

Water Technologies

Wallace & Tiernan® Flow Measurement Equipment

Glass Tube Varea-Meter® Units

SIEMENS

Features

Rugged, One-Piece Enclosure

The welded, deep-formed frame is heavy gauge 302 stainless steel. It protects tube alignment from pipe strain, makes for easy assembly with minimum number of parts.

Positive Tube Seating, Easy Tube Removal

An external clamp locks the tube in place. An O-ring gasketed tube retainer gives positive tube seating and sealing. Yet tube removal is quick and easy. The clamp is loosened and the tube lifted out. There is no spring in the flow stream to foul or corrode. O-rings are the same size, minimizing the number of wearable spares.

Convenient to Connect

Horizontal end fittings rotate through 360 degrees. Piping can be brought in from any direction. End fittings for vertical connection are available also.

Glass Tube Varea-Meter® Flow Measurement Unit



Size for Size, Greater Capacity, Cost Less

Varea-Meter® floats have their metering discs between the upper and lower bodies. The resultant short lower body permits greater pressure recovery and restricts flow less than other designs. This float design allows tubes to be made with a taper that gives low pressure drop plus high capacity for the tube, size. Often a smaller Varea-Meter® unit can be specified for a given capacity at less cost.

Convenient Capacity Change

All viscosity-immune floats for any given-size tube have similar characteristic flow curves. Thus, capacity can usually be changed by changing the float only. The same percentage flow scale may be used and the meter will not lose its inherent accuracy of 2% of full scale.

Key Benefits:

- Rugged, welded frame for superior lifespan of meter
- Versatile design allows for end connections in NPT and flanged, horizontal or vertical, or any combination
- Wide choice of capacities in liquid or gas service
- Highly stable through full range of scale for gas and liquids
- Easily adaptable to multiple mounting configurations
- Standard accuracy of $\pm 2\%$ Full Scale with special calibration to $\pm 1\%$



3/4-inch Varea-Meter® unit with 10-inch scale and standard enclosure.

Technical Data

Accuracy

2% of full scale. To 1% of full scale with special calibration.

Capacity

0.24 to 140 gpm water or 1.0 to 587 scfm air.

Range

10 to 1.

Pressure-temperature rating

350 psi and 200°F maximum (See chart on page 3)

Tubes

3/8- to 2-inch sizes are beaded types. Made of high quality borosilicate glass to very close tolerances.

Scales

Meters with 5- or 10-inch scales available. Scales may be fused on the tubes or detached. Detached scales are aluminum with etched white graduations on black background.

Scale Units

Percent is standard. Gpm water, scfm air, or specific-unit graduations are also available.

End Fittings

For vertical or horizontal connection. Both types available with screwed connections and with 150-lb raised-face flange. (See page 6)

Enclosure

The enclosure is a welded one-piece heavy gauge, 302 stainless steel. Standard front and rear tube shields have clear polycarbonate windows and stainless steel bezels.

Materials

Wetted parts are available in a selection of materials which provide a range of chemical resistance. (See table on page 3)

Mounting

May be pipeline mounted with vertical or horizontal connections. Optional are brackets for wall mounting or bezel for flush panel mounting.

Dimensions

All critical dimensions conform to ISA Recommended Practice. See page 8 and literature numbers:

WT.520.100.100.UA.CN

WT.520.100.102.UA.CN

WT.520.100.104.UA.CN

Materials of Construction

END FITTINGS	BRASS ¹	CARBON STEEL	316 STAINLESS	PVC ²
RETAINERS	TFE ³	KYNAR® - to 180°F		
O-RINGS	TFE ³	Buna N	Viton®	EPR (ethylene propylene rubber)
FLOATS	Hastelloy® C and 316 Stainless			
TUBE	Borosilicate glass			
FRAME	302 stainless steel			

¹ 2" brass available in 150lb. flange only.

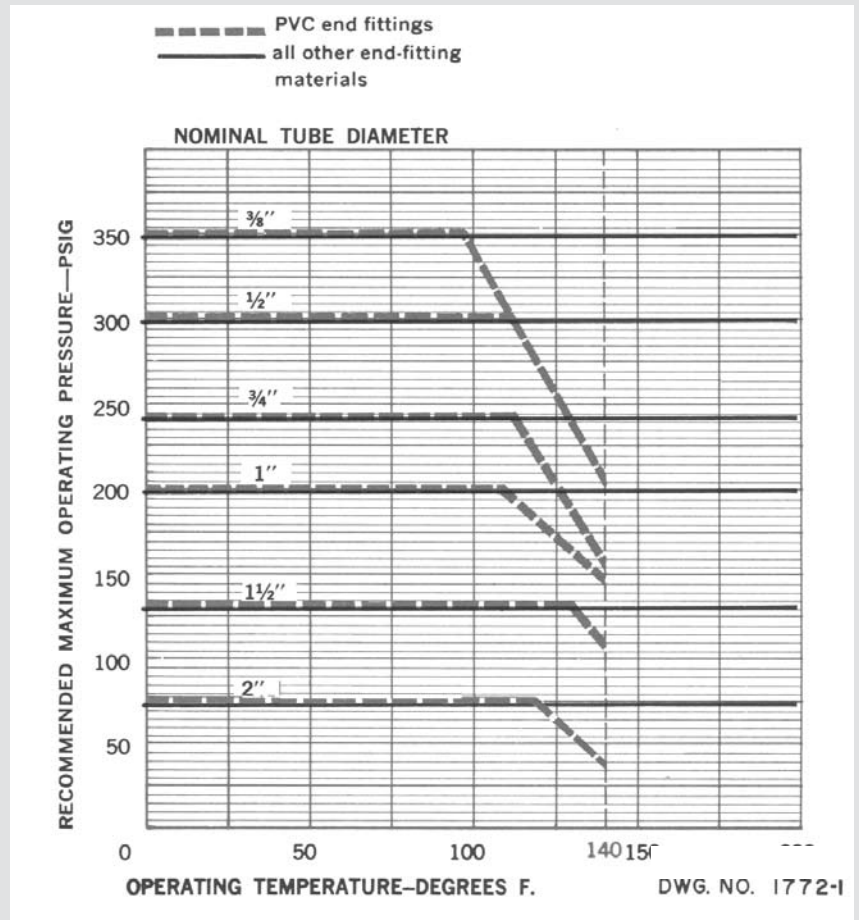
² 2" PVC available in NPT only.

³ TFE O-rings available with TFE tube retainers only.

Note: Do not use glass tube meters for fluids which are toxic, hazardous or which attack glass. For such applications, write for WT.520.205.000.UA.PS on the metal tube Varea-Meter® units. Write for literature WT.500.001.000.UA.CG, which is a detailed listing of meter compatibility with a wide range of fluids.

Recommended Maximum Operating Temperatures and Pressures

The information in this graph is based on the best practices known to Siemens Water Technologies Corp. It should not be assumed that the information is complete or that all possible circumstances, safety measures, precautions, etc., have been included. Since the conditions of use are beyond its control, Siemens Water Technologies Corp. makes no guarantee of results and assumes no liability in connection with the information contained herein. (Pressure and temperature limitations may be determined by components other than the tube.)



LIQUID SERVICE

Selection Procedure

Determine the capacity range, temperature and pressure capability, materials of construction, and options required for each meter. (See Pg. 3)

From Chemical Supplier determine Float Material. If the liquid is other than water, the desired units are other than GPM, its flow rate must be converted to GPM water (Equivalent Flow Rate).

How to Determine Water Equivalent

For liquids with viscosities greater than viscosity ceiling table 1, pages 6 and 7, consult distributor. For liquids with specific gravities other than 1, follow the formula to determine Equivalent Flow Rate Q_E in GPM

$$\begin{aligned} \text{Equivalent Flow Rate} &= \text{Desired Flow Rate} \times \text{Correction Factors} \\ Q_E \text{ GPM} &= Q_D \times F_E \times F_U \end{aligned}$$

1. From Table A determine F_E from Specific Gravity Correction factors.
2. From Table B determine F_U from Unit Conversion factors.
3. Work formula to obtain Equivalent Flow Rate (Q_E).
4. Use Equivalent Flow Rate to select tube and float code from Table 1, pages 6 and 7.

TABLE A
LIQUID SPECIFIC GRAVITY CORRECTION F_E

Specific Gravity	Float Material	
	F_E 316 Stainless Steel	F_E Hastelloy C
0.50	0.682	0.642
0.55	0.718	0.675
0.60	0.753	0.709
0.65	0.786	0.739
.070	0.818	0.768
0.75	0.851	0.798
0.80	0.882	0.827
0.85	0.912	0.854
0.90	0.941	0.882
0.95	0.971	0.909
1.00	1.000	0.937
1.05	1.026	0.962
1.10	1.055	0.988
1.15	1.083	1.012
1.20	1.110	1.036
1.25	1.137	1.062

Specific Gravity	Float Material	
	F_E 316 Stainless Steel	F_E Hastelloy C
1.30	1.164	1.086
1.35	1.192	1.112
1.40	1.218	1.136
1.45	1.244	1.159
1.50	1.271	1.184
1.55	1.296	1.208
1.60	1.323	1.231
1.65	1.347	1.254
1.70	1.374	1.278
1.75	1.400	1.300
1.80	1.426	1.324
1.85	1.450	1.346
1.90	1.475	1.368
1.95	1.503	1.393
2.00	1.527	1.415

To determine F_E for specific gravities not shown in Table A use liquid specific gravity correction equation.

TABLE B
UNIT CONVERSION F_U

IMP GAL/MIN	X	1.201	=	GAL/MIN
LTR/MIN	X	0.2642	=	GAL/MIN
LBS/MIN	X	$0.1198 \div S_L$	=	GAL/MIN
KILOGRAMS/MIN	X	$0.2641 \div S_L$	=	GAL/MIN

Liquid Specific Gravity Correction Equation

$$F_E = \sqrt{\frac{6.96 \times S_L}{S_F - S_L}}$$

F_E = Equivalence factor
 S_L = Specific gravity of liquid
 S_F = Specific gravity of float

SPECIFIC GRAVITY OF FLOAT (S_F)
 316SS = 7.96
 HAST 'C' = 8.94

GAS SERVICE

Selection Procedure

Determine the capacity range, temperature and pressure capability, materials of construction, and options required for each meter. (See Pg. 3) From Chemical Supplier determine Float Material. Table 1 capacities, pages 6 and 7 are air SCFM at 14.7 PSIA & 70°F. If the gas is other than the above, its flow rate must be converted to SCFM air (Equivalent Flow Rate).

How to Determine Air Equivalent

1. From Table A select appropriate Formula to determine Equivalent Flow Rate (Q_E).
2. From Table B determine F_G from Specific Gravity Correction factors.
3. From Table C determine F_P from Pressure Correction factors.
4. From Table D determine F_T from Temperature Correction factors.
5. From Table F determine F_U from Unit Conversion factors.
6. Work Formula to obtain Equivalent Flow Rate (Q_E).
7. Use Equivalent Flow Rate to select tube and float code from Tables 1, Pages 6 and 7

TABLE A
FORMULAS

Fluid Condition	Equivalent Flow Rate	=	Desired Flow Rate	X	Correction Factors
Standard (Q _S)	Q _E (SCFM)	=	Q _S	X	F _G x F _P x F _T x F _U
Operating (Q _{OP})	Q _E (SCFM)	=	Q _{OP}	X	F _G x 1/F _P x 1/F _T x F _U
Weight (W)	Q _E (SCFM)	=	W x 13.33*	X	1/F _G x F _P x F _T x F _U

*Substitute 11.88 for 13.33 when using Hastelloy® C float.

TABLE B
GAS SPECIFIC GRAVITY CORRECTION F_G

$F_G = \sqrt{\text{SP.GR} \times \frac{7.96}{\text{FLOAT SP.GR.}}}$					
Gas SP.GR. At 70° & 14.7 PSIA	F _G 316SS	F _G HAST C	GAS SP.GR. AT 70° & 14.7 PSIA	F _G 316SS	F _G HAST C
2.445 (Chlorine)	1.562	1.475	.965 (Nitrogen)	.982	.927
1.520 (Carbon Dioxide)	1.232	1.163	.587 (Ammonia)	.766	.723
1.103 (Oxygen)	1.049	0.990	.138 (Helium)	.372	.351
1.000 (Air)	1.000	0.944	.0696 (Hydrogen)	.264	.249

TABLE C
OPERATING PRESSURE CORRECTION F_P

$F_P = \sqrt{\frac{14.7}{14.7 + \text{psig}}}$									
OPER. PRESS. Hg. Vac.	FACTOR F _P	OPER. PRESS. PSIG	FACTOR F _P	OPER. PRESS. PSIG	FACTOR G _P	OPER. PRESS. PSIG	FACTOR F _P	OPER. PRESS. PSIG	FACTOR F _P
1"	1.017	0	1.000	9	0.787	55	0.459	140	0.308
2"	1.035	½	0.983	10	0.772	60	0.443	160	0.290
3"	1.054	1	0.968	15	0.704	65	0.429	180	0.275
4"	1.074	2	0.938	20	0.651	70	0.416	200	0.262
5"	1.096	3	0.911	25	0.608	75	0.404	220	0.250
6"	1.118	4	0.887	30	0.574	80	0.394	240	0.240
7"	1.142	5	0.864	35	0.545	85	0.384	260	0.231
8"	1.168	6	0.843	40	0.518	90	0.374	280	0.223
9"	1.196	7	0.823	45	0.496	100	0.358	300	0.216
10"	1.226	8	0.806	50	0.476	120	0.331	350	0.201

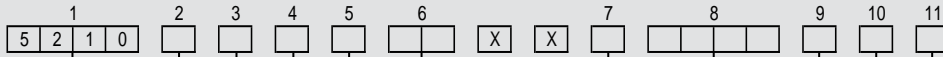
TABLE D
OPERATING TEMPERATURE CORRECTION F_T

$F_T = \sqrt{\frac{460 + F}{530}}$					
Oper. Temp. F	Factor F _T	Oper. Temp. F	Factor F _T	Oper. Temp. F	Factor F _T
0	.932	70	1.000	140	1.064
10	.942	80	1.009	150	1.073
20	.952	90	1.019	160	1.082
30	.962	100	1.028	170	1.091
40	.972	110	1.037	180	1.099
50	.981	120	1.046	190	1.108
60	.991	130	1.055	200	1.116

TABLE E
UNIT CONVERSION F_U

LITERS/MIN	X	0.03532	=	CU FT/MIN
CU. METERS/MIN	X	35.316	=	CU FT/MIN
LB/MIN	X	1.0	=	LB/MIN
KG/MIN	X	2.205	=	LB/MIN

ORDERING PROCEDURE 5" GLASS TUBE GAS OR LIQUID SERVICE



1 - Basic Arrangement

5210

2 - Float Type

Code	Description
B	5" Scale

3 - Connections

Code	Description		
0	In/Out	Vertical	NPT
1	In/Out	Horiz.	NPT
2	In/Out	Vertical	150 lb
3	In/Out	Horiz.	150 lb
H	In	Vertical	NPT
	Out	Horiz.	NPT
I	In	Horiz.	NPT
	Out	Vertical	NPT
J	In	Vertical	150 lb
	Out	Horiz.	150 lb
K	In	Horiz.	150 lb
	Out	Vertical	150 lb
L	In	Vertical	NPT
	Out	Horiz.	150 lb
M	In	Horiz.	150 lb
	Out	Vertical	NPT
P	In	Vertical	150 lb
	Out	Horiz.	NPT
R	In	Horiz.	NPT
	Out	Vertical	150 lb

4 - End Fittings

Code	Description
1	Brass
2	316 Stainless
3	CRS
4	PVC

5 - Retainers and O-Rings

Code	Description	
Standard		
1	Kynar®	(BUNA N)
Optional		
2	Kynar®	(Viton®)
3	TFE	(TFE)
4	Kynar®	(EPR)
A	TFE	(BUNA N)
B	TFE	(Viton®)
C	TFE	(EPR)

See Tech. Data Section for Temp. & Press. Limits

TABLE 1

ORDERING NUMBERS FOR TUBES AND FLOATS

Equivalent Capacity		Connections IPS	min operating press. for gas service, PSIG	Viscosity Ceiling, CSS	Pressure drop inches Water	Tube Code	Float Code
GPM	SCFM						
0.24	1.0	1/2	0	3.0	1.4	06	A202
0.32	1.3	1/2	0	2.6	2.5	06	A204
0.40	1.6	1/2	0	2.0	4.4	06	A206
0.49	2.2	1/2	0	2.0	7.6	06	A208
0.59	2.6	1/2	0	2.0	7.6	06	A210
0.71	3.1	1/2	0	3.0	2.5	06	A402
0.84	3.6	1/2	0	2.0	4.4	06	A404
1.00	4.5	1/2	0	2.0	6.3	06	A406
1.20	5.2	1/2	30	3.0	9.5	06	A408
1.50	6.3	1/2	30	3.0	12	06	A410
1.38	6.0	1/2	0	4.0	10	08	B402
1.90	7.9	1/2	30	1.5	18	08	A412
1.70	7.3	1/2	0	4.5	14	08	B404
2.00	8.9	1/2	0	3.8	20	08	B406
2.50	10.9	1/2	0	3.5	29	08	B408
2.90	12.8	1/2	0	3.0	43	08	B410
2.80	12.5	3/4	0	3.0	5.0	12	C402
3.70	16.6	1/2	30	3.8	66	08	B412
3.40	15.0	3/4	0	3.1	7.6	12	C404
4.30	19.8	1/2	30	3.5	88	08	B414
4.00	17.7	3/4	0	3.2	10	12	C406
4.60	20.0	3/4	0	3.1	13	12	C408
5.00	21.0	1/2	30	1.0	107	08	B434*
5.60	26.0	3/4	0	1.0	18	12	C428*
5.90	25.0	3/4	30	20.0	5.5	12	C410
5.70	25.0	1	0	10.0	5.0	16	D402
7.00	30.0	3/4	30	9.8	30	12	C412
6.90	30.0	1	0	14.0	7.6	16	D404
8.50	37.0	3/4	30	5.6	42	12	C414
8.10	34.0	1	0	14.0	10	16	D406
10.00	41.0	3/4	30	3.0	53	12	C416
9.80	42.0	1	30	12.0	15	16	D408
11.60	48.0	1	30	16.0	20	16	D410
11.50	48.0	1 1/2	0	15.0	5.0	24	E402
12.50	59.0	3/4	30	1.0	88	12	C436*
14	62	1	30	20	34	16	D412
14	60	1 1/2	0	15	7.6	24	E404
18	70	1	30	13	45	16	D414
17.5	73	1 1/2	0	24	12	24	E406
21	91	1	30	4.0	64	16	D416
21	89	1 1/2	0	22	16	24	E408
24	104	1	30	1.0	79	16	D434*
23	99	1 1/2	0	1.0	18	24	E426*
26	112	2	0	34	5	32	F402
26	113	1 1/2	30	14	23	24	E410
29	124	1 1/2	0	1.0	25	24	E428*
29	127	1	0	1.0	98	16	D436*
32	140	1 1/2	30	30	33	24	E412
31	131	2	0	36	12.6	32	F404
38	155	1 1/2	30	16	42	24	E414
37	155	2	0	37	21	32	F406
43	175	2	0	1.0	20	32	F424*
46	200	1 1/2	30	7.0	62	24	E416
48	181	2	30	39	28	32	F408
52	212	2	0	1.0	29	32	F426*
53	241	1 1/2	30	1.0	82	24	E434*
65	233	2	30	40	46	32	F410
69	281	1 1/2	30	1.0	106	24	E436*
81	264	2	30	42	63	32	F412
88	320	2	30	30	84	32	F414
91	406	2	30	13	104	32	F416
127	511	2	30	1.0	181	32	F434*
140	587	2	30	1.0	230	32	F436*

6 - Tube Size

From Shaded Area in Table 1

7 - Scale

Code	Description
A	Special Gas Fused
B	Special Gas Detached
D	% Air Detached
H	Special Liquid Fused
I	Special Liquid Detached
P	% Water Detached

8 - Float

From Shaded Area in Table 1

9 - Float Material

Code	Description
S	316SS
H	Hastelloy® C

10 - Accessories

Code	Description
X	None
D	Panel Mtg. Brackets (opt.)
K	Flush Mtg. Brackets (opt.)

11 - Tag

Code	Description
X	None (Standard)
1	Stainless Steel

Ordering Procedure

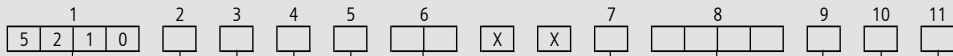
Example: To order a 1/2" Glass tube meter with 5" scale length, 316 SS float, NPT Vertical In/Out Carbon Steel end fittings, Kynar® retainers, Buna O-rings, a capacity of 2.0 GPM Water, standard percent calibration, detached scale, no accessories & no tag specify:

5210 B 0 3 1 0 8 X X P B406 S X X

Note: Your order number should consist of 20 characters.

*Indicates a Non-Viscosity (NVI) float configuration all other floats are viscosity (VI) types.

ORDERING PROCEDURE 10" GLASS TUBE GAS OR LIQUID SERVICE



1 - Basic Arrangement

5210

2 - Float Type

Code	Description
G	10" Scale

3 - Connections

Code	Description
0	In/Out Vertical NPT
1	In/Out Horiz. NPT
2	In/Out Vertical 150 lb
3	In/Out Horiz. 150 lb
H	In Vertical NPT
	Out Horiz. NPT
I	In Horiz. NPT
	Out Vertical NPT
J	In Vertical 150 lb
	Out Horiz. 150 lb
K	In Horiz. 150 lb
	Out Vertical 150 lb
L	In Vertical NPT
	Out Horiz. 150 lb
M	In Horiz. 150 lb
	Out Vertical NPT
P	In Vertical 150 lb
	Out Horiz. NPT
R	In Horiz. NPT
	Out Vertical 150 lb

4 - End Fittings

Code	Description
1	Brass
2	316 Stainless
3	CRS
4	PVC

5 - Retainers and O-Rings

Code	Description
Standard	
1	Kynar® (BUNA N)
Optional	
2	Kynar® (Viton®)
3	TFE (TFE)
4	Kynar® (EPR)
A	TFE (BUNA N)
B	TFE (Viton®)
C	TFE (EPR)

See Tech. Data Section for Temp. & Press. Limits

TABLE 1
ORDERING NUMBERS FOR TUBES AND FLOATS

Equivalent Capacity	Connections IPS		min operating press. for gas service, PSIG	Viscosity Ceiling, CSS	Pressure drop inches Water	Tube Code	Float Code
	GPM	SCFM					
0.24	1.0	1/2	0	3.0	0.8	06	A202
0.32	1.3	1/2	0	2.6	2.5	06	A204
0.39	1.7	1/2	0	2.0	3.5	06	A206
0.48	2.1	1/2	0	2.0	5.6	06	A208
0.58	2.5	1/2	0	2.0	7.4	06	A210
0.70	3.0	1/2	0	3.0	3.8	06	A402
0.82	3.6	1/2	0	2.0	5.7	06	A404
1.0	4.3	1/2	0	2.0	8.8	06	A406
1.2	5.0	1/2	30	3.0	13	06	A408
1.4	6.0	1/2	30	3.0	15	06	A410
1.4	6.0	1/2	0	4.0	8.8	08	B402
1.7	7.3	1/2	30	1.5	21	06	A412
1.7	7.2	1/2	0	4.5	14	08	B404
2.0	8.9	1/2	0	3.8	20	08	B406
2.5	10.8	1/2	0	3.5	30	08	B408
2.9	12.7	1/2	30	3.0	44	08	B410
2.9	12.4	3/4	0	3.0	5.0	12	C402
3.6	16.2	1/2	30	3.8	63	08	B412
3.5	15.1	3/4	0	3.1	7.6	12	C404
4.2	19.0	1/2	30	3.5	81	08	B414
4.0	17.8	3/4	0	3.2	10	12	C406
4.6	22.0	1/2	30	1.0	96	08	B434*
4.7	20.5	3/4	0	3.1	14	12	C408
5.8	25.1	3/4	0	1.0	18	12	C428*
5.9	24.8	3/4	30	5.5	20	12	C410
5.6	24.8	1	0	10.0	5.0	16	D402
7.0	30.5	3/4	30	9.8	29	12	C412
6.9	30.3	1	0	14.0	7.6	169	D404
8.3	36.1	3/4	30	5.6	43	12	C414
8.2	36.4	1	0	14.0	10	16	D406
9.9	43.8	3/4	30	3.0	53	12	C416
9.7	42.3	1	30	12.0	15	16	D408
11.4	49.9	1	30	16.0	20	16	D410
11.5	53.9	3/4	30	1.0	76	12	C436*
11.6	50	1 1/2	0	15	4.8	24	E402
14	62	1	30	20	32	16	D412
14.7	62	1 1/2	0	15	6.9	24	E404
17.3	79	1	30	13	44	16	D414
17.7	75	1 1/2	0	24	11	24	E406
21.2	98	1	30	4.0	64	16	D416
22	92	1 1/2	0	22	16	24	E408
23.8	107	1	30	1.0	76	16	D434*
24.2	106	1 1/2	0	1.0	16	24	E426*
27	121	1	30	1.0	90	16	D436*
26.4	112	1 1/2	30	14	21	24	E410
26.5	109	2	0	34	5.7	32	F402
29.5	129	1 1/2	0	1.0	25	24	E428*
31.6	138	1 1/2	30	30	31	24	E412
31.5	131	2	0	36	7.6	32	F404
37.5	169	1 1/2	30	16	39	24	E414
37.3	154	2	0	37	10	32	F406
43	176	2	0	1.0	18	32	F424*
45.6	189	1 1/2	30	7.0	57	24	E416
45	183	2	30	39	18	32	F408
51.3	214	2	0	1.0	25	32	F426*
51.7	240	1 1/2	30	1.0	69	24	E434*
57	234	2	30	40	19	32	F410
59.9	254	1 1/2	30	1.0	88	24	E436*
67.8	283	2	30	42	29	32	F412
79	331	2	30	30	43	32	F414
93.6	387	2	30	13	61	32	F416
115	491	2	30	1.0	147	32	F434*
126.5	521	2	30	1.0	164	32	F436*

6 - Tube Size

From Shaded Area in Table 1

7 - Scale

Code	Description
A	Special Gas Fused
B	Special Gas Detached
D	% Air Detached
H	Special Liquid Fused
I	Special Liquid Detached
P	% Water Detached

8 - Float

From Shaded Area in Table 1

9 - Float Material

Code	Description
S	316SS
H	Hastelloy® C

10 - Accessories

Code	Description
X	None
E	Panel Mtg. Brackets (opt.)
L	Flush Mtg. Brackets (opt.)

11 - Tag

Code	Description
X	None (Standard)
1	Stainless Steel

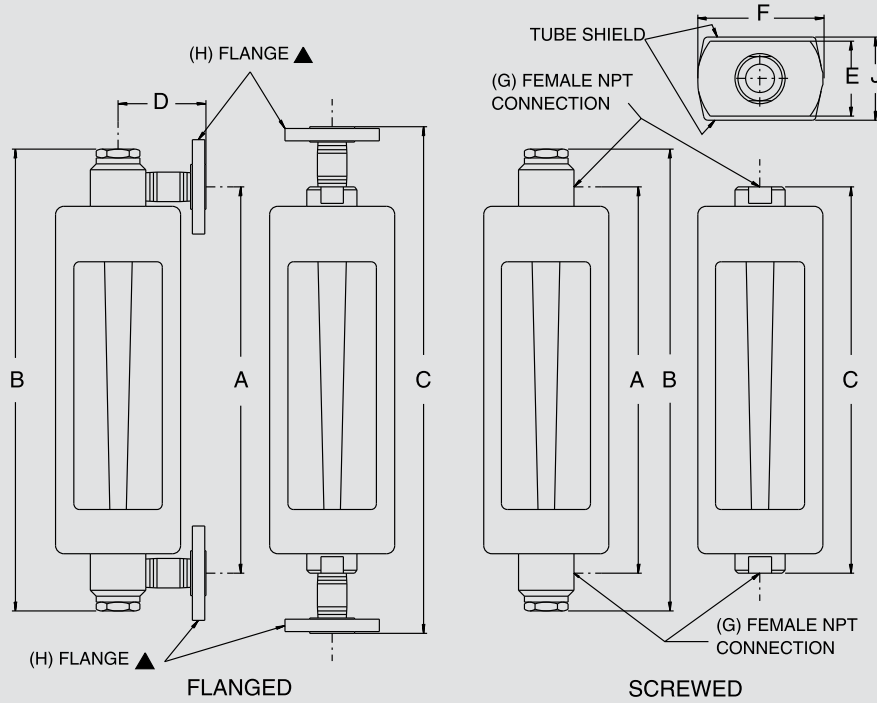
Ordering Procedure

Example: To order a 1" Glass tube meter with 10" scale length, 316 SS float, NPT Vertical In/Out 316 stainless steel end fittings, Kynar® retainers, Buna O-rings, a capacity of 62 SCFM of air, standard percent calibration, detached scales, no accessories & no tag specify:
5210 G 0 2 1 16 X X D D412 S X X

Note: Your order number should consist of 20 characters.

*Indicates a Non-Viscosity (NVI) float configuration all other floats are viscosity (VI) types.

Glass Tube Varea-Meter® Units with Screwed and Flanged End Fittings



TUBE SIZE	SCALE LENGTH	A (HORIZ)	B (HORIZ)	C (VERTICAL)		D	E	F	G	H	J
				SCR®D	150#						
3/8"	5"	11 1/2" (292)	14 3/8" (365)	12 3/8" (314)	17 7/8" (454)	3 1/2" (89)	2 1/2" (64)	3 3/4" (95)	1/2" (13)	1/2" (13)	3 1/8" (79)
	10"	16 1/2" (419)	19 3/8" (492)	17 3/8" (441)	22 7/8" (581)						
1/2"	5"	11 1/2" (292)	14 3/8" (365)	12 3/8" (314)	17 7/8" (454)	3 1/2" (89)	2 1/2" (64)	3 3/4" (95)	1/2" (13)	1/2" (13)	3 1/8" (79)
	10"	16 1/2" (419)	19 3/8" (492)	17 3/8" (441)	22 7/8" (581)						
3/4"	5"	12 1/2" (318)	15 5/8" (397)	12 1/2" (318)	18 3/4" (476)	4" (102)	2 1/2" (64)	3 1/2" (13)	3/4" (19)	3/4" (19)	3 1/8" (79)
	10"	17 1/2" (445)	20 5/8" (524)	17 1/2" (445)	22 3/4" (578)						
1"	5"	12 1/2" (318)	16" (406)	12 1/2" (318)	18 3/8" (467)	4" (102)	3 1/4" (83)	4 3/4" (121)	1" (25)	1" (25)	4 3/16" (106)
	10"	17 1/2" (445)	21" (533)	17 1/2" (445)	23 3/8" (594)						
1 1/2"	5"	15 1/2" (394)	18 1/2" (470)	15 1/2" (394)	22 3/4" (578)	5" (127)	4 1/4" (108)	5 3/4" (146)	1 1/2" (38)	1 1/2" (38)	5 1/2" (140)
	10"	20 1/2" (521)	23 1/2" (597)	20 1/2" (521)	27 3/4" (705)						
2"	5"	16" (406)	24 5/8" (625)	19 1/8" (486)	20" (508)	5" (127)	5" (127)	6 1/4" (159)	2" (51)	2" (51)	6 5/8" (168)
	10"	21" (533)	29 5/8" (752)	24 1/8" (613)	25" (635)						

▲Note: 1 1/16" raised face except flat face on PVC flanges.
Connections may be rotated 360° in horizontal plane.
Dimensions are in inches (mm).

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