



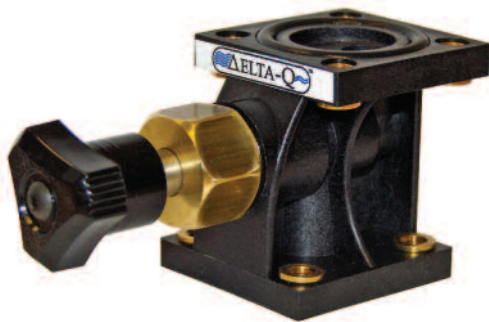
PRECISION FLOW REGULATOR

from



Your Platform for
Scientific CoolingSM

DELTA-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.

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.

**bunger &
brown**
engineering, inc.

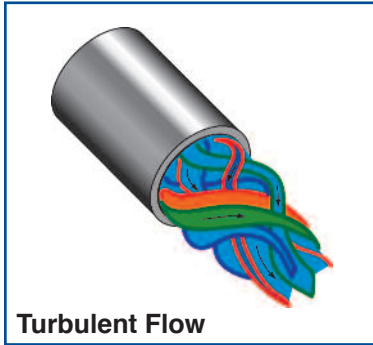
Tel. 800-764-3518
www.smartflow-usa.com

*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

1/4"NPT(F)	F2
1/4"BSPP(F)	F2B
3/8"NPT(F)	F3
3/8"BSPP(F)	F3B
1/2"NPT(F)	F4
1/2"BSPP(F)	F4B

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

Options

A	Regulator only
B	Thermometer
C	Thermometer and pressure gauge
CL	Thermometer and liquid-filled pressure gauge
F	Pressure gauge
FL	Liquid-filled pressure gauge



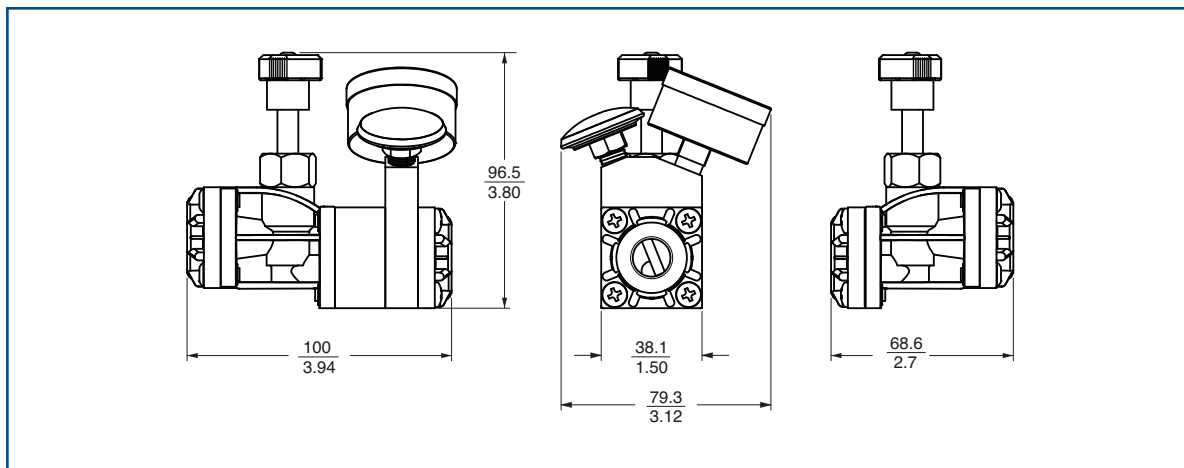
FP3-F-Q

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 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)



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

1/4"NPT(F)	F2
1/4"BSPP(F)	F2B
3/8"NPT(F)	F3
3/8"BSPP(F)	F3B
1/2"NPT(F)	F4
1/2"BSPP(F)	F4B

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

Flow Direction

QR	Return (standard flow in)
QS	Supply (flow out)

Flow Rate (max.)

15	1.5 gpm (gallons per minute)
25	2.5 gpm
80	8.0 gpm
100	10 lpm (liters per minute)
200	20 lpm
300	30 lpm

Options

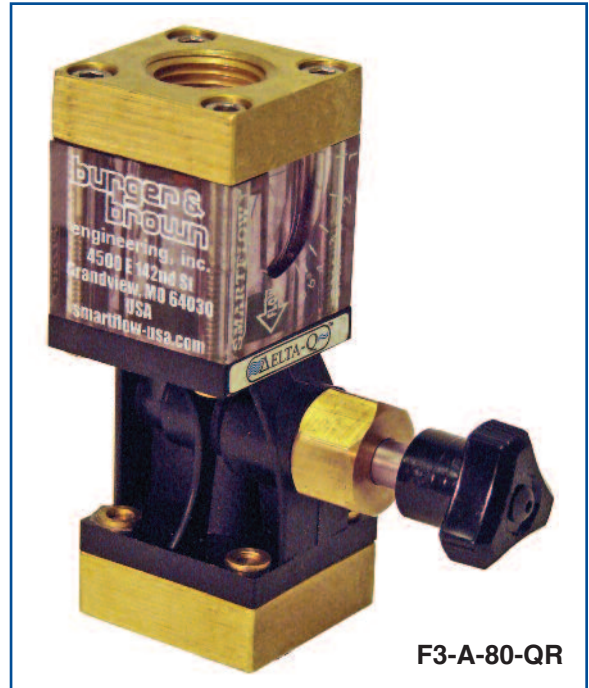
Flow body only	A
Thermometer	B
Thermometer & press. ga.	C
Thermometer and liquid-filled press. ga.	CL
Thermometer and quick change socket and plug	E
Pressure gauge	F
Liquid-filled	FL

Wetted Parts and Materials

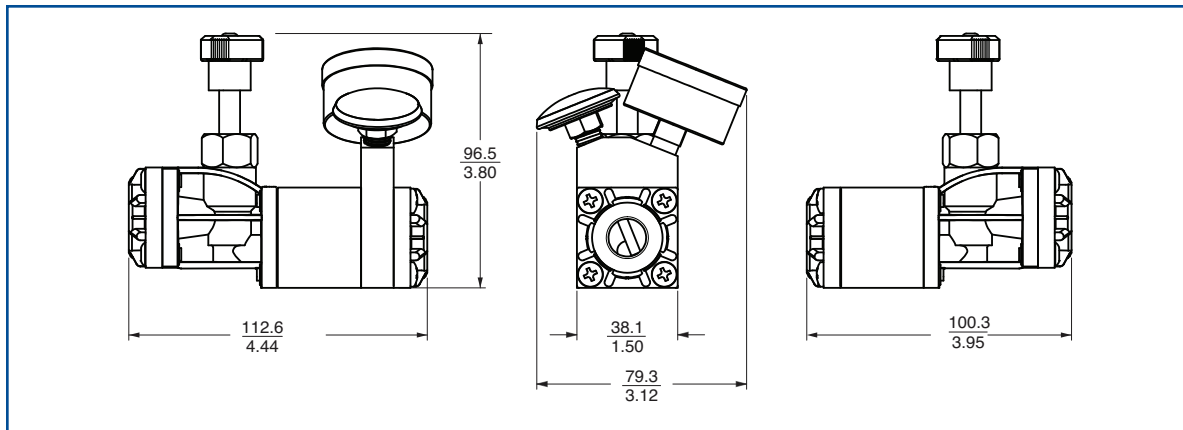
End Caps ..Brass or Glass-Filled Nylon
 Flow BodyPolysulfone
 Regulator BodyGlass-Filled Nylon
 VaneGlass-Filled Nylon
 SpringStainless Steel
 O-Rings.....EPDM
 Cap ScrewsStainless Steel
 Optional Gauge BlockBrass
 Optional Quick-Connect Fittings ..Brass

Specifications

Flow Accuracy±10% full scale
 Operating Temperature210°F max.
(99°C max.)
 Operating 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)



F3-A-80-QR



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

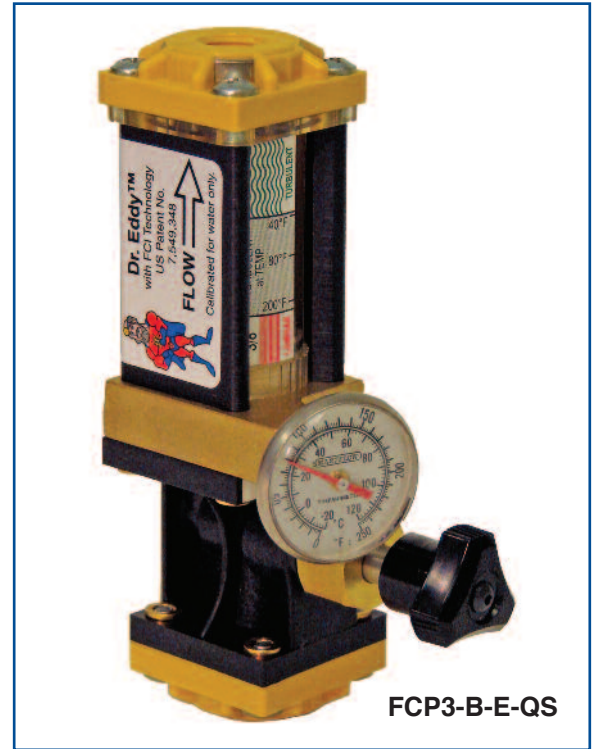


PRECISION FLOW REGULATOR with DR. EDDY™ FLOWMETER

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

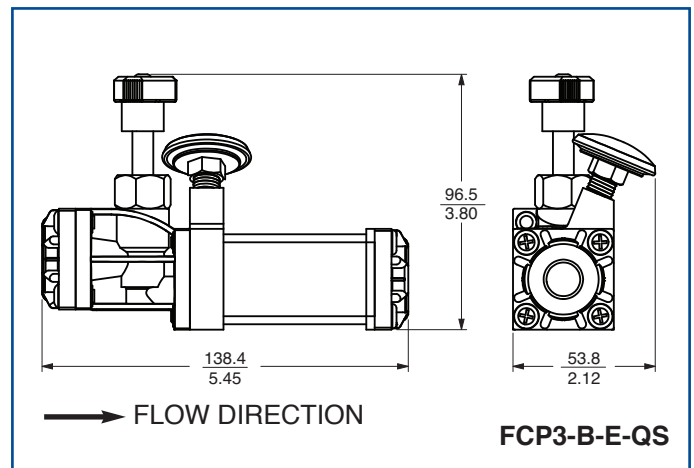
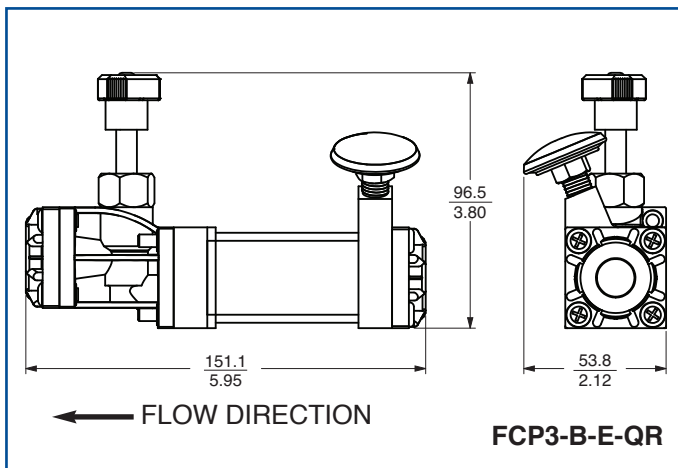


Wetted Parts and Materials

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

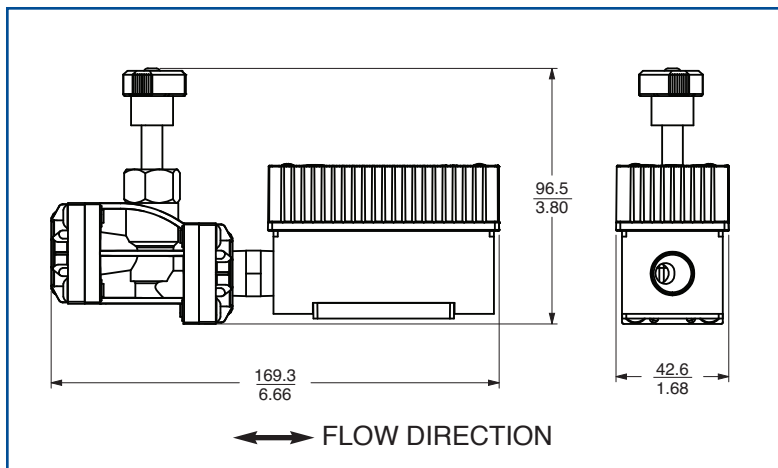
	DD	-	3B-B	-	Q	
Meter Style						
Digital Display	DD					Delta-Q
Digital Display plus Switching	DDS					End Cap
						Material
					Q	Brass
					QP	Nylon
Thread Size						
3/8"NPT(F)			3B			
3/8"BSPP(F)			3B-B			

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

BodyNickel-Plated Brass
 ImpellerNylon
 Impeller Shaft.....Stainless Steel
 MagnetNeodymium
 Back CoverPolysulfone
 O-RingEPDM
 End CapBrass 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 Temperature180°F max.
 (82°C max.)
 Operating Pressure150 psi max.
 (10.3 bar max.)
 Power
 DD- Model.....3.6VDC Battery (included)
 DDS- Model8 to 28VDC
 Switching (DDS- Model only)SPDT, 1A
 30VAC, 42VDC

**bunger &
brown engineering, inc.**

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