DATA SHEET

Flow Controllers

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 Temprature:	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.

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Beyond Measure

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 Cartridge Valve. Refer to Figure 3. Refer to data sheet DS-VA-CART-eng. 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.
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 10204-2.1; Certification to EN 10204-3.1
Ordering Information / Model Codes	Refer to Model Code

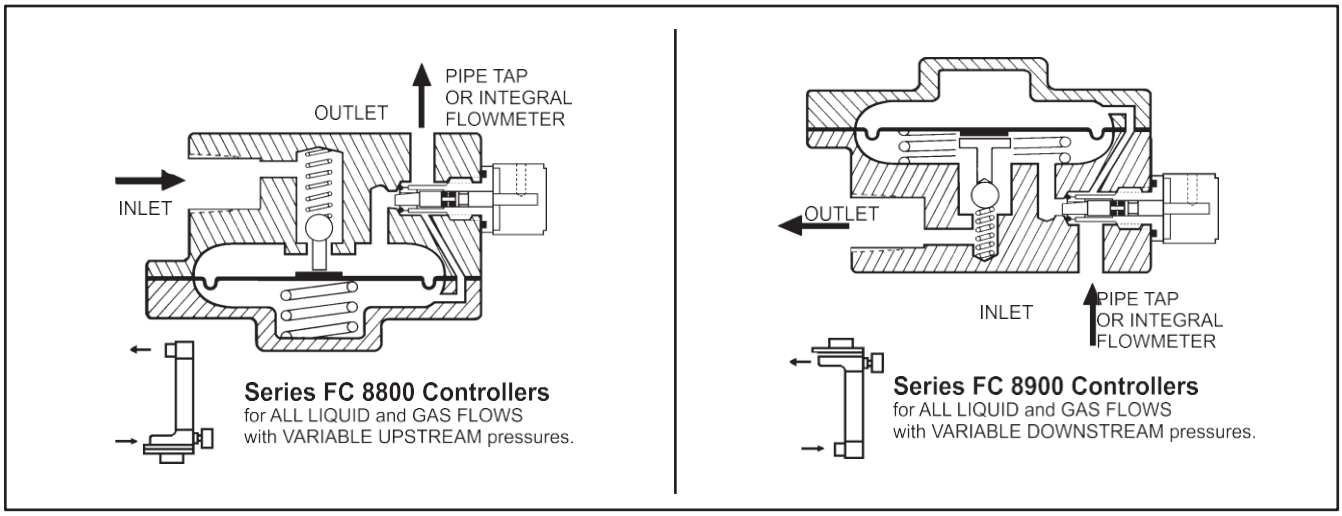


Figure 1 Cutaway View, Principle of Operation

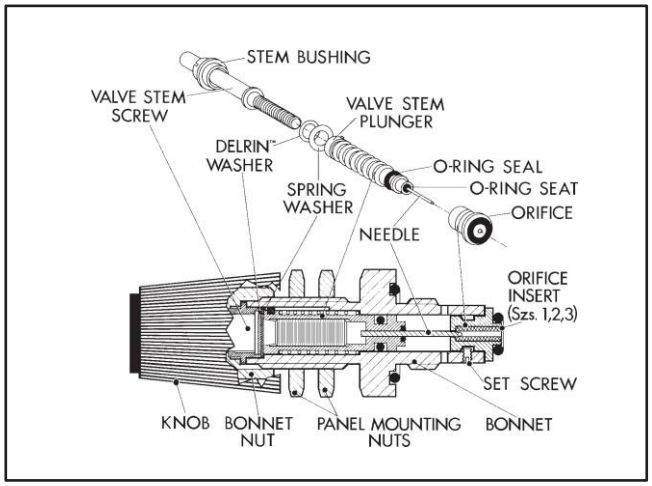


Figure 2 Cutaway View, NRS Valve

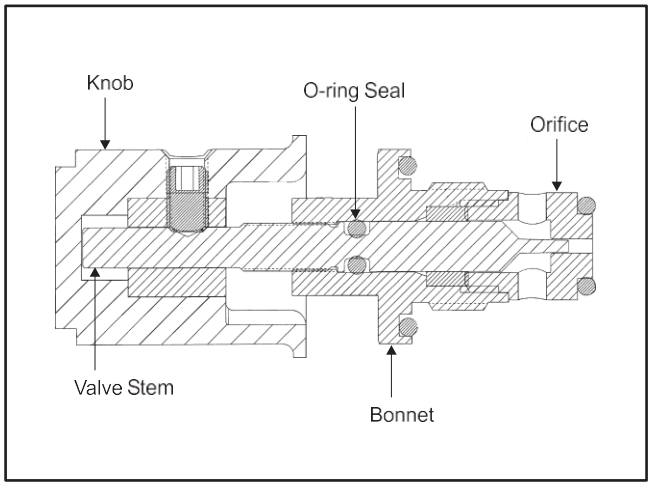


Figure 3 Cutaway View, Cartridge Valve

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			
		l/h		GPH		ln/h		SCFH	
Model	Valve	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**			
		l/h		GPH		ln/h		SCFH	
Model	Valve	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							
	Max. Temp		Max. Press.		Max. Temp		Max. Press.		Max. Temp		Max. Press.		Max. Temp		Max. Press.		Minimum		Maximum	
Model	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	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											
	Max. Temp		Max. Press.						Minimum		Maximum	
Model	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.

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

FC 8800 Series Sizing Formula for Gas

$$Q2 = Q1 \times \sqrt{\frac{Pout}{1.0} \times \frac{(293.1 \times 1.293)}{(T \times Density)}}$$

FC 8900 Series Sizing Formula for Gas

$$Q2 = Q1 \times \sqrt{\frac{Pin}{7.91} \times \frac{(293.1 \times 1.293)}{(T \times Density)}}$$

For All Liquid Controllers

$$Q2 = Q1 \times \sqrt{\frac{1000}{Density}}$$

Standard International Units

Q1	=	Stated flow range l_n/h or l/h (See Flow Range Table)
Q2*	=	Actual flow range l_n/h or l/h
Pout	=	Actual outlet operating pressure (bar abs)
Pin	=	Actual inlet operating pressure (bar abs)
T	=	Actual operating temperature (K)
Density	=	Density of fluid (kg/m^3_n)

FC 8800 Series Sizing Formula for Gas

$$Q2 = Q1 \times \sqrt{\frac{Pout}{14.7} \times \frac{530}{(T \times SG)}}$$

FC 8900 Series Sizing Formula for Gas

$$Q2 = Q1 \times \sqrt{\frac{Pin}{114.7} \times \frac{530}{(T \times SG)}}$$

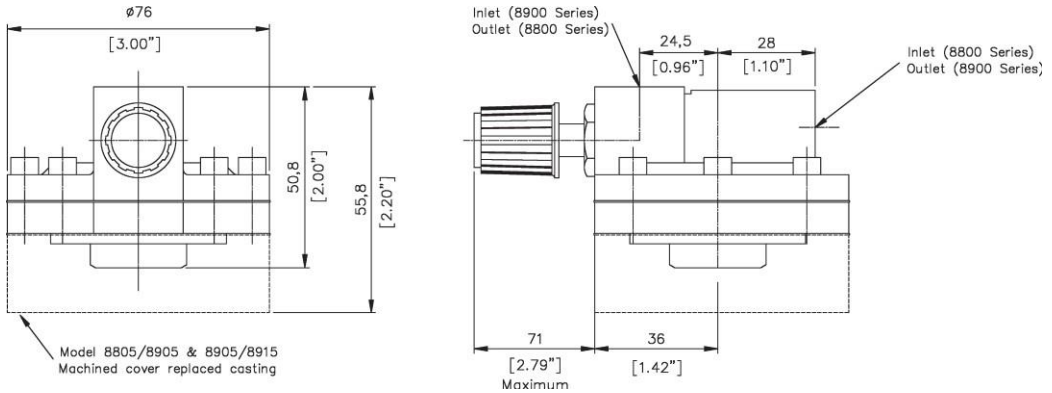
For All Liquid Controllers

$$Q2 = Q1 \times \sqrt{\frac{1}{SG}}$$

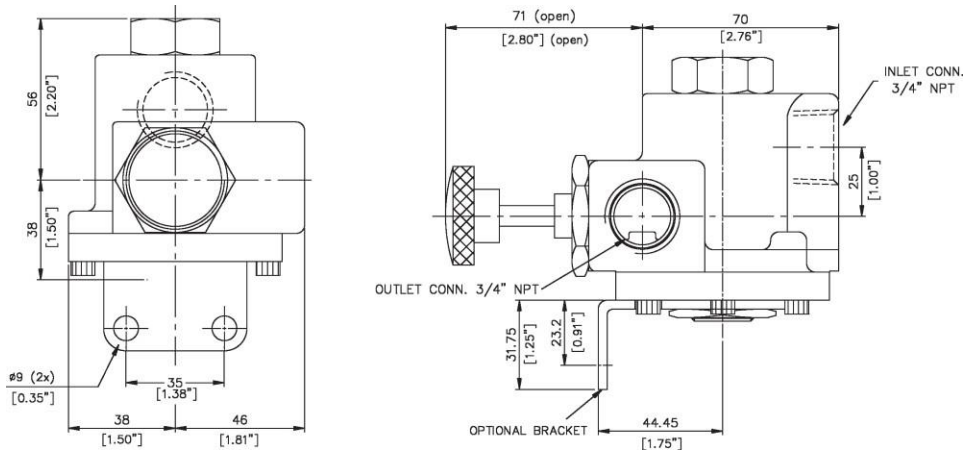
English Units

Q1	=	Stated flow range SCFH or GPH (See Flow Range Table)
Q2*	=	Actual flow range SCFH or GPH
Pout	=	Actual outlet operating pressure (psia)
Pin	=	Actual inlet operating pressure (psia)
T	=	Actual operating temperature °R(°F + 460)
SG	=	Specific gravity of Gas or Liquid

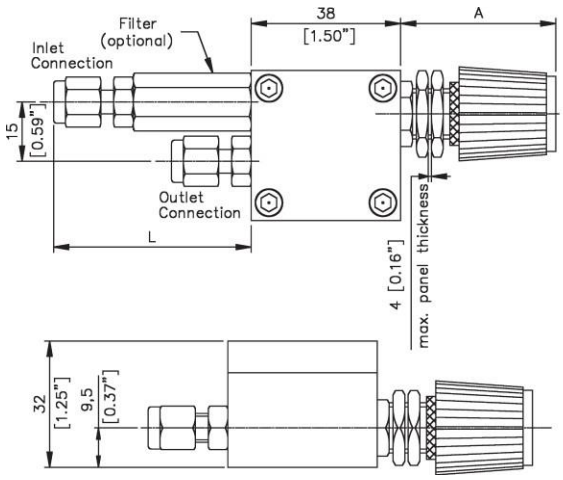
***FC 8800 Series Downstream Flow, FC 8900 Series Upstream Flow**



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

Model Code

Code Description	de Option	Option Description
I. Base Model Number	FCA87	Low flow gases and liquids with variable down stream pressure
	FCA88	Gases and liquids with variable up stream pressure
	FCA89	Gases and liquids with variable down stream 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
	03	General use, high operating pressure, integral NPT connections
	12	High flow rates, standard operating pressure, integral NPT connections
	13	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
	43	Precise control, high 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	1	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 10204-2.1 (N/A FC 8744)
	D	Material Certification EN 10204-3.1 (N/A FC 8744)
	E	Certification to NACE & Material Certification EN 10204-2.1
	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	1	D	0	A	0	A	1

Service and Support

Brooks is committed to assuring all of our customers receive the ideal flow solution for their application, along with outstanding service and support to back it up. We operate first class repair facilities located around the world to provide rapid response and support. Each location utilizes primary standard calibration equipment to ensure accuracy and reliability for repairs and recalibration and is certified by our local Weights and Measures Authorities and traceable to the relevant International Standards.

Visit www.BrooksInstrument.com to locate the service location nearest to you.

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

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