The Smart Multisense sensor provides solutions for the home/office requirements for advanced home automation services with its flush mounted design. The base board contains a Bluetooth Smart (Bluetooth Low Energy, BLE) along with motion detector and luminosity modules. The Bluetooth Smart module empowers location-based services with the use of beacon technology to locate users inside a given area. The built-in motion detector enables the effective management of a room by identifying its occupancy status. The highly accurate luminosity sensor can detect the light levels in a specified area or room for smart lighting control applications. Additionally, the optional Enocean/Zigbee modules can be added to the base sensor. This adds a higher degree of wireless connectivity making the Smart Multisense capable of communicating with either technology.

Detailed description

The Smart Multisense offers a low profile flush mount design that can discreetly be placed on the ceiling/tiles of any building without being intrusive to the building's infrastructure. The dimensions of the Smart Multisense are provided in *Figure 1*. The Smart Multisense sensor includes 2 x RJ45 sockets for CAT5/CAT6 cables. The Smart Multisense features a wide power supply input (7 – 36 VDC) providing the user with great flexibility to select the power supply. Both power, and data are provided via the CAT5/CAT6 cables. The sensors can then be daisy chained to setup the power and data transmission requirements for the network. Therefore, providing power to the sensors and setting up the network for data exchange becomes as simple as plugging a CAT5/CAT6 cable between adjacent sensors creating a network line. A maximum number of 10 sensors can be powered within the same line due to CAT5/CAT6 cable limitations.

The process of gathering the information from all the sensors is achieved via a Smart Coordinator (sold as a separate device) to be positioned at the beginning (or end) of the line. The Smart Coordinator can in turn be connected to the local network to make the information available for the system administrator. The information from the sensors is transmitted serially to the Smart Coordinator via the provided Smart Multisense's RS485 interface using a Smart Buildings proprietary serial protocol. Alternatively, the Smart Multisense offers the possibility of sending information wirelessly via the optional Zigbee module. Please refer to section Optional Enocean/Zigbee module for more information regarding the optional Zigbee module.

The Smart Multisense includes a Bluetooth Smart module that can either (or both) transmit and scan for beacons within its surroundings. The BLE transmission feature allows users to make use of their phones to detect the presence of a nearby sensor and empowers the location-based services infrastructure. On the other hand, the scanning feature allows visitors and other external users to be detected and positioned within the building where other services can be offered.

The luminosity sensor included in the Smart Multisense combines one broadband photodiode (visible plus infrared) and one infrared-responding photodiode on a single CMOS integrated circuit capable of providing a near-photopic response over an effective 20-bit dynamic range (16-bit resolution). The information received form luminosity sensor is evaluated at the Smart Multisense, and a lux level is derived using an empirical formula to approximate the human eye response.

The Smart Multisense includes also a motion sensor in the shape of a passive infrared detector that can detect the presence of a person inside a room or confined area. The motion sensor can detect movement within a 10 m radius and is ideal for determining if a room inside a building is occupied, effectively allowing building administrators to manage the assets of that room.

Optional Enocean/Zigbee module

The base version of the sensor can be upgraded to enable either (or both) Enocean and Zigbee networks within the same enclosure. This functionality allows the Smart Multisense to seamlessly combine the best of both technologies. This is achieved via the optional Enocean/Zigbee add-on module (sold separately). The Enocean/Zigbee module is easily integrable to the Smart Multisense base board

Enocean has established itself as a reliable wireless battery-less solution for many applications mainly in the field of home automation. Many Enocean devices are available in the market for different types of applications, such as radiator valve actuators, key card readers, door/window

contacts, thermostats, CO2 sensors, temperature sensors, etc. The Smart Multisense's Enocean module includes an Enocean transceiver that allows bidirectional communication with Enocean devices without the need for an external gateway. Therefore, information from Enocean sensors can be easily received at the Smart Multisense, but also commands can be sent from the Smart Multisense to Enocean actuators to operate remote devices.

On the other hand, when it comes to control and monitoring applications, Zigbee is one of the leading technologies within the the wireless context. The Smart Multisense's Zigbee module includes a Zigbee transceiver with an on-chip antenna, allowing a full Zigbee implementation. This in turns enhances the flexibility of the Smart Multisense allowing it to communicate to devices supporting the Zigbee technology. Moreover, the communication between Smart Multisense sensors and the Smart coordinator can be implemented wirelessly via Zigbee. Furthermore, an Ad-Hoc Zigbee network can be easily setup, expanded and reconfigured thanks to the self-meshing feature of Zigbee. **Note:** By default, due to security considerations, a home automation profile is not allowed in the Smart Multisense. However, this could be implemented under request.

Features

Base sensor

- Bluetooth Low Energy sensor
- Motion detector
- Luminosity detector
- RS-485 interface
- CAT5 interface for power and data

Enocean /Zigbee module

- Enocean transceiver for both transmission and reception

- Zigbee transceiver

Specifications

Power supply	7 – 36 VDC
Frequency	2.4 GHz Bluetooth/Zigbee, 868.3 MHz for Enocean
Data rate	9600 – 115200 bauds
Operating Temperature	0°C to 70°C
Antennae	On chip antennas Bluetooth/Zigbee, Pre-installed whip antenna Enocean
Motion detection range	10 m
RS485 impedance	100 Ω

Schematics

Information regarding physical and technical aspects of the Smart Multisense are presented in Figures 1 to 3. The dimensions of the Smart Multisense are shown in *Figure 1* for both, the side and top view. The Smart Multisense supports the use of either T568A or T568B for the termination of the CAT5/CAT6 RJ45 wire. The pinout configuration used is shown in *Figure 2* using T568B as example. Finally, in *Figure 3*, the implementation of the Smart Multisense network is shown.
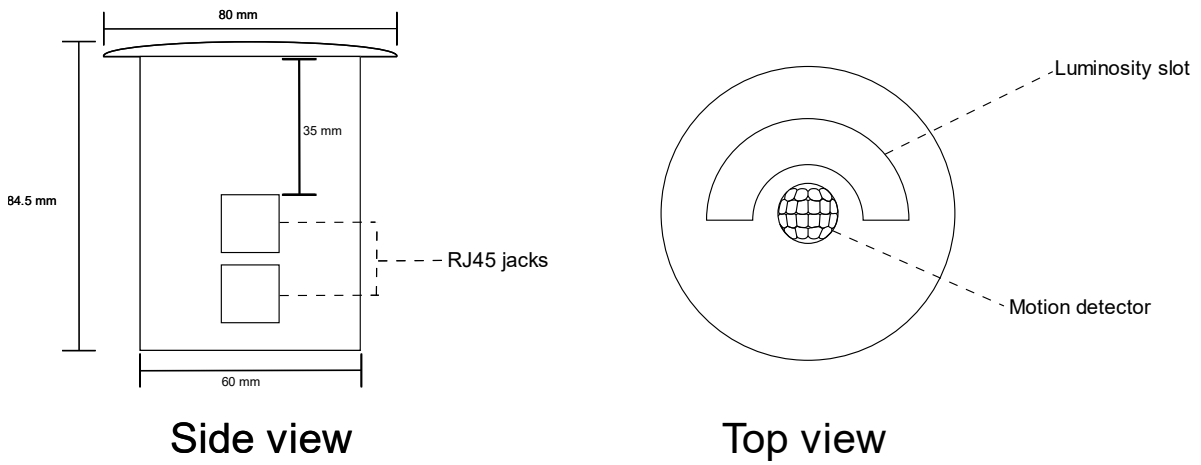
Dimensions

Figure 1. Smart Multisense dimensions

Pinout configuration

1 - VCC
2 - GND
3 - Reserved for future use
4 - RS485A
5 - RS485 B
6 - Reserved for future use
7 - Reserved for future use
8 - Reserved for future use
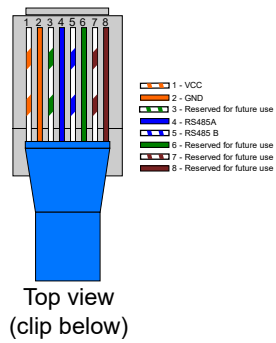
Top view
(clip below)

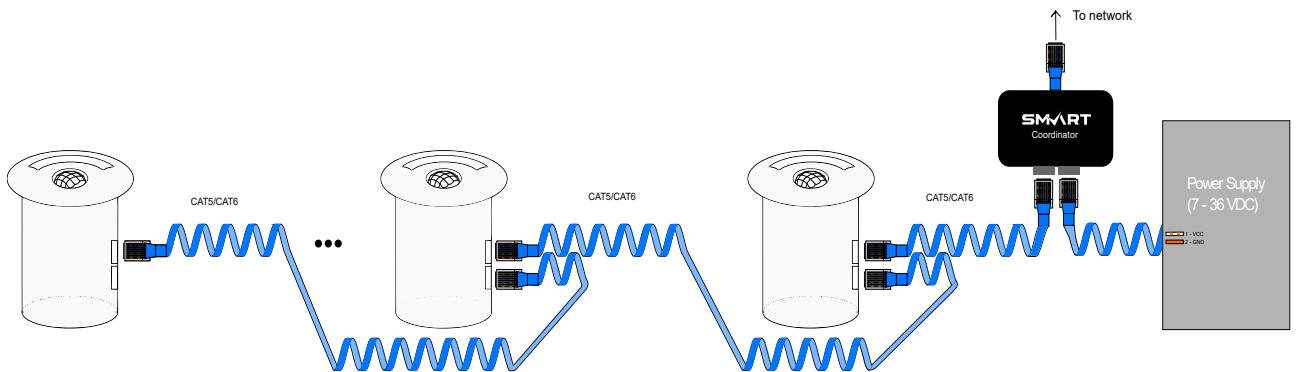*Figure 2. CAT5/CAT6 Pinout configuration for Smart Multisense*

Smart Multisense network setup

Figure 3. Smart Multisense network