

BROOKS**1350G & 1355G Glass Tube Variable Area Flowmeters**

Low Flow, 65 & 150 mm Tubes, Optional Constant Diff. Pressure Regulators

DESCRIPTION

The Brooks® Sho-Rate™ 1350 & 1355 Series glass tube variable area flow meter has been the industry standard glass tube variable area meter for decades. This glass tube meter is ideal for a variety of gas and liquid applications. These meters are particularly well suited for purge applications.

The base configuration uses a borosilicate glass tube installed in an aluminum frame with 316SS end blocks, adaptors, and valve. Additional material options, valve options, and flow controllers are available to provide the appropriate configuration for a wide variety of applications.

Features:

- Standard direct read scales on tube
- Standard millimeter scales with flow curves for all fluids and fluid conditions (user selected)
- Scale length (approximate) 65mm, 150mm
- Magnifier built into front shield
- Flowmeter options:
 - No valve, cartridge valve and precision control valve
 - Inlet & outlet valves
 - Integral flow controller, upstream & downstream
 - Multiple connection fittings to fit all applications
 - Multiple approval certifications for world wide usage



SPECIFICATIONS	Model	
	1350	1355
Accuracy	±5% (Direct Reading Scales @ Standard Conditions)	±3% (Direct Reading Scales @ Standard Conditions)
Repeatability	0.25% F.S.	
Pressure/Temperature	200 psig (33-250°F)/ 13.8 bar (1-121°C)	
Materials of Construction	Borosilicate glass, Brass, Aluminum, 316 Stainless Steel, Clear Polycarbonate, Milk White Polycarbonate, Teflon®	
End Block Options	Stainless Steel & Brass	
Elastomer Seals	Viton® fluoroelastomers, Teflon®, Buna, Kalrez® perfluoroelastomers	
Float Materials	Glass, Sapphire, Stainless Steel, Carboly® Tantalum	
Connection Materials	Stainless Steel	
Connection Options	1/8" NPT (w/wo locknuts) 1/4" NPT (w/wo locknuts) 1/8" Compression (w/wo locknuts) 1/4" Compression (w/wo locknuts) 6 mm Compression (w/wo locknuts) 1/4" Rc (BSPT), w/wo locknuts 3/8" Rc (BSPT), w/wo locknuts 1/4" VCR® 1/4" ID Hose Swagelok® Converters	
Valve Options	Cartridge III Valve and NRS™	
Valve Materials	Stainless Steel	
Flow Controller	Optional Model 8800 Constant Differential Pressure Regulator Available	

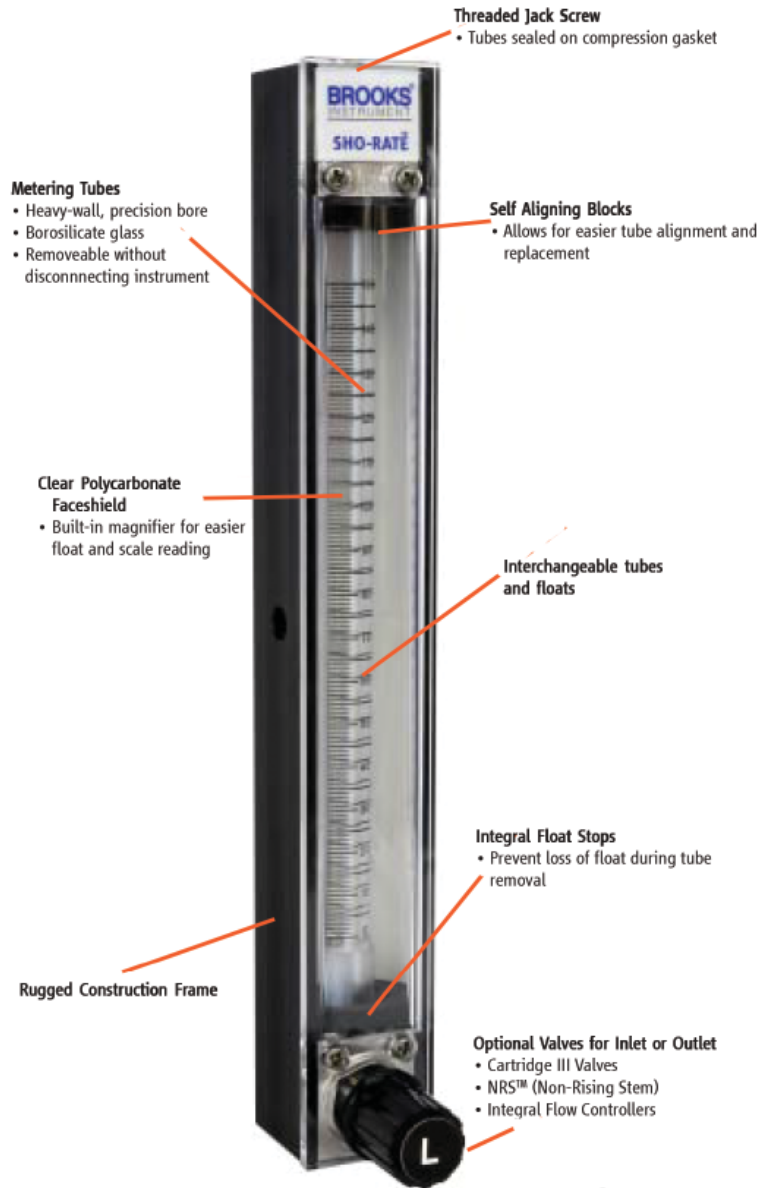
Product Specifications - Capacities; 1350G, Rib Guided, Spherical Floats, 65 mm Flow Tubes

Meter Size	Tube No.	Float Material	Water				*Air			
			GPH	Code	LPH	Code	SCFH	Code	NLPH	Code
2	R-2-65-A G	Glass	0.010	JB6	0.041	JB9	0.12	JB7	3.2	JB8
		Saphire	0.021	JC4	0.079	JC2	0.19	JC6	5.0	JC1
		STN. STL.	0.049	JC8	0.18	JC5	0.37	JC7	9.8	JC6
		Carboloy	0.10	JB4	0.36	LB5	0.68	JB2	17	JB3
		Tantalum	0.10	JD2	0.40	JC9	0.71	JD1	18	JD3
	R-2-65-B G	Glass	0.014	KB8	0.06	KB2	0.16	KB7	4.4	KB9
		Saphire	0.028	KC1	0.10	KD3	0.25	KC2	6.7	KC3
		STN. STL.	0.07	KC5	0.25	KC6	0.48	KC7	12	KC8
		Carboloy	0.12	KB4	0.48	KB5	0.80	KB3	21	KB6
		Tantalum	0.14	KD2	0.53	KD5	0.87	KD4	22	KD1
	R-2-65-C G	Glass	0.12	LB9	0.47	LB7	0.99	LB6	26	LB8
		Saphire	0.22	LC1	0.83	LC2	1.3	LC3	35	LC4
		STN. STL.	0.41	LC7	1.5	LC8	2.1	LC9	55	LC6
		Carboloy	0.65	LB3	2.4	LB2	3.1	LB4	81	LB5
		Tantalum	0.70	LD1	2.6	LD2	3.3	LD3	87	LD4
	R-2-65-D G	Glass	0.68	MB9	2.5	MB7	3.9	MB8	100	MC1
		Saphire	0.99	MC2	3.7	MC3	5.1	MC4	130	MC5
		STN. STL.	1.6	MC7	6.3	MD1	7.9	MC6	200	MC8
		Carboloy	2.5	MB5	9.5	MB2	11	MB3	290	MB4
		Tantalum	2.7	MD5	10.0	MD6	12	MD2	310	MD4
6	R-6-65-A G	Glass	2.4	NB8	9.2	NB7	14	NC1	370	NB9
		Saphire	3.6	NC4	13	NC3	18	NC6	480	NC5
		STN. STL.	6.0	ND1	22	ND3	27	NC9	710	ND2
		Carboloy	8.9	NB2	33	NB3	38	NB5	1000	NB6
		Tantalum	9.5	ND6	36	ND5	41	ND7	1000	ND4
	R-6-65-B G	Glass	9.9	PB9	37	PB8	52	PC1	1300	PB7
		Saphire	14.0	PC5	53	PC3	67	PC4	1700	PC2
		STN. STL.	22.0	PD1	85	PC9	97	PC8	2500	PC6
		Carboloy	32.0	PB3	120	PB2	130	PB6	3500	PB4
		Tantalum	34.0	PD7	130	PD6	140	PD5	3700	PD4

*AIR FLOWS ARE AT 14.7 PSIA AND 70 DEGREES F/1.01 BAR AND 21.1 DEGREES C

Product Specifications - Capacities: 1235G, Rib Guided, Spherical Floats, 150 mm Flow Tubes					
Meter Size	Tube No.	Float Material	Water (CC/Min)	* Air	Code
2	R-2-15-AAAA	Glass	0.59	50 SCC/M	JA6
		Sapphire	1.1	79 SCC/M	JA8
		STN. STL.	2.6	150 SCC/M	JA7
		Carboly	5.2	280 SCC/M	JA9
		Tantalum	5.8	310 SCC/M	JB1
	R-2-15-D	Glass	5.5	370 SCC/M	FA6
		Sapphire	10	520 SCC/M	FA8
		STN. STL.	20	830 SCC/M	FA7
		Carboly	34	1200 SCC/M	FA9
		Tantalum	36	1300 SCC/M	FB1
	R-2-15-A	Glass	17	0.82 SLPM	AA6
		Sapphire	26	1.0 SLPM	AA8
		STN. STL.	46	1.6 SLPM	AA7
		Carboly	70	2.4 SLPM	AA9
		Tantalum	75	2.5 SLPM	AB1
	R-2-15-B	Glass	53	2.3 SLPM	DA6
		Sapphire	80	3.0 SLPM	DA8
		STN. STL.	130	4.6 SLPM	DA7
		Carboly	200	6.7 SLPM	DA9
		Tantalum	210	7.1 SLPM	DB1
R-2-15-C	Glass	90	4.0 SLPM	EA6	
	Sapphire	130	5.2 SLPM	EA8	
	STN. STL.	220	7.9 SLPM	EA7	
	Carboly	340	11 SLPM	EA9	
	Tantalum	360	11SLPM	EB1	
6	R-6-15-A	Glass	210	9.5 SLPM	GA6
		Sapphire	320	12 SLPM	GA8
		STN. STL.	540	18 SLPM	GA7
		Carboly	790	25 SLPM	GA9
		Tantalum	840	26 SLPM	GB1
	R-6-15-B	Glass	560	23 SLPM	HA6
		Sapphire	820	29 SLPM	HA8
		STN. STL.	1300	43 SLPM	HAT
		Carboly	1900	60 SLPM	HA9
		Tantalum	2000	63 SLPM	HB1

*AIR FLOWS ARE AT 14.7 PSIA AND 70 DEGREES F/1.01 BAR AND 21.1 DEGREES C



VALVE OPTIONS

The Brooks® NRS™ (non-rising stem) control valves are designed specifically for extremely low flow gas and liquid applications. Straight and 90° angle pattern models in stainless steel are available. They feature a means of adjusting a sliding tapered needle which prevents sticking due to foreign matter in the fluid. These valves are particularly suitable for precise control requirements and possess a high turns to lift ratio. The flow is constant for any given stem position.

Six needles with different tapers provide a wide choice of flow ranges. Needles and orifices can be changed without removing the valve body from the line (two different orifices are used, one for needle sizes 1-3, another for sizes 4-6). Fifteen turns full open to full close provides high turn to lift ratio for excellent resolution

Materials of Construction:

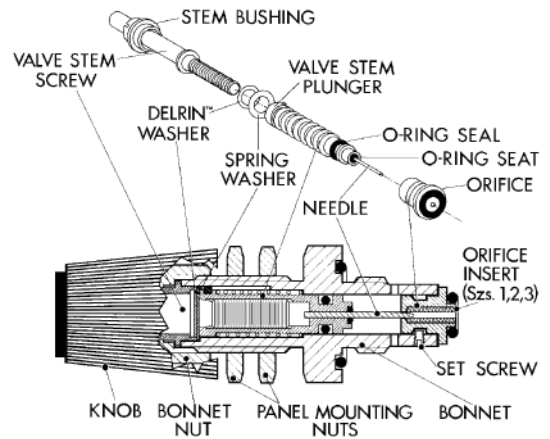
Body 316 stainless steel

Orifice Size 1-3: Stainless steel and Teflon®; Sizes 4-6: Stainless Steel

Valve Needle 316 stainless steel

Plunger Stainless steel

O-rings Viton® fluoroelastomers



Needle Taper No.	Orifice Type	Maximum Capacity (Std. cc/min.)		
		Helium	Air	Water
1	-	300	150	4
2	Small	700	350	10
3	(.041")	1,400	600	20
4	-	6,000	2,400	80
5	Larger	18,000	6,800	200
6	(.093")	655,000	22,000	650

Capacities measured with 10 psig supply and an atmospheric pressure exhaust. Flow capacities will vary for different gases, liquids and pressures. Consult factory for further information.

The Cartridge III Valve is a multipurpose valve, designed for gas and liquid flow applications. It is interchangeable with previous versions of Brooks valves. These valves come in three different sizes – low, medium and high flow. The stem is conical tapered at the end and it has two orifice sizes that provide a wide choice of flow ranges for all models. A Teflon piece is crimped into the valve body which gives better setability, repeatability and feel of operation.

The valve has eight turns open-to-close.

Materials of Construction:

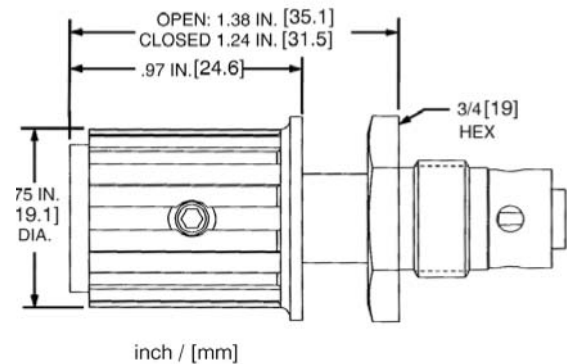
Valve Body and Stem- 316 Stainless Steel

Orifice- PEEK Arlon® 1126 15% glass filled

Valve Ring- Teflon® (PTFE)

O-Rings Standard: Viton® fluoroelastomers; Optional: Buna, Kalrez®, EPR, Teflon®, Butyl

Knob- Phenolic (Thermoset)



Size	Maximum Capacity		
	Air (slpm)	Water (lpm)	Cv
Low	5.7	0.176	0.015
Medium	19.7	0.712	0.050
High	75.6	2.04	0.193

Capacities measured with 10 psig supply and atmospheric pressure exhaust. Flow capacities will vary for different gases, liquids and pressures. Standard temperature 70°F, standard pressure 14.7 psia.

FLOW CONTROLLER OPTIONS

Brooks® flow controllers are designed to maintain a constant differential pressure across an integral manual flow regulating valve. The incoming fluid pressure on one side of the diaphragm, and outlet pressure plus spring action on the other side, position an integral diaphragm-actuated control valve. Variations in the supply or discharge pressure disturb the balance of forces on the diaphragm, causing the internal control valve to open or close, thus maintaining a fixed differential pressure across the integral, manual flow regulating valve resulting in constant flow.

Series FC 8800 controllers are used for accurately adjusting and maintaining liquid and gas flows with variable upstream pressures. Use Model FC 8800 with Cartridge valves & FC8840 with NRS™ (non-rising stem) control valves.

Series FC 8900 controllers are used for accurately adjusting and maintaining liquid and gas flows with variable downstream pressures. Use Model FC 8900 with Cartridge valves & FC8940 with NRS™ (non-rising stem) control valves.

Materials of Construction:

Controller Body- 316 Stainless Steel, Brass

Controller Diaphragm- Buna-N, Teflon® or Viton® fluoroelastomers.

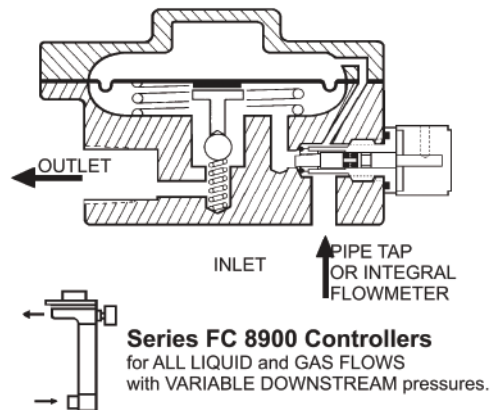
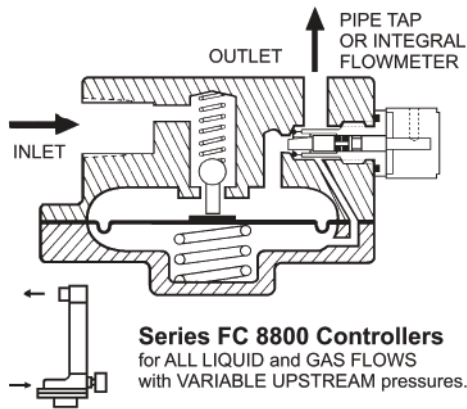
O-rings- Viton® fluoroelastomers, Buna-N, Kalrez® (SS body only), EPR (SS body only), Kalrez/Teflon (SS body only).

Material Certification- Certification to NACE MR-01-75; (Stainless Steel body only) Certification to EN 10204-2.2; Certification to EN 10204-3.1

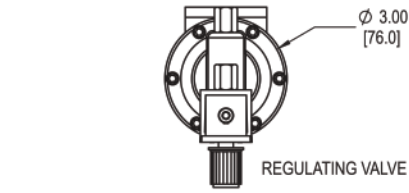


Model 1350G with FC 8800

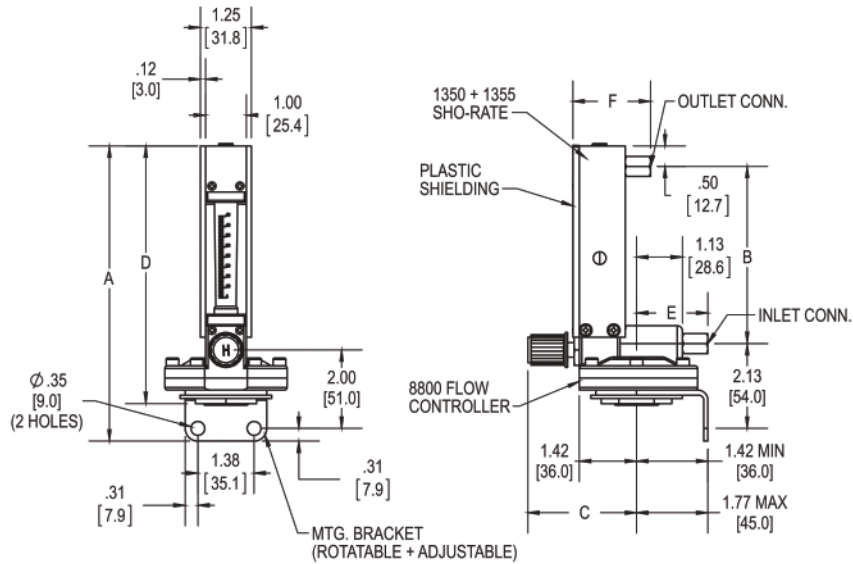
Cutaway View, Principle of Operation



Flowmeter Dimensions with Flow Controller

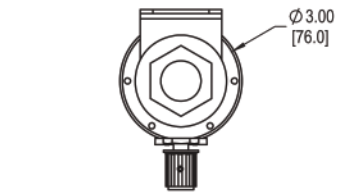


MODEL NO	SCALE LENGTH	A	A	B	B	C	C	C	C	D	D
		INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM
1350	65	7.31	185.7	4.34	110.3	2.5	63.5	2.17	55.2	6.38	162.0
1355	150	11.72	297.7	8.75	222.2	2.50	63.5	2.17	55.2	10.78	273.8

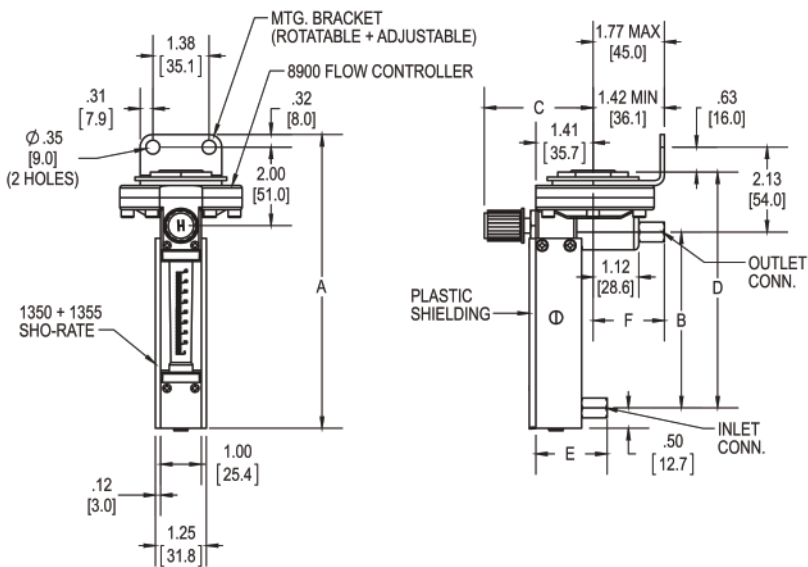


	INLET CONN.	INLET CONN.	OUTLET CONN.	OUTLET CONN.
CONN. SIZE	E	E	F	F
	INCH	MM	INCH	MM
1/8 NPT	1.72	43.7	1.62	41.1
1/4 NPT	1.12	28.6	1.71	46.0
1/8 COMP.	1.91	48.5	1.71	46.0
1/4 COMP.	2.04	51.8	1.94	49.3
1/4 I.D. HOSE	1.82	46.2	1.72	43.7
1/4 VCR (M)	N/A	N/A	2.06	52.3
1/8 Rc	1.91	48.5	1.62	41.1
1/4 Rc	1.91	48.5	1.81	46.0
3/8 Rc	2.35	53.1	2.09	53.1

Model 1350G/1355G with Model 8800 Flow Controller on Inlet



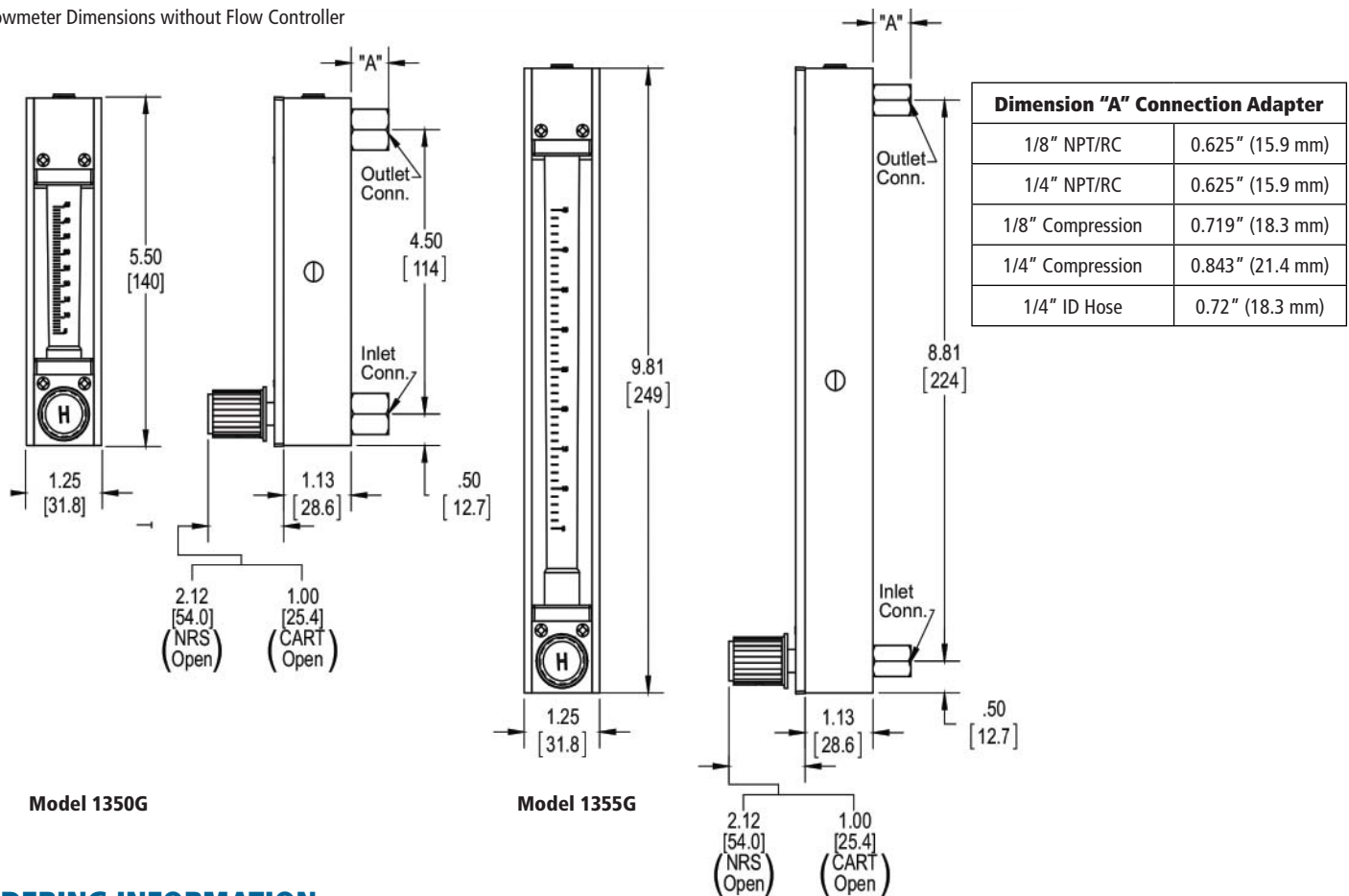
MODEL NO	SCALE LENGTH	A	A	B	B	C	C	C	C	D	D
		INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM
1350	65	7.31	185.7	4.34	110.3	2.5	63.5	2.17	55.2	6.38	162.0
1355	150	11.72	297.7	8.75	222.2	2.50	63.5	2.17	55.2	10.78	273.8



	INLET CONN.	INLET CONN.	OUTLET CONN.	OUTLET CONN.
CONN. SIZE	E	E	F	F
	INCH	MM	INCH	MM
1/8 NPT	1.62	41.1	1.72	43.7
1/4 NPT	1.81	46.0	1.12	28.6
1/8 COMP.	1.81	46.0	1.91	48.5
1/4 COMP.	1.94	49.3	2.04	51.8
1/4 I.D. HOSE	1.72	43.7	1.82	46.2
1/4 VCR (M)	2.06	52.3	N/A	N/A
1/8 Rc	1.63	41.1	1.91	48.5
1/4 Rc	1.81	46.0	1.91	48.5
3/8 Rc	2.09	53.1	2.35	59.7

Model 1350G/1355G with Model 8900 Flow Controller on Outlet

Flowmeter Dimensions without Flow Controller



ORDERING INFORMATION

General

The "Capacities" tables for models 1350G & 1355G include range codes for direct reading scales for water and air. These scales are for air at standard conditions. For non-standard operating conditions and for fluids other than air or water a number of scale options and calibrations are offered.

The options include direct reading scales calibrated for the fluid and operating conditions and mm scales provided with a calibration chart for the fluid and operating conditions. The mm calibration charts are offered with a standard factory calibration or as a NIST certified calibration at higher accuracy.

The following information is needed for flowmeters with non-standard operating conditions or fluids other than air or water:

1. Model
2. Size, connections, type
3. Quantity required
4. Fluid
5. Minimum, normal and maximum operating temperature
6. Minimum, normal and maximum operating pressure (inlet and outlet)
7. Minimum, normal and maximum flow rate
8. Materials of construction
 - a. End fittings
 - b. Side plates
 - c. Bezel
 - d. Elastomers
9. Fluid
10. Fluid specific gravity
11. Fluid viscosity
12. Unusual system conditions (For ranges and pressure drops other than those listed, consult factory).
13. Optional equipment
 - a. Valve type and location
 - b. Flow controller and type

Code-Description	Code Option	Description	
I- Basic Model Number	1350G	65mm Sho-Rate Size 1-6 Flow Indicator	
	1355G	150mm Sho-Rate Size 1-6 Flow Indicator	
II- Model Revision Level	G	Revision G	
III-End Block Material	A	316 Stainless Steel	
	B	Brass	
	C	Kynar	
IV-Tube		1350	1355
	A	-	R-2-15-A G
	B	-	R-2-15-B G
	C	-	R-2-15-C G
	D	-	R-2-15-D G
	E	-	R-6-15-A G
	F	-	R-6-15-B G
	G	R-2-65-A G	R-2-15-AAA G
	H	R-2-65-B G	
	I	R-2-65-C G	
	K	R-2-65-D G	
	L	R-6-65-A G	
	M	R-6-65-B G	
	N-	NO TUBE	
	*V- Float & Direct Read Scale Selection CONSULT US FOR APPLICATIONS FOR NON-STANDARD OPERATING CONDITIONS AND FLUIDS OTHER THAN AIR OR WATER ARBITRARY SCALE/PERCENT SCALES AND CUSTOM SCALES ARE AVAILABLE	Code (XXX(W,L)- Add Scale code from "Capacities" Tables)	Float
3A-XXX(Water,Air)		GLASS	5%/3%
3B-XXX (Water,Air)		STAINLESS STEEL	5%/3%
3C-XXX (Water,Air)		SAPPHIRE	5%/3%
3D-XXX (Water,Air)		CARBOLOY	5%/3%
3E-XXX (Water,Air)		TANTALUM	5%/3%
VI Tube Packing & O-ring Materials	Code	Tube Packing	O-ring Meter/Valve
	A	Buna	Buna
	B	Viton	Viton
	C	Viton	Teflon (mtr), Kalrez (vlv,Jack Screw)
	D	Viton	EPR
	E	Viton	Kalrez
	F	Teflon	Buna
	G	Teflon	Viton
	H	Teflon	Teflon (mtr), Kalrez (vlv,Jack Screw)
	I	Teflon	EPR
	K	Teflon	Kalrez
	L	EPR	EPR
	M	Butyl	Butyl

Code-Description	Code Option	Description	
VII- End Fittings	Code	Fitting Material	CONNECTION SIZE & TYPE
	C	316 SS	1/8" NPT
	*F	316 SS	1/8" Thd. W/Locknut
	I	316 SS	1/4" NPT
	*K	KYNAR	1/4" NPT
	*N	316 SS	1/8" THD. W/Locknut
	R	316 SS	1/8" Compression
	*U	316 SS	1/8" Compression W/Locknut (2 pcs)
	W	316 SS	1/4" F-Rc Thd W/Locknut
	X	316 SS	1/4" Compression
	*1	316 SS	1/4" Compression W/Locknut (2 pcs)
	3	316 SS	3/8" F-Rc Thd W/Locknut
	4	316 SS	1/4" ID Hose
	*6	316 SS	Integral 5/16-24 Thd
	*7	316 SS	1/4" VCR
	8	316 SS	6 mm Thd
	* Cannot be specified with 8800/8900 series flow controllers		
*VIII- Valve Type/Controler Option	Code	ValveType	
	A	Valve Plug	
	B	Non-Rising Stem- 316SS #1	
	C	Non-Rising Stem- 316SS #2	
	D	Non-Rising Stem- 316SS #3	
	E	Non-Rising Stem- 316SS #4	
	F	Non-Rising Stem- 316SS #5	
	G	Non-Rising Stem- 316SS #6	
	H	Non-Rising Stem- 316SS #7	
	J	Integrally Mounted 88/8900 316 SS Flow controller-Viton Diaphragm	
	K	Integrally Mounted 88/8940 316 SS Flow controller-Viton Diaphragm	
	L	Integrally Mounted 88/8900 Brass Flow controller-Viton Diaphragm	
	M	Integrally Mounted 88/8940 Brass Flow controller-Viton Diaphragm	
	N	Integrally Mounted 88/8900 316 SS Flow controller-Teflon Diaphragm	
	P	Integrally Mounted 88/8940 316 SS Flow controller-Teflon Diaphragm	
	Q	Integrally Mounted 88/8900 Brass Flow controller-Buna Diaphragm	
	R	Integrally Mounted 88/8940 Brass Flow controller-Buna Diaphragm	
	S	Std Valve Cavity- No Valve Assy. or Plug	
	T	Cartridge II/III Valve- Low Flow- 316SS	
U	Cartridge II/III Valve- Medium Flow- 316SS		
V	Cartridge II/III Valve- High Flow- 316SS		
* See separate data sheets for Non Rising Stem valves, Cartridge valves & 88/8900 Series Constant Differential Pressure Flow Controllers			

Code-Description	Code Option	Description		
IX- Valve Cavity/Controller Location & Connection Orientation	Code	Valve/Controller Location	Connection Orientation	
	1	Inlet	Back	Back
	5	Outlet	Back	Back
	9	N/A	Back	Back
X- Accessories	A	None		
	H	Aluminum Flush Bezel for Stainless Meters		
	J	Flush Panel Mtg. for Kynar Meters		
	K	Panel Mount Screws		
XI- Options	A	None		
	B	316 SS Frame		
	C	Circular Base Plate (Aluminum)		
	D	No Brooks Identification		
	E	316 SS Frame & No Brooks Identification		
	F	Circular Base Plate (Aluminum) & No Brooks Identification		
	G	316 SS Frame & Baseplate		
	H	316 SS Frame & Baseplate & No Brooks Identification		
	J	Stainless Steel Tag & 316 SS Frame		
	K	Stainless Steel Tag & Circular Base Plate (Aluminum)		
	L	Stainless Steel Tag & No Brooks Identification		
	M	Stainless Steel Tag & 316 SS Frame & No Brooks Identification		
	N	Stainless Steel Tag & Circular Base Plate (Aluminum) & No Brooks Identification		
	P	Stainless Steel Tag & 316 SS Frame & Base Plate		
Q	Stainless Steel Tag & 316 SS Frame & Base Plate & No Brooks Identification			
R	Stainless Steel Tag			
XII-Certifications	A	None		
	D	Degrease for Oxygen Service (not MIL spec.		

Sample Model Code											
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1350	G	A	G	3AJB6W	B	C	BQ	1	A	A	A

TRADEMARKS

Brooks Brooks Instrument, LLC
 Carboly General Electric Co.
 Kalrez DuPont Performance Elastomers
 Kynar Pennwalt Corp.
 NRS Brooks Instrument, LLC
 Sho-Rate Brooks Instrument, LLC
 Swagelok Swagelok Co.
 Teflon E.I. DuPont de Nemours & Co.
 VCR Swagelok Co.
 Viton DuPont Performance Elastomers
 All other trademarks are the property of their respective owners