

## MECHANICAL FLOW CATALOG

### METERS

- ICECUBE™
- ALUMINUM BODY
- HOT WATER/OIL
- DR. EDDY<sup>®</sup> TURBULENT FLOW

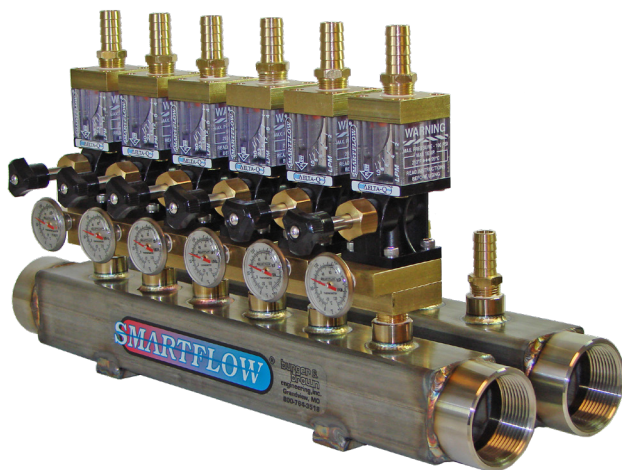


### REGULATORS

- BRASS
- DELTA-Q<sup>®</sup>
- MOLD TEMPERATURE



### CUSTOM ASSEMBLY SPECIFICATIONS



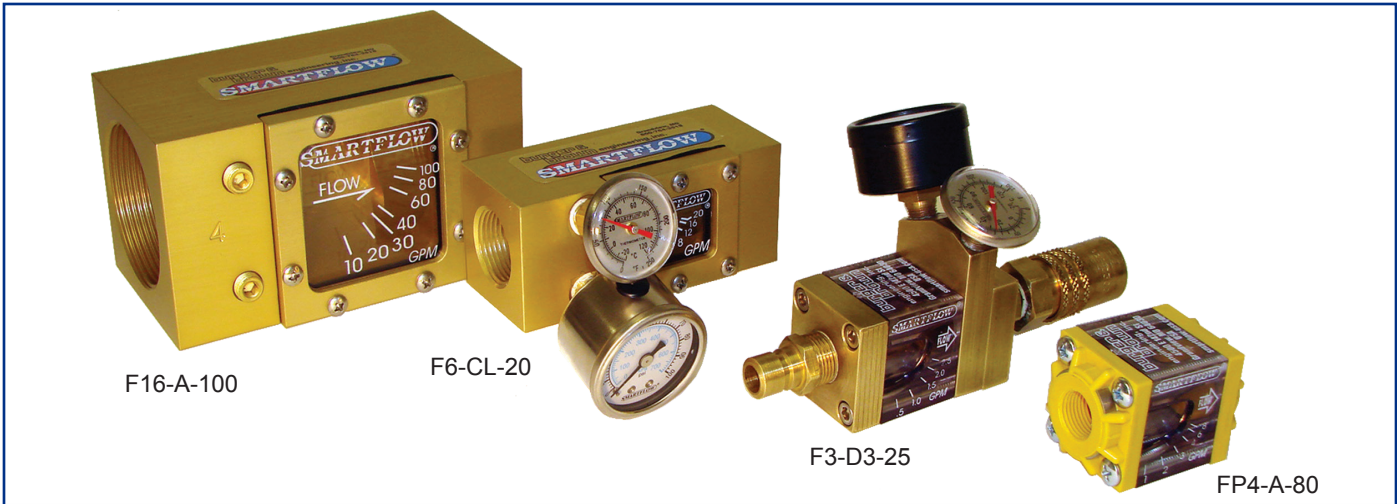
**Burger  
& Brown**  
ENGINEERING

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[www.smartflow-usa.com](http://www.smartflow-usa.com)

3D CAD Data is available on demand

[www.  
ManifoldBuilder  
.com](http://www.ManifoldBuilder.com)

# SMARTFLOW<sup>®</sup> Mechanical Flowmeters



## General Description

Smartflow mechanical flowmeters are durable, vane-operate devices that provide visual indication of flow rate in many different styles and sizes. Rugged wetted parts are compatible with many process liquids.

Optional temperature and pressure gauges add functionality and flexibility to Smartflow flowmeters. Brass quick-connect fittings are available on the smaller flowmeters to create an excellent, portable tool for determining flow and locating clogged lines

## Features and Benefits

- ◆ **Compact size** works well in restricted-space locations.
- ◆ **Rugged construction** gives years of dependable service.
- ◆ **Variety of inlet sizes** provides exactly the right connection.
- ◆ **210°F (99°C) Temperature Rating** allows installation into a wide range of applications.
- ◆ **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.

Galvanic corrosion may occur in anodized aluminum components when installed in electrical connection with more noble metals such as copper. Use appropriate installation practices.

For best performance, mechanical flowmeters should be installed in the vertical position with the flow moving upwards

## Turbulent Flow

Injection molders know that a certain rate of flow is needed to achieve turbulent flow in cooling lines. This concept applies to most cooling applications using a water-based coolant mixture. Charts below are for reference only. Turbulent Flow Rate is approximate based on Reynolds Number of 4000.

Passage Diameter	Nominal Pipe Size	Minimum Flow in GPM by Temperature		
		40°F	120°F	200°F
.44"	1/4"	0.88	0.31	0.18
.59"	3/8"	1.16	0.42	0.24
.72"	1/2"	1.41	0.51	0.29

Passage Diameter	Nominal Pipe Size	Minimum Flow in LPM by Temperature		
		4°C	49°C	93°C
11mm	1/4"	3.3	1.2	0.7
15mm	3/8"	4.4	1.6	0.9
18mm	1/2"	5.3	1.9	1.1

Use our on-line turbulent flow calculator to input additional sizes and cooling variables:

**[www.Smartflow-usa.com/  
Turbulent-Flow-Rate-Calculator](http://www.Smartflow-usa.com/Turbulent-Flow-Rate-Calculator)**



# IceCube™ Flowmeters with Brass or Nylon Ends

## Model Number

### F3 - D3 - 25

Inlet Size	
<b>Brass Ends</b>	
1/4"NPT	F2
1/4"BSPP	F2B
3/8"NPT	F3
3/8"BSPP	F3B
1/2"NPT	F4
1/2"BSPP	F4B
3/4"NPT	F6
3/4"BSPP	F6B

<b>Nylon Ends</b>	
1/4"NPT	FP2
1/4"BSPP	FP2B
3/8"NPT	FP3
3/8"BSPP	FP3B
1/2"NPT	FP4
1/2"BSPP	FP4B

Flow Range	
15	0.2 - 1.5 gpm (gallons per minute)
25	0.5 - 2.5 gpm
80	1.0 - 8.0 gpm
100	2 - 10 lpm (liters per minute)
200	5 - 20 lpm
300	4 - 30 lpm

### Accessories

- A Flowmeter only
- B Thermometer
- C1 Thermometer and 30 psi Pressure Gauge
- C2 Thermometer and 60 psi Pressure Gauge
- C3 Thermometer and 100 psi Pressure Gauge
- CL Thermometer and Liquid-Filled Pressure Gauge (100 psi)
- D1 \*Thermometer, 30 psi Pressure Gauge, Quick Change Socket and Plug
- D2 \*Thermometer, 60 psi Pressure Gauge, Quick Change Socket and Plug
- D3 \*Thermometer, 100 psi Pressure Gauge, Quick Change Socket and Plug
- DL \*Thermometer, Liquid-Filled Pressure Gauge (100 psi), Quick Change Socket and Plug
- E \*Thermometer, Quick Change Socket and Plug
- F1 30 psi Pressure Gauge
- F2 60 psi Pressure Gauge
- F3 100 psi Pressure Gauge
- FL Liquid-Filled Pressure Gauge (100 psi)

\*Not available with 3/4" inlet or BSPP threads

### Wetted Parts and Materials

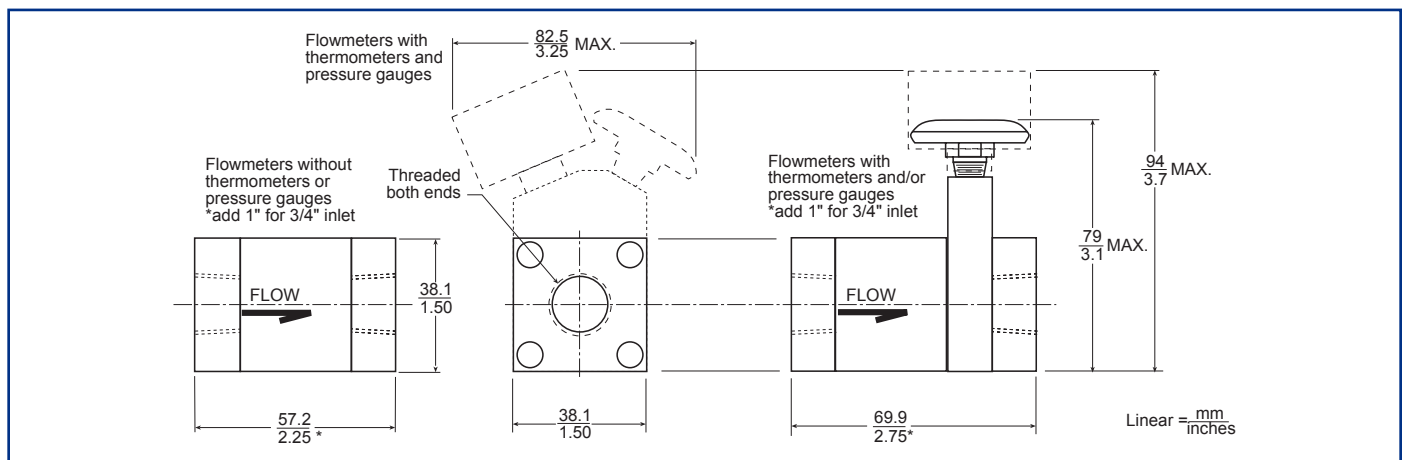
End Caps.....	Brass or Glass-Filled Nylon
Body.....	Polysulfone
Vane.....	Glass-Filled Nylon
Spring.....	Stainless Steel
O-Rings.....	EPDM
Cap Screws.....	Stainless Steel
Optional Gauge Block.....	Brass
Optional Quick-Connect Fittings.....	Brass

### Specifications

Flow Accuracy.....	±10% full scale
Operating Temperature max.....	210°F (99°C)
Operating Pressure max.....	100 psi (6.9 bar)
Optional Thermometer.....	0 to 250°F (-20° to 120°C)
	±2% accuracy (full scale)
Optional Pressure Gauge.....	±3% accuracy (full scale)

**For Custom Manifold Assemblies and 3D CAD files of Standard Components Visit**

[www.ManifoldBuilder.com](http://www.ManifoldBuilder.com)



# SMARTFLOW® Medium Mechanical Flowmeters

## Model Number

**F6 - B - 20**

### Inlet Size

3/4"NPT	<b>F6</b>
3/4"BSPP	<b>F6B</b>
1"NPT	<b>F8</b>
1"BSPP	<b>F8B</b>

### Flow Range

<b>20</b>	2 - 20 gpm (gallons per minute)
<b>75</b>	7 - 75 lpm (liters per minute)

### Accessories

- A** Flowmeter only
- B** Thermometer
- C1** Thermometer and 30 psi Pressure Gauge
- C2** Thermometer and 60 psi Pressure Gauge
- C3** Thermometer and 100 psi Pressure Gauge
- CL** Thermometer and Liquid-Filled Pressure Gauge (100 psi)
- F1** 30 psi Pressure Gauge
- F2** 60 psi Pressure Gauge
- F3** 100 psi Pressure Gauge
- FL** Liquid-Filled Pressure Gauge (100 psi)

### Wetted Parts and Materials

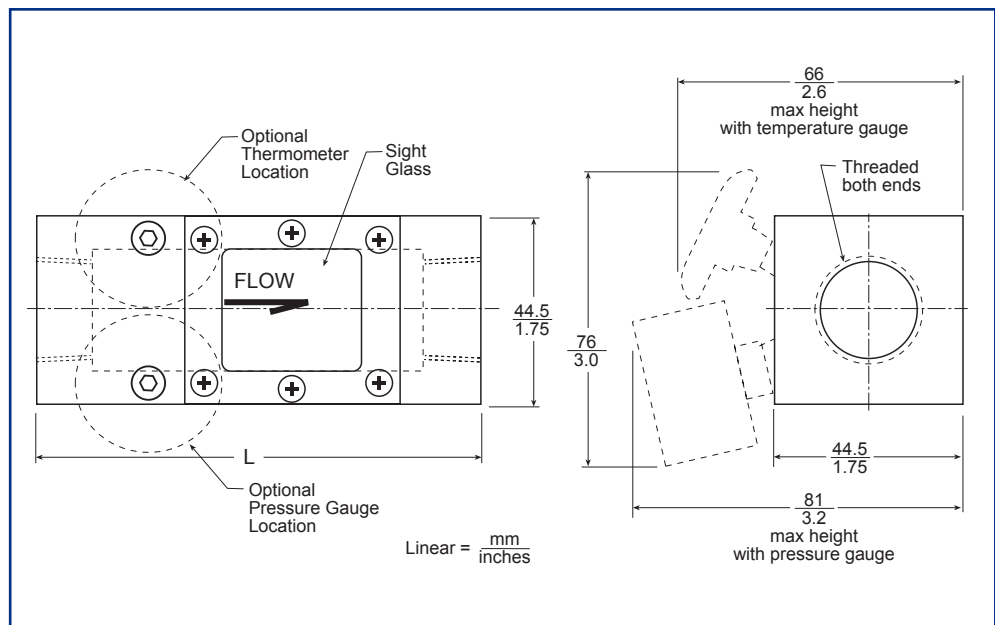
Body.....	Anodized Aluminum
Sight Glass .....	Polysulfone
Vane .....	Stainless Steel
Spring .....	Stainless Steel
Pin .....	Stainless Steel
Gasket .....	Neoprene

### Specifications

Flow Accuracy .....	±10% full scale
Operating Temperature max.....	210°F (99°C)
Operating Pressure max.....	100 psi (6.9 bar)
Optional Thermometer.....	0 to 250°F (-20° to 120°C)
	±2% accuracy (full scale)
Optional Pressure Gauge .....	±3% accuracy (full scale)

Galvanic corrosion may occur in anodized aluminum components when installed in electrical connection with more noble metals such as copper. Use appropriate installation practices.

Dimension Chart		
Dim.	Body Size	
	3/4"	1"
L	105	111
	4.125	4.375



# SMARTFLOW<sup>®</sup> Large Mechanical Flowmeters

## Model Number

**F8 - B - 40**

Inlet Size	Flow Range
1"NPT	40
1"BSPP	100
1-1/4"NPT	150G
1-1/2"NPT	150
1-1/2"BSPP	375
2"NPT	
2"BSPP	
3"NPT	

### Accessories

Flowmeter only	A
Thermometer	B
Thermometer and 30 psi Pressure Gauge	C1
Thermometer and 60 psi Pressure Gauge	C2
Thermometer and 100 psi Pressure Gauge	C3
Thermometer and Liquid-Filled Pressure Gauge (100 psi)	CL
30 psi Pressure Gauge	F1
60 psi Pressure Gauge	F2
100 psi Pressure Gauge	F3
Liquid-Filled Pressure Gauge (100 psi)	FL

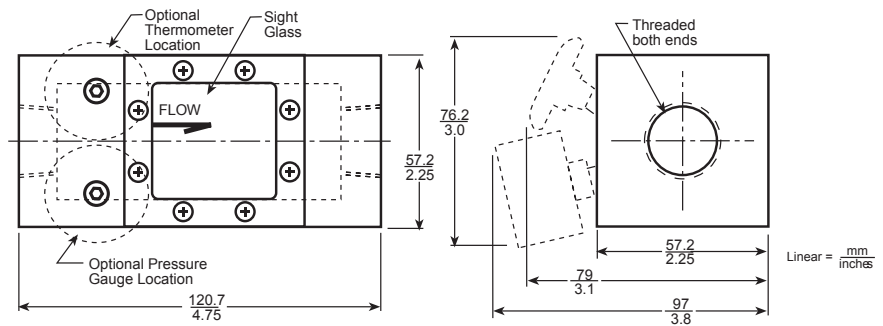
### Wetted Parts and Materials

Body	Anodized Aluminum
Sight Glass	Polysulfone
Vane	Stainless Steel
Spring	Stainless Steel
Pin	Stainless Steel
Gasket	Neoprene

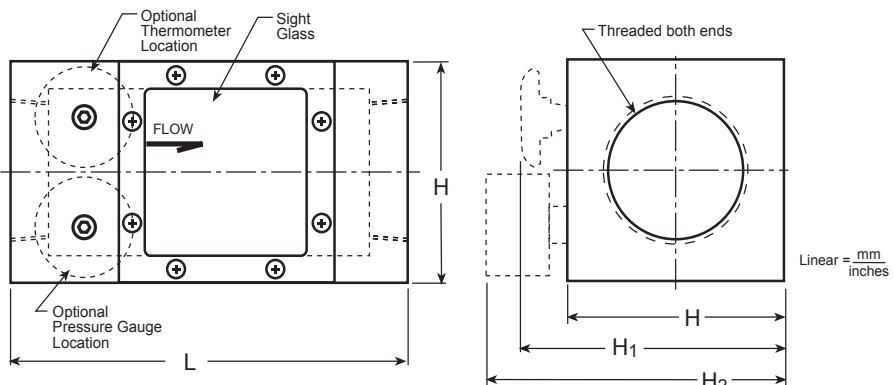
### Specifications

Flow Accuracy	±10% full scale
Operating Temperature max.	210°F (99°C)
Operating Pressure max.	100 psi (6.9 bar)
Optional Thermometer	0 to 250°F (-20° to 120°C)
Optional Pressure Gauge	±2% accuracy (full scale) ±3% accuracy (full scale)

### 1" and 1-1/4" Flowmeters 40 gpm & 150 lpm



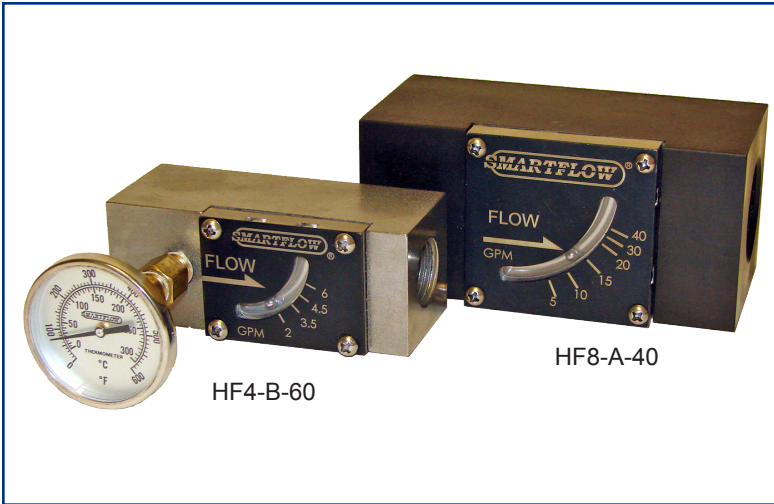
### 1-1/2", 2" & 3" Flowmeters 40, 100 & 150 gpm, 150 & 375 lpm



Dim.	Body Size	
	1-1/2" or 2"	3"
L	139.7	165.1
	5.5	6.5
H	76.2	101.6
	3.0	4.0
H <sub>1</sub>	99	124.5
	3.9	4.9
H <sub>2</sub>	114	139.7
	4.5	5.5

Galvanic corrosion may occur in anodized aluminum components when installed in electrical connection with more noble metals such as copper. Use appropriate installation practices.

# SMARTFLOW<sup>®</sup> 1/2" and 1" Hot Oil Flowmeters



## Model Numbers

### Model HF4

Stainless steel body with 1/2"NPT connection  
2-6 GPM or 5-22 LPM scale.

Model No.	Temp. Gauge	Inlet Size	Flow Range
<b>HF4-A-60</b>	no	1/2"NPT	2-6 gpm
<b>HF4B-A-220</b>	no	1/2"BSPP	5-22 lpm
<b>HF4-B-60</b>	yes	1/2"NPT	2-6 gpm
<b>HF4B-B-220</b>	yes	1/2"BSPP	5-22 lpm

L = 3.75" (95.3mm)

W = 1.5" (38.1mm)

H = 1.5" (38.1mm)

### Model HF8

Carbon steel body (black oxide finish) with  
1"NPT connection,  
5-40 GPM or 20-150 LPM scale

Model No.	Temp. Gauge	Inlet Size	Flow Range
<b>HF8-A-40</b>	no	1"NPT	5-40 gpm
<b>HF8-A-1500</b>	no		20-150 lpm
<b>HF8-B-40</b>	yes		5-40 gpm
<b>HF8-B-1500</b>	yes		20-150 lpm

L = 4.75" (120.6mm)

W = 2.25" (57.2mm)

H = 2.25" (57.2mm)

## General Description

Smartflow Hot Oil Flowmeters are durable, vane-operated devices that provide visual indication of flow rate in gallons or liters per minute. The indicator ball is separated from the process by a high temperature gasket and stainless steel plate. A glass window retains the indicator ball. This flowmeter is designed specifically for high temperature circulating loops in industrial processes.

## Features and Benefits

- ◆ **Compact size** works well in restricted-space locations.
- ◆ **Rugged construction** provides years of dependable service.
- ◆ **Optional Temperature Gauge** provides added function.
- ◆ **550°F (288°C) Temperature Rating** allows installation into high temperature applications.
- ◆ **150psi (10.3bar) Pressure Rating** satisfies most hot oil cooling pressure requirements.
- ◆ **Economical** for use in many locations throughout the plant.
- ◆ **Line mounted** for easy installation without extra brackets or hardware.

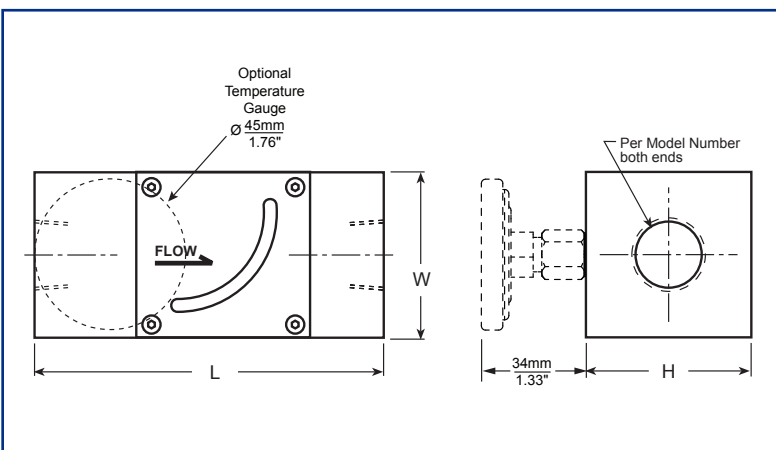
## Wetted Parts and Materials

Viewing Window ..... Glass  
Vane ..... Stainless Steel  
Spring ..... Stainless Steel  
Pin ..... Stainless Steel  
Gasket ..... Non-Asbestos Fiber  
Magnet ..... Sintered Alnico 8HE

## Specifications

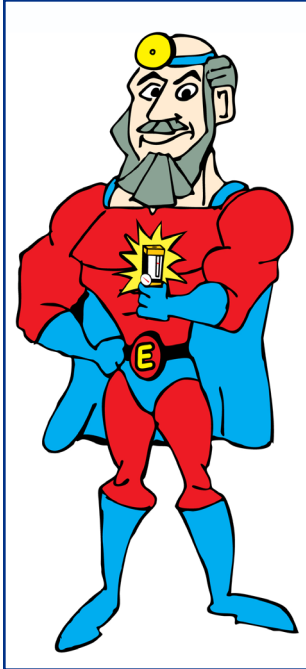
Operating Temperature max..... 550°F (288°C)  
Operating Pressure max..... 150 psi (10.3 bar)  
Flow Accuracy ..... ±10%

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



# SMARTFLOW® Dr. Eddy® Turbulent Flow Indicators with FCI Technology

## Dr. Eddy diagnoses flow condition.



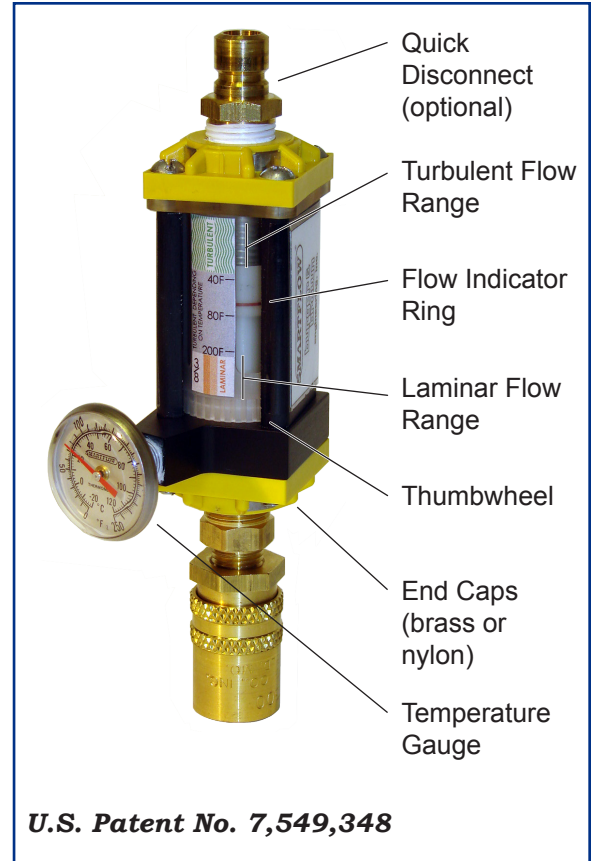
Using Fluid Characteristic Indication (FCI) technology, Dr. Eddy displays the condition of the water as it relates to cooling efficiency: lamina flo , transitional flo , or turbulent flo .

Dr. Eddy has four scales built into the meter: three scales for FCI and one scale for flow rate. FCI Scales are selectable and correspond to cooling line port size: 1/4", 3/8", or 1/2". Flow rate scale can be referenced quickly for additional functionality.

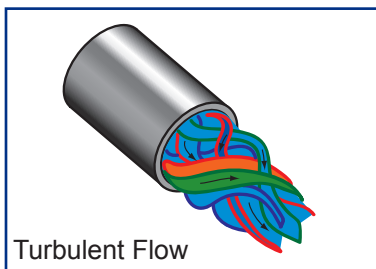
The flow scale displays flow rat in gallons or liters per minute depending on the model. A dual scale temperature gauge is standard on all models for process comparison to the FCI Scales.

Dr. Eddy applies the science of heat transfer, diagnosing the condition

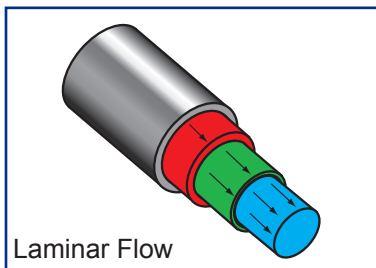
of cooling water lines at a glance. Cooling water capacity can be conserved plant-wide by using the minimum amount of flow that will produce turbulence on all presses. It may be possible to delay costly water system upgrades by optimizing the flow effectivi .



**U.S. Patent No. 7,549,348**



Turbulent Flow



Laminar Flow

### Turbulent Flow Basics

Turbulent water flow is much more efficient at removing heat in a cooling syst than water flowing under laminar conditions. Once turbulent flow is achieved increasing the flow rate does not significantly improve the cooling rate of th system.

In molding applications, many mold operators try to maximize the flow of water through their cooling systems to ensure turbulent flo . Doing so increases energy costs for pumping more water than necessary through the system. This practice may also limit the amount of cooling water available for cooling additional molds on the same cooling system circuit.

By insuring turbulent flow using FCI Technology, less water can be used in the molding process, saving precious resources.

Try our on-line Turbulent Flow Calculator:

[www.SMARTFLOW-USA.com/turbulent-flow-rate-calculator](http://www.SMARTFLOW-USA.com/turbulent-flow-rate-calculator)

### Turbulent Flow Facts

Flow is likely to be turbulent for Reynolds numbers above 4000. Reynolds Number (Re) is a dimensionless quantity used to predict fluid flo patterns.  $Re = (Velocity \times Diameter) \div Kinematic \ Viscosity$   
Kinematic Viscosity of water at 20°C (68°F) = 1cSt.  
Geometry and roughness inside flow passages will affec Turbulent Flow.

**Want to know more  
about Turbulent  
Flow?  
Take our Scientific  
Cooling<sup>SM</sup> class!**

**Model Number**

**FC3 - B - E**

**Brass Ends**

**Inlet Size**

- 1/4"NPT
- 1/4"BSPP
- 3/8"NPT
- 3/8"BSPP

- FC2
- FC2B
- FC3
- FC3B

**Nylon Ends**

**Inlet Size**

- 1/4"NPT
- 1/4"BSPP
- 3/8"NPT
- 3/8"BSPP

- FCP2
- FCP2B
- FCP3
- FCP3B

**Scale Units**

- E** English  
(Temp in °F and Flow in GPM)
- M** Metric  
(Temp in °C and Flow in LPM)

**Accessories**

- B** Thermometer (standard)
- E** Thermometer with quick-connect socket and plug

**Wetted Parts and Materials**

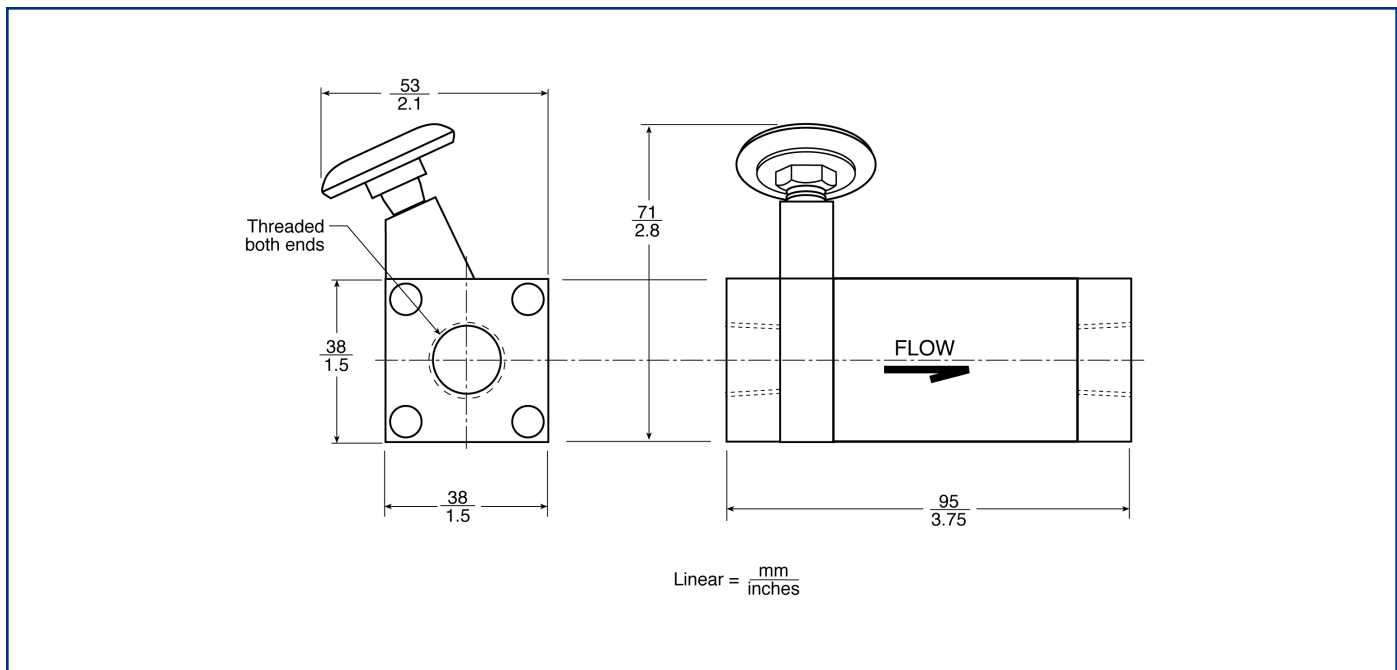
- End Caps..... Brass or Glass-Filled Nylon
- Body ..... Polysulfone
- Indicator Ring .....Silicone Rubber
- Piston..... Acetal
- Spring ..... Stainless Steel
- O-Rings .....EPDM
- Cap Screws ..... Stainless Steel
- Gauge Block.....Brass
- Optional Quick-Connect Fittings.....Brass

**Specifications**

- Flow Range .....0.25 - 2 gpm  
1 - 8 lpm
- Flow Accuracy .....±10% full scale
- Operating Temperature max.....210°F (99°C)
- Operating Pressure max.....100 psi (6.9 bar)
- Dial Thermometer..... 0 to 250°F  
(-20° to 120°C)
- ±2% accuracy (full scale)

10% glycol scale is available. Contact the factory for details

The addition of glycol to cooling water can have a dramatic effect on Turbulent Flow, increasing the flow rate needed to achieve optimum cooling efficiency .

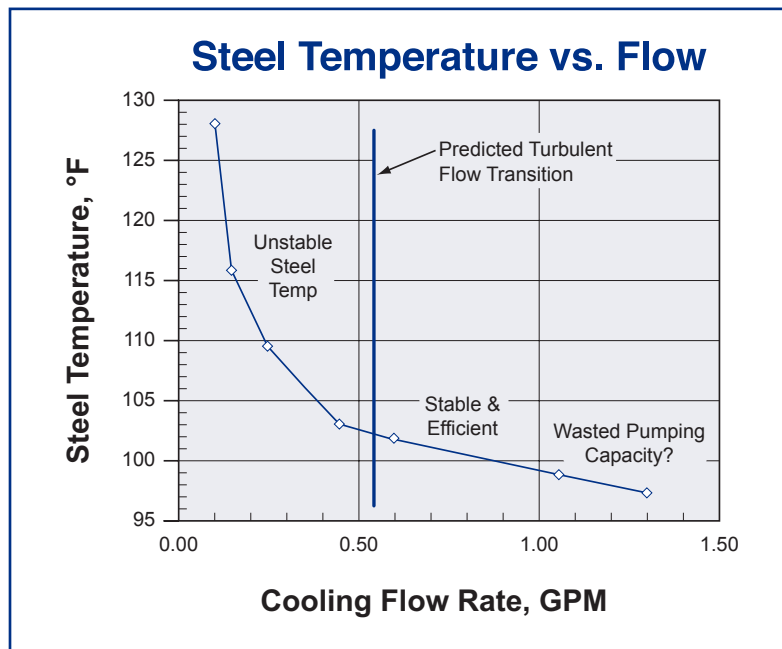




# SMARTFLOW® Flow Regulators

## Why use SMARTFLOW Flow Regulators?

- ◆ **Create Repeatable and Balanced Processes**  
Multiple circuits within an injection mold often have different cooling requirements. Cooling water will normally follow the path of least resistance leaving some circuits starved for water in manifolds without regulators. Individual circuit control allows the operator to direct the process cooling water where needed to produce repeatable finished part quality.
- ◆ **Optimize Cooling Capacity**  
By applying the principles of Turbulent Flow, cooling circuits can be optimized for efficient cooling, conserving water and electricity. Additional water flow rate beyond turbulent flow condition provides diminishing returns illustrated by the chart below.



Try our On-Line Calculators for Injection molders accessible from the home page:

[www.SMARTFLOW-USA.com](http://www.SMARTFLOW-USA.com)

**Scientific Cooling Calculator** extracts cooling water flow rate, heat transfer, processing temperatures, and overall cooling requirements based on polymer type, processing temperature, shot weight and other variables.

**Turbulent Flow Calculator** flow rate needed to achieve turbulence based on the Reynolds Number, cooling water temperature and inside diameter of the cooling channel.

- ◆ **Implement Scientific Cooling<sup>SM</sup>**  
Flow Regulators help injection molders use the three R's of Scientific Cooling: Reveal, Record, Repeat.

Burger & Brown Engineering recommends placing flow regulators on the return side of the cooling water loop. This position ensures that the cooling lines are full of cooling water. Regulators placed on the supply side may provide only a small stream of water to the cooling lines. The water may not come in contact with all internal cooling surfaces providing inconsistent part cooling.

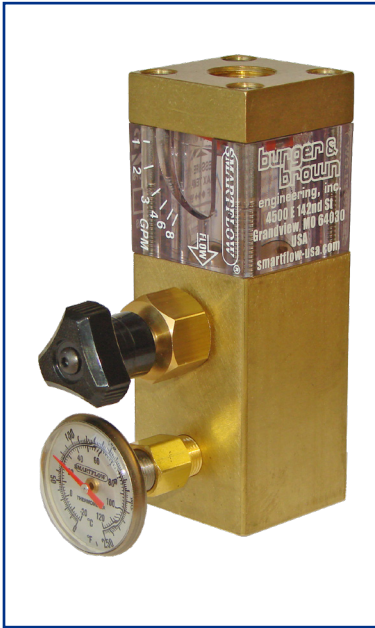
Using Smartflow Flow Regulators to apply the principles of Turbulent Flow and Scientific Cooling, injection molders optimize cooling water and energy efficiency while providing the best possible environment to make repeatable parts.



**For 3D CAD files of Custom Manifold Assemblies and Standard Components Visit**

**ManifoldBuilder.com**

# SMARTFLOW® Brass Flow Regulators



## General Description

Smartflow flow regulators provide a unique, leak-free, single-point manual flow control. This regulator incorporates the proven mechanical flowmeter and integral needle valve in a compact design. Very few moving parts improve reliability and leak-free operation.

Used singly or in combination with a water manifold, the flow regulator allows manual control of individual cooling water lines.

## Features and Benefits

- ◆ Compact size works well in restricted-space locations.
- ◆ Rugged construction provides years of dependable service.
- ◆ 210°F (99°C) Temperature Rating allows installation into a wide range of applications.
- ◆ Optional Temperature Gauge displays additional process information.
- ◆ No Mounting Restrictions ease installation in any position without extra brackets or hardware.

## Model Number

### FR3 - B - 25

Inlet Size	Model	Flow Range
1/4"NPT	FR2	15 0.2 - 1.5 gpm (gallons per minute)
1/4"BSPP	FR2B	
3/8"NPT	FR3	25 0.5 - 2.5 gpm
3/8"BSPP	FR3B	
1/2"NPT	FR4	80 1 - 8 gpm
1/2"BSPP	FR4B	100 2 - 10 lpm (liters per min.)
		200 5 - 20 lpm
		300 4 - 30 lpm

## Accessories

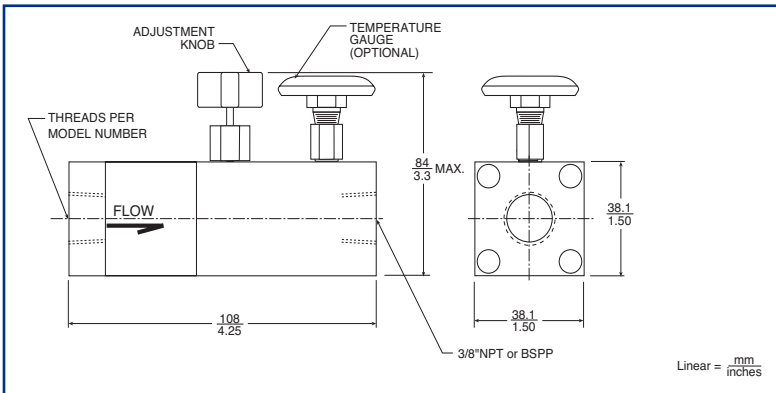
- A** Flow regulator only
- B** Thermometer
- E** Thermometer with quick-connect socket and plug (NPT only)

## Wetted Parts and Materials

Flow Out Thread Size	3/8"NPT or BSPP
End Caps & Regulator Body	Brass
Valve Stem & Seat	Brass
Flow Body	Polysulfone
Vane	Nylon
Spring	Stainless Steel
O-Rings	EPDM
Cap Screws	Stainless Steel
Optional Quick-Connect Fittings	Brass

## Specifications

Flow Accuracy	±10% full scale
Operating Temperature max.	210°F (99°C)
Operating Pressure max.	100 psi (6.9 bar)
Dial Thermometer	0 to 250°F (-20° to 120°C) ±2% accuracy (full scale)

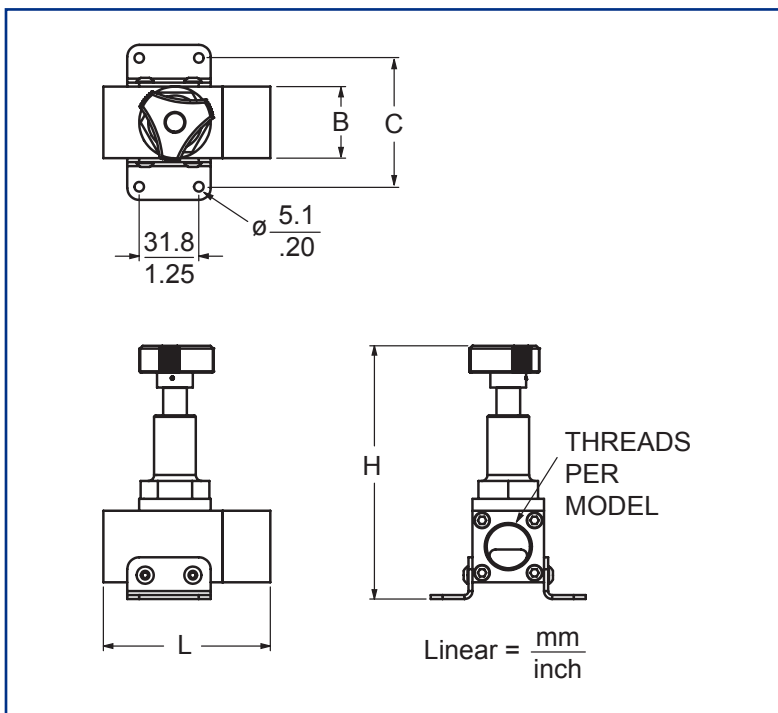


# SMARTFLOW<sup>®</sup> 3/4" & 1" Brass Flow Regulators



**3/4" or 1" Mechanical Flowmeters or Tracer<sup>®</sup> Electronic Flowmeters may be attached to this flow regulator for added functionality.**

**Contact Customer Service for details.**



## General Description

The large size of this flow regulator is unique in the industry for precise control of 3/4" or 1" cooling water lines. Brass body, valve stem and seat with EPDM o-rings are compatible with most process liquids. The 3/4" flow regulator can be used in combination with a mechanical IceCube™ flow body to add 8 gpm or 30 lpm flow indication. Additional IceCube™ flow body is not available for use with 1" flow regulator.

Mounting Brackets are included for mechanical support.

## Wetted Parts and Materials

Body ..... Brass  
Valve Stem & Seat..... Brass  
O-Rings ..... EPDM  
Mounting Brackets..... Powder Coated Steel

## Optional Flow Indicator Parts (3/4" only)

Flow Body..... Polysulfone  
Vane ..... Nylon  
Spring ..... Stainless Steel

## Specifications

Thread Size ..... 3/4" or 1" NPT(F)  
Operating Temperature max..... 240°F (115°C)  
Operating Pressure max..... 150 psi (10.3 bar)

## Model Number

**FR6-A**..... 3/4"NPT, no flow indicato

**FR8-A**..... 1"NPT, no flow indicato

**FR6-A-80** ..... with 1-8 gpm flow indicato

**FR6-A-300** ... with 4-30 lpm flow indicato

## Dimensions (mm/inches)

Model	FR6-A	FR6-A-XX	FR8-A
<b>B</b>	$\frac{38.1}{1.5}$	$\frac{38.1}{1.5}$	$\frac{44.5}{1.75}$
<b>C</b>	$\frac{68.6}{2.7}$	$\frac{68.6}{2.7}$	$\frac{74.9}{2.95}$
<b>H</b>	$\frac{134.9}{5.31}$	$\frac{134.9}{5.31}$	$\frac{146.3}{5.76}$
<b>L</b>	$\frac{88.9}{3.5}$	$\frac{120.7}{4.75}$	$\frac{101.6}{4.0}$



# Precision Flow Regulator Only

## General Description

Delta-Q is a durable and economical precision flow regulator module that can be used in conjunction with other **SMARTFLOW** components such as:

- ◆ Threaded End Caps
- ◆ IceCube™ Flowmeters
- ◆ Temperature and Pressure Gauges
- ◆ Dr. Eddy® Flowmeter/Turbulent Flow Indicators
- ◆ Tracer® Electronic Flowmeters
- ◆ Cooling Water Manifolds

The Delta-Q Regulator allows full adjustability of flow volume from unrestricted flow to complete shut off using the manual fi control knob.

The modular design allows users to customize models meeting Scientific Coolin<sup>SM</sup> requirements for each application. The glass-filled nylon body is lightweight and durable. Internal stainless steel components are resistant to corrosion.

See page 16 for custom assembly specification onto manifolds



FP3-F3-Q

## Model Number

### F3 - A - Q

#### Brass End Caps

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

#### Nylon End Caps

1/4"NPT	FP2
1/4"BSPP	FP2B
3/8"NPT	FP3
3/8"BSPP	FP3B
1/2"NPT	FP4
1/2"BSPP	FP4B

#### Accessories

A	Flowmeter only
B	Thermometer
C1	Thermometer and 30 psi Pressure Gauge
C2	Thermometer and 60 psi Pressure Gauge
C3	Thermometer and 100 psi Pressure Gauge
CL	Thermometer and Liquid-Filled Pressure Gauge (100 psi)
F1	30 psi Pressure Gauge
F2	60 psi Pressure Gauge
F3	100 psi Pressure Gauge
FL	Liquid-Filled Pressure Gauge (100 psi)

## Wetted Parts and Materials

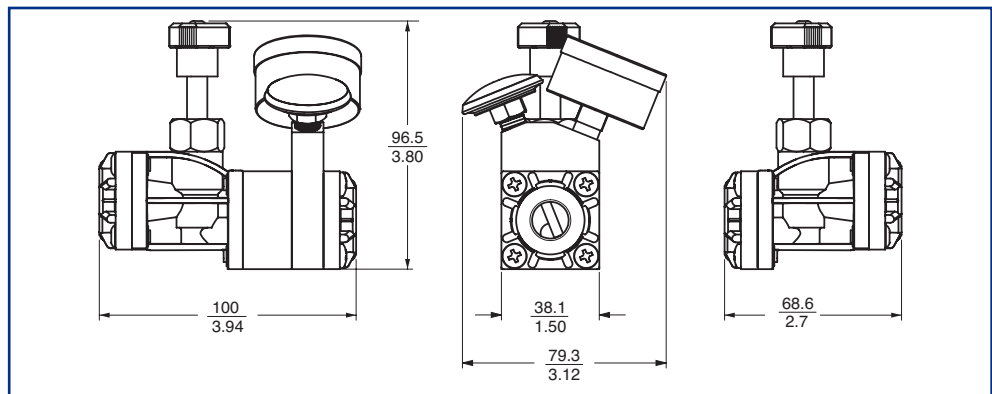
End Caps.....	Brass or Glass-Filled Nylon
Body .....	Glass-Filled Nylon
O-Rings .....	EPDM
Regulator Stem.....	Stainless Steel
Cap Screws .....	Stainless Steel
Optional Gauge Block.....	Brass
Optional Quick-Connect Fittings.....	Brass

## Specifications

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

For customized assembly onto Smartflow Manifolds, see page 16 or visit [www.manifoldbuilder.com](http://www.manifoldbuilder.com)

[www.ManifoldBuilder.com](http://www.ManifoldBuilder.com)





# Precision Flow Regulator with IceCube™ Flowmeter

## Model Number

**F3 - A - 25 - Q**

### Brass End Caps

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

### Nylon End Caps

1/4"NPT	FP2
1/4"BSPP	FP2B
3/8"NPT	FP3
3/8"BSPP	FP3B
1/2"NPT	FP4
1/2"BSPP	FP4B

### Flow Range

15	0.2 - 1.5 gpm (gallons per minute)
25	0.5 - 2.5 gpm
80	1 - 8 gpm
100	2 - 10 lpm (liters per minute)
200	5 - 20 lpm
300	4 - 30 lpm



F3-A-80-Q

### Accessories

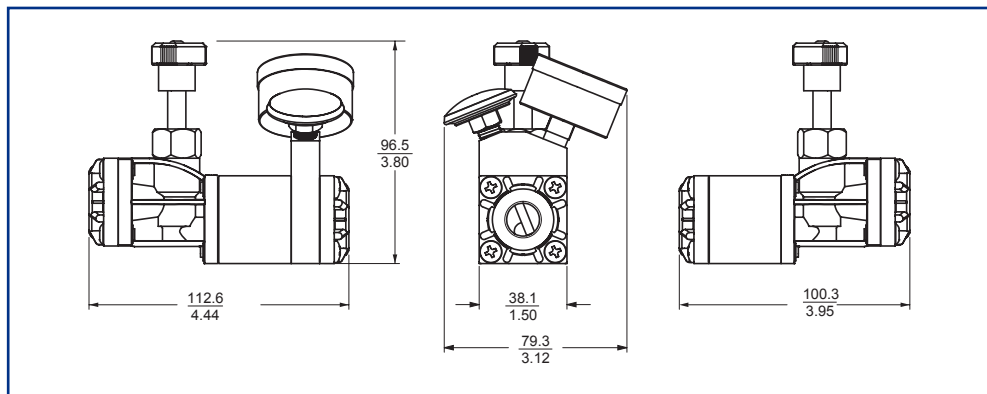
Flowmeter only	A
Thermometer	B
Thermometer and 30 psi Pressure Gauge	C1
Thermometer and 60 psi Pressure Gauge	C2
Thermometer and 100 psi Pressure Gauge	C3
Thermometer and Liquid-Filled Pressure Gauge (100 psi)	CL
30 psi Pressure Gauge	F1
60 psi Pressure Gauge	F2
100 psi Pressure Gauge	F3
Liquid-Filled Pressure Gauge (100 psi)	FL

### Wetted Parts and Materials

End Caps.....Brass or Glass-Filled Nylon  
 Flow Body.....Polysulfone  
 Regulator Body..... Glass-Filled Nylon  
 Vane ..... Glass-Filled Nylon  
 Spring ..... Stainless Steel  
 O-Rings ..... EPDM  
 Optional Gauge Block..... Brass

### Specifications

Flow Accuracy ..... ±10% full scale  
 Operating Temperature max.....210°F (99°C)  
 Operating Pressure max.....100 psi (6.9 bar)  
 Dial Thermometer.....0 to 250°F (-20° to 120°C)  
 ±2% accuracy (full scale)  
 Pressure Gauge .....0 to 100 psi (0 to 700Kpa)  
 ±3% accuracy (full scale)





# Precision Flow Regulator with Dr. Eddy Turbulent Flow Indicator

## Model Number

### FC3 - B - E - Q

#### Brass End Caps

1/4"NPT	FC2
1/4"BSPP	FC2B
3/8"NPT	FC3
3/8"BSPP	FC3B

#### Nylon End Caps

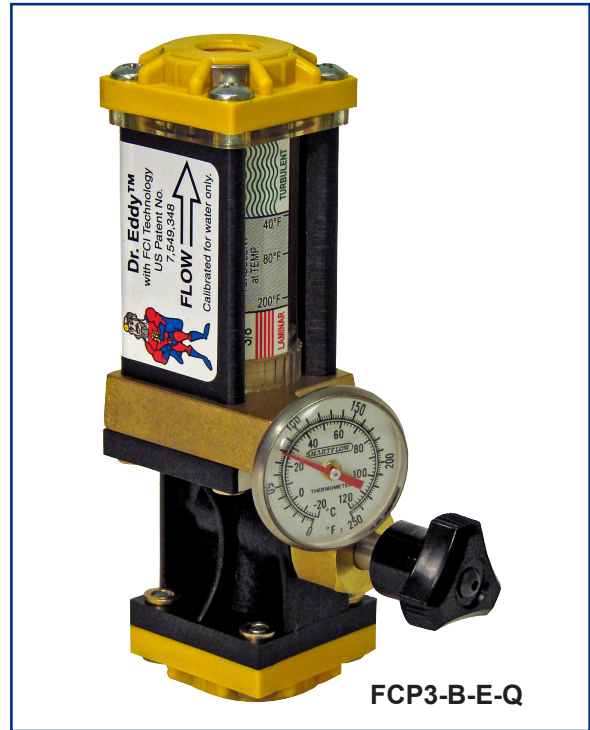
1/4"NPT	FCP2
1/4"BSPP	FCP2B
3/8"NPT	FCP3
3/8"BSPP	FCP3B

#### Scale Units

<b>E</b>	English (Temp in °F and Flow in GPM)
<b>M</b>	Metric (Temp in °C and Flow in LPM)

#### Accessories

<b>B</b>	Thermometer (standard)
<b>E</b>	Thermometer with quick-connect socket and plug



### Wetted Parts and Materials

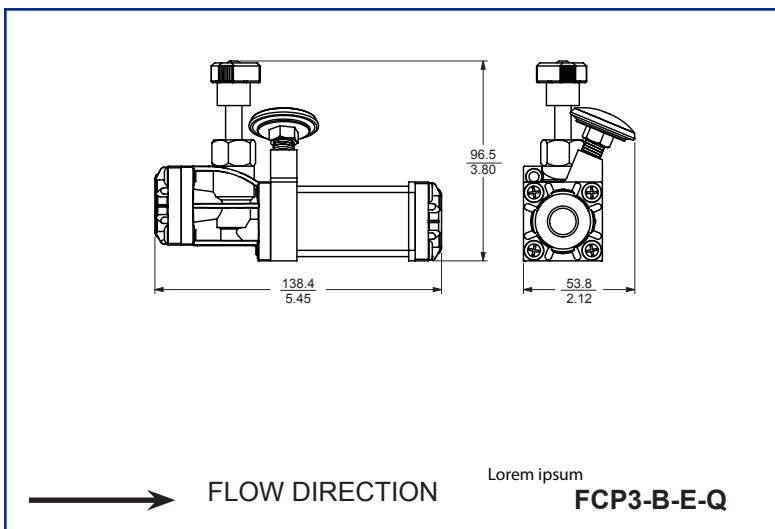
End Caps.....	Brass or Glass-Filled Nylon
Regulator Body.....	Glass-Filled Nylon
Flow Body.....	Polysulfone
Indicator Ring .....	Silicone Rubber
Piston.....	Acetal
Spring .....	Stainless Steel
O-Rings .....	EPDM
Optional Gauge Block.....	Brass
Optional Quick-Connect Fittings.....	Brass

### Specifications

Flow Range .....	0.25 - 2 gpm 1 - 8 lpm
Accuracy.....	±10% full scale
Operating Temperature max.....	210°F (99°C)
Operating Pressure max.....	100 psi (6.9 bar)
Dial Thermometer.....	0 to 250°F (-20° to 120°C) ±2% accuracy (full scale)

Dr. Eddy is calibrated for use with water only. A 10% glycol scale is available on request.

The addition of glycol to cooling water can have a dramatic effect on Turbulent Flow, increasing the flow rate needed to achieve optimum cooling efficiency.



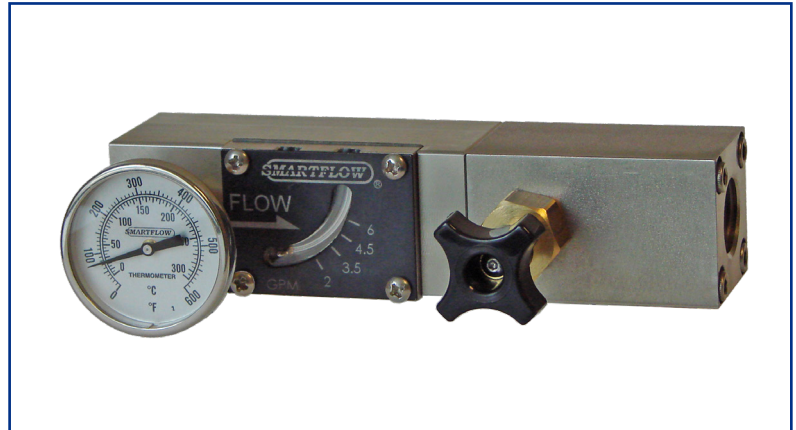
# SMARTFLOW<sup>®</sup> High Pressure and Temperature Stainless Steel Flow Regulators

## General Description

Smartflow High Pressure and Temperature Stainless Steel Flow Regulators are designed for use in hot water or oil cooling systems up to 400°F (204°C) and 250 psi (17 bar).

These regulators are ideal for connection to temperature control units in an injection molding environment. 1/2"NPT(F) threaded ends are standard. Temperature Gauge is optional.

Stainless steel valve seat and high temperature seals provide long, trouble-free service.



## Model Number

### HFR4 - A - 60

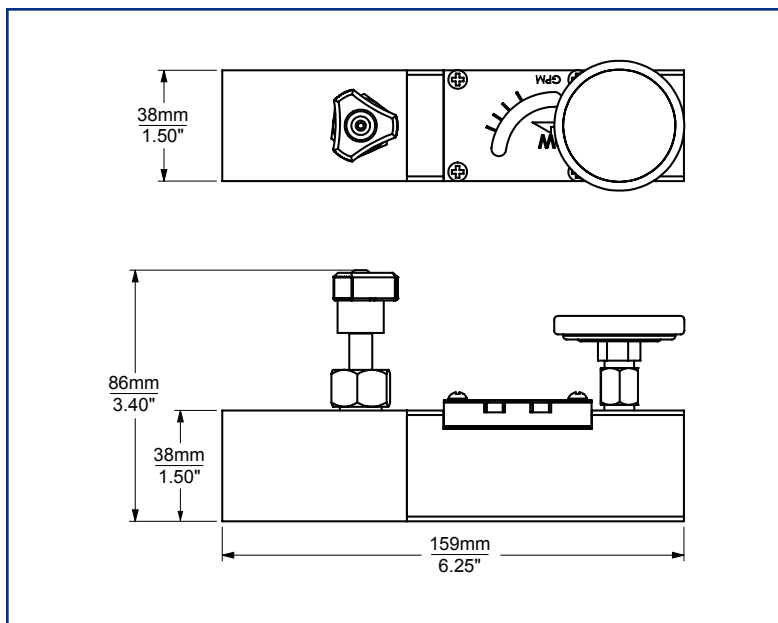
Temperature Gauge		Flow Range
No Temperature Gauge	A	60 2 - 6 gpm (gallons per minute)
With Temperature Gauge	B	220 5 - 22 lpm (liters per minute)

## Wetted Parts and Materials

Body	Stainless Steel
Viewing Window	Glass
Vane	Stainless Steel
Spring	Stainless Steel
Hinge Pin	Stainless Steel
Gasket	Non-Asbestos Fiber
Magnet	Sintered Alnico 8GE
O-Rings	Viton

## Specifications

Accuracy	±10% full scale
Operating Temperature max.	400°F (204°C)
Operating Pressure max.	250 psi (17.2 bar)
Dial Thermometer	0 to 600°F (-20° to 300°C)



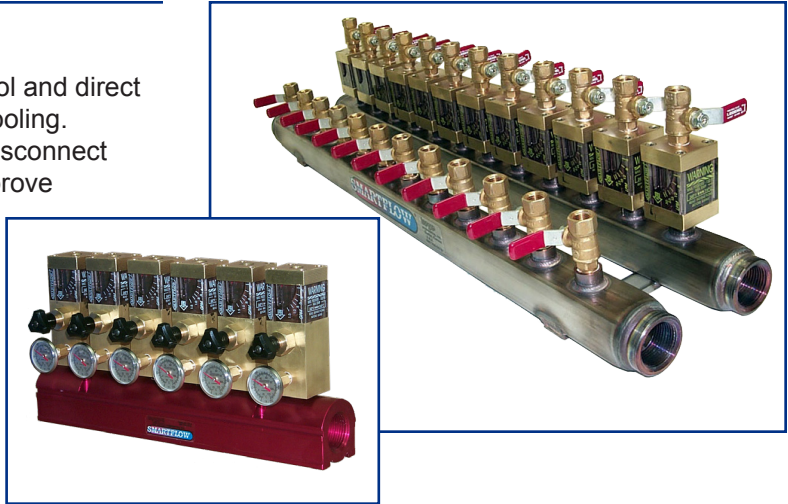
# SMARTFLOW<sup>®</sup> Manifold/Flowmeter Assemblies

## Assembly Specification

The Smartflow manifold line is the platform to control and direct cooling water in many types of industrial process cooling. Flowmeters, Flow Regulators, Ball Valves, Quick Disconnect Fittings and more can be added to manifolds to improve functionality and process control. Individual cooling lines can be accurately controlled according to the demands of each circuit.

**Parallel Stainless Steel Manifold Assemblies** are built with flowmeters on one half of the manifold pair only. Contact the factory if alternate configuration is needed

Burger & Brown Engineering recommends placing flowmeters and regulators on the return side of the cooling loop for best performance.



## Model Number

Manifold P/N	<b>8SA - 8 - 3 - 2 - Y</b>	<b>F3-A-80</b>	<b>B3Q3</b>	<b>R</b>
	<p><b>Aluminum or Stainless Steel Manifold</b> Consult Catalog Form #188</p>			<p><b>Function</b></p> <p><b>R</b> Return fluid flow enterin the manifold (default)</p> <p><b>S</b> Supply fluid flow exitin the manifold</p>
	<p><b>*Flowmeter/Regulator installed on each port of the manifold</b></p> <p>No additional flowmeter/regulato</p> <p>Mechanical Flowmeter</p> <p>Brass Flow Regulator</p> <p>Delta-Q Precision Flow Regulator (pages 3 thru 15)</p> <p>Tracer<sup>®</sup> Electronic Flowmeter</p> <p>Tracer<sub>VM</sub> Electronic Flowmeter</p> <p>See Tracer Catalog number 190</p>	<p><b>NA</b></p> <p><b>F</b></p> <p><b>FR</b></p> <p><b>F-Q</b></p> <p><b>DD</b></p> <p><b>VM</b></p>	<p><b>Connection Type</b></p> <p><b>Brass Valves and Fittings</b></p> <p><b>NA</b> No additional valve or fittin</p> <p><b>B2</b> Ball Valve 1/4"NPT</p> <p><b>B3</b> Ball Valve 3/8"NPT</p> <p><b>B4</b> Ball Valve 1/2"NPT</p> <p><b>H2</b> Hose Barb 1/4"ID Hose</p> <p><b>H3</b> Hose Barb 3/8"ID Hose</p> <p><b>H4</b> Hose Barb 1/2"ID Hose</p> <p><b>Q2</b> Quick Connect Plug 1/4"ID (200 Series)</p> <p><b>Q3</b> Quick Connect Plug 3/8"ID (300 Series)</p> <p><b>Q4</b> Quick Connect Plug 1/2"ID (500 Series)</p>	

**ManifoldBuilder.com**

**On-Line Part Number Specification Assistance**

3D Native CAD files for manifolds and assemblies are available for download 24/7 at [www.manifoldbuilder.com](http://www.manifoldbuilder.com)



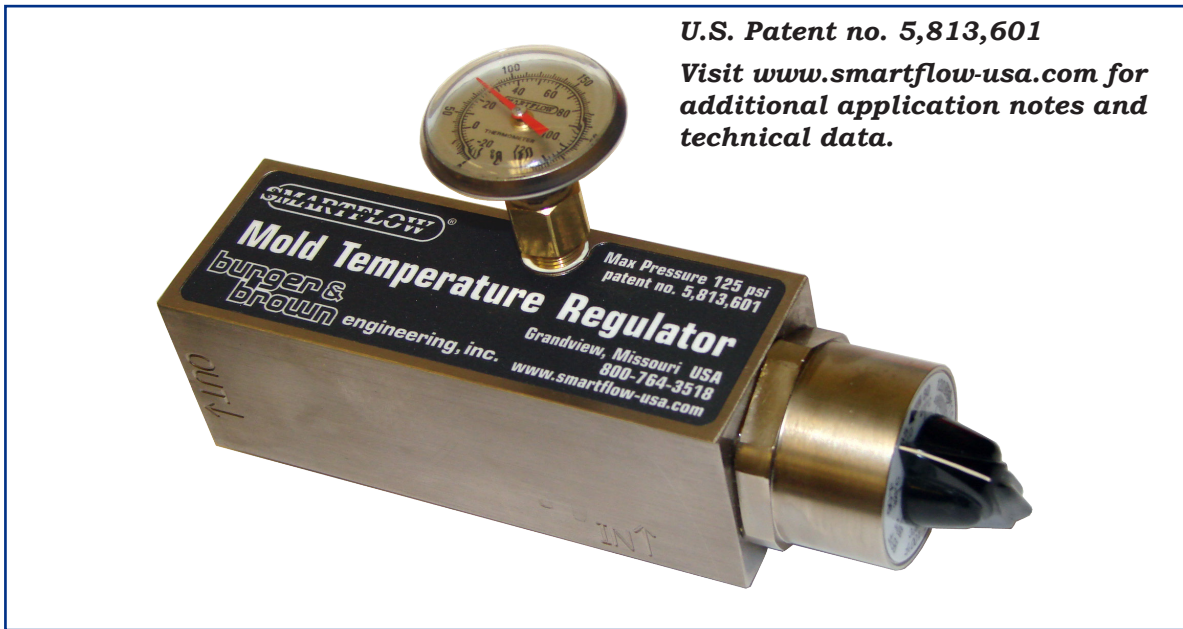
**SMARTFLOW<sup>®</sup> Ferrogard Page**

**Model Number**

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**Discontinued**

# SMARTFLOW<sup>®</sup> Mold Temperature Regulators



U.S. Patent no. 5,813,601

Visit [www.smartflow-usa.com](http://www.smartflow-usa.com) for additional application notes and technical data.

## General Description

The **Smartflow Mold Temperature Regulator** effectively controls mold cooling water temperature between 80°F and 120°F (27° and 49°C) to maintain a steady mold temperature. Installed to control water flow exiting an injection mold, the Mold Temperature Regulator quietly recovers waste heat from the resin shot, working without electricity to reduce shop floor clutter, and cut production costs. In many cases, it is a simple, inexpensive substitute for a conventional electric mold heater.

*Cooling water temperature always corresponds to higher mold (steel) temperatures (for example: 120°F water temperature may result in 180°F mold temperature).*

## Turbulent Flow, Supply Cooling Water Pressure & Temperature

Traditionally, high turbulent flow rates are used in cooling water loops to achieve acceptable heat transfer rates from the mold. High turbulent flow rates are irrelevant when using the Smartflow Mold Temperature Regulator. It regulates cooling water flow leaving the mold to achieve Set Point temperature. The unit is unaffected by supply cooling water pressure and temperature. For example, it automatically compensates for temperature changes of cooling tower water between night and day.

## Features and Benefits

- ◆ **Multiple zone control** - using several regulators or an optional inlet manifold facilitates effective zone control
- ◆ **Unaffected by pressure changes** - the Mold Temperature Regulator uses the thermal expansion principle for operation
- ◆ **Handles tower water temperature changes** - modulates flow to control cooling water temperature
- ◆ **In-Line mounting** - installs easily without additional hardware
- ◆ **Cost of ownership** - typically 1/6 the cost of a conventional electric mold heater
- ◆ **Maintenance free** - few internal parts for trouble-free operation
- ◆ **Energy saving** - it uses no electricity, conserving precious energy dollars
- ◆ **Small size** - cleans up shop floor clutter: no hoses or power cords to trip over
- ◆ **Integral dial thermometer** - verifies Set Point temperature
- ◆ **Optional inlet manifold** - provides temperature control for multiple zones with one regulator

# SMARTFLOW<sup>®</sup> Mold Temperature Regulators

## Model Numbers

Model	Inlet	Outlet
WDT2-N2-N4	1/4"NPT(F)	1/2"NPT(F)
WDT2-S2-P2	1/4" Quick Connect Socket	1/4" Quick Connect Plug
WDT2-S3-P3	3/8" Quick Connect Socket	3/8" Quick Connect Plug
WDT2-N2-N4-M	1/4"NPT(F) 7-port Manifold	1/2"NPT(F)
Manifold Only WDMF-100	1/4"NPT(F) 7 port	

## Specifications

### Physical

Material..... All wetted parts are Electroless Nickel-Plated Brass & Stainless Steel

O-Rings ..... Buna-N

Inlet Size..... 1/4"NPT(F)

Outlet Size..... 1/2"NPT(F)

maximum Pressure..... 125 psi (8.6 bar)

Weight ..... 3 lbs (1.5 kg)

### Operating Regulator

Cooling water set point range..... 80° to 120°F (27° to 49°C)

Accuracy..... ±1°F Full Scale

5 to 25 gallons (19 to 95 liters) per hour

Regulator operation is more accurate than dial thermometer.

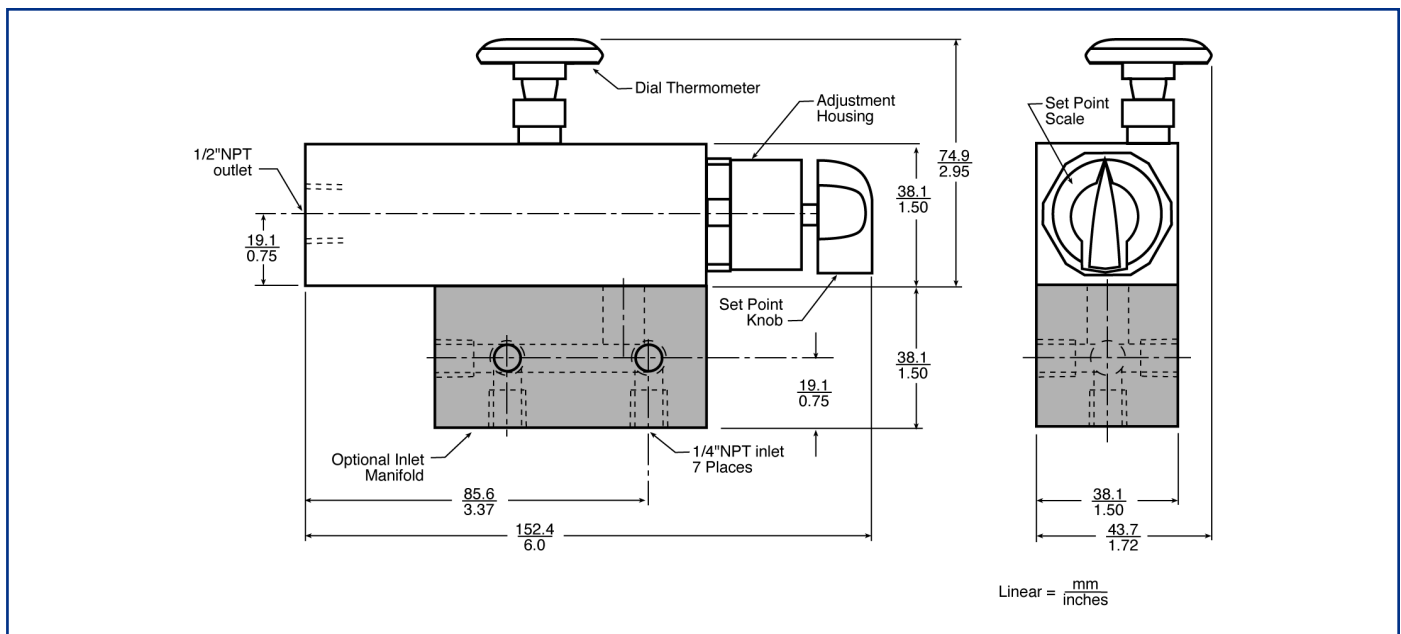
### Dial Thermometer

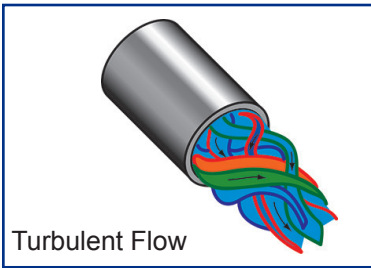
Range..... 0 to 250°F (-18° to 121°C)

Accuracy..... ±1°F Mid Scale  
±2°F Full Scale

Visit  
[www.smartflow-usa.com](http://www.smartflow-usa.com)  
for application data

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



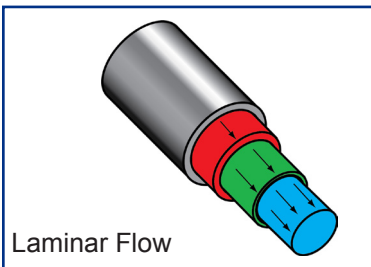


### Turbulent Flow Basics

Turbulent water flow is much more efficient at removing heat in a cooling system than water flowing under laminar conditions. Once turbulent flow is achieved increasing the flow rate does not significantly improve the cooling rate of the system.

In molding applications, many mold operators try to maximize the flow of water through their cooling systems to ensure turbulent flow. Doing so increases energy costs for pumping more water than necessary through the system. This practice may also limit the amount of cooling water available for cooling additional molds on the same cooling systems circuit.

By insuring turbulent flow using FCI (Fluid Characteristic Indication) Technology, less water can be used in the molding process, saving precious resources.



Try our on-line Turbulent Flow Calculator:

[www.SMARTFLOW-USA.com/  
turbulent-flow-rate-calculator](http://www.SMARTFLOW-USA.com/turbulent-flow-rate-calculator)

### Expected Rates of Flow

60°F (15°C) Water through  
Schedule 40 Pipe

Nominal Pipe Size	Flow Rate	
	Gallons per Minute	Liters per Minute
1/4"	3	11
3/8"	6	23
1/2"	10	38
3/4"	15	57
1"	25	95
1-1/4"	45	171
1-1/2"	60	228
2"	100	380
3"	230	870

### Turbulent Flow Reference Charts

Approximate Minimum Flow required for turbulence in drilled water passages based on Reynolds Number of 4000

Passage Diameter	Nominal Pipe Size	Minimum Flow in GPM by Temperature		
		40°F	120°F	200°F
.44"	1/4"	0.88	0.31	0.18
.59"	3/8"	1.16	0.42	0.24
.72"	1/2"	1.41	0.51	0.29

Passage Diameter	Nominal Pipe Size	Minimum Flow in LPM by Temperature		
		4°C	49°C	93°C
11mm	1/4"	3.3	1.2	0.7
15mm	3/8"	4.4	1.6	0.9
18mm	1/2"	5.3	1.9	1.0



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