



## FX-WMBUS-R4-M24-LR

Wireless M-BUS repeater  
(24 VAC/DC, IP67)

- 24 VAC/DC powered with always-on function
- Support for AES128 encrypted Wireless M-Bus communication
- IP67 design for demanding installations
- Plug-and-play yet highly configurable
- Convert between different WMBUS modes
- OMS 4 compatible

### Measure to manage

The 24 VAC/DC powered FX-WMBUS-R4-M24-LR is a wireless MBUS repeater mounted with AC/DC converter in combined enclosure. The device is a plug-and-play and highly configurable repeater for extending the range between meters and a collector/gateway. The enclosure is chosen to make the repeater as discrete as possible.

Once a minute a packet is sent from the repeater and contains information about the repeater, such as number of routed packets, software version, and current battery level. The packet is also used for time synchronizing between repeaters in a multihop system. Furthermore, this packet can be used as an indication that the device is up and running and the load of the repeater.

The repeater is highly immune to electrical disturbances that could be generated by, for example, LED-lights in buildings.



### Technical features

Temperature range:	-40..85°C
Dimensions:	130 x 130 x 50 mm
Power supply:	24V AC or DC
Protection class:	IP67
Max. number of connected sensors:	932
Communication:	OMS standard wireless M-Bus 0-30 min suppression timer Status Tx interval 60s

### Firmware:

INPUT MODE	T1/C1 (868 MHz)
OUTPUT MODE	C1- or T1mode (configurable)
REPETITION	Twice – Once on each internal antenna
MAX SENSORS	932
MAX PACKET LENGTH	255 bytes
FILTERING	0-30 min suppression timer, RSSI, manufacturer, whitelisting
SECURITY	Supports routing of security profile A and B according to OMS 4
STATUS TX INTERVAL	60 seconds
DEFAULT FACTORY SETTINGS	Output T1, 2 min suppression timer, encrypting off

### Radio:

RECEIVER CLASS	1,5
RADIATED POWER	< 14 dBm
TRANSMISSION	Listen before talk, polite spectrum access
HARDWARE FILTER	Yes

### Approvals:

ENVIRONMENT	RoHS (2011/65/EU) / (EU) 2015/863 RADIO / EMC RED (2014/53/EU)
WIRELESS MBUS	EN13757-3/4 / OMS 4.0.2

### General information:

TEMPERATURE RANGE	-40° to +85°C
PROTECTION CLASS	67
POWER SUPPLY	24V AC or DC
MATERIAL	Grey, PC
SIZE (W x L x D)	130 x 130 x 50 mm

### Antenna:

The repeater makes use of two high performance internal antennas. The internal antennas are mounted at 90 degrees from each other, thus taking advantage of both horizontal and vertical polarizations for maximum range. This diversity is important, especially for indoor operation since meters and gateway can be mounted either to the sides or above/below the repeater. If meters have different polarization (antenna alignment) a loss of up to 30 dBm can be observed. Having two antennas at an angle also minimizes multipath problems.

### Routing:

The advanced collision avoidance algorithm minimizes problems with collisions and data repetition. To ensure proper functionality, a randomised delay is used before repeating packets.

By default, our repeaters only retransmit packets coming directly from meters and not from other repeaters. However, the repeater comes with a transparent static routing algorithm which allow controlled static multihop between repeaters. By using multihop, up to three repeaters can be used to form an extended chain between meters and gateway.

The repeater supports both short and long transport header, as well as extended link layer 1-4. Furthermore, our repeaters can be configured to retransmit non-OMS wireless MBUS packets.

### Converter:

The repeater can be used to convert between different MBUS modes, for example, C-mode to S-mode.

### Features:

The repeater supports synchronisation via OMS time protocol. The configuration of the repeater can be protected via a 16- byte AES-key to avoid unauthorized changes of the configuration. It is always possible to read out data from the repeater even without the key.

### Configuration:

All repeaters can be used right out of the box but they are also highly configurable. Configuration of repeaters is performed using Wireless M-BUS programming dongle FX-WMBUS-D1-TC and our Configurator tool. Using this program, it is possible to see the routing from repeaters and how good the repeaters communicate with the sensors.

A non-exhaustive list of parameters which can be changed on the repeaters:

- Number of minutes to be active / not active
- Specific time during the day to activate (e.g., at 12:30)
- Specific days to be active (e.g., Mondays and Wednesdays)
- Suppression timer (limit number of packets per sensor)
- Sensor filtering (e.g., manufacturer ID or whitelisting)
- Static routing between repeaters (multihop)
- Append RSSI value of received data

### Available different versions:

4 different versions of the Wireless M-BUS repeater are available and each have a unique hardware configuration. They are thus optimised for different situations and purposes:

Product code	Power Supply	Dual Internal Antenna	LTE / GSM filter	External SMA interface	Typical sensitivity mode S1 / TC	Optimised for
FX-WMBUS-R4-M24-LR	24V AC/DC	X	X		-111/-108	Indoor multi-floor building with better range
FX-WMBUS-R4-M-LR	100-240V AC	X	X		-111/-108	Indoor multi-floor building with better range
FX-WMBUS-R4-M-LR-X	100-240V AC		X	1 TX/RX	-111/-108	Outdoor for longest range in one direction.
FX-WMBUS-PX4-M-LR-X	100-240V AC		X	1TX + 1RX	-113/-110	Maximum sensitivity - longest range in one direction.