

PORTER FLOWMETERS & FLOW CONTROLLERS

Technology you can trust



PORTER
INSTRUMENT COMPANY, INC.

TECHNOLOGY *you can trust*

Porter Instrument Company, Inc. is a leading manufacturer of specialized components for analytical, industrial and medical instrumentation. Since its inception in 1968, the company's focus has been the development, manufacture and sales of precision instruments for the measurement and control of gases and liquids.

The Flowmeters, Flow Tubes, Metering Valves and Flow Controllers in this catalog are part of a unique line of control components recognized as the industry standard for critical applications in the analytical, medical, semiconductor, chemical/petrochemical, water treatment, air quality monitoring and fuel cell industries.

The people at Porter are proud of the quality reputation that our products have earned. We are ready to help you achieve new levels of performance, efficiency and reliability in your application, either with standard product or a special configuration designed to your specific requirements.



Porter Flowmeters



Porter Variable Area Flowmeters include 65mm and 150mm scale length tube assemblies and are available in either forged body or side-plate construction. Forged body models feature a wrap-around window for full 180° tube visibility, and an attractive forged one-piece black anodized aluminum body. Side-plate constructed models are conveniently interchangeable with competitive designs.

Porter Control Valves, including the exclusive *Torque Guard Cartridge*, can be added to either style flowmeter for precise flow indication and control in one economical unit. Multi-tube side-plate models, ranging from two to six tubes, are available with or without controls valves and can include individual inlet and outlet connections or manifold ports according to your specifications.

Porter Metering Valves

Porter Metering Valves are designed for extremely precise control in low flow gas and liquid applications. Our Model HR High Resolution Control Valve features a non-rotating valve stem with a precision ground flat for exact control and an o-ring seal for positive shut-off. The Model HR's spring-loaded, non-rising adjustment stem eliminates sawtoothing and backlash. The Model SCV Standard Cartridge Valve offers a unique blend of economy and utility for a wide range of applications. Standard Cartridge Valves are available with the exclusive *Torque Guard Positive Stop Mechanism*.



Porter Variable Constant Differential Flow Controller



Porter Model VCD 1000 Flow Controller is precision-engineered to control low gas flows at constant mass flow rates regardless of changes in downstream pressure. The unique design yields extremely linear flow output in relation to stem rotation and virtually eliminates the sawtoothing associated with valve-based controllers. Available in full scale flow rates from 5 sccm up to 1500 sccm (He @ 70°F and 50 PSIG).

Custom Capability

Porter Flowmeters, Metering Valves and Flow Controllers can be modified to meet the particular needs of Original Equipment Manufacturers. We can also supply OEM glass flow tubes to meet specific size, scale and flow requirements. We welcome your inquiries.

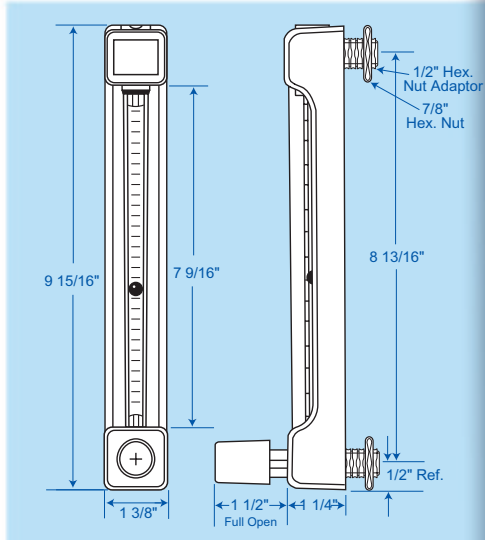


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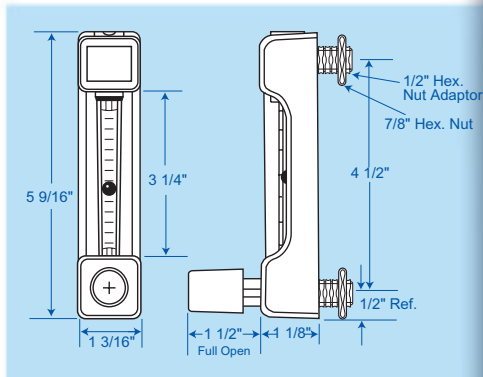
FLOWMETERS

the true measure of performance

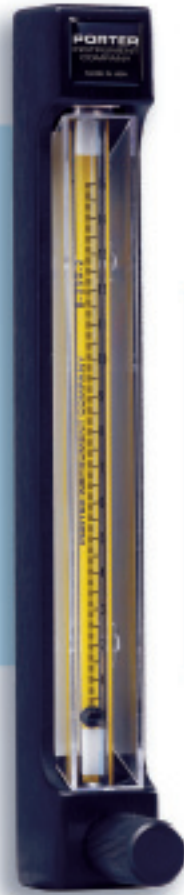
Forged Body Flowmeters



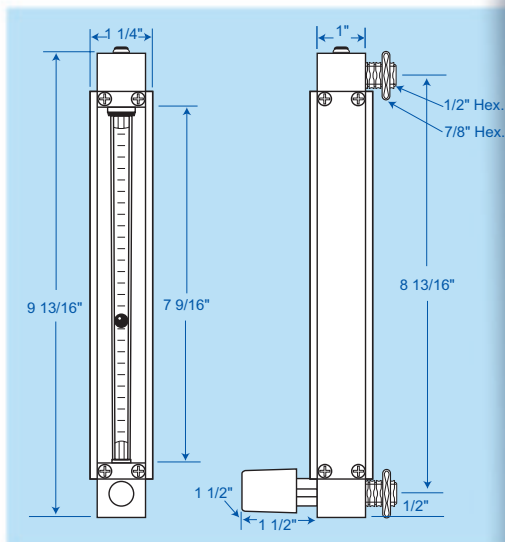
Model F150



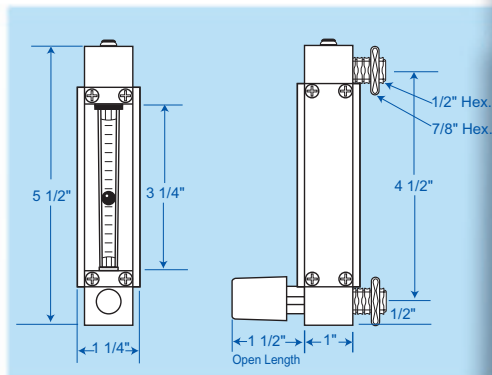
Model F65



Side Plate Flowmeters



Model 150



Model 65



The Porter Models 65 and 150 Side Plate Constructed Flowmeters combine a traditional body style with innovative design features. They are available with aluminum, brass or 316 stainless steel wetted parts. Multi-tube (2 to 6 tube) versions are available with optional valves and manifold inlet/outlet ports.

Design Features & Advantages

- Interchangeable flow tube assemblies and valves allow configuration changes without removal from process system.
- Rib-guided, compression sealed flow tubes for maximum float stability.
- Ceramic scales fired on flow tubes against a contrasting background provide high visibility and durability.
- Standard or high-resolution metering valves available on inlet or outlet (see page 8 for valve details).
- Ten-to-one rangeability.

Specifications

Scale -

Length: Models F65 and 65 - 65mm; Models F150 and 150 - 150mm.

Type: Fused on metering tube with contrasting yellow background.

Graduations: Standard - Models F65 and 65: 0-65mm w/ calibration data; Models F150 and 150: 0-150mm w/ calibration data.

Optional: Direct reading scales.

Capacities -

Refer to capacity chart on page 7.

Ratings -

Pressure/Temperature: Neoprene packing/ Buna N O-rings - 200 psig at temperatures up to 160°F; Viton® packing/Viton O-rings - 200 psig at temperatures up to 200°F.

Performance -

Accuracy: Models F65 and 65: ± 10% full scale; Models F150 and 150: ± 5% full scale.

Accuracy specified for 100% - 10% of scale reading (10 to 1 rangeability).

Repeatability: Models F65 and 65: ± 0.5% of full scale reading; Models F150 and 150: ± 0.25% of full scale reading.

Connections -

Standard: 1/8" female NPT threaded adaptors with locknuts for front panel mounting. Optional: 1/8" compression fitting; 1/4" compression fitting; 1/4" NPT female; 1/4" I.D. Hose.

Multi-tube Flowmeters

Porter Models 65 and 150 Side-Plate Flowmeters are available in multi-tube configurations up to 6 tubes. All valve options are available, and the inlet/outlet ports can be manifolded. Contact factory for details.

Materials of Construction

Metering tube - Borosilicate glass.

Floats- Standard: glass, stainless steel.
Optional: sapphire, carboloy, tantalum.

Structural Members -

Metering body: (F65 and F150) Black anodized aluminum.

Side plates: (65 and 150) Standard: black anodized aluminum. Optional: stainless steel.

Wetted Parts: aluminum, brass or 316 stainless steel.

End Fittings: black anodized aluminum or chrome plated brass or 316 stainless steel.

Shields - Clear polycarbonate.

Tube packing and O-Rings - Standard: Neoprene packing and Buna N O-rings with aluminum or brass construction. Viton packing and Viton O-rings with stainless steel construction. Optional Materials: Teflon®, EPDM, Kalrez®.

Options

- Integral standard cartridge or high resolution flow control valve
- Brass or 316 stainless steel wetted parts
- Special packing and o-rings
- Special process connections
- Direct reading scales
- Stainless steel side plates (Models 65 & 150 only)
- Base plate (Models 65 & 150 only)



Ordering Information

Model Number and Description

Example:

F65 A V 2

Basic Model

F65-65mm Forged Body
F150-150mm Forged Body
65-65mm Side Plate Body
150-150mm Side Plate Body

Body Material

A - Aluminum
B - Brass
S - Stainless Steel

Valve

O- No Valve
V- Standard Cartridge Control Valve
HR- High Resolution Control Valve

Valve Size

0 thru 6 High Resolution Control Valve
1 thru 3 Standard Cartridge Valve
1-TG Torque Guard Taper 1
2-TG Torque Guard Taper 2

To order, specify:

- Model Number
- Tube Number
- Float Material
- Connections (Type & Size)
- Fluid Specifications (specific gravity & viscosity)
- Flow Rate
- Operating Pressure
- Operating Temperature
- Material of Construction for
(a) End fitting
(b) Side plates or meter body
(c) Elastomers

Teflon® - E.I. DuPont de Nemours & Co.

Kalrez®, Viton® - DuPont Dow Elastomers LLC

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FLOW TUBES

the true measure of performance

Custom Variable Area Flow Tubes

Porter Instrument Company's heritage is based on the Variable Area Flow Tube. Today, Porter is recognized as the leading supplier of custom configured tubes. Porter Flow Tubes are the industry standard for medical anesthesia equipment, while Porter Flowmeters with special tubes are being utilized in the majority of veterinary anesthesia equipment.

Porter Custom Flow Tubes are also utilized in applications as diverse as water treatment equipment and specialized devices for testing rail car air brakes. For applications that demand accuracy and flexibility, Porter Flow Tubes are the solution. We can configure tubes for special length and diameter requirements, provide multiple tapers to increase range and supply a variety of float and scale options. We invite your inquiry.



Flowmeter Capacities

Models F65 & 65

Tube Number Float Material	cc/min air @ STP	cc/min water @ 70°F
A-125-3		
Glass	45	.57
Sapphire	68	.90
Stainless Steel	135	2.2
Carboloy	245	4.8
Tantalum	260	5.5
A-125-5		
Glass	78	.80
Sapphire	120	1.28
Stainless Steel	235	3.35
Carboloy	380	6.6
Tantalum	450	9.5
A-125-7		
Glass	445	6
Sapphire	610	11
Stainless Steel	975	22
Carboloy	1385	38
Tantalum	1540	42
A-157-1		
Glass	410	4.5
Sapphire	545	8.5
Stainless Steel	948	18
A-157-2		
Glass	1195	19
Sapphire	1595	34
Stainless Steel	2410	64
A-250-1		
Glass	2195	38
Sapphire	2900	63
Stainless Steel	4400	118
Carboloy	6390	190
Tantalum	6880	200
A-250-2		
Glass	4475	95
Sapphire	5790	144
Stainless Steel	8490	246
Carboloy	12200	370
Tantalum	12950	390
A-250-3		
Glass	6145	135
Sapphire	8100	208
Stainless Steel	11900	350
Carboloy	16980	515
Tantalum	18360	570
A-250-4		
Glass	10740	240
Sapphire	13460	365
Stainless Steel	20000	600
Carboloy	27500	870
Tantalum	29000	910
A-250-5		
Glass	13890	385
Sapphire	18000	480
Stainless Steel	26700	840
Carboloy	37870	1175
Tantalum	41800	1225
A-250-6		
Glass	22800	530
Sapphire	28900	795
Stainless Steel	42400	1205
Carboloy	63500	1835
Tantalum	67800	1965

Models F150 & 150

Tube Number Float Material	cc/min air @ STP	cc/min water @ 70°F	Tube Number Float Material	cc/min air @ STP	cc/min water @ 70°F
B-125-6			B-250-0		
Glass	34	.39	Glass	942	14
Sapphire	55	1.48	Sapphire	1360	28
Stainless Steel	102	2.2	Stainless Steel	2290	53
Carboloy	203	3.8	Carboloy	3395	91
Tantalum	251	4.3	Tantalum	3625	100
B-125-10			B-250-1		
Glass	50	.55	Glass	2400	43
Sapphire	77	1.04	Sapphire	3080	77
Stainless Steel	150	2.5	Stainless Steel	4600	125
Carboloy	263	5.3	Carboloy	6750	200
Tantalum	284	6.6	Tantalum	7360	218
B-125-20			B-250-2		
Glass	89	1.1	Glass	5180	113
Sapphire	144	2.15	Sapphire	6630	171
Stainless Steel	278	4.9	Stainless Steel	9900	282
Carboloy	473	10	Carboloy	14140	427
Tantalum	560	12	Tantalum	15400	467
B-125-30			B-250-3		
Glass	365	4.7	Glass	7700	173
Sapphire	514	10	Sapphire	9640	260
Stainless Steel	835	19	Stainless Steel	14300	420
Carboloy	1252	36	Carboloy	20100	625
Tantalum	1370	41	Tantalum	22000	680
B-125-40			B-250-4		
Glass	850	16	Glass	12100	278
Sapphire	1100	27	Sapphire	15300	417
Stainless Steel	1700	46	Stainless Steel	22500	675
Carboloy	2430	73	Carboloy	32400	990
Tantalum	2620	81	Tantalum	34200	1067
B-125-50			B-250-45		
Glass	2340	55	Glass	13885	296
Sapphire	3080	79	Sapphire	17600	485
Stainless Steel	4640	132	Stainless Steel	26010	770
Carboloy	6600	200	Carboloy	37040	1150
Tantalum	7000	214	Tantalum	39230	1270
B-125-60			B-250-5		
Glass	3800	87	Glass	16300	360
Sapphire	5070	126	Sapphire	20590	565
Stainless Steel	7580	210	Stainless Steel	30800	900
Carboloy	10770	330	Carboloy	42200	1300
Tantalum	11500	353	Tantalum	44100	1420
B-125-65			B-250-6		
Glass	4187	94	Glass	20470	482
Sapphire	5410	138	Sapphire	23300	708
Stainless Steel	7969	226	Stainless Steel	38900	1142
Carboloy	10960	335	Carboloy	49000	1646
Tantalum	11885	365	Tantalum	53300	1760
B-125-70			B-250-7		
Glass	5600	124	Glass	8820	203
Sapphire	7400	186	Sapphire	11260	295
Stainless Steel	10990	313	Stainless Steel	16600	494
Carboloy	15570	472	Carboloy	22900	716
Tantalum	16660	505	Tantalum	23400	780
B-157-1			B-250-8		
Glass	340	3.7	Glass	22360	580
Sapphire	540	9.3	Sapphire	29140	780
Stainless Steel	882	18	Stainless Steel	41420	1300
			Carboloy	61620	1784
			Tantalum	62500	2060
B157-2			B-250-9		
Glass	1180	20	Glass	23300	550
Sapphire	1570	38	Sapphire	30500	840
Stainless Steel	2420	65	Stainless Steel	45000	1332
			Carboloy	61680	1956
			Tantalum	65370	2160

Conversion Equations:

Gas	SLPM x 1000 = CC/MIN	Liquid	GPH x 63.09 = CC/MIN
	SCFM x 28320 = CC/MIN		GPM x 3785 = CC/MIN
	SCFH x 472 = CC/MIN		LPM x 1000 = CC/MIN

METERING VALVES

the true measure of performance

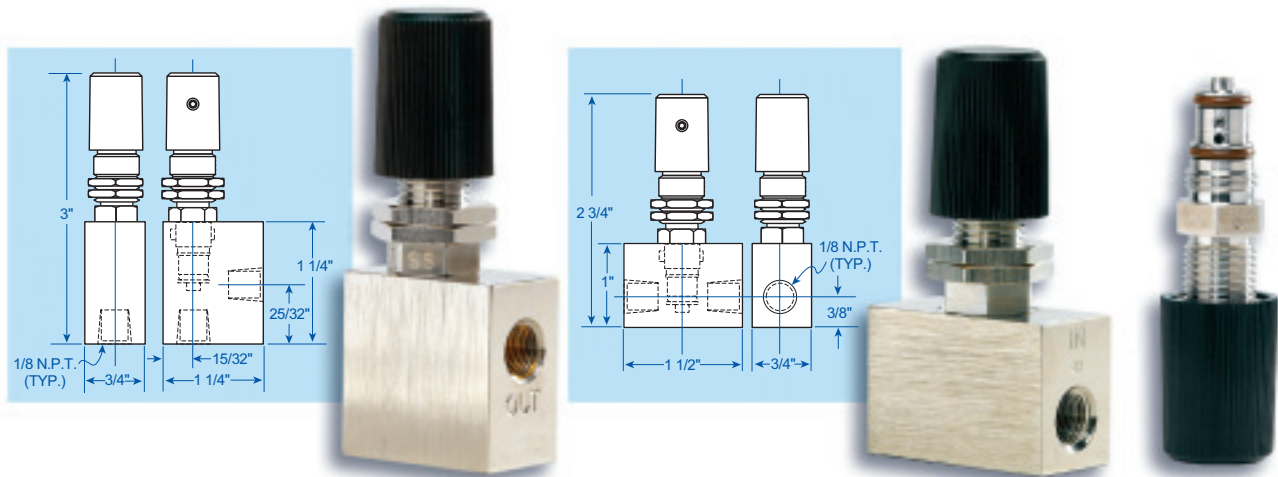
Porter Metering Valves are designed for extremely precise control in low flow gas and liquid applications. They are available as valve cartridges, integrally mounted in flowmeters

and in-line valve assemblies with straight or angle patterned bodies. All in-line valve assemblies have 1/8" female NPT inlet and outlet ports.

High Resolution Control Valves

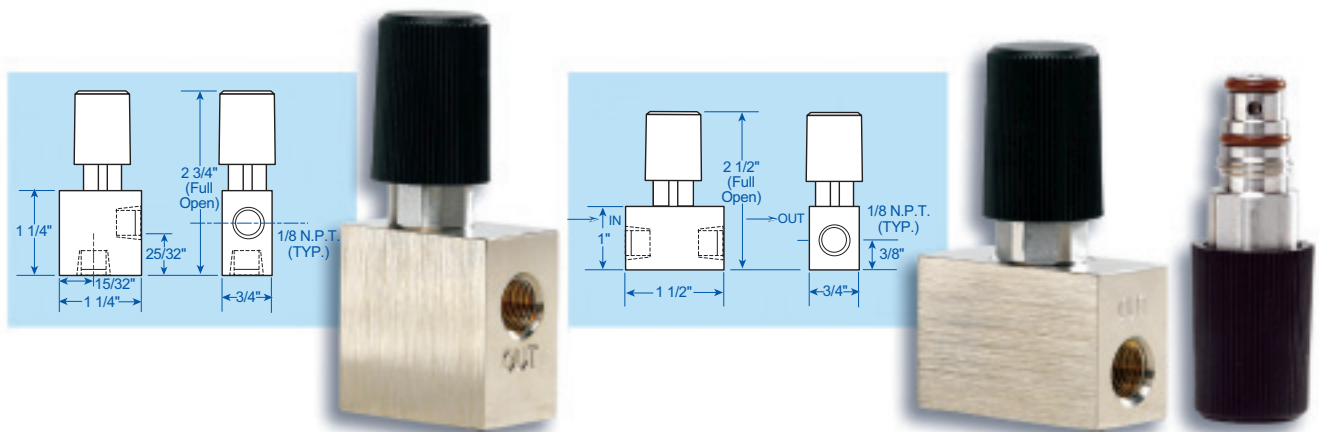
The HR Series High Resolution Control Valves contain unique design features that make them the ultimate choice for precise low flow control.

- Spring loaded, non rising adjustment stem with 56-pitch thread provides smooth, non-reversing flow characteristics and 15-turn resolution.
- Non-rotating stainless steel valve pin with precision ground flat gives exact control.
- Valve pin o-ring guarantees positive shut-off without stem damage.
- Self-lubricating orifice liner assures long life.
- Seven available needle tapers expand valve capacity.



Standard Cartridge Valves

Porter's Standard Cartridge Valves (SCV) are economical, multi-purpose valve assemblies. Available in 3 needle tapers, they are ideal for a wide spectrum of low flow applications.



Specifications

Capacities for High Resolution Control Valves

Needle Size (HRCV)		0	1	2	3	4	5	6
Max. Flow	cc/min. – Helium	95	220	450	1250	3600	12500	50000
	cc/min. – Water	2	6	15	30	100	200	900

Capacities for Standard Cartridge Valves

Needle Size (SCV)		1	2	3
Max. Flow	cc/min. – Helium	25000	35000	55000
	cc/min. – Water	700	1000	1200

Note: Capacities are typically measured with water or helium at 10 psig supply pressure and atmospheric pressure downstream. Capacities vary for different fluids and operating conditions.

Ratings: Maximum Operating

	Temperature °F	Pressure PSIG
Brass Model	160	250
Stainless Steel Model	250	250

Connections: 1/8" Female NPT (integral)

Materials of Construction

Model	Body	Valve Pin	Valve Pin Holder	O-Rings	Orifice
HRCV Brass	Nickel Plated Brass	316 SS	Brass	Buna N	Brass w/ Fluorosint® liner
HRCV Stainless Steel	316 SS	316 SS	316 SS	Viton	316 SS w/ Fluorosint® liner
SCV Brass	Nickel Plated Brass	316 SS	316 SS	Buna N	Brass
SCV Stainless Steel	316 SS	316 SS	316 SS	Viton	316 SS

Fluorosint® - DSM Engineering Plastic Products

Torque Guard

Porter Standard Cartridge Valves are available with the exclusive *Torque Guard Stop Mechanism*. *Torque Guard* eliminates stem damage caused by over tightening of the valve at shut-off.

The *Torque Guard System* consists of a specially designed knob with a stop pin pressed into an aluminum knob insert and a machined detail on the packing nut that engages the stop pin and prevents clockwise rotation beyond a predetermined point. During final test, the knob is adjusted so that the stop pin and packing nut engage precisely at shut-off. This combination eliminates the possibility of over tightening and the resultant stem damage.

Ordering Information

Model Number and Description

Control Valve

Example:



Basic Model

HRCV (High Resolution)
SCV (Standard Cartridge)

Body Material

B - Brass
S - Stainless Steel

Needle Size

0 thru 6 (HRCV only)
1 thru 3 (SCV only)
1 - TG (Torque Guard Taper 1)
2 - TG (Torque Guard Taper 2)

Connection Configuration

A - Angle
S - Straight

Valve Cartridge Only

Example:



Valve Configuration

HR (High Resolution)
SC (Standard Cartridge)

Needle Size

0 thru 6 (HR only)
1 thru 3 (SC only)
1 - TG (Torque Guard Taper 1)
2 - TG (Torque Guard Taper 2)

Material

A - Aluminum
B - Brass
S - Stainless Steel

To order, specify:

- Model Number
- Fluid
- Flow Rate
- Operating Pressure (inlet and outlet)
- Operating Temperature
- Materials of Construction

FLOW CONTROLLERS

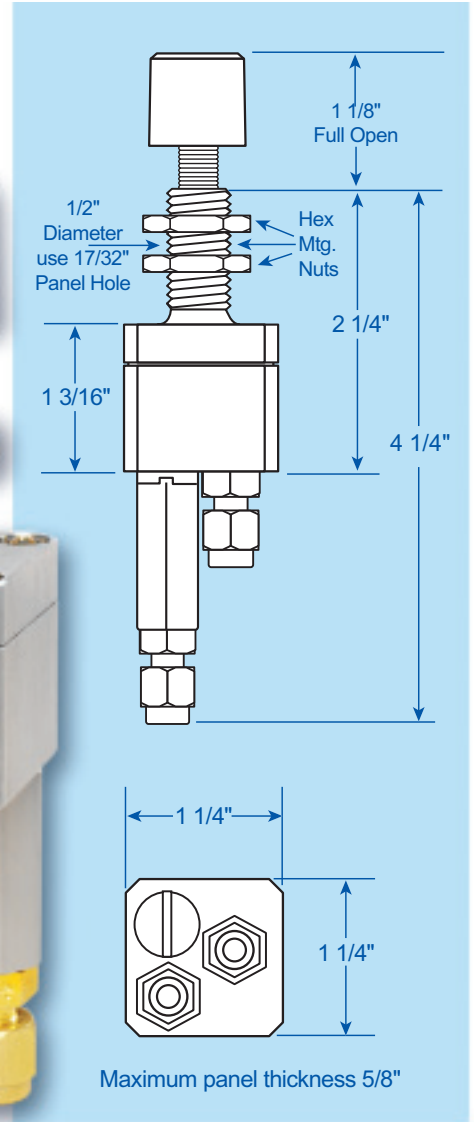
the true measure of performance

Variable Constant Differential Flow Controllers

The Porter Model VCD 1000 Flow Controller is precision-engineered to control low gas flows at constant mass flow rates regardless of changes in downstream pressure. The VCD 1000 maintains a preset pressure differential across a laminar flow element. Turning the fine-pitched adjusting stem varies the force on an internal diaphragm, which alters the differential pressure across the laminar flow element, thereby changing the flow rate. This design yields extremely linear flow output in relation to stem rotation and virtually eliminates the sawtoothing associated with valve-based controllers. The laminar flow elements are available in full scale flow rates from 5 sccm up to 1500 sccm (He @ 70°F and 50 PSIG).

Design Features & Advantages

- Delrin® adjusting stem with 56 pitch threads.
- Turns vs. flow relationship is linear.
- Bubble-tight shut-off
- Full scale flow rates from 5 SCCM up to 1500 SCCM (He @ 70°F and 50 PSIG)
- Replaceable inlet filter included.
- Standard panel mount configuration.



VCD 1000 Capacities

Maximum Flow Range*	Flow Element Size Number	Color Code on Flow Element**
5 cc/min	5	Gold Anodize w/ Red Dot
8 cc/min	8	Blue Anodize w/ Red Dot
10 cc/min	10	Blue Anodize
15 cc/min	15	Silver Anodize w/ Blue Dot
25 cc/min	25	Red Anodize w/ Silver Dot
35 cc/min	35	Black Anodize w/ White Dot
45 cc/min	45	Blue Anodize w/ Green Dot
60 cc/min	60	Red Anodize
95 cc/min	95	Gold Anodize

Maximum Flow Range*	Flow Element Size Number	Color Code on Flow Element**
110 cc/min	110	Green Anodize
144 cc/min	144	Silver Anodize w/ Red Dot
180 cc/min	180	Silver Anodize
535 cc/min	400	Black Anodize
465 cc/min	465	Black Anodize w/ Silver Dot
750 cc/min	750	Silver Anodize w/ Green Dot
1060 cc/min	1000	Black Anodize w/ Red Dot
1600 cc/min	1500	Black Anodize w/ Green Dot

* Flow ranges stated are based on helium gas at 50 psig supply pressure.

** Color-coded flow element packages appear on aluminum units only. Stainless steel flow controllers have flow element size etched on the flow element holder.

Specifications

Capacities - see chart on previous page.

Ratings – Maximum operating pressure: 250 psig; Maximum operating temperature: 160°F; Pressure Drop required: 15 psi minimum.

Performance – Control Accuracy: 0.3% of instantaneous flow rate. Adjustability: 0-100% of flow over 14 turns.

Connections – 1/8" compression fitting (brass) with aluminum body; 1/8" compression fitting (stainless steel) with SS body.

Dimensions – Refer to diagram



Materials of Construction

Controller Body- Aluminum or stainless steel.

Controller Diaphragm- Fairprene® BN-5029 or stainless steel.

Orifice- Brass with aluminum body; 316 stainless steel with stainless steel body.

O-Rings- Buna N or Viton.

Filter- Aluminum with aluminum body; stainless steel with stainless steel body.

Ordering Information

Model Number and Description

VCD Flow

Controller Example:

VCD	A	B	F	8
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Basic Model →

Body Material →

A - Aluminum

S - Stainless Steel

O-Ring Material →

B - Buna N

V - Viton

Diaphragm Material →

F - Fairprene BN-5029

S - 316 Stainless Steel

Flow Element Size Number →

5, 8, 10, 15, 25, 35, 45, 60, 95, 110

144, 180, 400, 465, 750, 1000, 1500

To order, specify:

- Model Number
- Flow Rate
- Gas Type
- Operating Pressure (inlet)
- Operating Temperature
- Body Material
- O-Ring Material
- Diaphragm Material

Delrin® - DuPont de Nemours & Co.

Fairprene® - Fairprene, Inc.

CERTIFICATE OF WARRANTY

THIS WARRANTY IS GIVEN IN PLACE OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE. NO PROMISE OR STATEMENT MADE BY ANY REPRESENTATIVE OR AUTHORIZED DEALER OF PORTER INSTRUMENT CO., INC. SHALL CONSTITUTE A WARRANTY BY PORTER INSTRUMENT CO., INC. PORTER INSTRUMENT CO., INC. ASSUMES NO LIABILITY FOR USE OF THIS EQUIPMENT.

Porter Instrument Co., Inc. warrants this equipment to be free from defects in workmanship and materials, when used in accordance with applicable specifications and with appropriate maintenance, for one (1) year from date of delivery to the customer, unless otherwise specified in writing.

Equipment which malfunctions may be returned, shipment prepaid, to Porter Instrument Co., Inc. for test and evaluation. Equipment determined to be defective and in warranty will be repaired or replaced at no charge to the customer.

Equipment out of warranty will be evaluated, and if the equipment does not meet original specifications and calibration, the customer will be notified of the costs before proceeding with repair or

replacement. Repaired equipment will be warranted ninety (90) days from date of delivery to the customer or for the balance of the original warranty, whichever is longer.

Failures due to shipping damage, accident, misuse, improper mechanical or electrical installation or operation, or internal clogging or corrosion due to contaminated fluids or inadequate system purging are excluded from warranty coverage.

Porter Instrument Co., Inc.'s obligation for breach of this warranty, or for negligence or otherwise, shall be strictly and exclusively limited to the repair or replacement of the equipment. This warranty shall be void as to any equipment on which the serial number, if applicable, has been altered, defaced, or removed. Porter Instrument Co., Inc. shall under no circumstances be liable for incidental or consequential damages.

No other promise or statement about the equipment by any representative or authorized dealer of Porter Instrument Co., Inc. shall constitute a warranty by Porter Instrument Company, Inc. or give rise to any liability or obligation of Porter Instrument Co., Inc. *Specifications and dimensions subject to change.*

PORTER INSTRUMENT COMPANY, INC.

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