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# MAXIGARD™



## AM1000 & AM2000 MOTION SWITCH

### Introduction

The MAXIGARD AM1000 and AM2000 motion switches are fail safe devices designed to monitor the rotation of critical driven shafts. The switches are precision built of quality materials and completely tested to insure long life and trouble free operations.

### Principle of Operation

While the shaft (with the magnet disc or optional magnet wrap attached) is rotating, a signal is generated and picked up by the sensing head. This signal is not impaired by build-up of dust or any other foreign material on the magnet disc or sensing head. The signal is processed through an electronic circuit that energizes the relay or relays when the shaft speed is above the set points. The relay contacts are SPDT. Both switches are equipped with red LEDs, that turn on when the relay(s) energize.

### AM1000 Single Set Point Switch

The AM1000 is designed to detect under speed, over speed, slow down, or stoppage of the monitored shaft. The AM1000 has one SPDT adjustable trip point relay and a built in time delay of 7.5 seconds. The delay activates on power up only. The set point is designed fail safe (N.O.). In the event of a power failure, loss of signal, component failure etc., the relay will de-energize and put the switch into an alarm condition. The AM1000 is equipped with a green LED, when lighted = power on.

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## AM2000 Dual Set Point Switch

The AM2000 is designed to detect under speed, over speed, slow down, or stoppage of the monitored shaft. The AM2000 has two SPDT adjustable trip point relays. The "LO" set point relay (K1) has a built in time delay of 7.5 seconds. The delay activates on power up only. The set points are designed fail safe (N.O.). In the event of a power failure, loss of signal, component failure etc., the relays will de-energize and put the switch into an alarm condition.

Both the AM1000 and AM2000 motion switches have automatic resetting. When the alarm condition ceases and the monitored shaft speed rises above the selected set points, the relay(s) will energize and allow the machine or process to restart and operate as normal. However, in some cases it's desirable that the motion switch remain in the alarm condition regardless of the signal being received and require a manual reset, (latching). An auxiliary latching relay will be required to perform this function. Both switches are equipped with red LEDs, when lighted = relays energized.

### Components

THE AM1000 AND AM2000 MOTION SWITCH PACKAGE INCLUDES:

- 4" MAGNET DISC (OTHER OPTIONAL TARGETS AVAILABLE)
- SENSING HEAD
- 10 FEET OF SENSING HEAD CABLE
- MOUNTING BRACKET
- MOTION SWITCH, IN A DIN RAIL MOUNTED OR STAND ALONE NEMA 1
- PLASTIC ENCLOSURE
- SCREW TERMINAL TOP WIRED SOCKET

## SECTION 1 - MECHANICAL

### 1.0 Magnet Disc

- 1.1 The end of the shaft to be monitored should be square to prevent excessive disc wobble.
- 1.2 Center drill and tap the shaft end. (Suggested #21 drill and #10-32NF tap). Bolt the magnet disc to the end of the shaft. Use "Loc-tite" to keep the bolt and disc tight on the shaft.  
(see figure 1A, page 3).

### 2.0 Magnet Wrap (optional)

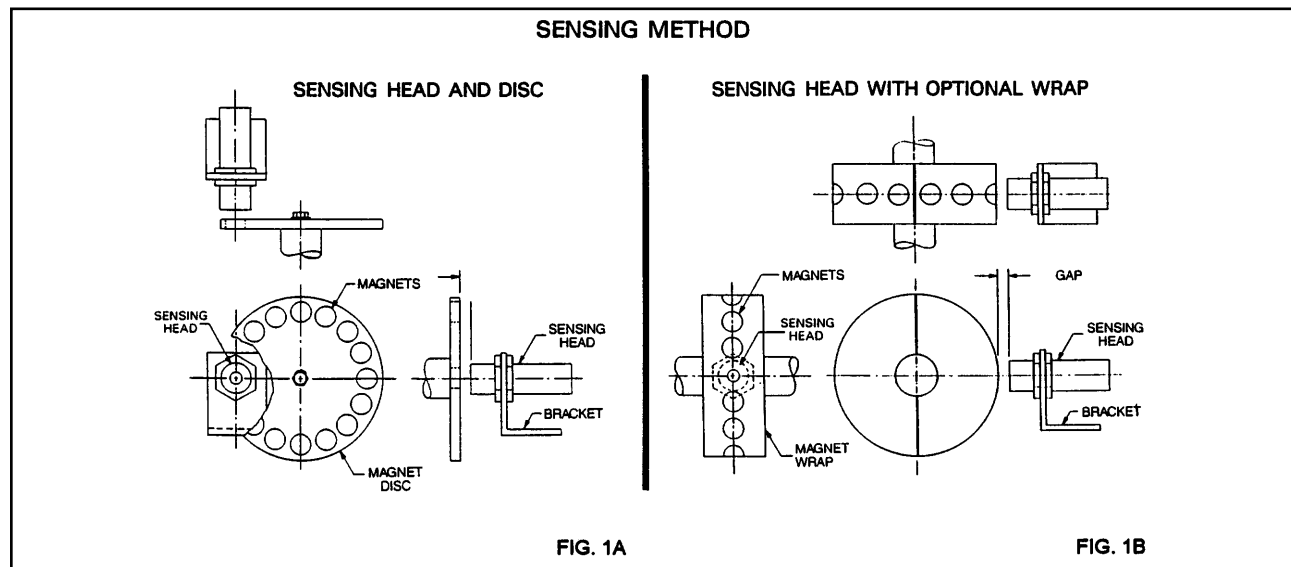
- 2.1 Separate the two halves of the magnet wrap by loosening the cap screws holding the two halves together.
- 2.2 Place both halves of the magnet wrap around the shaft. Re-insert and tighten the cap screws making sure the wrap is square to the shaft.  
(see figure 1B, page 3).

#### NOTE

There will be a slight gap between the two halves after tightening. This gap will not affect the generated signal.

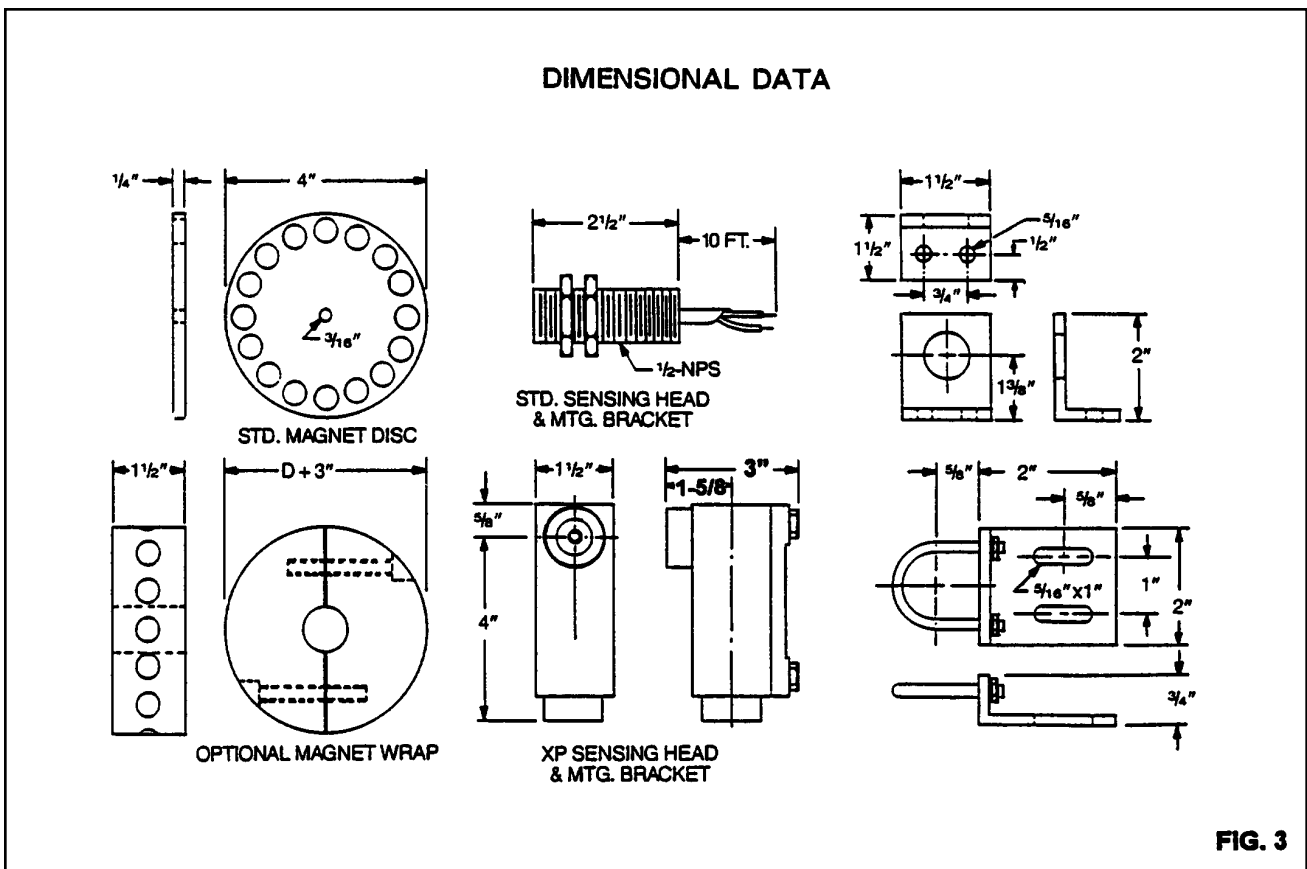
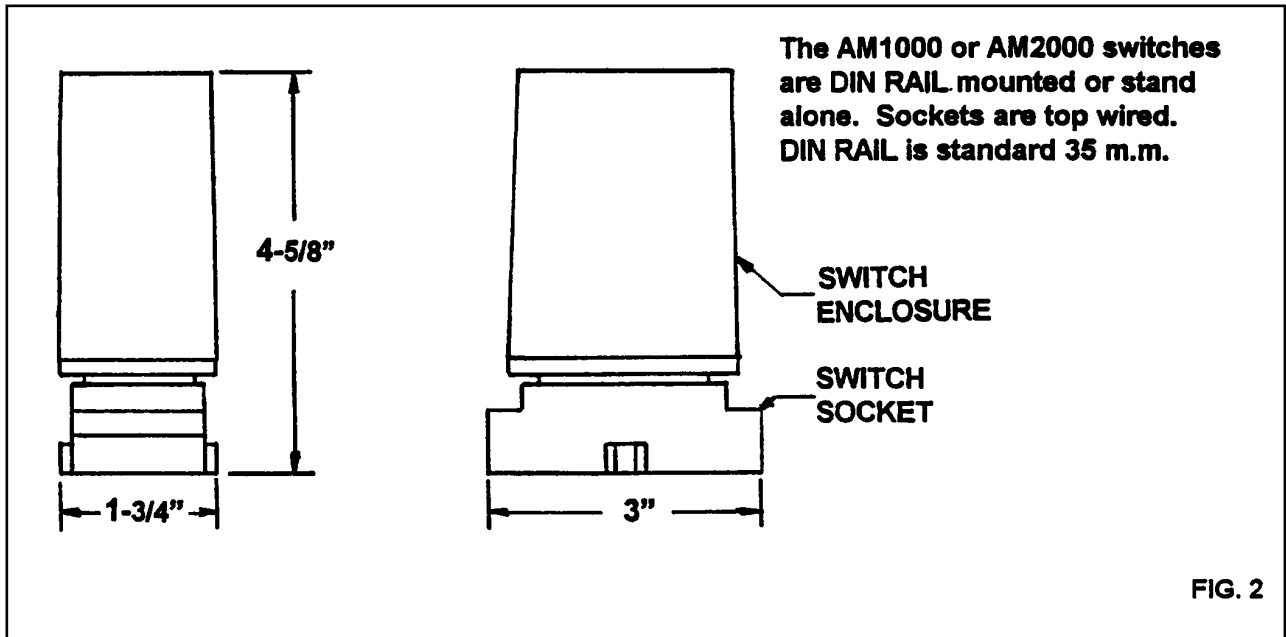
### 3.0 Mounting the Sensing Head

- 3.1 Place the sensing heads so the pole piece is centered directly in front of a magnet in the disc or optional magnet wrap.  
(see figure 1A and 1B, page 3)
- 3.2 The gap setting between the sensor and magnet disc should be approximately 1/8" - 7/8".



### 4.0 Motion Switch Enclosure

4.1 AM1000 and AM2000 enclosures are din rail mounted or stand alone NEMA 1 plastic enclosure, with top wired socket.  
(see figure 2, page 4)



## SECTION 2 - FIELD WIRING

### 5.0 Wiring and Energizing

#### 5.1 Sensing Head Wiring

5.1.1 Connect the sensing head cable to screw terminals 2 and 5, located on the motion switch socket.

(see figure 4, page 6)

5.1.2 The sensing head is provided with 10' of cable, additional cable can be added as required, be sure to maintain continuity, wrap the splice with the foil shield and electrical tape.

#### SENSING HEAD CABLE

Use "Belden" #8761 or equal. Cable should not be run in the same conduit as power wires. Maximum distance of cable run 10,000 ft. Make good splice connections and check continuity.

#### 5.2 Energize the Motion Switch through the Motor Starter

#### WARNING

To avoid electrical shock, disconnect all sources of power to the motor starter before wiring and observe voltage ratings of the motion switch.

5.2.1 Wire 120 VAC through the auxiliary contacts and make proper connections to screw terminals A (L2) and B (L1), located on the motion switch socket. The green LED light will be on when power is applied.

(see figure 4, page 6)

#### 5.3 Energizing the Motion Switch independent of the Motor Starter

#### WARNING

Be sure line voltage is off before wiring and connecting power.

5.3.1 Wire 120 VAC directly to screw terminals A (L1) and B (L2) located on the motion switch socket. The green LED light will be on when power is applied. The "LO" red LED will turn on for 7.5 seconds, then shut off.

(see figure 4, page 6)

### SOCKET WIRING DIAGRAM

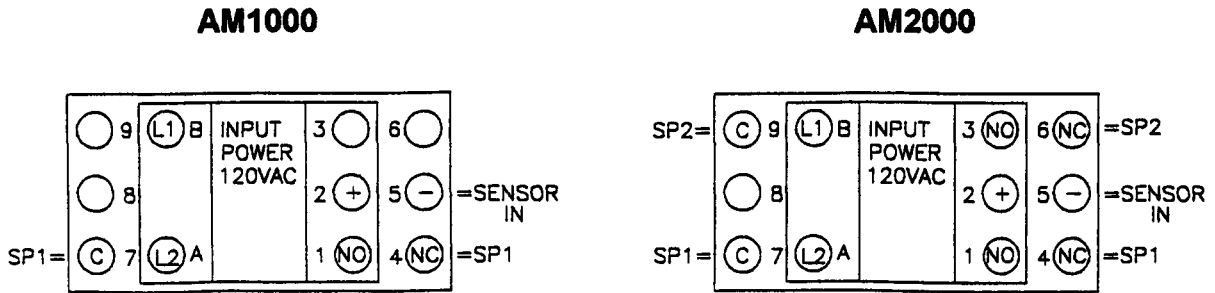


FIG. 4

### 6.0 Speed Range Selection

6.1 Set the dip switch (SW 1) for the monitored shaft operating speed range.  
(see figure 5, page 6)

### SPEED RANGE SELECTION

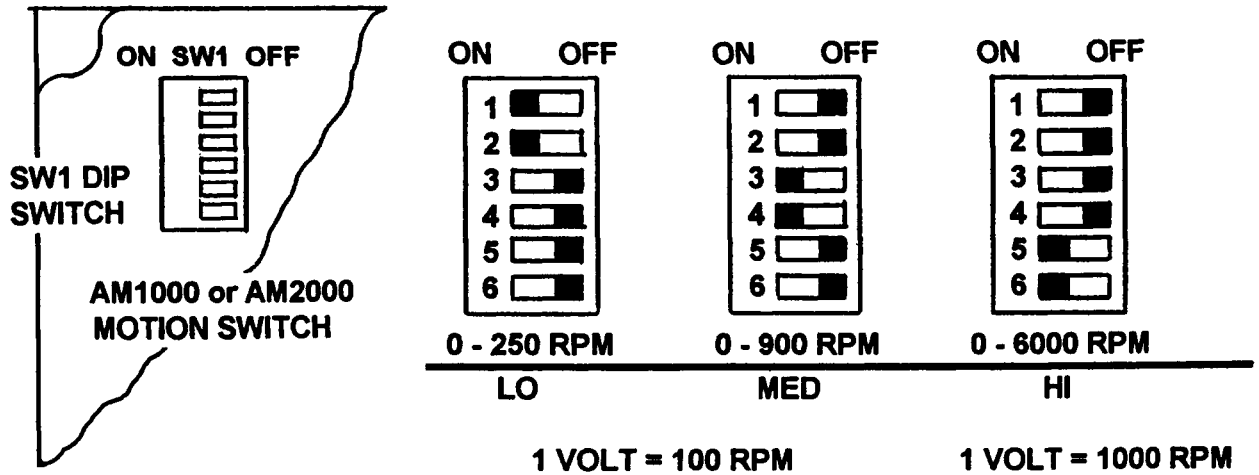


FIG. 5

## 7.0 Motion Switch and optional Meter Calibration

### NOTE

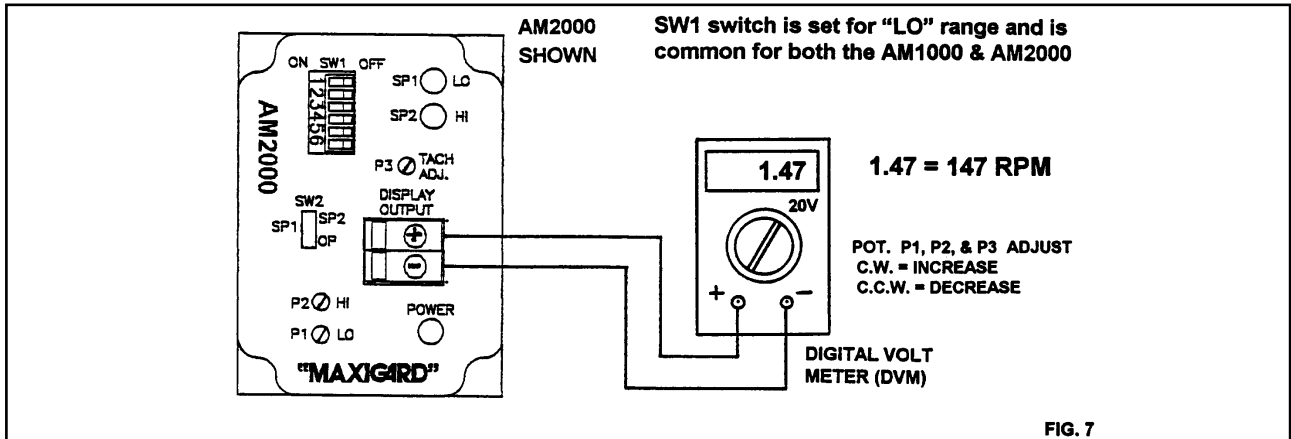
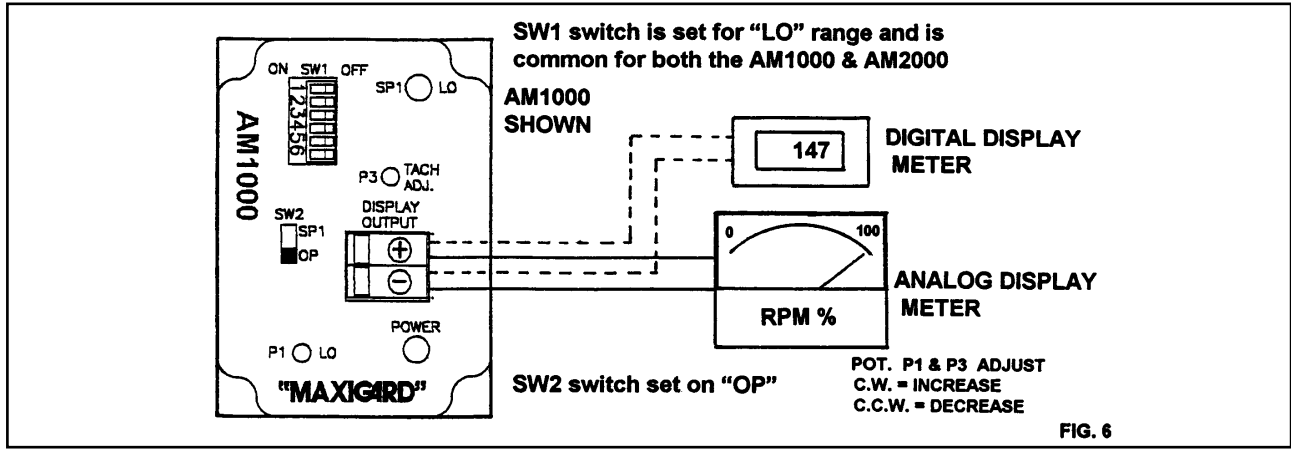
For best results, calibrate motion switch while machine is operating under full load.

- 7.1** Connect power lead to screw terminals L1 (B) and L2 (A) of the module socket. Apply power (120 VAC) as instructed in **Section 5.0**, green LED light is on when the motion switch is powered up. Run monitored machine at full speed under load.
- 7.2** To determine the actual operating speed of the monitored shaft, set the (SW 2) slide switch to the "OP" position. Use a digital volt meter, insert the DVM leads into the Display terminal block. Set the DVM to the 20 VDC scale. The AM1000 and AM2000 are designed to display shaft speed as a DC voltage. See example for read out explanation.  
(see figure 7, page 8)

### EXAMPLE

If the Speed Range dip switch is set for the LO or Medium range, each 1 volt reading of the DVM equals 100 RPM, example: 1 v = 100 RPM, 1.25 v = 125 RPM, 2.00 v = 200 RPM, 2.45 v = 245 RPM, etc. If the Speed Range dip switch is set for the HI range, each 1 volt reading equals 1000 RPM, example: 1 v = 1000 RPM, 1.25 v = 1250 RPM, 2 v = 2000 RPM, 2.45 v = 2450 RPM, etc.

- 7.3** Incorporating an analog or digital display meter with the AM1000 or AM2000 motion switches.
- 7.3.1** Connect the display meter signal input terminals to the Module's display output terminal block. Adjust POT P3 C.W. or C.C.W. until display meter reads desired scale for application. RPM, FPM, GPM, etc.

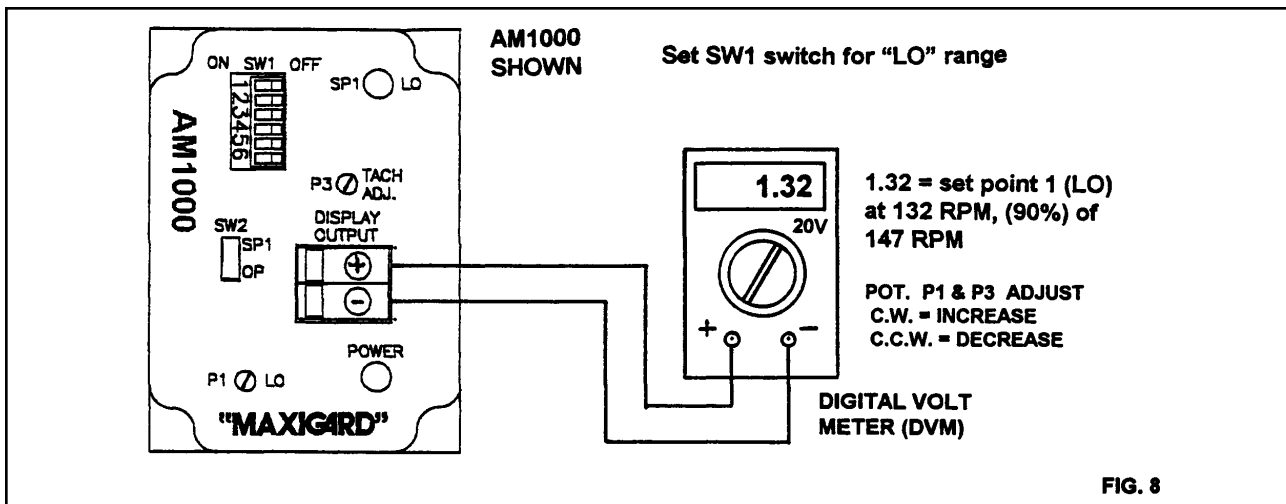


**8.0 Motion Switch Relay(s) - SPDT - 5 AMPS @ 120 VAC**

**NOTE**

The AM1000 and AM2000 motion switches "LO" trip point relay (K1) has a built in time delay of 7.5 seconds. Delay activates on start up only.

**8.1** The motion switch can be wired to detect slow down, stopping, starting, under speed or over speed. SPDT relay contacts are available for each trip point.





## 9.0 “LO” Trip Point Adjustment, (K1) AM1000 or AM2000

### NOTE

Machine does not have to be running to set the trip points. However, for best results it's suggested the settings be made while machine is running under full load.

The AM1000 and AM2000 motion switches “LO” trip point relay (K1) has a built in time delay of 7.5 seconds. Delay activates on power up only.

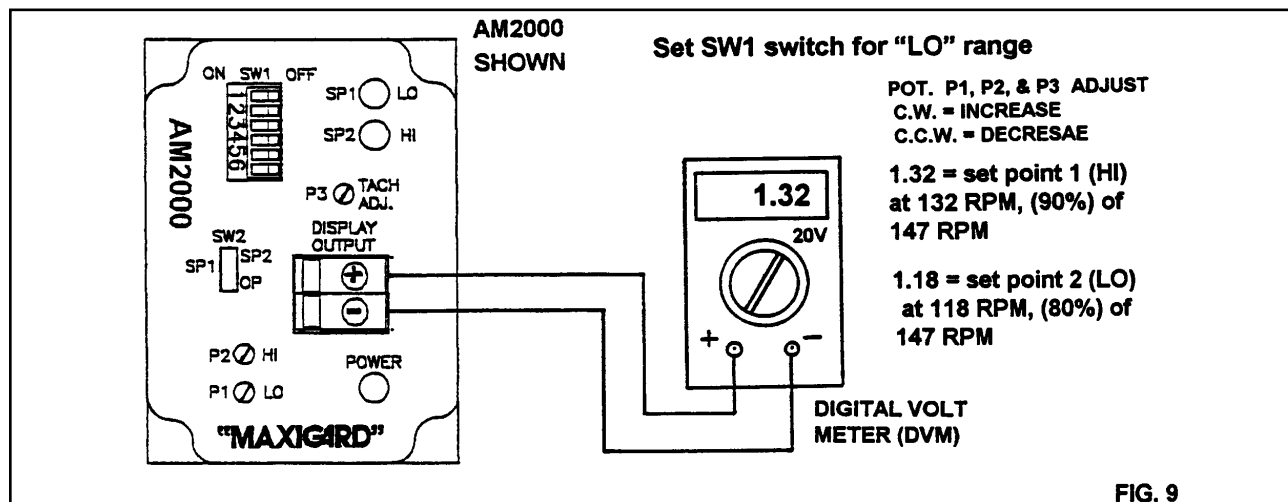
**9.1** Move the slide switch (SW 2) to the “SP1” position and adjust POT P1 to the desired trip point by watching the display meter. Turn POT P1 C.W. or C.C.W. to raise or lower the trip point. The red LED light will be on when the relay is energized. (see figure 8, page 8)

**9.2** Return the slide switch (SW 2) to the “OP” position. The AM1000 switch is now calibrated and the LO trip point is set and ready for operation. (see figure 8, page 8)

## 10.0 “HI” Trip Point Adjustment, (K2) for AM2000 Motion Switch only

**10.1** Move the slide switch (SW 2) to the “SP2” position and adjust POT P2 to the desired trip point by watching the display meter. Turn POT P2 C.W. or C.C.W. to raise or lower the trip point. The red LED lights will be on when the relays are energized. (see figure 9, page 9)

**10.2** Return the slide switch (SW 2) to the “OP” position. The AM2000 switch is now calibrated with the HI and LO trip points set and ready for operation. (see figure 9, page 9)



**SPARE PARTS LIST**

<b>Part No.</b>	<b>Description</b>
1656	AM1000 Module, Single Set Point
1657	AM2000 Module, Dual Set Point
1129	Sensing Head (Std) W/10' cable
1130	Mounting Bracket W/ Jam Nuts
1132	Sensing Head (XP) W/10' Cable
1134	Mounting Bracket
1136	Magnet Disc 4" Diameter
1378	Magnet Disc 8" Diameter
1177	Meter, Tachometer, Analog
1324	Meter, Tachometer, Digital
1139	Sensing Head Cable

**LIMITED WARRANTY**

Process Control Systems, Inc. will repair or replace, at their option, F.O.B. factory, any part or unit which proves to be defective in material or workmanship within five years of purchase date, provided that part of the unit was installed and operated as recommended, to be established by examination of the part or unit at the factory. Goods returned under warranty must be shipped prepaid to the factory and accompanied by the serial number, description of defect, order number and date of purchase.

This warranty shall not apply to any Maxigard™ product which shall have been repaired or altered outside of the Process Control Systems factory or has been subject to misuse, negligence or accident.

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