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## Enable your ELA Beacon or Sensor

To enable your ELA sensors or ELA Beacons use the ELA application

(Link:[https://play.google.com/store/apps/details?id=com.ela.mobileapp.elamobileapp&hl=en\\_US](https://play.google.com/store/apps/details?id=com.ela.mobileapp.elamobileapp&hl=en_US)). Your phone or device that is used for configuring ELA Sensors or Beacons has to have NFC (configurations are written to a sensor or beacon through NFC).

Below you can find on how to Enable and configure ELA Coin ID or ELA Puck ID to send in the iBeacon format.

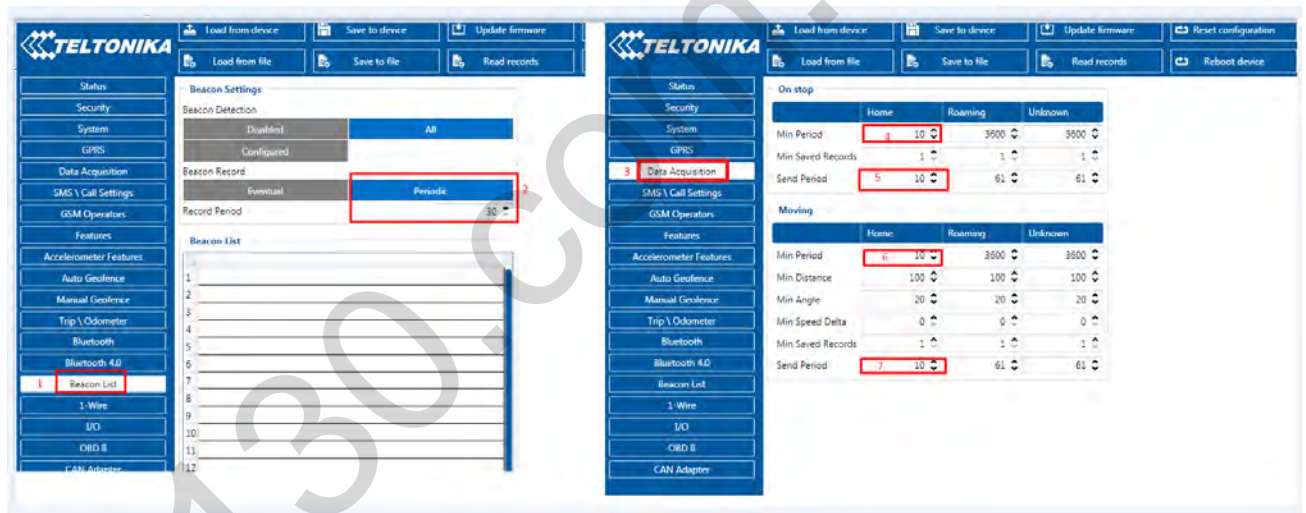


## Beacon testing instructions

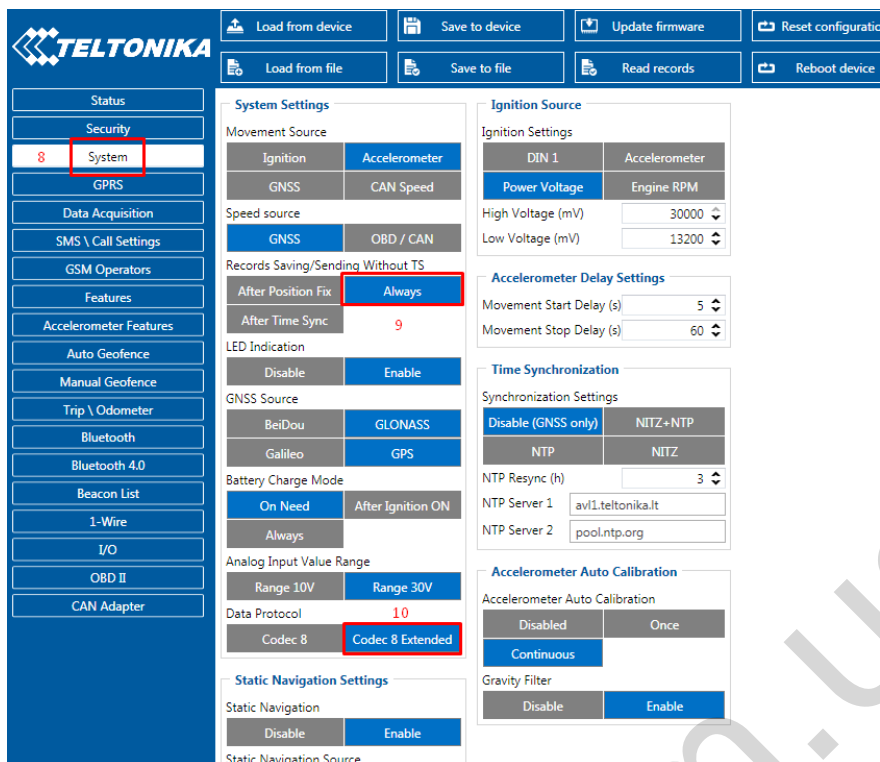
Instructions made with firmware version: FMB.Ver.03.25.09.Rev.51

1. Update FMB device firmware to version: FMB.Ver.03.25.09.Rev.51 (or later firmware version which supports beacon functionality)
2. Turn beacons ON (or configure it to send beacon ID)
3. Configure FMB device to send data into your server or computer over Codec 8 extended data sending protocol. Added print screens shows only one of possible ways how to perform test.

Important: To perform test faster, configure Beacon record to → **Periodic**

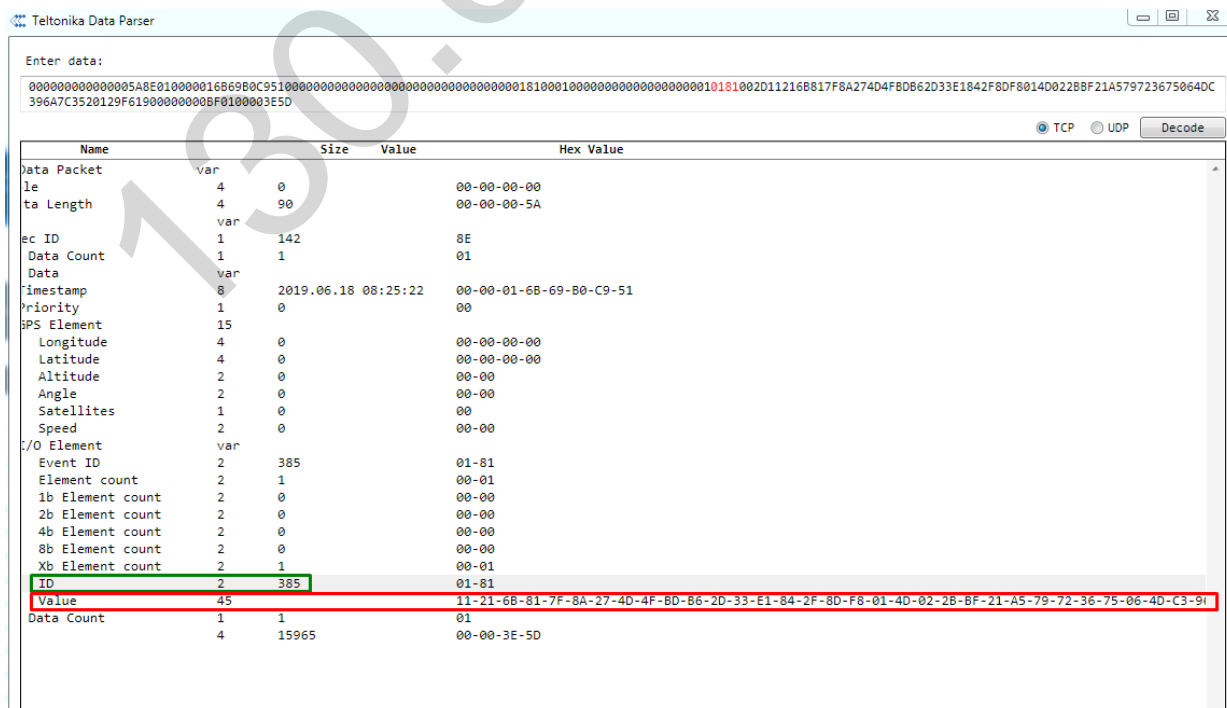






The image shows the Teltonika System Settings interface. The left sidebar contains a menu with items like Status, Security, System (highlighted with a red box and the number 8), GPRS, Data Acquisition, SMS \ Call Settings, GSM Operators, Features, Accelerometer Features, Auto Geofence, Manual Geofence, Trip \ Odometer, Bluetooth, Bluetooth 4.0, Beacon List, 1-Wire, I/O, OBD II, and CAN Adapter. The main area is divided into several sections: System Settings (Movement Source, Speed source, Records Saving/Sending Without TS, LED Indication, GNSS Source, Battery Charge Mode, Analog Input Value Range, Data Protocol, Static Navigation Settings), Ignition Source (Ignition Settings, Accelerometer Delay Settings), Time Synchronization (Synchronization Settings), and Accelerometer Auto Calibration. The 'Data Protocol' section shows 'Codec 8 Extended' selected with a red box and the number 10. The 'Records Saving/Sending Without TS' section shows 'Always' selected with a red box and the number 9.

4. Open Teltonika listener tool or other tool which allows to receive AVL data from FMB device. Records will be received over codec 8 extended data sending protocol
5. After record received copy it into Teltonika Data parser. Beacon ID: 385



The image shows the Teltonika Data Parser interface. The top bar contains the title 'Teltonika Data Parser' and a 'Decode' button. The main area displays a list of data fields with their names, sizes, values, and hex values. The 'ID' field is highlighted with a red box and the number 385. The 'Value' field is highlighted with a red box and the number 45. The 'Data Count' field is highlighted with a red box and the number 15965. The 'Hex Value' field is highlighted with a red box and the number 11-21-68-81-7F-8A-27-4D-4F-BD-B6-2D-33-E1-84-2F-8D-F8-01-4D-02-2B-BF-21-A5-79-72-36-75-06-4D-C3-91.

| Name             | Size | Value               | Hex Value                                                                                          |
|------------------|------|---------------------|----------------------------------------------------------------------------------------------------|
| Data Packet      | var  |                     |                                                                                                    |
| le               | 4    | 0                   | 00-00-00-00                                                                                        |
| ta Length        | 4    | 90                  | 00-00-00-5A                                                                                        |
| ec ID            | 1    | 142                 | 8E                                                                                                 |
| Data Count       | 1    | 1                   | 01                                                                                                 |
| Data             | var  |                     |                                                                                                    |
| Timestamp        | 8    | 2019.06.18 08:25:22 | 00-00-01-68-69-B0-C9-51                                                                            |
| Priority         | 1    | 0                   | 00                                                                                                 |
| GPS Element      | 15   |                     |                                                                                                    |
| Longitude        | 4    | 0                   | 00-00-00-00                                                                                        |
| Latitude         | 4    | 0                   | 00-00-00-00                                                                                        |
| Altitude         | 2    | 0                   | 00-00                                                                                              |
| Angle            | 2    | 0                   | 00-00                                                                                              |
| Satellites       | 1    | 0                   | 00                                                                                                 |
| Speed            | 2    | 0                   | 00-00                                                                                              |
| I/O Element      | var  |                     |                                                                                                    |
| Event ID         | 2    | 385                 | 01-81                                                                                              |
| Element count    | 2    | 1                   | 00-01                                                                                              |
| 1b Element count | 2    | 0                   | 00-00                                                                                              |
| 2b Element count | 2    | 0                   | 00-00                                                                                              |
| 4b Element count | 2    | 0                   | 00-00                                                                                              |
| 8b Element count | 2    | 0                   | 00-00                                                                                              |
| Xb Element count | 2    | 1                   | 00-01                                                                                              |
| ID               | 2    | 385                 | 01-81                                                                                              |
| Value            | 45   |                     | 11-21-68-81-7F-8A-27-4D-4F-BD-B6-2D-33-E1-84-2F-8D-F8-01-4D-02-2B-BF-21-A5-79-72-36-75-06-4D-C3-91 |
| Data Count       | 1    | 1                   | 01                                                                                                 |
|                  | 4    | 15965               | 00-00-3E-5D                                                                                        |



## 2nd Beacon Data:

21 – BLE Beacon Flags, this value has to be converted to Binary. 00100001 – Bit 0 is 1, which means Signal Strength is available. Bit 5 is 1, which means iBeacon data has been sent. (0 – Eddystone; 1 – iBeacon).

A579723675064DC396A7C3520129F619 – UUID

0000 – Major

0000 – Minor

BF – Signal Strength :Signed 2's complement: -65 RSSI

By parsing the BLE Beacon Flag (It is known how many Bytes of data will follow After, For example if it is iBeacon (21), 21 Bytes of information will follow (UUID:16 Bytes+Major:2 Bytes+Minor:2 Bytes+RSSI:1 Bytes) if it is Eddystone(01), 17 Bytes of information will follow (Namespace: 10 Bytes+Instance: 6 Bytes+RSSI: 1 Bytes))

6. Information for data parsing:

**Table 1. Beacon configuration parameters**

| Name             | ID          | Min   | Max  | Default | Description                                                                                                                                           |
|------------------|-------------|-------|------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Beacon Detection | 134         | 0     | 2    | 0       | 0 (Disabled) – Functionality disabled.<br>1 (All) – All beacons are sent to server.<br>2 (Configured) – Only beacons from the list are sent to server |
| Beacon Record    | 136         | 0     | 1    | 0       | 0 (Eventual) – Disabled.<br>1 (Periodic) – All beacons are sent to server.                                                                            |
| Record Period    | 137         | 30    | 3600 | 60      | Beacon record saving period                                                                                                                           |
| Beacon List      | 1600 – 1624 | Empty | 42 B | Empty   | List of authorized beacons. Eddystone and iBeacon protocols are supported*.                                                                           |

\*Beacon Ids can be entered the following way: Namespace:CompanyID, UUID:Major:Minor. Any of the ID parts can be omitted ex., Namespace:, UUID::, UUID::Minor, etc.

- Authorized Driving parameter (ID 11703) was extended to include new possible values: 2 – Beacon, 3 – Both (OneWire and Beacon).
- When Authorized Driving is configured to work with beacons, bluetooth scan procedure will be started for 5 minutes once ignition is detected.

Beacon are sent to server in a new variable length Beacon (AVL ID 385). Beacon (AVL ID:385) has the following structure

**Table 2. Beacon Packet structure**

| Data part                                                                            | BLE beacon flags #1                                                                                                                                                                                                                                                                                                                              | Beacon ID #1                                                                                 | Signal Strength #1 | Battery Voltage #1 | Temperature #1 | Beacon data #2 |
|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|--------------------|--------------------|----------------|----------------|
| 1 Byte                                                                               | 1 Byte                                                                                                                                                                                                                                                                                                                                           | 20B/16B                                                                                      | 1 Byte             | 2 bytes            | 2 bytes        | ...            |
| First half byte – current data part<br>Second half byte – total number of data parts | Bitwise parameter, specify BLE beacon type and parameters (signifies if specific data is present for certain beacon)<br>Bit 0 – signal strength 0/1<br>Bit 1 – Battery Voltage 0/1<br>Bit 2 – Temperature 0/1<br>Bit 3 – Reserved<br>Bit 4 – Reserved<br>Bit 5 – BLE beacon type 0/1<br>Bit 6 – Reserved<br>Bit 7 – Reserved (eddystone/ibeacon) | iBeacon – <b>20B</b> (UUID, major, minor)<br>Eddystone – <b>16B</b> (Namespace, Instance ID) |                    |                    |                | ...            |

**Important: Battery Voltage and Temperature are not supported in 03.25.09.Rev.51.**

## BLE sensors testing instructions

1. Enable BLE sensor via phone application.“Device Manager Mobile“. This application can be downloaded via this link:  
[https://play.google.com/store/apps/details?id=com.ela.mobileapp.elamobileapp&hl=en\\_US](https://play.google.com/store/apps/details?id=com.ela.mobileapp.elamobileapp&hl=en_US). Need to use Firmware 03.25.09.rev.51 (or later firmware version which supports beacon functionality).
2. In this application can be configured ELA sensors:
  - Change ELA sensor Name (Optional)
  - Enable ELA sensor.
  - Set ELA sensor signal power level (-40 is lowest signal power level, 4 is highest signal power level)
  - Choose the format of ELA sensor. For example if it's movement sensor it should be set as MOV
  - Advertising interval (s) with this parameter can be set interval for blue-tooth (optional)
  - Log interval (s) define the data logger period in seconds (optional)
  - Logger enable can enable for log mode.
  - Threshold acc is acceleration threshold for the tag which is working in MOV format only.





3. In configurator select BLE1 Sensor -> Advanced write usable sensor's MAC address. MAC ID can be found by using phone application nRF connect. Link to download:

<https://play.google.com/store/apps/details?id=no.nordicsemi.android.mcp&hl=en>

BLE connectionless functionalities

Connection #1

Mode

Working mode

Disabled TZ-BT04/05/05B sensor Advanced

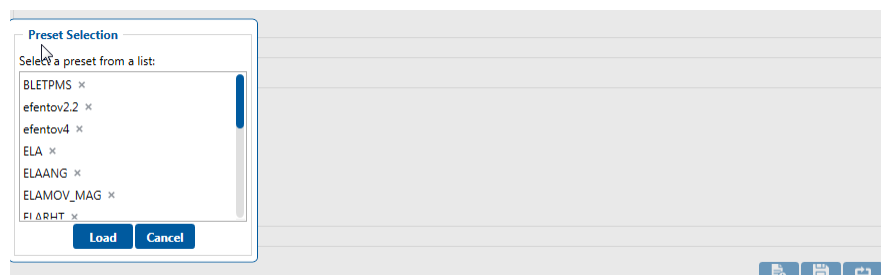
Settings

MAC FB61C012F623

1st Sensor

| Type | Data Offset | Data Size | Action | IO     | Match | Endianness    | Multiplier | Offset |
|------|-------------|-----------|--------|--------|-------|---------------|------------|--------|
| FE   | 5           | 2         | Match  | None   | 062A  | Little Endian | 1          | 0      |
| FE   | 7           | 2         | Save   | Custom |       | Little Endian | 1          | 0      |

4. Select Preset for the sensor which type it is. (If the sensor you are using does not have a made Preset, follow instructions „How to configure a unique sensor if there is no preset”)

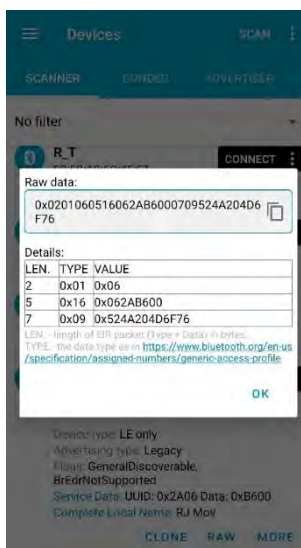


5. In the above shown configuration. I/O is set to „Custom“, that means data will be sent under the I/O element BLE Custom 1. However, if the I/O is set to Temperature/Humidity/Fuel etc. – data will be saved and sent under the corresponding I/O elements. Temperature – BLE Temperature #X; Battery – BLE Battery #X; Humidity – BLE Humidity #X etc.

|                    |     |      |     |      |       |   |   |       |     |    |            |  |  |                      |
|--------------------|-----|------|-----|------|-------|---|---|-------|-----|----|------------|--|--|----------------------|
| BLE Temperature #1 | °C  | None | Low | High | Panic | 0 | 0 | Crash | Yes | No | Monitoring |  |  | BLE Temp #1          |
| BLE Temperature #2 | °C  | None | Low | High | Panic | 0 | 0 | Crash | Yes | No | Monitoring |  |  | BLE Temp #2          |
| BLE Temperature #3 | °C  | None | Low | High | Panic | 0 | 0 | Crash | Yes | No | Monitoring |  |  | BLE Temp #3          |
| BLE Temperature #4 | °C  | None | Low | High | Panic | 0 | 0 | Crash | Yes | No | Monitoring |  |  | BLE Temp #4          |
| BLE Battery #1     | %   | None | Low | High | Panic | 0 | 0 | Crash | Yes | No | Monitoring |  |  | BLE Battery #1       |
| BLE Battery #2     | %   | None | Low | High | Panic | 0 | 0 | Crash | Yes | No | Monitoring |  |  | BLE Battery #2       |
| BLE Battery #3     | %   | None | Low | High | Panic | 0 | 0 | Crash | Yes | No | Monitoring |  |  | BLE Battery #3       |
| BLE Battery #4     | %   | None | Low | High | Panic | 0 | 0 | Crash | Yes | No | Monitoring |  |  | BLE Battery #4       |
| BLE Humidity #1    | %RH | None | Low | High | Panic | 0 | 0 | Crash | Yes | No | Monitoring |  |  | BLE Humidity #1      |
| BLE Humidity #2    | %RH | None | Low | High | Panic | 0 | 0 | Crash | Yes | No | Monitoring |  |  | BLE Humidity #2      |
| BLE Humidity #3    | %RH | None | Low | High | Panic | 0 | 0 | Crash | Yes | No | Monitoring |  |  | BLE Humidity #3      |
| BLE Humidity #4    | %RH | None | Low | High | Panic | 0 | 0 | Crash | Yes | No | Monitoring |  |  | BLE Humidity #4      |
| BLE Custom 1       |     | None | Low | High | Panic | 0 | 0 | Crash | Yes | No | Monitoring |  |  | BLE Custom sensor #1 |
| BLE Custom 2       |     | None | Low | High | Panic | 0 | 0 | Crash | Yes | No | Monitoring |  |  | BLE Custom sensor #2 |
| BLE Custom 3       |     | None | Low | High | Panic | 0 | 0 | Crash | Yes | No | Monitoring |  |  | BLE Custom sensor #3 |
| BLE Custom 4       |     | None | Low | High | Panic | 0 | 0 | Crash | Yes | No | Monitoring |  |  | BLE Custom sensor #4 |

### How to configure a unique sensor if there is no preset

This can be done by using the application nRF connect by finding a custom sensor and selecting RAW data. For example there is a screenshot with a RAW data from ELA movement sensor. As a type we are using type 16 to select all the needed data. Data offset is used to specify from which Byte data should be read or taken. We will use match on 062A (see screenshot of ELA movement packet structure). Data 062A is constant, that is why in the configuration we use „Match“ to confirm that this is the correct packet. To take data from the Packet, we enter type 16 and configure „Save“ and Offset is 2 bytes. We select I/O – Custom (Because Movement Sensor data is not measured in Kvants/°C/Voltage/%RH etc. )



| ELA MOV                  |      |
|--------------------------|------|
| Length :                 | 2    |
| Type :                   | 0x01 |
| Data :                   | 0x06 |
| Length :                 | 5    |
| Type :                   | 0x16 |
| Alert Charac :           | 0x06 |
| Alert Charac :           | 0x2A |
| MOV (cnt+state) data LSB |      |
| MOV (cnt+state) data MSB |      |
| Length :                 | 16   |
| Type :                   | 0x09 |



## AVL ID DETAILS

| Property ID in AVL packet | Property Name            | Bytes | Type     | Min  | Max   | Multiplier | Units | Description                                                                                                                              |
|---------------------------|--------------------------|-------|----------|------|-------|------------|-------|------------------------------------------------------------------------------------------------------------------------------------------|
| 20                        | BLE 2 Battery Voltage    | 1     | Unsigned | 0    | 100   | -          | %     | Battery voltage of sensor #2                                                                                                             |
| 22                        | BLE 3 Battery Voltage    | 1     | Unsigned | 0    | 100   | -          | %     | Battery voltage of sensor #3                                                                                                             |
| 23                        | BLE 4 Battery Voltage    | 1     | Unsigned | 0    | 100   | -          | %     | Battery voltage of sensor #4                                                                                                             |
| 25                        | BLE 1 Temperature        | 2     | Signed   | -400 | 1250  | 0.1        | °C    | Degrees ( °C ), -40 - +125; Error codes:<br>4000 - abnormal sensor state<br>3000 - sensor not found<br>2000 - failed sensor data parsing |
| 26                        | BLE 2 Temperature        | 2     | Signed   | -400 | 1250  | 0.1        | °C    | Degrees ( °C ), -40 - +125; Error codes:<br>4000 - abnormal sensor state<br>3000 - sensor not found<br>2000 - failed sensor data parsing |
| 27                        | BLE 3 Temperature        | 2     | Signed   | -400 | 1250  | 0.1        | °C    | Degrees ( °C ), -40 - +125; Error codes:<br>4000 - abnormal sensor state<br>3000 - sensor not found<br>2000 - failed sensor data parsing |
| 28                        | BLE 4 Temperature        | 2     | Signed   | -400 | 1250  | 0.1        | °C    | Degrees ( °C ), -40 - +125; Error codes:<br>4000 - abnormal sensor state<br>3000 - sensor not found<br>2000 - failed sensor data parsing |
| 29                        | BLE 1 Battery Voltage    | 1     | Unsigned | 0    | 100   | -          | %     | Battery voltage of sensor #1                                                                                                             |
| 86                        | BLE 1 Humidity           | 2     | Unsigned | 0    | 1000  | 0.1        | %RH   |                                                                                                                                          |
| 104                       | BLE 2 Humidity           | 2     | Unsigned | 0    | 1000  | 0.1        | %RH   |                                                                                                                                          |
| 106                       | BLE 3 Humidity           | 2     | Unsigned | 0    | 1000  | 0.1        | %RH   |                                                                                                                                          |
| 108                       | BLE 4 Humidity           | 2     | Unsigned | 0    | 1000  | 0.1        | %RH   |                                                                                                                                          |
| 270                       | Eskort LLS Fuel Level #1 | 2     | Unsigned | 0    | 65535 |            | -     | Fuel Level                                                                                                                               |
| 273                       | Eskort LLS Fuel Level #2 | 2     | Unsigned | 0    | 65535 |            | -     | Fuel Level                                                                                                                               |
| 276                       | Eskort LLS Fuel Level #3 | 2     | Unsigned | 0    | 65535 |            | -     | Fuel Level                                                                                                                               |
| 279                       | Eskort LLS Fuel Level #4 | 2     | Unsigned | 0    | 65535 |            | -     | Fuel Level                                                                                                                               |

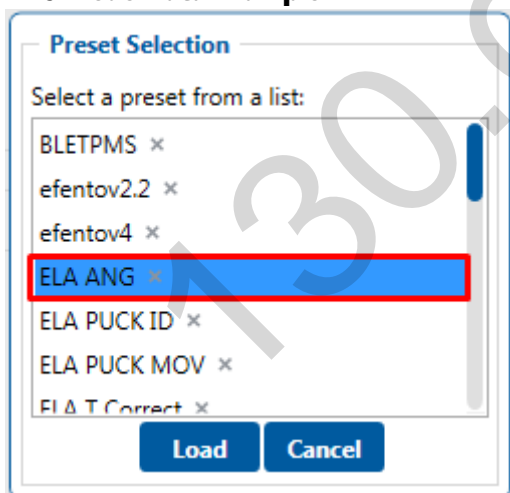
|     |                  |          |          |   |        |   |    |                                  |
|-----|------------------|----------|----------|---|--------|---|----|----------------------------------|
| 331 | BLE Sensor 1     | variable | HEX      | 0 | 256    | - | -  | Raw data of BLE sensor           |
| 332 | BLE Sensor 2     | variable | HEX      | 0 | 256    | - | -  | Raw data of BLE sensor           |
| 333 | BLE Sensor 3     | variable | HEX      | 0 | 256    | - | -  | Raw data of BLE sensor           |
| 334 | BLE Sensor 4     | variable | HEX      | 0 | 256    | - | -  | Raw data of BLE sensor           |
| 335 | BLE Luminosity 1 | 2        | Unsigned | 0 | 0xffff | - | lx | Luminosity value of a BLE sensor |
| 336 | BLE Luminosity 2 | 2        | Unsigned | 0 | 0xffff | - | lx | Luminosity value of a BLE sensor |
| 337 | BLE Luminosity 3 | 2        | Unsigned | 0 | 0xffff | - | lx | Luminosity value of a BLE sensor |
| 338 | BLE Luminosity 4 | 2        | Unsigned | 0 | 0xffff | - | lx | Luminosity value of a BLE sensor |

## ELA Sensor additional information

### ELA MOV

ELA MOV sensors can send data either in MOV mode or ANG mode. **ANG Mode:** acceleration (3 axis) on 16 bits / Axis(12 bits + a 16th sign bit); **MOV Mode:** 15-bit counter & instantaneous state\* on 1 bit (LSB)

### ANG Mode Data Example:



IO ID[331] Length[ 6]: 04 9C FF F8 00 03 BLE Custom 1

04 9C: 1180 – X axis

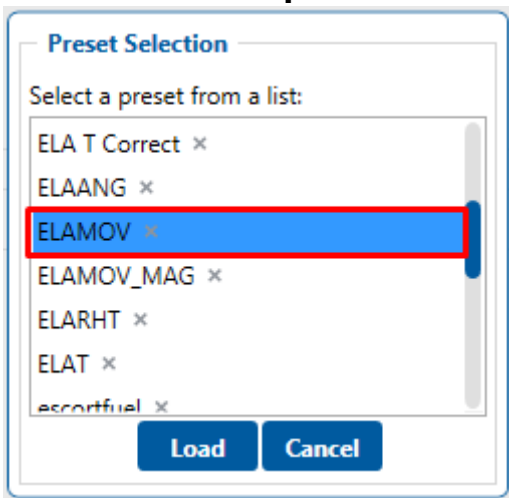
FF F8: -8 – Y axis

00 03: 3 – Z axis

Preset to use in the configurator: **ELA ANG**



### MOV Mode Data Example:



IO ID[331] Length[ 2]: 00 02

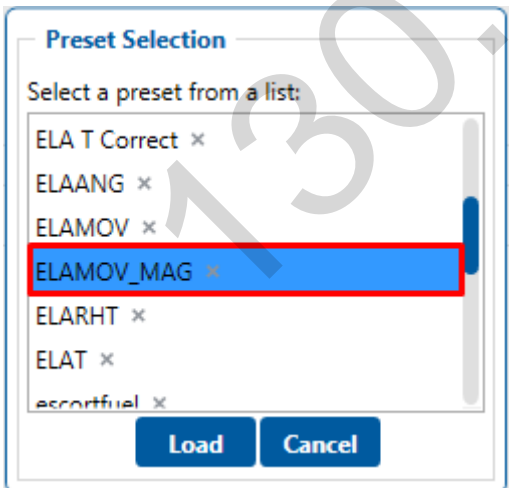
BLE Custom 1

00 02 - 0000 0000 0000 0010 (15 Bits Movement Counter: Movement Detected 1 time; 1 bit State of Sensor: Current State 0, not moving)

Preset to use in the configurator: **ELA MOV**

### ELA MAG

ELA MAG sends data 15-bit counter & instantaneous state\* on 1 bit (LSB).



### MAG Mode data Example:

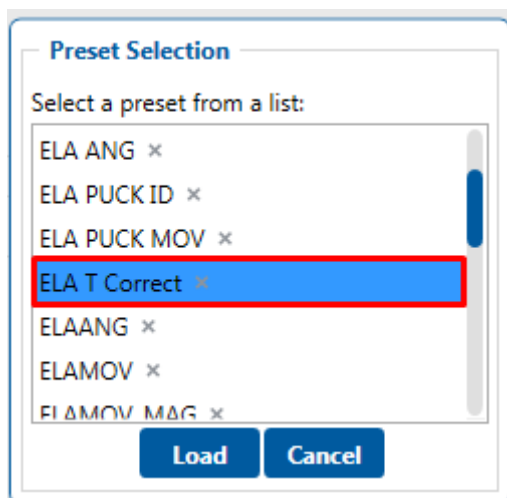
IO ID[331] Length[ 2]: 00 02

BLE Custom 1

00 02 - 0000 0000 0000 0010 (15 Bits Movement Counter: Attached/Detached Counter 1 time; 1 bit State of Sensor: Current State 0, Detached)

Preset to use in the configurator: **ELAMOV\_MAG**

## ELA T



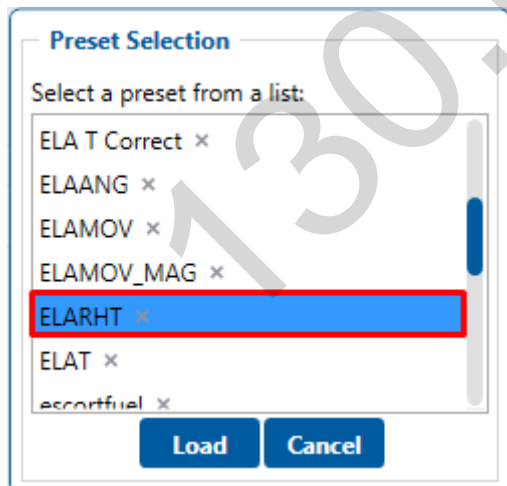
ELA T is a temperature sensor and it sends Temperature data.

### T Mode Data Example:

IO ID[ 26]: 2550 °C BLE Temperature #2

Preset to use in the configurator: **ELA T**

## ELA RHT



ELA RHT is a temperature and humidity sensor and it sends Temperature and Humidity data.

### RHT Mode Data Example:

IO ID[ 27]: 2550 °C BLE Temperature #3

IO ID[106]: 54% BLE Humidity #3

Preset to use in the configurator: **ELA RHT**

**NOTICE:**

**If there are troubles with configuring a specific sensor for usage. Please contact your sales manager and send the RAW data packet from **nRF Connect application** and the **protocol** of the sensors broadcasted frames.**

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