

# Operations Manual



**Zero Speed Switch Module  
Model ZS10**

# Operations Manual

## Model ZS10 – Zero Speed Switch Module

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

### **Overview**

The ZS10 Zero Speed Switch Module is an interface between simple on/off sensors and control circuitry enabling over speed, under speed and zero speed measurement.

Simple On/Off Sensors + ZS10 Zero Speed Switch Module = Zero Speed Switch

The ZS10 is particularly useful in applications where environmental conditions prohibit the use of certain electronics. In these cases, the sensor is installed in the prohibitive area and wired to the ZS10 Zero Speed Switch Module which is located out of the prohibitive area. Use for applications in locations classified as hazardous only when properly coupled with UL approved intrinsically safe barriers and sensors.

### **Detail**

The Phares Electric Model ZS10 Zero Speed Switch System consists of the ZS10 Zero Speed Switch Module, Sensor and Sensor Target.

The Sensor Target can be a bolt head, gear tooth, key, magnet, reflector, or other target depending upon type of Sensor used.

External sensor types which may be used with the ZS10 include:

- Hall Effect
- Photoeye
- Inductive
- Capacitive
- Encoder

The ZS10 Zero Speed Switch Module uses frequency input from various types of sensors to determine the presence of motion or the lack thereof. Use the ZS10 for over speed, under speed, and zero speed applications.

When motion is either detected or reaches setpoint, the relay energizes and the relay output changes state. It remains in this state until either under speed or zero speed condition occurs, depending upon the application.

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**Detail (continued)**

The ZS10 Zero Speed Switch Module has 3 diagnostic LED's. These LED's indicate Power, Pulses from Sensor input signal, and Relay status. LED's are labeled Power, Pulse, and Relay. There is a trim pot which is used for adjusting the setpoint.

The ZS10 Zero Speed Switch Module supplies 12 VDC to an external Sensor. The Sensor must be 3 wire, sourcing (PNP) or sinking (NPN) signal. Sensor input signal is configured via the two position selector switch located just above the "Sensor" terminals.

**Setup**

1. Mount the Sensor and Sensor Target.
2. Connect wires to the ZS10 Zero Speed Switch Module.

Wiring Notes:

- a.) The "L1" and "L2" terminals are not polarity sensitive.
  - b.) The "G" and "Shd" terminals are not connected to any circuit nor to each other. These should be wired to Earth Ground if used for grounding and/or shielding purposes.
3. Set Sensor Selector Switch according to the appropriate Sensor input signal. Set Switch to "A" for Sourcing (PNP) and "B" for Sinking (NPN) signal.
  4. When wiring is complete, apply power to the ZS10 Zero Speed Switch Module. The Power LED should illuminate.
  5. Rotate Sensor Target and check the Pulse LED. It should blink each time a marker on the Sensor Target passes the Sensor indicating motion.

If the Pulse LED does not blink:

- a) Check the gap between Sensor and Sensor Target.
- b) Make sure the Sensor is properly aligned with the Sensor Target.
- c) Make sure the Sensor is wired correctly.
- d) Make sure the Sensor selector switch is in the correct position (see step 3).

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**Setup (continued)**

6. When the shaft on which the Sensor Target is mounted rotates at or above operating speed, the Relay LED will illuminate indicating the Relay has energized and changed state. The Relay will remain in this state until speed either drops below setpoint or motion stops. At either point the Relay de-energizes returning to its normal state and the Relay LED turns off.
  
7. If the Relay LED does not illuminate at the desired speed levels, adjust the trim pot. The trim pot is a 10 turn precision pot which does not have stops. Turning the trim pot counterclockwise will lower the setpoint to a slower RPM setting; turning it clockwise will raise the setpoint to a faster RPM setting.
  
8. The ZS10 Zero Speed Switch Module has an internal non-replaceable 1/2 amp fuse for circuit protection.
  
9. A 5 amp external fuse is recommended to help protect the ZS10 relay contacts from possible overloads. Wire the fuse in-line to the Relay "Com" terminal.

Table 1. Phares Electric Sensor Wiring

<b>Wire Color</b>	<b>Function</b>
Black	-VDC
Red	+VDC
White	Signal

Table 2. Phares Electric Sensor Wiring  
for Part Numbers 950-1224100XX, where XX indicates cable length

<b>Wire Color</b>	<b>Function</b>
Black	+VDC
Red	-VDC
White	Signal

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**Setup (continued)**

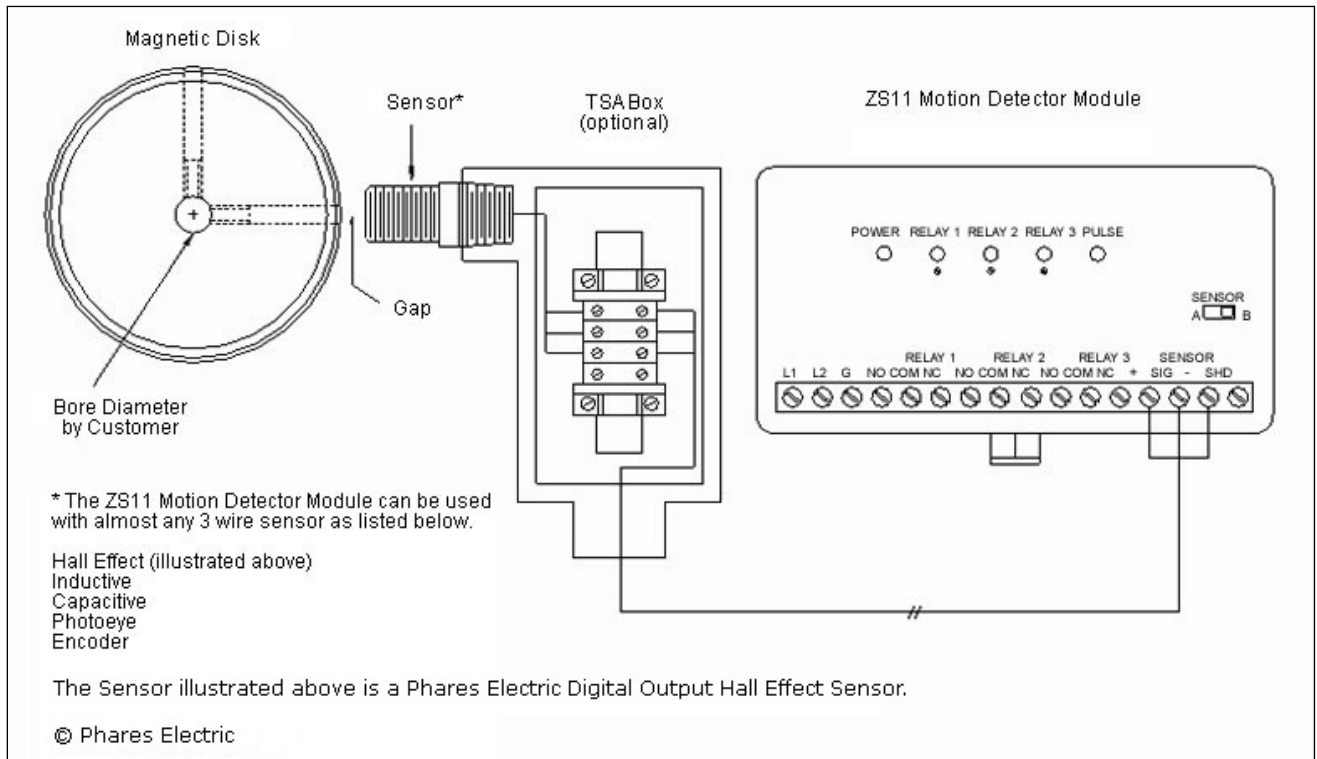


Figure 1. ZS10 Zero Speed Switch System Utilizing Radial Magnetic Disk Target



Figure 2. Indicators and Terminal Block (ZS10-D Shown)

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**Disclaimer**

The ZS10 Zero Speed Switch Module is not rated UL or otherwise.

Use for applications in locations classified as hazardous only when properly coupled with UL approved intrinsically safe barriers and sensors.

This ZS10 Zero Speed Switch Module is not intended for safety critical applications. Users of this Phares Electric product in such applications assume all risks of such use and shall indemnify Phares Electric against all damages, including attorneys fees and costs, resulting from such use.

**Warranty**

All products are thoroughly tested before shipping. If a product is found to be defective within 30 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 Electric before a replacement is shipped. If a replacement is needed before the defective unit arrives at Phares Electric, 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 Electric 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 Electric. In no event shall Phares Electric, 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 Electric.

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**Specifications**

Power Requirements

(Please see product label for supply voltage)  
85-264 VAC, 50/60 Hz (for Part No. ZS10-A)  
9-36 VDC, 50/60 Hz (for Part No. ZS10-D)

Current Draw

50 mA

Circuit Protection

Internal ½ amp fuse, non-replaceable

Input Signal

12VDC, 3 wire, sourcing (PNP) or sinking (NPN)

Dimensions (in inches)

3-1/16" Wide x 3-1/4" High\* x 2-1/2" Deep  
\*including DIN Rail Mount and Terminal Block

Relay

Output:

SPDT Form 'C' dry relay contact (N.O/N.C.)

Contact Rating:

5 A at 120 VAC; 5 A at 30 VDC

Maximum switching frequency:

1,800 operations/hr (under rated load)

Life expectancy:

Mechanical 10,000,000 operations min. (at 1,800 operations/hr)

Electrical 100,000 operations min. (at 1,800 operations/hr)

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**Troubleshooting**

<b>Line No.</b>	<b>Description</b>	<b>Causes</b>
1.	Power LED does not light with power applied.	<ul style="list-style-type: none"><li>• Confirm appropriate voltage is across “L1” and “L2” terminals</li><li>• Remove power and wires to "L1" and "L2" terminals. Check continuity across "L1" and "L2" terminals. If there is no continuity, the internal fuse is blown and ZS10 Zero Speed Switch Module needs to be replaced.</li></ul>
2.	Pulse LED does not blink.	<ul style="list-style-type: none"><li>• Confirm that the Sensor is wired correctly to the ZS10 Zero Speed Switch Module.</li><li>• Confirm that the Sensor Selector Switch is set properly for the Sensor type used. The "A" setting is for a Sourcing (PNP) Sensor, and the "B" setting is for a Sinking (NPN) Sensor.</li><li>• Check the gap between the Sensor and the Sensor Target. The Sensor may not be able to detect the Sensor Target if there is too large of a gap.</li><li>• Check Sensor alignment with Sensor Target. If out of alignment, the Sensor might not be able to detect the markers on the Sensor Target.</li><li>• Check the Sensor "+" and "-" terminals. There should be 12 VDC across the terminals.</li><li>• Sensor may be the wrong type or defective.</li></ul>



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**Troubleshooting (continued)**

<b>Line No.</b>	<b>Description</b>	<b>Causes</b>
3.	Relay LED does not light.	<ul style="list-style-type: none"><li>• Confirm that the Pulse LED is blinking. At high speeds it may appear to be lit continuously because it is blinking very fast. Slow the speed until it can be determined that the Pulse LED is actually blinking.</li> <li>• If Pulse LED is blinking:  Speed is below setpoint. Adjust trim pot. Turning the trim pot counterclockwise will lower the setpoint to a slower RPM setting and turning it clockwise will raise the setpoint to a faster RPM setting.</li> <li>• If Pulse LED is steady regardless of speed, then the sensor may be wired incorrectly, the wrong type of sensor or be defective.</li></ul>

**Contact**

Telephone: 727-351-2505

Mailing Address: Phares Electric  
P.O. Box 67251  
St. Petersburg, FL 33736

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