

INSTALLATION PROCEDURE AND MAINTENANCE BULLETIN FOR MALEMA'S FLOW SWITCHES

SERIES M-100 AND M-100-X ADJUSTABLE FLOW SWITCH (EXPLOSION PROOF MODEL)

SPECIFICATIONS by materials

CONSTRUCTION MATERIALS							
HOUSING	ACRYLIC	ALUMINIUM	BRASS	316SS	TEFLON	MONEL 400/ INCONEL 600	HASTELLOY 276
PISTON * SEE NOTE BELOW	N/A	N/A	Brass, 316SS or Teflon	316SS or Teflon	Teflon	Monel 400/ Inconel 600	Hastelloy 276
PISTON EPOXY (SEE TABLE B)	SUITED TO MEET CUSTOMER'S APPLICATION						
O RINGS (KALREZ ON REQUEST)	N/A	N/A	Viton or Buna	Viton	Viton & Teflon	Viton	Viton
REED SWITCH	10 WATTS SPST OR SPDT (HERMETICALLY SEALED) UL RECOGNIZED						
REED SWITCH OPERATING TEMP.	-40 TO +125 DEGREES CELSIUS						
ELECTRICAL DATA	TABLE B						
SWITCHING VOLTAGE (VDC)	200 (175 for SPDT)		TYPES	EPOXY USED IN PISTON			
BREAKDOWN VOLTAGE (VDC)	250 (200 for SPDT)		CR	CORROSION RESISTANT			
DC RESISTIVE	10 WATTS (3 WATTS FOR SPDT)		HT	HIGH TEMPERATURE			
AC RESISTIVE	10 VA		CL	WITHSTAND CHLORINATED SOLUTIONS			
SWITCHING CURRENT	0.5 A (0.25 FOR SPDT)		ST	STANDARD EPOXY			
CARRYING CURRENT	1.2 A		** OPTIONAL UPGRADED DESIGN OFFERS 10,000 PSI				
LAMP	DERATE BY 2/3						
LEAD WIRES	NO 24 TO 18 AWG. 18" LENGTH. POLYMERIC UL RECOGNIZED (LONGER LENGTHS AVAILABLE ON REQUEST)						
LEAD WIRES COLOR CODING FOR SPDT:	GREEN - COMMON, YELLOW - NORMALLY CLOSED, ORANGE - NORMALLY OPEN						
FLOW CALIBRATION							
SET POINT ACCURACY	± 10% MAX						
SET POINT DIFFERENTIAL (DEAD BAND)	10% ± 5%						
REPEATABILITY	± 1%						
MAX. OPERATING PRESSURE - PSIG	N/A	N/A	1500	3000	80	5,000	5,000
BURST PRESSURE - PSIG	N/A	N/A	3000	5000**	160	10,000	10,000
MAX. OPERATING TEMP	N/A	N/A	300° F	300° F	300° F	350° F	350° F
	N/A	N/A	149° C	149° C	149° C	175° C	175° C

FLOW SETTINGS

■ Calibration

Range: Air 100* - 20,000 scc/min. at STP Air 200 to 60,000 scc/min at 60 psi
Water 3 to 1450 cc/min.

* Lower flow settings as low as 25 cc/min. Air available on request (Dead band will increase for lower flow settings).

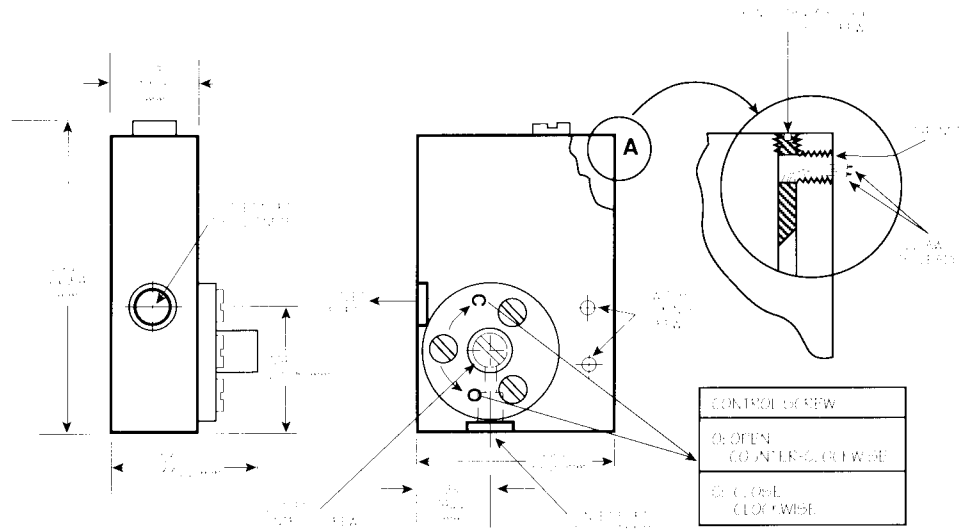
NOTE: * Teflon switches have completely teflon encapsulated pistons.

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INSTALLATION

Flow switch is mounted as shown in the photograph on page 3 (vertically). Models suitable for **universal mounting positions** are available on request. Adequate filtration and sealing procedures should be used when mounting in flow lines. To insure protection of **malema** flow switches from moisture penetration of lead wires, a suitable connector or adapter fitted to a sealed electrical conduit should be used.



Mounting holes may be drilled if needed as shown in fig. 1 on Page 3b.

DIMENSIONS IN INCHES & MILLIMETERS

ADJUSTMENT PROCEDURE TO SET ACTUATION POINT*

(These switches must be set with a flow meter. Factory will set your switch on request)

- a. For increasing flow.
 1. Turn adjustment screw (see diagram above) counter clockwise to full open
 2. Establish flow through the switch at nominal flow rate desired by setting the flowmeter to flow rate desired.
 3. Turn adjustment screw clockwise gradually until switch activates
 4. Verification: Turn off/reduce flow through flow switch and re-establish flow to verify that the flow switch is switching at the desired flow rate. The adjustment screw may need to be adjusted very slightly clockwise or counter clockwise to achieve greater accuracy in the setting.
- b. For decreasing flow.
 - Repeat steps 1 to 4.
 5. Turn adjustment screw counter-clockwise until switch deactivates.

SPST vs SPDT

The standard unit is provided with a **SPST NO.** (N.O. = Normally open at rest) dry reed switch. Increasing flow past point will close (activate) the switch. Decreasing flow will open (de-activate) the switch.

SPST N.C. (N.C. = normally closed at rest) models are closed at rest. Increasing flow pass set point opens the switch.

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and decreasing flow to set point will close the switch (**Typically used to detect loss of flow condition in overall systems**)

SPDT (Single Pole Double Throw) switches have both N.O. & N.C. configurations by using a common pole along with two additional poles to achieve this dual capability.

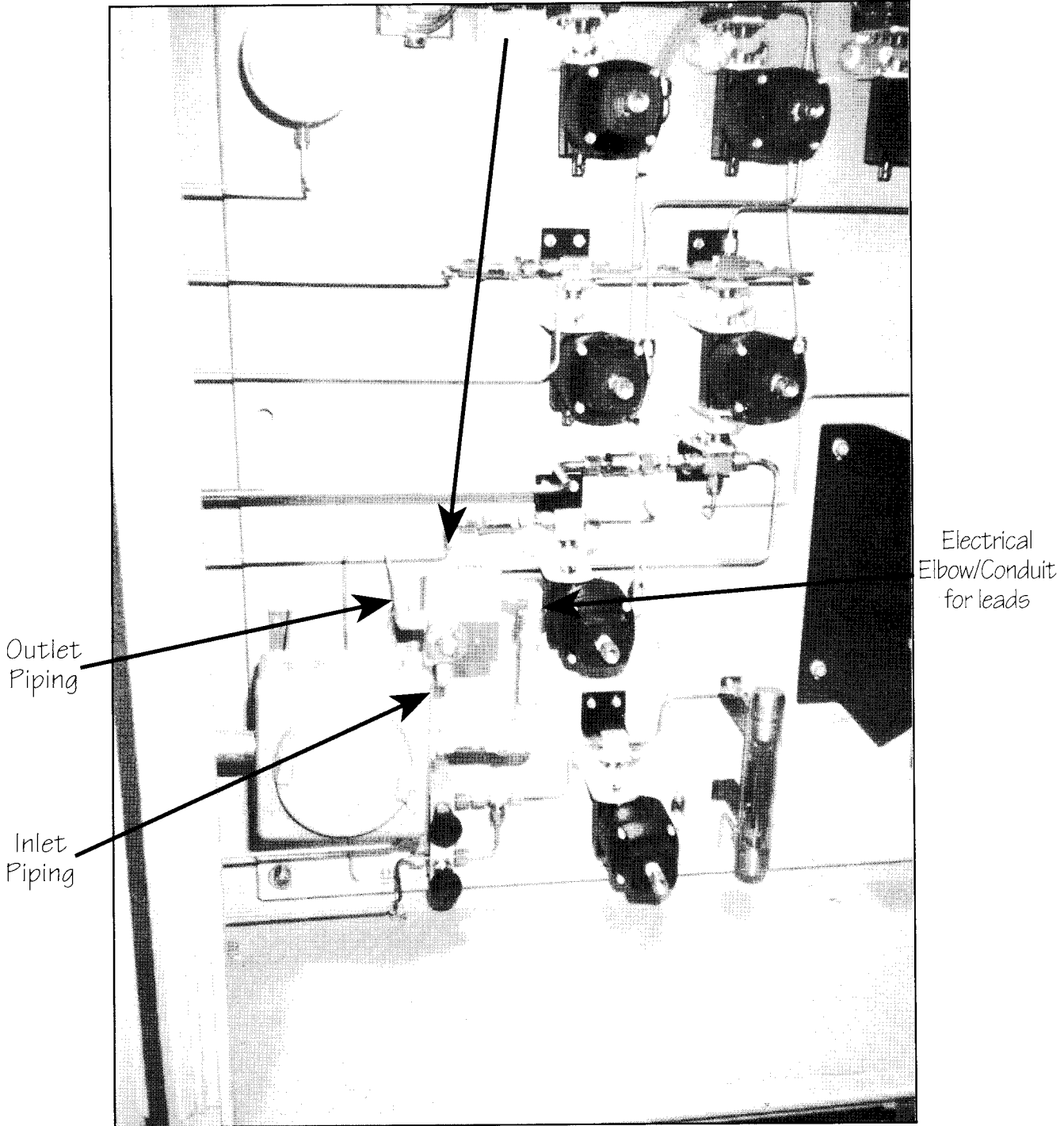
CONVERSION FROM N.O. (NORMALLY OPEN) TO N.C. (NORMALLY CLOSED)

1. Loosen allen set screws (4-40) on face of body. These are the set screws holding the reed switch in place.
2. Move the reed switch downwards until it shows a closed contact on the multi-meter.
3. Tighten 4-40 allen set screws on face of body.
4. Cycle unit on and off by turning upside down to simulate flow. This may necessitate some refinement of the exact location of the reed switch as determined in step 2.

PRECAUTIONS DURING INSTALLATION

1. Avoid any foreign particles during installation.
2. Large metallic and/or magnetic fields may affect the principle of operation of these units. If disturbance is detected, magnetic shielding may be necessary to ensure correct operation of the flow switch.
3. During installation for Explosion Proof Versions carefully screw in the conduit connector for the electrical leads piping so as to avoid damaging the reed switch leads or reed switch capsule which may lead to shorting the switch installation. 6 (six threads) have been provided for installation.
4. Electrical ratings etc. have been discussed later in this bulletin. It is advisable to keep within those ratings as excessive power will FRY the switch.

Malema - M-100-S-1-X
Explosion Proof Flow Switch



Courtesy of Applied Automation,
Bartlesville, OK

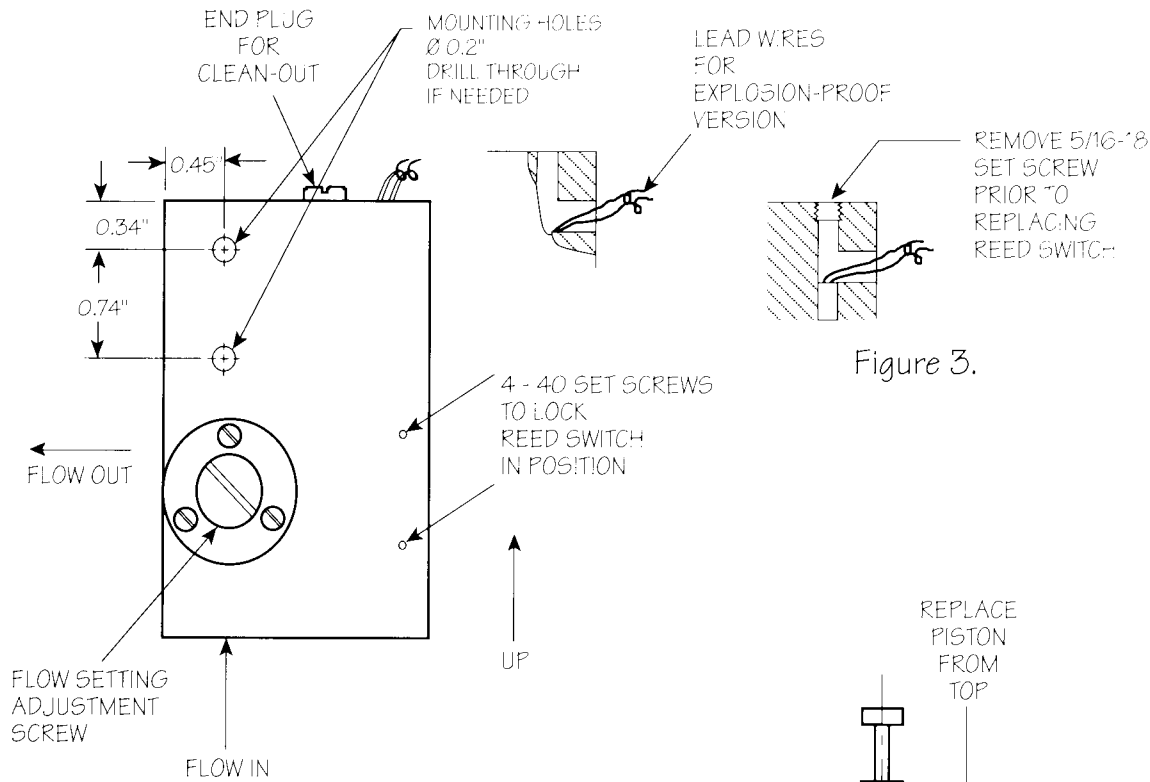


Figure 1.

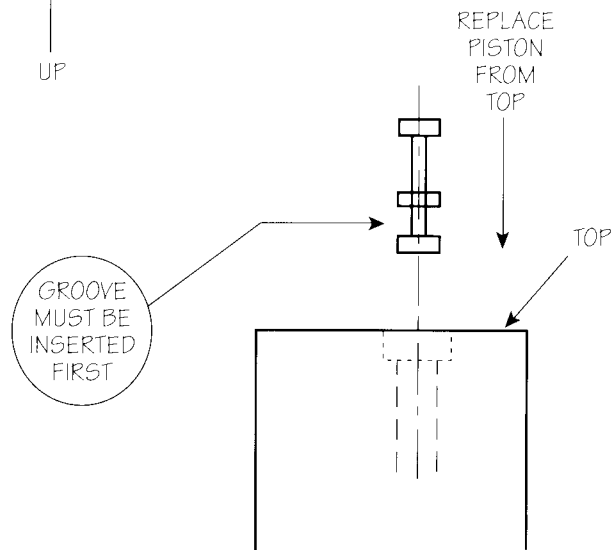


Figure 2.

INSTALLATION PROCEDURE AND MAINTENANCE BULLETIN FOR MALEMA'S FLOW SWITCHES

SERIES M-100 A ND M-100-X ADJUSTABLE FLOW SWITCH (EXPLOSION PROOF MODEL)

ELECTRICAL PROTECTION/RATINGS

The electrical Reed Switch is rated for several million cycles and should rarely require replacement. Most switch failures are the result of overloading. DO NOT EXCEED RATED CAPACITY, as this will cook the REED SWITCH. Catalog ratings are based upon D.C. resistive loads, however A.C. loads are also commonly switched.

Inductive load switching- Unless appropriate contact protection is provided with either a diode or R.C. network, inductive load switching will cause the contacts to stick.

Capacitive load switching-The static capacitance in cables may cause permanent or intermittent contact sticking. Contacts may be protected by a series surge protector of 0.5 to 5mH, depending on the load. In some instances, a 10-500 ohm resistor can replace the surge suppressor.

Color Coding for SPDT Switches:

- GREEN - COMMON
- ORANGE - NORMALLY OPEN
- YELLOW - NORMALLY CLOSED

ELECTRICAL RATINGS FOR REED SWITCHES USED IN MALEMA FLOW SWITCHES

CONTACT RATING		WATTS	SPST 10	SPDT 3
VOLTAGE	SWITCHING	Vdc-Max	200	175
	BREAKDOWN	Vdc-Min	250	200
	ARC-QUENCH	Vdc-Min	200	200
CURRENT	SWITCHING	Amperes-Max	0.5	0.25
	CARRY	Amperes-Max	1.2	1.2
RESISTANCE	CONTACT, INITIAL	Ohms-Max	0.100	0.100
	INSULATION	Ohms-Min	10 ¹⁰	10 ⁹
CAPACITANCE		Picofarads-Typ	0.2	1.0

These switches are U/L recognized for 120 VAC, 0.5A utilization. Where applications require 240 VAC voltage, Malema substitutes these switches with U/L recognized switches for 240 VAC, 1.5A utilization.

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CLEANING

Cleaning the Flow Switch is easily accomplished without removing from the line. By unscrewing the cleanout plug, the magnetic piston may be removed and the flow passage flushed or cleaned. Care should be taken to thoroughly clean the piston before replacing (replace the piston as shown in Figure 2 on page 3b. If the piston is replaced incorrectly, incorrect operation will result).

1. A magnet may be used to remove the magnetic piston.
2. Teflon end plugs (on Teflon models) should not be overtightened.

REED SWITCH REPLACEMENT FOR M-100 SERIES

For reed switch replacement:

1. Loosen allen set screws (4-40) on face of body.
2. Remove and replace reed switch if needed.
3. A. Normally Open
Move switch downward until switch closes then move upward until switch opens. Very gently retighten allen screws.
B. Normally Closed
Move switch downward until it closes and then move upward very slightly maintaining a closed contact. Very gently retighten allen set screws.
4. If possible cycle unit on and off to test. If unit is not installed, turning upside down will stimulate flow.

REED SWITCH REPLACEMENT FOR M-100-X SERIES

For reed switch replacement:

1. Remove 5/16-18 set screw at top of body (see page 3b), Figure 3.
2. Using tweezers (or fish hook), thread lead wires out of top hole.
3. Loosen allen set screws (4-40) on face of body.
4. Follow instructions similar to M-100 for replacement.
5. Do not forget to thread wires through explosion proof conduit (1/4" FNPT side hole) and replace/tighten 5/16-18 set screw prior to installing switch in system.