



PRECISION FLOW REGULATOR

from



Your Platform for
Scientific CoolingSM

ΔELTA-Q Precision Flow Regulator



U.S. Patent Pending



General Description

Delta-Q[™] is a low-cost precision flow regulator module that can be used in conjunction with other **SMARTFLOW** components such as threaded end caps, flowmeters, temperature and pressure gauges, Dr. Eddy[®] Flowmeter/Turbulent Flow Indicator, Tracer[®] Electronic Flowmeters, and cooling water manifolds. The Delta-Q Regulator allows full adjustability of flow volume from unrestricted flow to complete shut off using the manual flow control knob.

The modular design allows users to customize models meeting scientific cooling requirements for each application. The glass-filled nylon body is lightweight and durable. Internal stainless steel components are resistant to corrosion.

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Features and Benefits

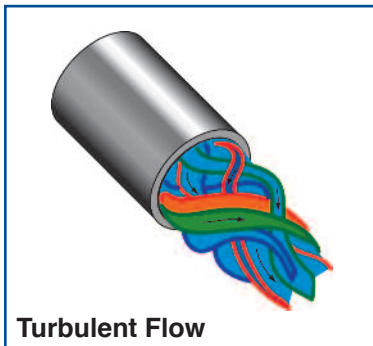
- ◆ **Economical** solution for leak-free flow regulation of single or multiple circuits.
- ◆ **Compact Size** works well in restricted-space locations.
- ◆ **Rugged Construction** gives years of dependable service.
- ◆ **Variety of Inlet Sizes** provides exactly the right connection.
- ◆ **Optional Temperature and Pressure Gauges** give instant access to pressure and temperature information in addition to flow in one unit.
- ◆ **No Mounting Restrictions** ease installation in any position without extra brackets or hardware.
- ◆ **210°F (99°C) Temperature Rating** allows installation into a wide range of applications.

*Design and specifications are
subject to change without notice.*



SCIENTIFIC COOLINGSM and DELTA-Q

Scientific Molding seeks to optimize molding efficiency by measuring and recording process parameters to the greatest extent possible, providing an effective means of easily repeating a successful molding setup, in any molding machine. Mold cooling, estimated to be about 80% of the molding cycle, is a key element.



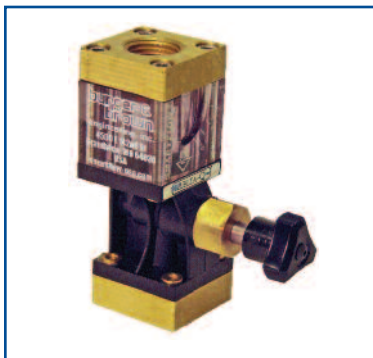
Turbulent Flow

Scientific CoolingSM is a training regimen developed by the engineers at Burger & Brown Engineering for SmartflowTM products. Scientific Cooling applies techniques from Scientific Molding: measure, record, adjust and repeat. The teaching of Scientific

Cooling requires the right tools to control and quantify cooling parameters. Smartflow's (patent pending) Delta-QTM flow regulator is the foundation of our modular system for Scientific Cooling because it controls and changes flow rate. Delta-Q is designed to mate with our IcecubeTM, Dr. Eddy[®], or Tracer[®] flow meters to provide a range of options for Scientific Cooling measurement and adjustment.

Measurement options using Delta-Q as your platform for Scientific Cooling:

With an IcecubeTM Flowmeter



Attach Delta-Q to a basic mechanical Icecube Flowmeter for economical flexibility of application. The modular design allows the addition of individual measurement components: temperature gauge, pressure gauge, or liquid-filled pressure gauge. Quick

disconnect fittings can also be added to create a portable troubleshooting tool to be kept in a toolbox or mold tryout station. In addition to the parameter measurements, Delta-Q allows technical molders to experiment with different flow rates while the meter is connected, making Scientific Cooling easier. See page 4.

With a Dr. Eddy[®] Flowmeter/Turbulent Flow Indicator

Attach Delta-Q to a Dr. Eddy meter to detect turbulent flow using FCI (Flow Characteristic Indication) Technology. The presence of turbulent flow indicates that the most efficient cooling is present. The swirling and mixing of the water inside cooling passages creates the greatest heat transfer from the mold to the cooling medium. When attached to a Dr. Eddy, the Delta-Q becomes a valuable capacity conservation tool. Conserving cooling water at each cooling supply line preserves water capacity in other locations in the shop. Downstream presses can have greater cooling water volume available when upstream cooling line efficiency is maximized. See page 5.

With a Tracer[®] Electronic Flowmeter

Attach Delta-Q to a Tracer Electronic Flowmeter for greater accuracy and access to FCI TechnologyTM. Tracer flowmeters have $\pm 5\%$ accuracy and optional NIST traceable calibration. Turbulent flow indication is standard on all Tracer Flowmeters.

A Switching Tracer flowmeter facilitates record-keeping when attached to a PLC or other data collection system. Record-keeping is an important step in Scientific Cooling. A Switching Tracer attached to a Delta-Q is the ultimate tool for Scientific Cooling. See page 6.

On a Smartflow Manifold

Attach an array of Delta-Q modular flow regulators and meters to a Smartflow Manifold and you have economical fingertip control of an entire mold half without moving individual flowmeters from circuit to circuit. Smartflow manifolds save time in mold setups and help molders start making accurate parts quickly. See page 7.





PRECISION FLOW REGULATOR ONLY

Use when flow indication is not required.

Model Number

F3 - A - Q		
Brass End Caps		Options
1/4"NPT(F)	F2	A Regulator only
1/4"BSPP(F)	F2B	B Thermometer
3/8"NPT(F)	F3	C Thermometer and pressure gauge
3/8"BSPP(F)	F3B	CL Thermometer and liquid-filled pressure gauge
1/2"NPT(F)	F4	F Pressure gauge
1/2"BSPP(F)	F4B	FL Liquid-filled pressure gauge
Nylon End Caps		
1/4"NPT(F)	FP2	
1/4"BSPP(F)	FP2B	
3/8"NPT(F)	FP3	
3/8"BSPP(F)	FP3B	
1/2"NPT(F)	FP4	
1/2"BSPP(F)	FP4B	



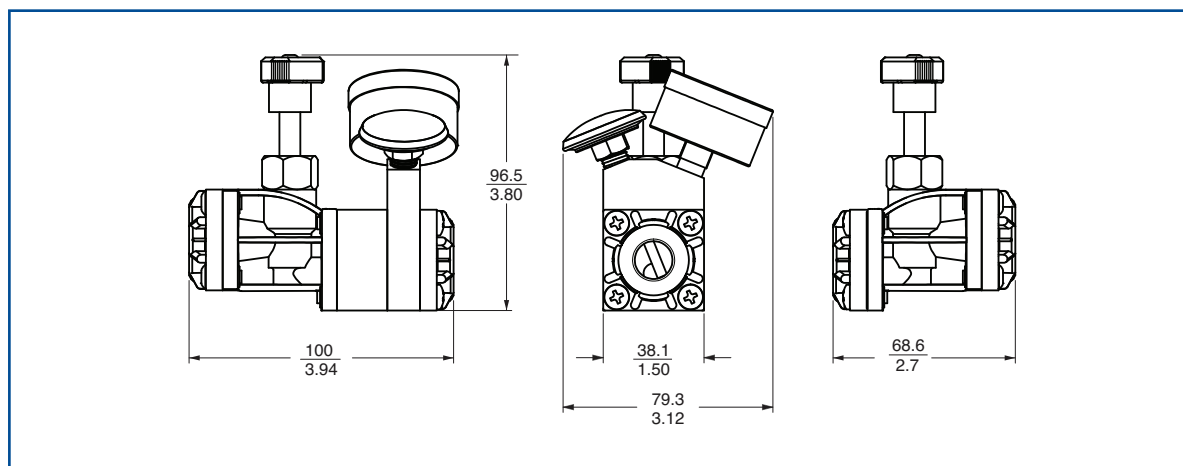
FP3-F-Q

Wetted Parts and Materials

End Caps	Brass or Glass-Filled Nylon
Body	Glass-Filled Nylon
O-Rings.....	EPDM
Regulator Stem	Stainless Steel
Cap Screws	Stainless Steel
Optional Gauge Block	Brass
Optional Quick-Connect Fittings	Brass

Specifications

Operating Temperature.....	210°F max. (99°C max.)
Operating Pressure	100 psi max. (6.9 bar max.)
Dial Thermometer	0° to 250°F (-20° to 120°C)
	±2% accuracy (full scale)
Pressure Gauge.....	0 to 100 psi (0 to 700 Kpa)
	±3% accuracy (full scale)



Linear= $\frac{\text{mm}}{\text{inch}}$
(TYP)



PRECISION FLOW REGULATOR with ICECUBE™ FLOWMETER

Use when flow indication is required.

Model Number

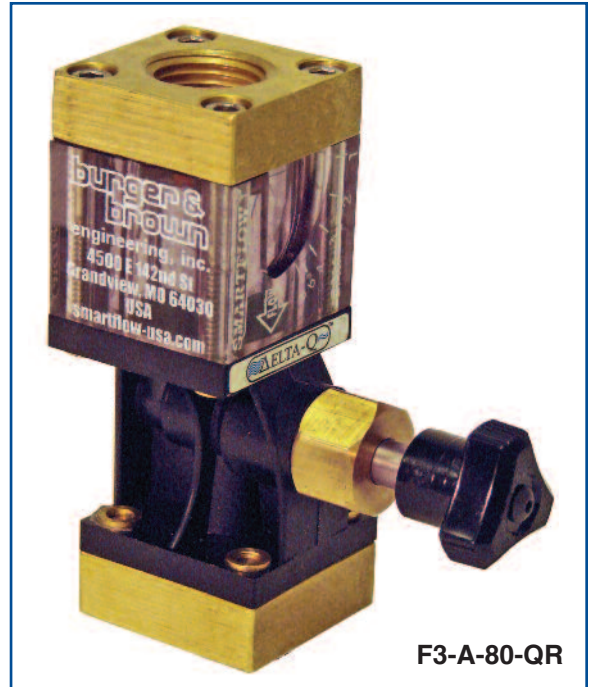
	F3	-	A	-	25	-	QR	
Brass End Caps								Flow Direction
1/4"NPT(F)	F2							QR Return (standard flow in)
1/4"BSPP(F)	F2B							QS Supply (flow out)
3/8"NPT(F)	F3							
3/8"BSPP(F)	F3B							
1/2"NPT(F)	F4							
1/2"BSPP(F)	F4B							
Nylon End Caps								Flow Rate (max.)
1/4"NPT(F)	FP2				15			1.5 gpm (gallons per minute)
1/4"BSPP(F)	FP2B				25			2.5 gpm
3/8"NPT(F)	FP3				80			8.0 gpm
3/8"BSPP(F)	FP3B				100			10 lpm (liters per minute)
1/2"NPT(F)	FP4				200			20 lpm
1/2"BSPP(F)	FP4B				300			30 lpm
Options								
Flow body only	A							
Thermometer	B							
Thermometer & press. ga.	C							
Thermometer and liquid-filled press. ga.	CL							
Thermometer and quick change socket and plug	E							
Pressure gauge	F							
Liquid-filled	FL							

Wetted Parts and Materials

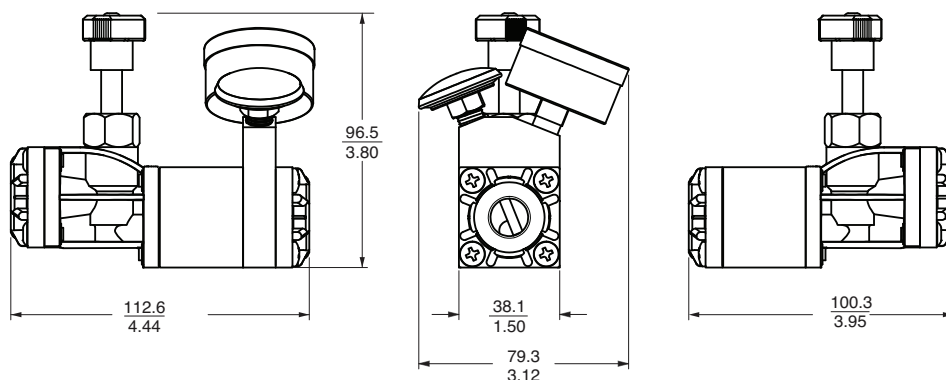
End Caps ..Brass or Glass-Filled Nylon
Flow BodyPolysulfone
Regulator BodyGlass-Filled Nylon
VaneGlass-Filled Nylon
SpringStainless Steel
O-RingsEPDM
Cap ScrewsStainless Steel
Optional Gauge BlockBrass
Optional Quick-Connect Fittings ..Brass

Specifications

Flow Accuracy±10% full scale
Operating Temperature210°F max.
.....(99°C max.)
Operating Pressure100 psi max.
.....(6.9 bar max.)
Dial Thermometer0° to 250°F
.....(-20° to 120°C)
.....±2% accuracy (full scale)
Pressure Gauge0 to 100 psi
.....(0 to 700 Kpa)
.....±3% accuracy (full scale)



F3-A-80-QR



Linear = $\frac{\text{mm}}{\text{inch}}$
(TYP)

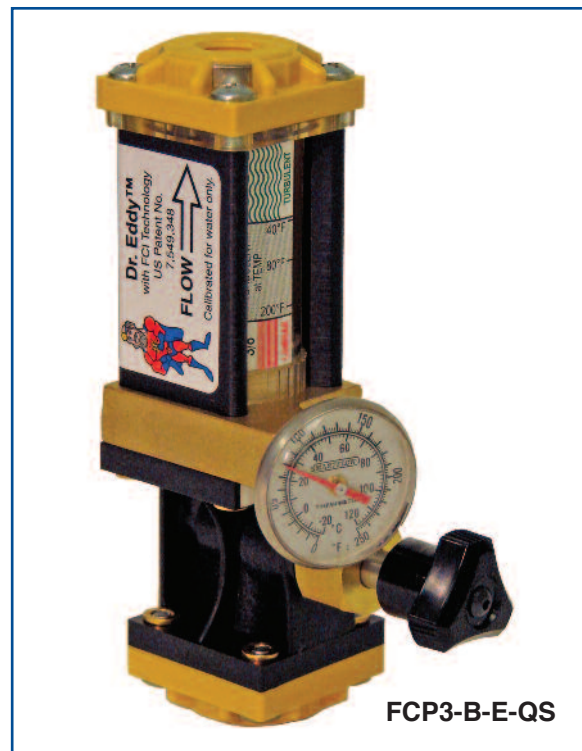


PRECISION FLOW REGULATOR with DR. EDDY™ FLOWMETER

Use when turbulent flow indication is required.

Model Number

	FC3	-	B	-	E	-	QR	
Brass End Caps								Flow Direction
Inlet Size								
1/4"NPT(F)	FC2							QR Return (standard flow in)
1/4"BSPP(F)	FC2B							
3/8"NPT(F)	FC3							QS Supply (flow out)
3/8"BSPP(F)	FC3B							
Nylon End Caps								
Inlet Size								
1/4"NPT(F)	FCP2							Scale Units
1/4"BSPP(F)	FCP2B				E			English (Temp in °F and Flow in GPM)
3/8"NPT(F)	FCP3							
3/8"BSPP(F)	FCP3B				M			Metric (Temp in °C and Flow in LPM)
Accessories								
Thermometer (standard)							B	
Thermometer with quick-connect socket and plug							E	

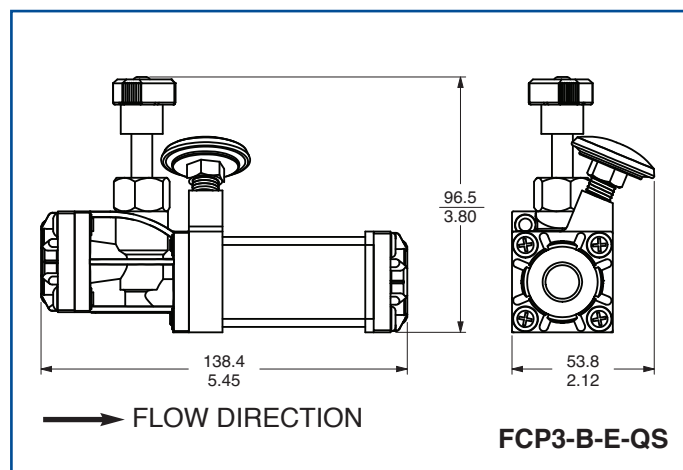
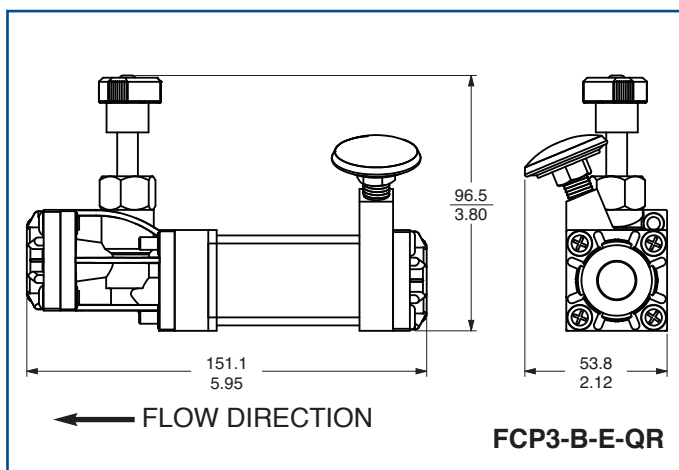


Wetted Parts and Materials

End Caps	Brass or Glass-Filled Nylon
Regulator Body	Glass-Filled Nylon
Flow Body	Polysulfone
Indicator Ring	Silicone Rubber
Piston	Acetal
Spring	Stainless Steel
O-Rings	EPDM
Gauge Block	Brass
Optional Quick-Connect Fittings	Brass

Specifications

Accuracy	±10% full scale
Operating Temperature	210°F max. (99°C max.)
Operating Pressure	100 psi max. (6.9 bar max.)
Dial Thermometer	0° to 250°F (-20° to 120°C)
	±2% accuracy (full scale)
10% Glycol Scales are available, contact the factory for information.	





PRECISION FLOW REGULATOR with 3/8" TRACER[®] FLOWMETER

Use when electronic flowmeters are required.

Model Number

	DD	-	3B-B	-	Q	
Meter Style						Delta-Q
Digital Display	DD					End Cap
Digital Display plus Switching	DDS					Material
					Q	Brass
					QP	Nylon
Thread Size						
3/8"NPT(F)			3B			
3/8"BSPP(F)			3B-B			

Delta-Q Flow Regulator can be used with 3/8" Tracer electronic flowmeters.

- DD-** 3.6V Battery-Powered
- Flow Rate Display
 - Temperature Display
 - BTU's/Minute Display
 - Turbulent Flow Condition (with optional glycol % input)

- DDS-** 8-28VDC Powered
- Flow Rate Display
 - Temperature Display
 - BTU's/Minute Display
 - Turbulent Flow Condition (with optional glycol % input)
 - Programmable switch for low and high flow, low and high temperature or turbulent flow condition
 - Analog Outputs: 0-5VDC or 0-10VDC for flow rate and temperature for connection to a data collection system.

See Catalog Form 100 for additional information.

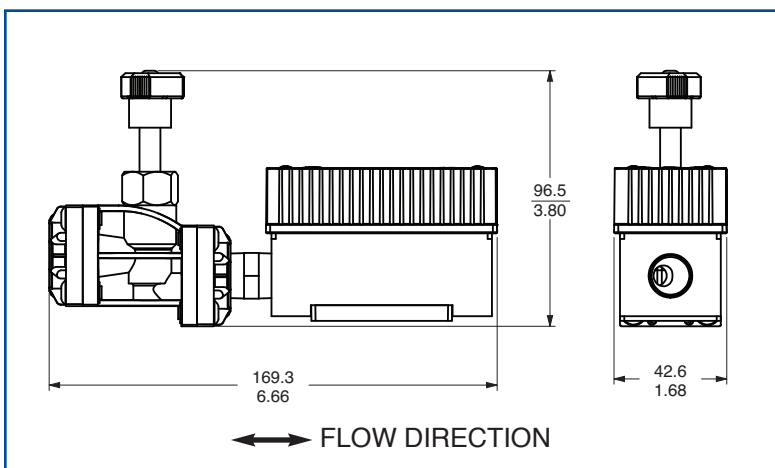


Wetted Parts and Materials

Body	Nickel-Plated Brass
Impeller	Nylon
Impeller Shaft	Stainless Steel
Magnet	Neodymium
Back Cover	Polysulfone
O-Ring	EPDM
End Cap	Brass or Glass-Filled Nylon

Specifications

Flow Accuracy	±5% of full scale
Flow Repeatability	±3% of full scale
Temperature Accuracy	±2% of display
Temperature Repeatability	±1% of display
Operating Temperature	180°F max. (82°C max.)
Operating Pressure	150 psi max. (10.3 bar max.)
Power	
DD- Model	3.6VDC Battery (included)
DDS- Model	8 to 28VDC
Switching (DDS- Model only)	SPDT, 1A 30VAC, 42VDC





Precision Flow Regulator with Low Flow Indicator

Delta-Q Flow Precision Flow Regulator with Low Flow Indicator is the ultimate in low flow process control cooling indication.

The combination regulator with indicator allows for total flow shut off through wide open processing position for 0.3 to 4LPM indication. Motion is observed in the high-visibility rotor to show the presence of flowing cooling media. The unit is designed to be used with water or glycol mix.

Low Flow Indicators are ideal for use in critical injection mold cooling circuits using bubblers or baffles where flow is restricted and effective cooling is essential.

Accessories may be added to the indicator/regulator for increased functionality in a single installed unit.



**Follow the
QR Code to
watch flow
balancing and
optimization
animation**

Model LFI3 - A - 40 - Q

Brass End Caps

1/4"NPT	LFI2
1/4"BSPP	LFI2B
3/8"NPT	LFI3
3/8"BSPP	LFI3B
1/2"NPT	LFI4
1/2"BSPP	LFI4B

Nylon End Caps

1/4"NPT	LFIP2
1/4"BSPP	LFIP2B
3/8"NPT	LFIP3
3/8"BSPP	LFIP3B
1/2"NPT	LFIP4
1/2"BSPP	LFIP4B

Accessories

A	Indicator only (no accessories)
B	Thermometer
C1	Thermometer and 30psi Press. Ga.
C2	Thermometer and 60psi Press. Ga.
C3	Thermometer and 100psi Press. Ga.
CL	Thermometer and Liquid-Filled Press. Ga. (100psi)
D1	Thermometer, 30psi Press. Ga., Quick Change Socket and Plug*
D2	Thermometer, 60psi Press. Ga., Quick Change Socket and Plug*
D3	Thermometer, 100psi Press. Ga., Quick Change Socket and Plug*
DL	Thermometer, Liquid-Filled Press. Ga. (100psi), Quick Change Socket and Plug*
E	Thermometer, Quick Change Socket and Plug*
F1	30psi Press. Ga.
F2	60psi Press. Ga.
F3	100psi Press. Ga.
FL	Liquid-Filled Press. Ga. (100psi)

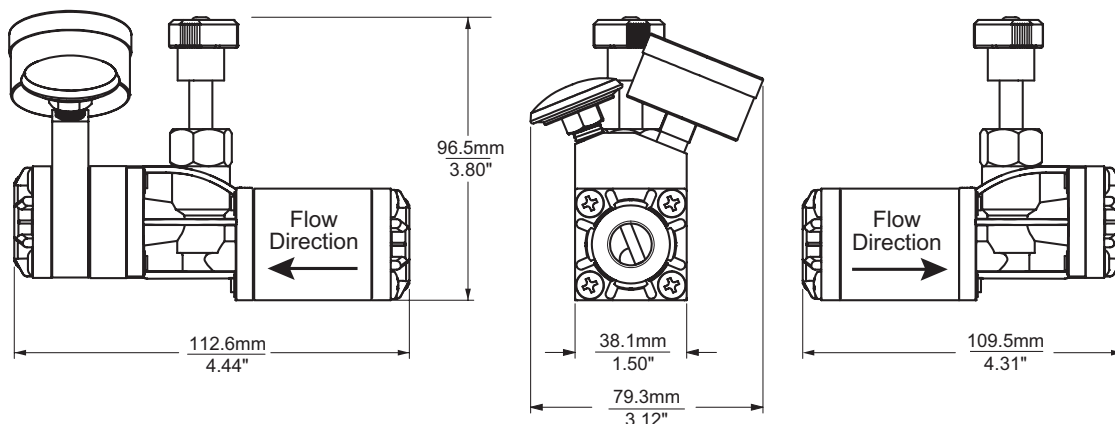
* NPT only

Wetted Parts and Materials

End Caps.....	Brass or Glass-Filled Nylon
Flow Body.....	Polysulfone
Regulator Body.....	Glass-Filled Nylon
Rotor.....	Glass-Filled Nylon
Stem and Valve Seat.....	Stainless Steel
O-Rings	EPDM
Optional Gauge Block.....	Brass
Optional Quick Change Socket and Plug (NPT only)	Brass

Specifications

Flow Range	0.3 to 4LPM (0.08 to 1GPM)
Operating Temperature max.....	99°C (210°F)
Operating Pressure max.....	6.9bar (100psi)
Dial Thermometer.....	-20° to 120°C (0 to 250°F)
	±2% accuracy (full scale)
Pressure Gauge	0 to 700Kpa (0 to 100psi)
	±3% accuracy (full scale)





PRECISION FLOW REGULATOR in MANIFOLD ASSEMBLIES

Use when an array of flow regulators is required.

Model Number

8SA - 16 - 3 - 2 - AQ B Y - 80									
Base Manifold						Aluminum Manifold Color		Flow Rates	
Supply Size and Material						Y	Red (flow direction in)	15	0.2 - 1.5 GPM
						Z	Blue (flow direction out)	25	0.5 - 2.5 GPM
							Does not apply to stainless steel manifolds	80	1 - 8 GPM
3/4"NPT AL	6SA							100	2 - 10 LPM
1"NPT AL	8SA							200	3 - 20 LPM
1-1/2"NPT AL	12SA							300	4 - 30 LPM
2"NPT AL	16SA								
1"NPT 304SS	8SS								
1-1/2"NPT 304SS	12SS								
3/4"BSPP AL	6BSA					B	Brass		
1"BSPP AL	8BSA					N	Nylon		
1-1/2"BSPP AL	12BSA								
2"BSPP AL	16BSA								
1"BSPP 304SS	8BSS								
1-1/2"BSPP 304SS	12BSS								
AL= Aluminum									
SS = Stainless Steel									
</									