EDK 300 – the Developer's Kit for EnOcean Dolphin Modules

Getting Started V1.5

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Important Notes

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.

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This evaluation kit and its components are intended for use for evaluation, demonstration or engineering development purposes only. It is not considered to be a finished end product fit for consumer use. Persons handling this developer kit must have electronics expertise and observe good engineering practice standards. As such, the goods being provided are not intended to be complete in terms of required design, marketing, and/or manufacturing related protective considerations, including product safety and environmental measures typically found in end products that incorporate such electronic components or circuit board. EnOcean will not be reliable for consequences of any HW or SW changes/modifications of the developer board(s) done by the developer. Before using EDK 300 please consider country specific radio regulations and frequencies, e.g. R&TTE (EDK 300 = 868 MHz) for the European Union or FCC (EDK 300C = 315 MHz) for US.

For users in Japan: This developer kit is not certified as confirming to technical regulations of radio law of Japan. If you use this kit in Japan, you are required by Radio Law of Japan to follow the instructions below with respect to this product: Use this product in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on sub-section 1.1 of article 6 of the "Rule for Enforcement of Radio Law of Japan". Use this kit only after you obtained the license of "Test Radio Station" as provided in Radio Law of Japan with respect to this product, or use of this product only after you obtained the technical regulations conformity certification as provided in radio law of Japan with respect to this product. Do not transfer this product, unless you give the same notice above to the transferee. Please note that if you could not follow the instructions above, you will be subject to penalties of Radio Law of Japan.

⚠ Observe precautions! Electrostatic sensitive devices!

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1 Introduction

EDK 300 and EDK 300C are designed to support hardware and software application development for following EnOcean modules:
- 868 MHz (EDK 300): TCM 3x0, STM 300
- 315 MHz (EDK 300C): TCM 3x0C, STM 300C

Content of EDK 300 Developer's Kit:
- 1x EVA 300 evaluation board for TCM 3x0
- 1x EVA 320 evaluation board for STM 300
- 1x TCM 300 on adapter board
- 1x STM 300 on adapter board
- 1x TCM 320
- 2x EOP 300 programmer
- 1x PTM 200 with test rocker
- 2x USB cable
- 1x Package leaflet with download links to documentation and software tools
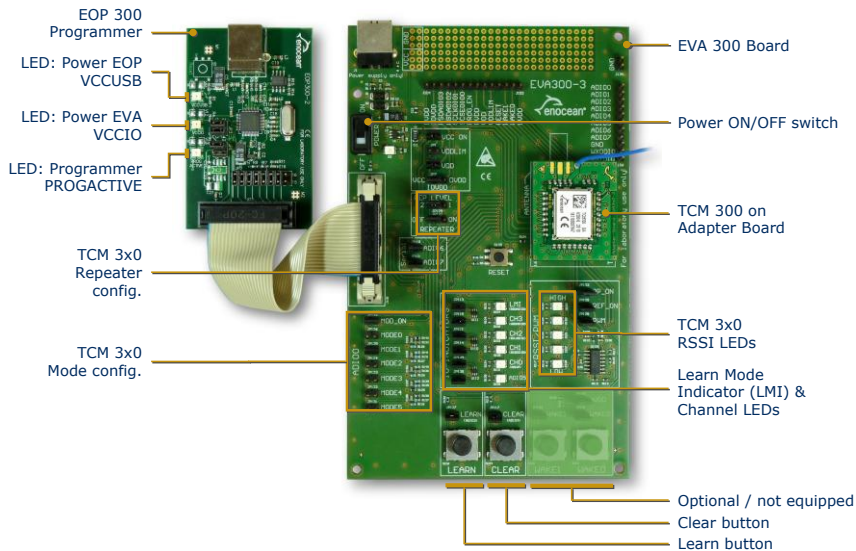
Additional developer kits are available for self-powered radio nodes of the STM 3xy product family:
- EDK 310 (Solar powered STM 3xy)
- EDK 312 (Thermo powered STM 3xy)

TCM 320

TCM 3x0

EDK 300
Developer's Kit

2 Line-powered applications with EVA 300 and TCM 3x0

2.1 Overview

- EOP 300 Programmer
- LED: Power EOP VCCUSB
- LED: Power EVA VCCIO
- LED: Programmer PROGACTIVE
- TCM 3x0 Repeater config.
- TCM 3x0 Mode config.

- EVA 300 Board
- Power ON/OFF switch
- TCM 300 on Adapter Board
- TCM 3x0 RSSI LEDs
- Learn Mode Indicator (LMI) & Channel LEDs
- Optional / not equipped
- Clear button
- Learn button

2.2 Default Configuration

Power Management:
- Power Switch (On/Off)
- USB connector for external power supply

Mode and configuration jumper for TCM 300
Standard FW:
- MODE 1: Serial bidirectional mode
- MODE 2: 1 channel receiver mode
- MODE 3: 4 channel receiver mode
- MODE 4: Dimmer mode
- 2LEVEL: Select one/two-level repeater
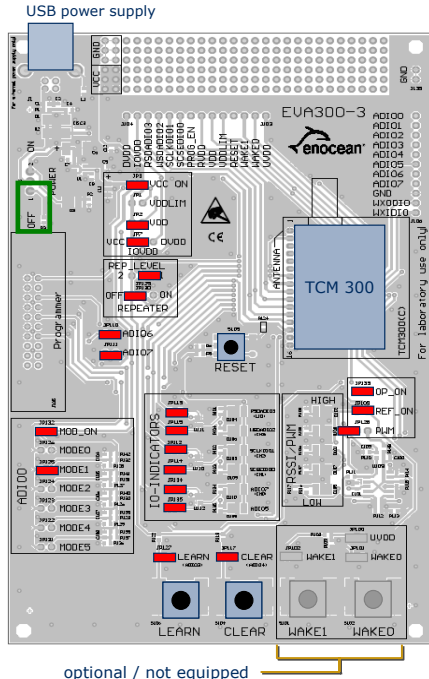- REPEATER: Selector for repeater mode

Buttons:
- Reset: reset the TCM3x0 module
- Learn: add or delete ID from list
  (standard TCM 3x0 FW)
- Clear: clear whole ID list
  (standard TCM 3x0 FW)

LEDs:
- IO indicators
- PWM (dimmer) or RSSI (signal strength)

Modul & extension slots:
- TCM 300 adapter board connector
- TCM 320 connector

optional / not equipped

2.3 Example: '1-Channel Relay Switch' (Mode 2)

1-channel relay mode to switch a light actuator. Telegrams from a learned PTM 2x0 push button will change status of output ADIO7 (CH0).

1. Check jumper configuration of EVA 300 according to the image on the right side, especially MODE2 jumper
2. Connect EVA 300 to delivered USB power supply
3. Switch on EVA 300 board
4. Learn PTM 2x0 (switch) ID to TCM3x0:
    - Press EVA 300 LEARN > 0.5s
      (LMI LED will light, CH0 flash)
    - Push PTM 2x0 to send learn telegram
    - Wait until CH0 LED will flash
    - Finish learn mode with LEARN button
      > 0.5s
5. Switching PTM 2x0 will toggle CH0 LED (relay pin)

Attention:
- If you have changed TCM firmware: Load EnOcean TCM 300 default firmware from CD
- If you have changed mode settings:
  Clear ID
  - press CLEAR button > 2s
    (LEDs "LMI" will light & "CH0" blink)
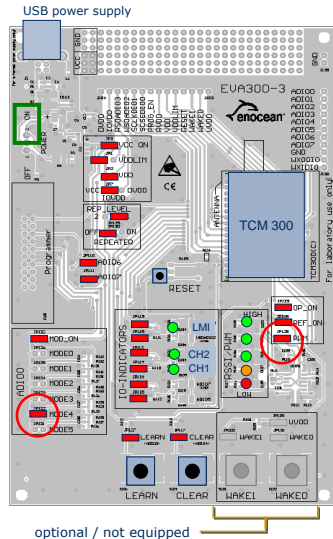 - press RESET (mode selection)

USB power supply
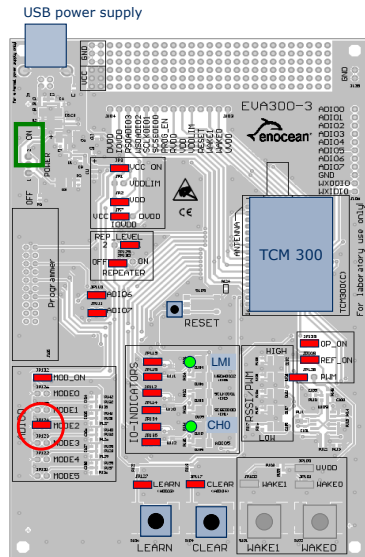
optional / not equipped

2.4   Example: '1-Channel Dimmer' (Mode 4)

1-channel dimmer mode to dim a electrical actuator. Telegrams from a learned push button will change PWM output signal.

1. Check jumper configuration of EVA 300 accord to the image on the right side, especially MODE4 & PWM

2. Connect EVA 300 to delivered USB power supply

3. Learn PTM 2x0 (switch) ID to TCM3x0:
- Press EVA300 LEARN > 0.5s
  (LMI & CH2 LED will light, CH0 flash)
- Push PTM 2x0 to send learn telegram
- Wait until CH0 LED will flash
- Finish learn mode with LEARN button > 0.5s

4. PTM 2x0:
- hold O-side long time, WM signal will drop from high to low
- hold I-side long time, PWM signal will rise from low to high
- press 1-side short time, TCM3x0 will switch on with last PWM value
- press 0-side short time, TCM3x0 will switch off

USB power supply

optional / not equipped

Attention:

- If you have changed FW: Load EnOcean TCM 300 default firmware from CD
- If you have changed mode settings: Clear ID
  - press CLEAR button > 2s (LEDs "LMI" will light & "CH0" blink)
  - press RESET (mode selection)

3 Software Installation

3.1 Updates

Please register for your personal account and check following website for updates: http://www.enocean.com/en/download/

3.2 Overview

DolphinAPI (for details see EDK 300 user manual)
- Operating system for self-powered applications
- Source code samples in C-Code for switching, dimming, etc.
- Comprehensive software libraries (wireless communication, energy management, etc.)

DolphinStudio
- Windows application which supports the whole firmware development process (chip configuration, programming, module updating)

DolphinView
- Visualize properites of EnOcean radio nodes
- Receives, sends and analyses radio telegrams according to the EnOcean standard
- Get detailed information e.g. subtelegram timing and signal strength
- Content of telegrams can be analyzed online and logged with time stamp
- Supports remote management features like ping, query and remote learn

PC requirements
- Microsoft Windows XP SP3 or Windows 7
- Microsoft .NET Framework 3.5 SP1
- 1.5 GHz CPU, 1 GB RAM, 0,3 GB Disc Space
- Graphics: min. 1024x768 with DirectX 9 support

3.3 DolphinStudio Installation

1. Launch DolphinStudio setup program and follow instructions
2. Connect EOP300 to PC via USB cable
3. Press "Options" button within menu bar
4. "Options" window will appear, press "Refresh" to recognize EOP 300 programmer
5. Programmer settings/firmware will be update if necessary
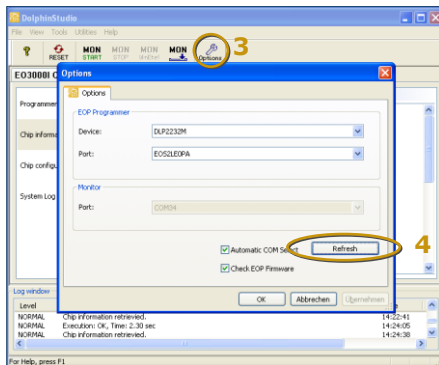
Attention:

- If you have installed a previous DolphinStudio version, it is recommended to uninstall older version
- If you have already installed older FTDI USB driver, it is recommended to remove previous and install latest FTDI driver by cross marking installation menu at the end of DolphinSetup

3.4 Check FW Version with DolphinStudio

1. Connect EVA 300 or EVA 320 with STM/TCM 3x0 plugged via EOP 300 to PC
2. Launch DolphinStudio
3. Select "EOPX (Programmer)" tab
4. Select "Chip information"
5. Press "Retrieve" button
**6.** Current application type and version e.g. "TCM 300 2.0.0.0" will be shown
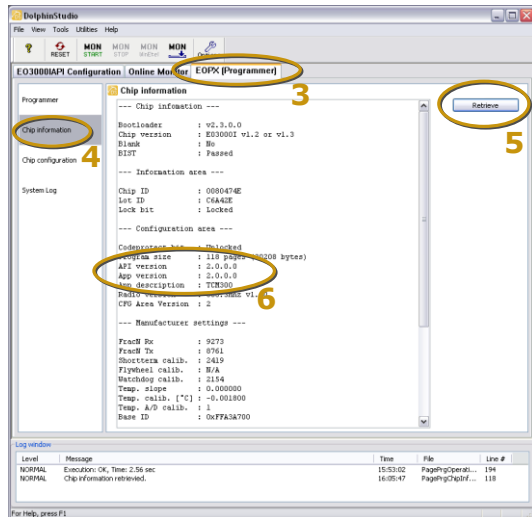
3.5 Update Module FW with DolphinStudio

1. Connect EVA 300 or EVA 320 with STM/TCM 3x0 plugged via EOP 300 to PC
2. Launch DolphinStudio
3. Select "EOPX (Programmer)" tab
4. Select "Programmer"
5. Select FW file via "Browse…" button; chip configuration file will be automatically recognized by ending *cfg.hex
6. Press "Execute" button to start the update process
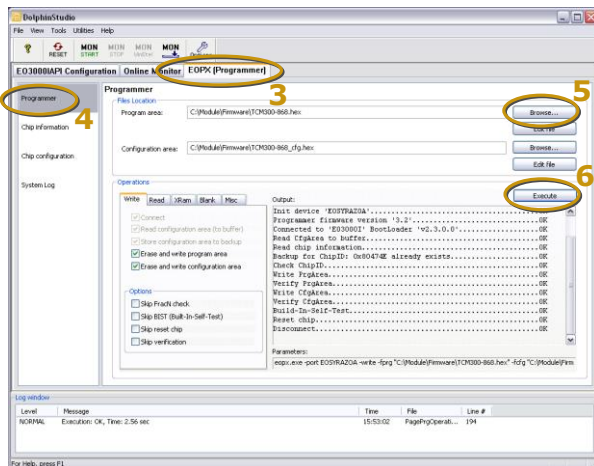
3.6 Configure STM 300 module

STM 300 is designed for multiple applications, therefore no application specific EnOcean Equipment Profile (EEP) is implemented. To use the auto learn function in DolphinView (or other EnOcean devices), the EEP profile must be configured first with DolphinStudio:
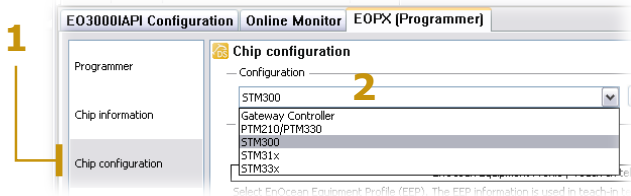

1. Start Dolphin Studio and select 'Chip configuration'

2. Select the module STM 300

3. The button 'Read configuration' shows the default EEP setting: FUNC: 0x3F, TYPE: 0x7F

4. For testing the entry has to be changed into e.g.: FUNC: 0x10 (room operating panels) TYPE: 0x03 (temperature sensor 0...40°C, with set point control)

5. The button 'Write configuration' set the new profile. A rereading of configuration (button 3) confirmed the successful write operation.
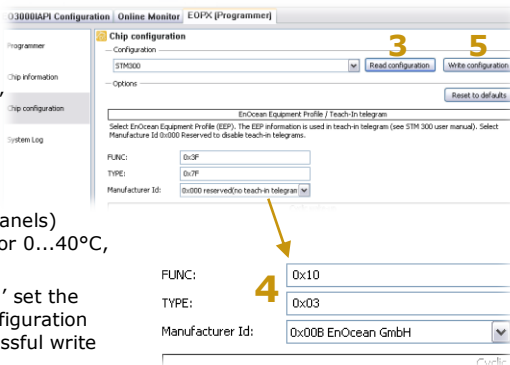
3.7 DolphinView installation / presetting

DolphinStudio has to be installed first, to get the required USB device driver.

1. Launch DolphinView setup program and follow instructions
2. Connect EOP 300 programmer to PC via USB cable and connect programmer to EVA 300 or EVA 320
3. Select COM port for serial interface "COM10 ..."
4. Select the ESP* serial protocol type **:
   - ESP2: standard TCM 300/320
   - ESP2+EPM: internal use
   - ESP3: TCM 300/320 incl. gateway controller firmware
5. Connect to EVA 300 board (= transceiver)
6. Check connection via EVA 300 transceiver example (see next page)
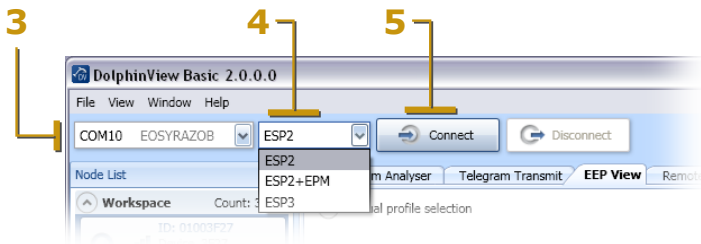
* EnOcean Serial Protocol

** Future DolphinView versions will automatically select the serial protocol type
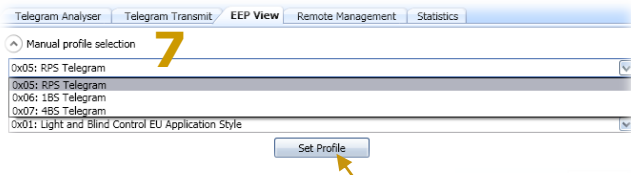
3.8 Example 'EVA 300 as Transceiver' (Mode 1)

EVA 300 configured as transceiver (Mode 1):

1. Check jumper configuration and TCM 300 module according to the picture on the right side
2. Connect EVA 300 via EOP 300 to PC
3. Switch on EVA 300 board power
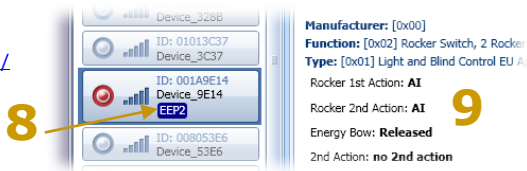4. DolphinView: Select COM port, ESP type and Connect button
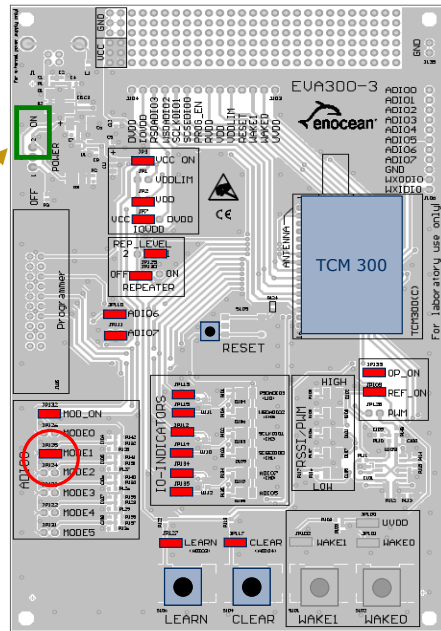
5. Press self powered switch

6. Radio node (switch) will be shown in node list and can be selected
7. Now it's possible to set up manually the EEP* Profile in the tab **EEP View**, e.g. for the RPS telegram
8. Subsequently the node button shows the label 'EEP has been selected'
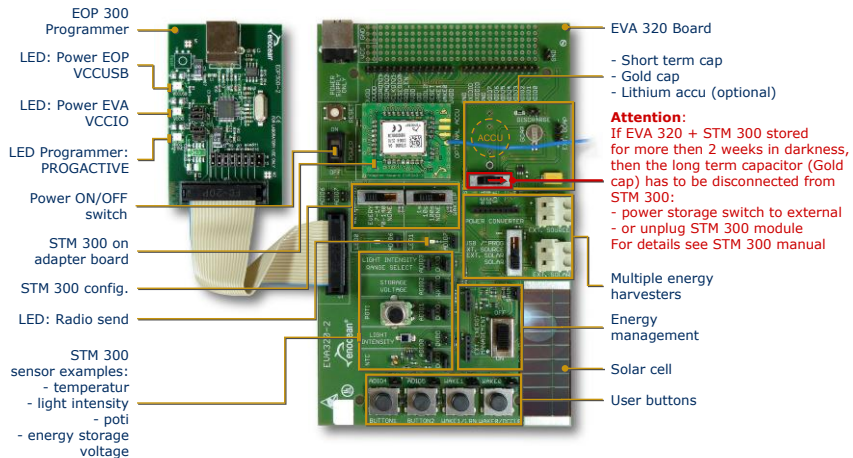**9.** The tab **EEP View** indicate the complete EEP profile details

* EnOcean Equipment Profile
Details see:
http://www.enocean-alliance.org/

Manufacturer: [0x00]
Function: [0x02] Rocker Switch, 2 Rocker
Type: [0x01] Light and Blind Control EU A

Rocker 1st Action: **AI**

Rocker 2nd Action: **AI**

Energy Bow: **Released**

2nd Action: **no 2nd action**

4 Self-powered Applications with EVA 320 and STM 300

4.1 Overview

EOP 300 Programmer

LED: Power EOP VCCUSB

LED: Power EVA VCCIO

LED Programmer: PROGACTIVE

Power ON/OFF switch

STM 300 on adapter board

STM 300 config.

LED: Radio send

STM 300 sensor examples:
- temperatur
- light intensity
- poti
- energy storage voltage

EVA 320 Board

- Short term cap
- Gold cap
- Lithium accu (optional)

Attention:
If EVA 320 + STM 300 stored for more then 2 weeks in darkness, then the long term capacitor (Gold cap) has to be disconnected from STM 300:
- power storage switch to external
- or unplug STM 300 module
For details see STM 300 manual

Multiple energy harvesters

Energy management

Solar cell

User buttons

4.2 Default Configuration

Power Management:
- Power Switch (On/Off)
- Power Selector
  (USB/Solar/ExternalSolar/External)
- Storage Selector (Optional Accu/Goldcap /None)
- Connector for external power source

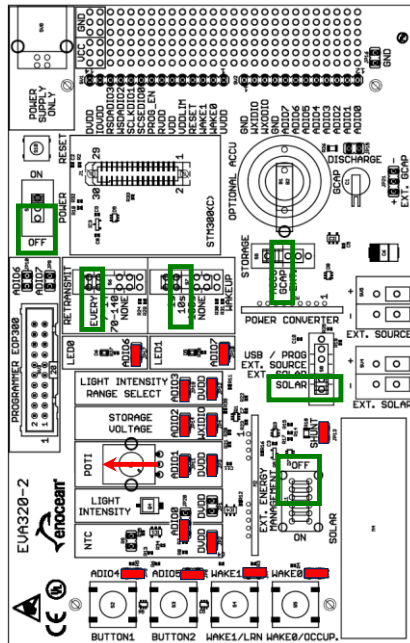Wake up & retransmit STM 300 standard FW:
- Wake Up (1s/10s/100s/None)
- Retransmit (7-14/70-140/None)

Buttons:
- Reset
- Button1
- Button2
- WAKE1/Learn
- WAKE0/Occupancy

Modul & extension slots:
- STM 300 on adapter board
- Optional Power Converter

4.3 Example: 'Self-powered temperature sensor'

EVA 320 as temperature sensor, DolphinView to monitor radio with EVA300 as receiver:

1. Set EVA 320 jumper configuration according to the image right side:
   - retransmit = every
   - wakeup = 10s
   - storage = GCAP
   - power source = solar
   - ADIO0 = NTC (temperature sensor) and
     DVDD = set
2. Switch on EVA 320 board power
3. STM 300 (e.g. EEP profile) has to be configured according to chapter 3.6, page 13
4. STM 300 will send temperature values every 10s, LED1 (ADIO7) will flash shortly for every transmitted telegram
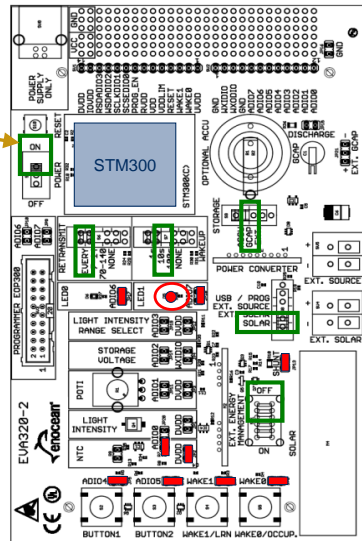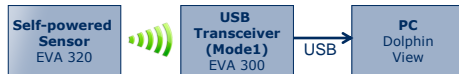
Use EVA 300 in transceiver (gateway) mode to receive telegrams via DolphinView:

1. Setup EVA 300 to USB transceiver (Mode1)

2. Press the LRN button on the EVA 320 to teach-in the STM 300 in Dolphin-View automatically (on the basis of LRN telegram which includes the EEP no.)

3. DolphinView displays all received sensor telegrams

4. Select tab "EEP View"

DB1 (data byte 1) = temperature value
(for details see 4BS telegram
EnOcean Equipment Profile)

Selected device with Chip ID & EEP ID-label

Manufacturer ID & EEP profile no.
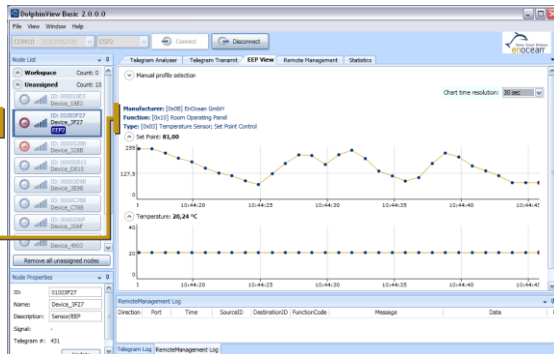
Attention:

- EVA320 needs sufficient energy (e.g. light) to transfer radio telegrams

## 4.4 Example: 'Self-powered room operating panel'

EVA 320 as room operating panel and DolphinView to monitor radio with EVA 300 as receiver:

Configure EVA 320:

1. Set EVA 320 jumper configuration according to the image right side:
   - retransmit = Every
   - wakeup= 10s
   - storage= GCAP
   - power source=solar
   - ADIO0 = temperature sensor (NTC)
   - ADIO1 = POTI
   - WAKE0 = occupancy button
2. Use module under office light
3. STM 300 will send poti & temp values every 10s

EVA 300 / TCM 300 config. for USB receiver:

1. Setup EVA 300 as transceiver (gateway) and connect with DolphinView
2. Switch on EVA 300
3. Check received telegrams
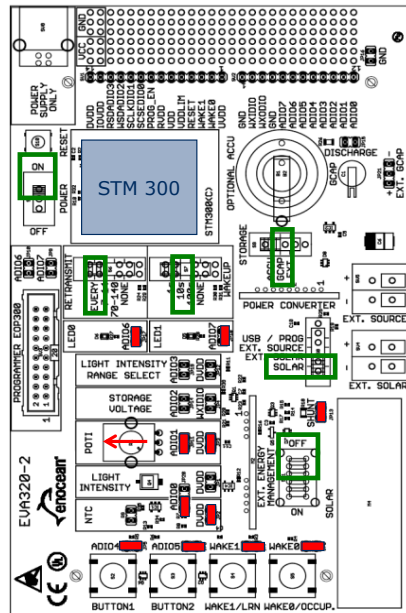
Sensor values can be visualized by using DolphinView:

1. Start DolphinView and select the tab 'EEP View'
2. Select the node
3. Diagram will show received temperature sensor and 'Set Point' potentiometer values
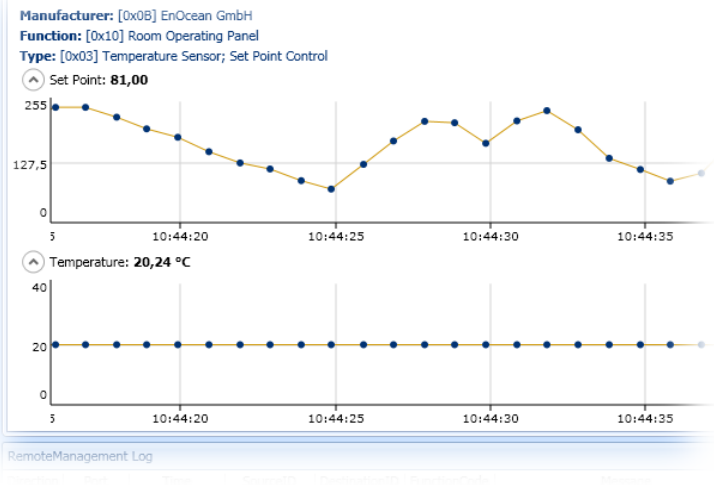
ENOCEAN

EnOcean is the originator of patented energy harvesting wireless sensor technology. The company manufactures and markets maintenance-free wireless sensor solutions for use in buildings and industrial installations. EnOcean solutions are based on miniaturized energy converters, ultra-lowpower electronic circuitry and reliable wireless. Combining these elements enables EnOcean and its product partners to offer sensor systems that are fundamental for energy-efficient buildings and innovative industry.

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