

Installation and Operation Manual

X-VA-FC-eng

Part Number: 541B045AHG

April, 2008

Brooks® Flow Controllers for Gas and Liquid Service Model FC 8744, Series FC 8800 and FC 8900



*Model 1350
with FC 8900
Flow Controller*



*Model FC 8800
Flow Controller*



*Model FC 8744
Flow Controller*

Flow Controllers for Gas and Liquid Service

Essential Instructions

Read this page before proceeding!

Brooks Instrument designs, manufactures and tests its products to meet many national and international standards. Because these instruments are sophisticated technical products, you must properly install, use and maintain them to ensure they continue to operate within their normal specifications. The following instructions must be adhered to and integrated into your safety program when installing, using and maintaining Brooks Products.

- Read all instructions prior to installing, operating and servicing the product. If this instruction manual is not the correct manual, please see back cover for local sales office contact information. Save this instruction manual for future reference.
- If you do not understand any of the instructions, contact your Brooks Instrument representative for clarification.
- Follow all warnings, cautions and instructions marked on and supplied with the product.
- Inform and educate your personnel in the proper installation, operation and maintenance of the product.
- Install your equipment as specified in the installation instructions of the appropriate instruction manual and per applicable local and national codes. Connect all products to the proper electrical and pressure sources.
- To ensure proper performance, use qualified personnel to install, operate, update, program and maintain the product.
- When replacement parts are required, ensure that qualified people use replacement parts specified by Brooks Instrument. Unauthorized parts and procedures can affect the product's performance and place the safe operation of your process at risk. Look-alike substitutions may result in fire, electrical hazards or improper operation.
- Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified persons, to prevent electrical shock and personal injury.

Pressure Equipment Directive (PED)

All pressure equipment with an internal pressure greater than 0.5 bar (g) and a size larger than 25mm or 1" (inch) falls under the Pressure Equipment Directive (PED). The Directive is applicable within the European Economic Area (EU plus Norway, Iceland and Liechtenstein). Pressure equipment can be traded freely within this area once the PED has been complied with.

- Section 1 of this manual contains important safety and operating instructions related to the PED directive.
- Meters described in this manual are in compliance with EN directive 97/23/EC module H *Conformity Assessment*.
- All Brooks Instrument Flowmeters fall under fluid group 1.
- Meters larger than 25mm or 1" (inch) are in compliance with category I, II, III of PED.
- Meters of 25mm or 1" (inch) or smaller are Sound Engineering Practice (SEP).

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Flow Controllers for Gas and Liquid Service

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1-1 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 1-1.

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.

1-2 Design Features

- Wide range of models for high and low flow rates.
- Integral Controller with flowmeter assemblies in a compact size.
- Brass or 316 Stainless Steel construction compatible with a wide range of fluids.
- Front or Rear Panel Mounting options.
- 15 Turn NRS™(extremely low flow) valve option for more precise control.

1-3 Specifications

WARNING

Do not operate this instrument in excess of the specifications listed in Section 1 of this manual. Failure to heed this warning can result in serious personal injury and/or damage to the equipment.

Flow Ranges

Water - up to 480 GPH / 1820 l/h

Air - up to 2130 SCFH / 56000 l_n/h

Refer to Table 1-1.

Flow Controllers for Gas and Liquid Service

Pressure and Temperature Ratings

Up to 1000 psig / 69 bar

Refer to Table 1-2.

Pressure Equipment Directive (97/23/EC)

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

Pressure Drop

Refer to Table 1-2.

Materials of Construction Controller Body:

316 Stainless Steel, Brass or Aluminum (FC 8744 only).

Refer to Table 1-3.

Controller Diaphragm:

Buna-N, Teflon® or Viton® fluoroelastomers

Refer to Table 1-3.

Needle Valve:

1) 316 Stainless Steel Cartridge valve, Refer to Figure 1-3,

Refer to DS-VA-CART-eng

2) 316 Stainless Steel NRS Valve, Refer to Figure 1-2,

Refer to DS-VA-8503-eng

3) 316 Stainless Steel standard needle valve type

Refer to Table 1-3.

O-rings:

Viton fluoroelastomers

Buna-N

Kalrez® (SS body only)

EPR (SS body only)

Kalrez®/Teflon®(SS body only)

Refer to Table 1-3.

Meter Dimensions

Refer to Figures 1-2 thru 1-11.

Sizing

Refer to Table 1-5.

Material Certification: **(Stainless Steel body only)**

Certification to NACE MR-01-75

Certification to DIN 50049-2.2

Certification to DIN 50049-3.1

Ordering Information and Model Codes

Refer to Table 1-4.

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Table 1-1 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 1-2 Pressure/Temperature Ratings

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.

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Table 1-3 Materials of Construction / 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

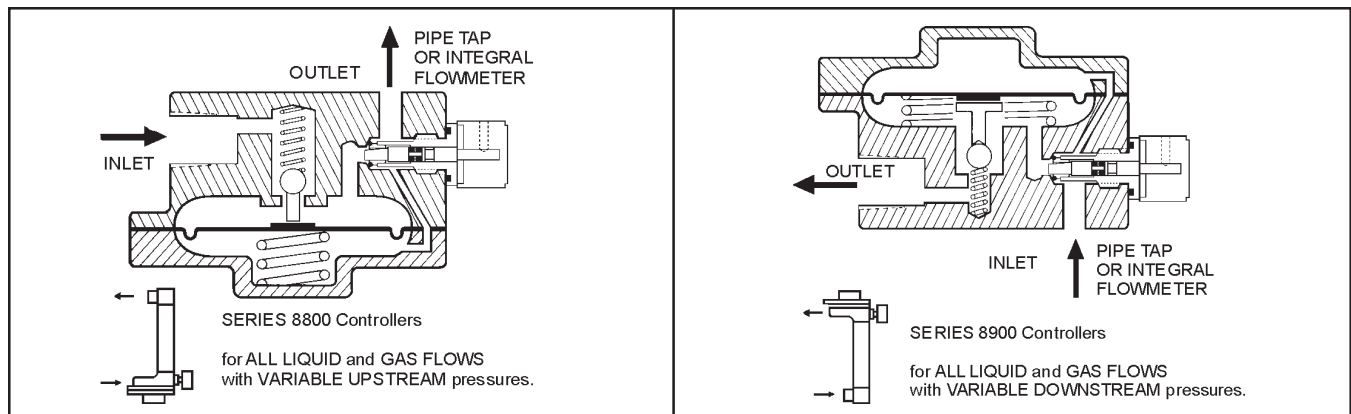


Figure 1-1 Cutaway View, Principle of Operation

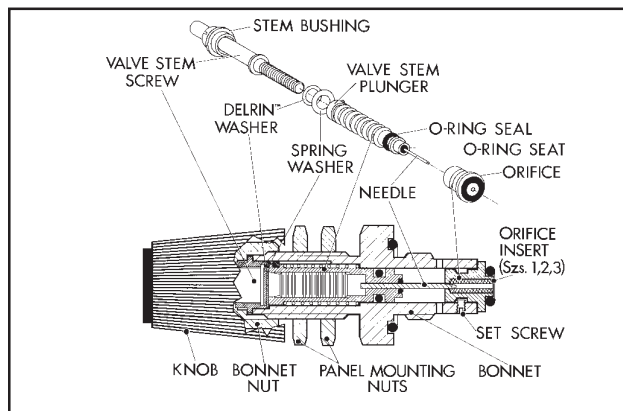


Figure 1-2 Cutaway View, NRS Valve

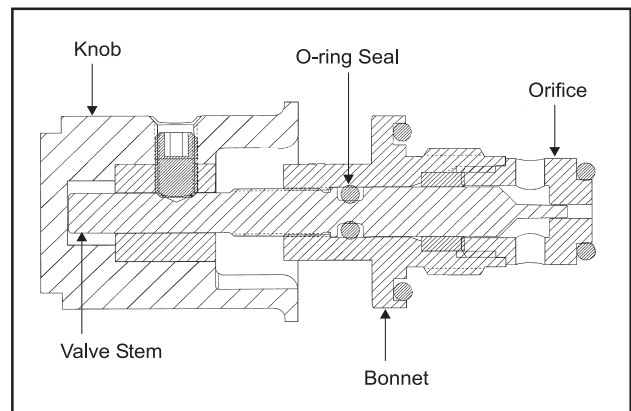


Figure 1-3 Cutaway View, Cartridge Valve

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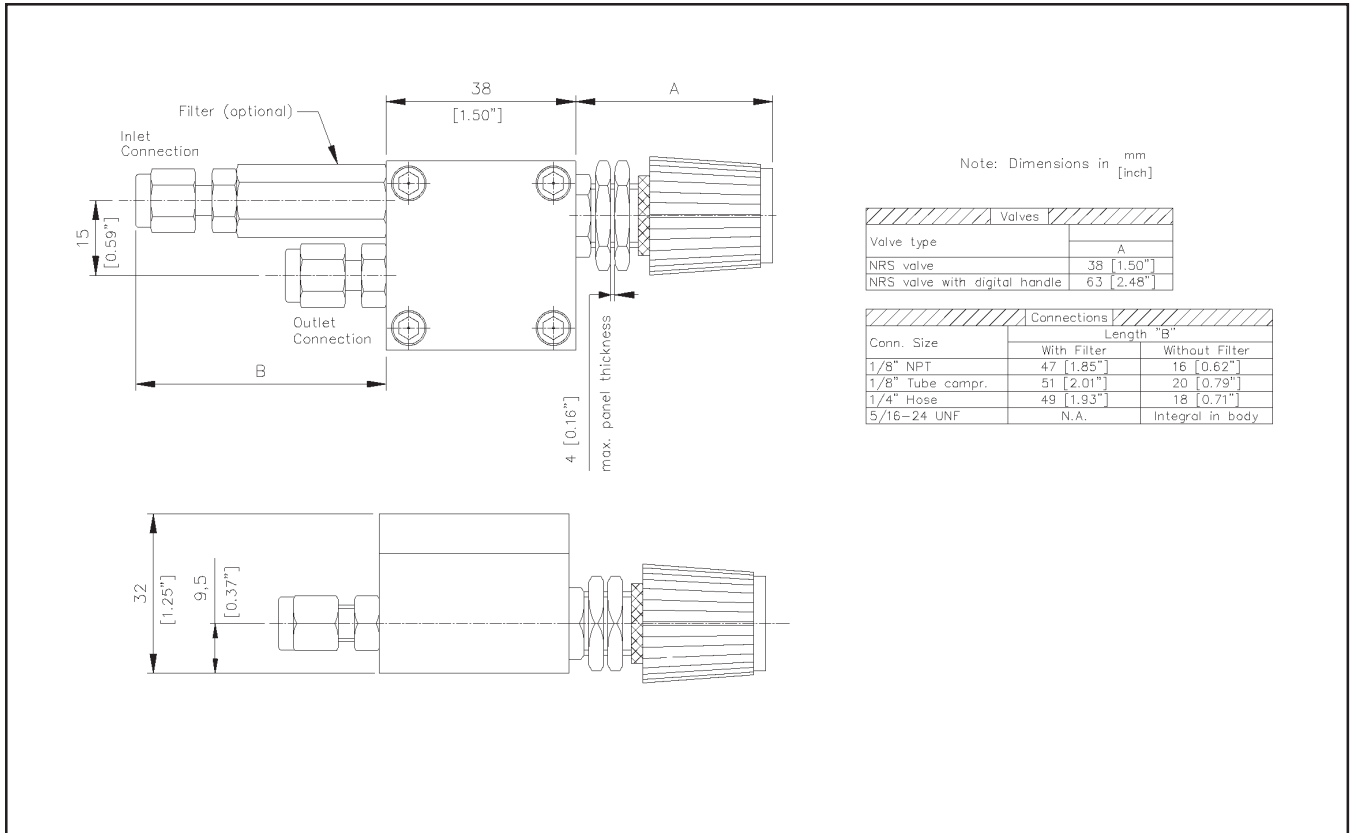


Figure 1-4 Dimensional Drawing Model FC 8744

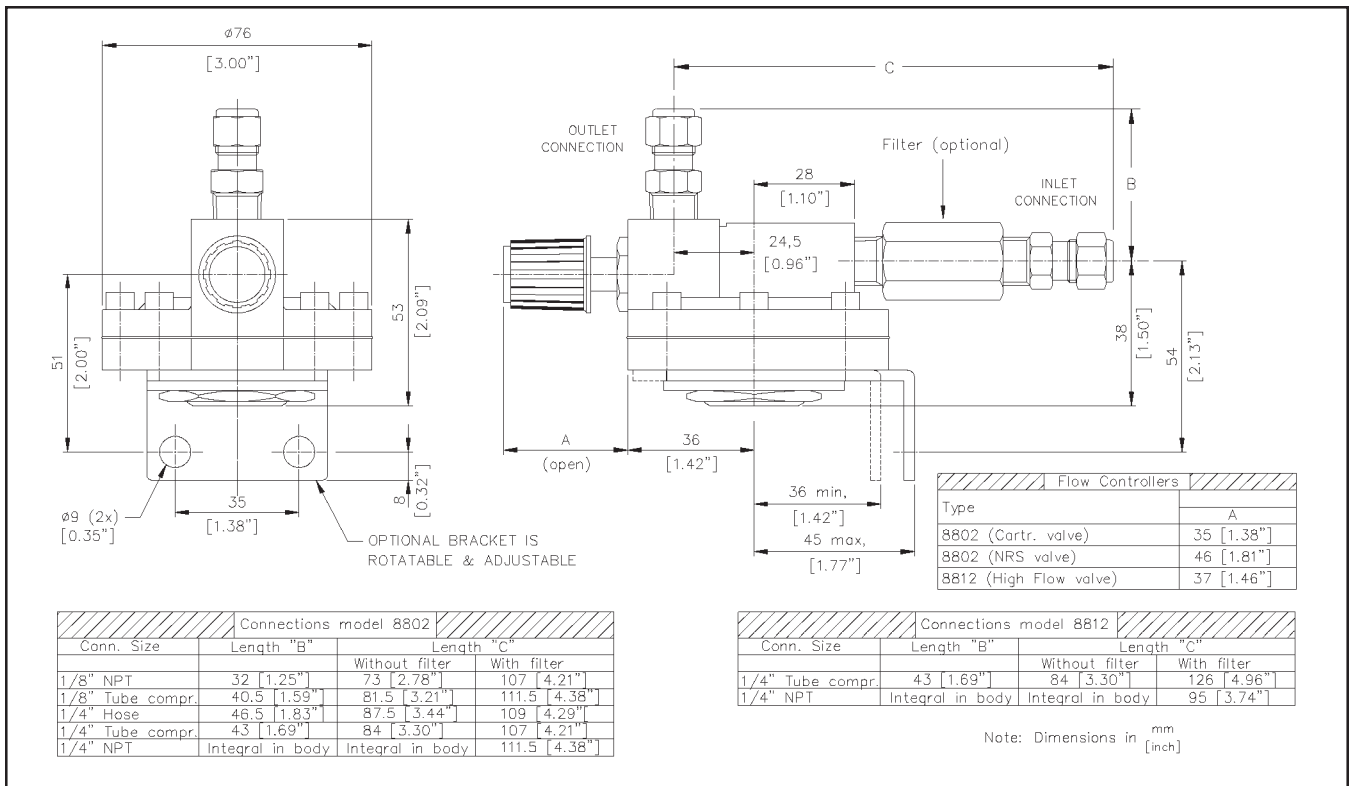


Figure 1-5 Dimensional Drawing Models FC 8802 and 8812

Flow Controllers for Gas and Liquid Service

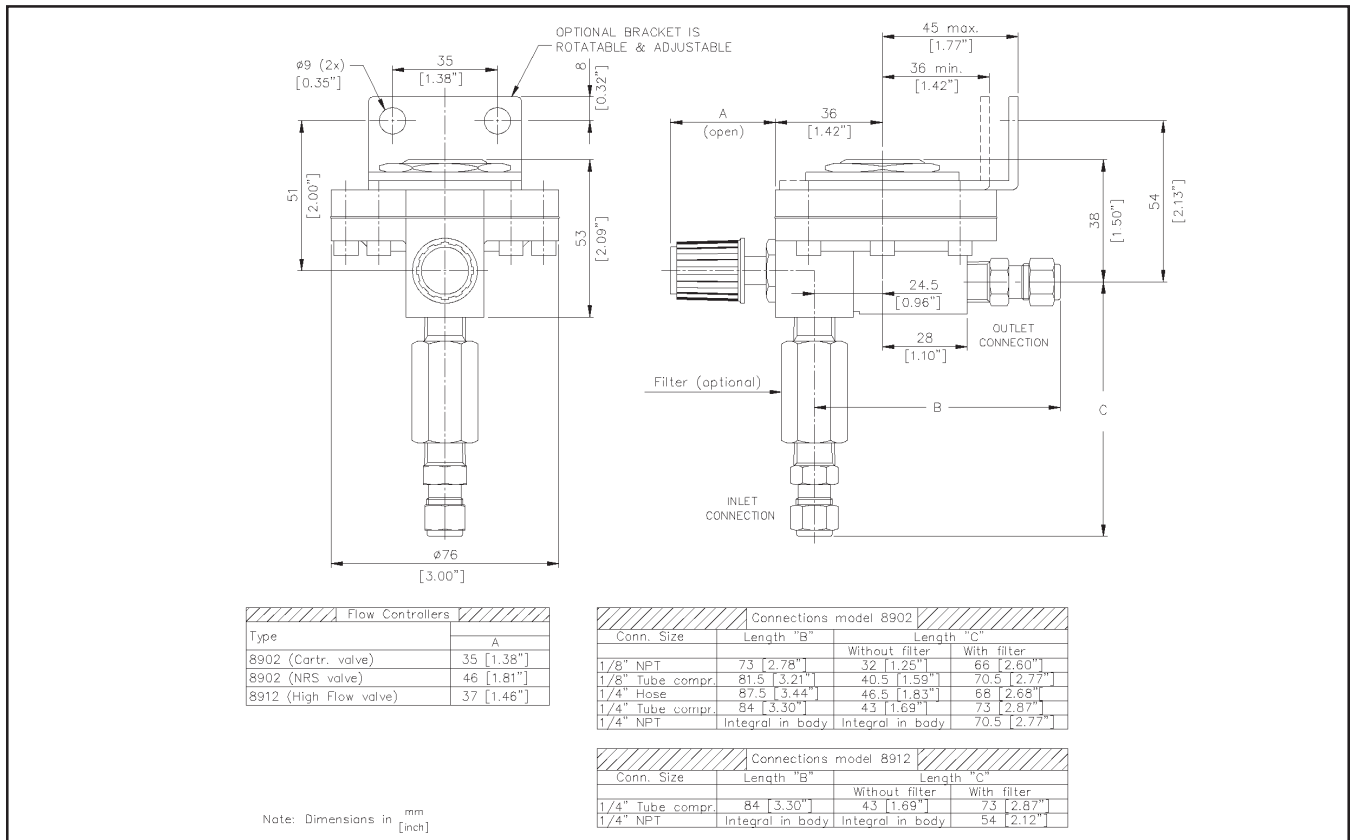


Figure 1-6 Dimensional Drawing Models FC 8902 and 8912

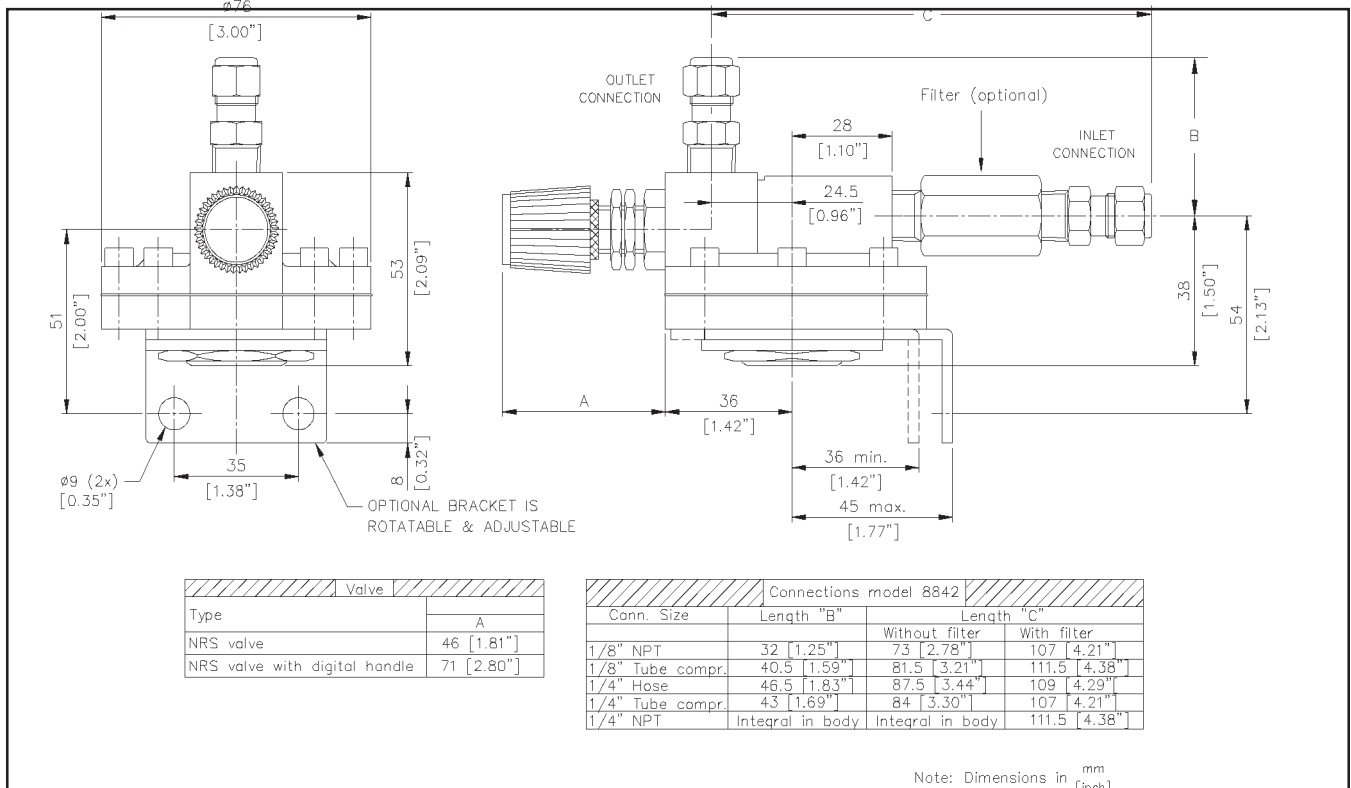


Figure 1-7 Dimensional Drawing Model FC 8842

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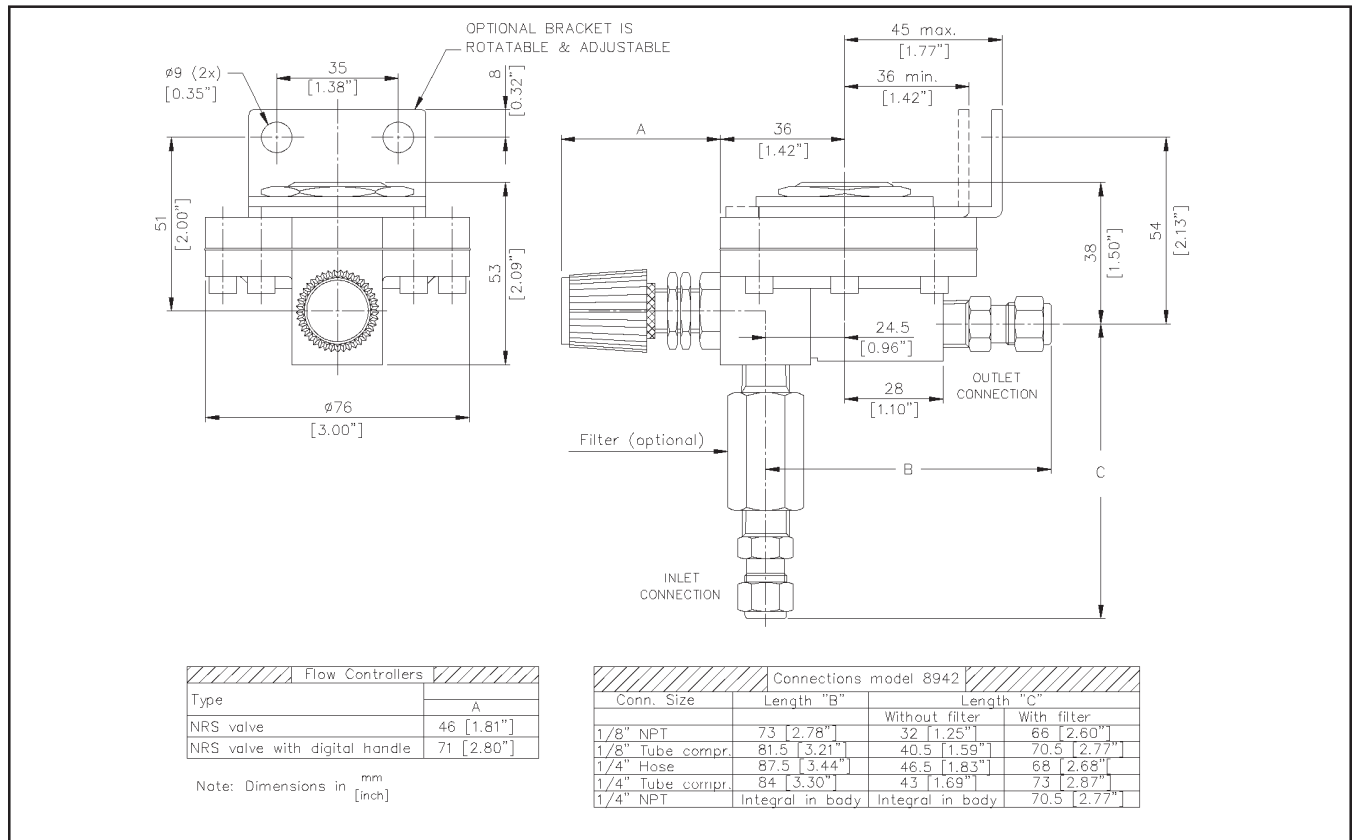


Figure 1-8 Dimensional Drawing Model FC 8942

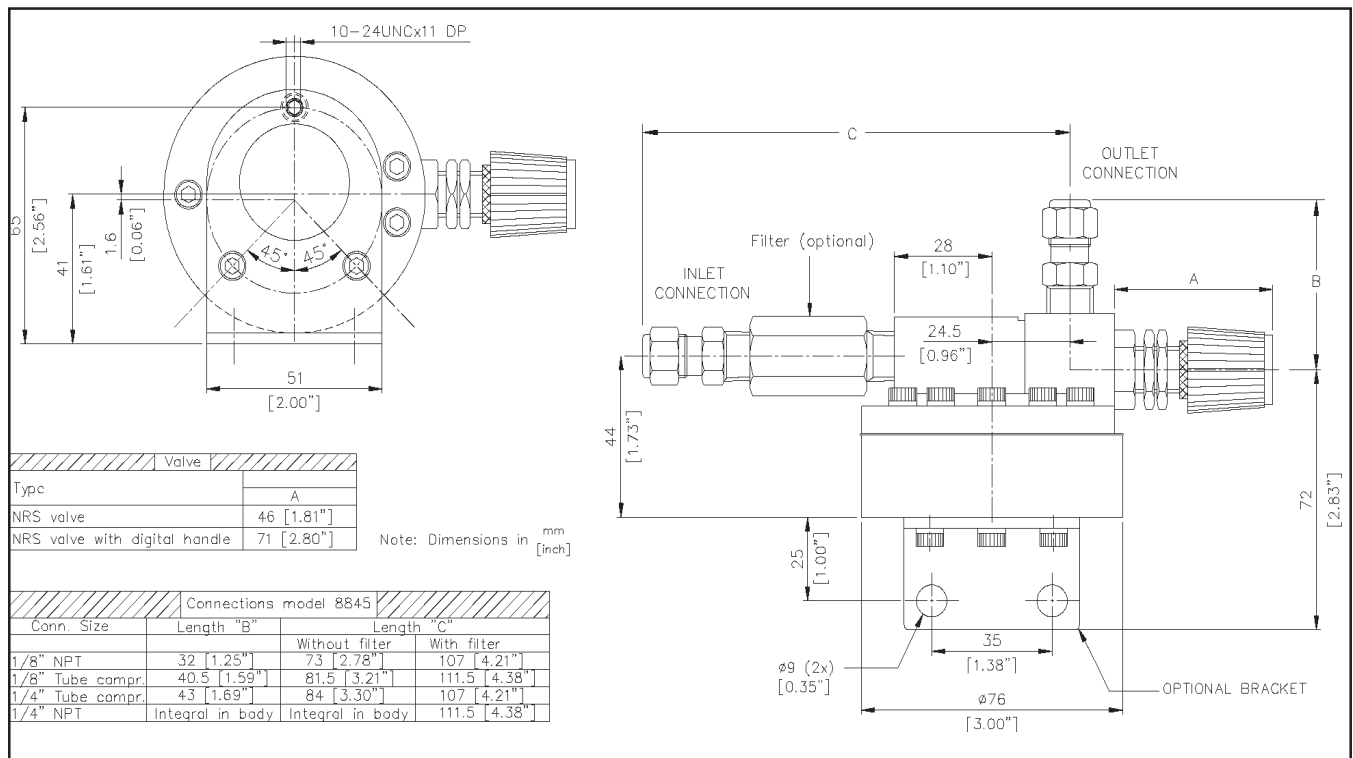


Figure 1-9 Dimensional Drawing Model FC 8845

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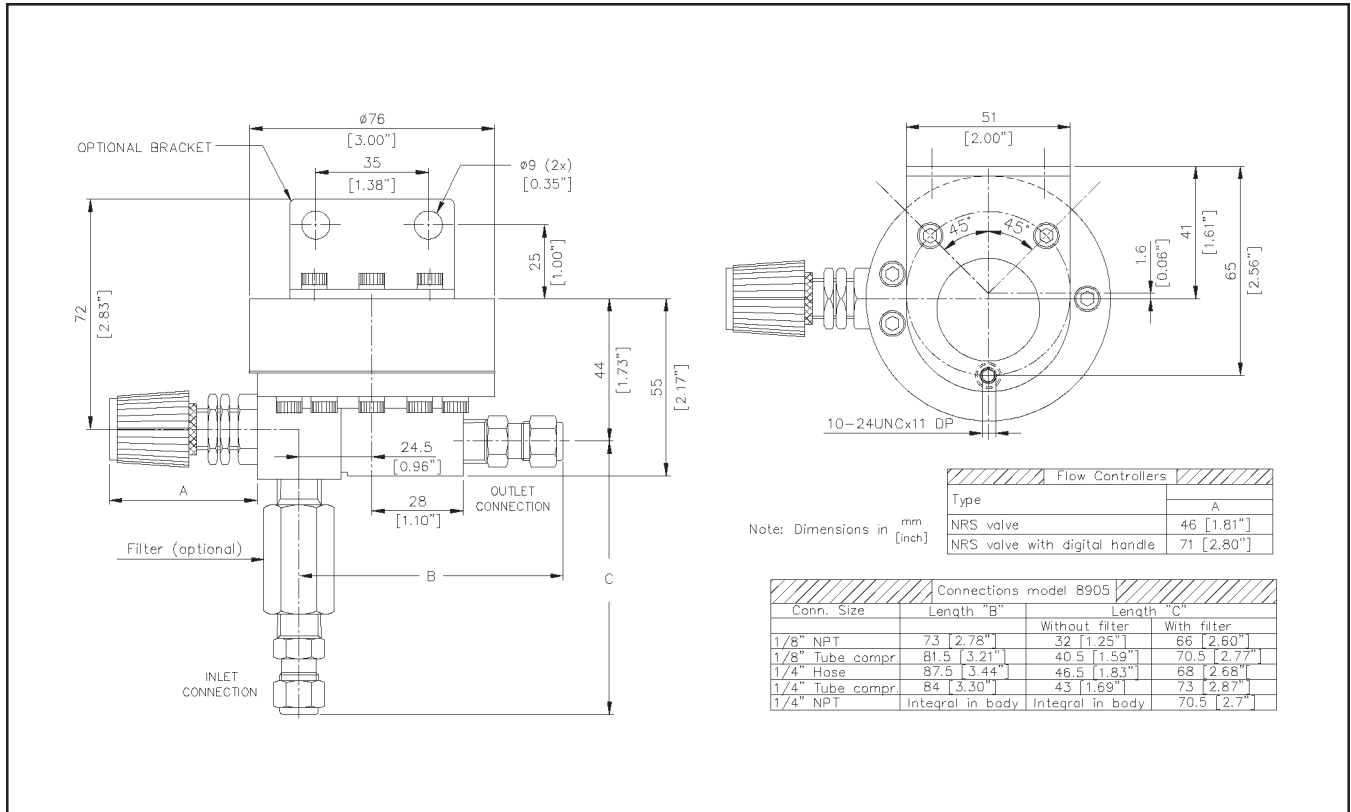


Figure 1-10 Dimensional Drawing Model FC 8945

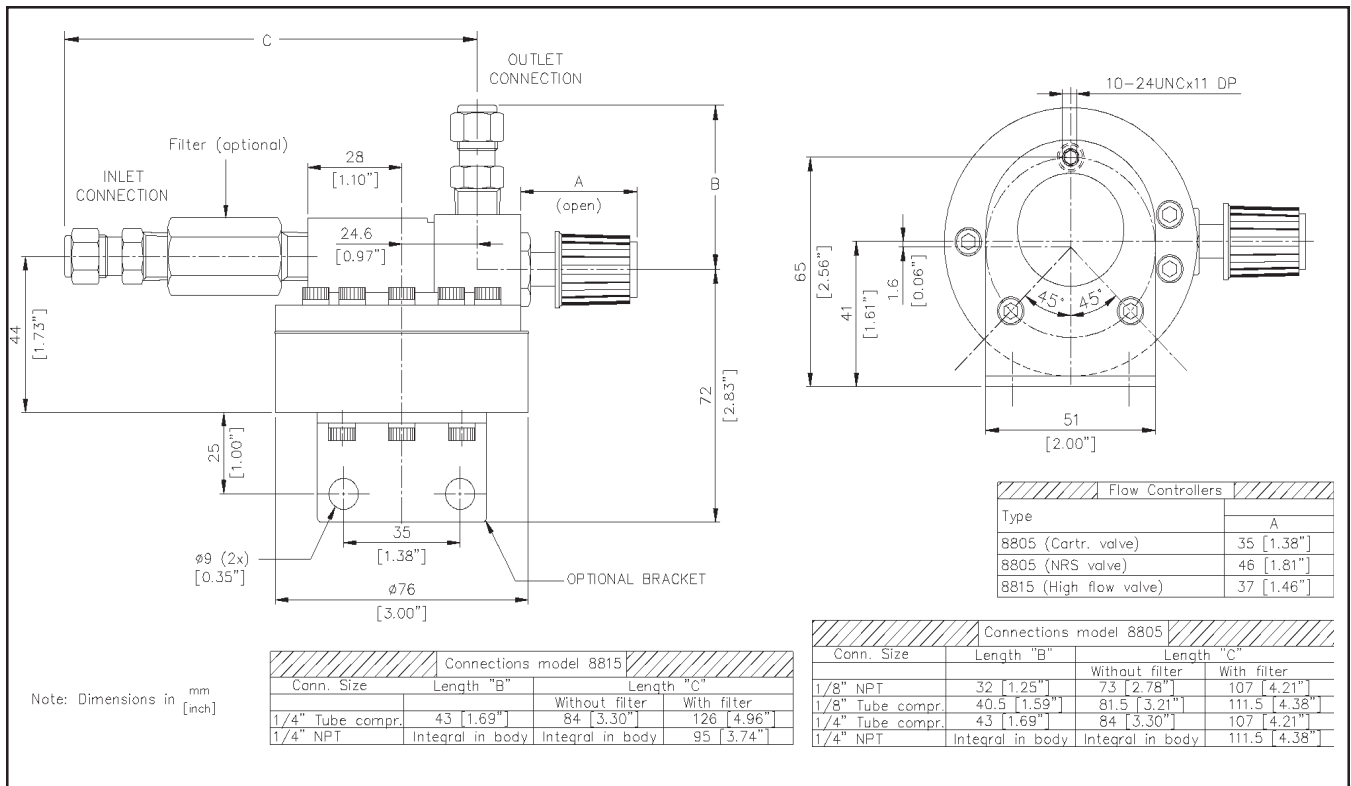


Figure 1-11 Dimensional Drawing Models FC 8805 and 8815

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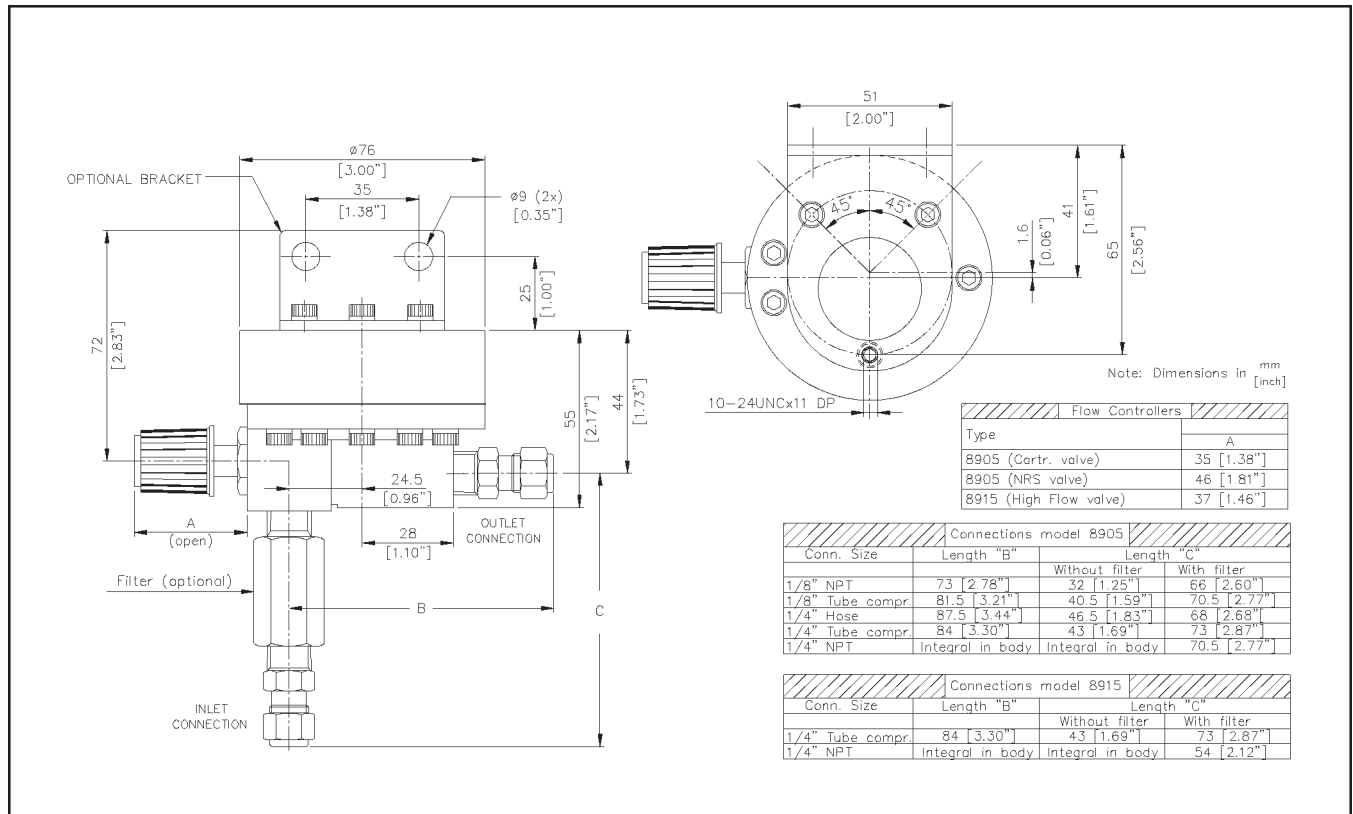


Figure 1-12 Dimensional Drawing Models FC 8905 and 8915

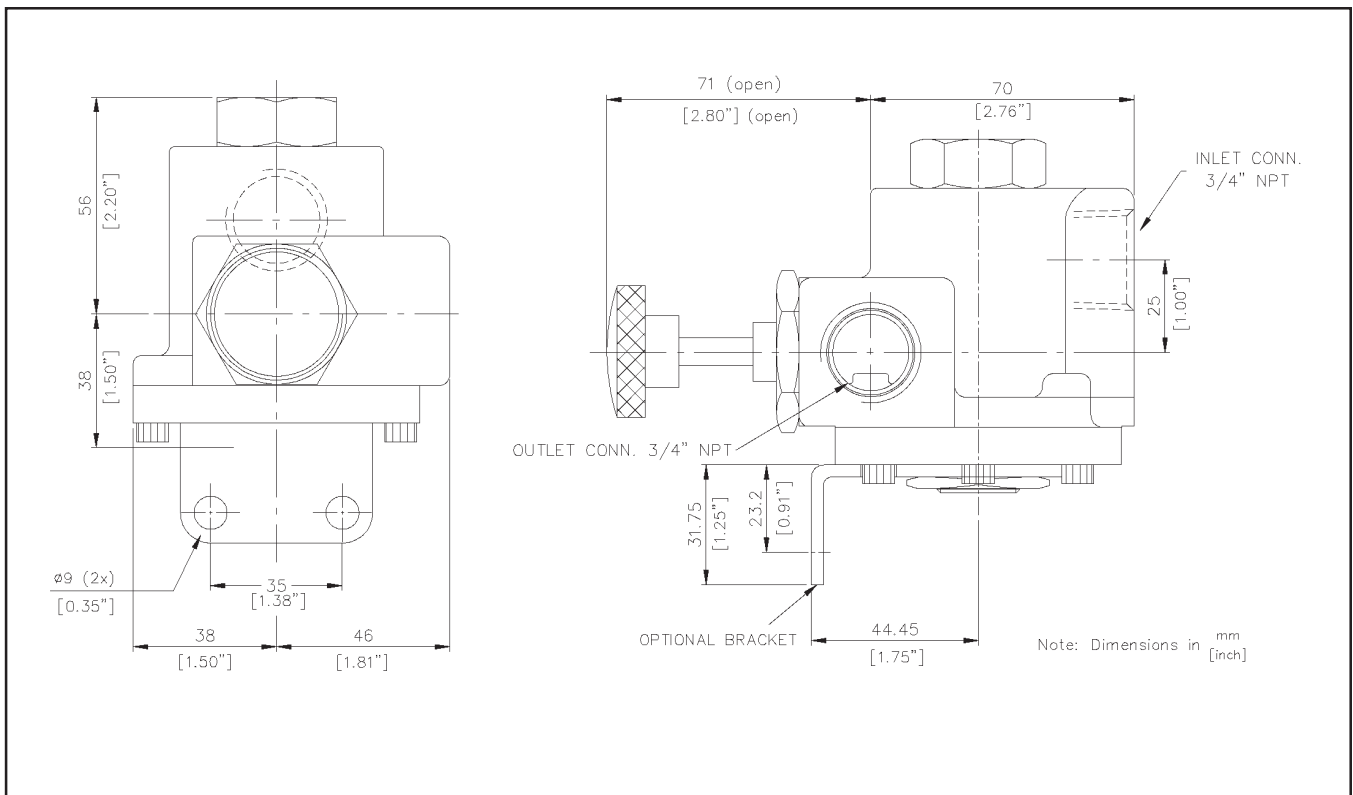


Figure 1-13 Dimensional Drawing Model FC 8830

Flow Controllers for Gas and Liquid Service

Table 1-4 Model Code

<p><u>APPLICATION</u></p> <p>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</p>	
<p><u>TYPE OF USE</u></p> <p>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</p>	
<p><u>BODY MATERIAL</u></p> <p>A Brass B 316 Stainless Steel C Aluminum FC 8744 only</p>	
<p><u>DIAPHRAGM MATERIAL</u></p> <p>1 Viton 2 Teflon 3 Buna</p>	
<p><u>O-RING MATERIAL</u></p> <p>A Viton B Buna C Kalrez SS body only D Kalrez/Teflon SS body only E EPR SS body only Y Not Applicable</p>	
<p><u>PROCESS CONNECTION SIZE & TYPE</u></p> <p>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</p>	

Table 1-4 Model Code Cont'd

<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

Table 1-5 Sizing Chart

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

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

2-1 General

This section contains the procedures for the receipt and installation of the instrument. Do not attempt to start the system until the instrument has been permanently installed. It is extremely important that the start-up procedures be followed in the exact sequence presented.

2-2 Receipt of Equipment

When the instrument is received, the outside packing case should be checked for damage incurred during shipment. If the packing case is damaged, the local carrier should be notified at once regarding his liability. A report should be submitted to your nearest Product Service Department.

Brooks Instrument

407 W. Vine Street
P.O. Box 903
Hatfield, PA 19440 USA
Toll Free (888) 554-FLOW (3569)
Tel (215) 362-3700
Fax (215) 362-3745
E-mail: BrooksAm@EmersonProcess.com
www.BrooksInstrument.com

Brooks Instrument

Neonstraat 3
6718 WX Ede, Netherlands
P.O. Box 428
6710 BK Ede, Netherlands
Tel 31-318-549-300
Fax 31-318-549-309
E-mail: BrooksEu@EmersonProcess.com

Brooks Instrument

1-4-4 Kitasuna Koto-Ku
Tokyo, 136-0073 Japan
Tel 011-81-3-5633-7100
Fax 011-81-3-5633-7101
Email: BrooksAs@EmersonProcess.com

Remove the envelope containing the packing list. Carefully remove the instrument from the packing case. Make sure spare parts are not discarded with the packing materials. Inspect for damaged or missing parts.

2-3 Recommended Storage Practice

If intermediate or long-term storage of equipment is required, it is recommended that the equipment be stored in accordance with the following:

- a. Within the original shipping container.
- b. Stored in a sheltered area, preferably a warm, dry, heated warehouse.
- c. 32°C (90°F) maximum, 45°F (7°C) minimum.
- d. Relative humidity 45% nominal, 60% maximum, 25% minimum.
Upon removal from storage a visual inspection should be conducted to verify the condition of equipment is "as received".

Flow Controllers for Gas and Liquid Service

2-4 Return Shipment

Prior to returning any instrument to the factory, contact your nearest Brooks location for a Return Materials Authorization Number (RMA#). This can be obtained from one of the following locations:

Brooks Instrument

407 W. Vine Street
P.O. Box 903
Hatfield, PA 19440 USA
Toll Free (888) 554-FLOW (3569)
Tel (215) 362-3700
Fax (215) 362-3745
E-mail: BrooksAm@EmersonProcess.com
www.BrooksInstrument.com

Brooks Instrument

Neonstraat 3
6718 WX Ede, Netherlands
P.O. Box 428
6710 BK Ede, Netherlands
Tel 31-318-549-300
Fax 31-318-549-309
E-mail: BrooksEu@EmersonProcess.com

Brooks Instrument

1-4-4 Kitasuna Koto-Ku
Tokyo, 136-0073 Japan
Tel 011-81-3-5633-7100
Fax 011-81-3-5633-7101
Email: BrooksAs@EmersonProcess.com

Any instrument returned to Brooks requires completion of Form RPR003-1, Brooks Instrument Decontamination Statement, as well as, a Material Safety Data Sheet (MSDS) for the fluid(s) used in the instrument. This is required before any Brooks Personnel can begin processing. Copies of the form can be obtained from any Brooks Instrument location listed above.

2-5 Transit Precautions

To safeguard against damage during transit, transport the instrument to the installation site in the same container used for transportation from the factory if circumstances permit.

2-6 Removal from Storage

Upon removal from storage, a visual inspection should be conducted to verify the condition of the equipment is "as received." If the equipment has been in storage in conditions in excess of those recommended (See Section 2-3), the device should be subjected to a pneumatic pressure test in accordance with applicable vessel codes.

2-7 Installation

The inlet and outlet connections are identified by the terms "in" and "out". The controller may be installed in any attitude. Care must be exercised to prevent solids from entering the controller. The internal flow area is very small and any foreign material entering the controller will impair the operation of the needle valve and controller. Inlet and outlet filters should be installed. Optional integral micron filter is available for all models except Model FC 8830.

2-8 Panel Mounting

Series FC 8800 and FC 8900: Optional Mounting Brackets are provided for panel mounting the controller. The brackets are rotatable and adjustable to any desired location. For front panel mounting, two (2) 1 1/32" diameter and one (1) 2 1/32" diameter panel openings are required.

To front panel mount controller, remove valve knob, valve bonnet and one panel nut (for panel thickness over 1/4" remove both panel nuts). Place the valve stem through the panel opening, install and tighten two mounting nuts. Tighten mounting nuts and valve bonnet. Replace and tighten valve knob.

Model FC 8744: Panel mounting nuts are provided on the valve stem for a 1 7/32" diameter panel cutout. The controller may be mounted in any desired attitude. To panel mount the controller, remove the valve knob, valve bonnet and one panel nut (for the panel thickness of 1/4" remove both panel nuts). Place the valve stem through the panel opening and tighten panel mounting nuts and valve bonnet. replace and tighten valve knob.

WARNING

Do not apply pressure to the valve until the bonnet nut has been completely tightened. Failure to heed this warning can result in serious personal injury and/or damage to the equipment.

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3-1 Operating Precaution

WARNING

Do not operate the instrument in excess of temperature and pressure ratings. Serious injury and/or damage to the instrument could result.

3-2 General


Series FC 8800: After the flow controller is installed and the downstream condition established, adjust the upstream pressure to the value required to pass the maximum flow rate desired with the integral valve 90% open. If a flow meter is used it should be installed downstream of the controller where the pressure is constant. Do not attempt to use the valve for shut-off. If tight shut-off is required a separate on-off valve should be installed upstream of the controller. Should the downstream condition change, thus changing the pressure, a proportional change in flow rate will result.

Model FC 8744 & Series FC 8900: After the flow controller is installed and the upstream condition established, adjust the downstream pressure to the value required to pass maximum flow rate desired with integral valve 90% open. A good pressure regulator should be installed upstream of the controller. If the supply or upstream pressure varies, the flow rate will vary proportionally. If a flow meter is used for rate indication, install it on the constant pressure or upstream side of the controller. Use a separate valve for tight shut-off, if required.

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4-1 Maintenance

	<p>⚠ WARNING</p>
<p>METER/CONTROLLER SEAL COMPATIBILITY</p>	
<p>Products in this manual may contain metal or elastomeric seals, gaskets, O-rings or valve seats. It is the "user's" responsibility to select materials that are compatible with their process and process conditions. Using materials that are not compatible with the process or process conditions could result in the Meter or Controller leaking process fluid outside the pressure boundary of the device, resulting in personnel injury or death.</p> <p>It is recommended that the user check the Meter or Controller on a regular schedule to ensure that it is leak free as both metal and elastomeric seals, gaskets, O-rings and valve seats may change with age, exposure to process fluid, temperature, and /or pressure.</p>	

The FC Series Flow Controllers require no maintenance when installed in a dirt-free flow line. Repair or disassembly of the regulator in the field is not recommended. The regulator parts are ultrasonically cleaned and white-room assembled for trouble free operation. Do not attempt to clean the regulator by flushing with solvent or air.

The optional filter elements should be periodically inspected and ultrasonically cleaned or replaced if necessary. When reinstalling the filter elements use care to prevent any dirt or foreign matter from entering the lines.

Should the regulator become inoperative, it should be returned to the factory for repair or replacement.

Flow Controllers for Gas and Liquid Service

LIMITED WARRANTY

Seller warrants that the Goods manufactured by Seller will be free from defects in materials or workmanship under normal use and service and that the Software will execute the programming instructions provided by Seller until the expiration of the earlier of twelve (12) months from the date of initial installation or eighteen (18) months from the date of shipment by Seller. Products purchased by Seller from a third party for resale to Buyer ("Resale Products") shall carry only the warranty extended by the original manufacturer.

All replacements or repairs necessitated by inadequate preventive maintenance, or by normal wear and usage, or by fault of Buyer, or by unsuitable power sources or by attack or deterioration under unsuitable environmental conditions, or by abuse, accident, alteration, misuse, improper installation, modification, repair, storage or handling, or any other cause not the fault of Seller are not covered by this limited warranty, and shall be at Buyer's expense.

Goods repaired and parts replaced during the warranty period shall be in warranty for the remainder of the original warranty period or ninety (90) days, whichever is longer. This limited warranty is the only warranty made by Seller and can be amended only in a writing signed by an authorized representative of Seller.

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:

Americas		1-888-554-FLOW	
Europe		+(31) 318 549 290	Within Netherlands  0318 549 290
Asia		+011-81-3-5633-7100	

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



Brooks Instrument
 407 West Vine Street
 P.O. Box 903
 Hatfield, PA 19440-0903 USA
 T (215) 362-3700
 F (215) 362-3745
 E-Mail BrooksAm@EmersonProcess.com
www.BrooksInstrument.com

Brooks Instrument
 Neonstraat 3
 6718 WX Ede, Netherlands
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 F 31-318-549-309
 E-Mail BrooksEu@EmersonProcess.com

Brooks Instrument
 1-4-4 Kitasuna Koto-Ku
 Tokyo, 136-0073 Japan
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 F 011-81-3-5633-7101
 E-Mail BrooksAs@EmersonProcess.com

