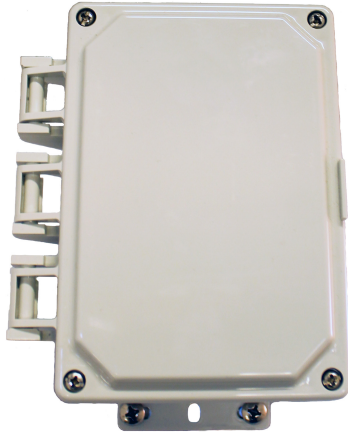


## M115 Repeater Unit



In cases where installed M100 sensors are out of range of the nearest access point, one or more M115 repeater units can be used to provide a two-way relay between the out of range sensors and the access point. A repeater is pole mounted by the roadside and is positioned so that both the sensors and the tandem repeater or access point are within the view and within range.

The M115 battery powered repeater is a single pole mounted unit with a 7-year life. As a battery powered standalone unit there is no need for cabling, ducting or wiring. This version of the repeater represents significant advantages over the previous model, as the repeater is housed in a robust enclosure that provides IP65 protection.

### Functions / Features

Relay of radio communications

- To / from wireless sensors (downlink)
- To / from access points (uplink)
- To / from another repeater (uplink or downlink)

Extension of range and coverage of the access point

- Installed up to 35m away from in-ground M100 sensors and up to 200m away from an M110 Access Point when installed 4.5m to 6m in height.
- Tandem operation – one repeater and its supported sensors can communicate with another repeater and then to the access point.
- Maximum range of 35m from sensors

Fully wireless operation – no cable connections

- Battery powered
- Low power consumption

Radio signal quality measurements (of each link to wireless sensors or tandem repeater)

- Receive signal strength indicator (RSSI in dBm)
- Link quality index (LQI, figure of merit 40-99)

Enclosure

- Provides IP65 protection

Simple installation

- Any roadside location that provides adequate height and line of sight to sensors and the access point or repeater

**No calibration or adjustment required**

**Firmware upgrades over-the-air from access point**

## Functional Specifications

<b>Interfaces</b>	To/from sensors via 802.15.4 PHY radio To/from repeaters via 802.15.4 PHY radio To/from access point via 802.15.4 PHY radio
<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>	2405 to 2480 MHz (ISM unlicensed band)
<b>Frequency channels</b>	16
<b>Channel bandwidth</b>	2 MHz
<b>Internal antenna type</b>	Microstrip patch antenna (behind front face panel)
<b>Antenna field-of-view</b>	+60° (Azimuth & elevation)
<b>Nominal output power</b>	0 dBm
<b>Spurious emissions</b>	30-1000 MHz: <-56 dBm 1-12.75 GHz: <-44 dBm 1.8-1.9 GHz: <-56 dBm 5.15-5.3 GHz: <-51 dBm
<b>Typical receive sensitivity</b>	-95 dBm (PER < 1%)
<b>Saturation (Max input level)</b>	> 10 dBm

### Power, Physical & Environmental

<b>Power Supply</b>	Li-SOCl2 3.6v battery pack - nominal capacity: 171Ah
<b>Recommended system replacement/battery unit</b>	Battery replacement every 7 years
<b>Dimensions</b>	7.75"x 6.5"x 5.37" (19.68cm x 16.51cm x 13.65cm)
<b>Weight</b>	3.87 lb (1.75 Kg) Mounting kit: add 1.2 lb (0.5kg)
<b>Environmental</b>	Designed for weatherproof, outdoor operation NEMA type 4 enclosure IP65 ingress protection
<b>Operating Temperature</b>	-40°F to +176°F / -40°C to +80°C

### Compliance

<b>Safety</b>	2006/95/EC
<b>EMC</b>	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