

M100 Magnetometer Sensors



The M100 wireless detection system from Clearview Intelligence uses wireless magnetometer magneto-resistive sensors to detect the presence and movement of vehicles. The sensors, installed in cored hole in the centre of each lane, transmits detection data in real-time via low-power radio technology to a nearby M110 Access Point. Vehicle detections are further relayed to a traffic signal controller, remote traffic monitoring centre or other system.

The M100 sensors utilises the next generation of RF chipsets and circuitry. Sensors installed in a cored hole at a depth of 165mm do not have to be removed and replaced during most resurfacing works.

As a direct alternative to inductive loops, in a typical traffic monitoring application a sensor is placed in the centre of a traffic lane to detect the presence and passage of vehicles. Vehicle speeds and length are measured by two sensors installed in the same lane with the exact distance between them configured in software.

The recommended distance between sensors depends on the range of expected speeds to be measured: for motorway / high speed road applications a separation of 4.5m is recommended; for low speed roads a separation of 3.6m is preferred.

Advanced Magnetometer-Based Vehicle Detection

The state-of-the-art magneto-resistive sensing devices in each wireless sensor measure the x-, y-, and z-axis components of the Earth's magnetic field at a 128Hz sampling rate. As vehicles come within range, changes in the x, y, or z axes of the measured magnetic field become apparent.

Compliance

Safety 2006/95/EC

EMC FCC: This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by the party responsible for compliance could void the users authority to operate the equipment.

Functions / Features

Lower Power Consumption

3-axis magnetometer for vehicle detection

- 128 Hz sampling rate
- Count and presence detection modes
- Modes for bicycle and motorcycle detection

In-ground installation up to a depth of 165mm with no wires or lead-in cabling.

Fast and simple installation

- Shallow sensor installation in approximately 15-20 minutes using a core drill.
 - Shallow install to a depth of 3" (75mm)
 - Deep install to a depth of 6.5" (165mm)
 - Covered with fast drying epoxy
- Minimal lane closure time
- No slot cutting required

10-year battery life

- Rugged mechanical design
- Auto-calibration

Reliable 2-way radio communications with access point

- Each sensor unique and feeds diagnostic information
- Uniquely addressable and configurable
- Firmware can be upgraded over-the-air

Readily deployed where other systems cannot be used

- Cracked / damaged road surface
- High water concentration

Ability to enable remote system reporting and alerts with SNAPs network

- Measure and record system diagnostics such as battery life and temperature
- Traffic flow data such as vehicle count over time
- Customise alerting thresholds for reporting of traffic flow levels or system health

Functional Specifications

Detection Technique	3-axis magnetic field sensing
Sampling Rate	128 Hz
Programmable Vehicle Detection Parameters (Mode B only)	Z-axis detect threshold Z-axis undetect threshold X-axis undetect threshold Auto-recalibration timeout (secs)
Over-the-air Protocol	Custom TDMA protocol
Physical Layer Protocol	IEEE 802.15.4 PHY
Modulation	Direct Sequence Spread Spectrum Offset Quadrature Phase-Shift Keying (DSSS O-QPSK)
Transmit/Receive bit rate	250 kbps
Frequency Band	2405 to 2480 MHz (ISM unlicensed band)
Frequency Channels	16
Channel Bandwidth	2 MHz
Antenna Type	Microstrip patch antenna (mounted below top surface of sensor)
Antenna Field-of-view	+60° (Azimuth and elevation)
Nominal output power	+3 dBm
Spurious Emissions	30 – 1000 MHz: < -36 dBm 1 – 12.75 GHz: < -30 dBm 1.8 – 1.9 GHz: < -47 dBm 5.15 – 5.3 GHz: < -47 dBm
Typical Receive Sensitivity	-101 dBm (PER = 1%)
Saturation (Max input levels)	> 10 dBm

Sensor Modes

Mode	Application	Description
B (Event)	Count stations; Advance detection	Sends time-stamped ON & OFF detection events
E (Idle)	Status reporting	Disables sensor and sends hardware and software version information
STOPBAR-# (presence detection)	Stop bar detection; Ramp management	Sends time-stamped ON % OFF detection events using preconfigured detection parameters

- 16 different stop bar detection modes can be selected
- Recommended stop bar detection modes for specific applications

	STOPBAR-0	Bicycles/ Scooters
	STOPBAR-2	Motorcycles
	STOPBAR-5	Passenger Vehicles (normal recalibration)
	STOPBAR-7	Passenger Vehicles (normal fast)
	STOPBAR-14	Light rail

Power, Physical & Environment

Power Supply	Non-replaceable primary Li-SOC1 3.6V battery pack
Dimensions	2.9"x2.9"x2.2" (7.4cm x 7.4cm x 5.6cm)
Weight	0.53 lbs/0.238 Kg
Environmental	Designed for in-ground mounting IP68 ingress protection NEMA Type 6P enclosure
Operating Temperature	-40°F to 176°F/-40°C to +85° C