SENSOURCE
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Magnetic Field Vehicle Detector

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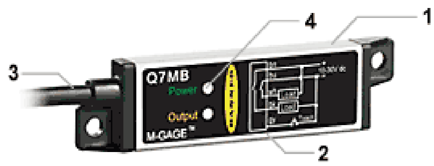

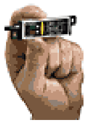

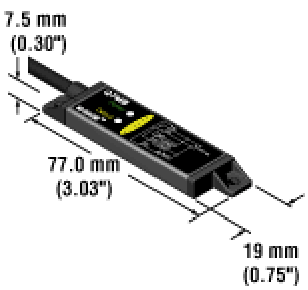

SS-MS30 Vehicle Detector Features:

- Patented magnetoresistive-based passive sensing technology for increased reliability
- Completely self-contained design with no external controller replaces inductive loops and amplifiers
- Allows PLC to be used in place of amplifiers and timer cards
- Embeds in roadways with a single 3/8" sawcut
- Narrow Flat-Pak design measures only 77.0 mm x 19.0 mm x 7.5 mm
- Reliably detects 3-dimensional changes when the presence of a large metal (ferromagnetic) object such as a car, truck or railcar is introduced
- Constructed with rugged epoxy encapsulation to assure no moisture problems

Versatile mounting includes above and below ground options

The SS-MS30 sensor uses a passive sensing technology to detect large ferrous objects. The sensor measures the change in the the Earth's natural magnetic field (ambient magnetic field) caused by the introduction of a ferromagnetic object.

The SS-MS30 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" saw cut. For applications where pavement has not been poured, consider the SS-MS30 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 SS-MS30 also may be mounted above-ground (see page 2).

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, as shown in Figure 1. The magnitude of this magnetic field change is dependent both on the object (its size, shape, orientation, and composition) and on the ambient magnetic field (its strength and orientation). During a simple programming procedure, the Q7M sensor 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 Q7M 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 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, and both settings are stored in non-volatile memory, the sensor is ready to detect the target object.

NOTE: The Q7 will continue to sense a vehicle in its sensing field, even when the vehicle is stopped.

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Below-Grade Installation

Optimally, the Q7M Flat-Pak should be mounted in the center of the vehicle traffic lane (see Figure 8). The axles of the vehicles provide the most effective and most repeatable magnetic field changes. When replacing an inductive loop, the geometric center of the failed loop is typically a good location for mounting. For applications at the “side” of the traffic lane, consideration must be made for movement of metallic objects within a few feet of the sensor on the side opposite the traffic lane, even if the activity is not visible (e.g., behind a wall, or inside a building). Consult a SenSource Applications Engineer with any questions. The SS-MS30 sensor’s narrow housing allows the sensor to be mounted in pavement, within a single 3/8" saw cut. The depth of the cut into the pavement is not critical; saw cut depths of 2" to 4" are typical. Consult SenSource Engineering Applications if planning to install the sensor more than 24" below final grade. The sensor cable will fit into a slot as narrow as 1/4". If a blade smaller than 3/8" thick is used, make a “double- cut” where needed to accommodate the sensor width. Rebar or other metal embedded in the pavement will not affect the sensor’s performance. **CAUTION: Take care to avoid any utilities, including heated floors, when cutting into pavement or floors.** Use an air hose to remove loose particles and moisture from the saw cut. Lay the sensor and cable into the saw cut, with the cable extending back to the control cabinet. Fill the saw cut with loop or pavement sealant. **Do NOT fill the saw cut with heated asphalt.** Work the sealant around the sensor and cable with a thin object, to eliminate any trapped air gaps. To remove the Q7M Flat-Pak, simply pull the sensor cable straight up, from the control cabinet end. This will pull the cable, the cured sealant and the sensor from the saw cut.

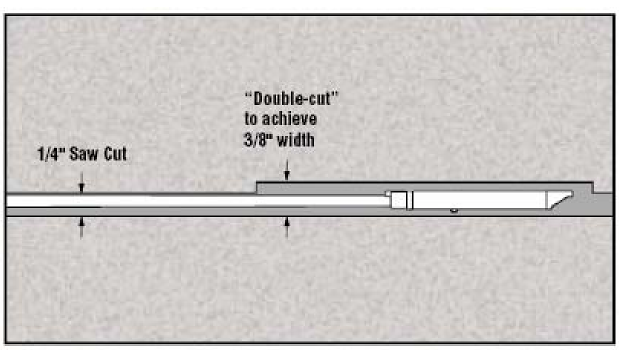

Figure 6. Sensor placed in saw cut in pavement

Above-Grade Installation

NOTE: For optimal performance in detecting vehicles, mount the SS-MS30 below-grade, in the center of the traffic lane (see Figure 8). In applications where the sensor must be mounted to the side of the vehicle traffic lane (e.g., in a kiosk, menu board, or gate control box), make sure that no other moving metal objects can affect the SS-MS30 sensor. Consult a SenSource representative for further information.

The Q7M Flat-Pak is “non-directional”; the sensor can be mounted in any position. For above-grade mounting, the end caps provide mounting holes at either end of the sensor. Select a location as close as possible to the vehicle(s) to be detected. Using the end cap mounting holes, mount to any desired surface (e.g., cement or metal). When mounting a QD-cable model, it is recommended to route the cable through conduit for protection from environmental conditions, but the integral cable needs no such protection.

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 memory,” it may be a result of having shifted position after setup.

Figure 7. Above-ground installation, using the mounting holes in thesensor’s end caps

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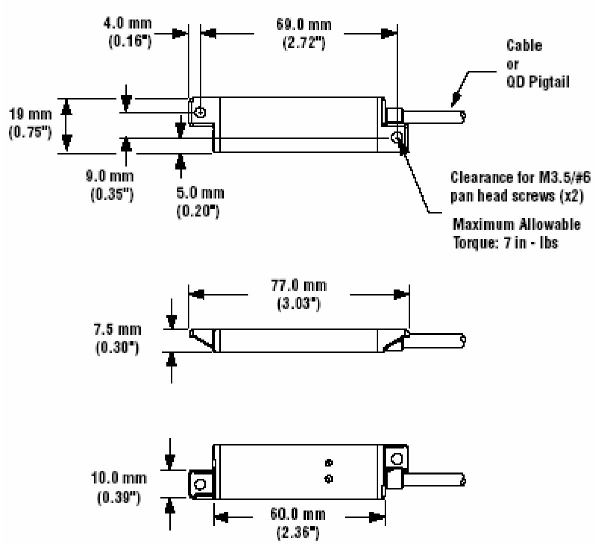
Specifications:

Supply Voltage	10 to 30V dc (10% max. ripple) at 43 mA, exclusive of loadAbove +50° C, supply voltage is 10 to 24V dc (10% max. ripple)
Sensing Range	See Figures 4 and 5.
Sensing Technology	Passive 3-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; one NPN (current sinking) and one PNP (current sourcing).
Output Protection	Protected against short-circuit conditions
Output Ratings	100 mA maximum (each output) **NPN saturation:** < 200 mV @ 10 mA and < 600 mV @ 100 mA; **OFF-state leakage current:** < 200 microamps **PNP saturation:** < 1.2V @ 10 mA and < 1.6V @ 100 mA; **OFF-state leakage current:** < 5 microamps
Output Response Time	20 milliseconds
Delay at Power-Up	0.5 seconds
Temperature Effect	< 0.5 milligauss/°C
Adjustments	Configuration of Background Condition and Sensitivity Level may be set by pulsing the gray wire remotely via the portable programming box (see page 3).
Indicators	**Two Indicators** (see Figure 2 and instructions on page 3):Power Indicator (Green)Configuration/ Output Indicator (Red/Yellow)
Remote TEACH Input	Impedance 12K ohms (low = < 2V dc)
Construction	**Housing:** Anodized aluminum **End Caps:** Thermoplastic polyester
Operating Conditions	-40° to +70°C (-40° to +158° F); 100% max. rel. humidity
Connections	Shielded 5-conductor (with drain) polyethylene jacketed attached cable or 5-pin Euro-style quick-disconnect PVC pigtail (see page 8 for quick-disconnect cable options)
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 max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2; 30G 11 ms duration, half sine wave.

Dimensions:



Wiring: