High Resolution Driveshaft Speed Sensor Instructions

1 Introduction

The Motion Raceworks Driveshaft Speed Sensor kit is designed to deliver a high resolution, noise-free driveshaft RPM signal to your EFI ECU, datalogger, or any device capable of reading a 5v or 12v square wave input with 16 teeth per revolution. EFI Systems such as MS3Pro and MS3Pro Ultimate, Holley HP/Dominator, FuelTech FT500/FT600 and dataloggers such as Racepak are all capable of using this kit. This type of system is popular for torque / traction management applications as well as performance recording. It uses a Hall Sensor to read a reluctor instead (not magnets) for a more accurate signal less prone to noise interference.

The kit contains a reluctor wheel for your pinion size, a bracket and a sensor to read the reluctor wheel.

2 Installation

2.1 Reluctor Wheel

2.1.1 The Motion Raceworks High Resolution Reluctor wheel is designed in multiple sizes to fit specific yokes (each manufacturer typically has a different machined Outer Diameter on its yoke). This wheel is a two piece split collar design which tightens around the machined OD on the yoke (see picture). Using a 5/32 Allen wrench, tighten the two socket head cap screws evenly until the reluctor wheel will not spin freely, then tighten each firmly. Note: you may also use blue loctite. Most yokes have a large machined OD allowing you to position the ring in various depths. Simply position this wheel so that the teeth are centered on the sensor.

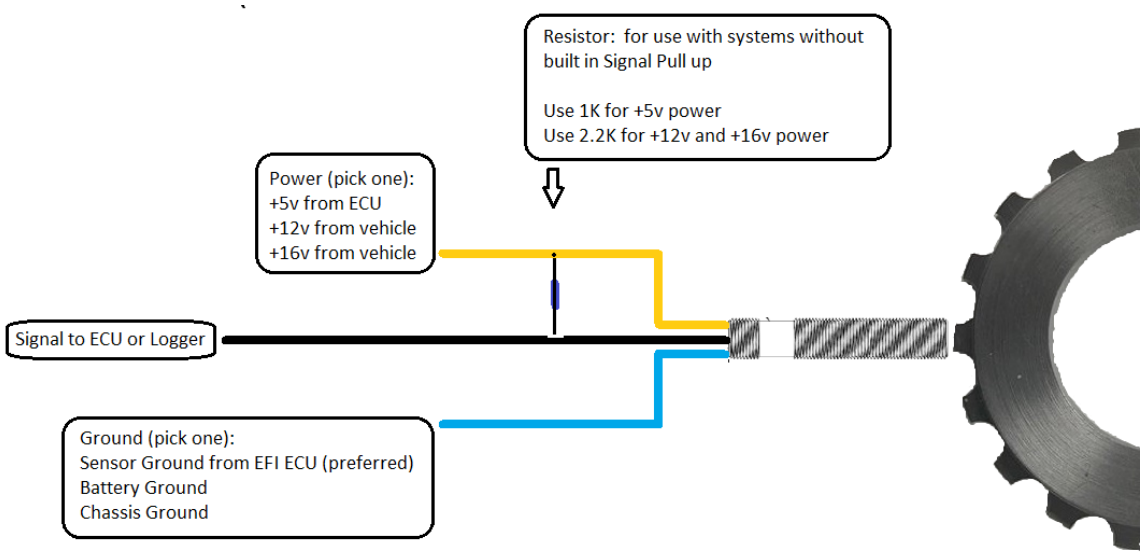
2.2 Bracket

2.2.1 Motion Raceworks offers an aluminum bracketry setup for both 9" and 8.8 housings. Orient the bracket so that the sensor is square and perpendicular to the reluctor wheel and allowing for the proper gap. Note: based on the large number of varying pinion yokes on the market today there is a chance that these will not work with your yoke and a custom fabrication will need to be made. We have found that a single hole mounting location is sufficient, so long as the face of the sensor is square/perpendicular to the reluctor wheels teeth.

2.3 Wiring

2.3.1 Sensor has 3 wires: Power, Ground, and Signal. **Make note that the colors are as follows: Tan: (power, +12 or +5v) Blue: (ground) and Black: (signal to ECU or logger).** *Whenever possible, power the sensor using your EFI or logger's "Reference Voltage" which is normally +5 volts.* You can power the sensor with +12v or +16v from your vehicle's charging system, but a 5v reference supply (normally found in EFI ECUs, and used to power sensors like TPS, MAP) is less susceptible to noise/interference.

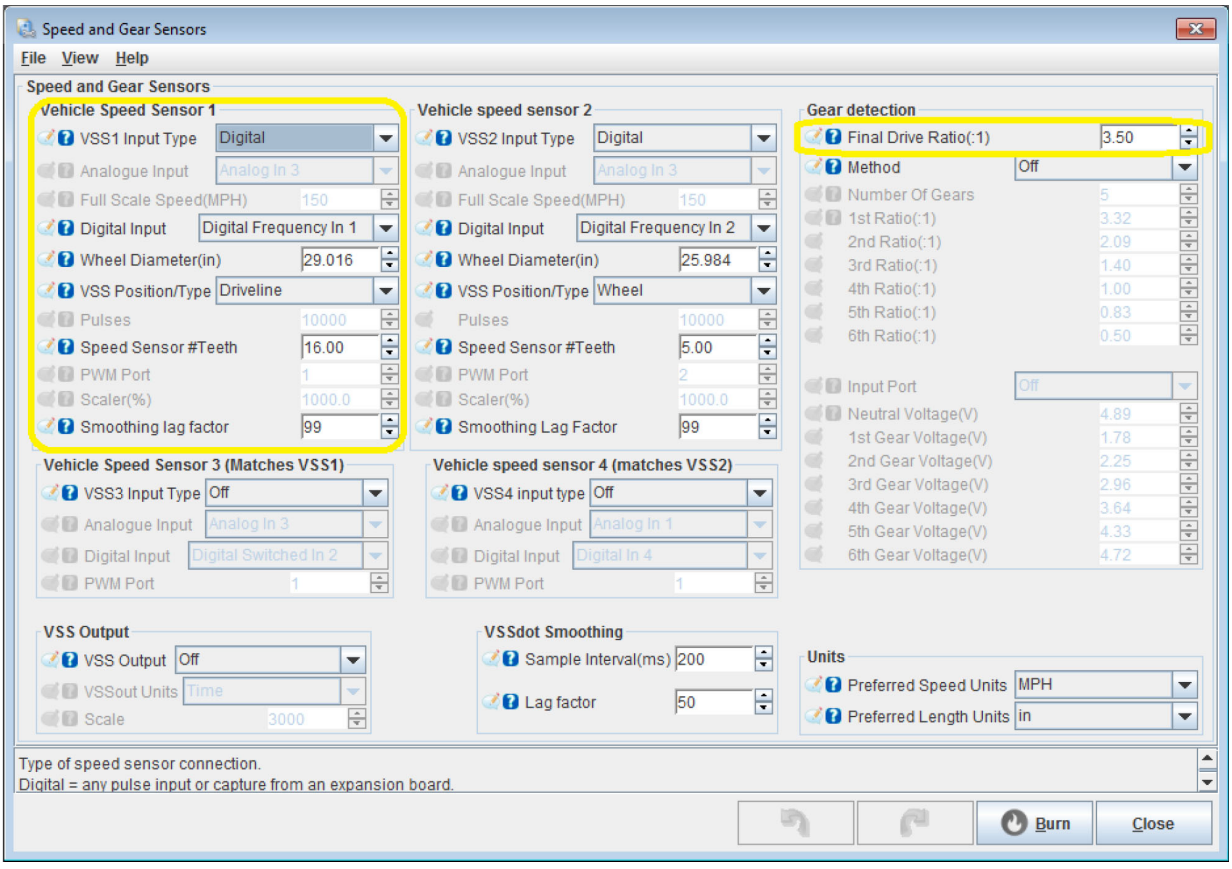
2.3.2 Resistor Installation: **If your ECU does not contain "pull up" resistance in their speed sensor inputs, you will need to install one of the included resistors when you wire your sensor.** The 1K resistor is used when powering the sensor with +5v. The 2.4k resistor is used when powering with +12v, and the 3.0k is used for +16v-24v. For example, Holley and Racepak systems have onboard resistors in their speed inputs already. MS3Pro and FuelTech both require the resistor to be installed externally. Check with our technical support to be sure of what you need. **The resistor ties the Power and Signal wires together (see diagram below).**



3 Configuration Examples

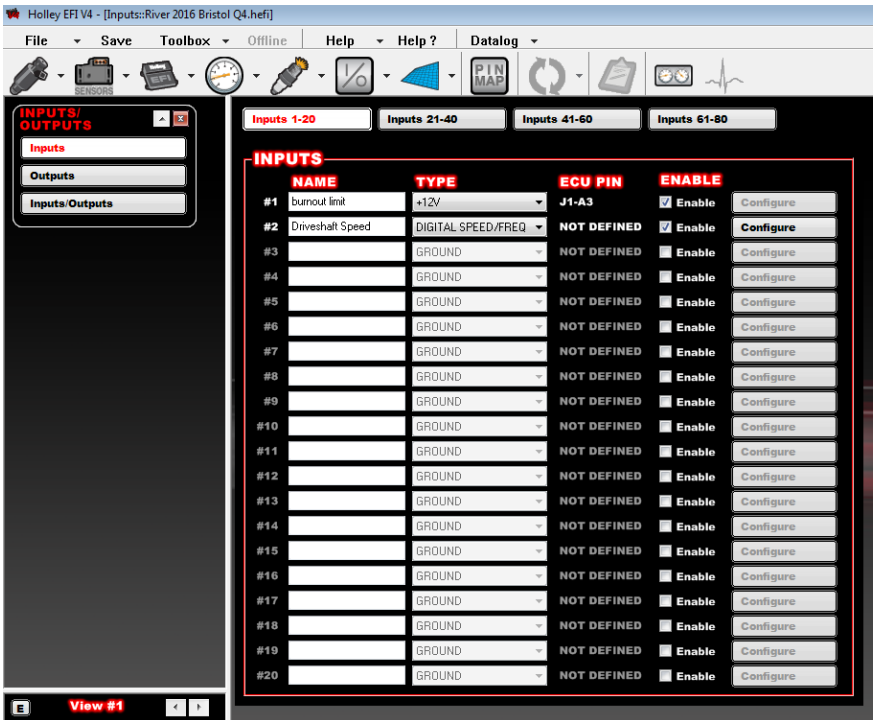
3.1 MS3Pro, MS3Gold, Megasquirt MS3 (kit versions), MS2, and Microsquirt (using MS2Extra firmware)

Speed sensors are configured in TunerStudio under the "Advanced" menu, "Speed and Gear Sensors" - here you select the input you've wired sensor to (in this case, Digital Switched Input 1), the number of teeth, and your final drive ratio. Once complete you will have a "VSS1" gauge and VSS1 field in your datalogs that should register MPH when teeth pass in front of the sensor. Adjust the Tire Diameter field up or down to calibrate your MPH accurately with either a GPS or using a chassis dynamometer. We recommend calibrating at 60mph. Always be careful and observe local laws when calibrating your speed sensor!

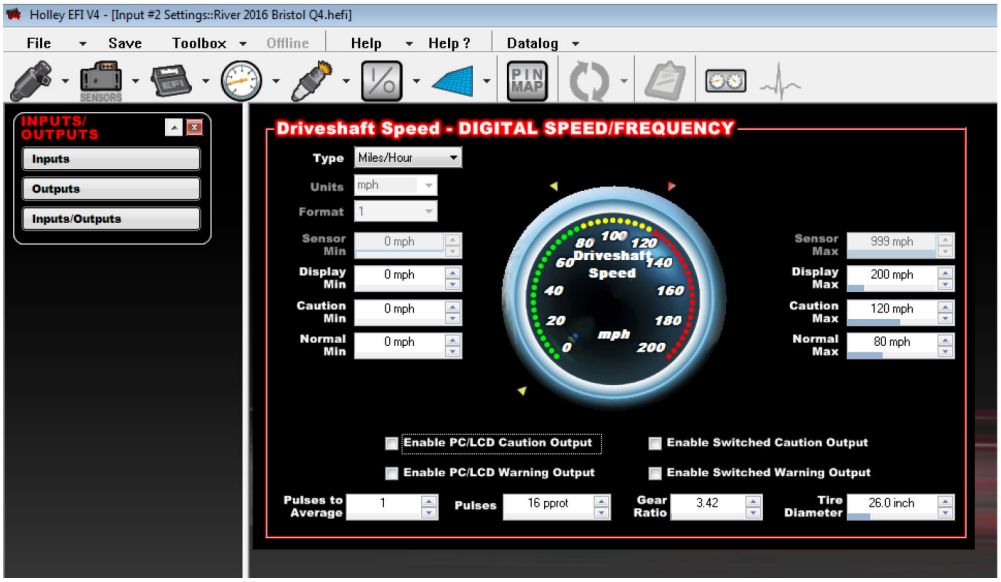


3.2 Holley Dominator / HP ECU

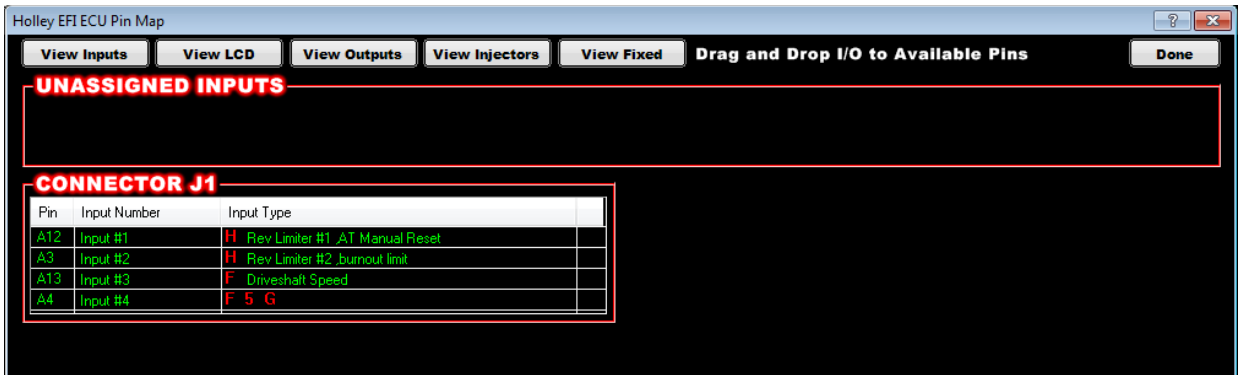
On Holley HP and Dominator Systems, you first need to configure your input for driveshaft speed in the Inputs configuration dialog:



Next, configure the sensor details in the "Configure" menu for the Driveshaft Speed Sensor input you created, as seen here:

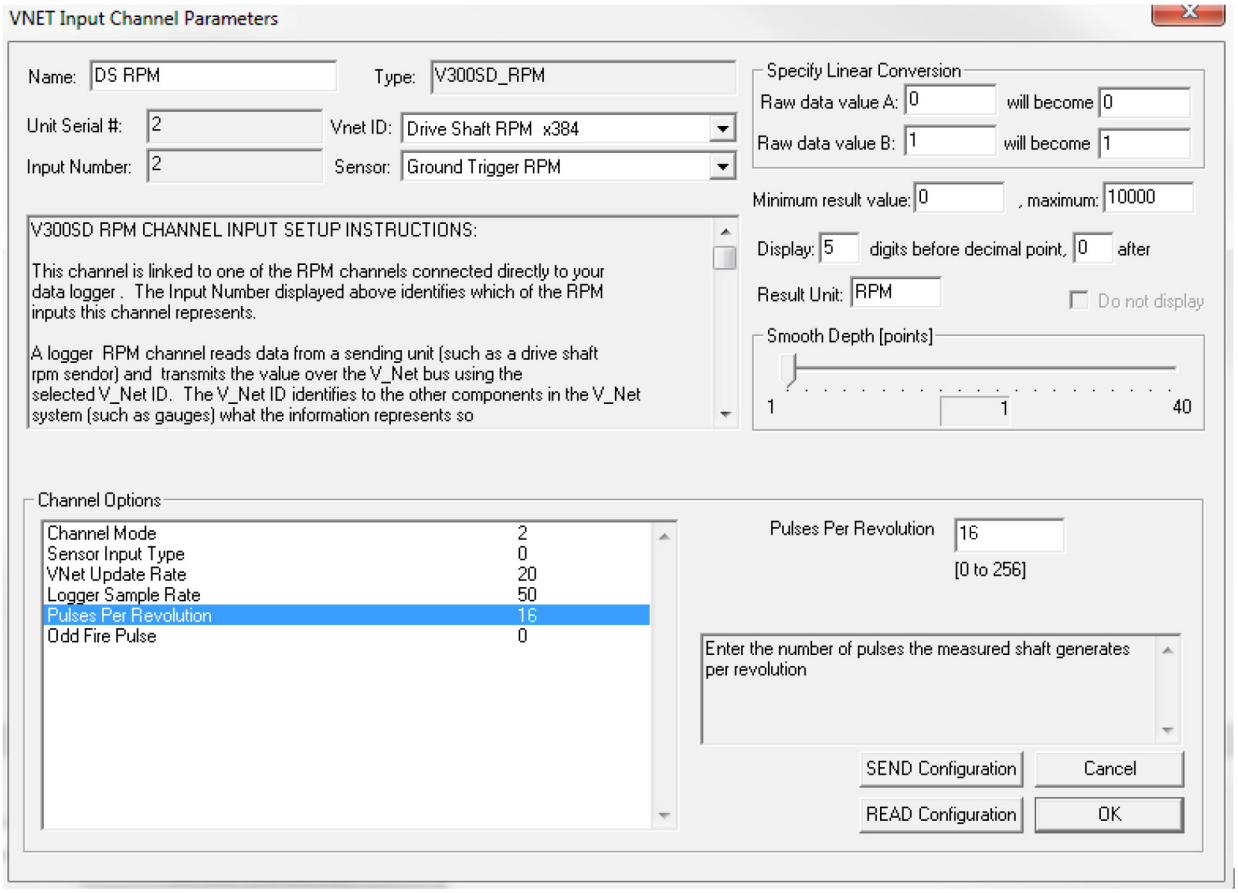


Finally, assign a pin to the input you created in the Pin Map configuration dialog:



3.3 Racepak (all logger versions)

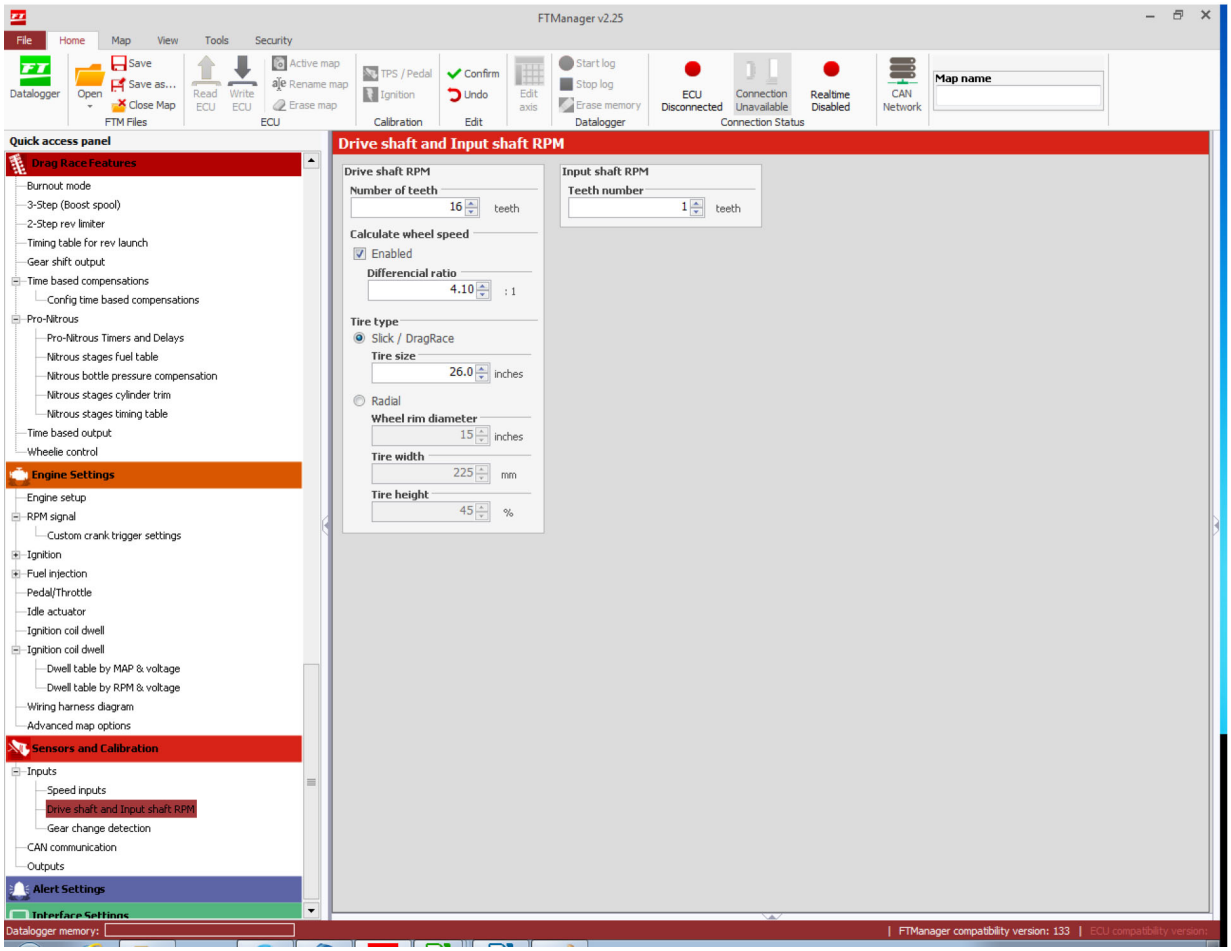
Physical installation is as described above, **however there is no pull-up resistor used as the Racepak system has this resistor installed internally.** Power the sensor using +12v or +16v from vehicle power. Ground sensor to godo battery (preferred) or chassis ground. Attach signal wire to Racepak ECU Driveshaft Speed Sensor input. Configuration for all loggers is as follows:



Once configuration is complete, this configuration needs to be sent to the recorder via the programming cable (just like configuring any other sensor in Racepak), configuration file saved, and power cycle the system before testing. Use Live Telemetry to view realtime speed information to test the sensor with the vehicle on jackstands.

3.4 FuelTech FT500 / FT500 Lite / FT600

In the FTManager program, select the Inputs, Drive Shaft and Input Shaft RPM menu. Configure as shown in this diagram.



4 Troubleshooting

4.1 No Signal to ECU

4.1.1 Verify signal by using a voltmeter on the "Signal" wire. The voltage should be around 0-1v when a "tooth" is near the sensor. The signal should be around 4-5v (with 5v power) or 11-12v (with 12v power) whenever there is NOT a tooth under the sensor. Test these by slowly rotating the reluctor/driveshaft and watching the voltage. If the voltage changes as described, the issue is most likely configuration in your logger/ECU.

4.1.2 Check pullup resistor is installed properly, see instructions!

4.1.3 Check ECU/Logger configuration. Manufacturer documentation and tech support may be very helpful.

4.2 Intermittent signal to ECU

4.2.1 Check sensor gap, we recommend .040" but you can try as much as .100" or as little as .015" - you may have to try a few different positions to find the one that provides the most reliable signal

4.2.2 Check pullup resistor is installed properly, see instructions!

4.2.3 Check power and ground to the sensor, measure both with a voltmeter. Power should be 5v, 12v, or 16-20v. Ground should show continuity to battery "-" terminal of 2 ohms or less. Repair power leads or grounds as necessary.

4.2.4 Try running resistor spark plugs and shielded plug wires. Believe it or not, solid core wires and nonresistor plugs can cause problems with ECUs, sensors, etc. Refer to your ECU / Ignition manufacturer's instructions on these. We recommend always using suppression (spiral) core wires and resistor spark plugs with any electronic engine or powertrain management.