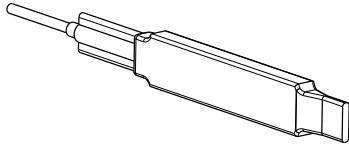


M-GAGE Q7LMEB Flat-Pak



Datasheet

Vehicle detection sensor



WARNING:

- **Appropriate use for vehicle detection**—The mechanical opening, braking, and reversing systems of the door will not respond in sufficient time to prevent moving trucks, cars, or material handling vehicles, even those traveling at low speeds, from coming in contact with the door. In addition, the detection zone of the device may fluctuate due to changes in the local magnetic environment.
- Failure to follow these procedures may result in serious injury or death.
- All vehicles should approach doors at speeds that allow the operator to ensure the door is operating properly and in an open position.



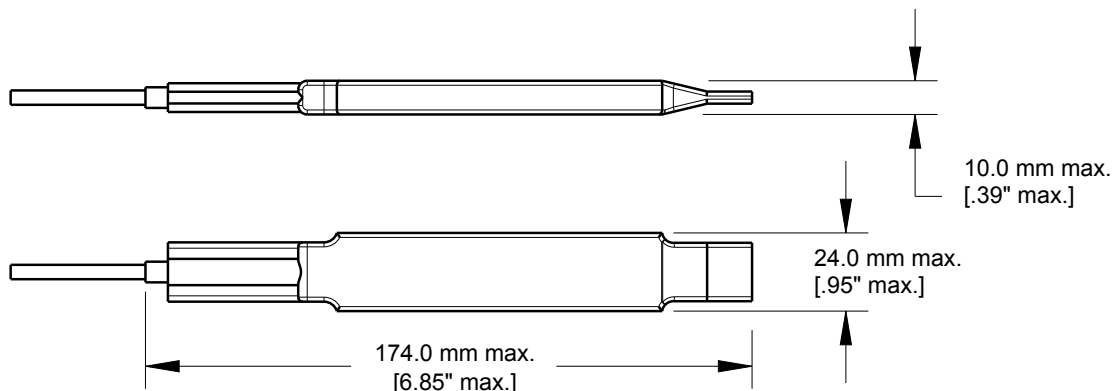
WARNING:

- **Do not use this device for personnel protection**
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction can cause either an energized (on) or de-energized (off) output condition.

Models

Model	Cable	Cable Type	Supply Voltage	Output Type
Q7LMEB-19137	30 m (100') cable	26 gage/5-wire shielded cable with 0.160" diameter polyurethane jacket	10 to 30V dc	Independently configurable
Q7LMEB-19146	60 m (200') cable			

Dimensions



Overview

The Q7LMEB sensor implements a passive sensing technology to detect large ferrous objects. The sensor measures the change in the Earth's natural magnetic field (the ambient magnetic field) caused by the introduction of a ferromagnetic object.

The Q7LMEB sensor provides a direct replacement for inductive loop systems and needs no external frequency box. Its unique design allows quick installation within a single 3/8 in saw cut. For applications where pavement has not been poured, consider the M-GAGE S18M, which can be mounted or replaced without disrupting the pavement.

For best performance, mount the sensor below-grade, in the center of the traffic lane. The Q7LMEB may be mounted above-ground.

Theory of Operation

The sensor uses three mutually perpendicular magnetoresistive transducers. Each transducer detects magnetic field changes along one axis. By incorporating three sensing elements, maximum sensor sensitivity is achieved.

A ferrous object will alter the local (ambient) magnetic field surrounding the object. The magnitude of this magnetic field change is dependent both on the object (size, shape, orientation, and composition) and on the ambient magnetic field (strength and orientation).

During a simple programming procedure, the Q7LMEB measures the ambient magnetic field. When a large ferrous object (for example, a truck, automobile, or rail car) alters that magnetic field, the sensor detects the magnetic field changes (anomalies). When the degree of magnetic field change reaches the sensor's threshold, the sensor's discrete outputs switch.

Sensor Field of View and Range

The sensor range depends on three variables:

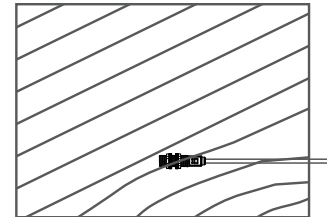
1. The local magnetic environment (including nearby ferrous material)
2. The magnetic properties of the object to be sensed
3. Sensor settings

The Q7LMEB can detect changes in the ambient magnetic field in all directions. As with other sensors, the range will depend on the target. The strong disturbance of a large ferrous object decreases as the distance from the sensor increases, and the magnitude and shape of the disturbance is dependent on the object's shape and content.

The sensor can be programmed to react to magnetic field disturbances of greater or lesser intensity using two adjustments: background condition and sensitivity level.

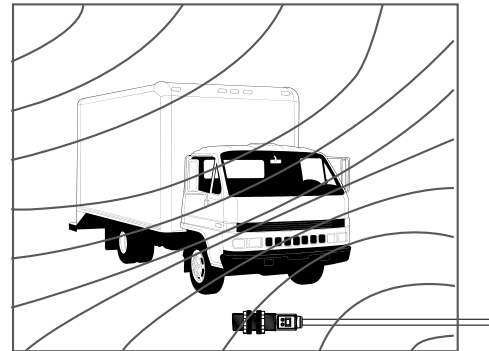
Once background condition and sensitivity level are set, the sensor is ready to detect the target object. Both settings are stored in non-volatile memory.

Figure 1. Baseline Magnetic Field



A. Baseline magnetic field, with slight disturbances caused by permanent ferrous-metal objects within or near the sensor.

Figure 2. Introduction of Large Steel Object



B. After a large steel target object is introduced, the sensor detects the differential (magnetic strength and orientation) between fields A and B. If the differential is greater than the sensitivity threshold, the sensor's outputs conduct.



Tip: Sensor may be mounted inside a non-ferrous architectural detail for cosmetic or security reasons. It is important that, wherever it is mounted, the sensor is securely attached during configuration and all later use. If the sensor moves after being taught, detection errors may occur and sensor must be re-taught. If a sensor appears to lose its taught settings, it may be a result of having shifted position after setup.

Installation Placement Considerations

Figure 3. Example good sensor placement

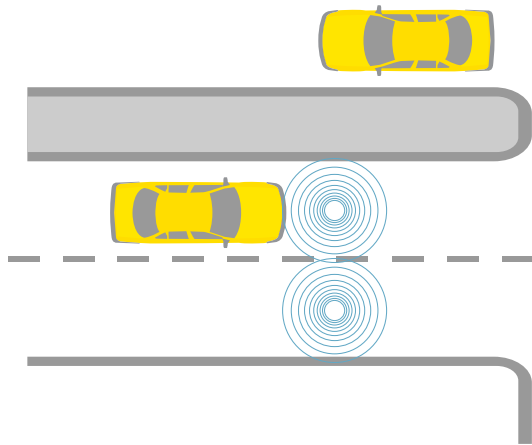
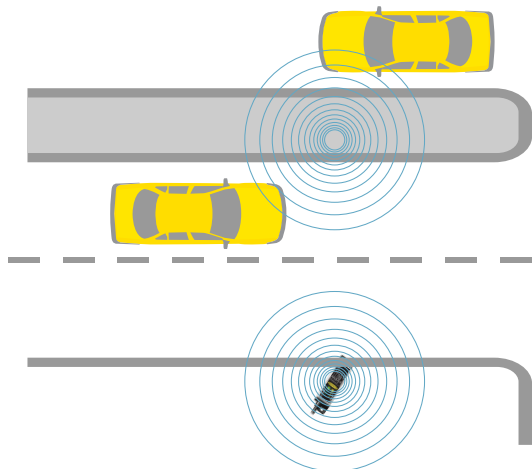


Figure 4. Example bad sensor placement



Good Placement

Figure 3 on p. 3 shows the optimum placement of M-GAGE sensors for vehicle detection. When the sensor is positioned in the middle of the traffic lane, it can be configured to a lower sensitivity level and still detect vehicles in the lane of interest only. This is known as lane separation, or not detecting a vehicle in an adjacent lane.

A lower sensitivity level also aids the sensor in vehicle separation – detecting a break between the back bumper of a leading vehicle and the front bumper of the next vehicle. With proper placement and configuration, the M-GAGE can achieve vehicle separation with distances of 635 mm (24 in) or less between vehicles.

Bad Placement

Figure 4 on p. 3 depicts a potential problem installation. While mounting the sensor at the side of a lane may be successful, this mounting location increases the potential for detection problems. To reliably detect a vehicle from the side, the sensor sensitivity must be increased in order to see objects further away in the lane of interest. Unfortunately, this enables the sensor to also detect another object operating behind the sensor or vehicles in adjacent lanes, which will cause false counts.

Place the M-GAGE sensor at the edge of a traffic lane only if there is no possibility of other objects being detected by the sensor. A good practice is to ensure that no vehicles will be within 3.05 m (10 ft) of the sensor on the non-traffic side.

Other Considerations

For sub-surface installations that do not utilize non ferrous, environmentally secure enclosures, the use of loop sealant to provide environmental isolation to the sensor is required. Care should be taken to fully encapsulate the sensor in environmentally stable sealant as part of the installation process. Please contact Banner Engineering for more information.

Specifications

Supply Voltage

10 V DC to 30 V DC (10% maximum ripple) at 43 mA, exclusive of load
Above +50° C (+122° F), supply voltage is 10 V DC to 24 V DC (10% maximum ripple)

Axis Sensitivity

1.5 counts/milligauss (typical)

Sensing Technology

Passive three-axis magnetoresistive transducer

Supply Protection Circuitry

Protected against reverse polarity and transient voltages

Output Configuration

Two SPST solid-state outputs conduct when object is sensed; outputs independently configurable

Output Protection

Protected against short-circuit conditions

Output Response Time

20 milliseconds

Output Ratings

100 mA maximum (each output)
NPN saturation: 0.4 V at 10 mA and <2.0 V at 100 mA
NPN OFF-state leakage current: < 200 microamps
PNP saturation: < 1.4 V at 10 mA and < 2.5 V at 100 mA
PNP OFF-state leakage current: < 5 microamps

Delay at Power-Up

0.5 seconds

Drift Filter

Enabled
Time: 4 hours
Smart Hysteresis Enabled

Patent

U.S. Patent 6,546,344 B1

Sensor Function Control:

Expanded control of XYZ axis

Environmental Rating

Leak proof design is rated IEC IP69K; NEMA 6P

Vibration and Mechanical Shock

All models meet Mil. Std. 202F requirements method 201A (vibration: 10 to 60 Hz maximum, double amplitude 0.06 inch, maximum acceleration 10G). Also meets IEC 947-5-2: 30G 11 ms duration, half sine wave.

Certifications



Remote TEACH Input

Impedance 12K ohms (low $\leq$ 2 V DC)

Adjustments

Configuration of Background Condition and Sensitivity Level may be set by pulsing the gray wire remotely via the portable programming box

Construction

Housing: E-coated aluminum
End Caps: Thermoplastic polyester

Operating Conditions

-40 °C to +70 °C (-40 °F to +158 °F)
100% maximum relative humidity

Connections

Shielded 5-conductor (with drain) polyurethane jacketed attached cable

Required Overcurrent Protection



WARNING: Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

Overcurrent protection is required to be provided by end product application per the supplied table.
Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.
Supply wiring leads < 24 AWG shall not be spliced.
For additional product support, go to www.bannerengineering.com.

Supply Wiring (AWG)	Required Overcurrent Protection (Amps)
20	5.0
22	3.0
24	2.0
26	1.0
28	0.8
30	0.5

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more sensors, more solutions