# STC65 RS485 Modbus

EnOcean Receiver/Transmitter with RS485 Modbus Interface

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## Data Sheet

Subject to technical alteration
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## Application

Bidirectional gateway for EnOcean-based sensors and actuators as well as controllers and control systems with RS485 Modbus interface.

Details of the protocol are described in the respective software documentation.

## Types available

| | |
|---|---|
| STC65-RS485 Modbus | EnOcean receiver and transmitter, converter to Modbus protocol |

## Security Advice – Caution

The installation and assembly of electrical equipment must be performed by a skilled electrician.

The modules must not be used in any relation with equipment that supports, directly or indirectly, human health or life or with applications that can result in danger for people, animals or real value.

**Before connecting devices with electrical power supply the installation must be isolated from power source!**

## Notes on Disposal

For disposal, the product is considered waste from electrical and electronic equipment (electronic waste) and must not be disposed of as household waste. Special treatment for specific components may be legally binding or ecologically sensible. The local and currently applicable legislation must be observed.

## Electrical Connection

The devices are constructed for the operation of protective low voltage (SELV). For the electrical connection, the technical data of the corresponding device are valid.

Especially with regard to passive sensors in 2-wire conductor versions, the wire resistance of the supply wire has to be considered. If necessary the wire resistance has to be compensated by the follow-up electronics. Due to self-heating, the wire current affects the measurement accuracy. So it should not exceed 1 mA.

Sensing devices with transducer should always be operated in the middle of the measuring range to avoid deviations at the measuring end points. The ambient temperature of the transducer electronics should be kept constant. The transducers must be operated at a constant supply voltage (±0,2 V).When switching the supply voltage on/off, onsite power surges must be avoided.

When using lengthy connection wires (depending on the cross section used) the measuring result might be falsified due to a voltage drop at the common GND-wire (caused by the voltage current and the line resistance). In this case, 2 GND-wires must be wired to the sensor - one for supply voltage and one for the measuring current.

## Transmitting Frequency and Measuring Principle

The device sends an event or a time controlled telegram to the receiver.

A: event controlled
By activating the learn button of the device, the internal microprocessor is woken up and a request telegram is generated and transmitted to the receiver. The request telegram contains the status of the device as well as the battery status.

B: time controlled
The internal microprocessor wakes up at a predefined interval according to the settings and a request telegram to the receiver is generated and transmitted.

After a telegram is sent, the device expects the answer telegram to be received within 1 sec. In case no telegram can be received, the device goes back into sleep mode.

If a telegram is received the control loop is calculated and the actuator will react before entering the sleep mode.

## Information about EasySens (Radio)

### Transmission Range

As the radio signals are electromagnetic waves, the signal is damped on its way from the sender to the receiver. That is to say, the electrical as well as the magnetic field strength is removed inversely proportional to the square of the distance between sender and receiver ($E,H \sim 1/r^2$).

Beside these natural transmission range limits, further interferences have to be considered: Metallic parts, e.g. reinforcements in walls, metallized foils of thermal insulations or metallized heat-absorbing glass, are reflecting electromagnetic waves. Thus, a so-called radio shadow is built up behind these parts.

Radio waves can penetrate walls, however signal dampening is increased vs transmitting within the free field.

Penetration of radio signals:

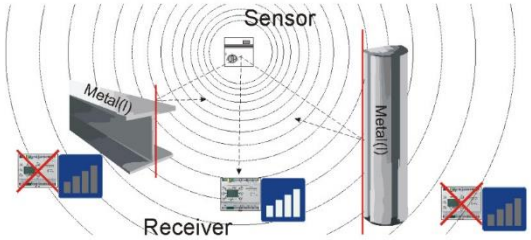
| *Material* | *Penetration* |
|---|---|
| Wood, gypsum, glass uncoated | 90..100% |
| Brick, pressboard | 65.. 95% |
| Reinforced concrete | 10.. 90% |
| Metal, aluminium pasting | 0.. 10% |

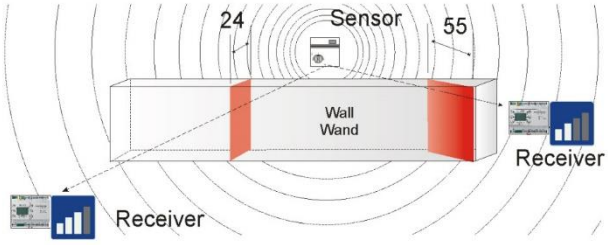
This means that the building material used in a building is of paramount importance for the evaluation of the transmitting range. For an evaluation of the environment, please see guide values listed below:

| *Radio path* | *Range/penetration* |
|---|---|
| Visual contacts | Typ. 30m range in passages, corridors, up to 100m in halls |
| RI gypsum walls/wood | Typ. 30m range through max. 5 walls |
| Brick wall/Gas concrete | Typ. 20m range through max. 3 walls |
| Reinforced concrete/-ceilings | Typ. 10m range through max. 1 ceiling |

Supply blocks and lift shafts should be seen as a compartmentalization

In addition, the angle with which the signal sent arrives at the wall is also important. Depending on the angle, the effective wall strength and thus the damping attenuation of the signal changes. If possible, the signals should run vertically through the wall. Recesses should be avoided.




**Other Interference Sources**

Devices that also operate with high-frequency signals, e.g. computer, audio-/video systems, electronic transformers and ballasts etc. are also considered as an interference source. The minimum distance to such devices should amount to 0,5 m.

**Selecting the best Device Mounting Position using field strength measuring instruments (e.g. Thermokon AirScan)**

Instruments for measuring and indicating the received field strength (RSSI) of the EnOcean telegrams and interfering radio activity of transmission frequency support electrical installers during the planning phase and enable them to verify whether the installation of EnOcean transmitters and receivers is possible at the positions planned.

They can be used for the examination of interfered connections of devices, already installed in the building, to determine the correct mounting position for the wireless sensor/ receiver:

Person 1 operates the wireless sensor and produces a radio telegram by manual actuation while Person 2 monitors the displayed field strength values on the measuring instrument. Person 1 does vary the wireless sensor's position to determine the optimal intended mounting position.

**High-Frequency Emission of Wireless Sensors**

Since the development of cordless telephones and the use of wireless systems in residential buildings, the influence of radio waves on people's health living and working in the building have been discussed intensively. Due to incomplete measuring results and long-term studies, very often great feelings of uncertainty exist with the supporters as well as with the critics of wireless systems.

A measuring expert certificate of the institute for social ecological research and education (ECOLOG) has confirmed, that the high-frequency emissions of wireless keys and sensors based on EnOcean technology are **considerably lower** than comparable conventional keys.

Even conventional keys send electromagnetic fields, due to the contact spark. The emitted power flux density (W/m²) is 100 times higher than using a wireless switch considering the total frequency range. In addition, a potential exposition by low frequency magnet fields emitted via used wires are reduced due to wireless keys.

If the radio emission is compared to other high-frequency sources in a building such as DECT-telephones and basis stations, these systems are 1.500 times higher-graded than wireless switches.

## Technical Data

| | |
|---|---|
| Power supply: | 15..24 V = (±10%) / 24 V~ (±10%) |
| Power consumption: | typ. 0,6 W / 1,5 VA |
| Trans.-/Receiv.-Freq.: | 868 MHz (EnOcean) |
| Transmitting Power: | max. 10 mW |
| Antenna: | External receiving antenna with magnetic holding (included in shipment) |
| Interface: | RS485 protocol: Modbus RTU or ASCII<br>Baud rate: 9600, 19200 38400 or 57600, Parity: None, Even or Odd |

| | |
|---|---|
| Terminating resistor: | 120 Ohm, available via jumper |
| Clamps: | Terminal screw max. 1,5 mm² |
| Enclosure: | Bottom part: material PA6, colour white<br>Top cover: material PC, colour crystal clear |
| Protection: | IP42 according to EN 60529 |
| Ambient temperature: | -20..+60 °C |
| Transport: | -20..+60 °C / max. 70% rF, non-condensed |
| Weight: | 110 g (without external Antenna) |

## Mounting Advices

The module enclosure is prepared for direct wall mounting. For the operation a separate external 868 MHz receiving antenna is necessary, which is included in shipment as a standard.

The antenna should be mounted at metallic objects, e.g. at an air tube behind a false ceiling or at an 180x180 mm metal plate (material: galvanized sheet steel, see accessories).

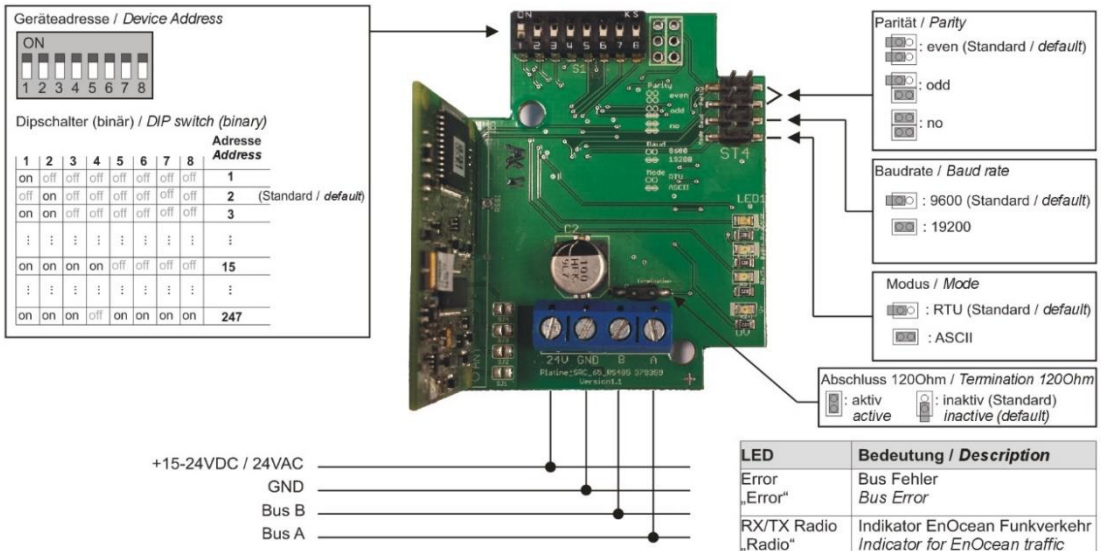
If possible the antenna should be mounted with a distance of >10 cm from the ceiling and from a wall. The distance to other transmitters (e.g. GSM / DECT / wireless LAN / EnOcean sender) should be minimum 0,5 m.

The antenna should be vertically aligned downwards. The antenna cable should be wired in an electric conduit. A crushing of cable shall be absolutely avoided. The minimal bend radius of the extension cable is 50 mm.

As for the cable laying the use of an active pull-up device should be avoided, in order to avoid any damages to the sheathing respectively to the connectors.

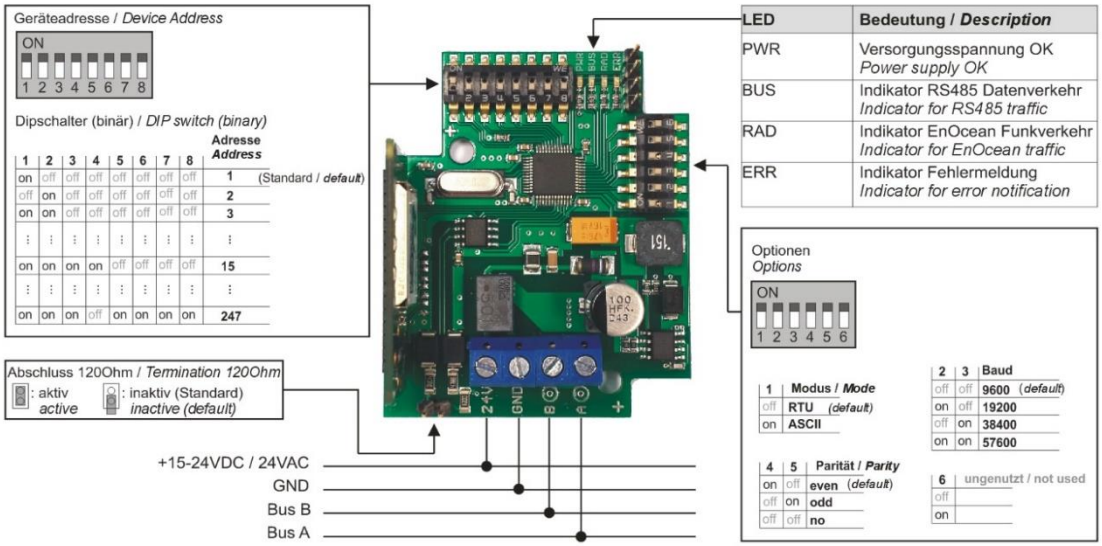
## Terminal Connection Plan / Configuration

Revision A:




| LED | Bedeutung / *Description* |
|---|---|
| Error „Error“ | Bus Fehler *Bus Error* |
| RX/TX Radio „Radio“ | Indikator EnOcean Funkverkehr *Indicator for EnOcean traffic* |
| RX/TX RS485 „Rx/Tx“ | Indikator RS485 Datenverkehr *Indicator for RS485 traffic* |
| Power „Uv“ | Versorgungsspannung OK *Power supply OK* |

Revision B:




| LED | Bedeutung / *Description* |
|---|---|
| PWR | Versorgungsspannung OK *Power supply OK* |
| BUS | Indikator RS485 Datenverkehr *Indicator for RS485 traffic* |
| RAD | Indikator EnOcean Funkverkehr *Indicator for EnOcean traffic* |
| ERR | Indikator Fehlermeldung *Indicator for error notification* |

When using ASCII mode, the parity must be set to EVEN or ODD. „No Parity“ (no) is not available in ASCII mode.

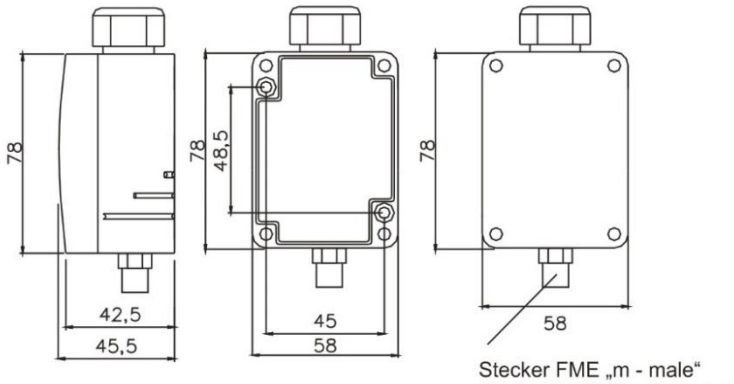
## Installation

Radio sensors send time or event controlled telegrams to the receiver. The receiver verifies the incoming telegrams and output them directly via their interface. Each telegram allows a precise allocation and consists of the format: type of the telegram, data, sender-ID 32bit.

In order to assure a correct evaluation of the measuring values by the receiver, it is necessary to have the devices learned by the receiver. This is done automatically by means of a “learn button” at the sensor or manually by input of the 32bit sensor ID and a special “learning procedure” between sender and receiver. The respective details are described in the corresponding software documentation of the receiver.

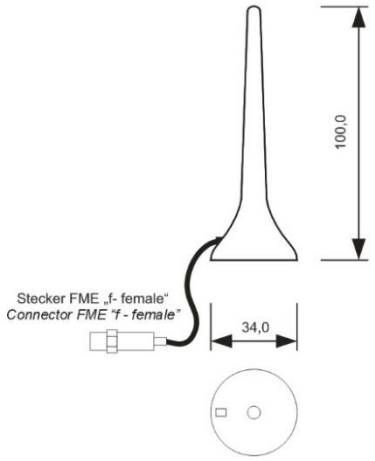
*depending on the respective receiver type

## Dimensions (mm)




Gehäuse
*Enclosure*

Stecker FME „m - male“
*Connector FME „m - male“*

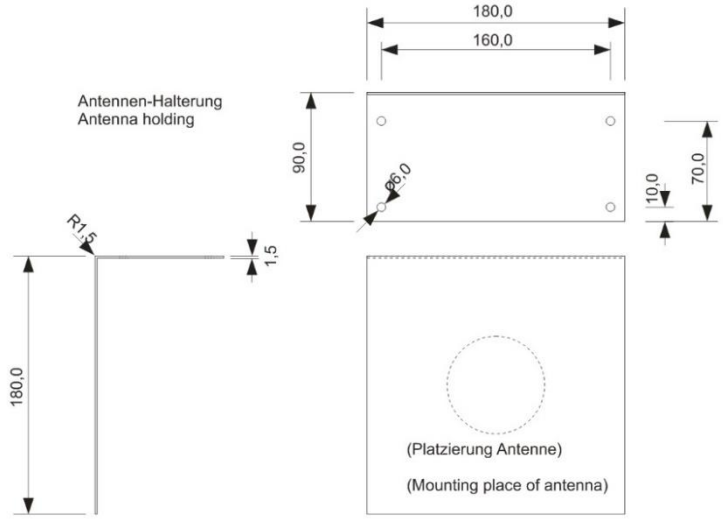



Externe Antenne
*External Antenna*

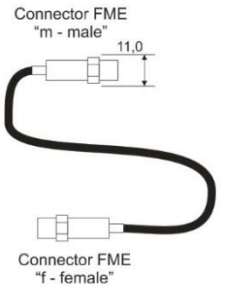
## Accessories

| | |
|---|---|
| (D+S) | 1 Set (each 2 pieces) rawl plugs and screws |
| (ANT10) | Antenna wire extension 10 m |
| (ANT20) | Antenna wire extension 20 m |
| (AHA180) | Antenna holding 180x180 mm |

## Dimensions Accessories (mm)




Material: Eisenblech, magnetisch
Material: Iron, magnetic




Antennen-Verlängerungskabel
Antenna wire extension
ANT10: L=10m
ANT20: L=20m