

M-50/55 Series

Fixed Set Point Inline Flow Switch



malema sensors
M-50-T13-00
FLOW SWITCH
Set at 170 cc/min Water
120Vac, 0.1A
Cocoa Raton, FL USA (800) 637-6411



Where Innovation Flows



The M-50/55 Fixed Set Point Flow Switches monitor increasing and decreasing flow. They utilize a single moving part which responds to fluid (liquid or gas) flowing within a system. These switches are suitable for a wide range of applications in industrial, biomedical, and OEM products. The flow switches operate only when fluid flow is positively established. The M-50 Flow Switch features two port size options (1/8" or 1/4") and has a flow range up to 170 CCM (0.04 GPM) for water and 5,000 SCCM for air.* While the 1/8" port sized M-55 Flow Switch features a flow range up to 750 CCM (0.19 GPM) for water and 25 SLPM for air*. M-50/55 Flow Switches have configurations available for single-pole, single-throw (SPST) or single-pole, dual-throw (SPDT) allowing for flexibility with different outputs for both the high and low set point. All Malema Fixed Set Point Flow Switches can have their own customized set points calibrated at the factory before shipping. Additionally, Malema offers pre-calibrated set point ranges for applications that do not require a custom calibrated range.

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 control. Piston travel is short which insures low hysteresis. Universal mounted units are built with a spring which resets the piston.

Applications

- Pure water control for sample stations
- Laser equipment
- Pollution sampling equipment

Key Features

- Very accurate custom flow settings
- For corrosive and non-corrosive liquids or gases
- All-PTFE switch is also available
- Senses increasing or decreasing flow
- Hermetically sealed
- Universal mounting option is also available
- Available in acrylic, anodized aluminum, brass, polypropylene (contact factory for details), PTFE and stainless steel materials of construction
- Extremely high level of accuracy within 10% of the desired set point for fixed set point models, and repeatability of 5% for all models of Malema Flow Switches.
- Female NPT standard on flow switches providing small, compact design.



M-50 in PTFE

- All Malema Fixed Set Point Flow Switches can have their own customized set points calibrated at the factory before shipping.
- Standard pre-calibrated set point ranges on Malema Flow Switches are also available for immediate use and distribution
- Malema application engineers are available for consultations to provide the best possible flow switch options and materials of construction to ensure compatibility.
- Configurations available for single-pole, single-throw (SPST) or single-pole, dual-throw (SPDT) allowing for flexibility

* With applications featuring gases, ranges may vary.

Measurement Specifications

| | | | | | | | |
|---------------------|--|------|------|-------------|-------------|-------------|--|
| Calibration Range * | <p>Model M-50: Air: 50 - 5,000 scc/m Water: 1 -170 cc/m</p> <p>Model M-55: Air: 5,000 - 25,000 scc/m Water: 170 - 750 cc/m</p> <p>* For lower and higher trip points contact factory. Maximum flows through switch are higher.</p> | | | | | | |
| Set Point Accuracy | ±10% maximum | | | | | | |
| Repeatability | ± 5% maximum | | | | | | |
| Hysteresis | 15% - 30% | | | | | | |
| Material Versions | <ul style="list-style-type: none"> • 316 Stainless Steel • Acrylic • Anodized Aluminum • Brass • Polypropylene* • PTFE <p>* Polypropylene material available on certain port sizes. Contact factory for more information..</p> | | | | | | |
| Port Sizes | <table border="0"> <tr> <td>M-50</td> <td>M-55</td> </tr> <tr> <td>• 1/8" FNPT</td> <td>• 1/8" FNPT</td> </tr> <tr> <td>• 1/4" FNPT</td> <td></td> </tr> </table> | M-50 | M-55 | • 1/8" FNPT | • 1/8" FNPT | • 1/4" FNPT | |
| M-50 | M-55 | | | | | | |
| • 1/8" FNPT | • 1/8" FNPT | | | | | | |
| • 1/4" FNPT | | | | | | | |

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, material, extreme temperature and pressure capabilities, etc.

Design Considerations/Construction

The M-50/55 Series comprises a Body, Piston, and Retaining Rings. Selecting a Flow Switch begins with selecting the body. This 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 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 configuration. 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 specific temperatures tend to swell PTFE causing the piston to change shape resulting in failure of the product. Stainless or PTFE retaining rings can be used with this piston.

(3) The third 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. Stainless Steel retaining rings are recommended for this piston type for low pressure applications and an orifice disc is recommended for high pressure (125 psi) applications.

Installation & Maintenance

The standard switch has to be mounted vertically in the position shown above for normally open conditions and inverted position for normally closed conditions. When inverted, the switch set-point will change by $\pm 5\%$; please use the product in the orientation it was calibrated (as indicated by reading the label). 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 slightly when changing orientation. Adequate filtration and sealing procedures should be used when mounting in flow lines. For detailed directions, please refer to our instruction manual.

Certifications



UL and Canadian UL

UL and Canadian UL Recognized for ordinary locations. File E138467



CE Compliance

As per LVD Directive

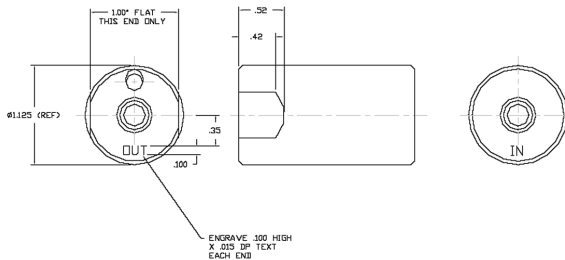
Cv at typical set points

| | Water | Air | Typical Cv * | | Water | Air | Typical Cv * |
|------|-------|-------|--------------|------|-------|--------|--------------|
| | cc/m | scc/m | | | cc/m | scc/m | |
| M-50 | 03 | 100 | 0.0031 | M-55 | 250 | 7,500 | 0.145 |
| | 18 | 500 | 0.0153 | | 350 | 10,000 | 0.182 |
| | 50 | 1,500 | 0.034 | | 500 | 15,000 | 0.211 |
| | 85 | 2,500 | 0.050 | | 600 | 20,000 | 0.238 |

* Consult factory for additional pressure drop details

Dimensional Drawings

Illustrated is the M-50/55 Model with 1/8" ports.



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 additional information. Typical application details required before purchasing the product are:

- 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)
- Mounting orientation (i.e. horizontal or vertical)

Ordering Information

| Standard Part Numbering | | | | | | | Options | | |
|-------------------------|---|----------|---|---|-------------------------|---|---------|--|--|
| M | - | Model | - | Material | Port | Switch | - | Mounting | Piston |
| - | - | 50 | - | S | 1 | 1 | - | 0 | 0 |
| | | 50 55 | | A - Aluminum B - Brass P - Acrylic S - 316 Stainless T - PTFE | 1 - 1/8" 2 - 1/4"*** | 1 - SPST N.O. 2 - SPST N.C. 3 - SPDT 4 - DS (Two SPST) | | 0 - Standard (Vertical) 1 - Universal Mounting (with disc and spring) | 0 - Standard* (316SS with epoxy) 1 - PTFE encapsulated 2 - All-316 SS (no epoxy) |

* The standard piston on the PTFE version is PTFE encapsulated.

NOTE: Specifications are subject to change without notice.

** 1/4" option available only with M-55 model.

Standard Specifications by Materials

| Housing | Acrylic | Anodized Aluminum | Brass | 316 Stainless Steel | PTFE | Polypropylene |
|--|---|-------------------|---------------|---------------------|---------------|--------------------|
| Piston* | 316SS | 316SS | 316SS | 316SS | PTFE | |
| Orifice Plate or Disc | Stainless Steel | | | | PTFE | |
| Spring | Stainless Steel | | | | N/A | |
| Retaining Rings* | Stainless Steel (PH 15-7 MO, AMS 5520, AISI-632) (Passivated) | | | | PTFE | |
| Pressure & Temperature Maximum Operating (psig) | 200 | 1,000 | 1,500 | 3,000 | 80 | |
| Burst (psig) | 400 | 2,000 | 3,000 | 5,000 | 160 | |
| Maximum Operating Temperature | 77°C (170°F) | 149°C (300°F) | 149°C (300°F) | 149°C (300°F) | 104°C (220°F) | |
| Reed Switch Data (Electrical Ratings) Reed Switch | 10 Watts SPST or 3 Watts SPDT (Hermetically Sealed) UL Recognized. File E47258. Operating Temperature -40°C to 125°C | | | | | Consult Factory |
| Switching Voltage | 200 VDC (170 VDC for SPDT) | | | | | |
| Breakdown Voltage | 250 VDC (200 VDC for SPDT) | | | | | |
| DC Resistive | 10 Watts (3 Watts for SPDT) | | | | | |
| AC Resistive | 10 VA (3VA for SPDT) | | | | | |
| Switching Current | 0.5 A (0.25 A for SPDT) 1.2 A (0.5A for SPDT) | | | | | |
| Lead Wires | No 24 to 18 AWG. 18" Length, Polymeric UL Recognized (Belden cable or specialshielded cable is available) | | | | | |
| Lead Wires Color | SPST: 2 Blue wires; SPDT: Green - Common, Yellow - Normally Closed, Orange - Normally Open | | | | | |
| Flow Calibration | (Higher accuracy units available) | | | | | |
| Set Point Accuracy | ± 10% maximum | | | | | |
| Hysteresis (Deadband) | 15% - 30% | | | | | |
| Repeatability | ± 5% maximum | | | | | |

* See "Design Considerations/Construction" above

Reed Switch Ratings as Recognized by UL

| | | |
|------|--------------------------------|---|
| SPST | 120 V ac 24 V dc 50V dc | 0.1 A general purpose 0.25 A resistive 0.25 A resistive |
| SPDT | 120 V ac 10 V dc 24 V dc | 0.1 A general purpose 0.25 A resistive 0.1 A resistive |



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