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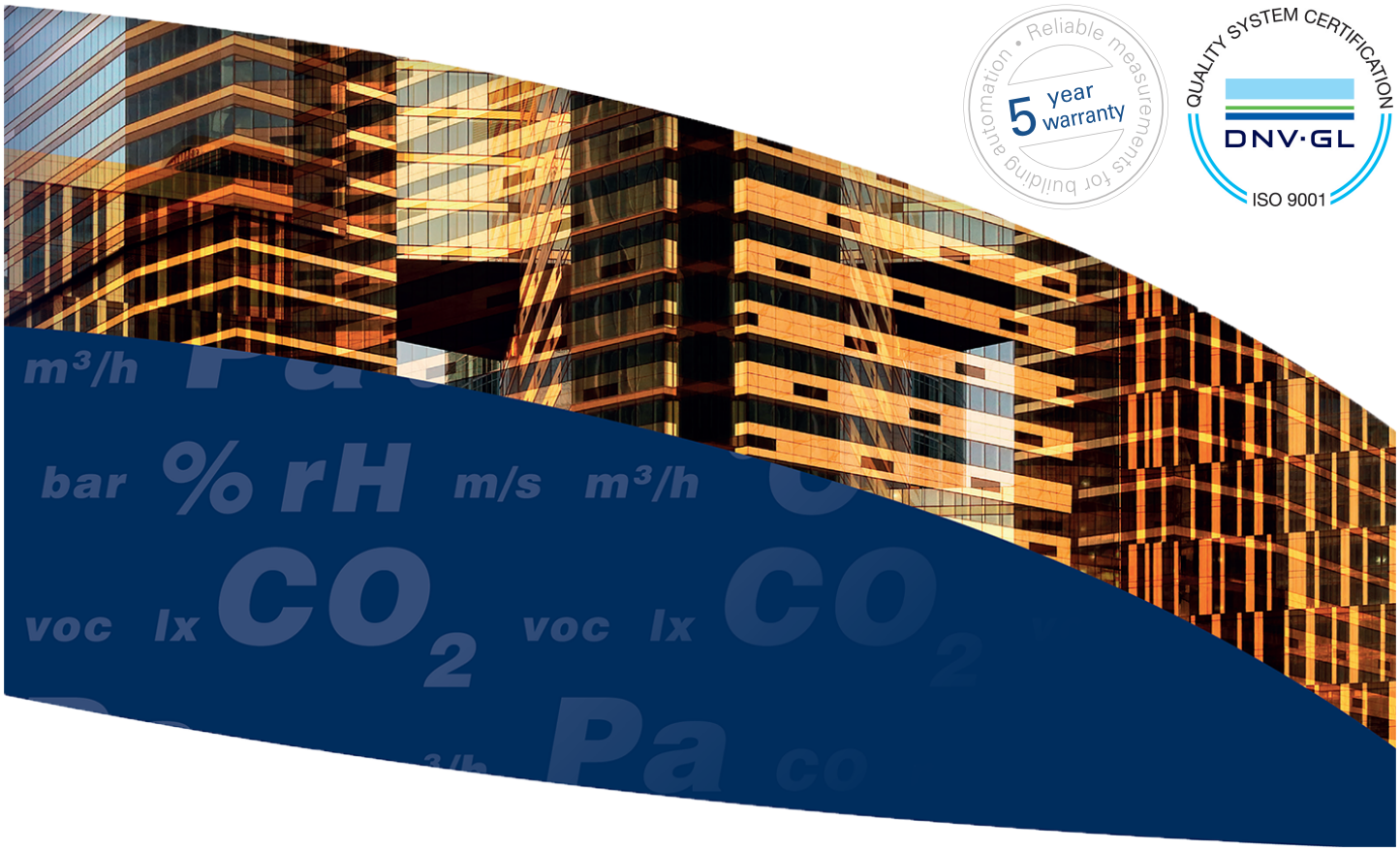
USER GUIDE

# MLB

Produal

Distributed by AKRIBIS






# MLB - Modbus LoRaWAN bridge

User Guide

PRODUAL
measure-be sure.

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# 1 Safety precautions

The product is developed, manufactured and tested according to high quality standards. However, instructions for safe use shall be taken account when installing, using or disposing the product or parts of product.

Read this user guide carefully before commissioning, using or servicing this device. To avoid any kind of damage to people or property, follow the instructions carefully. Produal is not liable for any hazards or damages to people or property which are caused by ignoring the using or installation instructions.

To avoid electrical shock or damage to equipment, disconnect power before installing or servicing the product. Use only a proper wiring rated for the full operating voltage and maximum current in the system.

After installation the product will be part of a system whose specifications and performance characteristics are not designed or controlled by Produal. Refer to national and local authorities to ensure that the installation is functional and safe.

The product should only be used in professionally designed applications. Unauthorised modifications are not allowed. The product must not be used in relation with any equipment that in case of a failure may threaten, directly or indirectly, human health or life or result in danger to human beings, animals or property.

In this document, there are different kind of warnings and notes. The warning and note types are defined in the following table.

| Sign | Description |
|---|---|
| **Warning:** | The warning symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. |
| **CAUTION:** | The caution symbol indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. |
| **Important:** | The important symbol indicates a potentially hazardous situation which, if not avoided, could result in damage to the device or property. |
| **Note:** | The note symbol indicates a useful tip or a recommended way to complete a task. These notes also provide information that is useful but not critical to the user. |

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# 2 Commissioning

## 2.1 Security keys

To be able to connect MLB devices to LoRaWAN network, security keys must be added to network. The security keys are delivered to the person that ordered the products from Produal.

## 2.2 Fitting antenna

MLB-ANT devices are delivered with an external antenna.

**Important:** Don't turn on device's supply power before fitting the antenna.

1. Check that the antenna and antenna connectors are not damaged.
2. Carefully fit the antenna.
   Tighten the antenna to the torque of 0.5 Nm

## 2.3 Mounting the product

**Warning:** Handle the product with care. Dropping the product may cause internal damage and unwanted functions in the connected system.

1. Check that the product is not damaged during transportation.
2. Select the mounting location.
   Place the product according to the wireless installation plan avoiding radio shadows.

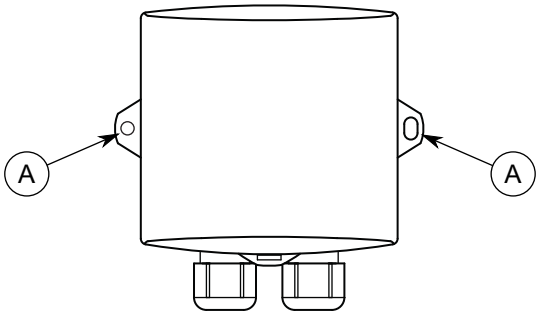
   **CAUTION:** Place the product outside the reach of children and animals.

   **Important:** The product may only be installed in a location where the ambient conditions meet the operating condition requirements.

   Operating conditions

   | | |
   |---|---|
   | Temperature | -5...50 °C |
   | Humidity | 0...95 %rH (non-condensing) |

3. Mount the product on flat surface using the mounting points.




A. Mounting point

Select the mounting screws according to the mounting surface. The maximum screw diameter is 4.5 mm.

**Important:** Don't use excessive force when tightening the mounting screws.

## 2.4 Wiring

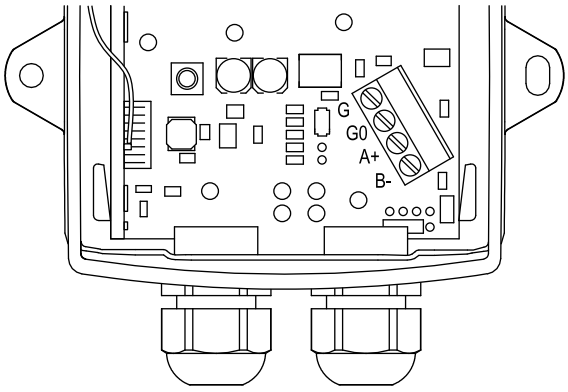
**Warning:** Device wiring and commissioning can only be carried out by qualified professionals. Always make the device wirings in de-energised electricity network.

**Warning:** This product is appliance class III product according to IEC 60664-1. The product may only be connected to SELV (safety extra low voltage) electricity network

**CAUTION:** The product may only be connected to overvoltage category III electricity network according to IEC 60664-1.

**CAUTION:** Extra care should be taken when mixing full and half rectified devices in same AC electricity network. If the outputs are not isolated, connected devices could be damaged.

**Important:** The supply voltage source must be the same in the transmitter and in the connected devices.




| | | |
|---|---|---|
| *G* | 24 Vac/dc supply | **Warning:** Power supply wiring must have a minimum cross-section area of 1.5 $mm^2$ to ensure over-current protection operation. Too thin wiring may overheat and limit current under the over-current protector trip point.<br><br>**Note:** Power inputs are equipped with an internal fuse and external over-current protection is not needed. The internal fuse can't be replaced. |
| *G0* | 0 V | |
| *A+* | RS-485, Modbus RTU | |
| *B-* | **Important:** Don't connect communication ports (RS-485) to other devices that are powered from an other electricity network than this product. | |

The nominal wire terminal screw tightening torque is 0.6 Nm

**Important:** Don't use excessive force when tightening the wiring terminal screws.

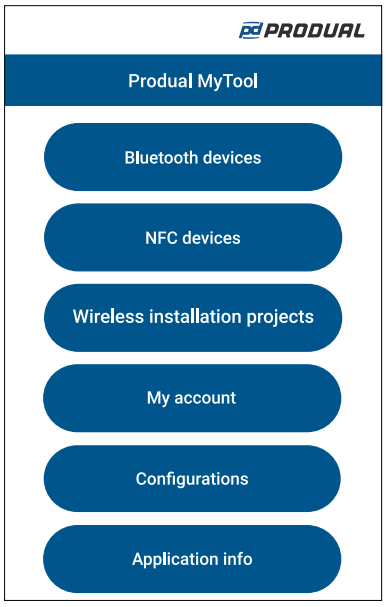
**CAUTION:** Ensure that all covers are closed before connecting supply voltage to the product. Don't remove the covers when the supply voltage is connected.

## 2.5 Configuring the device

To configure the device, you first need to connect it to Produal MyTool® application. When the device is connected to application, you can make changes to the configuration.

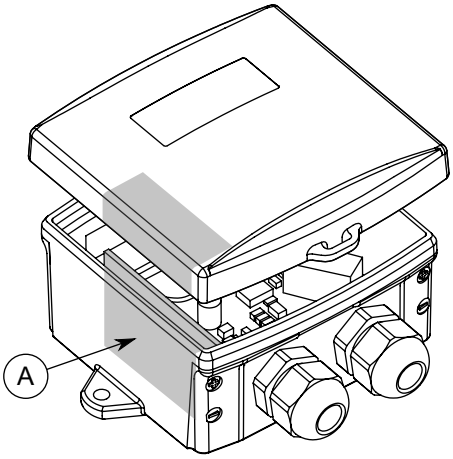
1. Connect the supply voltage to MLB.

2. Start Produal MyTool®.




3. Press the *NFC Devices* button.

**4.** Take the smartphone's NFC reader near the NFC area.




A. NFC area

You can use the NFC connection from the left side or from the top left side of the device. The NFC reader location depends on smartphone manufacturer.

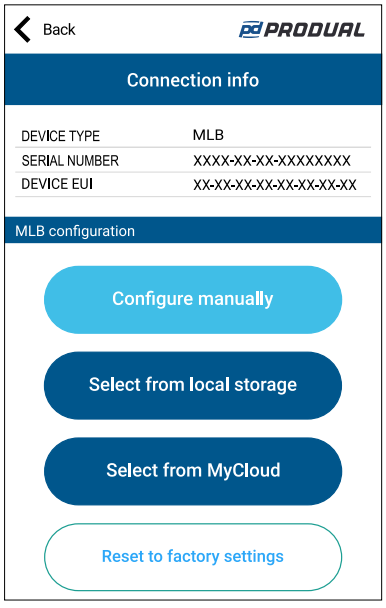
The NFC reading process takes few seconds. The loading icon starts rotating on the screen when Produal MyTool® connects to the device. Don't move the smartphone during the reading process.

**Note:** The NFC connection can only be established when MLB is powered on.

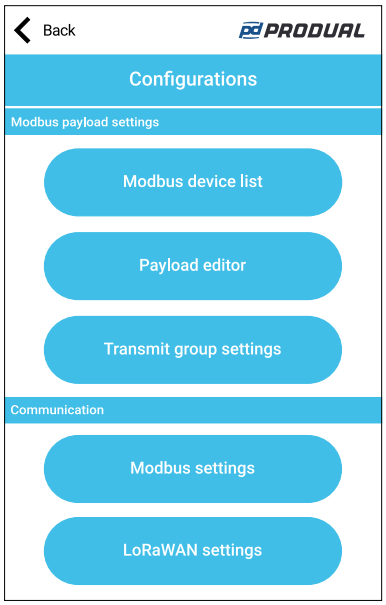
**Note:** Open the device cover if the NFC connection fails from outside the housing.

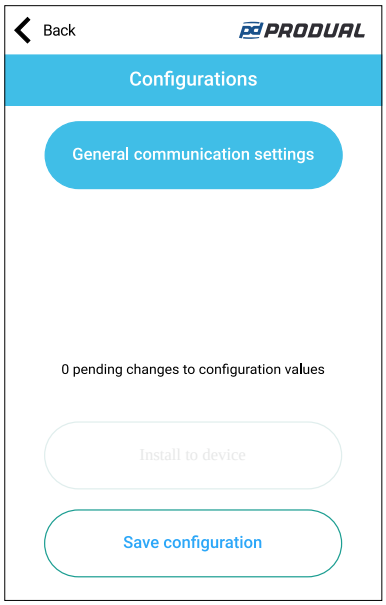
**CAUTION:** When the power supply is connected, be extra careful when handling the product without the cover.

*Connection info* view is displayed when the device information is read.



5. Press the *Configure manually* button.



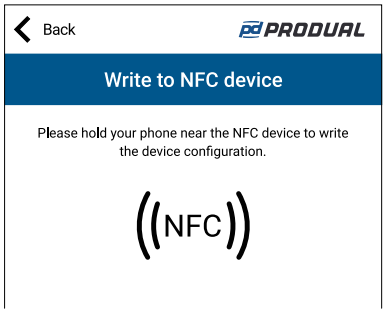




*Configurations* view has the following menus:

| | |
|---|---|
| *Modbus device list* | Add the devices to be used using pre-created device profiles or creating a generic Modbus device.<br>Produal provides a list of ready-made device profiles that are constantly updated. You can also create your own device profiles for Produal devices or for any Modbus devices. The device profiles can be managed in Produal MyCloud. Produal MyCloud address is https://mytool.produal.com/. |
| *Payload editor* | Set up device payloads.<br>You can select the Modbus registers to be read / written from the devices. Also COV limits etc. can be managed via this menu. |
| *Transmit group settings* | Set up transmit groups.<br>A maximum of four transmit groups can be selected as active. Each group can hold up to eight 16-bit Modbus registers. 32-bit register takes two 16-bit register slots from the group. Each group can be configured to independently send information based on either time, change of value, or a combination of these. |
| *Modbus settings* | Set up Modbus communication. |
| *LoRaWAN settings* | Set up LoRaWAN communication. |
| *General communication settings* | Set the device name. |

See more information about the settings from the following chapters.

6. Make the changes to configuration.
7. Press *Install to device* button.
   *Write to NFC device* view is displayed.



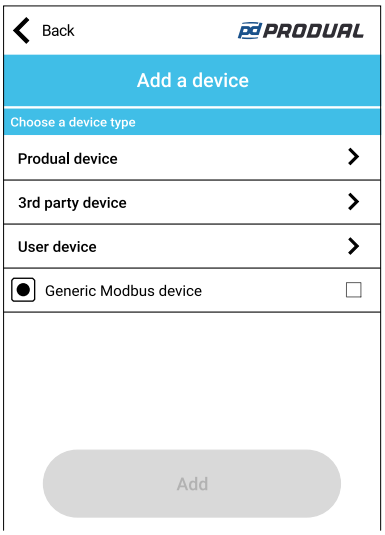

8. Hold the smart phone near the device's NFC area until *Write to NFC device* view disappears.

## 2.5.1 Adding devices

There are two ways to add devices to MLB, using device profiles or configuring the devices directly using *Payload editor* view. This instruction is for adding device profiles to MLB. See instructions for *Payload editor* from the chapter Configuring payload messages on page 11.

The device profiles can be managed in Produal MyCloud. Produal MyCloud is a cloud service for managing device profiles and configurations by using a web browser. Produal MyCloud address is https://mytool.produal.com/. A new device profile can also be created in Produal MyCloud. See more information from the chapter Creating device profile in Produal MyCloud on page 9.

1. Press *Modbus device list* button in the *Configurations* display.
2. Press *Add a device* button.
3. Select the Modbus address for the device and press *Next* button.
   Device selection view is displayed.

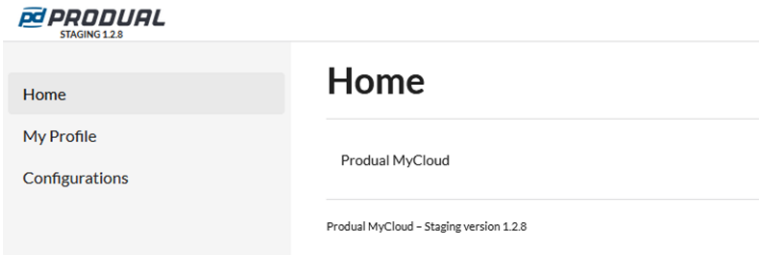



4. Select the device by browsing the device categories.
   There are ready-made device profiles to be selected. If the device profile can't be found from the device categories, the profile can be created in Produal MyCloud. You can also create a generic Modbus device by selecting *Generic Modbus device*.
5. Press *CONFIRM CHANGES* button to save the changes.

### 2.5.1.1 Creating device profile in Produal MyCloud

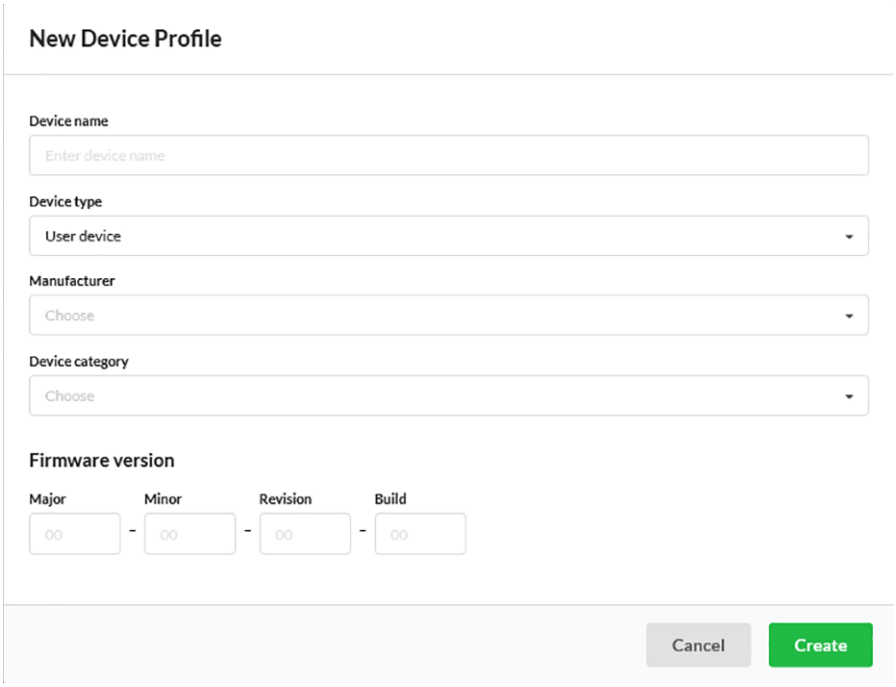
Produal MyCloud is a cloud service for managing device profiles and configurations by using a web browser. Produal MyCloud address is https://mytool.produal.com/.

1. Log in to Produal MyCloud.
   The login credentials are the same as in Produal MyTool®.




2. Go to *Configurations*.
3. Go to *MLB device profiles*.

4. Press *Create a new device profile* button.

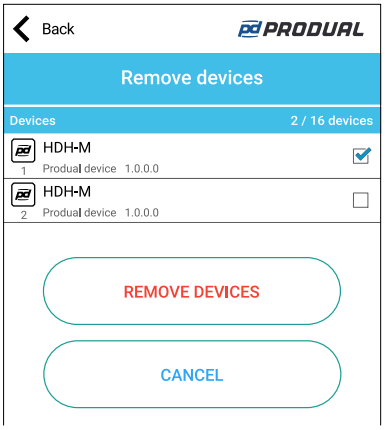



5. Make the basic settings for the profile.
6. Press *Create* button.
7. Press *OK* button.
   The device profile is now created with the basic information and it shows in the product profile list.
8. Make the Modbus register mapping by pressing *Edit* button.
9. Save the changes by pressing *Save changes* button.

The new device profiles are available in Produal MyTool® after the next login to application.

## 2.5.2 Removing devices

1. Press *Modbus device list* button in the *Configurations* display.
2. Press *Remove devices* button.
3. Mark the devices to be removed.




4. Press *REMOVE DEVICES* button.
5. Confirm the removal by pressing *Remove* button.
6. Press *CONFIRM CHANGES* button to save the changes.

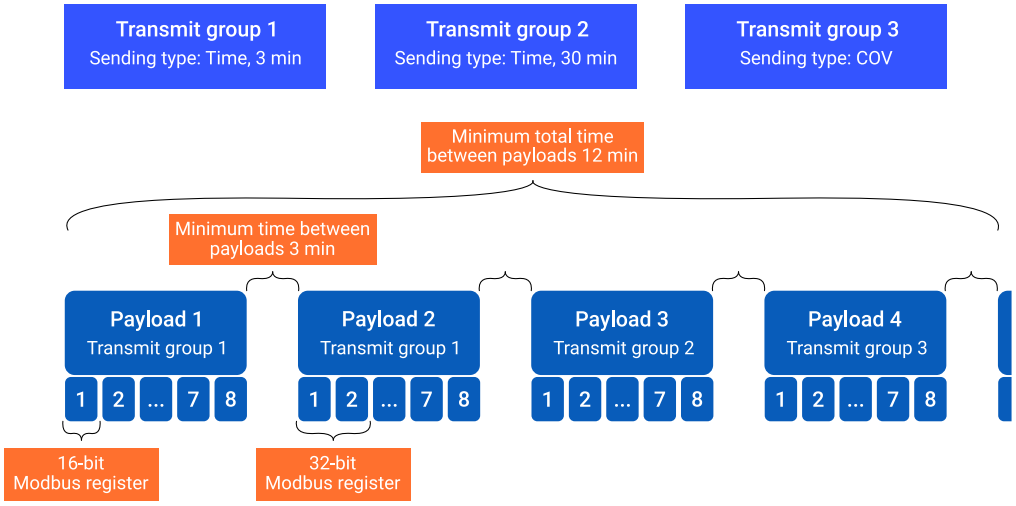
## 2.5.3 Configuring transmit group settings

Transmit groups define how the payloads are sent. Each group can be configured to independently send information based on either time, change of value, or a combination of these.

The minimum transmission interval for groups is 3 minutes. If more than one transmission group is selected, the transmission interval is counted from the previous transmission.

Example 1: Groups 1, 2 and 3 are selected and transmission is based on time interval (3 min). Group 1 is sent first, group 2 is sent after 3 min delay and group 3 is sent after 3 min delay from group 2. The values of each groups are updated in the LoRaWAN network every 9 minutes.

Example 2:




Payloads 1 and 2 are part of transmit group 1 which sends a message every 3 minutes. Payload 3 is part if transmit group 2 which sends a message every 30 minutes. Payload 4 is part of transmit group 3 which sends a message based on the change of value.

The messages that are based on the change of value (COV), are sent immediately when the value changes enough and the minimum transmission interval (3 min) has passed. If the minimum transmission interval is not passed, the packet is sent after the time has passed.

1. Press *Transmit group settings* button in the *Configurations* display.
2. Select the transmit group (*Transmit group*) by pressing the group number.
3. Make the settings.
   See the chapter Available transmit group settings on page 11 for more details.
4. Press *Confirm changes* button to save the changes.

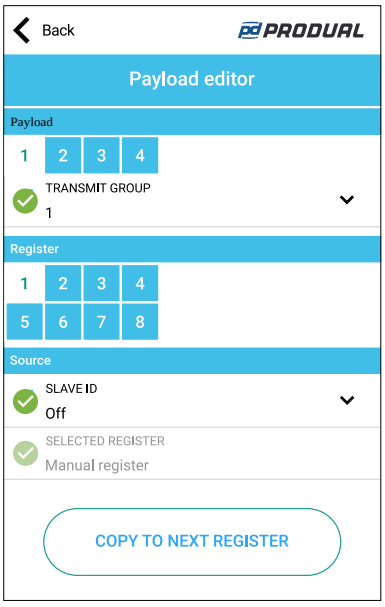
#### 2.5.3.1 Available transmit group settings

| Parameter name | Values | Default | Description |
|---|---|---|---|
| *Packet send type* | *Disabled / Time / COV / COV + Time* | *Time* | Message sending method. |
| *Time interval* | *3...65535 min* | *10 min* | Message sending interval. |

## 2.5.4 Configuring payload messages

In *Payload editor* view you can set the registers that are read from the connected devices.

1. Press *Payload editor* button in the *Configurations* display.




2. Select the payload slot by pressing the slot number.
3. Select the transmit group (*Transmit group*).
4. Select the register slot (*Register*) by pressing the slot number.
5. Select the value source device Modbus address (*Slave ID*).
6. Select the Modbus register.
7. Make the register settings.
   See the chapter Payload editor register parameters on page 12 for more details.

   **Note:** The settings can be copied to next register slot by pressing *COPY TO NEXT REGISTER* button.
8. Press *CONFIRM CHANGES* button to save the changes.

### 2.5.4.1 Payload editor register parameters

| Parameter name | Values | Default | Description |
|---|---|---|---|
| *Selected register* | | *Manual register* | Register selection wizard. The selection is available if the device has preconfigured Modbus registers. Device profiles can be edited in Produal MyCloud cloud service. |
| *Register parameters* | | | |
| *Function code* | *Input register / Holding register / Discrete input / Coil* | *Input register* | Modbus function code. |
| *Register address* | *0...65535* | *0* | Modbus register address. |
| *Data type* | *U16 / S16 / U32 / S32* | *S16* | Modbus data type.<br>**Note:** 32 bit registers (*U32 / S32*) reserve also the next register slot for the message. |
| *Endianness adjustment* | *None / 16-bit inversion / 32-bit and 16-bit inversion / 32-bit inversion* | *None* | Modbus register reading order. |
| *COV limit* | *0...65535* | *0* | Change of value (COV) limit. |

## 2.5.5 Configuring Modbus settings

1. Press *Modbus settings* button in the *Configurations* display.
2. Make the settings.
   See the chapter Available Modbus settings on page 13 for more details.
3. Press *CONFIRM CHANGES* button to save the changes.

### 2.5.5.1 Available Modbus settings

| Parameter name | Values | Default | Description |
|---|---|---|---|
| *RS-485 settings* | | | |
| *Baud rate* | *9600 / 14400 / 19200 / 38400 / 57600 / 115200* | *9600* | Bus speed. |
| *Data bits* | *8 bits* | *8 bits* | Data bits. The value can't be changed. |
| *Parity bit* | *None / Even / Odd* | *None* | Bus parity. |
| *Stop bits* | *1 Stop-bit / 2 Stop bits* | *1 Stop-bit* | Stop bits. |
| *Generic Modbus settings* | | | |
| *Modbus timeout* | *50...10000 ms* | *500 ms* | Bus timeout. |
| *Delay between polls* | *10...10000 ms* | *10 ms* | Polling frequency. |

## 2.5.6 Configuring LoRaWAN settings

**Note:** The LoRaWAN communication is turned off by default.

1. Press the *LoRaWAN settings* button in the *Configurations* display.
2. Make the settings.
   See the chapter Available LoRaWAN settings on page 13 for more details.
3. Press *CONFIRM CHANGES* button to save the changes.

### 2.5.6.1 Available LoRaWAN settings

| Parameter name | Values | Default | Description |
|---|---|---|---|
| *Device enable* | *Disabled / Enabled* | *Disabled* | LoRaWAN network status. |
| *LoRaWAN data rate mode* | *Fixed / Adaptive* | *Adaptive* | LoRaWAN data rate mode. |
| *LoRaWAN activation mode* | *ABP / OTAA* | *OTAA* | LoRaWAN activation mode. |
| *Join EUI* | *XX XX XX XX XX XX XX XX* | *00 00 00 00 00 00 00 00* | LoRaWAN application server ID. |

## 2.5.7 Configuring general communication settings

1. Press the *General communication settings* button in the *Configurations* display.
2. Make the settings.
   See the chapter Available general communication settings on page 14 for more details.
3. Press *CONFIRM CHANGES* button to save the changes.

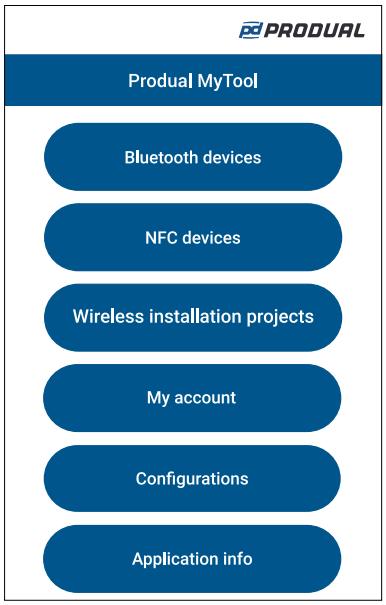
#### 2.5.7.1 Available general communication settings

| Parameter name | Values | Default | Description |
|---|---|---|---|
| *Device name* | 0...32 characters | *Unnamed device* | Device name. |

## 2.5.8 Using existing configuration

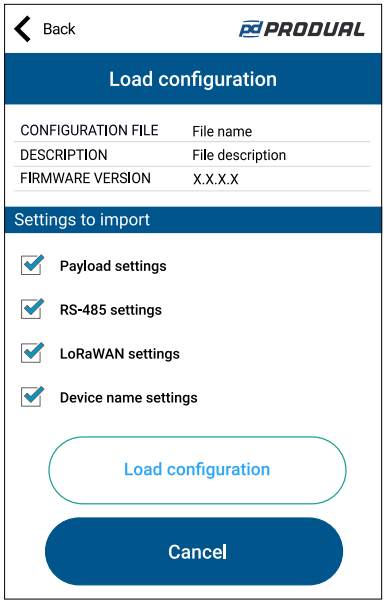
If you have saved a device configuration to Produal MyCloud or to a local device, the saved configuration can be written to another MLB.

1. Connect the supply voltage to MLB.
2. Start Produal MyTool®.

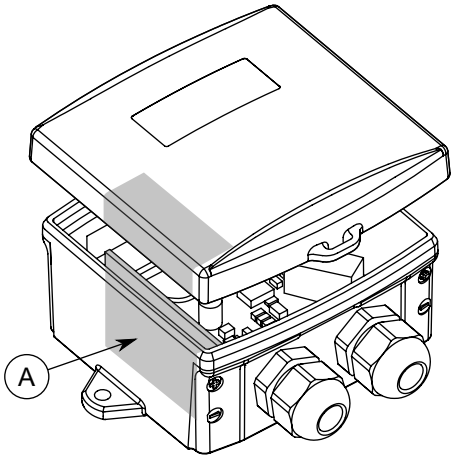



3. Press *NFC Devices* button.
4. Press *Install existing configuration* button.
5. Select the configuration.
   - Press *Select from local storage* to load configuration from the device.
   - Press *Select from MyCloud* to load configuration from the cloud service.

   Follow the on-screen instructions to select the file.
6. Select the properties to be imported.



7. Press *Load configuration* button.
8. Take the smartphone's NFC reader near the NFC area to write the configuration to device.




A. NFC area

You can use the NFC connection from the left side or from the top left side of the device. The NFC reader location depends on smartphone manufacturer.

The NFC writing process takes few seconds. The loading icon starts rotating on the screen when Produal MyTool® writes the data to the device. Don't move the smartphone during the writing process.

**Note:** The NFC connection can only be established when MLB is powered on.

**Note:** Open the device cover if the NFC connection fails from outside the housing.

**CAUTION:** When the power supply is connected, be extra careful when handling the product without the cover.

9. Press *OK* button on the successful writing confirmation view.

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# 3 Functional description

## 3.1 LoRaWAN messages

LoRaWAN message maximum size is 20 bytes.

| Message data section | Maximum number of bytes |
|---|---|
| Message ID. | 1 |
| Sequence number / Group number. | 1 |
| Segment number / Total segments. | 1 |
| Data point availability (8 bits, 1 = available, 0 = not available). | 1 |
| Modbus register data, slot 1. | 2 |
| Modbus register data, slot 2. | 2 |
| Modbus register data, slot 3. | 2 |
| Modbus register data, slot 4. | 2 |
| Modbus register data, slot 5. | 2 |
| Modbus register data, slot 6. | 2 |
| Modbus register data, slot 7. | 2 |
| Modbus register data, slot 8. | 2 |

### 3.1.1 Uplink messages (read)

#### 3.1.1.1 Uplink message ID

LoRaWAN uplink message ID is 46 (0x2E).

#### 3.1.1.2 Segment number / Total segments

When a group contains multiple data messages, the upper 4-bit nibble contains the segment number (1...4). Total number of segments (1...4) is written in the lower 4-bit nibble. The information is used on the application server side to determine when all messages of the same group has been received.

When a group is split into multiple messages, LoRaWAN confirmed messages are used.

#### 3.1.1.3 Sequence number / Group number

Sequence number in upper 4-bit nibble increments each time a group is sent. The data is used for reassembling group data on the application server when groups have multiple data messages configured.

Group number in the lower 4-bit nibble is the group number (1...4) which the message corresponds to.

#### 3.1.1.4 Data point availability

Each bit in this byte represents one Modbus register slot. Bits 0...7 represent slots 1...8 in this order. If the bit is high, receiver assumes that the data was successfully read via Modbus and is included in this message.

For example, if there is a 32 bit data point configured to start from Modbus register slot 1, the bit 0 value is 1. However, the bit 1 value is 0, because that slot is occupied by slot 1 as an extension.

#### 3.1.1.5 Modbus register data

Each Modbus register slot holds 16 bits of register data. There are eight register slots and the data is in big endian format. The data for each slot is always sent even if the slot is not configured. Slots that

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are not configured, are not extensions of previous slots or are failed to receive Modbus data, are sent as fixed value of 0x0000.

#### 3.1.1.6 Uplink message example

Message:

```
0x2E 0x01 0x11 0x0F 0x12 0x21 0x23 0x32 0x34 0x43 0x45 0x54 0x00 0x00 0x00 0x00 0x00 0x00
 0x00 0x00
```

| Message (hex) | Description |
|---|---|
| 0x2E | Message ID. |
| 0x01 | Sequence number / Group number. |
| 0x11 | Segment number / Total segments. |
| 0x0F | Data point availability. |
| 0x12 0x21 | Modbus register data, register 1. |
| 0x23 0x32 | Modbus register data, register 2. |
| 0x34 0x43 | Modbus register data, register 3. |
| 0x45 0x54 | Modbus register data, register 4. |
| 0x00 0x00 | Modbus register data, register 5. |
| 0x00 0x00 | Modbus register data, register 6. |
| 0x00 0x00 | Modbus register data, register 7. |
| 0x00 0x00 | Modbus register data, register 8. |

Uplink message for group 1, segment 1. Data points 1, 2, 3 and 4 are valid and will be read from Modbus device to LoRaWAN.

### 3.1.2 Status messages

#### 3.1.2.1 Status message ID

LoRaWAN status message ID is 47 (0x2F). The status message sending interval is 3 hours.

#### 3.1.2.2 Segment number / Total segments

When a group contains multiple data messages, the upper 4-bit nibble contains the segment number (1...4). Total number of segments (1...4) is written in the lower 4-bit nibble. The information is used on the application server side to determine when all messages of the same group has been received.

When a group is split into multiple messages, LoRaWAN confirmed messages are used.

#### 3.1.2.3 Sequence number / Group number

Sequence number in upper 4-bit nibble increments each time a group is sent. The data is used for reassembling group data on the application server when groups have multiple data messages configured.

Group number in the lower 4-bit nibble is the group number (1...4) which the message corresponds to.

#### 3.1.2.4 Data point availability

Each bit in this byte represents one Modbus register slot. Bits 0...7 represent slots 1...8 in this order. If the bit is 1, receiver assumes that the register value is valid.

#### 3.1.2.5 Modbus register status data

Each Modbus register slot hold 16 bits of status data for that slot. There are eight register slots and the data is in big endian format. The upper 8 bits of status contains a counter for consecutive successful read operations for that slot. If a read operation fails, the counter resets to 0. If read operation is successful, counter increases by 1 until it reaches 0xFF (255).

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The lower 8 bits of status data contains a counter for consecutive successful write operations for that slot. If a read operation fails, the counter resets to 0. If read operation is successful, counter increases by 1 until it reaches 0xFF (255).

#### 3.1.2.6 Status message example

Message:

```
0x2F 0x01 0x11 0x0F 0x12 0x21 0x23 0x32 0x34 0x43 0x45 0x54 0x00 0x00 0x00 0x00 0x00 0x00
 0x00 0x00
```

| Message (hex) | Description |
|---|---|
| 0x2F | Message ID. |
| 0x01 | Sequence number / Group number. |
| 0x11 | Segment number / Total segments. |
| 0x0F | Data point availability. |
| 0x12 0x21 | Modbus register status, register 1. |
| 0x23 0x32 | Modbus register status, register 2. |
| 0x34 0x43 | Modbus register status, register 3. |
| 0x45 0x54 | Modbus register status, register 4. |
| 0x00 0x00 | Modbus register status, register 5. |
| 0x00 0x00 | Modbus register status, register 6. |
| 0x00 0x00 | Modbus register status, register 7. |
| 0x00 0x00 | Modbus register status, register 8. |

Status message for group 1, segment 1. Status for registers 1, 2, 3 and 4 is available.

## 3.1.3 Downlink messages (write)

#### 3.1.3.1 Downlink message ID

LoRaWAN downlink message ID is 49 (0x31).

#### 3.1.3.2 Sequence number / Group number

The upper 4-bit nibble (sequence number) is always 0.

Group number in the lower 4-bit nibble is the group number (1...4) which the message corresponds to.

#### 3.1.3.3 Segment number / Total segments

When a group contains multiple write messages, the upper 4-bit nibble contains the segment number (1...4). The lower 4-bit nibble is always 1.

When a group is split into multiple messages, LoRaWAN confirmed messages are used.

#### 3.1.3.4 Data point availability

Each bit in this byte represents one Modbus register slot. Bits 0...7 represent slots 1...8 in this order. This data defines the registers that are written to the slave device.

For example, if there is a 32 bit data point configured to start from Modbus register slot 1, set bit 0 value to 1 and bit1 value to 0.

#### 3.1.3.5 Modbus register data

Each Modbus register slot holds 16 bits of register data. There are eight register slots and the data is in big endian format.

### 3.1.3.6 Downlink message example

This example describes how to change the values of holding registers 10 and 12 in HLS 44-SE device. The changed values are in registers 3 and 4 in transmit group 1 in payload 1. The payloads are set as follows:

1. Transmit group 1
2. Transmit group 2
3. Transmit group 3
4. Transmit group 4

Message:

```
0x31 0x01 0x11 0x0C 0x00 0x00 0x00 0x00 0x00 0x02 0x00 0x19 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
```

| Message (hex) | Description | |
|---|---|---|
| 0x31 | Message ID. All downlink messages begin with this byte (0x31). | |
| 0x01 | Sequence number / Group number. This byte designates to which payload this message is directed.<br>In this case, the value is 1 (payload 1). The byte always begins with 0. | |
| 0x11 | Segment number / Total segments. This byte designates to which transmit group the message is directed.<br>In this case, the value is 1 (transmit group 1). The second number is always 1. For example, the value for group 2 is 0x21. | |
| 0x0C | Data point availability. This byte designates to which registers the data is written.<br>The byte value depends on the registers you want to write to. The value can be calculated by converting using 8-bit binary number to hexadecimal number. In this case, the 8-bit binary value is 00001100. Converted hexadecimal number is 0C. The binary code is read from right to left, and each bit is a different register. Only the bits that are 1, are written to device. If you want to write new values for all the registers, use the value FF. | |
| 0x00 0x00 | Modbus register data to be written in register 1. | These byte values are 0, since their register were not designated to be written. You can write any values to these bytes and the current register values are not changed in the device. |
| 0x00 0x00 | Modbus register data to be written in register 2. | |
| 0x00 0x02 | Modbus register data to be written in register 3.<br>In this case, the value 2 is written to register 10 (DI2 input). The register values must be written using big-endian data format. | |
| 0x00 0x19 | Modbus register data to be written in register 4.<br>In this case, the value 25 is written to register 12 (setpoint centre). The register values must be written using big-endian data format. | |
| 0x00 0x00 | Modbus register data to be written in register 5. | These byte values are 0, since their register were not designated to be written. You can write any values to these bytes and the current register values are not changed in the device. |
| 0x00 0x00 | Modbus register data to be written in register 6. | |
| 0x00 0x00 | Modbus register data to be written in register 7. | |
| 0x00 0x00 | Modbus register data to be written in register 8. | |

## 3.2 Message transmission interval

LoRaWAN communication protocol limits the device message transmission interval to minimum of 3 minutes.

MLB supports up to 32 registers to be send via LoRaWAN network. There are four payload messages that can contain up to 8 registers. Each payload message can be connected to one of the four transmission groups. Each payload message can be set to send information based on time, COV or both. If more than one payload messages are selected, each payload is sent in every 6, 9 or 12 minutes automatically. Longer interval can also be selected. As a factory setting, transmission is disabled.

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# 4 Disposal

The device is considered as electrical and electronic equipment for disposal in terms of the applicable European Directive. At the end of life the product must enter the recycling system at an appropriate collection point.

- The device must be disposed through channels provided for this purpose.
- The disposal must be completed according to the local and currently applicable laws and regulations.

Generally all metals can be recycled as material. Plastics and cardboard packaging material can be used in energy recovery. Printed circuit boards need selective treatment according to IEC 62635 guidelines. To aid recycling, plastic parts are marked with an appropriate identification code. Contact your local Produal distributor for further information on environmental aspects and recycling instructions for professional recyclers.

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