ETHS - Easyfit Temperature and Humidity Sensor

Version 2.1
(before Stepcode DE)

Observe precautions! Electrostatic sensitive devices!

Patent protected:
WO98/36395, DE 100 25 561, DE 101 50 128,
WO 2004/051591, DE 103 01 678 A1, DE 10309334,
WO 04/109236, WO 05/096482, WO 02/095707,
US 6,747,573, US 7,019,241

REVISION HISTORY

The following major modifications and improvements have been made to this document:

Version	Author	Reviewer	Date	Major Changes
1.0	MKA	MKA	22.12.2017	First release (902 MHz Version)
1.1	AA	MKA	26.02.2018	Several additions: 868 MHz version, enhanced security feature, packaging info, outline drawings, application info, etc...
1.2	AA	AA	28.05.2018	Chapter 4.3 added (Installing Supplemental Battery)
2.0	AA	AA	04.01.2019	Additional supplied Wall Mounting Plate added (in chapters 2.1, 2.5, 2.6)
2.1	AA	AA	01.02.2019	Tray packaging added (chapter 2.4, new chapter 2.7)

Published by EnOcean GmbH, Kolpingring 18a, 82041 Oberhaching, Germany
www.enocean.com, info@enocean.com, phone +49 (89) 6734 6890

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Important!
This information describes the type of component and shall not be considered as assured characteristics. No responsibility is assumed for possible omissions or inaccuracies. Circuitry and specifications are subject to change without notice. For the latest product specifications, refer to the EnOcean website: http://www.enocean.com.

As far as patents or other rights of third parties are concerned, liability is only assumed for modules, not for the described applications, processes and circuits. EnOcean does not assume responsibility for use of modules described and limits its liability to the replacement of modules determined to be defective due to workmanship. Devices or systems containing RF components must meet the essential requirements of the local legal authorities. 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. Components of the modules are considered and should be disposed of as hazardous waste. Local government regulations are to be observed. Packing: Please use the recycling operators known to you.

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1 RELATED DOCUMENTS

This document describes set-up and operation of the ETHS unit. Related documents are as follows:

1.1 Installation Instructions

The installation instructions are content of the single unit packaging box

1.2 Range Planning

We recommend following our application notes, in particular AN001 "EnOcean Wireless Systems - Installation Notes" (PDF) available as download at:
www.enocean.com/en/application-notes/

1.3 Radio Telegram Description

ETHS transmits a radio telegram according to EnOcean Equipment Profile EEP A5-04-03 as defined in the EnOcean Equipment Profiles specification:
www.enocean-alliance.org/eep/

If the device shall be operated in Enhanced Security mode please refer to the EnOcean Security Specification:
www.enocean.com/security-specification

1.4 Declaration of Conformity

The Declaration of Conformity can be found at the EnOcean ETHS product webpage.

2 GENERAL DESCRIPTION

2.1 Basic Functionality

ETHS is a wireless and maintenance free temperature & humidity sensor for EnOcean systems. It provides on-board a calibrated temperature and humidity sensor. Powered by a solar cell, it works absolutely maintenance-free. An integrated energy store allows operation for several days in total darkness. In dark surroundings, a coin cell battery can be retrofitted.

The small housing can easily be mounted to walls or furniture using the included adhesive pad or using the included wall plate.

Single Unit Packaging only: Using the included metal stand the sensor can be positioned on horizontal surfaces. One end cap can be replaced by the enclosed triangle cap.

ETHS periodically measures temperature and humidity of its environment. Significant changes in readings are reported immediately. In addition, frequent updates (signs-of-life) are provided at regular intervals. A teach-in telegram is triggered immediately using the LRN button. ETHS provides the option to use Enhanced Security mode with encrypted communication and Rolling Code

ETHS Key Product Features

- Fully autonomous operation under sufficient lighting with pre-installed solar cell (Battery backup option for operation in dark surroundings)
- Enhanced Security feature
- Accessories included
    - Wall mounting plate
    - Double-sided adhesive
    - Metal stand and triangle cap for freestanding operation (single unit packaging only)
- Small housing with
    - Factory calibrated on-board temperature and humidity sensor
    - Integrated energy storage and charging circuit
    - Integrated LRN button and TX indicator LED

2.2 Technical Data

Primary power supply		Solar harvesting of indoor light, solar, incandescent, fluorescent, LED, illumination 50-100000 lx
Auxiliary power supply		Option for backup battery (CR1225, not included)
Antenna		Internal helix antenna
Radio standard / frequency		ETHSA: EnOcean 868.300 MHz ETHSU: EnOcean 902.875 MHz
Data rate / modulation type		125 kbps / ETHSA = ASK, ETHSU = FSK
Radiated Output Power		ETHSA = typ. 5dBm ETHSU = typ. 100 dBµV/m,
Temperature sensor performance	Measurement range: Resolution: Accuracy:	-20°C … +60 °C 0.1 K ±0.5 K across entire range
Humidity sensor performance	Measurement range: Resolution: Accuracy:	0 % … 100 % r.h. 0.4 % r.h. ±4.5 % r.h. across entire range ±3.0 % r.h. between 20 … 80 % r.h.
Measurement cycle time		Once every 100s
Immediate transmission threshold		Change by >±0.5 K or >±3% rh versus last transmission
Sign-of-life transmission		Measurement data update once every 11-24 minutes (by random)
Teach-in telegram trigger		Pushbutton behind hole in side wall
Teach-in telegram indicator		LED shining through housing side wall
Start-up time from empty energy store		Typ. < 5 min @ 400 lx [1]
Sustain condition for battery free operation		min. 1200 lxh per day (25°C)
Fully charged condition		6400 lxh (25°C)
Operation time in total darkness		typ. 4 days after full charge [2]
Operation time with backup battery		5 years min. (total darkness)
EnOcean module integrated		ETHSA: STM 350 ETHSU: STM 350U
EnOcean Equipment Profile (EEP)		A5-04-03 SIGNAL 0x06 (Energy Level Reporting)

Note 1: Charge time at 25°C from empty energy store until a teach-in telegram can be sent
Note 2: Operation time at 25°C from a fully charged energy store if telegrams are sent on average every 17.5 minutes (signs-of-life)

2.3 Environmental Conditions

Operating and Storage temperature	Absolute Maximum: -20 °C … +60 °C Recommended [3]: +10 °C…+30 °C
Shelf life (in absolute darkness)	36 months after delivery [4]
Operating and storage humidity	Maximum: 0% … 93% r.h., non-condensing Recommended: < 60% r.h.

Note 3: Recommended for maximum life of energy storage capacitor.

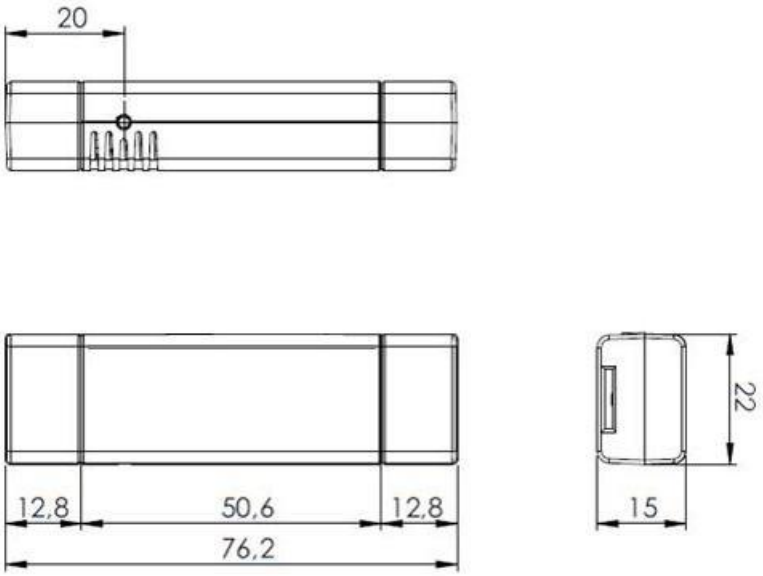
Note 4: Deep discharge of the energy storage leads to degradation of performance. Therefore products have to be taken into operation after 36 months.

2.4 Ordering Information

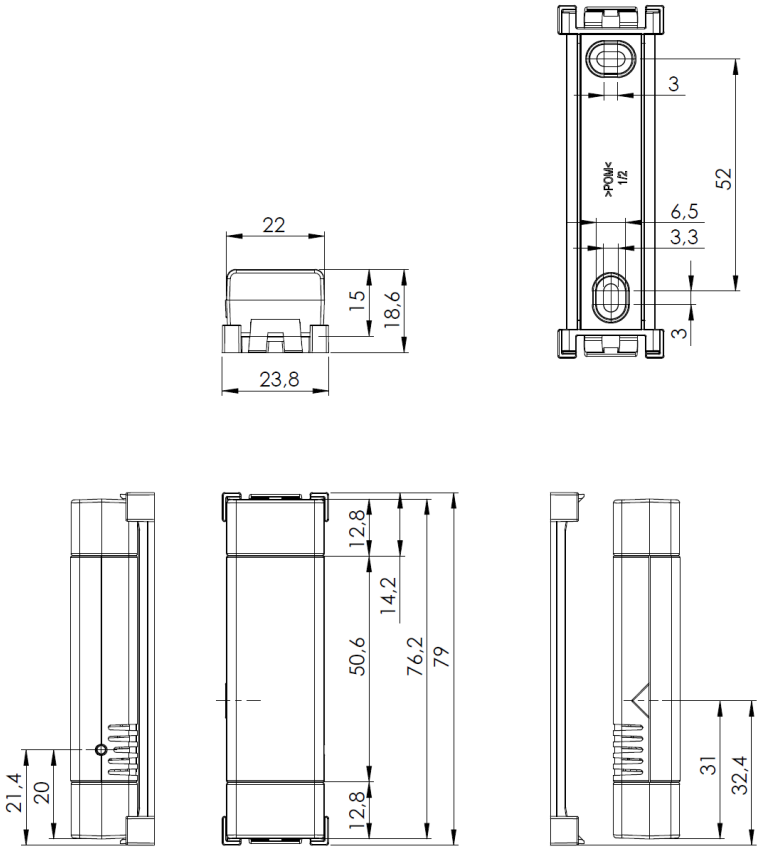
Type	Ordering Code	Frequency	Packaging
ETHSA	**S3001-C350**	**868.300MHz**	**Single Unit Packaging (chapter 2.6)**
ETHSA	**S3001-T350**	**868.300MHz**	**Tray Packaging (chapter 2.7)**
ETHSU	**S3051-C350**	**902.875MHz**	**Single Unit Packaging (chapter 2.6)**

2.5 Physical Dimensions

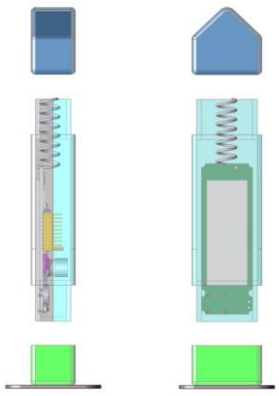
Colour and material of unit housing	White, similar to RAL 9010, PC/ABS
Dimensions of unit with wall plate (no stand, 2 square caps)	79 x 23.8 x 18.6 mm
Dimensions of unit without wall plate (no stand, 2 square caps)	76.2 x 22 x 15 mm
Height with triangle cap and stand	85±1 mm
Dimensions of stand	30 x 30 x 1.2 mm (without slide-flap)
Dimensions of housing adhesive	50 x 18 x 0.8 mm



ETHS Mechanical Outline (with 2 square caps, without stand)



ETHS Mechanical Outline (with mounting plate)



ETHS Mechanical Outline (with triangle cap and stand)

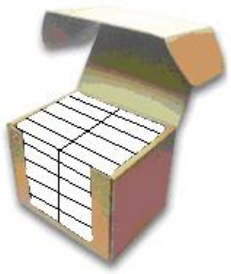
2.6 Packaging Information – Single Unit Packaging

Content of single unit box:

1. TH Sensor Unit (wireless sensor in housing)
2. Mounting Plate (for mounting the sensor onto a wall)
3. Adhesive Tape (double-sided, for easy gluing the sensor onto a smooth surface)
4. Metal Stand (fixed to unit, removable)
5. Triangle Cap (separate in a little plastic bag)
6. Installation Instructions

Weight of sensor unit (with 2 square caps, without stand)	20 g
Weight of single unit box (sensor unit, stand, mounting plate, packaging)	43 g
Size of single unit card box	32 x 32 x 99 mm
Minimum order quantity (transport packaging)	50 units
Dimensions of transport card box (50 single unit boxes)	232 x 176 x 174 mm
Weight of transport box (including 50 single unit boxes)	2.3 kg

Content of single unit box:
TH Sensor Unit, Adhesive, Stand, Mounting plate, Triangle Cap, Instructions



Transport packaging with 50 single unit boxes

2.7 Packaging Information – Tray Packaging

Card box with 7 plastic trays containing 8 sensor units each, plus 1 tub-tray for the accessories.

Content:

1. 56 TH Sensor Units
2. Mounting Plates (preinstalled at reed contact units)
3. Adhesive Tapes (in separate tray)
4. Magnets with adhesive tape (in separate tray)

Minimum order quantity (transport packaging)	56 units
Dimensions of transport box (56 units)	232 x 176 x 174 mm
Weight of transport box (56 units)	2.2 kg

3 FUNCTIONAL DESCRIPTION

3.1 Block Diagram

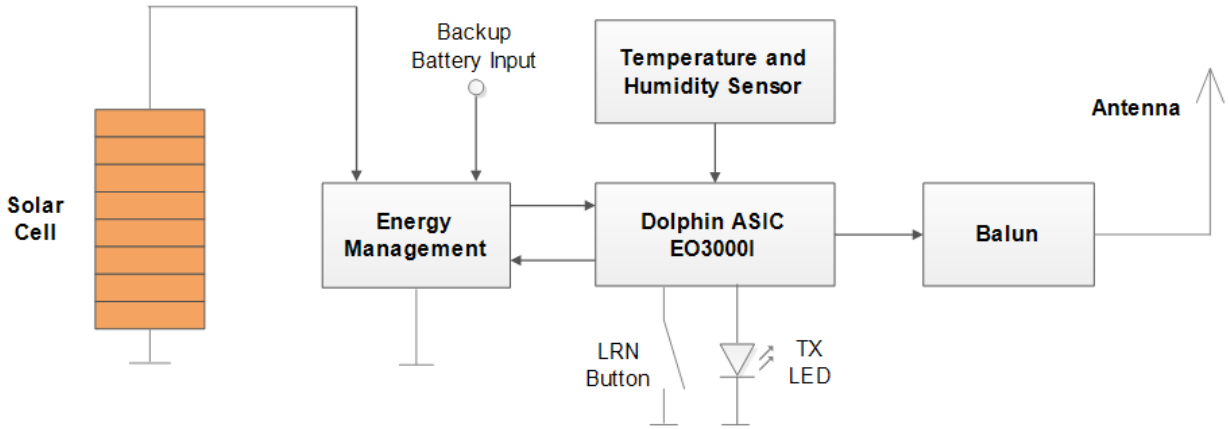


Figure: Hardware block diagram (simplified)

3.2 Measurement and Transmission Timing

ETHS wakes up approximately once every 100 seconds to measure temperature and humidity. The measured values are then compared against the last reported (transmitted) values. If there is a significant change then the measured values are transmitted immediately. Significant change is defined as follows:

- Temperature: The measured temperature deviates from the last reported temperature by more than 0.5 K
- Humidity: The measured humidity deviates from the last reported humidity by more than 3% r.h.

In absence of a significant change, a heartbeat telegram reporting the currently measured values is transmitted for every 7 to 14 measurements (affected at random). In addition, ETHS measures and reports the energy level of its internal energy storage element approximately every 100 measurements. With each default transmission cycle, 3 identical sub-telegrams are transmitted within 40ms. Transmission of a sub-telegram lasts approximately 1.2ms. The delay between the three transmission bursts is affected at random. This setup of the transmission timing allows avoiding possible collisions with data packages of other EnOcean transmitters as well as disturbances from the environment.

3.3 Radio Telegram Format, EEP

ETHS transmit telegram data according to EEP (EnOcean Equipment Profile) A5-04-03 which encodes a temperature range of Temperature -20 ... 60°C with 10 Bit and a Humidity range of 0 ... 100 % r.h. with 8 Bit. In addition, ETHS reports its internal energy level using a SIGNAL telegram of type 0x06. For more information please consult the EEP specification at www.enocean-alliance.org/eep/

3.3.1 High Security Communication

ETHS supports both standard and high security communication. The default (out of the box) operation mode is standard mode. It is possible to switch to high security communication where the telegram payload is both encrypted and authenticated. High security communication can be used to address two main issues:

- Unauthorized interception (reception and correct interpretation) of transmitted data: In doing so, a third (unauthorized) party is able to understand the content of a received content.
- Unauthorized transmission of radio telegrams: In doing so, a third (unauthorized) party is able to transmit a radio telegram that is treated by a receiver as valid request.

The goal of high security is preventing an unauthorized person (*attacker*) both from learning about the current state of a system and from actively changing it. These goals can be achieved via techniques such as telegram encryption, telegram authorization and dynamic security key modification. All three techniques are supported by this device.

3.3.2 High Security Parameters

ETHS supports High Security communication with the following parameters:

- Encryption algorithm: Variable AES 128 (VAES)
- Key length: 128 bit
- Key modifier: 24 bit rolling code
- Signature: 24 bit CMAC

For details about the security in EnOcean networks, please check the "Security of EnOcean Radio Networks" specification that can be downloaded from:
www.enocean.com/security-specification

3.3.3 Switching between Standard Mode and High Security Mode

To switch between the two operation modes a button sequences has been defined in order to minimize the likelihood of an unintended mode change:

- **High Security Mode**: In order to select High Security Mode, press the LRN button for at least 5 seconds, release it and immediately press it again for at least 5 seconds. The indicator LED will blink slowly 3 times to confirm selection of High Security Mode.
- **Standard Mode**: In order to select Standard Mode, press the LRN button quickly 3 times. The indicator LED will blink quickly 5 times to confirm selection of Standard Mode.

3.4 Teach-in

Push the button behind the hole in the side wall to trigger a teach-in telegram. In sufficiently dark environments you will see a LED shining through the housing side wall as telegram indicator.

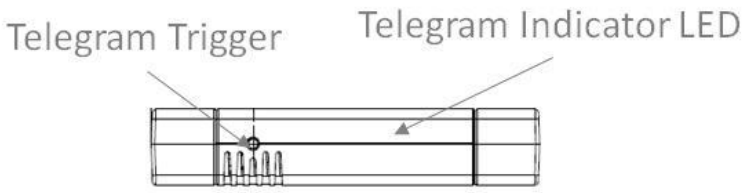


Figure: Teach-in telegram trigger

When pressing the LRN key, the module sends a teach-in telegram to a suited receiver according to the currently selected communication mode (4BS teach-in telegram for standard mode, secure teach-in telegram for high security mode). The teach-in telegram identifies the device manufacturer and the function and type of the device via the EEP used. For EASYFIT devices, EnOcean is set as manufacturer with ID 0x00B.

3.5 Firmware Flow Chart

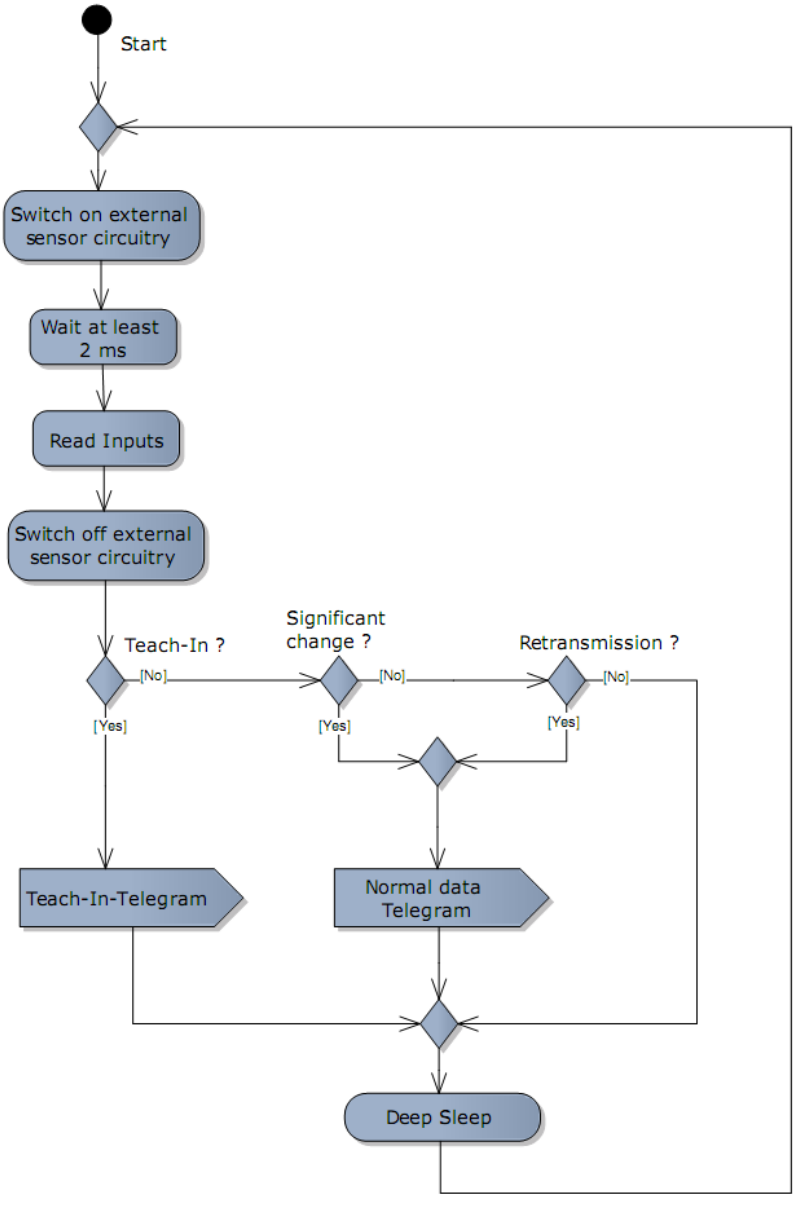


Figure: Firmware flow chart (simplified)

4 Application Information

4.1 General Installation Instructions

The small sensor housing can easily be mounted to walls or furniture using the included double-sided adhesive pad. Using the included metal stand the sensor can be positioned on horizontal surfaces. One end cap can be replaced by the enclosed triangle cap. To mount the sensor to walls with uneven ground, for example rough plaster, the sensor can be glued to a fixing plate that was previously fastened to the wall by screws. Well suited is a fixing plate of e.g. dimensions 60 x 16 x 1.5 mm with counter sunk holes, available from Amazon or DIY market, as www.amazon.de/dp/B077WRSHHC

To achieve the desired measurement result, avoid direct sunlight on the device and do not place the device close to HVAC units or similar.

Further important installation notes please find in the Installation Instructions provided together with the unit.

4.2 Lighting Conditions

4.2.1 Minimum Illumination

- **1200 lxh per day** is the minimum illuminance over time of the solar panel that has to ensured in order to recharge the device for night operation
- lxh (lux hours) is the multiplication value between illuminance (lux) and time (hours). This value can roughly be taken as a constant at illuminances greater than 100 lx: e.g. 200 lx illumination for 6 hours equals 400 lx for 3 hours
- The value applies to daylight, artificial light and mixed light. Define the minimum brightness and duration in worst case (averaged over the day). Check the long-term lighting conditions at the intended location of the device under the most unfavorable conditions (e.g. winter time)

4.2.2 Local Lighting Conditions

- Brightness values are highly dependent on the site. Typical values for room type and placement within a room can be found in the following table and figure. **The given numbers are reference values only.** Please use an illuminometer (lux meter) to verify a particular case. Suited lux meters are available from € 25 upwards from internet shops.
- If possible the unit should be mounted with the solar cell facing the window, but avoiding direct sunlight. With regard to the future use of the room, the installation site should be chosen so that it cannot be shaded by the user (eg filling cabinets).
- Determine the best compromise position between the best illuminance and the location requirements of the sensor. A place that is not sufficiently illuminated during the day should be avoided or, if not possible, a CR 1225 battery can be retrofitted.

Illumination Area	Type Destination / Workspace	Typical Brightness
Home	Usually	100 – 500 lx
Schools	Corridor	100 – 300 lx
	Classroom in general	300 – 750 lx
	Reading room, laboratory	500 – 1500 lx
Offices	PC room, working at PC	200 – 500 lx
	Meeting room	300 – 700 lx
	Canteen	150 – 300 lx
	Corridors	50 – 100 lx
	Reception	300 – 700 lx
	Restroom	100 – 300 lx
Factories	Production hall	500 – 1500 lx
	Development, office	300 – 750 lx
	Design CAD	500 – 1500 lx
	Laboratory, inspection work	750 – 1500 lx
	Packaging of products	150 – 500 lx
	Storage	100 – 300 lx
Hospitals	Visitor room	300 – 500 lx
	First aid, surgery	500 – 1500 lx
	Bedroom	100 – 300 lx
	Pharmacies	500 – 1000 lx
	Wash rooms	150 – 300 lx
Hotels	Reception	200 – 500 lx
	Entrance area	100 – 300 lx
	Restaurant	150 – 300 lx
	Restroom	100 – 300 lx
	Bars	50 – 150 lx
	Corridors	50 – 100 lx
	Staircases	50 – 150 lx
Stores	Saleroom	300 – 1000 lx
	Show room	500 – 1500 lx
	Packaging area	200 – 300 lx
	Lounge	300 – 500 lx
	Conference room	300 – 700 lx
Trade Show	Booth	300 – 500 lx
Sports Arena	Indoor area	200 – 500 lx

Table: Typical Indoor Brightness Levels (Lux)

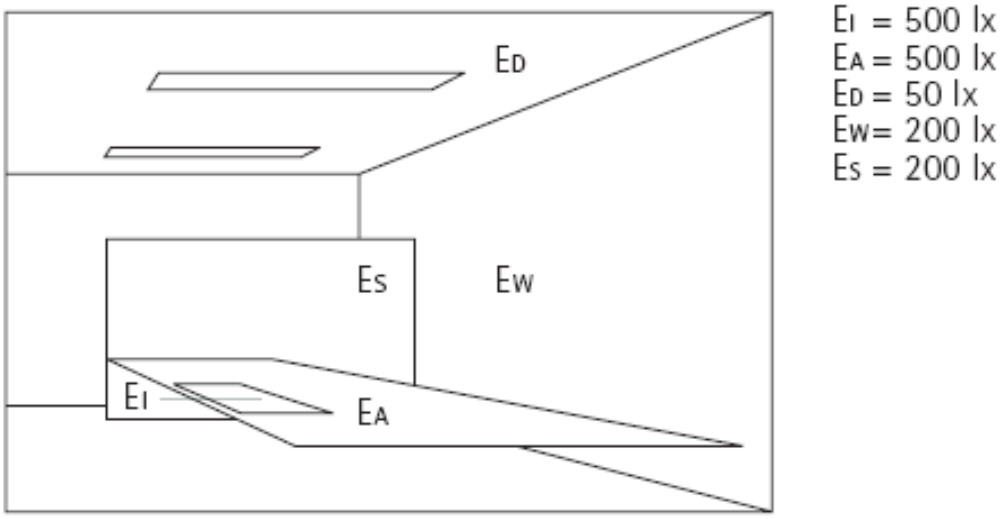


Figure: Examples of brightness levels at different spots in a typical office room (worktable EA=500 lx)

4.2.3 Initial Sensor Operation

To reach full performance the solar-powered energy storage must be recharged after a long storage in dark (eg at initial installation). This is done automatically from the beginning of operation in the light and the sensor will reach its full operating state after 3 to 4 days. Then the sensor will have enough energy to work in dark the whole weekend.

4.3 Installing Supplemental Battery (optional)

If the sensor is installed where the light levels are consistently too low, battery power can be used to supplement the solar energy harvester. Use CR1225 battery only.

1. Pull off the cap which rests directly at the solar cell.
2. Insert the battery with the larger positive pole (+) directed to the solar cell and slide it between the two contact terminals (see following figure).
3. Put the cap back on.

NOTE: It is strongly recommended to wear protective gloves while handling coin cell batteries. Failure to do so might result in the formation of a conductive layer on the battery surface due to skin moisture and a much shorter battery lifetime.

WARNING: Ensure the battery is properly oriented. Improper handling of lithium batteries may result in heat generation, explosion, or fire.

Figure: Properly inserted battery

4.4 Transmission Range

Mounting the sensor housing with his backside on metal surfaces will reduce the transmission range. Therefore please note that a radio receiver unit should not be mounted in the same plane as the metal surface, because in extension of the metal surface the transmission range is reduced by physical radio transmission effects of the antenna near to metal. For example the receiver should not be mounted at the same wall side.

The main factors that influence the system transmission range are type and location of the antennas of the receiver and the transmitter, type of terrain and degree of obstruction of the link path, sources of interference affecting the receiver, and "dead" spots caused by signal reflections from nearby conductive objects. Since the expected transmission range strongly depends on this system conditions, range tests should categorically be performed before notification of a particular range that will be attainable by a certain application. The following figures for expected transmission range may be used as a rough guide only:

- Line-of-sight connections: Typically 30 m range in corridors, up to 100 m in halls
- Plasterboard walls / dry wood: Typically 30 m range, through max. 5 walls
- Ferroconcrete walls / ceilings: Typically 10 m range, through max. 1 ceiling
- Fire-safety walls, elevator shafts, staircases and supply areas should be considered as screening.

The angle at which the transmitted signal hits the wall is very important. The effective wall thickness – and with it the signal attenuation – varies according to this angle. Signals should be transmitted as directly as possible through the wall. Wall niches should be avoided. Other factors restricting transmission range:

- Switch mounted on metal surfaces (up to 30% loss of transmission range)
- Hollow lightweight walls filled with insulating wool on metal foil

- False ceilings with panels of metal or carbon fiber
- Lead glass or glass with metal coating, steel furniture

The distance between EnOcean receivers and other transmitting devices such as computers, audio and video equipment that also emit high-frequency signals should be at least 0.5 m.

A summarized application note to determine the transmission range within buildings is **AN001 "EnOcean Wireless Systems - Installation Notes"** (PDF) available as download from: www.enocean.com/en/application-notes/

5 ETHSA Regulatory Information

ETHSA has been developed and tested to fulfil all requirements for the European Market including RED, REACH and RoHS.

5.1 RED (European Union)

The ETHSA unit is compliant to the Radio Equipment Directive RED (2014/53/EU) as regulatory framework for radio products in the European Union. RED conformity has been proven and the according documentation has been deposited at EnOcean. The unit can be operated without notification and free of charge in the area of the European Union and in Switzerland.

- This device must not be modified or used outside their specification limits.
- This device must not be used with gain antennas, since this may result in allowed ERP or spurious emission levels being exceeded.
- This device itself meets the essential requirement of the EU directives. A CE marking is affixed on the ETHS unit and on the packaging each. This operating instructions containing a Declaration of Conformity.
- This device is conforming the regulations of the 868.3 MHz band, a so-called "Duty Cycle" of 1% per hour is not be exceeded.

5.2 Declaration of Conformity

The Declaration of Conformity can be found at the EnOcean ETHS product webpage.

6 ETHSU Regulatory Information

ETHSU is certified according to FCC (US) and ISED (CA) regulations.
Changes or modifications not expressly approved by EnOcean could void the user's authority to operate the equipment.

6.1 FCC (United States)

6.1.1 FCC Certificate

TCB

GRANT OF EQUIPMENT AUTHORIZATION

Certification
Issued Under the Authority of the
Federal Communications Commission
By:

TCB

Timco Engineering, Inc.
849 NW State Road 45
P.O. Box 370,
Newberry, FL 32669

Date of Grant: 01/30/2018

Application Dated: 01/30/2018

EnOcean GmbH
Kolpingring 18a
Oberhaching, 82041
Germany

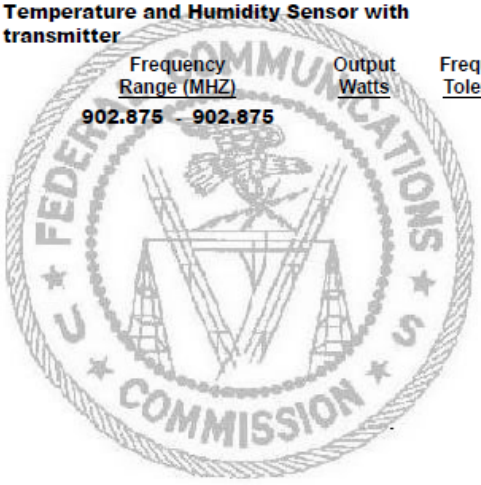
Attention: Armin Anders , Director Product Marketing

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: SZV-STM350U
Name of Grantee: EnOcean GmbH
Equipment Class: **Part 15 Security/Remote Control Transmitter**
Notes: **Temperature and Humidity Sensor with transmitter**

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	15.231	902.875 - 902.875			



6.1.2 FCC Regulatory Statement

The ETHSU device contains the EnOcean radio module STM 350U with FCC ID: SZV-STM350U and complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

To comply with FCC/IC RF exposure limits for general population / uncontrolled exposure, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter

Warning
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Interference
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

6.2 ISED (Canada)

6.2.1 ISED Certificate

TIMCO ENGINEERING INC.

849 NW State Road 45
Newberry, Florida 32669
http://www.timcoengr.com
888.472.2424 F 352.472.2030 email: cb@timcoengr.com

No. ➤ 83IC18

TECHNICAL ACCEPTANCE CERTIFICATE

Certification No. ➤ IC: 5713A-STM350U

Issued To ➤ EnOcean GmbH
Kolpingring 18A,
Oberhaching, 82041, Germany

Tested By ➤ VPI LABORATORIES, INC.
Company No: 2041A
29145 Old Lincoln Hwy,
Wanship, Utah 84017 USA
801-260-4056; 866-307-0033
joej@vpitech.com

Type of Equipment ➤ Low Power Device (902-928 MHz)

Type of Service ➤ New Certification (Single)

Hardware Version Id Number (HVIN) ➤ STM 350U

Product Marketing Name: (PMN) ➤ STM 350U

Firmware Version Id Number (FVIN) ➤ N/A

Host Marketing (HMN) ➤ N/A

FREQUENCY RANGE	EMISSION DESIGNATIONS NECESSARY BANDWIDTH & EMISSION CLASSIFICATION	R.F. POWER	ANTENNA INFO	SPECIFICATION/ ISSUE & DATE	
902.875 MHz	342KF1D	80.3 dBuV/@ 3m	Helical 0 dBi	RSS-210	Issue 9; Aug 16

Note1: This equipment also complies with RSS-102, Issue 5 (March 2015) and RSS-Gen, Issue 4 (Nov 2014)

Certification of equipment means only that the equipment has met the requirements of the above noted specifications. License applications, where applicable to use certified equipment, are acted on accordingly by the issuing office and will depend on the existing radio environment, service and location of operation.

This certificate is issued on condition that the holder complies and will continue to comply with the requirements of the radio standards specifications and procedures issued by Industry Canada.

I hereby attest that the subject equipment was tested and found in compliance with the above-noted specifications.

La certification du matériel signifie seulement que le matériel a satisfait aux exigences de la norme indiquée ci-dessus. Les demandes de licences nécessaires pour l'utilisation du matériel certifié sont traitées en conséquence par le bureau de délivrance et dépendent des conditions radio ambiantes, du service et de l'emplacement d'exploitation.

Le présent certificat est délivré à la condition que le titulaire satisfasse et continue de satisfaire aux exigences et aux procédures d'Industrie Canada.

J'atteste par la présente que le matériel a fait l'objet d'essai et jugé conforme à la spécification ci-dessus.

ISSUED UNDER THE AUTHORITY OF MINISTER OF INDUSTRY
DÉLIVRÉ AVEC L'AUTORISATION DU MINISTRE DES INDUSTRIES

Bruno Clavier, General Manager

DATE: January 31, 2018

6.2.2 ISED Regulatory Statement

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

1. This device does not cause interference, and

2. This device does accept any interference, including interference that may cause undesired operation of the device.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to ICES-003. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

6.2.3 ISED Déclaration de conformité

PRUDENCE: Tout changements ou modifications pourraient annuler le droit de l'utilisateur à utiliser l'équipement non autorisées.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. L'appareil ne doit pas produire de brouillage,

2. L'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Ces limites sont conçues pour fournir une protection raisonnable contre les interférences nuisibles dans une installation résidentielle. Cet équipement génère, utilise et peut émettre une énergie de radiofréquence et, s'il n'est pas installé et utilisé conformément aux instructions, il peut causer des interférences nuisibles aux communications radio. Cependant, il n'existe aucune garantie que des interférences ne se produiront pas dans une installation

particulière.

Si cet équipement provoque des interférences nuisibles à la réception radio ou télévision, ce qui peut être déterminé en mettant l'équipement hors tension, l'utilisateur est encouragé à essayer de corriger l'interférence par une ou plusieurs des mesures suivantes:

- Réorienter ou déplacer l'antenne de réception.
- Augmentez la distance entre l'équipement et le récepteur.
- Connecter l'équipement à une sortie sur un circuit différent de celui sur lequel le récepteur est branché.
- Consulter le revendeur ou un technicien radio / télévision expérimenté pour de l'aide