324	270	346	333	844	331	294
062-01-SA	505	412	494	569	1209	467	460
062-01-ST	825	687	771	1089	2432	833	764
062-01-CA	1275	1062	1132	1972	3732	1303	1175
112-02-GL	1086	855	934	1779	3110	1016	930
112-02-SA	1324	1115	1168	2468	4289	1340	1228
112-02-ST	2024	1717	1724	4083	6740	2034	1905
112-02-CA	2912	2472	2521	6927	9979	2997	2703
082-03-GL	2008	1697	1747	4214	6711	2039	1865
082-03-SA	2590	2186	2264	5656	8995	2643	2503
082-03-ST	3903	3274	3343	8669	14490	3731	3685
082-03-CA	5547	4697	4691	12717	19993	6169	5210
092-04-GL	5528	4794	4954	12540	18862	5801	5381
092-04-SA	7240	6163	6217	15703	25235	7415	6826
092-04-ST	10813	9077	9178	24629	38556	11044	10335
092-04-CA	15322	12904	12879	34709	55936	15433	14451
102-05-GL	9294	7705	7888	19830	30900	9419	8749
102-05-SA	11647	9969	10042	26008	45263	11955	11137
102-05-ST	17311	14489	14420	40831	60300	17525	16353
102-05-CA	24065	20744	20099	59702	86369	24549	22905
034-39-GL	19767	17978	17936	48193	73500	21676	19931
034-39-SA	27514	23001	54010	63240	97000	27449	25800
034-39-ST	38995	33778	33087	98676	142000	40086	36821
034-39-CA	55293	47151	45745	139847	200500	55930	52494
044-40-GL	49374	41899	40520	125617	182239	50258	46851
044-40-SA	62480	53038	51220	159976	231239	63595	59304
044-40-ST	89880	76322	73584	231946	333775	91478	85341
044-40-CA	123846	105182	101303	321265	460942	126041	117615

DIRECT READING SCALES FOR P, Px AND S METERS

TABLE 11 - FLOW TUBES FOR AIR

65mm				150mm			
FLOW TUBE	**QMAX**	**[UNITS]**	**PRESSURE**	**FLOW TUBE**	**QMAX**	**[UNITS]**	**PRESSURE**
042-10-GL	7.00	mL/min	14.70 psia	**042-12-SA**	25.00	mL/min	14.70 psia
032-01-ST	50.00	mL/min	14.70 psia	**032-06-SA**	52.00	mL/min	14.70 psia
062-04-ST	75.00	mL/min	14.70 psia	**042-06-CA**	75.00	mL/min	14.70 psia
022-14-GL	100.00	mL/min	14.70 psia	**032-10-ST**	100.00	mL/min	14.70 psia
032-11-ST	130.00	mL/min	14.70 psia	**042-75-CA**	100.00	mL/min	14.70 psia
032-03-CA	250.00	mL/min	14.70 psia	**032-21-ST**	150.00	mL/min	14.70 psia
022-05-CA	500.00	mL/min	14.70 psia	**062-03-ST**	200.00	mL/min	14.70 psia
052-12-GL	1000.00	mL/min	14.70 psia	**112-10-GL**	300.00	mL/min	14.70 psia
052-04-GL	1.00	L/min	14.70 psia	**112-08-SA**	500.00	mL/min	14.70 psia
023-03-GL	1.15	L/min	14.70 psia	**082-02-GL**	800.00	mL/min	14.70 psia
052-07-ST	2.00	L/min	14.70 psia	**112-19-CA**	1.25	L/min	14.70 psia
013-89-ST	4.00	L/min	14.70 psia	**082-12-ST**	1.80	L/min	14.70 psia
014-03-GL	5.00	L/min	14.70 psia	**092-25-GL**	2.50	L/min	14.70 psia
014-02-ST	10.00	L/min	14.70 psia	**102-07-GL**	4.00	L/min	14.70 psia
044-11-ST	16.00	L/min	14.70 psia	**102-03-SA**	4.50	L/min	14.70 psia
054-01-ST	25.00	L/min	14.70 psia	**092-14-ST**	4.80	L/min	14.70 psia
064-03-ST	40.00	L/min	14.70 psia	**102-01-SA**	5.00	L/min	14.70 psia
052-05-GL	2.20	scfh	14.70 psia	**034-62-GL**	10.00	L/min	14.70 psia
365-18-GL	6.00	scfh	14.70 psia	**102-16-CA**	10.00	L/min	14.70 psia
365-19-ST	10.00	scfh	14.70 psia	**034-13-ST**	17.00	L/min	14.70 psia
034-61-ST	18.00	scfh	14.70 psia	**044-14-GL**	23.00	L/min	14.70 psia
014-17-ST	25.00	scfh	14.70 psia	**044-41-ST**	42.00	L/min	14.70 psia
054-02-ST	50.00	scfh	14.70 psia	**044-16-CA**	60.00	L/min	14.70 psia
064-62-ST	90.00	scfh	14.70 psia	**112-01-CA**	2.50	scfh	14.70 psia
074-02-CA	150.00	scfh	14.70 psia	**092-09-GL**	5.00	scfh	14.70 psia
014-01-CA	0.60	scfm	14.70 psia	**102-06-GL**	8.25	scfh	14.70 psia
				092-10-ST	10.00	scfh	14.70 psia
				102-08-ST	16.50	scfh	14.70 psia
				102-09-CA	23.00	scfh	14.70 psia
				044-05-GL	55.00	scfh	14.70 psia
				044-18-ST	90.00	scfh	14.70 psia
				044-07-ST	94.00	scfh	14.70 psia
				044-23-SA	1.00	scfm	14.70 psia
				044-43-ST	1.50	scfm	14.70 psia

TABLE 12 - FLOW TUBES FOR WATER

65mm				150mm			
FLOW TUBE	**QMAX**	**[UNITS]**	**PRESSURE**	**FLOW TUBE**	**QMAX**	**[UNITS]**	**PRESSURE**
032-04-GL	0.50	mL/min	14.70 psia	**032-05-SA**	1.00	mL/min	14.70 psia
022-08-ST	6.00	mL/min	14.70 psia	**112-12-SA**	10.00	mL/min	14.70 psia
052-09-GL	25.00	mL/min	14.70 psia	**112-05-ST**	20.00	mL/min	14.70 psia
052-08-ST	60.00	mL/min	14.70 psia	**092-02-GL**	50.00	mL/min	14.70 psia
013-02-ST	115.00	mL/min	14.70 psia	**092-08-GL**	60.00	mL/min	14.70 psia
365-01-ST	150.00	mL/min	14.70 psia	**102-11-GL**	100.00	mL/min	14.70 psia
044-09-GL	250.00	mL/min	14.70 psia	**092-06-CA**	200.00	mL/min	14.70 psia
064-05-GL	500.00	mL/min	14.70 psia	**044-15-ST**	1.20	L/min	14.70 psia
054-03-ST	750.00	mL/min	14.70 psia	**044-01-TA**	2.00	L/min	14.70 psia
064-04-SA	1.00	L/min	14.70 psia	**044-12-SA**	0.22	gpm	14.70 psia
064-06-ST	1.20	L/min	14.70 psia	**044-42-CA**	0.45	gpm	14.70 psia
052-16-ST	3.00	L/hr	14.70 psia	**044-10-CA**	29.00	gph	14.70 psia
034-74-ST	2.7	gph	14.70 psia				
064-12-GL	10.00	gph	14.70 psia				
064-09-CA	24.00	gph	14.70 psia				
064-11-TA	32.00	gph	14.70 psia				

DIRECT READING SCALES FOR P, Px AND S METERS

TABLE 13 -FLOW TUBES FOR ARGON

65mm				150mm			
FLOW TUBE	**QMAX**	**[UNITS]**	**PRESSURE**	**FLOW TUBE**	**QMAX**	**[UNITS]**	**PRESSURE**
052-15-SA	1000.00	mL/min	14.70 psia	**062-10-CA**	325.00	mL/min	14.70 psia
013-09-CA	4.5	L/min	14.70 psia	**032-18-GL**	33.00	mL/min	14.70 psia
064-14-SA	26.00	L/min	14.70 psia	**082-11-CA**	2.00	L/min	14.70 psia
023-05-GL	2.50	scfh	14.70 psia	**034-07-ST**	15.00	L/min	14.70 psia
365-17-ST	10.00	scfh	14.70 psia	**044-22-SA**	25.00	L/min	14.70 psia
014-14-ST	22.00	scfh	14.70 psia				
064-01-GL	50.00	scfh	14.70 psia				

TABLE 14 - FLOW TUBES FOR CARBON DIOXIDE

65mm				150mm			
FLOW TUBE	**QMAX**	**[UNITS]**	**PRESSURE**	**FLOW TUBE**	**QMAX**	**[UNITS]**	**PRESSURE**
042-20-SA	10.00	mL/min	14.70 psia	**062-09-GL**	100.00	mL/min	14.70 psia
042-09-ST	20.00	mL/min	14.70 psia	**032-32-ST**	150.00	mL/min	14.70 psia
032-20-GL	55.00	mL/min	14.70 psia	**062-14-ST**	300.00	mL/min	14.70 psia
022-24-SA	220.00	mL/min	14.70 psia	**092-18-SA**	2.5	L/min	14.70 psia
052-14-GL	1.00	L/min	14.70 psia	**034-18-SA**	10.00	L/min	14.70 psia
023-07-ST	2.00	L/min	14.70 psia				
014-18-GL	6.00	L/min	14.70 psia				
014-19-ST	10.00	L/min	14.70 psia				
064-08-ST	35.00	L/min	14.70 psia				

TABLE 15 - DIRECT READING FLOW TUBES FOR FUEL OIL

150mm			
FLOW TUBE	**QMAX**	**[UNITS]**	**PRESSURE**
034-60-GL	3.00	gph	14.70 psia

TABLE 16 - DIRECT READING FLOW TUBES FOR HELIUM

65mm				150mm			
FLOW TUBE	**QMAX**	**[UNITS]**	**PRESSURE**	**FLOW TUBE**	**QMAX**	**[UNITS]**	**PRESSURE**
032-07-SA	65.00	mL/min	14.70 psia	**062-13-GL**	100.00	mL/min	14.70 psia
022-02-GL	120.00	mL/min	14.70 psia	**062-07-CA**	500.00	mL/min	14.70 psia
014-04-GL	30.00	scfh	14.70 psia	**082-05-GL**	1500.00	mL/min	14.70 psia
				082-07-CA	5.00	L/min	14.70 psia
				034-09-ST	40.00	L/min	14.70 psia
				112-03-SA	1.25	scfh	14.70 psia

TABLE 17 - DIRECT READING FLOW TUBES FOR HYDROGEN

65mm				150mm			
FLOW TUBE	**QMAX**	**[UNITS]**	**PRESSURE**	**FLOW TUBE**	**QMAX**	**[UNITS]**	**PRESSURE**
032-13-GL	35.00	mL/min	14.70 psia	**032-12-GL**	100.00	mL/min	14.70 psia
042-01-CA	100.00	mL/min	14.70 psia	**092-15-SA**	20.00	scfh	14.70 psia
032-02-SA	150.00	mL/min	14.70 psia	**044-20-SA**	225.00	scfh	14.70 psia
012-01-GL	600.00	mL/min	14.70 psia				
022-01-CA	1.50	L/min	14.70 psia				
023-01-GL	3.50	L/min	14.70 psia				
013-01-GL	6.00	L/min	14.70 psia				
014-15-ST	42.00	L/min	14.70 psia				
013-08-ST	30.00	scfh	14.70 psia				

DIRECT READING SCALES FOR P, Px AND S METERS

TABLE 18- DIRECT READING FLOW TUBES FOR METHANE

150mm			
FLOW TUBE	**QMAX**	**[UNITS]**	**PRESSURE**
042-03-ST	40.00	mL/min	14.70 psia

TABLE 19- DIRECT READING FLOW TUBES FOR NITROUS OXIDE

150mm			
FLOW TUBE	**QMAX**	**[UNITS]**	**PRESSURE**
112-11-SA	500.00	mL/min	14.70 psia

TABLE 20 - DIRECT READING FLOW TUBES FOR NITROGEN

65mm				150mm			
FLOW TUBE	**QMAX**	**[UNITS]**	**PRESSURE**	**FLOW TUBE**	**QMAX**	**[UNITS]**	**PRESSURE**
042-08-GL	6.00	mL/min	14.70 psia	**062-12-GL**	100.00	mL/min	14.70 psia
032-16-ST	50.00	mL/min	14.70 psia	**032-22-CA**	200.00	mL/min	14.70 psia
032-08-SA	60.00	mL/min	14.70 psia	**062-30-CA**	300.00	mL/min	14.70 psia
022-15-GL	120.00	mL/min	14.70 psia	**112-06-SA**	500.00	mL/min	14.70 psia
022-06-SA	200.00	mL/min	14.70 psia	**032-31-GL**	50.00	mL/min	14.70 psia
014-16-ST	12.00	L/min	14.70 psia	**092-05-GL**	2.00	L/min	14.70 psia
064-13-GL	20.00	L/min	14.70 psia	**102-21-ST**	7.00	L/min	14.70 psia
				034-24-ST	14.00	L/min	14.70 psia
				044-25-CA	50.00	L/min	14.70 psia
				044-24-TA	66.00	L/min	14.70 psia
				044-06-ST	1.60	scfm	14.70 psia

TABLE 21 - DIRECT READING FLOW TUBES FOR OXYGEN

65mm				150mm			
FLOW TUBE	**QMAX**	**[UNITS]**	**PRESSURE**	**FLOW TUBE**	**QMAX**	**[UNITS]**	**PRESSURE**
042-21-ST	10.00	mL/min	14.70 psia	**032-33-ST**	150.00	mL/min	14.70 psia
032-09-GL	35.00	mL/min	14.70 psia	**062-02-ST**	250.00	mL/min	14.70 psia
032-19-GL	50.00	mL/min	14.70 psia	**112-04-SA**	400.00	mL/min	14.70 psia
022-07-ST	300.00	mL/min	14.70 psia	**062-16-CA**	600.00	mL/min	14.70 psia
012-02-ST	500.00	mL/min	14.70 psia	**082-08-SA**	1.00	L/min	14.70 psia
052-02-GL	1.00	L/min	14.70 psia	**102-12-SA**	5.00	L/min	14.70 psia
013-25-ST	4.00	L/min	14.70 psia	**102-17-CA**	10.00	L/min	14.70 psia
034-08-ST	8.00	L/min	14.70 psia	**034-15-ST**	16.50	L/min	14.70 psia
044-04-ST	15.00	L/min	14.70 psia	**044-19-CA**	58.00	L/min	14.70 psia

TABLE 22 - DIRECT READING FLOW TUBES FOR PROPANE

150mm			
FLOW TUBE	**QMAX**	**[UNITS]**	**PRESSURE**
092-01-ST	4.20	L/min	14.70 psia
102-02-CA	10.00	L/min	14.70 psia
044-02-ST	38.00	L/min	14.70 psia