

MAG-01S

Magnetic Field Vehicle Detector

MAG-01S is a sensor able to detect, in 3D, the change of the earth magnetic field using a "magneto-resistive" technology. It has been developed to detect moving or stopping vehicles and then it can be used in a wide range of applications.

MAG-01S represents an efficient substitution of an inductive loop for its easy installation: even if an underground installation is possible, an embedded use of the sensor into the asphalt is not required (non-intrusive installation).

MAG-01S is able to detect the magnetic field surrounding itself (named "base field" and stored in the memory). This value is maintained unchanged while temperature and weather conditions are changing or in case the 12Vdc power supply is lost.

MAG-01S gives an output when, in the surrounding of the sensor, the magnetic field changes: the output status is maintained active for the whole time the magnetic field change is detected (e.g. vehicle presence in the sensor detection area). The output returns to its initial status when the magnetic field returns to the "base" value.



□ Technical Data / Features

Applications	<p><u>Detection and counting of moving vehicles</u> - for low speeds - typically in the urban areas - the MAG-01S sensor has a fast response so to be able to detect and count vehicles even in queued conditions (e.g. traffic light detection systems at the stop bar). An embedded installation in the middle of the lane is suggested.</p> <p><u>Speed vehicle detection</u> - to measure a speed, two sensors aligned along the middle of the lane at a known distance (e.g. 2 m) are required. The response time analysis on the output signals allows the speed measure with an accuracy of 95%.</p> <p><u>Vehicle detection in car park entry/exit lanes</u> - in such an application the sensor can be positioned side of the vehicle transit within the detection range of the sensor.</p> <p><u>Vehicle detection in high security areas</u> - in a security area many sensors are installed to detect vehicles in any area position (or in particular sub-areas) to generate an alarm signal.</p>
Sensor	Magneto-resistive 3D, aluminum housing, dimensions approx 124 (L) x 25 (H) x 15 (D) mm.
Min Detection limit / Sensitivity	± 8 gauss / sensitivity adjustable on 4 levels
Detection range	Approx 100 cm using a medium sensitivity level
Power supply	10-14 Vdc, typ. consumption 35 mA
Output	NPN digital output, resistive load 2 mA - max current 50 mA - 10 msec response time
Working indication	LED (external to the circuit)
Working conditions	-30°C ... +60°C, suitable for an embedded installation (IP69); isolation voltage: 750V
Connection cable	8 cores cable, 3 m length (in case of longer feeders, use multi-core 0.22 mm ² cables)

Application Info

- **INTRUSIVE INSTALLATION.** MAG-01S can be embedded below the asphalt layer at a depth not higher than 20 cm. Cut the asphalt for the cable - width 2 cm - and for the sensor - 15 cm by 5 cm. Remove the material from the excavation and put sand to create a layer 10 mm deep. Lay down the sensor and link the cable to the control unit in order to perform a functional test before closing the cut in the road. Put a second sand layer 10 mm deep and gravel up to the asphalt final layer.
- **NON-INTRUSIVE INSTALLATION.** MAG-01S can be installed in any outdoor place being fully protected and water / weather proof. It can be even positioned over metal surfaces and / or installed using metal pole-holders: it is important that the sensor is not moved from the first position so that the measure of the initial magnetic field is not modified once this setting is made.

- **CAR PARK ENTRY/EXIT LANES MAG-01A INSTALLATION.** To detect vehicles entering / exiting car parks and toll stations, it is suggested an above-ground installation of the sensor with an alignment of the longer side parallel to the ground at an height of approx 60 cm.
- **CABLING.**

WIRE	DESCRIPTION	COLOR
1	+V (from 10 to 14 V dc)	Brown
2	-V (0 V)	White
3	SET BASE	Green
4	SENSITIVITY 1	Blue
5	SENSITIVITY 2	Orange
6	NPN OUTPUT	Red
7	RS485+ serial bus	Yellow
8	RS485- serial bus	Grey

- **SENSITIVITY.**

Sensitivity Adjustment		
LEVEL	Sens1	Sens2
Low	0	0
Medium Low	0	1
Medium High	1	0
High	1	1

TIP: The suggested sensitivity level is the third one (Medium High). In the above table, "0" means 0V (GND) while a value "1" corresponds to a voltage between 4.5Vdc and the positive power Vdc supply.

- **SET BASE.** This feature allows to store inside the sensor the surrounding magnetic field when no vehicles (or objects to be detected) are present in the detection area. Give to the SET BASE wire a voltage of 4.5 Vdc or higher for at least 100 msec. It is enough to connect the Green Wire to the positive power supply value for a while and then connect it back to 0V (GND).
- **OUTPUT.** The output is connected to the collector of an NPN transistor and it has a resistive load (pull-up to +Vdc). The output is normally Vdc and goes to 0V when a metallic mass is detected. It is possible to connect a further load in parallel to the existing one but the total current must be not higher than 50 mA. **DO NOT CONNECT RELAYS:** to decouple the load, use a photo-diode / photo-coupler circuit.



Do not install any relay close to the MAG-01S sensor. The magnetic field generated by the relay could affect the sensor behaviour and its functionality.

Do not install MAG-01S close to power cable. The magnetic field generated by the flowing current could affect the sensor behaviour and its functionality.

Do not install MAG-01S close to devices generating high magnetic fields, for examples electric motors, inverters, etc.

When a cable extension is required, it is important that such a connection is never affected by water/humidity leakage. Pay attention that the connection is not laid down in a place of water stagnation.



REMARK.

The MAG-01S features an RS485 interface: through the data link it is possible to analyze the electrical signal caused by a vehicle passing over the sensor and then obtain the "signature" produced by the transit to be used for classification purposes. For the classification applications, an underground installation of the sensor is preferred.

