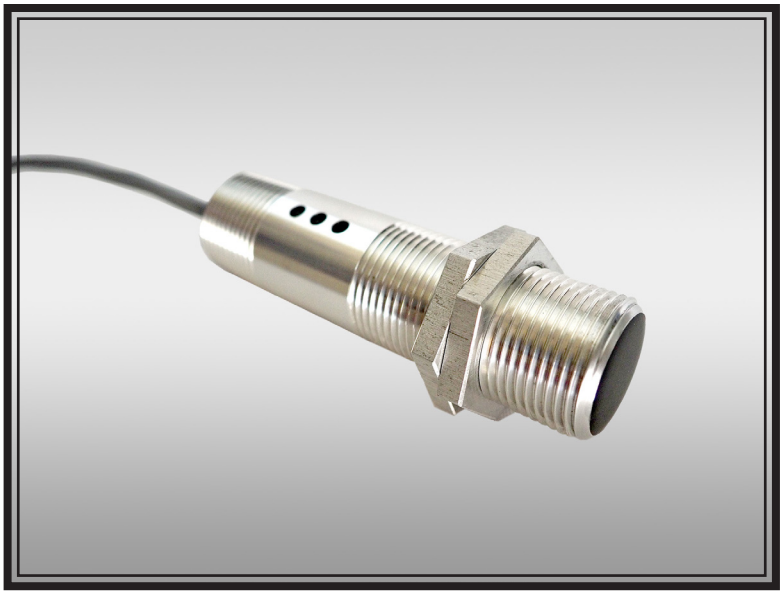
User Manual



Zero Speed Switch Sensor
Model ZS09P

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The User Manual must be referred to for correct installation. Failure to comply with the User Manual shall void all warranties and liabilities.

Overview

The Phares Sensors Model ZS09P Zero Speed Switch Sensor is a self-contained sensor which houses both the Zero Speed Switch circuitry and switching relay, so no separate control boxes for the Zero Speed Switch Sensor are needed. It is available in 5-24 VDC, and 120 VAC. Please see Product Label for Supply Voltage. The ZS09P is designed for switching control circuits, 5 Amps maximum.

Description

The Phares Sensors Model ZS09P Zero Speed Switch Sensor System consists of the Zero Speed Switch Sensor and a sensing target such as Magnetic Disk, Magnet(s), Gear tooth Wheel (all sold separately), key stock, bolt head, etc. Ferrous targets must be high iron content. Stainless steel and iron alloys will not work with the sensor. The Zero Speed Switch Sensor target is attached to a rotating shaft at the point of measure. As the shaft rotates, the switch senses the rotating sensor target to determine motion or the lack thereof. When either motion is detected or speed reaches setpoint (depending on application), the relay energizes, and remains energized as long as motion is detected or speed remains above setpoint (depending on application). The ZS09P is designed for over speed, under speed, and zero speed applications.

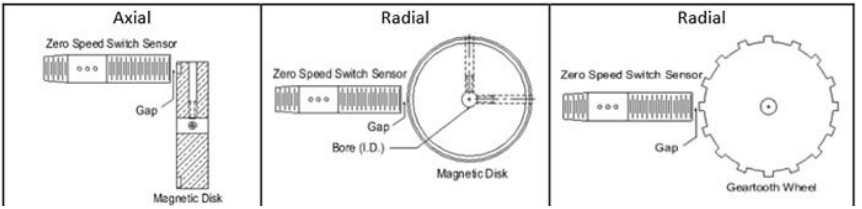

Figure 1. Zero Speed Switch Systems consisting of Zero Speed Switch Senor and Sensing Target.

Relay Setpoint Adjustment

A 10 turn precision trim pot is used to adjust the relay trip point setting. Adjust the trim pot Counterclockwise for slower RPM trip point setting and Clockwise for faster RPM trip point setting. There are no stops in the trim pot, so there is no concern for twisting through a stop and damaging the trim pot. The trim pot is always factory set at the highest relay trip point. For a lower relay trip point, turn the trim pot a few turns counterclockwise.

Fixed Setpoint Option

The Relay Setpoint Adjustment can be disabled at the factory prior to assembly for applications requiring a Fixed Relay Setpoint.

Relay Latch Option

The Relay Latch is a factory preset time delay allowing speed at the point of measure time to ramp up to relay trip point. It is factory preset per order and once set, cannot be changed. With the Relay Latch feature enabled, the ZS09P Zero Speed Switch Sensor relay will energize as soon as the first sensor target marker is detected. It will remain energized until speed at point of measure reaches setpoint. The ZS09P Zero Speed Switch Sensor relay will remain energized until speed falls below relay trip point or motion ceases. If speed at point of measure does not ramp up to relay trip point within allotted time, the relay will de-energize and remain de-energized until speed reaches setpoint. Once the relay latch delay time has expired, the relay latch is disabled until power is cycled to the ZS09P Zero Speed Switch Sensor. The Relay Latch is reset at power up. An optional factory preset Relay Latch Auto Reset option is available. This feature allows the Relay Latch to be reset without cycling power.

LED Indicators

The sensing target indicator "Pulse" LED is in the center of the Zero Speed Switch Sensor. This LED will blink on and off during operation indicating the Zero Speed Switch Sensor is detecting sensing target markers. The "Relay" LED will illuminate indicating that the Zero Speed Switch Sensor relay is energized.

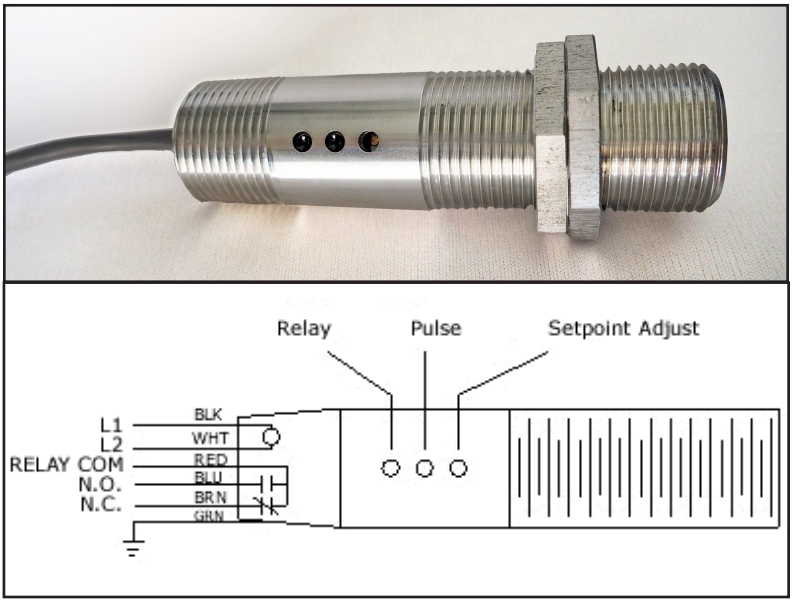

Figure 2. LED Indicators and Wire Color Code

Circuit Protection

The ZS09P Zero Speed Switch Sensor has an internal, non-replaceable 1/2 Amp fuse. This fuse is in-line with the Zero Speed Switch Sensor internal control circuit only; it does not protect the relay contacts.
A 5 Amp external fuse is required to help protect the Zero Speed Switch Sensor relay contacts from excessive loads, or short circuits. Place the fuse in-line with the Zero Speed Switch Sensor relay common or pole (red wire). Use a surge suppressor to help prolong the life of the relay contacts when applicable.

Connection

Table 1. Wire Color Code

ZS09P1 Form 'C'	ZS09P2 Normally Open	ZS09P3 Normally Closed
Black: L1 White: L2 Green: Ground Red: Pole Blue: N.O. Brown: N.C.	Black: L1 White: L2 Green: Ground Red: Pole Blue: N.O. Brown: No Connection	Black: L1 White: L2 Green: Ground Red: Pole Blue: No Connection Brown: N.C.

NOTE: L1 and L2 are not polarity sensitive.

Table 2. Wire Color Code for Optional Auxiliary Relay

ZS09P1 Form 'C'	ZS09P2 Normally Open	ZS09P3 Normally Closed
Yellow: Pole Orange: N.O. Violet: N.C.	Yellow: Pole Orange: N.O. Violet: No Connection	Yellow: Pole Orange: No Connection Violet: N.C.

NOTE: L1 and L2 are not polarity sensitive.

Installation and Operation

1. Mount the Zero Speed Switch Sensor at the point of measure and align with Magnetic Disk or other sensing target. The gap will vary depending on which sensing target is being used. See "Sensing Distance" under "Specifications" on page 8.

2. Orient the Zero Speed Switch Sensor for proper alignment for ferrous sensing targets. See Figure 5 on page 6.

3. L1 and L2 are not polarity sensitive. Connect wires and turn on power. Do not connect any wires to the Zero Speed Switch Sensor when power is present. There is a 2 second power up delay before the Zero Speed Switch Sensor will operate. Rotate sensing target and check the center LED on the Zero Speed Switch Sensor. It should blink each time the Zero Speed Switch Sensor detects the sensing target markers. If not, check the gap between the Zero Speed Switch Sensor and sensor target.

4. When either motion is detected or speed reaches setpoint (depending on application), the Relay indicator LED (the LED located closest to the cable) will illuminate indicating the Relay has energized. The Relay will remain energized as long as either motion is detected or speed remains above setpoint, depending on application. When motion ceases or speed drops below setpoint the Relay will de-energize and the LED will turn off.

5. Use a surge suppressor to prevent the Zero Speed Switch Sensor relay contacts from arcing when applicable. This will help prolong the life of the relay contacts.

NOTE FOR WASHDOWN AREAS OR OUTDOOR USE:

After setup, fill the trim pot opening with clear silicone. Make sure surface is clean and dry before applying silicone. The LED openings are sealed at the factory.

Installation and Operation

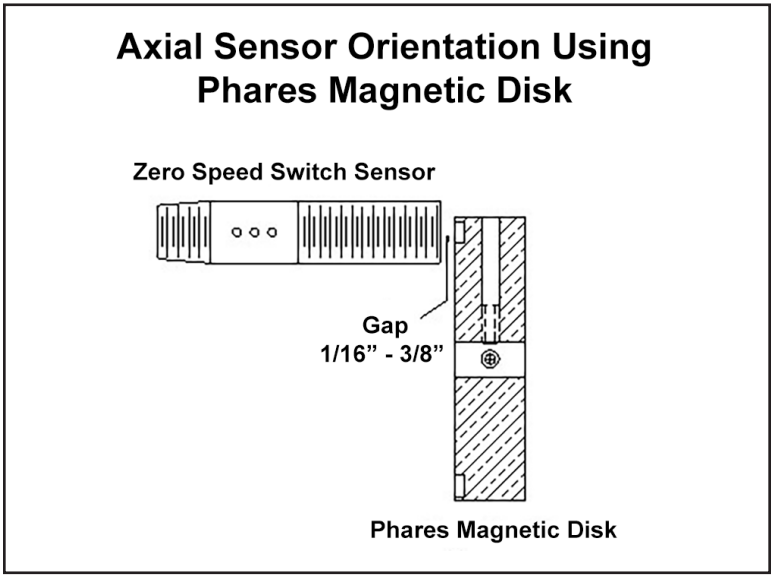

Figure 3. Axial Zero Speed Switch Sensor Orientation

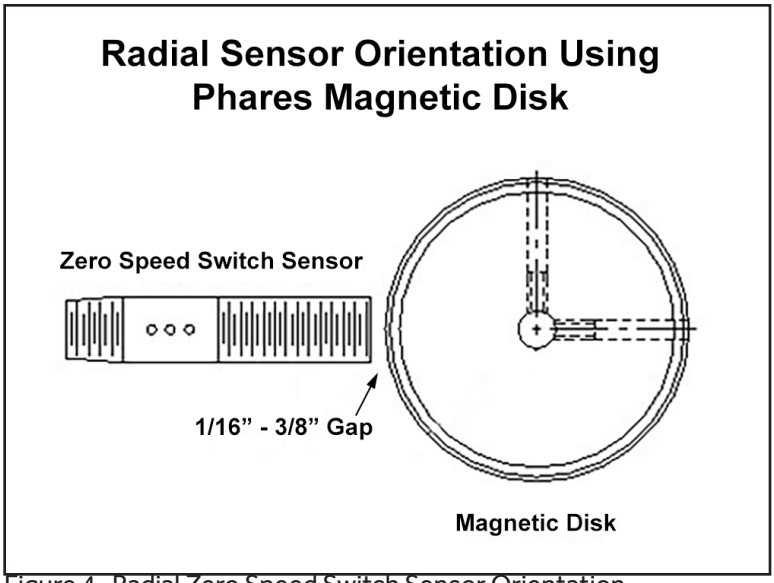

Figure 4. Radial Zero Speed Switch Sensor Orientation

Installation and Operation

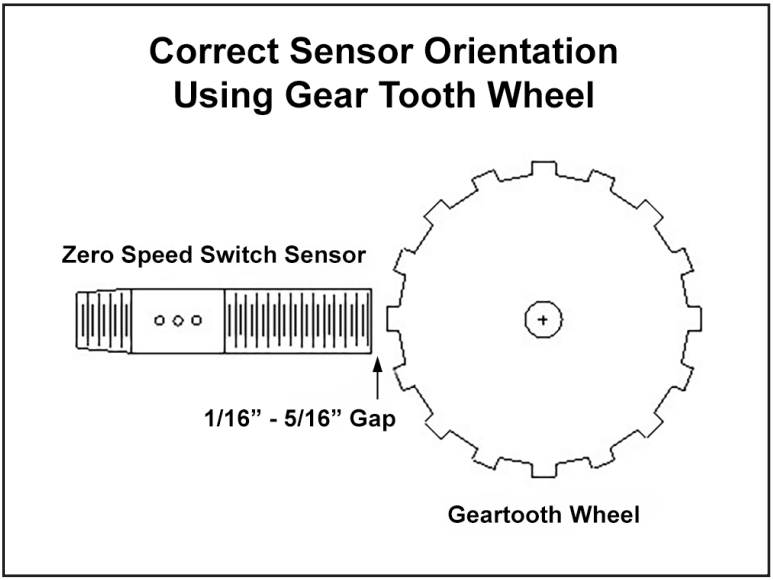

Figure 5. Radial Zero Speed Switch Sensor orientation using a gear tooth wheel. Same orientation for bolt head, key stock, or other ferrous target.

Warning

For maximum safety, the green wire must be attached to Earth Ground and the case mounted to a bracket or conduit that is Earth Grounded.

Safety Precautions

Upon installation make sure any unused wires on the Zero Speed Switch Sensor cable are properly insulated to prevent short circuits or electrical shock. Use caution when handling the ZS09P Zero Speed Switch Sensor wiring. The relay contacts are 'dry' contacts, and do not receive power internally from the ZS09P Zero Speed Switch Sensor, but rather from an external source.

Disclaimer

The ZS09P Zero Speed Switch Sensor is not rated UL or otherwise.

This ZS09P Zero Speed Switch Sensor is not intended for safety critical applications. Users of this Phares Sensors product in such applications assume all risks of such use and shall indemnify Phares Sensors against all damages, including attorney's fees and costs, resulting from such use.

Specifications

Power Requirements:
5-24 VDC, (for Part No. ZS09P-D)
120 VAC, 50/60 Hz (for Part No. ZS09P-120)

Current Draw:
50 mA

Fuse:
Internal ½ Amp non-replaceable fuse

Relay Output: (specify when ordering)
SPDT Form 'C' dry relay contact (Normally Open / Normally Closed)
SPST Normally Open
SPST Normally Closed

Contact Ratings:
5 Amp, 240 VAC
5 Amp, 30 VDC
Cycles: 5A, 250VAC, resistive, 85°C 100x103
Vibration resistance (functional), >15/5g
Shock resistance (destructive) >100g
Shock resistance (functional/ 11ms), >15/5g

Operating Frequency:
Hall Effect and Inductive (Gear Tooth): 0.02Hz – 10kHz
Hall Effect Only: 0.02Hz – 25kHz

Sensing Distance (Gap):
1/16" to 5/16" using Gear Tooth Wheel, Key Stock, Bolt Head, etc.

Sold Separately
1/16" to 3/8" using Phares High Density Magnetic Disk.
1" Maximum using Phares Standard Magnetic Disk.
1" Maximum using Phares Steel Magnet SM-100.
2" Maximum using Phares Rectangle Magnet RM-100

Minimum Gear Tooth Sizes:
1/8" gear tooth length, width, depth, and gap.

Gear Tooth Material:
Low carbon steel (high iron content)

Specifications

Operating Temperature:

-40°F to 140°F

Dimensions

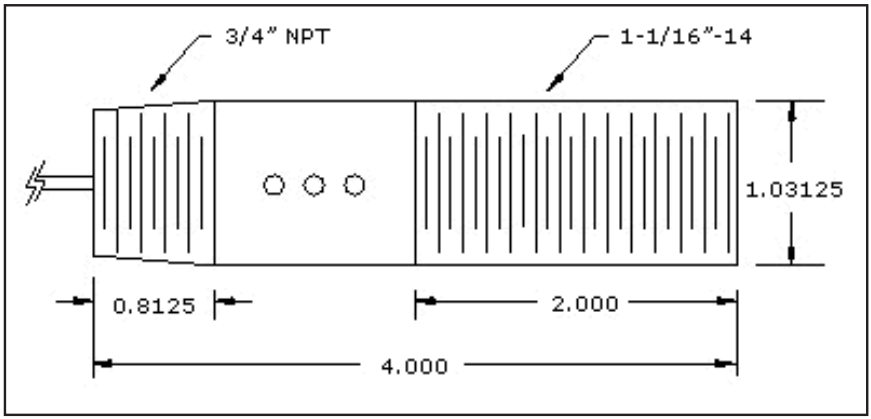

Figure 6. Dimensions (in inches)

Weight: 6 oz.

Cable: 4 ft., 6 conductor, 22 AWG, unshielded
Custom cable lengths are available.

Relay Set-Point Adjustment Range:
Standard: 1-100 RPM, 1 Pulse Per Revolution
Custom parameters are available.

Speed Detection Range: 0.03 – 25,000 RPM

Warranty

All products are thoroughly tested before shipping. If a product is found to be defective within 60 days from the date of purchase, not the date of installation, we will repair or replace the unit. The defective unit must be received and tested at Phares Sensors before a replacement is shipped. If a replacement is needed before the defective unit arrives at Phares Sensors, the replacement will be charged to your credit card, or invoiced to your Net30 Account. A credit will be issued once the unit is received at Phares Sensors and deemed defective upon inspection and testing. Please call us for return shipping instructions.

The warranty is void if the unit is physically damaged from abuse or misuse, or if the unit shows evidence of excessive current, heat, moisture, vibration, or operating conditions outside of design limits or unauthorized modification.

The above constitutes the sole and exclusive warranty provided by Phares Sensors and will not be superseded by any agreement such as a purchase order or other documentation external to Phares Sensors. In no event shall Phares Sensors, or its agents, be liable for any damages, whether direct, indirect, consequential, punitive, or otherwise, arising out of any product or service provided or arranged by Phares Sensors.

Returns

Returns are accepted within 30 days from date of sale. Please call us for return shipping instructions. Returned items must be in resalable condition. A credit will be issued after the item is received by Phares Sensors and deemed resalable after inspection and testing.

Troubleshooting

1. No LED's lit

- Power off
- Sensor target marker aligned with Zero Speed Switch Sensor
- Wiring incorrect
- Zero Speed Switch Sensor internal fuse blown
- End of sensor damaged due to contact with sensor target

2. Pulse LED lit, not blinking; Intermittent blinking

- Zero Speed Switch Sensor gap incorrect
- Zero Speed Switch Sensor not oriented correctly to sensing target
- Zero Speed Switch Sensor misses pulses due to disk wobbling or misalignment
- End of sensor damaged due to contact with sensor target
- Defective Zero Speed Switch Sensor

3. Pulse LED blinking, relay LED not lit

- Incorrect setpoint, or machine speed below setpoint. Turn trim pot several turns counterclockwise to lower the setpoint
- Zero Speed Switch Sensor misses pulses due to disk wobbling, misalignment, incorrect sensor gap, or incorrect sensor orientation.
- Defective Zero Speed Switch Sensor

4. Pulse LED blinking, relay LED lit, relay drops out briefly, pulls back in

- Zero Speed Switch Sensor misses pulses due to disk wobbling, misalignment, incorrect sensor gap, or incorrect sensor orientation.
- Loose electrical power connection to Zero Speed Switch Sensor
- Ambient temperature above 140°F
- Defective Zero Speed Switch Sensor

5. Pulse LED blinking, relay LED lit, relay not energized

- Relay contacts damaged from arcing, not making electrical connection
- Relay contacts inoperable due to excessive load
- Relay contacts inoperable due to excessive shock or vibration

Troubleshooting

6. Pulse LED not blinking, relay LED not lit, contacts remain engaged

- Relay contacts fused together due to excessive load
- Relay contacts inoperable due to excessive load, shock, or vibration
- Both blue and brown wires (N.O./N.C.) are connected together. Separate the wires and choose either N.O. or N.C.

7. Pulse LED blinking, relay LED lit, relay will not engage

- Relay contacts fused together due to excessive load
- Relay contacts inoperable due to excessive load, shock, or vibration

Contact Information

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