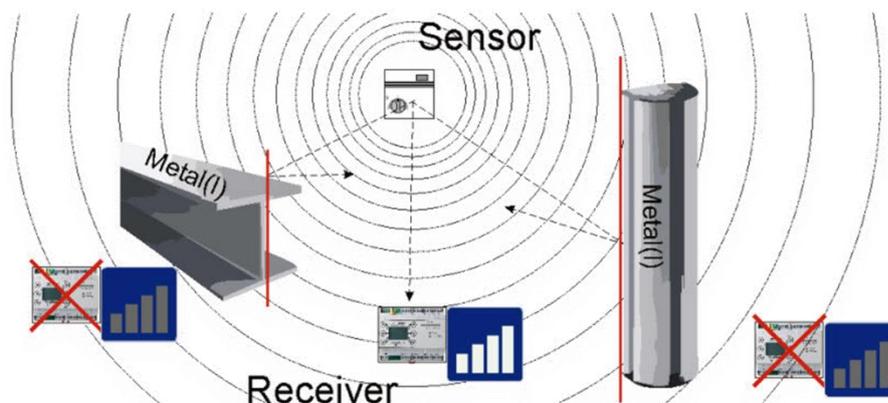


Information

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EasySens – wireless sensor system

Innovative wireless solar technology enables the control of temperature and ventilation in buildings using ambient light as power source. Time-consuming, expensive installation costs such as wiring and cabling are unnecessary.

Low material costs and time saving installations enable competitively priced system solutions. EasySens offers significantly more flexibility in regards to the sensor location, allowing for a variable room layout in modern buildings.

Even in historically protected buildings where no architectural changes are allowed, sensors for air-conditioning technology can be easily integrated.

The EasySens system uses a standard data profile conforming to EnOcean (IEC Standard 14543-3-10). Therefore, it is guaranteed that the wireless sensors and receivers by Thermokon can be combined with devices of other manufacturers without any problems.

There are different devices for monitoring of temperature, relative humidity, light, set point adjustment and status detection.

Among others, receivers are available with LON-, EIB/KNX-, RS485-, or BACnet interface and are designed as a gateway to be integrated with superior control systems. Connection to other bus systems is feasible without any problems.

Advantages at a glance

- »» No batteries, thus almost maintenance-free
- »» Simple installation, no wiring
- »» Flexibility of installation layout
- »» Significant reduction in energy consumption
- »» Flush mounting possible wherever needed (no cables)
- »» Cost-effective system solutions
- »» Environmental and protection of resources
- »» Frequencies available: 868 MHz; 902 MHz (North America); 928 MHz (Japan); 315 MHz on request
- »» Minimal transmitting power (10 mW) with safe radio transmission
- »» Transmitting range up to 30 m in buildings and up to 300 m in free field
- »» Interoperable
- »» International Standard (IEC 14543-3-10)

EasySens – Smart Acknowledge

The self-powered room operating unit SR06 LCD has the ability to illustrate data on the display such as presence or window statuses. There is also an option for external reset of given set points.

For bidirectional communication of energy-autonomous devices EnOcean offers Smart-Acknowledge technology. As usual the control unit periodically transmits data and measured values to a gateway (1) and goes back to sleep. After a short break of a few milliseconds, set by learning in the SR06 LCD wakes up again and transmits a second, so called reclaim-telegram (2). This shows the gateway that the device is ready for reception. The SR06 LCD is now ready to receive telegrams for a few milliseconds, so the gateway has to answer immediately without delay (3). If the gateway does not respond instantly, the SR06 LCD goes back to sleep, to save energy. The use of repeaters is not possible in this application, due to delays in signal run time in both directions.

Compatibility

Pending the availability of Smart-Acknowledge-enabled gateways, the first generation of SR06 LCD is delivered as a unidirectional version. From now on energy independent room operating units support Smart-Acknowledge and are capable of bidirectional communication, as well as illustration of commands and messages on the display.

Before using a bidirectional SR06 LCD, check if the device supports Smart Acknowledge technology.

Transmitting Frequency and Measuring Principle Transmitters

The sensors send event or time controlled telegrams to the receiver.

A: event controlled

By activating the learn button of the device, the internal microprocessor is woken up, the measuring value is detected and a telegram to the receiver is generated and transmitted. Some devices, for example to measure humidity or motion, generate telegrams event controlled to the receiver.

B: time controlled

The internal microprocessor wakes up at a predefined interval according to the settings (T_wake up) and the measuring value is detected. If the status of an input has changed more than 2% (for devices with airConfig this value can be programmed) since the last inquiry, a telegram is produced immediately. If the input value remains unchanged compared to the previous telegram, a telegram is automatically produced after expiration of the fixed sending time (approx. 16 minutes (for devices with airConfig this value can be programmed); T_send).

After a telegram is sent, regardless whether produced by status changes or after expiration of T_send, the times T_wake up and T_intervall are restarted.

A telegram always includes all information (measured data, charging voltage of energy storage,...).

Transmitting Frequency and Measuring Principle Receivers

Sensors send events and / or time controlled telegrams to the receiver.

A: event controlled

By operation of controls, for example, you press the learn button of the device, the internal microprocessor is woken up and sent a telegram. Which data contained in the telegram is in the EEP (EnOcean equipment profile) defined (<http://www.enocean-alliance.org/eep/>).

B: time controlled

The sensor wake up at regular intervals (T_wake up) and send the measured values. Provided that the measured values from the last transmission have significantly changed, the current readings are sent. With almost unchanged measured values the sensor goes to sleep-mode without a telegram to send. Is repeatedly sent no unchanged measurements the sensor sends a telegram after a specified number of wake-up-cycles.

A telegram always includes all information (measured data, charging voltage of energy storage,...).

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 field strength is removed inversely proportional to the square of the distance between sender and receiver ($E, H \sim 1/r^2$), at twice the distance, only $\frac{1}{4}$ of the field strength is still present.

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:

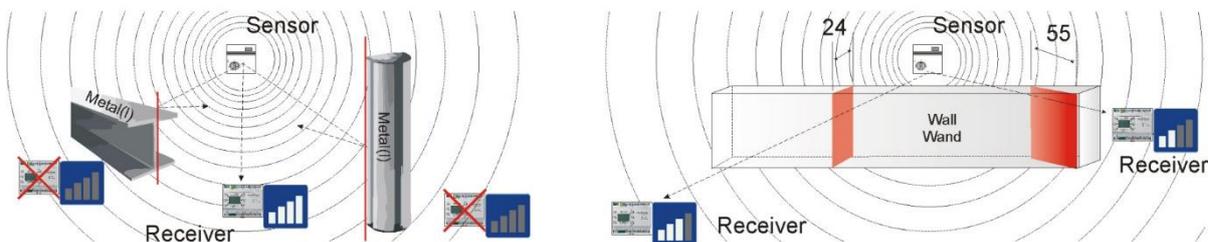
| Material | Penetration |
|------------------------------|-------------|
| Wood, gypsum, glass uncoated | 90..100% |
| Brick, pressboard | 65.. 95% |
| Reinforced concrete | 10.. 90% |
| Metal, aluminium pasting | 0.. 10% |

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. 30 m range in passages, corridors, up to 100 m in halls |
| Plasterboard walls/wood | Typ. 30 m range through max. 5 walls |
| Brick wall/Gas concrete | Typ. 20 m range through max. 3 walls |
| Reinforced concrete/-ceilings | Typ. 10 m 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 during the planning phase and enable them to verify whether the installation of EnOcean transmitters and receivers is possible at the positions planned.

For this purpose, a field strength meter, a laptop with the software AirScan for example is placed at the point where the receiver is provided. The USB transceiver from AirScan then logs the messages of the sensors and displays the field strength. Color-coded values indicate the signal quality. By changing the sensor position there can the best possible mounting position located. Refer to the documentation "range planning EnOcean radio systems"

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.

airConfig – Commissioning made easy

In addition to the field strength-measuring tool airScan, Thermokon now offers the new free software tool airConfig which allows remote commissioning of EasySens EnOcean products. Remote commission means parameterization respectively learning of sensors into a receiver without interacting directly with the devices.

airConfig uses EnOcean radio technology to parameterize devices through special remote commissioning commands. Only the airScan USB transceiver and the free airConfig software (which can be downloaded from the download centre on www.thermokon.com) are required.

The software is available for all Windows- and Apple OS X-based computers. It also runs on the Microsoft Surface Tablet.

Benefits at a glance

- »» Reduced storage: one receiver, multiple functions (e.g. control of heating, ventilation, lighting and more)
- »» Flexibility
- »» Variable parameters – simple on screen
- »» PC configuration

Start-up and configuration

- »» Secure communication with unlimited devices
- »» Selected device blocked for other learning processes
- »» Selectable functions e.g. measuring range strength, EEPs
- »» Individual designation of devices/ information text
- »» Choice of EnOcean timing
- »» Configuration of time & date
- »» Programming of sensors via drag & drop
- »» Remote maintenance & programming without additional tools
- »» Project file: Saving/Export of all settings with all shortcuts
- »» Restoration/Import of devices from other project files
- »» Password protection
- »» Identification by visual and/or acoustic feedback
- »» Configuration for transmitting identical/duplicate settings to multiple devices simultaneously

Programming and configuration of sensors using airConfig is done easily by drag & drop, no tools are required. Configuration parameters such as wakeup cycles, measuring ranges or output functions can be adapted directly in the settings of the device and transmitted by radio signals via airConfig.

Flexibility

- »» Later changes of product functionality is no problem
- »» Products can be configured before being mounted at the customer
- »» Changes of specification can be fulfilled in the field

Safety

- »» Protect your projects and products using password
- »» EnOcean Rolling-Code encryption to protect communication
- »» Prevents unauthorized persons to access network

Support

- »» Decentralized access to products and project information via remote access
- »» Identification via visual or acoustic feedback
- »» Structured display of installed products showing unique device ID

Usage of airConfig

Starting airConfig

EasySens AirConfig commissioning tool is available free of charge for download from the download centre of www.thermokon.de. To run AirConfig a Windows operated PC or Apple MAC is required. Java and FlashPlayer have to be installed and for communication an EasySens USB transceiver has to be connected (with driver installed), e.g. same as supplied with Thermokon's field test tool airScan. Alternatively EnOcean's USB300 may also be used. AirConfig does not require any special license.

Please also consult the airConfig manual in addition to this data sheet. airConfig offers further explanations of each parameter using guide notes when moving the mouse above each parameter.

Connect the USB stick to one of your computer's USB ports and start airConfig. The driver should be installed automatically from Windows website. In case the driver of the USB transceiver has not been installed properly and no device could be found in the network, a window will appear:

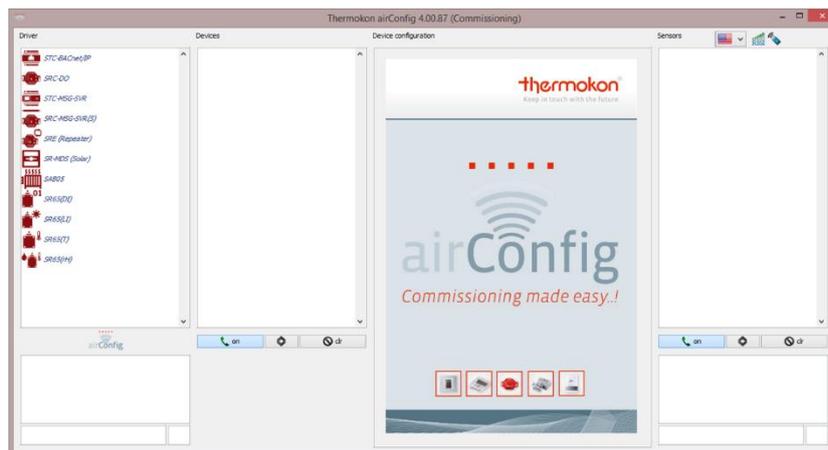


In this case please check in your device manager whether the USB transceiver has been detected properly and the driver is installed. If the driver is missing, you may download the appropriate driver for your system from <http://www.ftdichip.com/Drivers/VCP.htm>.

If no transceiver and no network device could be found, then the software will not start.

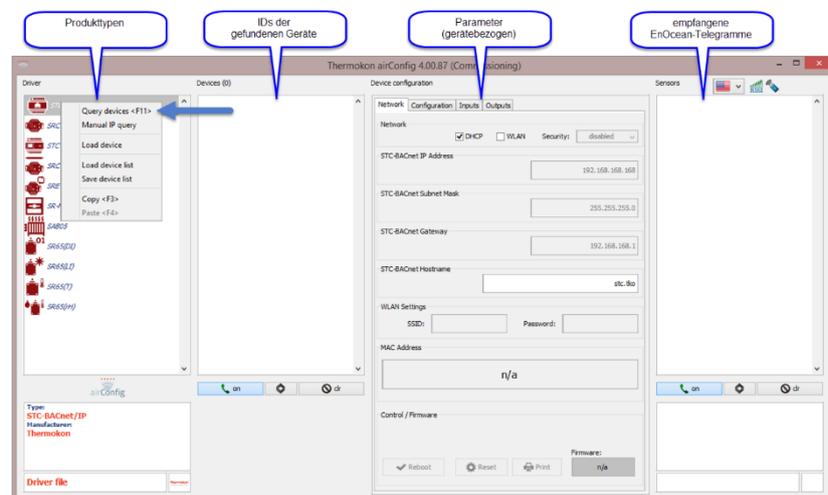
The airConfig Screen

To configure the device, please start airConfig, make sure, that the USB transceiver has been detected and choose "Commissioning" to get the following screen (to get access to BACnet foreign device registration, use EEP-Virtuoso).



Click right the symbol of the device in the smartCom Driver list (column 1). Select "Query devices" or press F11. airConfig will send a query to request the IDs of all devices of that kind within transmission range or connected to the same network as the computer.

Note: To receive and send configuration data to solar powered sensors LEARN button has to be activated to wake-up the sensor.



Each device will be listed with its EnOcean ID in the list "Devices" (2nd column).

To configure a particular device click right on the Icon of the device and select "Request configuration" or press F5.

airConfig will prompt for the PIN that protects the device's configuration. Enter the PIN numbers (000..255) and select "Yes" to read the configuration from the device. Default PIN key is 000-000-000. To work with the default settings, press "No".



The area "Device configuration" is based on the type of device, which should be configured. Here all settings could be changed to configure the device or devices.

To finalize configuration choose "Send configuration" from the context menu (F6). For sensors it is necessary to press LEARN button to store the configuration at the device.

Remarks for solar powered sensors using airConfig

For all solar powered sensors please check, that energy power is sufficient. This is shown in column "Device configuration" using field "Energy status", which has to be highlighted in green. Especially when configuring the device a battery should be used to send and receive parameters from airConfig. This procedure consumes more energy than normal processing, which may not be available after unpacking the device.

When choosing shorter cycles for measuring and sending of the information to the receiver please have in mind, that the brightness may not be sufficient to gain the necessary energy for the device.

Product specific Configuration of devices enabled for airConfig

The appearance of column "Device configuration" for configuring the devices depends on the type of device. Setting of the parameters is described in the datasheet of the device.