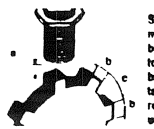
# Veeder-Root brand Motion Detectors

## Installation, Setup, and Operation Instructions

Manual No. 702122-0001, Rev.: None
Date: September 5, 1997
Models: 109888-0001 (Low Speed Range)
109888-0002 (High Speed Range)

**MECHANICAL INSTALLATION:** Detects all metal targets approaching the sensing face radially (slide-by mode), axially (head-on mode), or in any other direction. Axial mode (head-on) is not recommend when the application might expose the switch to damage by being struck by the target. Target(s) surface should be approximately 30 x 30mm in order to fully cover the sensor's face. The space between multiple targets should fully clear the sensors face.

- Select locations which allow easy installation and inspection
- Avoid locations where excessive accumulations of metallic chips, dust or dirt exist
- Do not run signal lines in the same conduit as power or control lines from relays, motor starters, etc

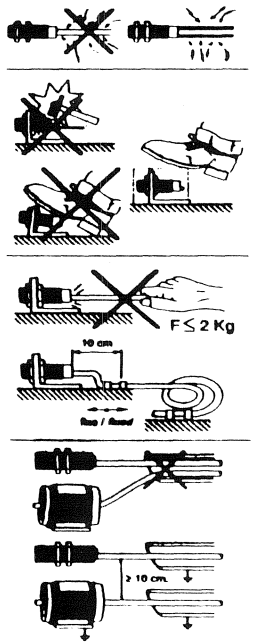


| a | b | c |
|---|---|---|
| 4 - 6 | 30 x 30 | 60 |

All Dimensions in mm

Single or multiple targets may be used (even numbers are recommended to maintain mechanical balance). The more targets, the faster the response to an underspeed condition. The number of targets is limited by the maximum operating frequency stated in Specifications.

**MOUNTING PRECAUTIONS**

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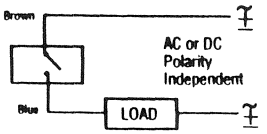
**ELECTRICAL CONFIGURATION:** Being a LOAD POWERED SWITCH, it is wired in series with the load and draws its operating current through the load. Even when the switch is in its OPEN state (not conducting continuous load current), operating current for Motion Detector passes through the load. This current is called leakage current and must be less than the maximum acceptable OFF state current for the load (i.e., drop out current for a relay).

Operating voltage for Motion Detector (AC or DC) appears as voltage drop in series with the load when the switch is conducting, and must be DEDUCTED from the supply voltage to determine the voltage available to the load. This voltage drop is usually small enough to be ignored.




**Note: Sensors are not protected against overload and short circuit. It is recommended that a "fast-blow" fuse be wired in series with the load.**

**SETPOINT ADJUSTMENT:** A 15 turn potentiometer is used to set the speed threshold (pulses per minute) to the normal operating speed. The output circuit will remain closed unless the speed falls below the setpoint at which time it will open. At power up, a 9 second delay overrides underspeed detection to allow the equipment to reach normal operating speed.

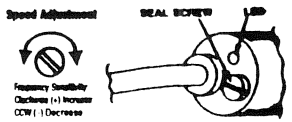
**PRELIMINARY SETUP:**

*After the sensor is mounted in its desired location and mechanically set to be within the proper bounds of the target, the following steps will calibrate the system.*

1. Connect the switch to a temporary indicating load (10VA inrush, max.). A 10 watt light bulb makes an excellent indicating load.

2. Apply power to the Motion Detector and load combination.

4. Notice that the switch will close when power is applied. The indicating LED will also be ON. Wait for the switch to turn OFF (9 seconds).




5. Remove the seal screw to the speed adjustment located at the rear of the switch.

6. Turn the speed adjustment 15 turns counterclockwise (CCW). This sets the switch at it's minimum speed range.

7. Rotate the shaft which the Motion Detector will monitor.

8. If the indicator does not turn on, turn off the motor and slightly reduce the gap between the sensor and the target.

9. Repeat steps 7 and 8. It may be necessary to repeat this several times. If these adjustments cannot be made, one of four problems may exist.

a. The target is too small to detect.

b. The space between targets is too small.

c. The speed of the shaft is too high or low (beyond specification) for the sensor.

d. The switch is not operating.

If this happens, contact us for applications assistance.

**CALIBRATION:** Determine which of the following two actions is best for the application:

a. **Precise:** You have a variable speed drive and want to set the trip point at a specific, calibrated speed.

b. **Non-precise:** You have a fixed speed drive or do not require a high precision trip point with your variable speed drive.

If you have a *Precise* requirement, start at step 1. If you have a *Non-precise* requirement, run the machine at normal speed and start at step 2.

1. Set the motor speed set to the worst case (minimum) speed. Proceed to set the speed setpoint as follows:

2. Slowly turn the adjustment screw clockwise (CW), allowing 2 target revolutions between turns, until the indicator turns OFF.

3. Turn the speed adjustment counterclockwise (CCW) 1/8 turn and wait for two shaft revolutions. Repeat this procedure until the indicator turns ON.

*The sensor is now calibrated to trip if the speed falls below the present rotation speed of the shaft.*

4. Replace the potentiometer seal screw.

**FINAL SETUP:**

1. Stop the Motor – remove all power from the system.

2. Disconnect power from the switch and indicator.

3. Permanently connect the motor starter or other control where the temporary indicator was located. Your Motion Detector is now operational.

**MOTION DETECTOR OPERATION TEST:**

1. Apply power to the Motion Detector and machine.

2. The Motion Detector's 9 second delay should allow the machine to ramp up to normal operating speed.

3. Operate the machine or process at normal and reduced speed (or abnormal load). Observe that each time the actual target speed falls below the desired point, the Motion Detector and output device operate properly.

4. If proper operation is not observed, recheck Installation, Setup, and Calibration procedures.

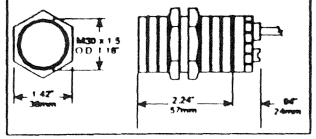
**SPECIFICATIONS:**

**Electrical Characteristics:**
- **Operating Voltage Range:** 20-264 AC/DC
- **Operating Line Frequency (Hz):** DC: 0, AC: 50/60 Hz ±10%
- **On-State Voltage Drop (volts):** 5.7 Max.
- **Load Current:**
  - **Maximum Continuous (mA):** DC: 200; AC: 350
  - **Minimum Continuous (mA):** 5
  - **Inrush (A):** 2
- **Leakage Current (mA):** 1.5
- **Output State:** Speed above set-point: Closed, below set-point: Open
- **Termination:** 2-wire cable, 20 AWG, PVC Jacket

**Operating Characteristics:**
- **Usable Sensing Distance (mm):** 0 to 8 (with mild steel target)
- **Power-Up Time Delay (seconds):** 9 ±20% + 1/Fr, fixed
- **Adjustable Frequency Range (set-point):**
  - 109888-0001: 6 to 150 pulses-per-minute
  - 109888-0002: 120 to 3000 pulses-per-minute
- **Maximum Operating Frequency:**
  - 109888-0001: 6000 pulses-per-minute
  - 109888-0002: 48,000 pulses-per-minute
- **Hysteresis (% of Fr):** 5 to 15
- **Repeatability (% of usable):** 3
- **Operating Temperature Range:** -13° to +158° F (-25° to +70°C)
- **Enclosure Ratings:** NEMA type: 1, 4, 6, 12, CENELEC type: IP67
- **Enclosure Material:** Nickel-plated brass

**Note: Fr= Frequency Preset**

**Dimensions:**




**WARRANTY:**

Products manufactured by Danaher Controls (the Company) are warranted to be free from defects in workmanship and material for a period of one year from the date of shipment, and products which are defective in workmanship or material will be repaired or replaced, at the option of the Company, at no charge to the Buyer. Final determination as to whether a product is actually defective rests with the Company. The obligation of the Company hereunder shall be limited solely to repair and replacement of products that fall within the foregoing limitations and shall be conditioned upon receipt by the Company of written notice of any alleged defects or deficiency promptly after discovery within the warranty period, and in the case of components or units purchased by the Company, the obligation of the Company shall not exceed the settlement that the Company is able to obtain from the supplier thereof. No products shall be returned to the Company without its prior consent.

Products which the Company consents to have returned shall be shipped F.O.B. the Company's factory. The Company cannot assume responsibility or accept invoices for unauthorized repairs to its components, even though defective. The life of the products of the Company depends, to a large extent, upon the type of usage thereof, and THE COMPANY MAKES NO WARRANTY AS TO FITNESS OF ITS PRODUCTS FOR SPECIFIC APPLICATIONS BY THE BUYER NOR AS TO PERIOD OF SERVICE UNLESS THE COMPANY SPECIFICALLY AGREES OTHERWISE IN WRITING AFTER THE PROPOSED USAGE HAS BEEN MADE KNOWN TO IT.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

**ORDERING INFORMATION:**

| Model No. | Adjustable Speed Detection Range (Targets/Minute) | Operating Voltage Range | Power-Up Time Delay (Seconds) | Program-mable Controller Compatible | LED | Output Func. | Max. Sens. Dist. (mm) |
|---|---|---|---|---|---|---|---|
| 109888-0001 | 6-150 (0.1-2.5 Hz) | 20-264 VAC/DC | 9 ±20% + 1 Fr | Yes | Yes | N.O. | 8 |
| 109888-0002 | 120-3000 (2-50 Hz) | 20-264 VAC/DC | 9 ±20% + 1 Fr | Yes | Yes | N.O. | 8 |

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