

FC

Технические характеристики

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Model FC 8744, Series FC 8800 & FC 8900

Flow Controllers for Gas & Liquid Service



Model 1350G with FC 8800



FC 8744



FC 8800/ FC 8900

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. (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.

Features

- 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

Product Specifications

| | |
|--|---|
| Flow Ranges (Refer to Table 1) | Water - up to 480 GPH / 1820 l/h Air - up to 2130 SCFH / 56000 l/h |
| Pressure and Temperature Ratings Minimum Operating Temperature: Maximum Operating Temperature: | Up to 1000 psig / 69 Bar. Refer to Table 2a or 2b -40°F/C Refer to Tables 2a or 2b. |
| Pressure Drop | Refer to Table 2a. |
| Pressure Equipment Directive (97/23/EC) | Equipment falls under Sound Engineering Practice (SEP) according to the directive. |

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 316 Stainless Steel NRS™ Valve. Refer to Figure 2. Refer to data sheet DS-VA-8503-eng. 316 Stainless Steel high flow needle valve type. Refer to Table 3. | 316 Stainless Steel Cartridge Valve. Refer to Figure 3. Refer to data sheet DS-VA-CART-eng. |
| O-rings Kalrez/Teflon (SS body only). Refer to Table 3. | Viton® fluoroelastomers, Buna-N, Kalrez® (SS body only), EPR (SS body only), |

SPECIFICATIONS

| | |
|---|---|
| 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 / Model Codes | Refer to Model Code |

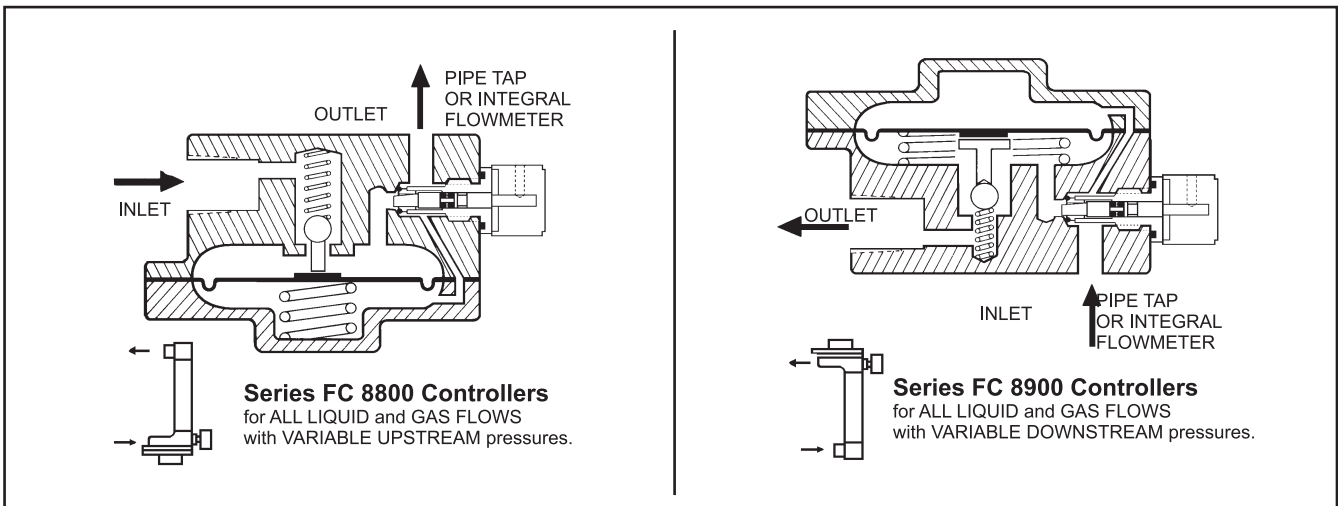


Figure 1 Cutaway View, Principle of Operation

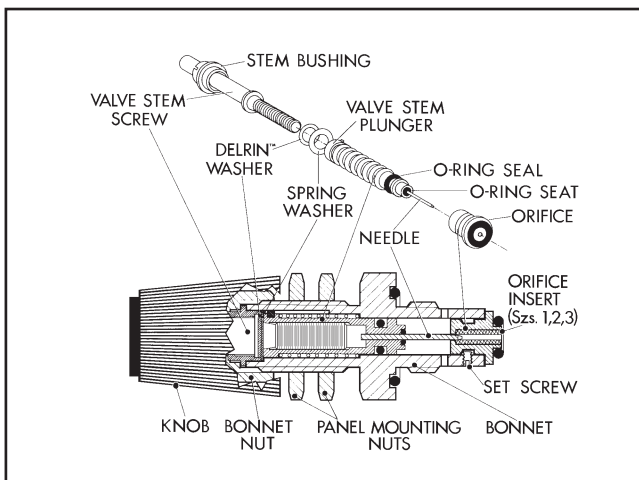


Figure 2 Cutaway View, NRS Valve

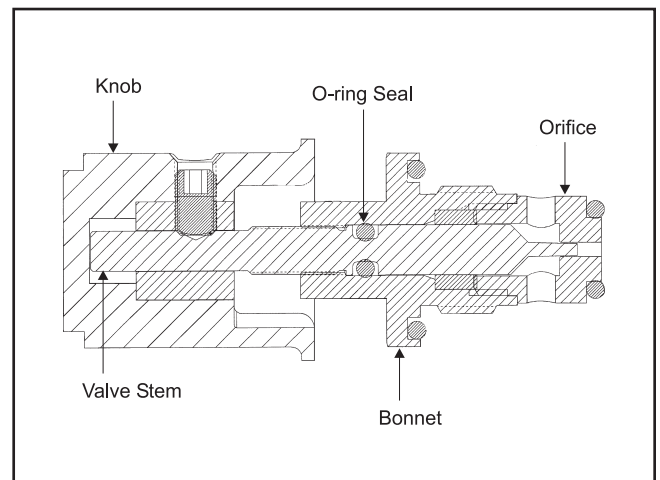


Figure 3 Cutaway View, Cartridge Valve

Product Specifications - Flow Ranges, Pressure/Temperature Ratings & Pressure Drop

Table 1 FC Series 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/7.91 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 2a FC Series Pressure / Temperature Ratings and Pressure Drop

| Body material: | Brass | | | | | | | | Stainless | | | | | | | | Total Pressure Drop* | | | |
|---------------------|-----------|-----|-------------|-----|-----------|----|-------------|-----|-----------|-----|-------------|-----|-----------|-----|-------------|-----|----------------------|-----|---------|-----|
| Diaphragm material: | Viton | | | | Buna | | | | Viton | | | | Teflon | | | | Minimum | | Maximum | |
| Model | Max. Temp | | Max. Press. | | Max. Temp | | Max. Press. | | Max. Temp | | Max. Press. | | Max. Temp | | Max. Press. | | psi | bar | psi | bar |
| | F | C | psi | bar | F | C | psi | bar | F | C | psi | bar | F | C | 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 | 130 | 9 |
| 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 | | | | | | | | | | | | Minimum | | Maximum | |
| Model | Max. Temp | | Max. Press. | | | | | | | | | | psi | bar | psi | bar |
| | F | C | 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.

Table 2b FC Series Pressure / Temperature Ratings CRN

| CRN Pressure Ratings - Flow Controller Model (316 Stainless Steel ONLY - only models shown) | | | | | | | | | | | | |
|---|----------------------------------|--------|--------|--------|--------|--------|-----------------------------------|--------|--------|--------|--------|--------|
| Diaphragm Material: | FC8802 | FC8812 | FC8842 | FC8902 | FC8912 | FC8942 | FC8805 | FC8815 | FC8845 | FC8905 | FC8915 | FC8945 |
| Viton | 275 psig/19 Bar(g) @ 350°F/178°C | | | | | | NOT AVAILABLE | | | | | |
| Teflon | 275 psig/19 Bar(g) @ 300°F/149°C | | | | | | 1000 psig/69 Bar(g) @ 300°F/149°C | | | | | |

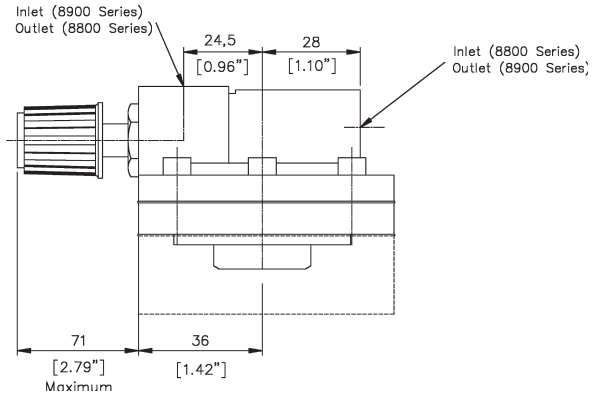
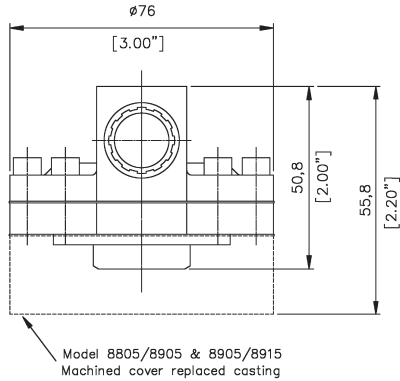
Table 3 FC Series Materials of Construction / Connection / Valve Option

| 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 |
| High Flow Needle Valve | - | - | - | X | X | - | - | - | X | - |
| No Valve | X | X | X | - | - | X | X | X | - | X |

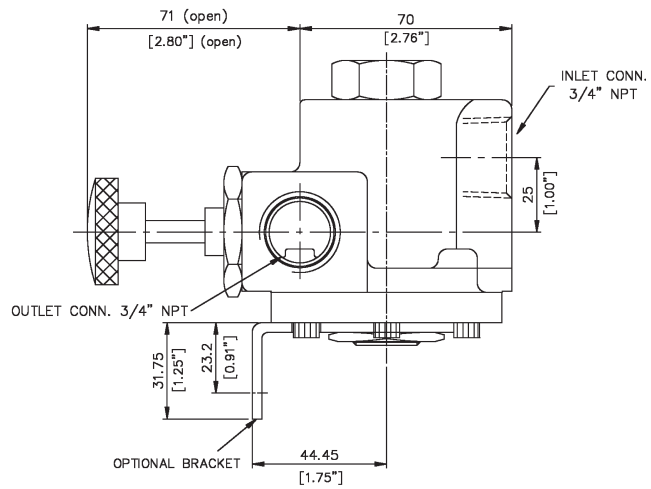
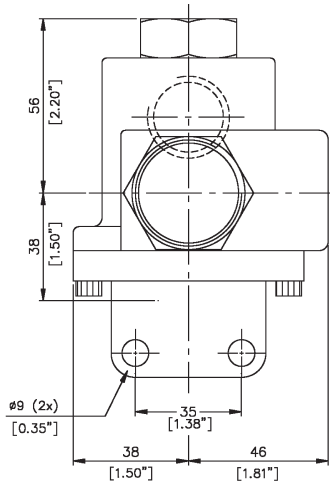
Table 4 Sizing Chart

| | |
|---|---|
| <p>FC 8800 Series Sizing Formula for Gas</p> $Q2 = Q1 \times \sqrt{\frac{P_{out}}{1.0}} \times \frac{(293.1 \times 1.293)}{(T \times \text{Density})}$ | <p>Standard International Units</p> <p>Q1 = Stated flow range l_n/h or l/h (See Flow Range Table)</p> <p>Q2* = Actual flow range l_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)</p> |
| <p>FC 8900 Series Sizing Formula for Gas</p> $Q2 = Q1 \times \sqrt{\frac{P_{in}}{7.91}} \times \frac{(293.1 \times 1.293)}{(T \times \text{Density})}$ | |
| <p>For All Liquid Controllers</p> $Q2 = Q1 \times \sqrt{\frac{1000}{\text{Density}}}$ | |
| <p>FC 8800 Series Sizing Formula for Gas</p> $Q2 = Q1 \times \sqrt{\frac{P_{out}}{14.7}} \times \frac{530}{(T \times \text{SG})}$ | |
| <p>FC 8900 Series Sizing Formula for Gas</p> $Q2 = Q1 \times \sqrt{\frac{P_{in}}{114.7}} \times \frac{530}{(T \times \text{SG})}$ | <p>English Units</p> <p>Q1 = Stated flow range SCFH or GPH (See Flow Range Table)</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> |
| <p>For All Liquid Controllers</p> $Q2 = Q1 \times \sqrt{\frac{1}{\text{SG}}}$ | |

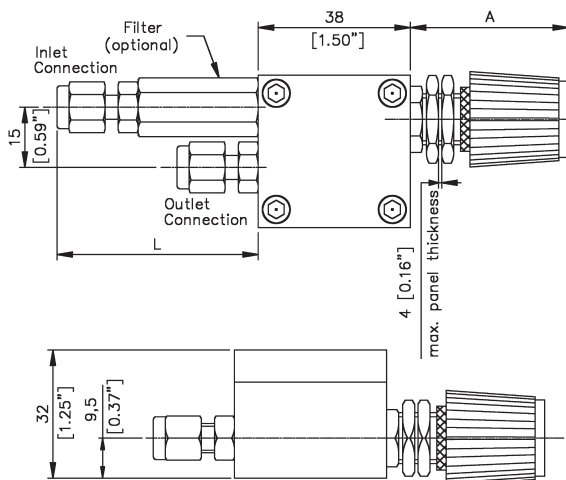
*FC 8800 Series Downstream Flow, FC 8900 Series Upstream Flow



Series FC 8800/8900



Model FC 8830



| Valves | |
|-------------------------------|------------|
| Valve type | A |
| NRS valve | 38 [1.50"] |
| NRS valve with digital handle | 63 [2.48"] |

| Connections | | |
|------------------|------------|------------------|
| Conn. Size | Length L | |
| | Filter | Without Filter |
| 1/8" NPT | 47 [1.85"] | 16 [0.62"] |
| 1/8" Tube compr. | 51 [2.01"] | 20 [0.79"] |
| 1/4" Hose | 49 [1.93"] | 18 [0.71"] |
| 5/16-24 UNF | N.A. | Integral in body |

Model FC 8744

Figure 4 Flow Controller Dimensional Drawings

| Code Description | Code Option | Option Description |
|------------------------------------|-------------|---|
| I. Base Model Number | 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 |
| II. Type of Use | 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 |
| | 44* | Very precise control, low operating pressure, adapters required |
| III. Body Material | A* | Brass |
| | B | 316 Stainless Steel |
| | C* | Aluminum - FC 8744 only |
| | D | 316 Stainless Steel - CRN |
| IV. Diaphragm Material | 2 | Teflon |
| | 3* | Buna |
| V. O-ring Material | A | Viton |
| | B | Buna |
| | C | Kalrez - Stainless Steel body only |
| | D | Kalrez/Teflon - Stainless Steel body only |
| | E | EPR - Stainless Steel body only |
| | Y | Not applicable |
| VI. Process Connection Size & Type | 1 | 1/4" FNPT |
| | 2 | 1/8 FNPT |
| | 3 | 1/8" Tube Compression |
| | 4 | 1/4" Tube Compression |
| | 5* | 1/4" I. D. Hose |
| | 6* | 3/4" FNPT |
| | 7 | Integral 5/16-24 UNF Thd |
| VII. Valve Configuration | A | Cartridge Valve, Low Flow |
| | B | Cartridge Valve, Medium Flow |
| | C | Cartridge Valve, High Flow |
| | D | NRS Needle Valve, Size #1 (316 SS only) |
| | E | NRS Needle Valve, Size #2 (316 SS only) |
| | F | NRS Needle Valve, Size #3 (316 SS only) |
| | G | NRS Needle Valve, Size #4 (316 SS only) |
| | H | NRS Needle Valve, Size #5 (316 SS only) |
| | J | NRS Needle Valve, Size #6 (316 SS only) |
| | L | High Flow Needle Valve |
| | Y | No Valve |
| VIII. Valve Option | 0 | Knob only |
| IX. Filter | A | None |
| | B | Filter on Inlet |
| | C | Filters on Inlet & Outlet |
| X. Mounting Configuration | 0 | None |
| | 1 | Mounting Bracket, Plated Steel (standard) Note: N/A FC 8744 |
| | 2 | Mounting Bracket, Stainless Steel Note: N/A FC 8744 |

* CRN NOT AVAILABLE

Sample Standard Model Code (Fields incomplete)

| I | II | III | IV | V | VI | VII | VIII | IX | X | XI | XII |
|-------|----|-----|----|---|----|-----|------|----|---|----|-----|
| FCA88 | 00 | B | 2 | A | 2 | D | 0 | A | 0 | | |

| Code Description | Code Option | Option Description |
|-----------------------------|-------------|---|
| XI. Material Certifications | A | None |
| | B | Certification to NACE MR-010-75 |
| | 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 |
| XII. Additional Cleaning | 1 | Standard Cleaning Process |
| | 2 | Degrease and Clean for Oxygen Service |

* CRN NOT AVAILABLE

Sample Standard Model Code (Fields complete)

| I | II | III | IV | V | VI | VII | VIII | IX | X | XI | XII |
|-------|----|-----|----|---|----|-----|------|----|---|----|-----|
| FCA88 | 00 | B | 2 | A | 2 | D | 0 | A | 0 | A | 2 |

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| Владивосток (423)249-28-31 | Красноярск (391)204-63-61 | Пермь (342)205-81-47 | Тула (4872)74-02-29 |
| Волгоград (844)278-03-48 | Курск (4712)77-13-04 | Ростов-на-Дону (863)308-18-15 | Тюмень (3452)66-21-18 |
| Вологда (8172)26-41-59 | Липецк (4742)52-20-81 | Рязань (4912)46-61-64 | Ульяновск (8422)24-23-59 |
| Воронеж (473)204-51-73 | Магнитогорск (3519)55-03-13 | Самара (846)206-03-16 | Уфа (347)229-48-12 |
| Екатеринбург (343)384-55-89 | Москва (495)268-04-70 | Санкт-Петербург (812)309-46-40 | Хабаровск (4212)92-98-04 |
| Иваново (4932)77-34-06 | Мурманск (8152)59-64-93 | Саратов (845)249-38-78 | Челябинск (351)202-03-61 |
| Ижевск (3412)26-03-58 | Набережные Челны (8552)20-53-41 | Севастополь (8692)22-31-93 | Череповец (8202)49-02-64 |
| Иркутск (395)279-98-46 | Нижний Новгород (831)429-08-12 | Симферополь (3652)67-13-56 | Ярославль (4852)69-52-93 |
| Россия (495)268-04-70 | Киргизия (996)312-96-26-47 | Казахстан (7172)727-132 | |