

e-Gizmo

# Magnetic Car Sensor

Hardware Manual

Rev 1r0



e-Gizmo magnetic car sensor detects presence or passing of cars by measuring the disturbance caused by the car with the earth's magnetic field. Only large and heavy metal objects (e.g. car engine) can cause field disturbances that are detectable by this sensor. Hence, the sensor is largely unaffected by people, animals, non metals, and even small metal objects when more than 12" away from the sensor.

Although the Magnetic Car sensor is made to detect cars, its sensitivity to the earth's magnetic field (hence, position), makes it usable for other purposes as well. For example, you can use it as a security detection device that sets off an alarm when something it is protecting is moved. It can be used to detect flow of current in a wire. It is not hard to find other potential uses for this sensor.

**Specifications:**

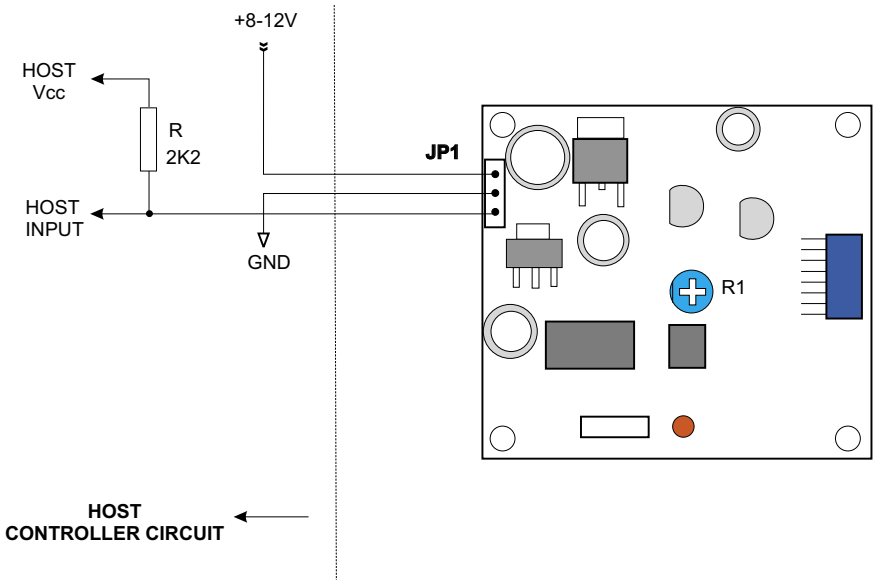
Sensor Type: HMC1021Z Magneto Resistive Sensor

Supply Voltage: 8V - 12VDC

Supply Current: 25mA Typical with LED OFF

Car Detection Range : 1 M typical (Mounted Overhead)

Dimensions: 42 x 45 x 13 mm (WLH)



**Figure 1.** Magnetic Car Sensor wiring diagram.

## WIRING

The sensor has a single bit open collector digital output that activates whenever a car passes within sensing range. Open collector output allows the sensor to be interfaced with a wide variety of host controller (of differing logic levels), with just the addition of one pull-up resistor terminating on the host controller Vcc rail. It is even possible to use the sensor with 24VDC logic that is a standard for industrial controllers.

Figure 1 shows a general wiring scheme for the car sensor. A 8V to 12V DC must be supplied either by the host controller or a separate power supply. The 2.2K pull up resistor will work with 3V to 12V logic level.

## INSTALLATION AND ADJUSTMENT

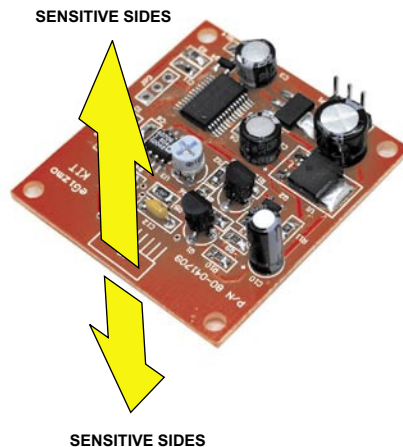
### Enclosure

While protecting the sensor board with an enclosure is a good idea, you have to make sure you use one made from non metallic materials. Water resistant plastic enclosures are highly preferred, especially if the sensor is to be installed in locations where rain and flooding is likely to occur.

### Installation

The Magnetic Car Sensor does not like to work near objects and places where there is too much stray magnetic field abound. It must be installed away from electric motors, transformers, AC lines, generators, and the like. Magnets, being a strong source of magnetic field, will confuse the sensor. Even a small magnet a foot or so away will prevent the sensor from doing its job, so keep these objects away.

The Magnetic Car Sensor is most sensitive in the direction perpendicular to the sensor face (Figure 2). You must always take this into account when planning for your installations.



**Figure 2.** The Magnetic Car Sensor works best when mounted with the pcb lined up with the horizontal plane. It is most sensitive in the directions shown by the arrows.

CAR SENSOR KIT



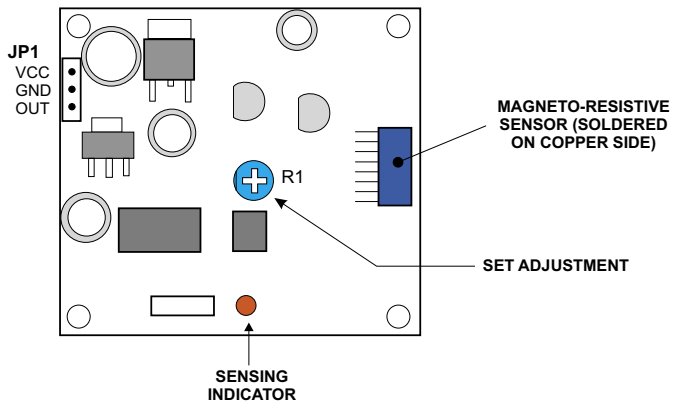
Fig. 3A



CAR SENSOR KIT

Fig. 3B

**Figure 3.** The Magnetic Car Sensor can be installed (a) hanging above head or at (b) pavement level. With careful adjustment, detection distance of up to a meter is possible. Make sure the sensor is mounted away from large metal objects. See text for more details.



**Figure 4.** R1 set adjustment and sensing LED indicator location.

## ADJUSTMENT

Once the sensor is installed and secured, the sensor can be adjusted for operation. Because of the small PCB size, the adjustment pot R1 cannot be located far enough from the sensor element, and any metallic object (i.e. screwdriver) used to adjust R1 can disturb the magnetic field around the sensor, making the adjustment somewhat more difficult. Adjustment will be easy when using a non metallic screw driver. If a non metallic screwdriver is not available, use the smallest you can get, and make sure the screwdriver is not magnetized!

Adjust R1 while observing the LED sensing indicator. You will notice that as you rotate R1, there is a point where the LED flickers. Slowly rotate back to that point until the LED completely turns OFF. Mark or remember the R1 knob position. Continue rotating R1 along the same direction until the LED turns ON again. Slowly turn R1 knob back until the LED turns OFF again. Note the new knob position, and then finally adjust the knob until it sits midway between the two OFF position. The LED should stay OFF once the adjustment is completed.

Test the sensor by bringing a small iron object close to the sensing element. The sensor indicator should turn ON as the metal close in within a few centimeters, and turn OFF again when the metal is withdrawn.