

# Ameritrol Inc.

Manufacturer of Industrial Instrumentation

## ELECTRONIC FLOW SWITCHES

### Features

- No Moving Parts
- Operates in Liquids, Gases and Slurries
- Can Detect Increase or Decrease of Flow
- 316L Stainless Steel Sensor
- Low Cost, Designed for Industrial OEM and End Users



### Applications

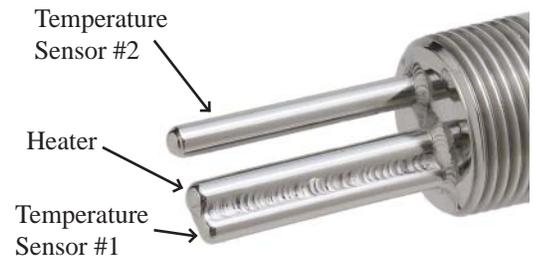
- Low Flow Shut Down of Pumps
- Flow Indication/Verification
- Pump or Valve Seal Leakage
- Bearing Lubrication Flow Sensor
- HVAC Flow Monitor
- Safety Shower Flow Switch

### FM Series

The FM series is designed to provide an extremely reliable flow switch at a very cost effective price. This series replaces the standard explosion proof enclosure utilized in our FX series with a general purpose enclosure.

The principle of operation measures a temperature differential between a heated and a reference temperature sensor (see figure 1). The differential varies as flow across the sensor changes. This allows the flow switch to detect the increase or decrease of flow of virtually all liquids, gases and slurries. Flow ranges are shown on the next page of this brochure in the set-point range chart. A conversion chart is also provided to convert volumetric flow to velocity.

The electronics feature a SPDT relay switch output with options for power input of 120 VAC, 12VDC, and 24 VDC or VAC. Calibration is easily performed by adjusting a potentiometer on the circuit board.



Temperature Differential = Temperature Sensor #1 Minus Temperature Sensor #2

### Part Number/Order Entry Specification

	<b>FM -</b>				-	<b>Option</b>		
Process Connection	1/2" MNPT	0	5	0	0	S	HIGH FLOW OPTION- CLEAN LIQUIDS/GASES, 1" MNPT ONLY	
	3/4" MNPT	0	7	5	0			
	1" MNPT	1	0	0	0			
Power Input	12 VDC (+30%, -10%)				B	Probe Length		
	117 VAC (90-135 VAC)				C			
	24 VDC or VAC (± 10%)				D			
		0	1	1.2" PROBE				
		0	2	1.8" PROBE				
				SPECIAL PROBE LENGTH, SPECIFY LENGTH IN INCHES				

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# Optional Calibrator

## Flow Switch Calibrator Model MC-5

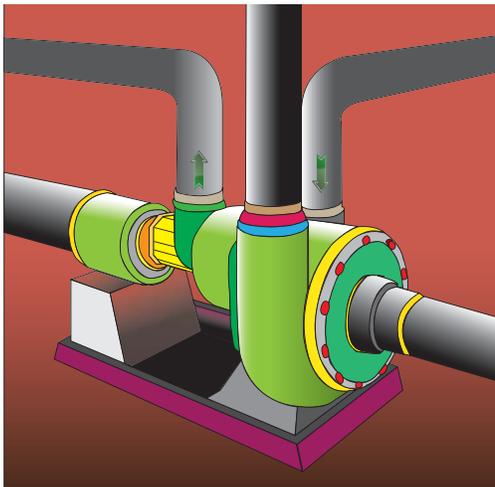
- Displays mV output which is proportional to flow
- Induces signal to electronics for setting specified switch point
- Allows periodic switch point verification

This tool is not needed for a vast majority of users. It is useful when a user has large quantity of units and requires periodic verification of switch point calibrations.

This easy to use hand held, self powered instrument can be used in conjunction with all single or dual switch point circuit boards. By simply plugging this instrument into the circuit board, the user can interrogate all functions of the flow switch.

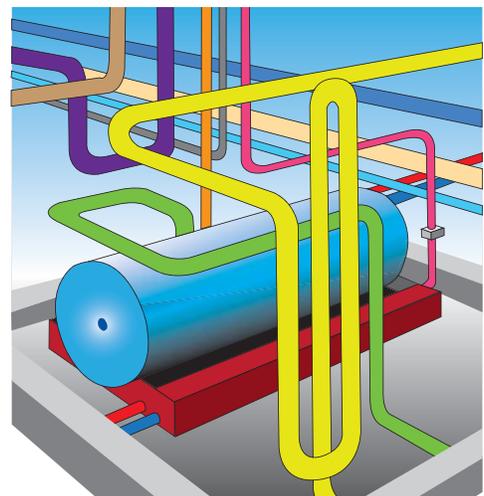


## Flow Switch Applications

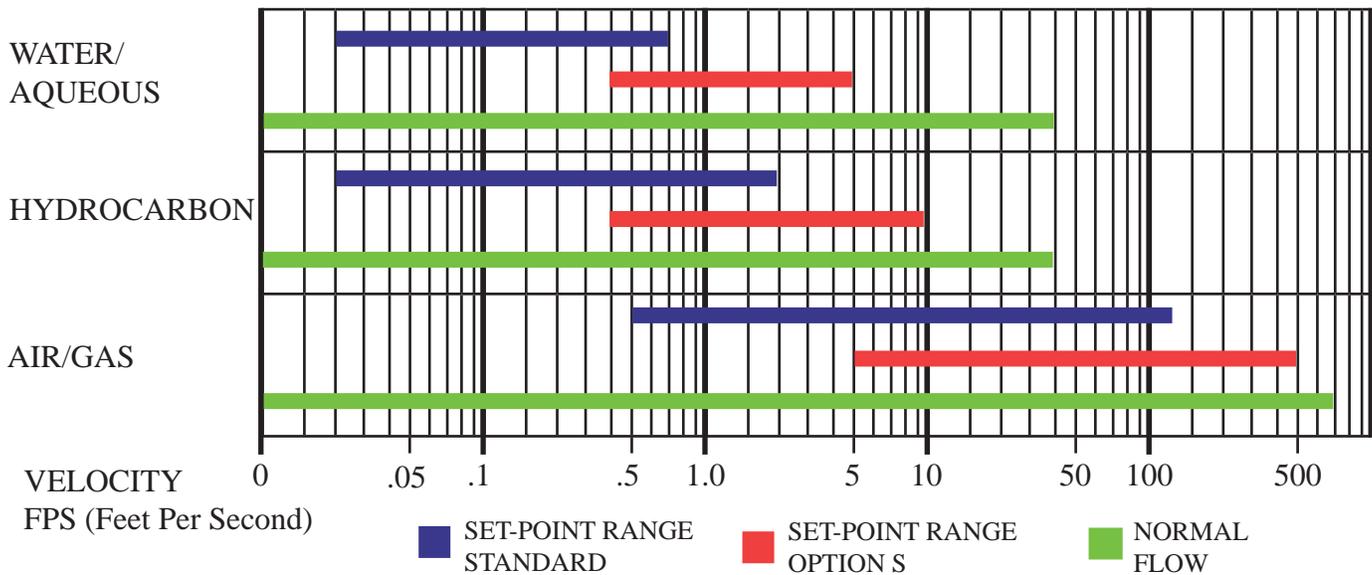


- Pump Protection: Automatic shut down on low or no flow
- Bearing Lubrication: Detects loss of lubricant flow
- Seal Leakage: Verifies positive seal flow or detects excessive leakage indicating maintenance requirement
- Chemical Feed and Metering Pumps: Indicates low or no flow of chemical additives to process
- Safety Shower/Eye Wash Station: Automatic annunciation of potential danger to plant personnel
- Analyzer/ Gas Chromatographs: Confirms continuous sample flow to instruments
- Control Rooms: Verifies flow when fans, pumps or valves are energized

- Purge Air: Detects loss of flow for process or plant safety
- Spray Nozzles: Detects nozzle blockage in coating applications
- Relief Valve/Rupture Disks: Alarms on flow or leakage of safety relief valves or rupture disks
- Chiller Lines: Automatic shut down of chillers on low or no flow
- Heater Burnout Prevention: Heater shutdown on loss of flow to prevent overheating of elements
- Tank Car Loading: Senses dry line or phase change from liquid to nitrogen gas flow
- Drain Line Sensor: Capable of detecting flow in partially filled lines
- Agitation Monitor: Positive indication of agitation in tanks



# Flow Switch Set-Point Range



## Conversion Table

Volumetric (GPM or CFM) to Velocity (Feet per Second - FPS)

Line Size	1/8"	1/4"	3/8"	1/2"	3/4"	1"	1.25"	1.5"	2"	2.5"	3"	3.5"	4"	5"	6"
Liquid Multiplier	5.65	3.08	1.68	1.06	.602	.371	.215	.158	.096	.067	.0434	.0325	.0252	.0160	.0111
Air Multiplier	42.19	23.06	12.57	7.91	4.50	2.78	1.61	1.18	.716	.502	.325	.243	.188	.120	.083

Line Size	8"	10"	12"	14"	16"	18"	20"	24"
Liquid Multiplier	.0064	.00407	.00287	.00237	.00182	.00143	.00115	.000798
Air Multiplier	.0480	.0304	.0209	.0177	.0136	.0107	.00863	.00597

### Examples:

- 1) 100 CFM in 3" Line = 100 x .325 = 32.5 FPS
- 2) 10 GPM in 3" Line = 10 x .0434 = .434 FPS

## Specifications

### Sensor Head

Material of Construction: 316L Stainless Steel Standard

Operating Temperature: -50 to +250F (-46 to +121C)

Operating Pressure: Vacuum to 4000 PSIG (275 Bar)

Response Time: From 3 Seconds

Repeatability ± 0.5% of Range at Constant Conditions

Process Connection: 3/4" MNPT, 1" MNPT, Option 1/2" MNPT

Probe Length: 1.8", 1.2" Option Customer Specified

### Electronics

Housing: Powder Coated General Purpose

Temperature: -50 to +150F (-46 to +65C)

Power Input: 90-135 VAC, 50/60 Hz, 4 Watts  
Option 12 VDC, 24 VDC/VAC

Relay Output: SPDT 2 Amps Resistive

Electrical Connection: 1" FNPT

Shipping Weight: 4 lbs

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