

## M100BR Radar Bicycle Detector



The M100BR radar bicycle detector incorporates an extremely low power, wide-band, fixed-position radar with a Nano power radio. The compact in-ground sensor works using the same principle as any other radar. High frequency RF pulses are transmitted, reflected 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. The detector incorporates a higher sensitivity radar design and a modified case with tabs to aid installation flush with the road surface.

M100BR detectors are capable of detecting and distinguishing large objects from small objects. Detectors have a programmable detection range between 1.2m and 3m. The elevation of a detection zone is approximately 90 degrees and the azimuth is approximately 180 degrees.

M100BR detectors can detect bicycles that are stopped at a stop bar and differentiate between a vehicle and a bicycle.

The basic method to differentiate bicycles from vehicles is based on measuring the breadth of the vehicles returned RF signal. Bicycles field a relatively small breadth values while vehicles generate both small and large values depending on the location of the vehicle.

Fully wireless operation – no cable connections

- Battery powered
- Up to eight years battery life depending on mode of operation.
- Low power consumption

Compatible with M100 magnetometer sensors

- M100BR detectors can be used in conjunction with M100 magnetometer sensors, and can be used in both dedicated and shared lanes
- Installs seamlessly as a supplement to an existing primary detection system

### Functions / Features

#### In-Road detection

- In-road detection capable of detecting bicycles and vehicles
- Detection modes differentiate between vehicles and bicycles

#### Detection area

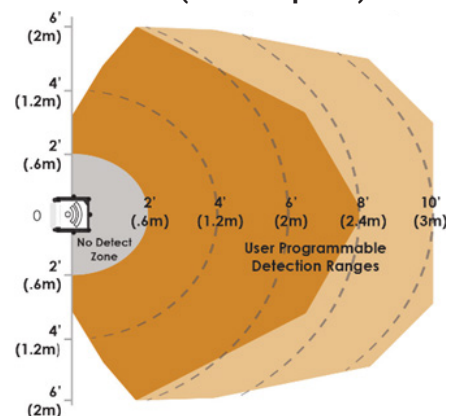
- User programmable detection area
- 1 Hz default sampling rate for in-road detection
- Selectable sampling rate of ½, 1, 2, 4 and 8 Hz.

#### Simple installation

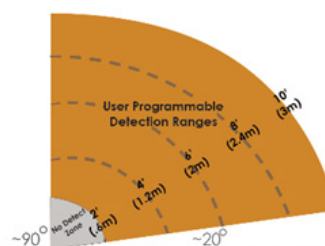
- Installs in less than 10 minutes using a core drill
- Cored hole 102mm diameter x 76mm depth
- Installed flush to road surface
- Covered with fast drying epoxy
- Minimal lane closure time
- No saw cuts

### Functional specifications

#### In-road detection zone (azimuth plane)



Adjustable radar detection zone: The grey area depicts a 2' (0.6m) no detect zone around the sensor. The dark colored area depicts the sensor detection zone for all vehicles (including bicycles). The light-colored area depicts the sensor detection zone for large vehicles. The 4' (1.2m), 6' (2m), 8' (2.4m) and 10' (3m) arcs represent detection range settings.



Note: The detection zone can be modified by changing the radar sensitivity configuration.

## Functional Specifications

### Radio Specifications

|                                    |   |
|------------------------------------|---|
| <b>Over-the-air protocol</b>       | Custom TDMA protocol  |
| <b>Physical layer protocol</b>     | IEEE 802.15.4 PHY   |
| <b>Modulation</b>                  | Direct Sequence Spread Spectrum Offset Quadrature Phase-Shift Keying (DSSS O-QPSK)                              |
| <b>Transmit/receive bit rate</b>   | 250 kbps  |
| <b>Frequency band</b>              | 2400 to 2483.5 MHz (ISM unlicensed band)  |
| <b>Frequency channels</b>          | 16  |
| <b>Channel bandwidth</b>           | 2 MHz   |
| <b>Antenna type</b>                | Ceramic patch antenna (mounted below top surface of sensor)   |
| <b>Antenna field of view</b>       | +60 degree (azimuth & elevation)  |
| <b>Nominal output power</b>        | +3 dBm  |
| <b>Spurious emissions</b>          | 30-1000 MHz: < - 56 dBm<br>1 – 12.75 GHz: < - 44 dBm<br>1.8 – 1.9 GHz: < - 56 dBm<br>5.15 – 5.3 GHz: < - 51 dBm |
| <b>Typical receive sensitivity</b> | -101 dBm  |

### Radar Specifications

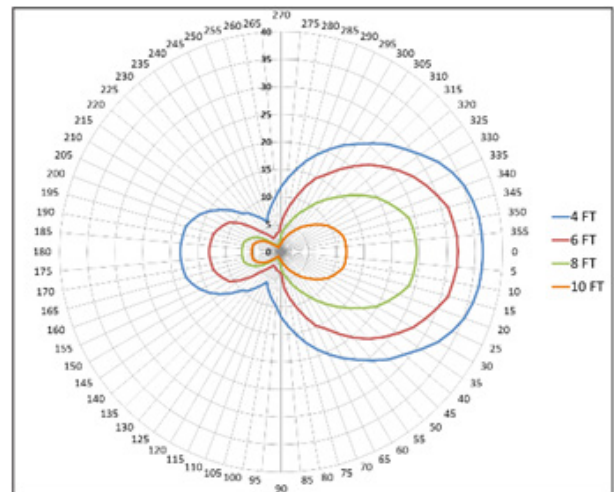
|                            |                                    |
|----------------------------|------------------------------------|
| <b>Frequency</b>           | 6.3 GHz                            |
| <b>Bandwidth</b>           | > 500 MHz                          |
| <b>Radiated power</b>      | Within FCC class B limits          |
| <b>Radar field of view</b> | +90 (azimuth), +20-90 (elevation)  |
| <b>Maximum range</b>       | 4' (1.2m) to 10' (3m) (selectable) |
| <b>Calibration</b>         | Self-calibrating                   |
| <b>Sample Rate</b>         | ½, 1, 2, 4, 8Hz (selectable)       |

### Range

### Sampling Rate

|           | 1/2 | 1  | 2  | 4  | 8 |
|-----------|-----|----|----|----|---|
| 4' (1.2m) | 8+  | 8+ | 8+ | 8+ | 5 |
| 6' (2m)   | 8+  | 8+ | 8+ | 8  | 4 |
| 8' (2.4m) | 8+  | 8+ | 8+ | 6  | 3 |
| 10' (3m)  | 8+  | 8+ | 8  | 4  | 2 |

### Radar Gain Pattern



Target used is corner cube with radar cross-section

### Compliance

Safety – 2006/95/EC  
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.  
2004/108/EC

### Power, Physical & Environment

|                              |   |
|------------------------------|---|
| <b>Power supply</b>          | Non-replaceable primary Li-SOC12 3.6V C-cell battery 7.2 Ah (nominal capacity)  |
| <b>Dimensions</b>            | 2.9" x 2.9" x 2.6"<br>(7.4cm x 7.4cm x 6.6cm)<br>Excluding tabs   |
| <b>Weight</b>                | 0.3kg   |
| <b>Environment</b>           | Designed for in-pavement mounting<br>Performance diminishes in standing water and in slushy conditions<br>NEMA Type 6P enclosure<br>IP67 ingress protection |
| <b>Operating Temperature</b> | -40°F to 176°F/-40°C to +85°C   |