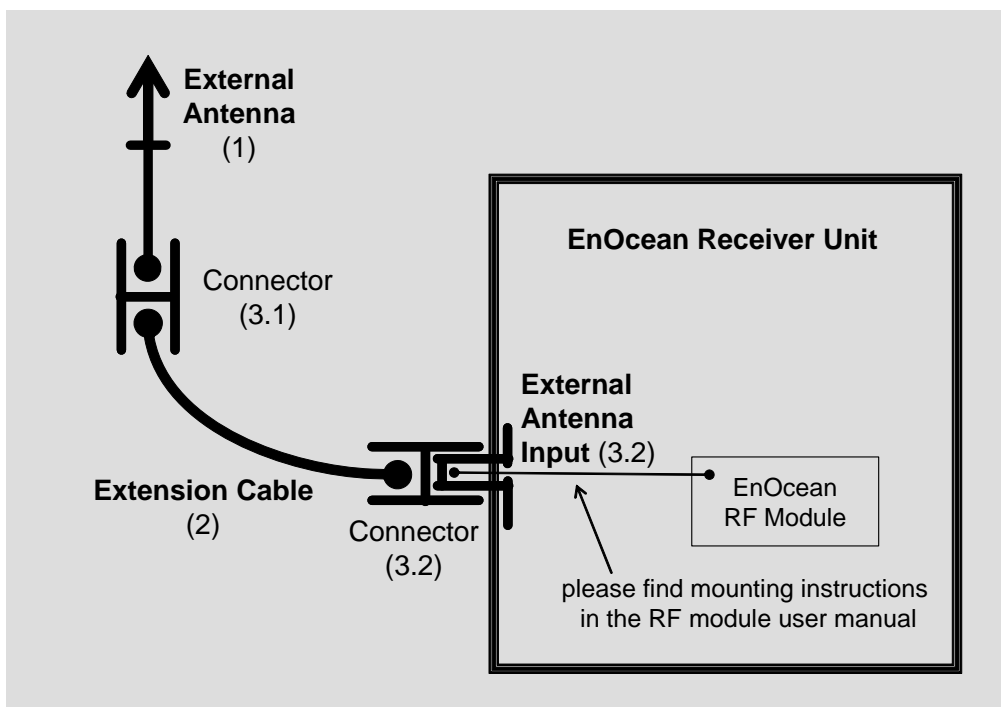


EXTERNAL PASSIVE ANTENNAS – Recommendations for Antenna Products and Connectors

In the following application note please find recommended antenna products and connectors for the realization of highly efficient external passive antennas for the EnOcean products.



Schematic for connecting an external antenna to an EnOcean receiver unit, if an external antenna input is available

Attention: Please use from EnOcean certified antennas and recommended accessories only! The antenna performance strongly depends on the cable length, quality and losses of the cable and connectors, and impedance matching.

Attention: Please read the EnOcean Application Note “AN#001 Range Planning” for further details. Placement of the antennas is very important. An antenna should never be located inside or beyond a conductive or metallic enclosure to avoid shadowing of the radio waves. Antennas should be placed as far as possible away from massive brick walls and concrete ceilings to avoid long penetration way through them. Avoid mounting antennas in room corners to avoid unfavourable radio reflections.

External Passive Antennas

1 PASSIVE ANTENNAS FOR 868 MHZ SYSTEMS

1.1 Magnetic base antenna for mounting on METAL or metal surfaces:

This antenna has a magnetic base and must be mounted on a metal surface of minimum 15 x 15 cm, otherwise the antenna will not work properly. This type of antenna is a solution with best performance for mounting the antenna downwards from a metal ceiling or for easy plugging the antenna on metal conducts beyond a false ceiling.

The following recommended antenna is supplied with an FME connector:



Hirschmann MCA 1890 MH (e.g. www.telefon.de, Art.Nr. 17003)

1.2 Alternative Patch Antenna Hirschmann MCA1890MP:

The following flat patch antenna has a very good performance independent from the underground and can be mounted practically on any surfaces, also on a metal or ferro concrete ceiling or wall. The antenna diameter is 57 mm. The antenna itself offers a self-adhesive foil, so it can be easily fixed. This can be a good alternative to the magnetic base antenna above.

The following recommended antenna is supplied with an FME connector:



Hirschmann MCA 1890 MP (e.g. www.mercateo.com, Art.-Nr.: 252-20432)

External Passive Antennas

1.3 Mini-Patch antenna for mounting on NON-METAL surfaces:

The following small flat patch antenna must be mounted onto a non-metallic ceiling or onto a dry wall. The antenna diameter is only 52 mm, so a standard 70 mm wall box can be used for proper hiding of the antenna. The antenna itself offers a self-adhesive foil, so it can be easily fixed onto the plastic cover of a wall-box mounted into a dry wall or dry ceiling. Please note that this antenna should not be mounted onto concrete and needs appropriate distance from metal.

The following recommended antenna is supplied with an FME connector:



HAMA MiniPlanar 38499 (e.g. www.conrad.de, Art.Nr. 765329 – LN)

1.4 Alternative “active” antenna:

A so-called active antenna is a radio unit with integrated antenna that communicates with the actuator unit via a simple multi-line cable (e.g. RS485). Thus no shielded antenna cable is needed, which would lose performance with increasing length and could be folded during installation. So an active antenna allows very simple failure test.

2 ANTENNA SELECTION FOR 315 MHZ SYSTEMS

2.1 Magnetic base antenna for mounting on METAL or metal surfaces:

The recommended passive antenna consists of a magnetic stand and a helix stick drilled onto the stand. The magnetic stand must be mounted on a metal surface of minimum 25 x 25 cm, otherwise the antenna will not work properly. This type of antenna is a solution with best performance for mounting the antenna downwards from a metal ceiling or for easy plugging the antenna on metal conducts beyond a false ceiling.

The following recommended magnetic stand is supplied with an SMA reverse connector:

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Magnetic Stand from DIGITUS NETWORK (e.g. www.digitus.de, Art.Nr: DN-70101-1)

The recommended 315 MHz antenna has a relatively short length (51 mm) and is supplied alternatively with SMA respectively SMA reverse connector:



ANT-315-CW-RH from Antenna Factor (e.g. www.digikey.com)

2.2 Patch Antenna for 315 MHz:

We haven't found suitable low-cost patch antennas for 315 MHz yet. The main reason would be that the upper recommended 868 MHz patch antennas are GSM antennas used in high-volume for cars.

2.3 Alternative for 315 MHz Systems: Use an active antenna

For 315 MHz systems a good suited alternative to passive antennas is designing or using an existing active EnOcean antenna. A so-called active antenna is an external unit with integrated antenna and radio module that communicates with the actuator unit via a simple multi-line cable (e.g. RS485). Thus in addition no shielded antenna cable is needed, which would lose performance with increasing length and could be folded during installation. So an active antenna also allows very simple connection failure test.

External Passive Antennas

3 ANTENNA CABLE EXTENSION

The above recommended antennas are already pre-installed with a coax feeder of around 2.5 m length. If this length is not sufficient, it can be enlarged by using one of the following RG58 cables. **Please note: Antenna cables can strongly differ in their electrical characteristic. So don't use others than RG58 low loss cables for extensions to avoid loss in range.**

The antenna cable loss increases with the cable length. So use cables with appropriate length. Avoid a total cable length more than 15 m.



Low Loss RG58 extension cable 3 m / 5 m / 10 /15 /20 m
(e.g. www.thiecom.de, Art.Nr. FME3FME / FME5FME, FME10FME...)

4 CONNECTORS

4.1 Connecting the antenna to the extension cable (if used):

Both the antennas recommended in 1. and the cable extensions recommended in 2. have FMA-female connectors. Connecting them together can easily be done with the following connector:



Connector FME to FME (e.g. www.thiecom.de, Art.Nr. NIP-NIP)

External Passive Antennas

4.2 Connecting the antenna or the extension cable to the EnOcean receiver unit

In the following please find some typical external antenna input connectors from EnOcean radio receivers:



*FME jack
(e.g. Thermokon)*



*receptacle
(e.g. Wago)*

SMA



*SMB
jack
(e.g.
Peha)*

Please simply use the following corresponding adaptors to the FME connector of the antenna or the extension cable:

*FME jack:
No adapter needed
(plug in directly)*



*Adapter
FME ->
SMA
(e.g.*

*www.thiecom.de, Art.Nr.
SMANIP)*



*Adapter FME -> SMB
(e.g. www.navisys.de,
Art. Nr. ai140243)*

Disclaimer

The information provided in this document describes typical features of the EnOcean radio system and should not be misunderstood as specified operating characteristics. No liability is assumed for errors and / or omissions. We reserve the right to make changes without prior notice. For the latest documentation visit the EnOcean website at www.enocean.com.