



### Product Specification

### M100 Wireless vehicle detection system



The wireless vehicle detection system uses embedded in-road sensors to detect the presence and movement of vehicles.

The system provides a more reliable, lower cost and easier to install alternative to traditional inductive loops. It is traffic controller manufacturer independent and suitable for all Urban Traffic Control systems including System D, MOVA, and SCOOT.



#### Cost effective vehicle detection system

The M100 magnetometer in-road sensors wirelessly transmit their detection data in real time via low power secure radio technology to a nearby M110 Access Point, which is fed in to one or more local or remote traffic management controllers or systems using the M120 interface card. For larger more complex junctions or where greater distances are involved, the Access Point may be supplemented by a M115 Repeater Unit.

#### A wireless alternative to traditional inductive loops

Low life-cycle costs, reduced installation costs, with increased accuracy, durability and reliability makes the M100 wireless vehicle detection system a versatile and beneficial alternative to traditional inductive loop based systems for traffic signal control. Like inductive loops, the M100 wireless sensors can be located exactly where measurements are required, whether it is at a specific through lane, turn lanes or entrance and exit ramps.

Each small sized M100 sensor is typically installed in the middle of a traffic lane where it will detect the presence and passage of vehicles in that lane.

Two or more sensors can be used and configured to replicate extended loops if required. The M100 sensors eliminate the need for expensive and time consuming slot cutting, trenching / ducting.

The M100 system can also reduce costs for other applications such as: vehicle cordons, car park counting - entrance / exit, ramp metering, MIDAS and queue detection.

The M100 sensor allows for installation up to a maximum depth of 175mm beneath the road surface and is therefore unaffected by any future resurfacing of the wearing course.

### Key Benefits

- Reduced installation costs versus traditional loop technology
- Rapid installation and deployment reduces road closures, worker exposure and traffic disruption
- More reliable and cost effective than traditional inductive loops
- Reduces junction maintenance costs
- Centre lane installation maintains the integrity of the road surface
- Depth of installation eliminates need to remove during resurfacing
- Superior reliability and longer operational life than your average loop



## CONSTITUENTS OF THE CLEARVIEW INTELLIGENCE WIRELESS DETECTION SYSTEM

### M100 in-road wireless sensors

The M100 sensors are sensitive magnetometers equipped with a low power secure radio transmitter packaged in a small hardened plastic case suitable for either flush or up to 175mm depth in-road mounting. The low power transmission technology combined with its integral high quality battery ensures an average operational life of ten years.



- Quick and easy installation of the rugged compact sensor in the middle of a traffic lane
- Measures x,y- and z-axis components of the earth's magnetic field at a 128Hz sampling rate
- Changes in x, y or z axis are measured as vehicles come into range
- Installation location options and operating modes allow for a range of vehicle types to be detected from motorcycles to light rail trams.

### M100BR in-road wireless radar sensor for bicycle detection

The M100BR Bicycle Radar Detector has been designed to uniquely detect the presence of a bicycle within a defined zone and differentiate it from other forms of traffic. The M100BR works in conjunction with the M100 wireless vehicle detection system



The M100BR sensor incorporates an extremely low power, wide-band radar with secure radio technology. The compact in-ground sensor works using the same principle as any other radar. High frequency RF pulses are transmitted, bounced off a target object, and the return pulses are measured by a time-gated RF mixer. RF reflections are analysed to produce presence, distance, and motion measurements.

M100BR sensors are installed very close to the roadway surface and are capable of detecting trains, cars, trucks, bicycles and pedestrians. M100BR sensors are also capable of detecting and distinguishing

objects in motion from objects that are stationary and large objects from small objects.

### M110 access point

The M110 Access Point maintains two way communications with the M100 sensors and M115 Repeater Units. It establishes overall time synchronisation, transmits configuration commands and message acknowledgements, and receives and processes data from the sensors. The Access Point then uses a wired connection to relay the sensor detection data via the M120 interface card to a roadside traffic signal controller.



The Access Point can be mounted on any roadside column or signal head that provides adequate signal coverage to sensors or repeaters.

### M115 repeater unit

In cases where one or more installed M100 sensors are out of the range of the nearest Access Point, one or more Repeater Units can be used to provide a two way relay extending the range and coverage between the sensors and the Access Point. Two Repeater Units operating in tandem can be installed between a sensor and Access Point if required.



- Repeater Units are battery powered and therefore require no external power supply or cabling.
- Repeater Units must be mounted on a convenient pole or other structure so that both sensors and the Access Point are within view and range.
- The Access Point and Repeater Units each provide a 120° field of view, providing installation flexibility.
- The Repeater Unit can also be mounted on the same pole or mast as the access point but pointed in the opposite direction to communicate with any sensors located in front of it.
- 7 year battery life.

### M120 magnetometer interface card

The M120 interface card provides four detection channels; each comprising of an optically isolated contact closure relay for maximum reliability in both normally closed (n/c) and normally open (n/o) configurations. An additional master fault relay (n/c and n/o) is also provided. If the sensors require more than the four channels up to 16 interface cards can be daisy-chained together via the front panel connectors. Multiple cards may also be used if the traffic controller detector rack has pre-defined functions or phases for each slot.



Each M100 sensor can be mapped to its own individual channel or up to 15 sensors can be mapped to a single channel to effectively "OR" the sensor signals together, if any sensor detects a vehicle, the contact closure relay will close. In this way the system can be easily configured to replicate the way traditional inductive loops interface with a traffic controller.

### M150 magnetometer midas outstation interface card

The M150 MIDAS Interface Card provides four detection channels suitable for two lanes; each comprising of an optically isolated contact closure relay for maximum reliability in both normally closed (n/c) and normally open (n/o) configuration and is switchable between different manufacturers of MIDAS outstation to give compatibility via a single interface card. Up to 16 interface cards can be daisy-chained together via the front panel connectors to support more sensors across multiple lanes.



M100 sensors are installed two per lane at 4.5m spacing and mapped to their own individual channel so that on vehicle detection the contact closure relay will close. The Clearview Intelligence wireless vehicle detection system can therefore be easily configured to replicate the way traditional inductive loops interface with a MIDAS outstation.

# Removing the requirement for traditional inductive loops

## General Specifications

### M100 IN-ROAD WIRELESS SENSORS

<b>Detection:</b>	3-axis magnetic field sensing
<b>Sampling rate:</b>	128 Hz
<b>Physical layer protocol:</b>	IEEE 802.15.4 PHY
<b>Transmit / receive bit rate:</b>	250 kbps
<b>Frequency band:</b>	2400 to 2483.5 MHz (ISM license free band)
<b>Frequency channels:</b>	16
<b>Channel bandwidth:</b>	2MHz
<b>Antenna type:</b>	microstrip patch antenna (located below top surface of sensor)
<b>Power supply:</b>	non-replaceable primary Li-SOCI2 3.6V battery
<b>Dimensions:</b>	74mm x 74mm x 56mm
<b>Installation core size:</b>	Ø100mm 65mm deep up to 175mm deep
<b>Installation compound:</b>	Two part silicon polyurea sealant (up to three tubes of sealant required for 175mm deep sensors)
<b>Weight:</b>	0.3kg
<b>Ingress protection rating:</b>	IP68
<b>Operating temperature:</b>	-40°C to +85°C (-40°F to 185°F)

### M100BR WIRELESS BICYCLE RADAR SENSOR

<b>Detection:</b>	Micro Radar
<b>Sampling rate:</b>	1/2, 1, 2, 4 and 8Hz (selectable)
<b>Radar frequency:</b>	6.3 GHz
<b>Radar bandwidth:</b>	>500 MHz
<b>Radiated power:</b>	Within FCC class 8 Limits
<b>Range:</b>	1 metre to 3 metres (selectable)
<b>Radio physical layer protocol:</b>	IEEE 802.15.4 PHY
<b>Radio transmit / receive bit rate:</b>	250 kbps
<b>Radio frequency band:</b>	2400 to 2483.5 MHz (ISM license free band)
<b>Radio frequency channels:</b>	16
<b>Radio channel bandwidth:</b>	2MHz
<b>Antenna type:</b>	microstrip patch antenna (located below top surface of sensor)
<b>Power supply:</b>	non-replaceable primary Li-SOCI2 3.6V battery
<b>Dimensions:</b>	74mm x 74mm x 67mm
<b>Installation core size:</b>	Ø100mm 75mm deep
<b>Installation compound:</b>	two part silicone polyurea sealant
<b>Weight:</b>	0.3kg
<b>Ingress protection rating:</b>	IP68
<b>Operating temperature:</b>	-40°C to +85°C (-40°F to 185°F)

### M110 ACCESS POINT

<b>Interfaces:</b>	<ul style="list-style-type: none"><li>to / from sensors / repeater units via 802.15.4 PHY radio</li><li>to / from configuration device (PC) via TCP/IP over 10 Base T Ethernet</li><li>to roadside traffic controller via M120 interface card</li></ul>
<b>Data storage:</b>	~130 kb for event caching ~500 kB for processed data storage
<b>Physical layer protocol:</b>	IEEE 802.15.4 PHY
<b>Transmit / receive bit rate:</b>	250 kbps
<b>Frequency band:</b>	2400 to 2483.5 MHz (ISM license free band)
<b>Frequency channels:</b>	16
<b>Channel bandwidth:</b>	2MHz
<b>Antenna type:</b>	microstrip patch antenna (located behind front face panel)
<b>Power supply:</b>	36 – 58V DC (48V DC nominal)
<b>Power Consumption:</b>	2W
<b>Dimensions:</b>	159mm x 159mm x 89mm
<b>Weight (including mounting kit):</b>	1.4kg
<b>Ingress protection rating:</b>	IP67
<b>Operating temperature:</b>	-40°C to +80°C (-40°F to +176°F)

### M115 REPEATER UNIT

<b>Interfaces:</b>	to / from sensors / access point / other repeater units via 802.15.4 PHY radio
<b>Physical layer protocol:</b>	IEEE 802.15.4 PHY
<b>Transmit / receive bit rate:</b>	250 kbps
<b>Frequency band:</b>	2400 to 2483.5 MHz (ISM license free band)
<b>Frequency channels:</b>	16
<b>Channel bandwidth:</b>	2MHz
<b>Antenna type:</b>	microstrip patch antenna (located behind front face panel)
<b>Power supply:</b>	user replaceable primary Li-SOCI2 3.6v battery pack
<b>Battery life:</b>	7year(average)
<b>Dimensions:</b>	197mm x 165mm x 137mm
<b>Weight (inc mounting kit):</b>	2.25kg
<b>Ingress protection rating:</b>	IP65
<b>Operating temperature:</b>	-40°C to +80°C (-40°F to +176°F)





#### M120 MAGNETOMETER INTERFACE CARD

<b>Standard 3U single extended Eurocard outline:</b>	160mm x 100mm x 25mm (nominal)
<b>Number of channels:</b>	Four optically isolated (n/c and n/o)
<b>Sensitivity:</b>	16 levels
<b>Master fault:</b>	Isolated output (n/c and n/o)
<b>Configuration:</b>	With Traffic Dot software via front panel RJ45 (Ethernet port)
<b>Access point connection:</b>	Via connection on front panel
<b>Input voltage:</b>	Via traffic controller backplane DC - 19 - 29V DC 550mA or AC - 21 - 28V AC 800mA 47 - 63Hz
<b>Output voltage:</b>	48V DC 6W max (Access Point power)
<b>Operating temperature:</b>	-15°C to +60°C (5°F to +140°F)
<b>Humidity:</b>	95% (non condensing)

#### M150 MAGNETOMETER MIDAS OUTSTATION INTERFACE CARD

<b>Standard 3U single extended Eurocard outline:</b>	160mm x 100mm x 25mm (nominal)
<b>Number of channels:</b>	Four optically isolated (n/c and n/o) for two lanes per interface card
<b>Sensitivity:</b>	16 levels
<b>Configuration:</b>	With Traffic Dot software via front panel RJ45 (Ethernet port)
<b>Access point connection:</b>	Via connection on front panel
<b>Input voltage:</b>	Via MIDAS outstation backplane AC - 21 - 28V AC 800mA 47 - 63Hz
<b>Output voltage:</b>	48V DC 6W max (Access Point power)
<b>Operating temperature:</b>	-15°C to +60°C (5°F to +140°F)
<b>Humidity:</b>	95% (non condensing)

Approved to Highways England standard MCH1529

#### COMPLIANCE AND COMPATIBILITY

CE Marked  
 Type approved to UK specification TR2512A and approved to Highways England standard MCH1529  
 Meets electrical safety requirement EN 60950  
 Elexon Code: 83 9000 5000 10  
 Designed to meet mechanical and temperature requirements of TR2130C and European specification HD638  
 Electromagnetic Compatibility (EMC) tested to EN 50293

### Case Study Slough deploy M100 wireless vehicle detection system

Slough Borough Council were looking for a cost effective solution when upgrading the multiple traffic signalised junctions along the A4 dual carriageway. The project included a large number of new detector locations, ninety one in all, both on the main A4 dual carriageway and also a large number of intersecting side roads at eleven separate junctions.

Slough Borough Council decided to install Clearview Intelligence's M100 Wireless Vehicle Detection system, benefitting from reduced installation costs, due to the elimination of the amount of additional ducting associated with SCOOT detection. Additionally, considerably less disruption to traffic and local residents can be achieved, eliminating any potential need for night time working and long periods of traffic management as the sensors can be installed quickly and easily during the daytime, even on junctions on busy main arterial routes such as the A4 in Slough.

Following the successful initial trial, all ninety one SCOOT detectors across the eleven junctions were installed within only six days of off peak, restricted hours day working further demonstrating substantial cost benefits purely from a reduced installation time and disruption perspective.

#### Key Features

- Uses 3-axis magneto-resistive wireless sensors to detect vehicle presence and movement
- Fast and simple installation with no wires, ducting or trenching
- Ultra-low power communications protocol with reliable two-way communications with access point
- Universal platform for all traffic detection applications
- Re-usable and remotely upgradeable
- Expected 8-10 year battery life
- Traffic light controller and MIDAS outstation manufacturer independent to ensure compatibility
- Standard contact closure card output replicates traditional loop inputs
- Optically isolated contact closure signals (n/c and n/o)
- Type Approved to Highways England specification TR2512A and MCH1529 (MIDAS)
- Use under elevated sections of motorway (MIDAS)
- Easy user configuration and reporting using Traffic Dot (Java Application)