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LD | MD | HD

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MOTOR | BRAKE  
UNITS

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UNITS

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BRAKES

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PUMPS

FLOW  
DIVIDERS

# SPEED SENSORS

## Single & Dual Sensing Options



Delivering The Power To Get Work Done





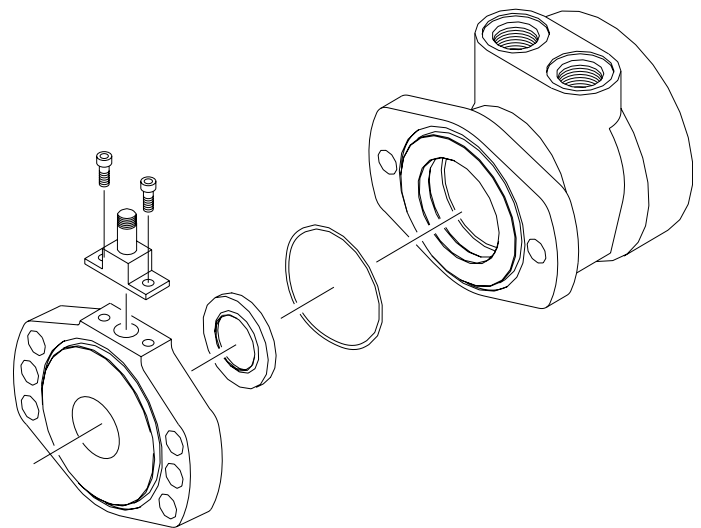
**OVERVIEW**

White Drive Products offers both single and dual element speed sensor options providing a number of benefits to users by incorporating the latest advancements in sensing technology and materials. The 700 & 800 series motors single element sensors provide 60 pulses per revolution with the dual element providing 120 pulses per revolution, with all other series providing 50 & 100 pulses respectively. Higher resolution is especially beneficial for slow speed applications, where more information is needed for smooth and accurate control. The dual sensor option also provides a direction signal allowing end-users to monitor the direction of shaft rotation .

Unlike competitive designs that breach the high pressure area of the motor to add the sensor, the White Drive Products speed sensor option utilizes an add-on flange which has been built to withstand the toughest conditions to locate all sensor components outside the high pressure operating environment. This eliminates the potential leak point common to competitive designs.

Another important feature of the sensor flange is that it is self-centering, which allows it to remain concentric to the magnet rotor. This produces a consistent mounting location for the new sensor module, eliminating the need to adjust the air gap between the sensor and magnet rotor. The o-ring sealed sensor module attaches to the sensor flange with two small screws, allowing the sensor to be serviced or upgraded in the field in under one minute.

This feature is especially valuable for mobile applications where machine downtime is costly. The sensor may also be serviced without exposing the hydraulic circuit to the atmosphere. Another advantage of the self-centering flange is that it allows users to rotate the sensor to a location best suited to their application. This feature is not available on competitive designs, which fix the sensor in one location in relationship to the motor mounting flange.



**FEATURES / BENEFITS**

- Grease fitting allows sensor cavity to be filled with grease for additional protection.
- Internal extruder seal protects against environmental elements.
- M12 or weatherpack connectors provide installation flexibility.
- Dual element sensor provides up to 120 pulses per revolution and directional sensing.
- Modular sensor allows quick and easy servicing.
- Acetal resin flange is resistant to moisture, chemicals, oils, solvents and greases.
- Self-centering design eliminates need to set magnet-to-sensor air gap.
- Protection circuitry

**SPECIFICATIONS**

**SINGLE ELEMENT SENSOR - Y & Z**

|   |                                |
|---|--------------------------------|
| Supply voltages .....                   | 7.5-24 Vdc                     |
| Maximum output off voltage .....        | 24 V                           |
| Maximum continuous output current ..... | < 25 ma                        |
| Signal levels (low, high) .....         | 0.8 to supply voltage          |
| Operating Temp .....                    | -30°C to 83°C [-22°F to 181°F] |

**DUAL ELEMENT SENSOR - X & W**

|   |                                |
|---|--------------------------------|
| Supply voltages .....                   | 7.5-18 Vdc                     |
| Maximum output off voltage .....        | 18 V                           |
| Maximum continuous output current ..... | < 20 ma                        |
| Signal levels (low, high) .....         | 0.8 to supply voltage          |
| Operating Temp .....                    | -30°C to 83°C [-22°F to 181°F] |

# SPEED SENSOR

Optional Hydraulic Motor Accessory

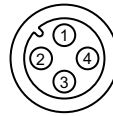


## SENSOR OPTIONS

### Z - 4-pin M12 male connector

This option has 50 pulses per revolution on all series except the DT and D9 which have 60 pulses per revolution. This option will not detect direction.

Z Option



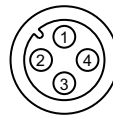
PIN

|   |           |              |
|---|-----------|--------------|
| 1 | positive  | brown or red |
| 2 | n/a       | white        |
| 3 | negative  | blue         |
| 4 | pulse out | black        |

### X - 4-pin M12 male connector

This option has 100 pulses per revolution on all series except the DT and D9 which have 120 pulses per revolution. This option will detect direction.

X Option



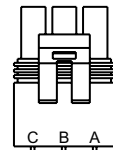
PIN

|   |               |              |
|---|---------------|--------------|
| 1 | positive      | brown or red |
| 2 | direction out | white        |
| 3 | negative      | blue         |
| 4 | pulse out     | black        |

### Y - 3-pin male weatherpack connector\*

This option has 50 pulses per revolution on all series except the DT and D9 which have 60 pulses per revolution. This option will not detect direction.

Y Option



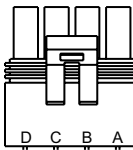
PIN

|   |           |              |
|---|-----------|--------------|
| A | positive  | brown or red |
| B | negative  | blue         |
| C | pulse out | black        |
| D | n/a       | white        |

### W - 4-pin male weatherpack connector\*

This option has 100 pulses per revolution on all series except the DT and D9 which have 120 pulses per revolution. This option will detect direction.

W Option



PIN

|   |               |              |
|---|---------------|--------------|
| A | positive      | brown or red |
| B | negative      | blue         |
| C | pulse out     | black        |
| D | direction out | white        |

\*These options include a 610mm [2 ft] cable.

## PROTECTION CIRCUITRY

The single element sensor has been improved and incorporates protection circuitry to avoid electrical damage caused by:

- reverse battery protection
- overvoltage due to power supply spikes and surges (60 Vdc max.)
- power applied to the output lead

The protection circuit feature will help “save” the sensor from damage mentioned above caused by:

- faulty installation wiring or system repair
- wiring harness shorts/opens due to equipment failure or harness damage resulting from accidental conditions (i.e. severed or grounded wire, ice, etc.)

- power supply spikes and surges caused by other electrical/electronic components that may be intermittent or damaged and “loading down” the system.

While no protection circuit can guarantee against any and all fault conditions. The single element sensor from White Drive Products with protection circuitry is designed to handle potential hazards commonly seen in real world applications.

Unprotected versions are also available for operation at lower voltages down to 4.5V.

### TECHNICAL INFORMATION

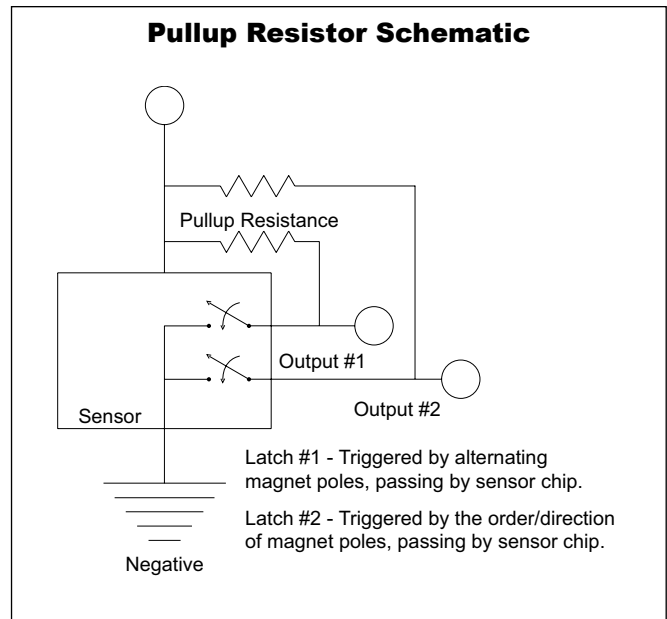
White Drive Products speed sensors are non-contact magnetic based devices that can operate in harsh environments with high reliability. They use the latest technology in Hall Effect integrated circuitry to provide separate digital outputs to detect the speed and/or direction of a rotating magnet. They require a magnetic south pole to switch the sensor output from a low (logic "0") to a high (logic "1") and a magnetic north pole to switch from a high to a low signal.

These sensors are calibrated to operate symmetrically around zero gauss to provide a 50 % duty cycle. The operating frequency is from 0 to 100,000 Hz. The sensor circuit requires pull-up resistance (i.e. 2K ohm @ 12V- See Example 1) and surge protection. The sensor will operate as low as 5 ma. Reverse polarity protection is built in. The output can be directly interfaced with most rate meters, programmable controllers or TTL/CMOS logic devices. This transducer is an NPN open collector current sinking device.

The sensor flange comes equipped with a grease fitting. Filling the sensor cavity with grease provides an additional level of protection for the sensor components in harsh applications. An all-purpose grease is recommended. The sensor flanges may be turned to any position to accommodate the application.

### CIRCUIT

Pull-up resistance is required to provide the necessary voltage and current levels to guarantee a "1" logic output whenever the output transistor is in the "off" state. Pull-up resistance also limits current through the device and shapes the leading edge of the square wave. Many readouts and controllers have internal pullup resistance available. Follow the device manufacturer's instructions.



#### Pullup Resistance Formula\*

$$R \text{ (K ohms)} = \frac{V \text{ supply (7.5-18 Vdc)}}{\text{Desired sink current (5-20ma)}}$$

$$\text{Example: } 2\text{K Ohm Resistor} = \frac{12 \text{ V}}{6 \text{ ma}}$$

**\*DO NOT** exceed maximum ratings.  
**NO** pullup resistance destroys sensors.

**Example 1**

# ST (970 Series)

## Sensor Tester



### INSTRUCTIONS

The sensor tester will perform functional testing of sensors and wiring harnesses in the shop or field. Power for these tests can be derived from the controller system or the tester's internal batteries. To conduct tests, a tester and the appropriate cable adapter will be required. There are three different cable (M12 style, 3 pin Weatherpack, and 4 pin Weatherpack) adapters available to connect to the system and sensor.

### SYSTEM TEST

To test the system, shut the system down and disconnect the sensor. Connect the tester to the system and the sensor to the tester. Turn the system back on. The TRUCK PWR indicator should come on. If it does not, check the system wiring and controller. If the TRUCK PWR indicator does turn on, then select the TRUCK POWER position on S1 and SENSOR on S2. This will apply +12 volts to the tester's internal circuitry and to the sensor and connect the sensor's output to the controller. Rotate the motor. The OUTPUT indicator should turn on and off and the audible indicator should turn on and off. An alternative method is to take the sensor and pass it over the sensor tester's face plate where indicated. The SIG OUT indicator should turn on and off, along with the audible indicator. If the SIG OUT indicator (and the audible indicator) is on continuously, disconnect the sensor. If the indicator is still on continuously, check the controller and system wiring for a short between the signal line of the system and ground. If disconnecting the sensor causes the SIG OUT indicator to turn off, replace the sensor and retest. If power from the controller is unavailable a sensor may be tested by selecting power from the tester's internal batteries. Remember to turn the POWER switch to the off system when not in use to extend the life of the batteries. The tester can also simulate a sensor. Connect the tester to the system, Select the PULSE GEN mode and the tester will feed pulses to the controller. If the controller does not recognize the pulses from the tester, check the system wiring and the controller.

### ORDER CODES

- 9702211AA** Tester with M12 4-Pin Connector
- 9702212AA** Tester with 3-Pin Weatherpack Connector
- 9702214AA** Tester with 4-Pin Weatherpack Connector

### SWITCHES & INDICATORS

Switch S1 (left hand side) selects the power source for the tester. It is a center off switch and when in the center position, the tester is shut down and no power is applied to the sensor. When TRUCK POWER is selected by S1, power for the tester and the sensor is furnished by the controller system. When S1 is in the BATTERY POWER position, power for the tester and the sensor is supplied by the tester's internal batteries. When BATTERY POWER is selected, the BATTERY POWER led will be on. The TRUCK POWER led will be on any time the tester is connected to the controller and the controller is supplying +12 volts through the system wiring. This indicator will be on as long as +12 volts is available from the controller regardless of the position of S1. Switch S2 is also a three position, center off switch. When in the center, or OFF position, the output line to the truck is disconnected. When in the SENSOR position, the output from the sensor under test is connected and routed through to the controller. The SENSOR OUT indicator will turn on, indicating that the signal source for the controller is the sensor. When switch S2 is in the PULSE GEN position, the internal pulse generator will send output pulses to the controller, simulating a good sensor. The PULSE GEN indicator will turn on, indicating the PULSE GEN has been selected. When in the PULSE GEN mode, the SIG OUT indicator will flash on and off and the audible indicator will be heard.

### BATTERY REPLACEMENT

The sensor tester's internal power is provided by two standard nine volt batteries, which are widely available. To replace the batteries, remove the four screws at the corners of the top of the tester and carefully lift the top of the tester, while guiding the cable pigtail into the housing to gain more room. Guide the top cover and PCB assembly out of the way. Remove the battery cushion and then remove the batteries from their nest. Replace the batteries and reverse the above procedure to close the tester. Use caution when guiding the cable pigtail. Rechargeable nine volt batteries may be used if desired, but the tester does NOT provide any charging capability for the internal batteries.

## **DISCLAIMER**

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