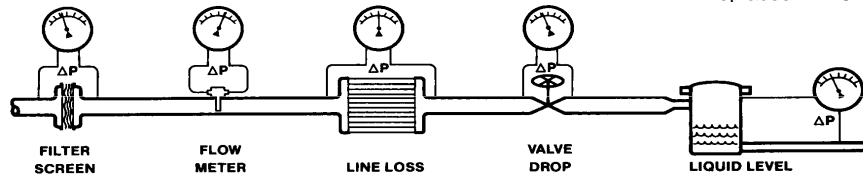


# Mid-West<sup>®</sup> Instrument



## Model 140 Electrical Installation and Operating Instructions

### ELECTRICAL

Gauges with switches have one or two SPST or SPDT hermetically sealed adjustable set point reed switch assemblies. Resistive load ratings and capabilities for each reed switch type are defined as follows:

Type	SPST	SPDT
*Power	25 W	3W
Max. Current	0.5 Amps	0.25 Amps
Max. Voltage	240 VAC/VDC	125 VAC/VDC
Setting (F.S.)	10% to 90%	10% to 90%
Hysteresis (Max/Nom)	15% / 8% Full Scale(F.S.)	10% / 5% Full Scale(F.S.)
Repeatability	1% F.S.	1% F.S.

\* Product of the switching voltage and current shall not exceed the power rating of the device.

Provide standard protection techniques for the switch contacts for capacitive and inductive loads. Use current limiting techniques near the switch to protect the contacts due to high inrush (i.e.; in line resistor or inductor) for long cable interfaces. Provide clamping devices at or near inductive loads (i.e.; relay). Long cable runs can be considered both inductive and capacitive, therefore also clamp across the switch. We recommend for long cable runs of 70 feet or greater that you use the SPST switch or use a current limiting resistor wired in series and located near the switch. Contact the factory if you need assistance.

Both switch types are field adjustable from 10% to 90% of full scale reading of the gauge.. All switches come with a decal to identify adjustment direction to increase the set point. To set the switch at a desired set point on increasing pressure apply pressure to the gauge for the desired set point. Adjust the switch so that it is adjusted above the set point (normally open contacts are open) and slowly decrease the set point until the switch activates (normally open contact closes). Remove pressure and slowly reapply to determine the actual setting. This process can be repeated to achieve a more accurate setting.

All switch functionalities shown are with the gauge at 0 PSID. The SPST switches are available in the Normally Open configuration only.

Use the Mid-West Power Relay 1000TR or equivalent relay for loads above the switch rating.

The following warnings apply to all gauge options with electrical interface.



**WARNING: ELECTRICAL CONNECTIONS SHOULD BE PERFORMED BY QUALIFIED PERSONNEL AND MEET THE REPRESENTATIVE COUNTRY'S NATIONAL ELECTRICAL CODE.**

**WARNING: FAILURE TO CONNECT TO THE PROTECTIVE CONDUCTOR TERMINAL MAY RESULT IN A SHOCK HAZARD.**

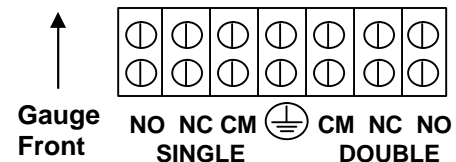
**WARNING: REMOVAL OR REPLACEMENT OF INSTRUMENT HARDWARE VOIDS ALL WARRANTIES AND CONFORMANCES TO ANY STANDARDS (EXCEPT COVERS AND OR SWITCH ADJUST PLUGS).**

### NEMA 4X (Plastic Weatherproof Enclosure) (A & B options)



The reed switch(es) are located inside the enclosure, on the top of the pressure housing, and are connected to a 7 position terminal strip. An opening is provided at the rear of the enclosure for a 1/2" flexible weather-proof cable or conduit connector (supplied by customer). Upon request the hole may be sized to accommodate a PG-11 cable gland connector.

Remove the switch enclosure cover by removing the (4) screws. Insert wires through an appropriate (not supplied) weatherproof connector into the enclosure and connect to the terminal strip per the terminal strip diagram shown below or on the underside of the switch enclosure cover. The center connection is for connection of a protective conductor and is connected to the body of the pressure gauge.



The terminal strip will accept wires in the range of 22 Awg - 16 Awg.. Reinstall the cover, gasket, and (4) screws. (Fig. 3) after connection of field wiring.

Wiring for the SPST switches is connected between NO and CM connections on the terminal strip. Normally closed switches are not available..

Access holes and plugs are provided for external adjustment of the switches if required.

**Division II Hazardous Ratings (E & F options):**



The **E & F** Electrical Configurations are CSA certified to both Canadian and U.S. standards for **Class I, Division II, Groups A, B, C, & D, Class II, Groups F & G** hazardous environments

Interface is identical to the plastic weatherproof enclosure with the exception of a 1/2" FNPT conduit interface.

**NEMA 7 (Explosion-proof ) Enclosure (C & D options)**



**WARNING: THE COVER AND/OR SWITCH ADJUST ACCESS PLUGS MUST NEVER BE REMOVED WHEN THERE IS POWER TO THE UNIT. MAKE ALL ADJUSTMENTS IN A NONHAZARDOUS AREA.**

The gauge and switches are mounted inside the enclosure. A 1/2"-14 FNPT conduit connection is provided in the bottom side of the enclosure. A proper explosion proof, dust tight sealing fitting with appropriate sealing cement must be used when making connections to the 24", 18 Awg. wire leads.

Adjustment of the set point can be accomplished by removing the switch adjustment access plug(s). Insert the screw driver through the hole into the switch adjustment slot and rotate until the desired set point is reached. A clockwise rotation will increase the set point for the right side switch access and a clockwise rotation will decrease the set point for left switch access. **Do not use excessive force**. Reinstall the access plugs for **5 full threads of engagement** after completion.

SPDT Switch leads are color coded and labeled as follows:

- White- 1 or 2 Com (1 Right Access 2 Left Access)
- Black- 1 or 2 NC
- Red - 1 or 2 NO

SPST Switch leads are black in color and are labeled:

- 1 or 2 Com (1 Right Access 2 Left Access)
- 1 or 2 NO

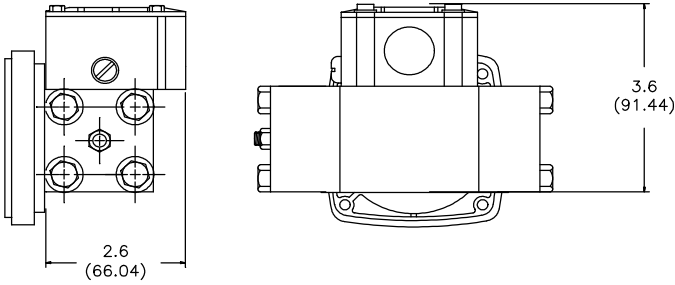
A green / yellow wire is provided for proper electrical bonding of the enclosure chassis.

Enclosures with SPDT and SPST switches comply with NEC Class 1, Groups C & D, Class 2 Groups E, F, & G, NEMA 7 & 9, and are CSA & UL listed.

**Trouble Shooting**

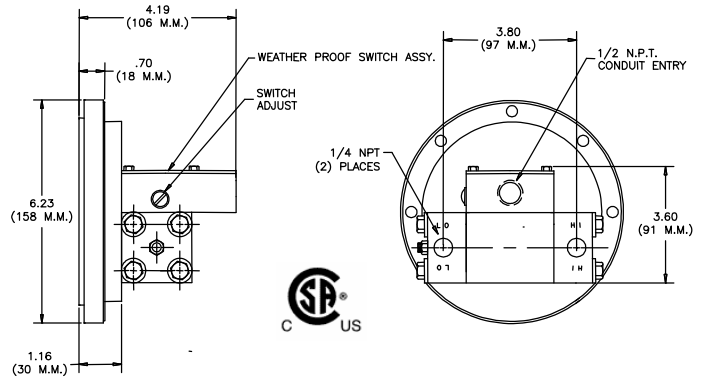
- A. Switch doesn't function. (Assuming Indication is good)
  - i. Make sure that the switch load does not exceed the specified wattage rating of the switch. (steady-state and transient). Contact factory for assistance for excessive loads, otherwise proceed to the next step.
  - ii. Perform a continuity check of the switch contacts by trying to actuate the switch using an external magnet. An operational switch usually indicates a problem with the gauge. If not operational proceed to the next step.
  - iii. Verify the reed switch wires are connected to the terminal strip (NEMA 4X enclosure only). Contact the factory for assistance if the switch is connected and/or request an "RGA" number.
- C. Gauge accuracy and set point problems:
  - i. Verify gauge is not in an electromagnetic / magnetic environment. i.e.; close proximity to high current power lines.
  - ii. All others, contact the factory for assistance.
- D. When contacting the factory please have the following information available if possible:
  - 1. Gauge / Switch Serial Number
  - 2. Model Number of the Gauge / Switch
  - 3. Description of the problem and events prior to failure.
  - 4. Interface Information such as switching voltage, switching current, cable lengths, etc.

### NEMA 4X 2 1/2 INCH DIAL

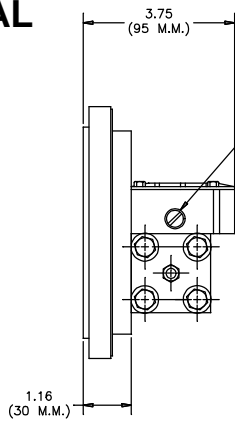
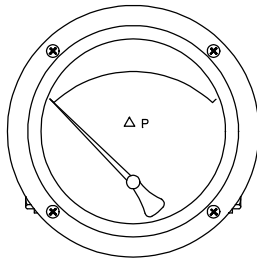


### NEMA 4X METAL ENCLOSURE

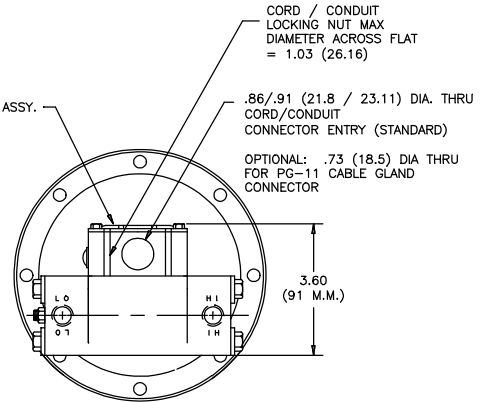
Class I, Div. 2, Groups A, B, C, D  
Class II, Div 2, Groups F & G



### NEMA 4X 4 1/2 INCH DIAL

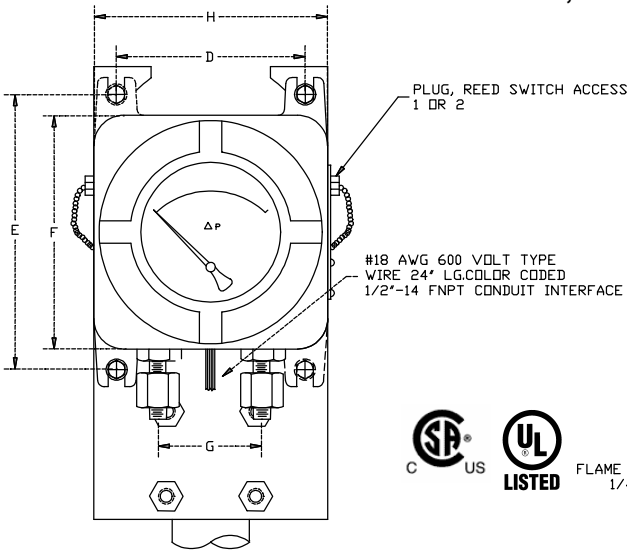


WEATHER PROOF SWITCH ASSY.  
SWITCH ADJUST  
ACCESS PLUG  
(1 OR 2 SWITCHES)



### Explosion-Proof Enclosures Class I, Groups C & D Class II, Groups E, F, & G

#### Dial Size

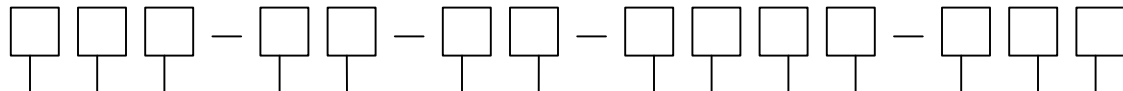


FLAME ARRESTOR  
1/4-18 MNPT  
2 PLACES

OPTIONAL PIPE MOUNT

DIM	2 1/2	2 1/2	4 1/2
A	7.12 (180.9)	6.53 (163.3)	8.50 (215.9)
B	4.15 (105.4)	2.12 (53.84)	2.50 (62.5)
C	3.15 (80.01)	3.12 (79.24)	4.35 (110.5)
D	6.00 (152.4)	6.56 (166.6)	6.25 (158.8)
E	8.75 (222.2)	7.75 (196.9)	9.12 (231.6)
F	7.35 (186.7)	6.68 (169.7)	7.75 (196.9)
G	3.80 (96.52)	3.80 (96.52)	3.80 (96.52)
H	8.12 (206.3)	7.43 (188.7)	7.75 (196.9)

## PART NUMBERING SYSTEM



### ① BASIC MODEL NUMBER

### ② MATERIAL

- A. Aluminum (3000 P.S.I.G.)
- B. Brass (1500 P.S.I.G.)
- S. 316 S.S. (3000 P.S.I.G.)
- Z. Special

### ③ DIAL SIZE

- A. 2-1/2" Round Dial (**Standard**)
- C. 4-1/2" Round Dial
- E. 3-1/2" Round Anod. Alum. Dial Assy.
- G. 4-1/2" Round Anod. Alum. Dial Assy.
- T. Differential Pressure Switch Only (**Without Indication**).  
Selection Appropriate Electrical Options
- Z. Special (Uncoded Options)

### ④ SEALS & DIAPHRAGM

- 0. Buna N (**Standard**)
- 1. Viton® (**60" H 2 O & Above**)
- 2. Silicone
- 4. Neoprene (**25 PSID & Below**)
- 5. Ethylene Propylene
- 9. Special (Uncoded Options)

### ⑤ CONNECTIONS

- 0. 1/4" FNPT Back Connections (**Standard**)
- 2. Dual 1/4" FNPT Top and Bottom Connections (**Non-Switch Units Only**)
- 4. 7/16"-20 Str. Thd. O-Ring Back Connections
- 5. 1/2" FNPT S.S. Adaptors
- 6. Dual 7/16"-20 Str. Thd. O-Ring Top/Bottom Connections (**Non-Switch Units Only**)
- 9. Special (Uncoded Options)

### ⑥ OPTIONS (Up to four options)

- O. None
- A. Reversed High/Low Process Connections
- B. DIN2353 12-S (12 mm) Steel Tube Fittings (2)
- F. Pipe Mounting Kit (**Not Available with Both Reversed Port and Switches**)
- M. Maximum Indicator Follower Pointer
- T. Oxygen Cleaning
- U. S.S. Tag w/S.S. Wire
- V. S.S. Tag w/S.S. Screws
- W. Wall Mounting Kit
- X. Chemical Seals
- Z. Special (Uncoded Options)

**NOTE: NOT ALL OPTIONS AVAILABLE IN COMBINATION WITH OTHER OPTIONS.**

### ⑦ ELECTRICAL CONFIGURATIONS

(Switch Adjustable Range 10-90% except where stated below)

- O. None
- A. One (1) Reed Switch in NEMA4X Enclosure
- B. Two (2) Reed Switches in NEMA4X Enclosure
- C. One (1) Reed Switch in NEMA7 CSA & UL Listed Exp. Proof Enclosure
- D. Two (2) Reed Switches in NEMA 7 CSA & UL Listed Exp. Proof Enclosure.
- E. One (1) Reed Switch in NEMA 4X Aluminum Enclosure With CSA Div 2 Listing
- F. Two (2) Reed Switches in NEMA 4X Aluminum Enclosure with CSA Div 2 Listing
- Z. Special

### ⑧ ELECTRICAL SPECIFICATIONS

- A. S.P.D.T., 3 Watts, 0.25 Amp, 125 VAC/VDC
- B. S.P.S.T., 25 Watts, 0.5 Amp, 230 VAC/VDC
- Z. Special

# Mid-West®

Instrument

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