

Brooks® Flow Controllers

for Gas and Liquid Service

Model FC 8744, Series FC 8800 and FC 8900

BENEFITS

- Flow controllers for high pressure or low flow rates to handle demanding applications
- Integral mounting to flowmeter to save space and improve installation
- High-resolution valves provide precise flow control for many applications
- Many different materials of construction that provides process immunity and flexibility

DESCRIPTION

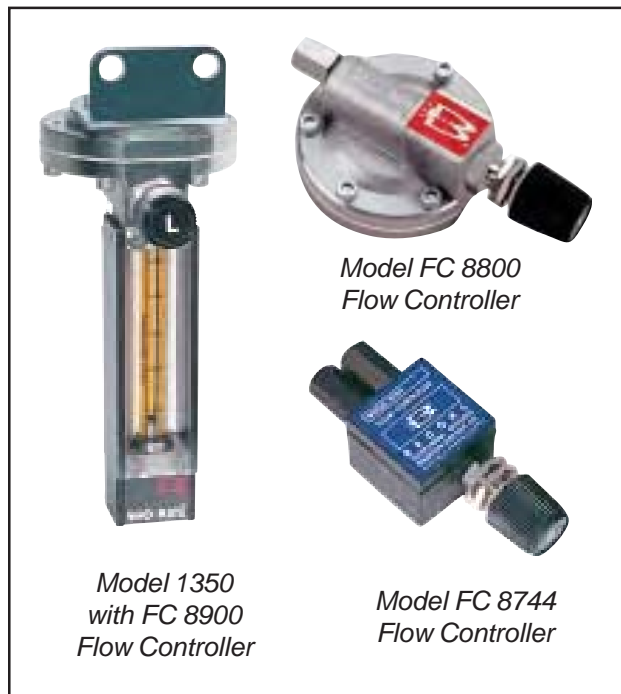
Brooks® flow controllers are designed to maintain a constant differential pressure across an integral, manual flow regulating valve. The incoming fluid pressure on one side of the diaphragm, and outlet pressure plus spring action on the other side, position an internal diaphragm-actuated control valve. 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.

Refer to Figure 1.

Model FC 8744 controllers are used for accurately adjusting and maintaining small gas and liquid flows with variable downstream pressures.

Series FC 8800 controllers are used for accurately adjusting and maintaining liquid and gas flows with variable upstream pressures.

Series FC 8900 controllers are used for accurately adjusting and maintaining liquid and gas flows with variable downstream pressures.



SPECIFICATIONS

Flow Ranges

Water - up to 480 GPH / 1820 l/h
Air - up to 2130 SCFH / 56000 l_n/h
Refer to Table 1.

Pressure and Temperature Ratings

Up to 1000 psig / 69 bar
Refer to Table 2.

Pressure Equipment Directive (97/23/EC)

Equipment falls under Sound Engineering Practice (SEP) according to the directive

Pressure Drop

Refer to Table 2.

Flow Controllers for Gas and Liquid Service

PHYSICAL

Materials of Construction

Controller Body:

316 Stainless Steel, Brass or Aluminum (FC 8744 only)
 Refer to Table 3.

Controller Diaphragm:

Buna-N, Teflon® or Viton® fluoroelastomers
 Refer to Table 3.

Needle Valve:

- 1) 316 Stainless Steel Cartridge valve
 Refer to Figure 3,
 Refer to DS-VA-CART-eng
- 2) 316 Stainless Steel NRS Valve
 Refer to Figure 2, Refer to DS-VA-8503-eng
- 3) 316 Stainless Steel high flow needle valve type
 Refer to Table 3.

O-rings:

Viton fluoroelastomers
 Buna-N,
 Kalrez® (SS body only)
 EPR (SS body only)
 Kalrez®/Teflon® (SS body only)
 Refer to Table 3.

Meter Dimensions

Refer to Figure 4.

Sizing

Refer to Table 4.

Material Certification: (Stainless Steel body only)

Certification to NACE MR-01-75

Certification to EN 10204-2.2

Certification to EN 10204-3.1

Ordering Information and Model Codes

Refer to Table 5.

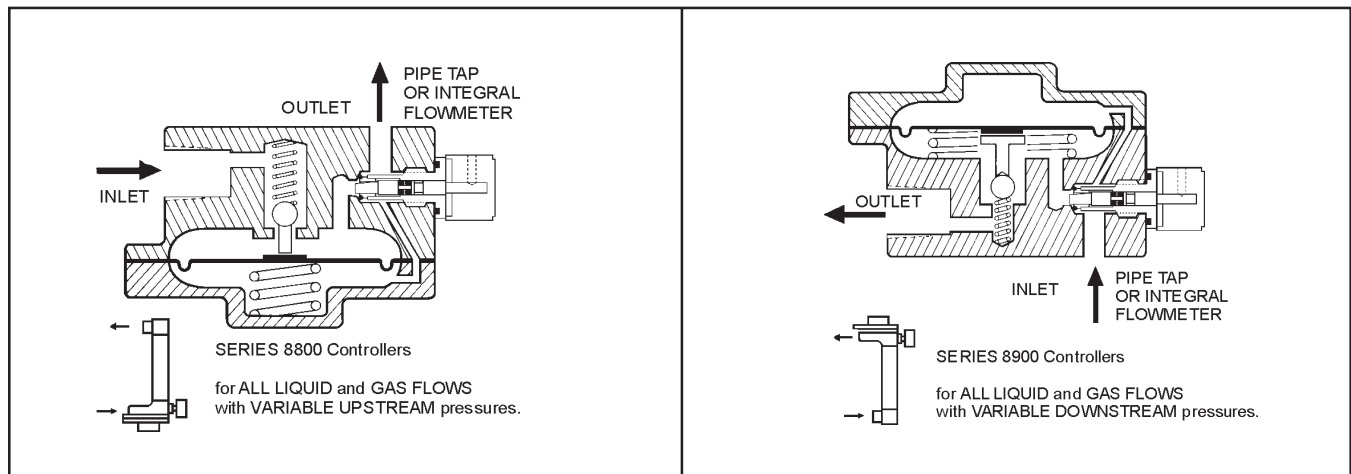


Figure 1 Cutaway View, Principle of Operation

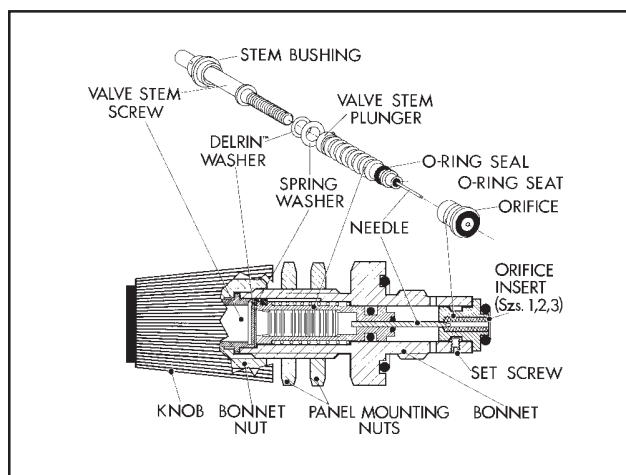


Figure 2 Cutaway View, NRS Valve

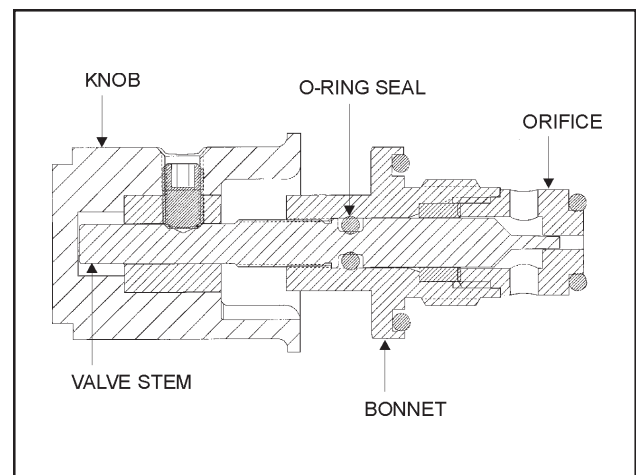


Figure 3 Cutaway View, Cartridge Valve

Flow Controllers for Gas and Liquid Service

Table 1 Flow Ranges

Flow Ranges		Water				Air @ 0 PSIG/1.013 bar abs, 70°F/20°C			
Model	Valve	l/h		GPH		ln/h		SCFH	
		min	max	min	max	min	max	min	max
FC 8800	Low	0.090	4.5	0.024	1.2	2.6	130	0.10	4.9
FC 8802	Medium	0.29	15	0.077	3.8	8.4	420	0.32	16
FC 8805	High	1.76	88	0.46	23	51	2540	1.9	97
FC 8812 / FC 8815	High Flow	11	570	3.0	151	280	14000	11	532
FC 8840	NRS 1	0.0050	0.25	0.0013	0.066	0.14	7.0	0.0053	0.27
FC 8842	NRS 2	0.0088	0.44	0.0023	0.12	0.32	16	0.012	0.61
FC 8845	NRS 3	0.022	1.1	0.0058	0.29	0.50	25	0.019	0.95
	NRS 4	0.054	2.7	0.014	0.71	2.3	114	0.087	4.3
	NRS 5	0.17	8.7	0.046	2.3	5.2	260	0.20	9.9
	NRS 6	0.70	35	0.18	9.2	18	900	0.68	34
FC 8830	High Flow	136	1820	36	481	3800	56000	145	2130

Flow Ranges		Water				Air @ 100 PSIG/7.013 bar abs, 70°F/20°C			
Model	Valve	l/h		GPH		ln/h		SCFH	
		min	max	min	max	min	max	min	max
FC 8900	Low	0.090	4.5	0.024	1.2	6.8	340	0.26	13
FC 8902	Medium	0.29	15	0.077	3.8	22	1100	0.84	42
FC 8905	High	1.8	88	0.46	23	132	6600	5.0	251
FC 8912 / FC 8915	High Flow	11	570	3.0	151	728	36400	28	1384
FC 8940	NRS 1	0.0050	0.25	0.0013	0.066	0.38	19	0.014	0.72
FC 8942	NRS 2	0.0088	0.44	0.0023	0.12	0.90	45	0.034	1.7
FC 8945	NRS 3	0.022	1.1	0.0058	0.29	1.3	66	0.050	2.5
	NRS 4	0.054	2.7	0.014	0.71	5.8	290	0.22	11
	NRS 5	0.17	8.7	0.046	2.3	13	630	0.48	24
	NRS 6	0.70	35	0.18	9.2	44	2200	1.7	84
FC 8744	NRS 1	0.010	0.25	0.0026	0.066	0.52	26	0.020	0.99
	NRS 2	0.020	0.44	0.0053	0.12	0.98	49	0.037	1.9
	NRS 3	0.040	1.1	0.011	0.29	1.8	91	0.069	3.5

Table 2 Pressure/Temperature Ratings and Pressure Drop

Body material:	Brass								Stainless								Total Pressure Drop*			
Diaphragm material:	Viton				Buna				Viton				Teflon							
Model	Max. Temp		Max. Press.		Max. Temp		Max. Press.		Max. Temp		Max. Press.		Max. Temp		Max. Press.		Minimum		Maximum	
	F	C	psi	bar	F	C	psi	bar	F	C	psi	bar	F	C	psi	bar	psi	bar	psi	bar
FC 8800 / FC 8802	350	178	250	17	180	82	250	17	350	178	300	21	300	149	300	21	10	0.7	300	21
FC 8900 / FC 8902	350	178	250	17	180	82	250	17	350	178	300	21	300	149	300	21	10	0.7	150	10
FC 8805	-	-	-	-	-	-	-	-	-	-	-	-	300	149	1000	69	10	0.7	300	21
FC 8905	-	-	-	-	-	-	-	-	-	-	-	-	300	149	1000	69	10	0.7	150	10
FC 8812	350	178	250	17	180	82	250	17	350	178	300	21	300	149	300	21	15	1	150	10
FC 8815	-	-	-	-	-	-	-	-	-	-	-	-	300	149	1000	69	15	1	150	10
FC 8912	350	178	250	17	180	82	250	17	350	178	300	21	300	149	300	69	15	1	50	3.5
FC 8915	-	-	-	-	-	-	-	-	-	-	-	-	300	149	1000	69	15	1	50	3.5
FC 8840 / FC 8842	350	178	250	17	180	82	250	17	350	178	300	21	300	149	300	21	8	0.5	300	21
FC 8940 / FC 8942	350	178	250	17	180	82	250	17	350	178	300	21	300	149	300	21	8	0.5	150	10
FC 8845	-	-	-	-	-	-	-	-	-	-	-	-	300	149	1000	69	8	0.5	300	21
FC 8945	-	-	-	-	-	-	-	-	-	-	-	-	300	149	1000	69	8	0.5	150	10
FC 8830	-	-	-	-	-	-	-	-	350	178	300	21	300	149	300	21	25	2	75	5

Body material:	Aluminum				Total Pressure Drop*			
Diaphragm material:	Buna							
Model	Max. Temp		Max. Press.		Minimum		Maximum	
	F	C	psi	bar	psi	bar	psi	bar
FC 8744	140	60	200	14	10	0.7	150	10

*Maximum pressure based on body material cannot be exceeded by total pressure drop value

NOTES: The minimum total pressure drop is the minimum pressure needed to reach maximum flow.
The maximum total pressure drop is the maximum permitted across the controller.

Flow Controllers for Gas and Liquid Service

Table 3 Materials of Constructions / Connection / Valve Option

Item	Model									
	00	02	05	12	15	40	42	45	FC 8830	FC 8744
Body/Diaphragm/Valve Seat & O-ring										
Brass/Viton	X	X	-	X	-	X	X	-	-	-
Brass/Buna/Buna-N	X	X	-	X	-	X	X	-	-	-
SS/Teflon	X	X	X	X	X	X	X	X	X	-
SS/Viton	X	X	-	X	-	X	X	-	X	-
Alum/Buna-N	-	-	-	-	-	-	-	-	-	X
Connection Size and Type										
1/4" F-NPT	X	X	X	X	X	X	X	X	-	-
1/8" F-NPT	X	X	X	-	-	X	X	X	-	X
1/8" Tube Compression	X	X	X	-	-	X	X	X	-	X
1/4" Tube Compression	X	X	X	X	X	X	X	X	-	-
1/4" I.D. Hose	X	X	-	X	-	X	X	-	-	X
3/4" F-NPT	-	-	-	-	-	-	-	-	X	-
Integral 5/16-24 UNF Thd	-	-	-	-	-	-	-	-	-	X
Integral connection for 1350/55 - one end	X	-	-	-	-	X	-	-	-	-
Filter										
Filter - inlet	X	X	X	X	X	X	X	X	-	X
Filter - inlet & outlet	-	-	-	-	-	-	-	-	-	X
Valve Type										
Cartridge valve	X	X	X	-	-	-	-	-	-	-
NRS Valve	-	-	-	-	-	X	X	X	-	X
Digital handle NRS Valve	-	-	-	-	-	X	X	X	-	X
High Flow Needle Valve	-	-	-	X	X	-	-	-	X	-
No Valve	X	X	X	-	-	X	X	X	-	X

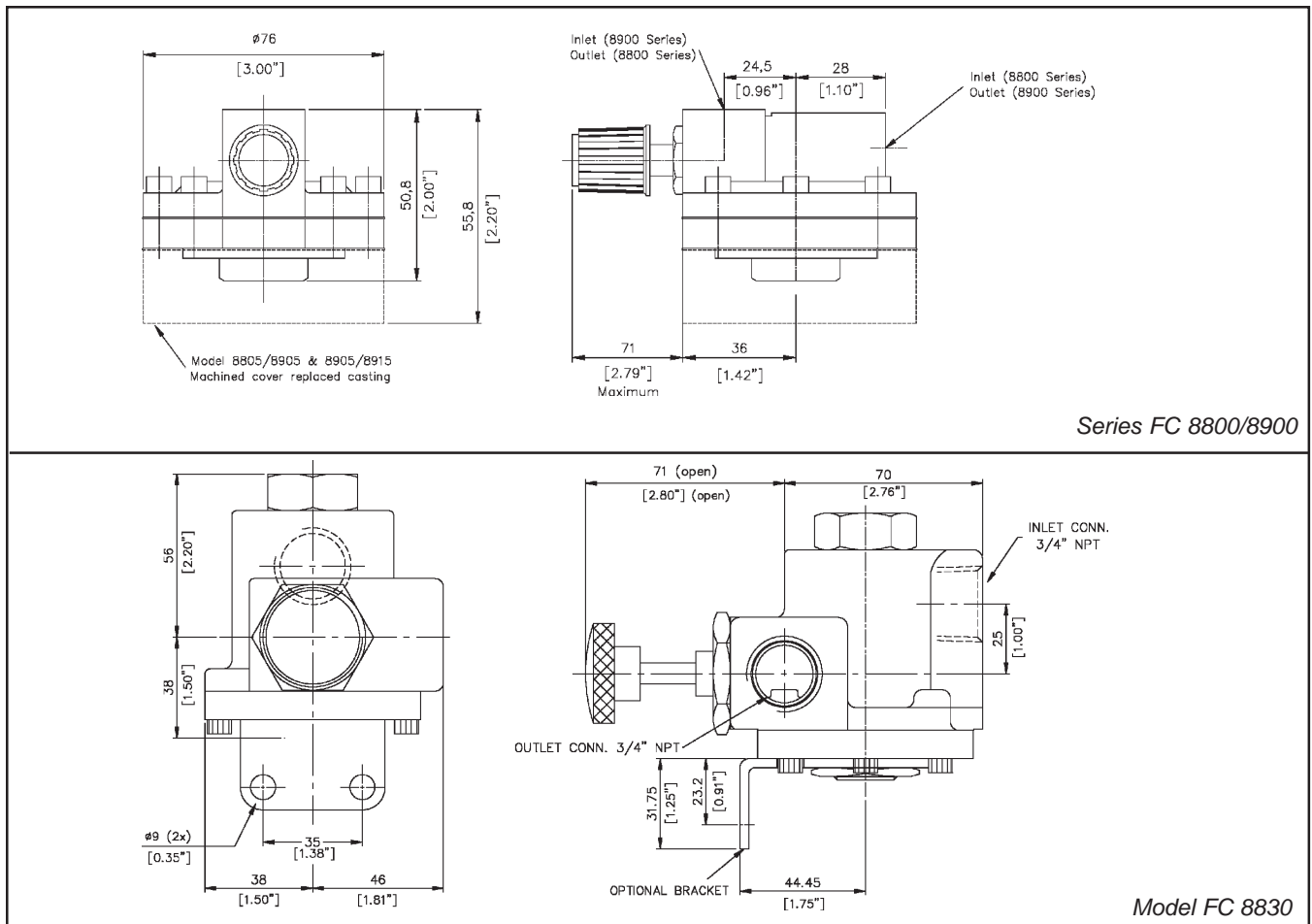
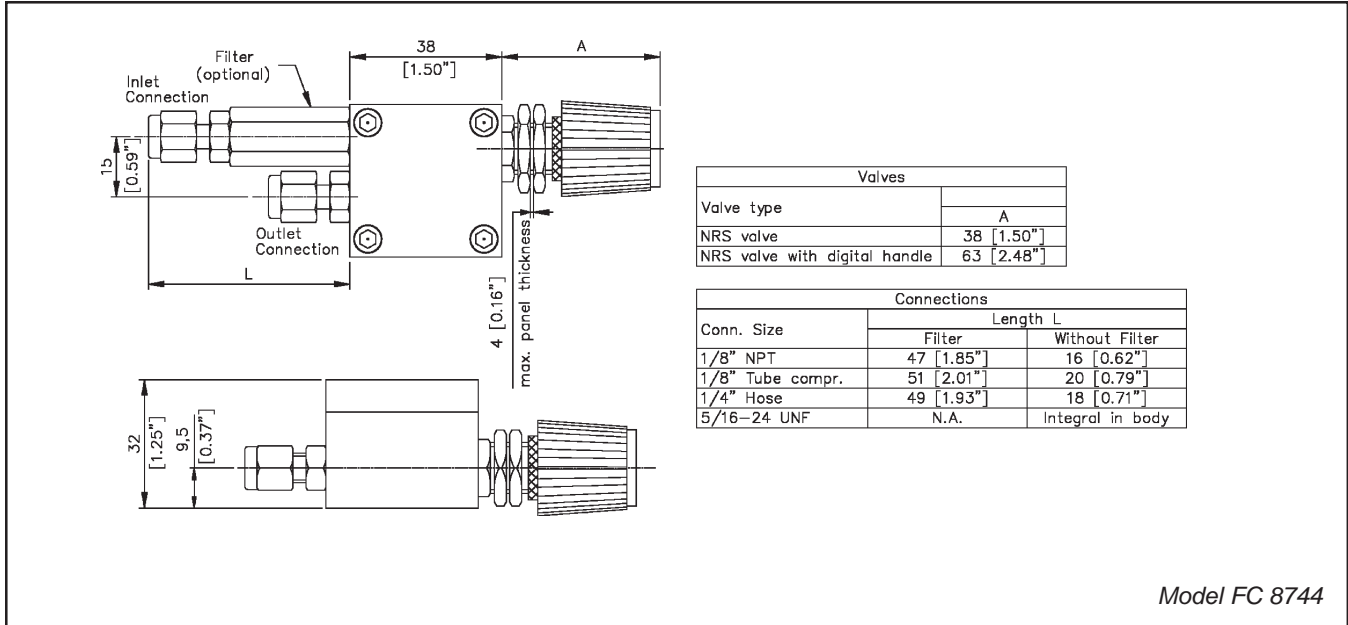


Figure 4 Dimensional Drawings



Model FC 8744

Figure 4 Dimensional Drawings (continued)

Table 4 Sizing Chart

<p>(FC 8800 Series) Sizing Formula for gas</p> $Q_2 = Q_1 \times \sqrt{\frac{P_{out}}{7.013} \times \frac{(293.1 \times 1.293)}{(T \times \text{density})}}$ <p>(FC 8900 Series) Sizing Formula for gas</p> $Q_2 = Q_1 \times \sqrt{\frac{P_{out}}{7.013} \times \frac{(293.1 \times 1.293)}{(T \times \text{density})}}$ <p>For All Liquid Controllers</p> $Q_2 = Q_1 \times \sqrt{\frac{1000}{\text{Density}}}$	<p>(Standard International Units)</p> <p>Q1 = Stated flow range I_n/h or l/h (See Table 1)</p> <p>Q2* = Actual flow range I_n/h or l/h</p> <p>P_{out} = Actual outlet operating pressure (bar abs)</p> <p>P_{in} = Actual inlet operating pressure (bar abs)</p> <p>T = Actual operating temperature (K)</p> <p>Density = Density of fluid (kg/m³_n)</p>
<p>(FC 8800 Series) Sizing Formula for gas</p> $Q_2 = Q_1 \times \sqrt{\frac{P_{out}}{14.7} \times \frac{530}{(T \times \text{SG})}}$ <p>(FC 8900 Series) Sizing Formula for gas</p> $Q_2 = Q_1 \times \sqrt{\frac{P_{in}}{100} \times \frac{530}{(T \times \text{SG})}}$ <p>For All Liquid Controllers</p> $Q_2 = Q_1 \times \sqrt{\frac{1}{\text{SG}}}$	<p>(English Units)</p> <p>Q1 = Stated flow range SCFH or GPH (See Table 1)</p> <p>Q2* = Actual flow range SCFH or GPH</p> <p>P_{out} = Actual outlet operating pressure (psia)</p> <p>P_{in} = Actual inlet operating pressure (psia)</p> <p>T = Actual operating temperature °R (°F + 460)</p> <p>SG = Specific gravity of Gas or Liquid</p>

* FC 8800 Series Downstream Flow, FC 8900 Series Upstream Flow

Flow Controllers for Gas and Liquid Service

Table 5 Model Code

<u>APPLICATION</u>	
FCA87	Low flow gases and liquids with variable downstream pressure
FCA88	Gases and liquids with variable upstream pressure
FCA89	Gases and liquids with variable downstream pressure
<u>TYPE OF USE</u>	
00	General use, standard operating pressure, integral connection to Models 1350 & 1355
02	General use, standard operating pressure, integral NPT connections
05	General use, high operating pressure, integral NPT connections
12	High flow rates, standard operating pressure, integral NPT connections
15	High flow rates, high operating pressure, integral NPT connections
30	Very high flow rates, standard operating pressure, integral NPT connections
40	Precise control, standard operating pressure, integral connection to Models 1350 & 1355
42	Precise control, standard operating pressure, integral NPT connections
45	Precise control, high operating pressure, integral NPT connections
44	Very precise control, low operating pressure, adapters required
<u>BODY MATERIAL</u>	
A	Brass
B	316 Stainless Steel
C	Aluminum FC 8744 only
<u>DIAPHRAGM MATERIAL</u>	
1	Viton
2	Teflon
3	Buna
<u>O-RING MATERIAL</u>	
A	Viton
B	Buna
C	Kalrez SS body only
D	Kalrez/Teflon SS body only
E	EPR SS body only
Y	Not Applicable
<u>PROCESS CONNECTION SIZE & TYPE</u>	
1	1/4" F-NPT
2	1/8" F-NPT
3	1/8" Tube Compression
4	1/4" Tube Compression
5	1/4" I.D. Hose
6	3/4" F-NPT
7	Integral 5/16-24 UNF Thd

Table 5 Model Code (Continued)

<u>VALVE CONFIGURATION</u>	
A	Cartridge Valve, Low Flow
B	Cartridge Valve, Med. Flow
C	Cartridge Valve, High Flow
D	NRS Needle Valve, Size # 1
E	NRS Needle Valve, Size # 2
F	NRS Needle Valve, Size # 3
G	NRS Needle Valve, Size # 4
H	NRS Needle Valve, Size # 5
J	NRS Needle Valve, Size # 6
L	High Flow Needle Valve
Y	No Valve
<u>VALVE OPTION</u>	
0	Knob only
1	Digital Handle
<u>FILTER</u>	
A	None
B	Filter on Inlet
C	Filters on Inlet & Outlet
<u>MOUNTING CONFIGURATION</u>	
0	None
1	Mounting Bracket, plated steel (standard) Note: N/A FC 8744
2	Mounting Bracket, stainless steel Note: N/A FC 8744
<u>MATERIAL CERTIFICATIONS</u>	
A	None
B	Certification to NACE MR-01-75
C	Material Certification EN 10204-2.2
D	Material Certification EN 10204-3.1
E	Certification to NACE & Material Certification EN 10204-2.2
F	Certification to NACE & Material Certification EN 10204-3.1
<u>ADDITIONAL CLEANING</u>	
1	Standard cleaning process
2	Degrease and clean for oxygen service

Flow Controllers for Gas and Liquid Service

BROOKS LOCAL AND WORLDWIDE SUPPORT

Brooks Instrument provides sales and service facilities around the world, ensuring quick delivery from local stock, timely repairs and local based sales and service facilities.

Our dedicated flow experts provide consultation and support, assuring successful applications of the Brooks flow measurement and control products.

Calibration facilities are available in local sales and service offices. The primary standard calibration equipment to calibrate our flow products is certified by our local Weights and Measures Authorities and traceable to the relevant international standards.

START-UP SERVICE AND IN-SITU CALIBRATION

Brooks Instrument can provide start-up service prior to operation when required.

For some process applications, where ISO-9001 Quality Certification is important, it is mandatory to verify and/or (re)calibrate the products periodically. In many cases this service can be provided under in-situ conditions, and the results will be traceable to the relevant international quality standards.

CUSTOMER SEMINARS AND TRAINING

Brooks Instrument can provide customer seminars and dedicated training to engineers, end users and maintenance persons. Please contact your nearest sales representative for more details.

HELP DESK

In case you need technical assistance:

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Due to Brooks Instrument's commitment to continuous improvement of our products, all specifications are subject to change without notice.

TRADEMARKS

Brooks Brooks Instrument, LLC
Kalrez DuPont Dow Elastomers
NRS Brooks Instrument, LLC
Teflon E. I. DuPont de Nemours & Co.
Viton DuPont Performance Elastomers



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