Table of Contents – Fluid and Diagnostic Sensors

Flow

Top five product features!

- Immune to rapid temperature changes of media
- Fast response time 10 ms: great for cycling applications; minimum 10 million switching cycles
- Easy to set: turn dial to desired switchpoint up to 26 gpm
- Can be bench set outside of the process
- DC PNP switching output with LED indication

ifm mechatronic flow switch

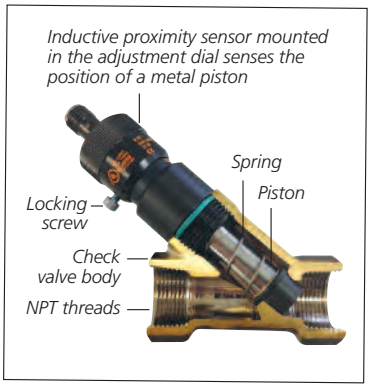
The ifm SBN Series mechatronic flow switch monitors liquid media and provides reliable flow control for various flow applications.

The mechatronic flow switch sensing principle ensures extremely fast response time and allows for a more precise switchpoint setting. The switchpoint can be easily set and locked with a setting screw.

The SBN mechatronic flow switch is ideal for applications with rapid temperature changes or where fast response time is required, such as:

- Spindle coolant flow monitoring for drilling
- Furnace cooling water flow detection
- Cycling coolant flow monitoring in machining applications

SBN Principle of operation
The flow sensor utilizes a spring-supported piston that is lifted by the flowing medium. The piston position is detected via an inductive sensor and is output as a binary signal. The spring resets the piston to its initial position with decreasing flow. This allows the sensor to be mounted in any position (horizontally or vertically) and function as a check valve.



The mechatronic sensor reliably monitors the flow of water in cooling loops of an induction furnace.

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Fiber optics 98 - 103
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2D / 3D inspection 112 - 125
Safety products 128 - 141

Product + accessory selector

Output	Setting Range [gpm]	Response Time [ms]	Accuracy [% of Full Range]	Process Connection	Part No.	List Price (1-pc.)
1 x PNP, N.O.	0.26…6.6	10	± 5	3/4" NPT female	**SBN333**	**$249.00**
1 x PNP, N.O.	1.32…26.4	10	± 5	1" NPT female	**SBN346**	**$264.00**

Cordsets

Type	Description	Part No.	List Price (1-pc.)
	M12 Micro DC (4-pin) 2 m, PUR	**EVC001**	**$9.95**
	M12 Micro DC (4-pin) 5 m, PUR	**EVC002**	**$13.50**
	M12 Micro DC (4-pin) 10 m, PUR	**EVC003**	**$18.00**
	M12 Micro DC (4-pin) 2 m, PUR	**EVC004**	**$9.95**
	M12 Micro DC (4-pin) 5 m, PUR	**EVC005**	**$13.50**
	M12 Micro DC (4-pin) 10 m, PUR	**EVC006**	**$18.00**

Can't find the right sensor for your application, call 800-441-8246 or visit www.ifm.com/us

Technical Specs

Supply voltage: 24 VDC
Maximum load current: 100 mA
Pressure rating: 363 psi
Medium temperature: 32…185 °F (0...85 °C)
Wetted parts: 304 stainless steel, nickel-plated brass, Pocan; O-ring: Viton™
Protection: IP67
Switching cycles: 10 million / min.

Top five product features!

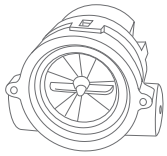
- *Thermal sensing principle with no moving parts is more reliable than mechanical switches*
- *Replaces mechanical switches for monitoring liquids and gases*
- *Wide measuring range to cover more applications*
- *LED bar graph display for flow and setpoint*
- *Easy pushbutton setup with flexible mounting*

ifm's flow switches are an ideal alternative to mechanical flow switches

The SI flow switch features microprocessor-based pushbutton programming and highly visible LED status of flow and output conditions. They are ideally suited to flow / no flow applications in most industries.

ifm efector flow switches offer a variety of process connections to fit most applications. This flexibility allows the switch to be easily installed in many different applications that have various mounting requirements.

ifm efector flow switches are solid state alternatives to mechanical flow switches for sensing the flow rate of liquids and gases. Because there are no moving parts to jam or break, ifm efector flow switches eliminate the maintenance headaches of mechanical flow switches.

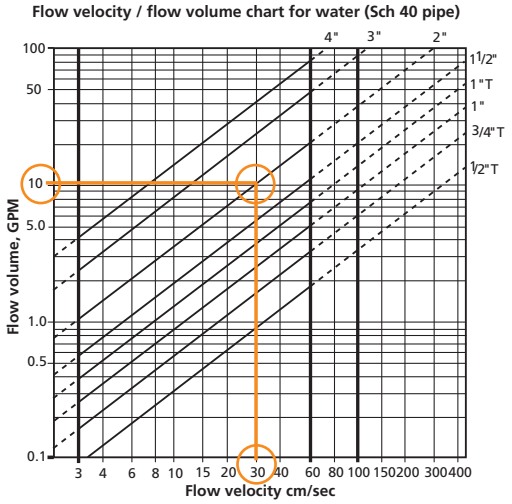


Challenge
Mechanical flow switches that stick.

Solution
ifm flow switches have no moving parts that can stick or break.

How to convert flow rate to flow velocity

1. *Find the volumetric flow rate for the switchpoint on the y-axis. (Example: 10).*
2. *Follow the line horizontally until it intersects the diagonal line for the pipe diameter. (Example: 2").*
3. *From that intersection point, drop straight down to read the velocity on the x-axis to find the flow velocity. (Example: 30).*



Ideal switchpoint setting ranges for the following flow models:
SI 5xxx *(see page 163): 3…100 cm/sec. for water*
SF xxxx *(see page 165): 3…60 cm/sec. for water*

If the velocity falls within the ideal switchpoint range (as indicated between the bold lines in the chart: 3...100 cm or 3...60 cm), the switch will be very repeatable. If it does not fall within that range, consider increasing the pipe size or reducing the switchpoint flow rate.

Search Bar

Company	Position Sensors: Inductive	Capacitive	Cylinder position	Photoelectrics and lasers	Distance, color and contrast	Fiber optics	Motion Control: Speed monitors	Vision Sensors: 2D / 3D inspection	Safety Technology: Safety products
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Product + accessory selector

Output	Process Connection	Ideal Switchpoint Setting Range for Water*	Supply Voltage	Current/ Power Consumption	Load Current/ Contact Rating	Response Time	Pressure Rating	Part No.	List Price (1-pc.)
1 x PNP, N.O. / N.C.	See required accessories	3...100 cm/sec	19…36 VDC	< 60 mA	250 mA	1...10 sec	4350 psi (300 bar)	**SI5010**	**$299.00**
1 x NPN, N.O. / N.C.	See required accessories	3...100 cm/sec	19…36 VDC	< 60 mA	250 mA	1...10 sec	4350 psi (300 bar)	**SI5011**	**$299.00**
1 x AC relay, N.O./N.C.	See required accessories	3...100 cm/sec	90…240 VAC	< 3.5 V	3A contact rating	1...10 sec	4350 psi (300 bar)	**SI5006**	**$365.00**

* Refer to technical specs for ideal switchpoint setting range for other media.

Required Accessories

Type	Description	Part No.	List Price (1-pc.)
	1/4" NPT adapter, 316 stainless steel	**E40106**	**$21.00**
	1/2" NPT adapter, 316 stainless steel	**E40107**	**$23.00**
	3/4" NPT adapter, 304 stainless steel	**U40085**	**$45.00**
	1" NPT adapter, 304 stainless steel and brass	**U40080**	**$72.00**
	G1/4 BSPP adapter, 316 stainless steel	**E40099**	**$21.00**
	G1/2 BSPP adapter, 316 stainless steel	**E40096**	**$26.00**
	Weldable adapter, carbon steel	**E40113**	**$19.00**
	Weldable adapter, 316 stainless steel	**E40124**	**$39.00**

Optional Accessories and Cordsets

Type	Description	Part No.	List Price (1-pc.)
	1/2" tee, brass	**U40029**	**$18.00**
	1/2" tee, stainless steel	**U40030**	**$66.00**
	M12 Micro DC (4-pin) 2 m, PUR	**EVC001**	**$9.95**
	M12 Micro DC (4-pin) 5 m, PUR	**EVC002**	**$13.50**
	M12 Micro DC (4-pin) 10 m, PUR	**EVC003**	**$18.00**
	M12 Micro DC (4-pin) 2 m, PUR	**EVC004**	**$9.95**
	M12 Micro DC (4-pin) 5 m, PUR	**EVC005**	**$13.50**
	M12 Micro DC (4-pin) 10 m, PUR	**EVC006**	**$18.00**
	1/2" Micro AC (5-pin) 4 m, PUR (for SI5006)	**E18026**	**$32.00**
	1/2" Micro AC (5-pin) 4 m, PUR (for SI5006)	**E18027**	**$32.00**

For additional cordsets, please call 800-441-8246 or visit www.ifm.com/us

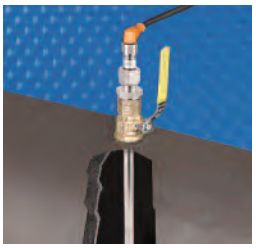
Technical Specs

Medium temperature range:	-13...176 °F (-25…80 °C)
Ideal switchpoint setting range for oils:	9…300 cm/sec
Ideal switchpoint setting range for gases:	200...800 cm/sec
Maximum temperature gradient of medium:	300 °C / min
Repeatability:	1…5 cm/sec (for water)
Hysteresis:	2…5 cm/sec (for water)
Wetted parts:	316 stainless steel, Viton™
Protection rating:	IP67

Top five product features!

- 2-piece monitoring system for remote flow indication
- Sensor connects to variety of control monitors
- Ideal for applications where mounting space is limited
- Reduced inventory via modular mounting adapter system
- High temperature model available

Direct or remote mount flow monitoring systems offer a modular solution for installation



Remote flow probe connects to a cabinet control monitor.

Field-mount monitors can be direct mounted or remote mounted.

ifm's flow monitoring system is a modular solution for direct or remote indication of fluids and gases. With no moving parts or paddles to stick or break, ifm's flow monitor provides reliable flow detection in a variety of equipment. This modular solution is ideal for environments with limited mounting space or locations that do not permit local installation of the control monitor.

Cabinet mount control monitor

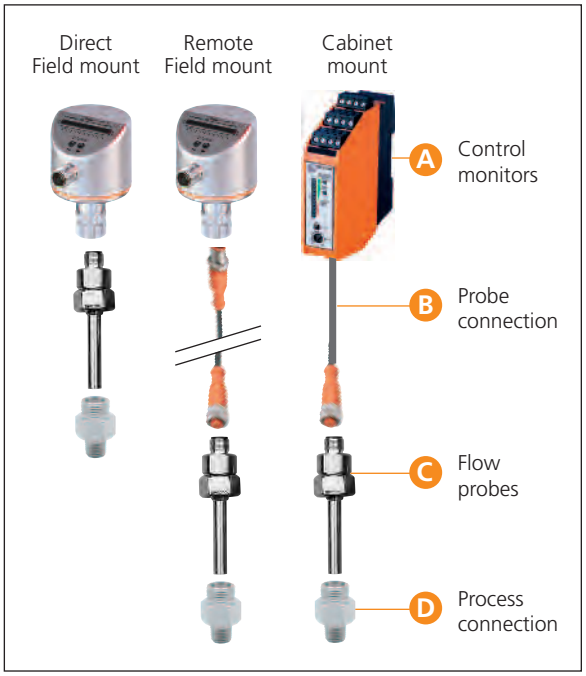
ifm's cabinet mount control monitor offers easy to access terminal connections and can be wired prior to installing inside the control cabinet. The connection to the flow probe is low voltage and does not require a conduit for protection. The control monitor's LED display provides a visual indication of flow and flow setpoint. Separate LEDs indicate temperature and wire break relay output.

Field mount control monitor

ifm's field mount control monitor connects to multiple probes and can be used directly at the application or remote mounted. The monitor features pushbutton programming and a bar graph LED display for visual operating status.

Component guide

Select a control monitor depending on your application. Next, determine an electrical connection, flow probe and process connection.



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Product + accessory selector

A Control monitors

Type	Description	Output	Power Connection	Operating Voltage	Flow / Temperature / Wire Break Monitoring	Part No.	List Price (1-pc.)
	Field mount control monitor	PNP, N.O. / N.C.	M12 Micro DC	19...36 DC	yes / no / yes	**SR5900**	**$279.00**
	Field mount control monitor	AC, relay, N.O. / N.C.	1/2" Micro AC	90…240 AC	yes / no / yes	**SR5906**	**$315.00**
	Cabinet mount control monitor	3 x SPDT relay	Combicon	24 VDC	yes / yes / yes	**SR0150**	**$395.00**
	Cabinet mount control monitor	3 x SPDT relay	Combicon	90…240 AC	yes / yes / yes	**SN0150**	**$395.00**

C Flow probes

Type	Process Connection	Probe Connection to SR590x Field Mount	Probe Connection to Sx0150 Cabinet Mount	Part No.	List Price (1-pc.)
	Requires E40106, E40107, U40085, or U40080	Connect directly for field mount or use EVC059 patchcord for remote mount	Use EVC074 cordset for remote mount	**SF5200**	**$230.00**
	6" insertion depth, requires E40174	Connect directly for field mount or use EVC059 patchcord for remote mount	Use EVC074 cordset for remote mount	**SF6200**	**$265.00**
	4" insertion depth, requires E40174	Connect directly for field mount or use EVC059 patchcord for remote mount	Use EVC074 cordset for remote mount	**SF6201**	**$252.00**
	Requires E40106, E40107, U40085, or U40080	Use E11506 connector for remote mount	Wire directly to combicon cable connector	**SF5300**	**$329.00**

D Process connection

Type	Description	Part No.	List Price (1-pc.)
	1/2" NPT adapter (SF6200 or SF6201)	**E40174**	**$62.00**
	1/4" NPT adapter (SF5200 or SF5300)	**E40106**	**$21.00**
	1/2" NPT adapter (SF5200 or SF5300)	**E40107**	**$23.00**
	3/4" NPT adapter, 304 stainless steel	**U40085**	**$45.00**
	1" NPT adapter, 304 stainless steel and brass	**U40080**	**$72.00**

B Cordsets (for power / probe connections)

Type	Description	Part No.	List Price (1-pc.)
	M12 Micro DC cordset (4-pin) 5 m, PUR (for SR5900)	**EVC004**	**$9.95**
	1/2" Micro AC cordset (5-pin), 4 m, PUR (for SR5906)	**E18027**	**$32.00**
	M12 Micro DC patchcord (5-pin), PUR (for SF 5200 or SF 6200)	**EVC059**	**$33.00**
	M12 Micro DC connector (5-pin), PA (for SF 5300)	**E11506**	**$17.00**
	M12 Micro DC cordset (5-pin) 5 m, PUR (for SF 5200 or SF 6200)	**EVC074**	**$19.00**

Technical Specs

Ideal switchpoint setting range for water:	3...60 cm/sec*
Ideal switchpoint setting range for oils:	9...180 cm/sec
Ideal switchpoint setting range for gases:	50...600 cm/sec
Medium temperature:	SF 5200 and SF 6200: -13...176 °F (-25…80 °C) SF 5300: 32...248 °F (0…120 °C)
Protection rating:	IP67 (SR0150, SN0150: IP20)

* See flow velocity/flow volume chart for water (p. 162)

For additional cordsets, please call 800-441-8246 or visit www.ifm.com/us

Top five product features!

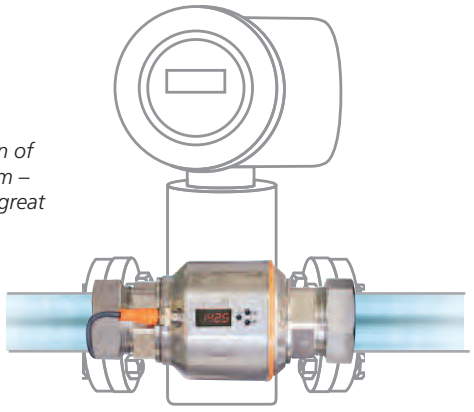
- *Magnetic inductive flow technology provides high-precision measurement of all conductive media up to 160 gpm*
- *Compact, in-line stainless steel housing fits up to 2" pipes*
- *4-digit numeric display indicates flow rate, total volume and temperature*
- *Configurable output: switching, pulse or analog (flow and temperature)*
- *No compromise in quality – high performance at a great price*

The next generation of magmeters from ifm

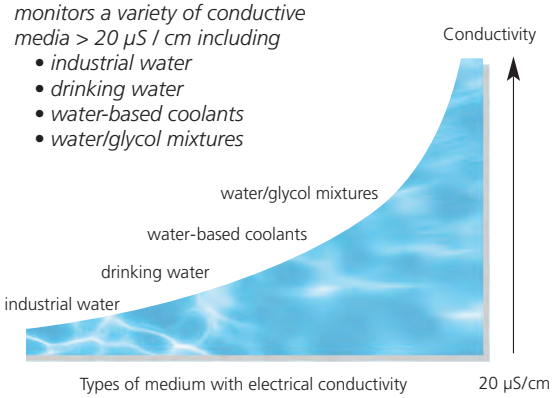
NEW! ifm's SM Series Magmeter is designed to reliably detect the flow rate of conductive media up to 160 gallons per minute. The stainless steel, mechanically-robust design mounts directly in-line providing a compact, low-profile installation for process control.

A 4-digit numeric display with pushbutton setup simultaneously indicates flow rate, fluid temperature and total volume. Simple to setup and easy to install, the SM is a reliable alternative to traditional flow meters and mechanical flow switches.

The next generation of magmeters from ifm – smaller in size at a great price/performance



The volumetric flow meter monitors a variety of conductive media > 20 µS / cm including
- *industrial water*
- *drinking water*
- *water-based coolants*
- *water/glycol mixtures*



Typical applications
- Flow and temperature monitoring through heat exchangers
- Guard welding equipment against loss of cooling water
- Batching applications
- Totalize flow of process water
- Pump run dry protection

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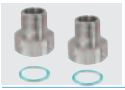
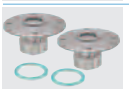
Product + accessory selector

	Measuring Range (Flow)	Output 1	Output 2	Measuring Range (Temperature)	Display Units Available	Empty Pipe Detection	Part No.	List Price (1-pc.)
	0…6.6 gpm	PNP / NPN Switching pulse (flow)	PNP / NPN Switching / 4…20 mA / 0…10V Scaleable analog (flow or temperature)	-4...176 °F	gpm, gph, gal, °F	No	**SM6001**	**$498.00**
	0…13.2 gpm						**SM7001**	**$591.00**
	0…26.4 gpm						**SM8001**	**$699.00**
	0…25 l/min	PNP / NPN Switching pulse (flow)	PNP / NPN Switching / 4…20 mA / 0…10V Scaleable analog (flow or temperature)	-20…80 °C	lpm, m³/h, L, °C	No	**SM6000**	**$498.00**
	0…50 l/min						**SM7000**	**$591.00**
	0…100 l/min						**SM8000**	**$699.00**
	0…25 l/min	4…20 mA Scaleable analog (temperature)	4…20 mA Scaleable analog (flow)	-20…80 °C	lpm, m³/h, gpm, gph, °C, °F	No	**SM6004**	**$498.00**
	0…50 l/min						**SM7004**	**$591.00**
	0…100 l/min						**SM8004**	**$699.00**
	0…80 gpm	PNP / NPN Switching / pulse / frequency (flow)	PNP / NPN Switching / 4…20 mA / 0…10V Scaleable analog (flow or temperature)	-4...176 °F	gpm, gph, gal, °F	Yes	**SM9001**	**$925.00**
	0…160 gpm						**SM2001**	**$990.00**
	0…300 l/min			-20…80 °C	lpm, m³/h, L, °C		**SM9000**	**$925.00**
	0…600 l/min						**SM2000**	**$990.00**
	0...300 l/min	4…20 mA Scaleable analog (temperature)	4…20 mA Scaleable analog (flow)	-4...176 °F	lpm, m³/h, gpm, gph, °C, °F	Yes	**SM9004**	**$925.00**
	0…600 l/min						**SM2004**	**$990.00**

Required Accessories (2 adapters per package)

Type	Description	Use With	Part No.	List Price (1-pkg.)
	1/2" NPT adapter	SM6	**E40200**	**$54.00**
	1/2" NPT adapter	SM7	**E40191**	**$54.00**
	1/2" NPT adapter	SM8	**E40192**	**$54.00**
	3/4" NPT adapter	SM8	**E40193**	**$54.00**
	1" NPT female adapter	SM8	**US0041**	**$54.00**
	1-1/2" NPT adapter	SM2 and SM9	**E40229**	**$120.00**
	2" NPT adapter	SM2 and SM9	**E40228**	**$120.00**
	2" flanges	SM2 and SM9	**US0045**	**$225.00**

Adapter material: 316 stainless steel

Cordsets

Type	Description	Part No.	List Price (1-pc.)
	M12 Micro DC (4-pin) 2 m, PUR	**EVC001**	**$9.95**
	M12 Micro DC (4-pin) 5 m, PUR	**EVC002**	**$13.50**
	M12 Micro DC (4-pin) 2 m, PUR	**EVC004**	**$9.95**
	M12 Micro DC (4-pin) 5 m, PUR	**EVC005**	**$13.50**

Technical Specs

Fluid conductivity	≥ 20 µS / cm
Fluid viscosity	≤ 70 cSt at 104 °F
Supply voltage	19…30 VDC (20…30 VDC SMxxx4)
Accuracy (flow)	± (2% measured value + 0.5% of full range)
Repeatability (flow)	± 0.2% of full range
Response time (flow)	< 150 msec
Accuracy (temperature)	± 4.5 °F (2.5 °C)
Response time (temperature)	T09 = 30 sec
Pressure rating	232 psi (16 bar)
Wetted parts	316L stainless steel, PEEK™, Viton™
Protection rating	IP67

Top five product features!

- Simultaneously monitors flow rate, fluid temperature and totals liquid volume
- Monitors water, glycol and oil up to 53 gpm
- Integrated display with pushbutton setup
- Ultrasonic sensing principle uses no moving parts
- Selectable outputs for switching, totalizer and pulse

ifm's in-line flow meter provides accurate feedback for your critical flow applications

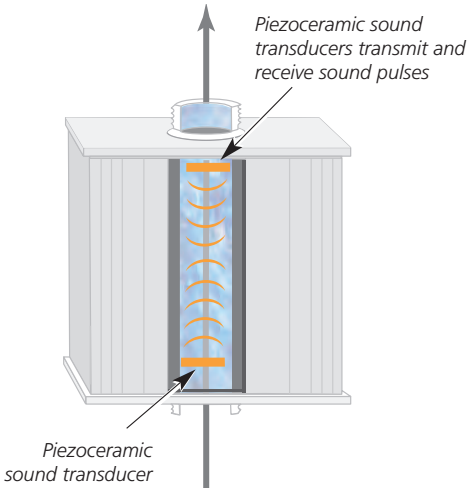
The SU Ultrasonic Flow meter is designed to simultaneously monitor flow rate, detect fluid temperature and provide a totalizer function for a variety of flow applications. With its compact design, the ultrasonic flow meter is intended for small diameter pipes – 1" or less.

The meter provides a four-digit numeric display of the liquid's flow rate (gal/min or l/min), total quantity accumulated (gallons or liters), and medium temperature (°F or °C). The setpoints are established through a simple pushbutton setup. The meter can be programmed to provide switching output (flow rate and/or temperature), pulse output (flow volume), or analog output (flow rate or temperature).

Batching applications

The ultrasonic flow meter has the capability to count the number of gallons of fluid. In addition to the totalizer display, the meter provides a pulse output for each gallon (or liter).

SU Ultrasonic Flow Meter – Principle of Operation



Ultrasonic technology is based on the differential transit time principle. Sound pulses are alternately emitted and detected with and against the direction of flow using piezoceramic sound transducers. The flow rate is calculated from the difference of the transit time.

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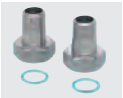
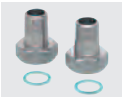
Product + accessory selector

Measuring Range (Flow)	Output 1	Output 2	Measuring Range (Temperature)	Display Units Available	Part No.	List Price (1-pc.)
0...13.2 gpm	PNP / NPN Switching pulse (flow)	PNP / NPN Switching / 4...20 mA / 0...10V Scaleable analog (flow or temperature)	14...176 °F	gpm, gph, gal, °F	**SU7001**	**$725.00**
0...26.4 gpm					**SU8001**	**$749.00**
0...53 gpm					**SU9001**	**$1,320.00**
0...50 lpm	PNP / NPN Switching pulse (flow)	PNP / NPN Switching / 4...20 mA / 0...10V Scaleable analog (flow or temperature)	-10...80 °C	lpm, m³/h, L, °C	**SU7000**	**$725.00**
0...100 lpm					**SU8000**	**$749.00**
0...200 lpm					**SU9000**	**$1,320.00**
0...200 lpm	4...20 mA Scaleable analog (temperature)	4...20 mA Scaleable analog (flow)	14...176 °F (-10...80 °C)	lpm, m³/h, gpm, gph, °C, °F	**SU9004**	**$1,320.00**

Required Accessories (2 adapters per package)

Type	Description	Use With	Part No.	List Price (1-pkg.)
	1/2" NPT adapter	SU7	**E40191**	**$54.00**
	1/2" NPT adapter	SU8	**E40192**	**$54.00**
	3/4" NPT adapter	SU8	**E40193**	**$54.00**
	1" NPT female adapter	SU8	**US0041**	**$54.00**
	1" NPT adapter	SU9	**E40206**	**$204.00**

Adapter material: 316 stainless steel

Optional Accessories and Cordsets

Type	Description	Part No.	List Price (1-pc.)
	SU mounting bracket	**E40166**	**$26.00**
	M12 Micro DC (4-pin) 2 m, PUR	**EVC001**	**$9.95**
	M12 Micro DC (4-pin) 5 m, PUR	**EVC002**	**$13.50**
	M12 Micro DC (4-pin) 10 m, PUR	**EVC003**	**$18.00**
	M12 Micro DC (4-pin) 2 m, PUR	**EVC004**	**$9.95**
	M12 Micro DC (4-pin) 5 m, PUR	**EVC005**	**$13.50**
	M12 Micro DC (4-pin) 10 m, PUR	**EVC006**	**$18.00**

Can't find the right sensor for your application, call 800-441-8246 or visit www.ifm.com/us

Technical Specs

Supply voltage:	19...30 VDC
Maximum load current:	2 x 250 mA
Accuracy (flow):	SU7, SU8, SU9: ±3% of measured value + 0.2% of full range (water) SU7 and SU8: ±5% of measured value + 0.5% of full range (oil and glycol) SU9: ±8% of measured value + 0.5% of full range (oil and glycol)
Repeatability (flow):	SU7, SU8: 0.2% of full range SU9: 0.5% of full range
Response time (flow):	< 0.25 sec
Load resistance for analog output:	4...20 mA: max 500Ω / 0...10V: min. 2,000Ω
Pressure rating:	232 psi (16 bar)
Wetted parts:	Stainless steel (316L); Viton™; PES (Ultrason 2010); Centellen 200
Protection rating:	IP67