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Inductive Shaft Speed Sensor Installation and Calibration

Corsa part #: SS5
Thread size: 15/32-32
Recommended sensing range: 0.050"
Maximum sensing range: 0.150"
Maximum operating temperature: 125°C

Nominal scale: 0.0167 hz/rpm for one target
0.0333 hz/rpm for two targets
0.0667 hz/rpm for four targets

scale = (number of targets)/60 to read RPM

The shaft speed sensor can be used to measure engine RPM, driveshaft, halfshaft, or intermediate shaft speed, etc. The sensor creates a pulse when a metallic object such as a bolt head passes its face. The Corsa RPM interface box monitors this output signal and returns a RPM signal to the main Data Acquisition box. This sensor is wired to the DB9 input connector on the face of the RPM interface box which is in turn, wired to the 'Speed In' port on the face of the Main Box.

Installation:

Find a place to mount the sensor so the flat end faces the moving part. Be careful of runout or movement of the shaft that may allow the shaft to hit the sensor or allow the targets to move too far away from the sensor for it to work.

The sensor is designed to pick up ferrous metal objects. These can be coarse gear teeth, bolt heads, or notches or slots in a hub. Often an existing set of bolts can be used, for instance on a crankshaft pulley or a wheel hub.

Generally speaking, large targets, on a small diameter circle, work best. Usually the targets should be at least ½" wide and ¼" high or more, and the diameter of the bolt circle should be 6" or less. Larger bolt circles are OK on wheel hubs, since the speed is much lower than on the crankshaft. If the targets are hex bolts or nuts, it's best to align them all the same, so the flat edge of the hex (not the point) passes first across the sensor.

The recommended sensing range is .050". If this airgap between the sensor and it's target is too large, the readings will be erratic. Air gaps up to about 0.150" can work, if the target is large, the diameter of the bolt circle is small, or the speed is low.

The number of targets affect the sampling resolution. For best resolution at shaft speeds under 1200RPM, make sure there are at least two targets. One target is usually the easiest choice if you are not concerned with shaft speeds under 1200 RPM or with high sampling rates. If you need to measure low speeds, you can use more targets, equally spaced. It is important that they are spaced exactly equally, or you will get "jitter" in the readings. Using more targets also reduces accuracy at very high shaft speeds.

<u>Targets</u>	<u>Lowest speed Readable</u>	<u>Lowest speed Recommended</u>	<u>Highest speed for 1% accuracy</u>
1	120 RPM	1200 RPM	30,000 RPM
2	60	600	15,000
3	40	400	10,000
4	30	300	7,500
5	24	240	6000
6	20	200	5000
8	15	150	3750

Higher RPMs than listed above can also be obtained. Call Corsa Instruments for further information.

Suggestions about targets:

- For drag race cars, use four targets for driveshaft speed to get the best resolution at launch.
- Road racing formula cars or sports racers should use two to six targets on the halfshaft or wheel, especially if you run relatively slow courses. There may be an existing bolt circle you can use.
- For engine RPM, one target is fine, or use two for balance.

Hookup:

If you only have one shaft speed sensor wired to the DB9 connector, it will be wired to channel S2. (S1 is usually Engine RPM) The channel number will be on the connector. The shaft speed sensors require a 1k 'pullup' resistor to be hooked up between the signal return and the +12 or +5v terminal. The RPM interface box has these resistors built in, with "dip switch" to connect or disconnect them. Normally the interface box is shipped with the switches turned on for RPM channels 2, 3, and 4, so you should not need to change them. If your sensor doesn't work, check these switches. Older RPM boxes (version 1.5) have jumpers, and even earlier boxes have a terminal strip with the resistors attached inside the RPM box and were usually shipped with a resistor attached to channel S2 only. If you are adding more speed sensors to an older (before 5/98) Corsa system, check inside the RPM

interface box to see if the 1k resistors are in place; if not, see the appendix of the manual for instructions on how to hook them up or call Corsa for more information.

Calibration:

Set the “Zero Reference” to 0. Set the Scale to the number listed at the top of this sheet, if you want the readout in RPM. In some cases, especially drag racers, driveshaft RPM is more useful than MPH because it is easier to compare to engine or clutch RPM.

To calibrate the sensor to read vehicle speed in miles per hour, follow the procedure below. But be aware that the measured speed will change a little depending on actual tire size, vehicle weight, downforce, and tire growth with increasing speed.

- First you need to figure out “pulses per mile”. There are lots of ways to do this, but one good way is this:
- Put a chalk mark on the bottom sidewall of the tire, and a matching chalk mark on the ground. Now roll the car forward one tire revolution, and put another mark on the ground matching the mark on the tire. Measure between the marks on the ground in inches, this is the tire rolling circumference.
- Now divide 63360 by this number of inches. The result is the number of tire revolutions per mile. If you have more than one target on the tire or halfshaft, multiply the “revolutions per mile” by the number of targets. If your targets are on the driveshaft, also multiply by your final drive ratio. Now you have “pulses per mile”.
- For example, say the tire rollout is 59 inches. $63360 / 59 = 1073.9$ and say we have two targets on the halfshaft, so the pulses per mile = 2148.
- Now divide “pulses per mile” by 3600 to get the Scale in “hertz / MPH”. Enter this number in the “Scale” field in the configuration file.
- For example, 2148 pulses per mile would make a Scale of 0.5967 hertz per MPH.