M-50X Series

Explosion proof flow switch
with in-line flow

malema sensors

www.malema.com

Features

- Well suited for corrosive and non-corrosive gases or liquids
- UL recognized for hazardous locations
- ISSep certied for intrinsic safety and encapsulation
- Community Europe compliant
- Universal mounting available

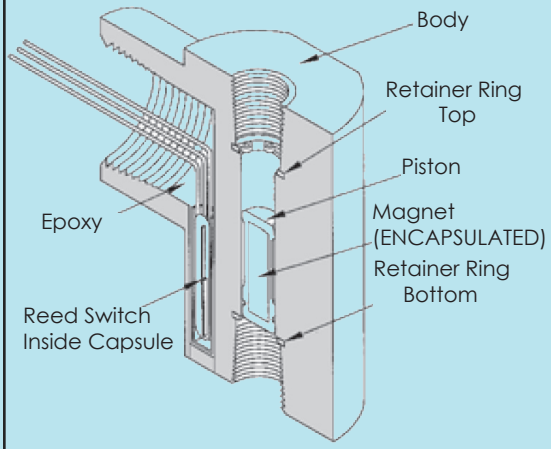
Application

- Gas chromatographs
- Hazardous fluid systems
- Sewage systems
- Leak detection
- Sample lines

The M-50X Explosion Proof Series low flow monitors increasing and decreasing flow. it utilizes a single moving part which responds to fluid (liquid or gas) flowing within a system. This switch is suitable for a wide range of applications in industrial, biomedical, and OEM products. The flow monitors operate only when fluid flow is positively established.

Operation

The operating principle is based on a free floating magnetic piston which responds only to the motion of fluids within the line, not to static or system pressures. In the presence of fluid flow, controlled movement of the piston actuates an external hermetically sealed Reed switch thus producing the required signal. This signal can be used to actuate audible or visual alarms as well as relays, or other controls. Piston travel is short which ensures low hysteresis. Pressure drop across flow switch varies from 0.035 to 2 psi (at maximum flow rates of air and liquid). Universal mounted units are fitted with a spring which resets the piston. The spring is held in place using an orifice disc.



Illustrated is the M-50X Model with 1/8" ports.

Custom Versions Available

Malema welcomes the opportunity to apply its flow sensor experience to work for its customers. Please contact the factory for any special requirements; such as ports, extreme temperature and pressure capabilities, etc.

Calibration Range *

Air: 50 - 5,000 NmLPM
Water: 1 - 170 mLPM

* For lower and higher trip points contact factory. Maximum flows through switch are higher.

Material Versions *

- 316 Stainless Steel

* Other materials available on request; only the 316 SS is ISSep Certied.

Specifications

Set Point Accuracy: ±10% maximum
Repeatability: ±2%
Hysteresis: 15%

Port Size

M-50

- 1/8" FNPT
- 1/4" FNPT

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Design Considerations/Construction

The M-50X Series comprises a Body, Piston, and Retaining Rings. Selecting a Flow Switch begins with selecting the body; this series is available in 316 Stainless Steel, Monel 400, or Hastelloy 276. The M-50X Series contains one moving part (i .e. the piston) and two retaining rings that are in the fluid path. Construction of the piston is important from a design perspective. We manufacture three types of pistons (it is critical to select the correct piston for your application): 316 Stainless Steel, PTFE Encapsulated, and Special All-Metal piston.

(1) The standard piston is a 316 Stainless Steel piston with epoxy to hold the magnet in place. This piston is recommended for non-aggressive fluids and inert gases. Stainless Steel retaining rings are typically used with this piston type.

(2) The second version piston that is available is a PTFE Encapsulated one. This piston is a magnet that has PTFE molded around it and then machined to the appropriate conguration. These pistons are primarily used in PTFE flow switches and also in other flow switch bodies (typically 316SS and Acrylic bodies) where customers prefer a piston that does not have epoxy in the fluid path; as well as a piston that is impervious to aggressive fluids and gases. This piston is highly recommended for medical applications. Hysteresis on these pistons does tend to be slightly higher (10 to 15%) than metal pistons due to frictional effects, weight, and surface adhesion considerations. Prior to selecting this piston, fluid temperatures and fluid compatibility with PTFE must be taken into account because certain aggressive chemicals at specic temperatures tend to swell PTFE causing the piston to change shape resulting in failure of the product. Stainless or Teon retaining rings can be used with this piston.

(3) The third version piston that is available is a Special All-Metal piston with no epoxy (only available in 316SS). This piston is fabricated in a proprietary process with only one weld seam (leak tested) which presents an all 316SS surface to the fluid path This piston is recommended for those applications where the piston could experience a lot of cycling wear. This piston has been tested to 250,000 cycles at 125 psi. Stainless Steel retaining rings are recommended for this piston type.

Standard Specifications by Materials

Housing	316SS
Piston*	316SS*
Orifice Plate or Disc (only in universal Mounting version)	316SS
Spring	Stainless Steel
Retaining Rings*	Stainless Steel
Pressure & Temperature Specification Maximum Operating Pressure (PSIG) Burst (PSIG) Maximum Operating Temperature	 3,000 5,000 149°C/300°F
Reed Switch Data (Electrical Ratings) Reed Switch Switching Voltage Breakdown Voltage DC Resistive AC Resistive Switching Current Carrying Current	 3 Watts SPDT (Hermetically Sealed) UL Recognized. File E47258. Operating Temperature -40°C to 125°C 170 V DC 200 V DC 3 Watts 0.25 A 0.50 A
Lead Wires	No 24 to 18 AWG. 18" Length, Polymeric UL Recognized
Lead Wires Color	Green - Common, Yellow - Normally Closed, Orange - Normally Open
Flow Calibration Set Point Accuracy Set Point Differential (Deadband) Repeatability	(Higher accuracy units available) 10% maximum 15% ± 2% maximum

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Reed Switch Ratings as Recognized by UL

SPDT	120 V AC 10 V DC 24 V DC	0.1 A general purpose 0.25 A resistive 0.1 A resistive

Installation & Maintenance

The standard switch has to be mounted vertically in the position shown on the previous page for normally open conditions or for normally closed conditions (to convert from normally open to normally closed, use yellow and green leads instead of orange and green). Universal units can be mounted horizontally or vertically. Please advise mounting orientation while ordering, so that the factory can calibrate in the required orientation as calibration does change when changing orientation (i.e. if a universal mounted unit is required, however inlet is downward). Adequate filtration and sealing procedures should be used when mounting in flow lines. For detailed directions, please refer to our "Installation and Maintenance " sheet.

Certications

- The M-50X in 316 Stainless Steel is UL and Canadian UL Recognized for use in Class I (Groups A, B, C & D) and Class II (Groups E, F & G), all divisions, hazardous locations. File E153446.
- The M-50X in Stainless Steel, Hastelloy C276(if available) and Monel (if available) are ISSeP approved as follows:

Intrinsic safety-

II 1 G D Ex ia IIC T6-T5

II 1 G D Ex iaD 20 IP65 T95°C

Via ISSeP certicate number : ISSeP08ATEXxxxX

Encapsulation-

II 2 G D Ex mb II T6-T5

II 2 G D Ex mbD 21 IP65 T95°C

Via ISSeP certicate number : ISSeP08ATEXxxxX

The temperature class is T6 for ambient temperature up to +60°C and T5 for ambient temperature up to +75°C. The list of used standards are as indicated below.

- Ex i : IEC 60079-0 : 2004
  IEC 60079-11 : 2006
  IEC 60079-26 : 2004
  IEC 61241-0 : 2004
  IEC 61241-11 : 2005

- Ex i : IEC 60079-0 : 2004
  IEC 60079-18 : 2004
  IEC 61241-0 : 2004
  IEC 61241-18 : 2004

Meet the intent of Directive 89/336/EEC for Electromagnetic Compatibility and Low Voltage Directive 73/23/EEC for Product Safety. Compliance was demonstrated to the following specications as listed in the Official Journal of the European Communities: EMC Directive 89/336/EEC: EN 55011, Class B Radiated Emissions, EN 50082-1 (Immunity): IEC 801-2, Electrostatic Discharge Immunity, IEC 801-3, RF Electromagnetic Field Immunity; Low Voltage Directive 73/23/EEC: EN 61010-1, Safety Requirements for electrical equipment for measurement, control, and laboratory use.

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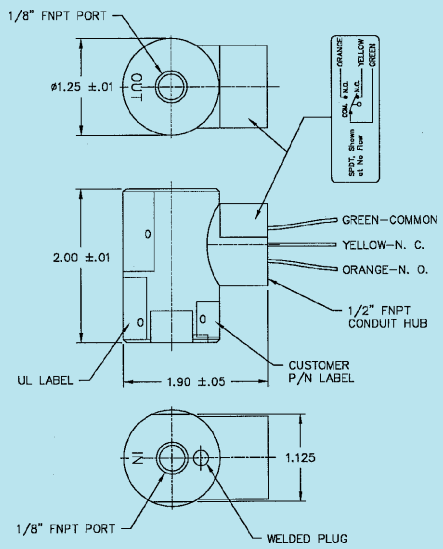
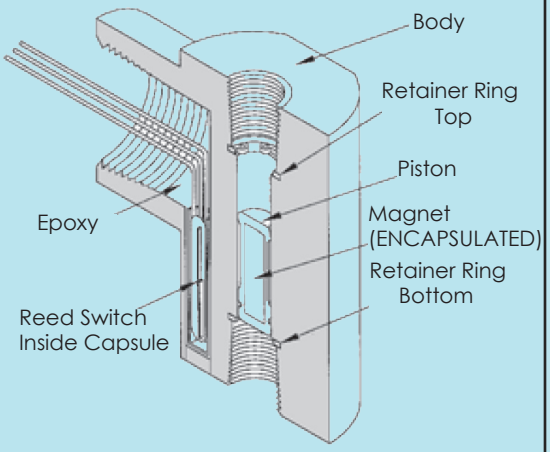
Dimensional and Cut-Away Drawings

Illustrated is the M-50X Model with 1/8" ports.



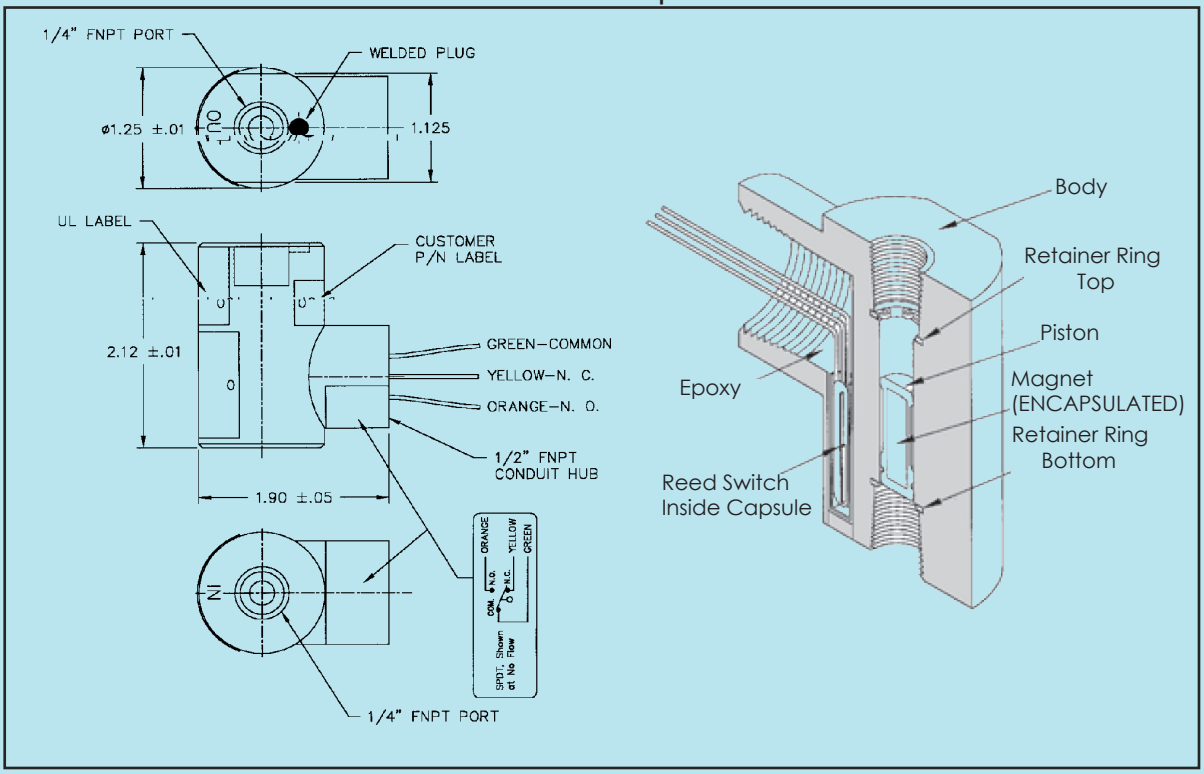


Cv at typical set point

	Water mLPM	Air NmLPM	Cv
M-50X	3	100	0.0031
	18	500	0.0153
	50	1,500	0.034
	85	2,500	0.050

Dimensional and Cut-Away Drawings

Illustrated is the M-50X Model with 1/4" ports.



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Fixed Flow Setting Information

This model is a FIXED flow switch. The flow set point is fixed at the factory and is NOT field adjustable. Proper calibration of the set point requires the following information. When purchasing a flow switch, use the "Set Point Calibration " form on page i-vi or provide this information on the purchase order.

- Calibration set point,
- Increasing or decreasing flow,
- Fluid type (i.e. liquid or gas),
- Density or specific gravity,
- Viscosity,
- System pressure and temperature,
- Flow direction (i.e. upward or downward), and
- Mounting orientation (i.e. horizontal or vertical).

Ordering Information

Standard Part Numbering							Options		
M	-	Model	-	Material	Port	Switch	-	Mounting	Piston
M	-	50X	-	S	1	3	-	0	0
		50X		S316 Stainless Steel	1 - 1/8" 2-1/4"	3 - SPDT		0 - Standard (Vertical) 1-Universal Mounting (with disc and spring)	0 - Standard (316SS with epoxy) 1 - PTFE encapsulated 2 - All-316 SS (no epoxy)

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