



# Wireless Produal Proxima<sup>®</sup> MESH 2,4 GHz

Commissioning and maintenance

**pd** **PRODUAL**  
*measure-be sure.*

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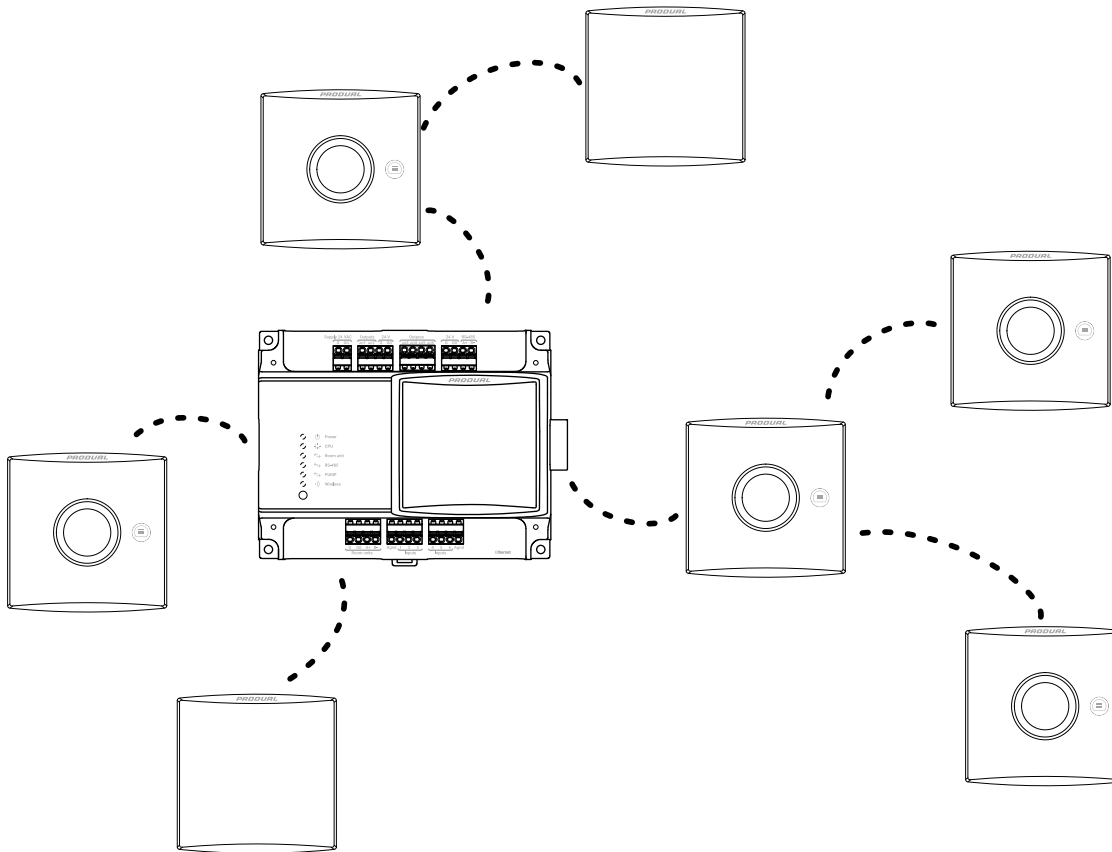
# 1 Wireless network introduction

## 1.1 Network properties

Produal Proxima® wireless network is based on Lumenradio MIRA platform that provides a wireless mesh network with unprecedented scalability and reliability. The Mira network is a self-healing multi-hop network system that operate on the worldwide license-free 2,4 GHz ISM band. With patented Future-Proof Coexistence Connectivity (FPCC) technologies we enable connectivity that can safely co-exist along other wireless technologies, not being interfered or causing interference.

**i Important:** The network uses 2,4 GHz frequency for communication. The frequency is an ISM frequency band that can be used worldwide without any licence fees. If you are not sure about the permissions to use this frequency in your country, contact your local authority for more information.

Produal Proxima® WBU base unit supports up to 100 transmitters and separate repeaters are not needed.



Only Wireless Produal Proxima® MESH compatible transmitters can be used in the MIRA network. The previous generation network (868 MHz) transmitters do not work in the MIRA network. Other than wireless Produal 2.4 GHz transmitters are not compatible with the network unless otherwise is stated.

Bluetooth technology is used for communication between wireless devices and commissioning tool (Produal MyTool®).

**NOTE** **Note:** The wireless devices can use only one communication protocol at a time. The device is disconnected from the MIRA network when the Bluetooth is activated.

The wireless devices also support Bluetooth beacon messages. The beacon messages are one-way messages that can be sent with same time with MIRA and Bluetooth communication. MyTool can compile these messages and show the network status data and the network coverage (signal scanner).

## 1.2 Average groups

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The data collected from the transmitters can be arranged into five averages groups. One average group can be represent one measured property, such as temperature, humidity, carbon dioxide, etc. The average groups can be defined using Produal MyTool®.

Measurements that exceed or fall below a particular subset can be dropped out from the calculation. For example, you can set that under 15 °C and over 30 °C measurements are dropped from the average calculation. These limits are only available for temperature values.

## 1.3 Alarms

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You can read the alarms based on the wireless network information from the base unit Modbus registers. The following alarms are available.

- Battery level alarm. You can set the battery level that causes an alarm.
- Missing transmitter alarm.
- Measurement value alarm. You can set the measurement value limits that define the normal values. An alarm is caused when the value drops under the low limit or rises over the high limit.

## 1.4 Input register cloning

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With the input register cloning you can group the transmitter information to a smaller Modbus register range. You can set up to ten cloned register values that can be read from the same input register range.

The cloned input register range is from 18X00 to 18X99 according to the transmitter ID. The X is the slot number (0...9). The cloned registers are defined in the holding registers 18000...18009.

For example if you want to read a temperature value from the transmitter with ID 27, you can read the values from the input register 18026. The cloned register slot 1 is for temperature by default. The original register for the transmitter temperature is 22651

## 1.5 Value over bus (VOB)

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The data can be transmitted in two directions, which allows the different values to be viewed on the transmitters' displays. The base station has writeable Modbus registers, where the data can be written and then send to the transmitters. Two individual measurements can be shown, as well as one global measurement, for example, outdoor temperature.

## 1.6 Firmware updates

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The base unit firmware can be updated only locally using Produal MyTool®.

The transmitter firmware updates can be done locally or by using Firmware Over The Air (FOTA) function.

The FOTA function updates the devices over the wireless network. The FOTA firmware update process can take up from few minutes to several hours depending on the network size. The base unit updates two devices at a time and then moves to the next devices until the whole network is updated to the latest firmware version. The update process starts from the farthest transmitter in the network.



**Note:** The FOTA function requires more power than the regular transmitter functioning. Therefore the FOTA updates should planned carefully in battery powered network.

## 1.7 Measurement data sending interval

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The measurement data can be read from the transmitters based on the base unit polling or with a Change of Value (COV) function.

When using base unit polling, the base unit queries the measurement data from the transmitters according to a given interval. The base unit polling interval can be set in the battery-operated network between 120 s and 24 h.

In COV mode, the transmitter sends the measurement data only when the data changes. However, the measurement is not continuous, but is activated to measure according to the specified interval. If the value has changed more than the given hysteresis, this data is sent to the base station.



NOTE

**Note:** The COV mode may significantly shorten the battery life if the hysteresis is set to very low value.

## 2 Building the wireless network

### 2.1 Designing the wireless network

In the mesh network, the base unit should be located in the centre of the network to achieve the optimal network functionality. However, the central base unit positioning is not always possible. In these situations, you should consider carefully the used devices in the network.

The separate repeaters are not needed because all transmitters in the network work also as a repeaters. It is recommended to use transmitters with wired power supply in the critical points of the network. Network prefers these transmitters when routing the messages if it doesn't disturb the message quality or network coverage.

#### 2.1.1 Signal range

Because the radio signals are electromagnetic waves, the signal becomes weaker the further it travels. The radio signal coverage is also decreased by specific materials that are in the propagation direction. The radio waves can penetrate walls, but the signal is dampened more than in the direct line of sight path. See the following table for the different construction material effect on the radio signal strength.

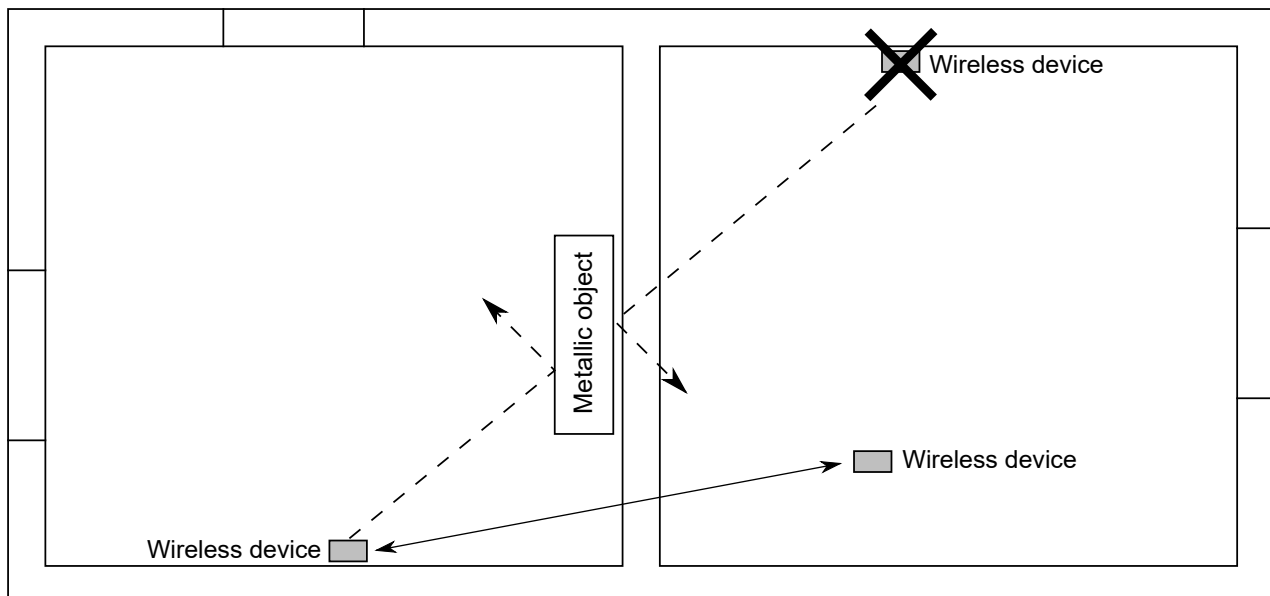
Material	Range reduction compared to direct line of sight
Wood, plaster, uncoated glass	0...10 %
Brick, press board	5...35 %
Ferro concrete	10...90 %
Metal, aluminium lining	90...100 %

#### 2.1.2 Effect of metal structures

Metallic parts, e.g. wall reinforcements, thermal insulation metal foils and metallized heat-absorbing glasses reflect radio waves. This creates a so called radio shadow behind the structure.

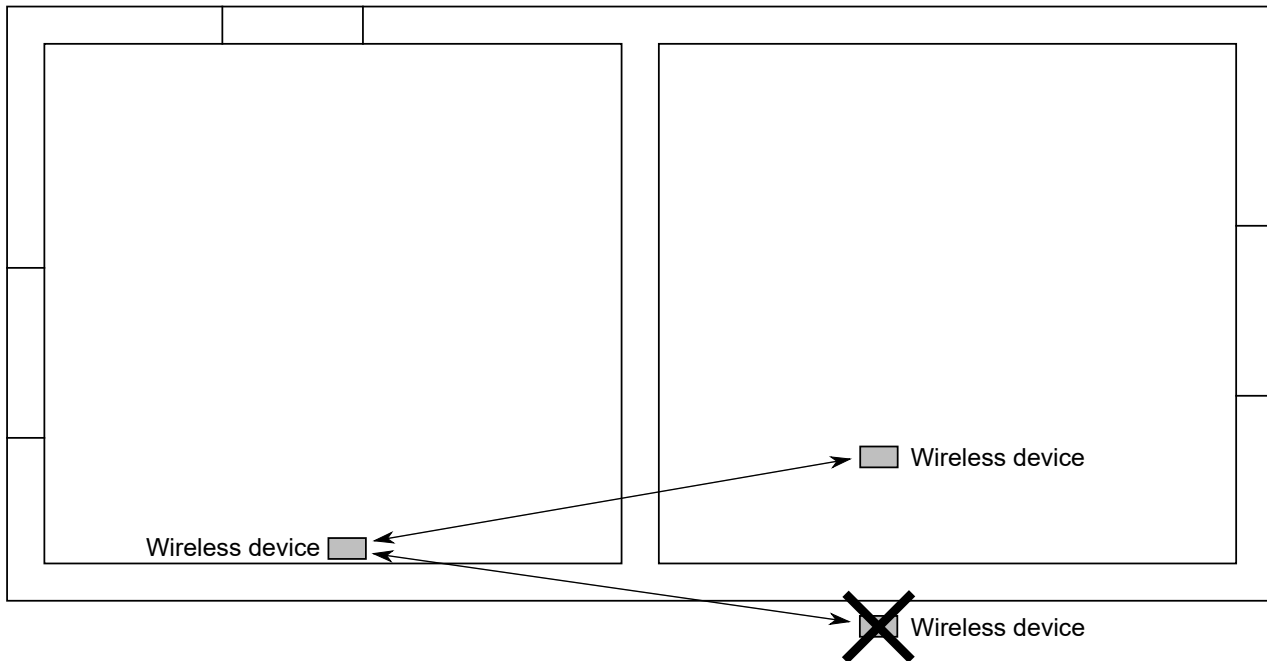
The radio transmission may work even if there are metallic obstacles on the direct path to the receiver. The radio waves reach to the destination by reflecting from metallic objects and passing through non-metallic objects (doors, windows, wooden walls). However, the radio signal range is strongly reduced.

The radio transmission problems can be avoided by placing the devices on a direct propagation path.



### 2.1.3 Wall penetration angle

The wireless devices should be placed so that the radio signal goes through a wall as directly as possible. The attenuation is higher the longer the signal travels inside the wall. Avoid installing the devices in wall recesses.



## 2.2 Planning the wireless device positions

The device locations should be planned carefully by observing possible radio shadow places and other restrictive factors. The radio coverage in commercial buildings is usually restricted by fire safety walls that cause radio shadows. However, inside the fire protected sections, lightweight or glass partition walls are commonly used.

1. Take the building floor plan.
2. Locate and mark all relevant radio shadows to the plan.
  - Fire protection walls
  - Lavatories
  - Staircases
  - Elevator shafts
  - Big metallic furniture (e.g. cabinets)



**3. Plan the device locations.**

Make sure the fixed power supply is available where needed. See the following table for power supply options.

Device	Power supply	
	Battery	24 Vac/dc
WBU		x
WTR	x	
WTR24		x
WTR-IM	x	x

**NOTE**

**Note:** For reliable range planning, you have to assume some unfavourable conditions. Planning with a few meters smaller range offers reserve against the most typical bad conditions. Bad conditions are often resulted from later environmental changes (people, partition wall relocations, furniture, plants, etc.). Also the device real positions might deviate from the plan.

**4. Verify the device locations before final installation.**

## 2.3 Placing and mounting the base unit

The ideal base unit installation place is the central location in the network area. The device should be at least 10...15 cm away from the wall corner or concrete ceiling.

The base unit is designed for hidden installation, e.g. above a false ceiling, and doesn't normally require any additional cover for the cabling. However, the installation regulations may be different in your country.



**Important:** Check the local installation regulations before making any installations.

It's recommended to use cable ties or equivalent to have some pull relief and to tidy up the installation. If a touch protection is required on the terminals, please use a CUCC cable cover.

The control unit can be mounted on the wall by screws or to a 35 mm DIN rail.

### 2.3.1 Wiring

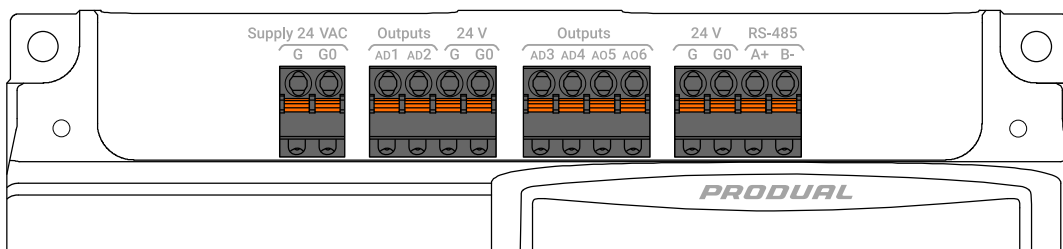


**CAUTION:** Device wiring and commissioning can only be carried out by qualified professionals. Always make the wirings while the power is switched off.

The device terminals are grouped according to the functions to avoid any wiring mistakes. There are extra G and G0 terminals for connecting the separate supply voltage for actuators. The terminals for 24 V supply voltage should not be used for anything else.

The terminals are designed for maximum of 1,5 mm<sup>2</sup> cable area. Please note that the cables for communication (RS-485 and room unit) should be twisted pair (2x2 pairs).

#### 2.3.1.1 Top connectors



#### Supply 24 VAC

G	24 Vac/dc supply.
G0	Ground

**Outputs**

AD1	Not in use
AD2	

**24 V**

G	24 Vac output.
G0	Ground

**Outputs**

AD3	Not in use
AD4	
AO5	
AO6	

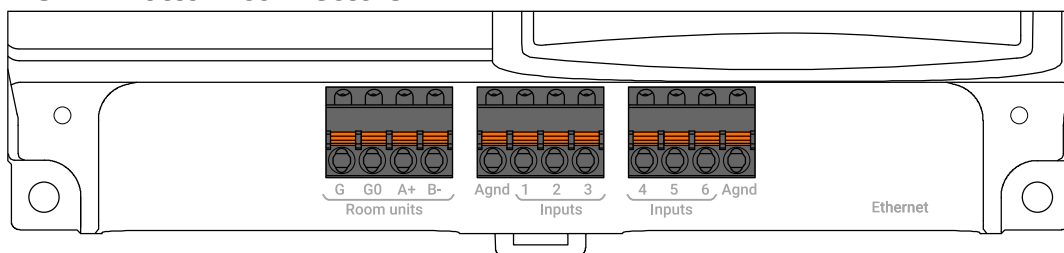
**24 V**

G	24 Vac output.
G0	Ground

**RS-485**

A+	RS-485 bus connection for Modbus RTU.
B-	

**2.3.1.2 Bottom connectors**



**Room units**

G	Not in use.
G0	
A+	
B-	

**Inputs**

Agnd	Not in use.
1	
2	
3	
4	
5	
6	
Agnd	

**Ethernet**

RJ-45 connector.

## 2.4 Mounting wireless transmitters

Place the wireless transmitters according to the plan avoiding radio shadows.

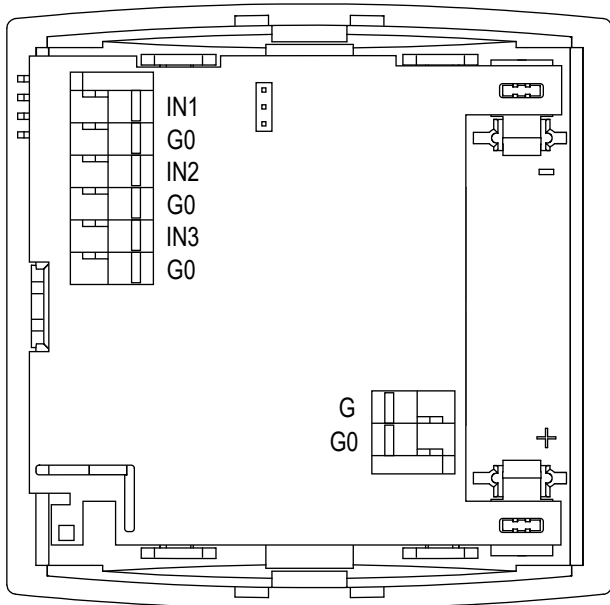
The device can be installed in dry surroundings (IP20) by screws on the wall surface or on the standard flush mounting box. The recommended installation height is 150...180 cm.

The device position should be selected carefully. All the error factors that can affect to the measurements should be eliminated as well as possible. The following list defines the typical measurement error factors.

- direct sun light
- occupant proximity
- air flow coming from windows or doors
- air flow coming from ventilation nozzles
- air flow coming from the flush mounting box
- differential temperature caused by external wall

### 2.4.1 Wiring WTR-IM

**CAUTION** **CAUTION:** Device wiring and commissioning can only be carried out by qualified professionals. Always make the wirings while the power is switched off.

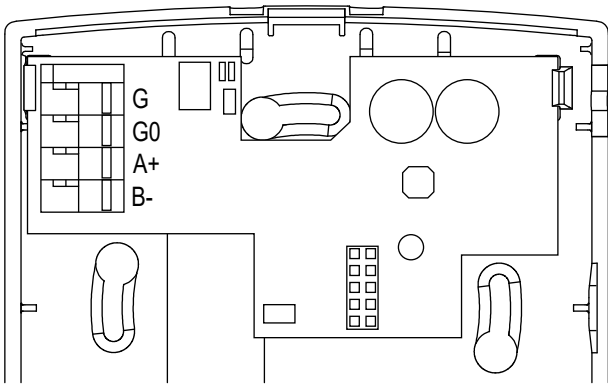


IN1	Input 1 (0...10 V or NTC 10 or digital).
G0	
IN2	Input 2 (0...10 V or NTC 10 or digital).
G0	
IN3	Input 3 (0...10 V or NTC 10 or digital).
G0	
G	24 Vac/dc supply.
G0	Ground.

### 2.4.2 Wiring WTR24

The WTR24 models have connectors for 24 Vac/dc supply.

**CAUTION** **CAUTION:** Device wiring and commissioning can only be carried out by qualified professionals. Always make the wirings while the power is switched off.



G	24 Vac/dc supply
G0	Ground
A+	Not in use.
B-	

## 3 Produal MyTool®

Produal MyTool® is a smartphone and tablet application for configuring and commissioning Produal Proxima® products. Produal MyTool® connects to devices via Bluetooth connection. The configuration software is available for Android devices via Google Play.

Produal MyCloud is a cloud service that can be used to host the device configurations and firmware updates for supported devices. Produal MyCloud can be used via Produal MyTool®.

### 3.1 Creating a Produal MyCloud account

You need Produal MyCloud account to be able to use the Produal MyTool® application.

**1.** Start the application.

The application starts on the *Sign In* display.

**2.** Press the *Create an account* button.

**3.** Write your email address and password to the correct fields.

**4.** Press the *Create an account* button.

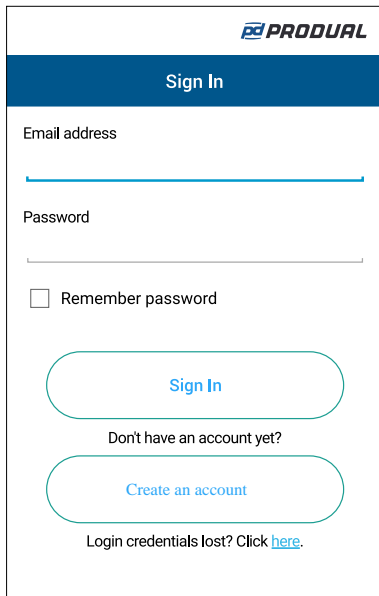
**5.** Go to your email and click the verification link.

The application sends a confirmation email to the given email address. If the email doesn't arrive in 15 minutes, please check your junk mail folder.

**6.** After successful verification, you can login the application.

## 3.2 Signing in to Produal MyTool® application

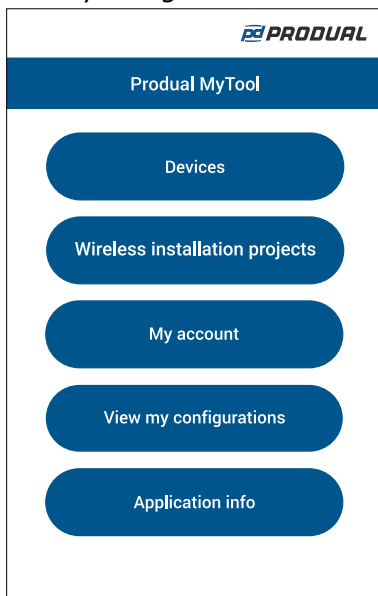
1. Start the application.  
The application starts on the *Sign In* display.



2. Give your sign in credentials in the *Sign In* display.
3. Press the *Sign In* button.  
The application main view is displayed.

## 3.3 MyTool main view

After you sign in to Produal MyTool®, the main menu is displayed.



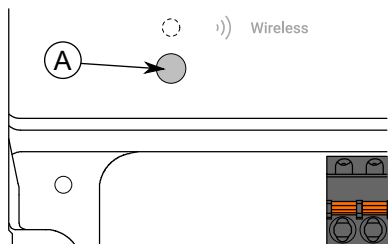
The main menu has the following menus:

<i>Devices</i>	Find and connect to devices and make configurations.
<i>Wireless installation projects</i>	Commission and maintain wireless networks.
<i>My account</i>	Edit personal information, change password and logout from the application.
<i>View my configurations</i>	View saved configuration files and delete files from Produal MyCloud.
<i>Application info</i>	View application version, terms and conditions and application licensing information.

### 3.4 Connecting Produal MyTool® to a device

1. Enable the Bluetooth in the device by pressing the connection button until the *Wireless* indicator light illuminates.

**NOTE:** The Bluetooth is enabled when the supply voltage is connected for the first time.



A. Connection button

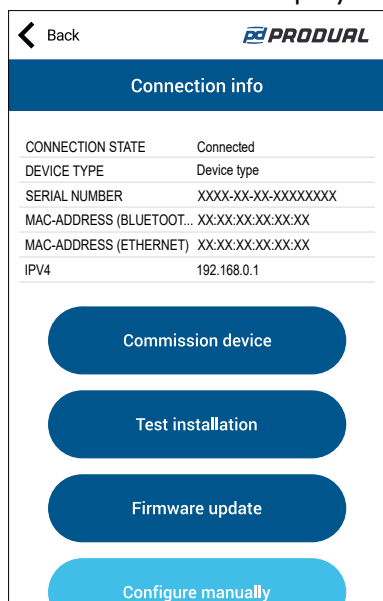
**NOTE:** Use a small screwdriver or a similar tool to push the button.

**NOTE:** Turn off the control unit Bluetooth after commissioning. This prevents unauthorised access to the device.

2. Start the Produal MyTool® application.
3. Sign in to you account.  
If you don't have an account, you can create one in the log in screen.
4. Press the *Devices* button.  
If the your device's Bluetooth is not activated, you can activate it by pressing the *Bluetooth: OFF* button. Bluetooth is needed for communicating with the control unit.
5. Select the correct device from the *Devices* list.  
There is an address tag on the control unit housing. This is handy if there are several units found in the device search. You can compare the device ID from the tag the ID's in the device list in the application to make sure you connect to the correct device.
6. Press the *Connect* button.

All device parameter values are now downloaded to application.

*Connection info* is displayed on the screen after successful connection.



### 3.5 Making offline configurations

1. Press the *Offline mode* button in the *Devices* view.

2. Select the device from the device type list.
3. Press the *Select* button.  
The application loads the device configuration with default parameter values.
4. Make the needed changes to the settings.
5. Save the configuration.  
You can save the configuration locally or to Proidual MyCloud service.

## 3.6 Updating the device firmware

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The device firmware can be updated when the Proidual MyTool® notifies about the update.

1. Press the *Firmware update* button.  
The available update is displayed. You can see the update details by pressing the *Details* button.
2. Press the *Start update* button to update the firmware.

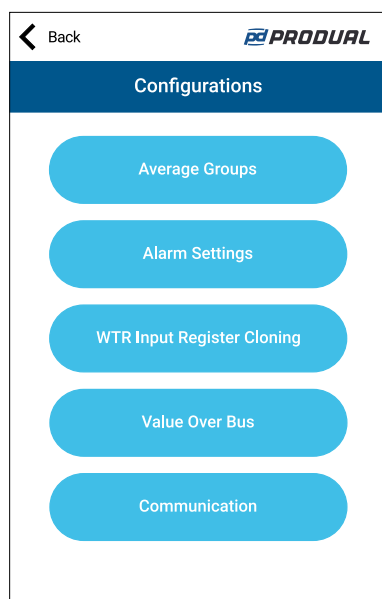


**Important:** The update starts immediately when you press the button. Do not interrupt the installation process.



## 4 Configuring base unit settings

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.



The *Configurations* view has the following menus:

<i>Average groups</i>	Set up average group calculations from measured values. There are five calculation groups available.
<i>Alarm Settings</i>	Set up measurement alarms.
<i>WTR Input Register Cloning</i>	Set up input register cloning.
<i>Value Over Bus</i>	Set up value over bus (VOB) settings.
<i>Communication</i>	Set up communication parameters. Also the basic wireless network settings can be set via this menu.

### 4.1 Configuring average measurement groups

You can configure up to five average measurement groups. One transmitter can be in several groups and one group can include only one measured property.

1. Press the *Average Groups* button in the *Configurations* view.
2. Select the group you are going to set by pressing the number.
3. Select the average group type.

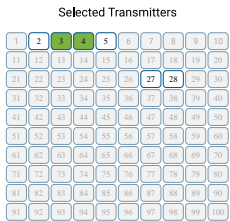
The available types are:

<i>Disabled</i>	Average group disabled.
<i>Temperature</i>	Average group for temperature measurements.
<i>Relative Humidity</i>	Average group for relative humidity measurements.
<i>CO2</i>	Average group for CO <sub>2</sub> measurements.

4. Press the *Edit parameters* button.
5. Make the settings.
6. Press the *Confirm changes* button to save the changes.
7. Press the *Confirm changes* button again to save the changes.

- Press *Install to device* button to write the changes to the device.

### 4.1.1 Available settings for average groups

Parameter name	Values	Default	Description
<i>Average calculation source selection</i>	<i>Internal / External 1...4</i>	<i>Internal</i>	Source for the measurement. <i>Internal</i> = internal measurement. <i>External</i> = external measurement. External measurements are available for the devices that have inputs (e.g. WTR-IM).
<i>Selected transmitters</i>			List of transmitters that are used in the average group. The selected transmitters are marked with green background and online transmitters are marked with white background. Offline transmitters can also be selected to the average group.
<i>Temperature average high cutoff</i>	<i>-100...100 °C</i>	<i>0,0 °C</i>	Set the highest value that is used in the average calculation. Values over the set value are not used in the calculation. The parameter is available only for temperature average groups.
<i>Temperature average low cutoff</i>	<i>-100...100 °C</i>	<i>0,0 °C</i>	Set the lowest value that is used in the average calculation. Values below the set value are not used in the calculation. The parameter is available only for temperature average groups.

## 4.2 Configuring alarms

- Press the *Alarm Settings* button in the *Configurations* view.
- Make the settings.
- Press the *Confirm changes* button to save the changes.
- Press *Install to device* button to write the changes to the device.

### 4.2.1 Available settings for alarms

Parameter name	Values	Default	Description
<i>Offline alarm</i>	<i>0 = Off, 3600...65535 s</i>	<i>0 (off)</i>	Alarm for offline transmitters. Set the offline time that activates the alarm.
<i>Battery alarm limit</i>	<i>50...100 %</i>	<i>0%</i>	Battery level alarm. Set the battery level that activates the alarm.
<i>General temperature alarm, low</i>	<i>-100,0...100,0 °C</i>	<i>0,0 °C</i>	Low temperature alarm. Alarm activates when any transmitter's temperature drops below the set value.
<i>General temperature alarm, high</i>	<i>-100,0...100,0 °C</i>	<i>0,0 °C</i>	High temperature alarm. Alarm activates when any transmitter's temperature rises over the set value.
<i>General RH% alarm, low</i>	<i>0,00...100,00 %rH</i>	<i>0,00 rh%</i>	Low humidity alarm. Alarm activates when any transmitter's humidity level drops below the set value.
<i>General RH% alarm, high</i>	<i>0,00...100,00 %rH</i>	<i>0,00 rh%</i>	High humidity alarm. Alarm activates when any transmitter's humidity level rises over the set value.
<i>General CO2 alarm, low</i>	<i>0...10000 ppm</i>	<i>0 ppm</i>	Low CO <sub>2</sub> alarm. Alarm activates when any transmitter's CO <sub>2</sub> level drops below the set value.
<i>General CO2 alarm, high</i>	<i>0...10000 ppm</i>	<i>0 ppm</i>	High CO <sub>2</sub> alarm. Alarm activates when any transmitter's CO <sub>2</sub> level rises over the set value.

## 4.3 Configuring WTR Input Register Cloning

1. Press the *WTR Input Register Cloning* button in the *Configurations* view.
2. Make the settings.
3. Press the *Confirm changes* button to save the changes.
4. Press *Install to device* button to write the changes to the device.

### 4.3.1 Available settings for Input register cloning

Parameter name	Values	Default	Description
<i>Address of register cloned from WTR, slot 1</i>	0...99	51 = temperature	Modbus input register address that is cloned from transmitter. The value is cloned to base unit register 18000.
<i>Address of register cloned from WTR, slot 2</i>	0...99	52 = humidity	Modbus input register address that is cloned from transmitter. The value is cloned to base unit register 18001.
<i>Address of register cloned from WTR, slot 3</i>	0...99	53 = transmitter specific measurement 1	Modbus input register address that is cloned from transmitter. The value is cloned to base unit register 18002.
<i>Address of register cloned from WTR, slot 4</i>	0...99	54 = transmitter specific measurement 2	Modbus input register address that is cloned from transmitter. The value is cloned to base unit register 18003.
<i>Address of register cloned from WTR, slot 5</i>	0...99	57 = input 1	Modbus input register address that is cloned from transmitter. The value is cloned to base unit register 18004.
<i>Address of register cloned from WTR, slot 6</i>	0...99	58 = input 2	Modbus input register address that is cloned from transmitter. The value is cloned to base unit register 18005.
<i>Address of register cloned from WTR, slot 7</i>	0...99	59 = input 3	Modbus input register address that is cloned from transmitter. The value is cloned to base unit register 18006.
<i>Address of register cloned from WTR, slot 8</i>	0...99	60 = input 4	Modbus input register address that is cloned from transmitter. The value is cloned to base unit register 18007.
<i>Address of register cloned from WTR, slot 9</i>	0...99	23 = battery level	Modbus input register address that is cloned from transmitter. The value is cloned to base unit register 18008.
<i>Address of register cloned from WTR, slot 10</i>	0...99	24 = signal strength	Modbus input register address that is cloned from transmitter. The value is cloned to base unit register 18009.

## 4.4 Configuring Value Over Bus settings

You can configure up to three Value Over bus functions.

1. Press the *Value Over Bus* button in the *Configurations* view.
2. Select the configuration you are going to set by pressing the number.
3. Select the bus value type.
4. Press the *Edit parameters* button.
5. Select the value over bus mode.  
Select *Common value* to use the same value for all transmitters. Select *Transmitter specific value* to use the value for one transmitter.
6. Press the *Confirm changes* button to save the changes.
7. Press the *Confirm changes* button again to save the changes.

8. Press *Install to device* button to write the changes to the device.

## 4.5 Configuring communication settings

1. Press the *Communication* button in the *Configurations* display.
2. Make the settings.
3. Press the *Confirm changes* button to save the changes.
4. Press *Install to device* button to write the changes to the device.

### 4.5.1 Available settings for communication

Parameter name	Values	Default	Description
<i>Custom device name</i>	0...32 characters	<i>Unnamed device</i>	Device name. Device name supports ASCII characters. The name is shown in the device connection view.
<i>DHCP</i>	<i>Enabled / Disabled</i>	<i>Disabled</i>	Enable DHCP. Enable to get the IP address from server.
<i>Gateway poll interval</i>	0 = Off, 120...65535 s	900 s	Poll frequency for transmitters. Base unit polls transmitters with this interval.
<i>Transmitter activity interval</i>	0 = Off, 120...65535 s	0	Global setting for transmitters' measurement frequency. The value 0 deactivates the feature and the frequency is set in the transmitters.
<i>IP-address</i>	xxx.xxx.xxx.xxx	192.168.0.1	Ethernet IP address.
<i>Subnet mask</i>	xxx.xxx.xxx.xxx	255.255.255.0	Ethernet subnet mask.
<i>Gateway</i>	xxx.xxx.xxx.xxx	192.168.1.1	Ethernet gateway.
<i>Primary DNS server</i>	xxx.xxx.xxx.xxx	10.10.1.7	Primary DNS server for Ethernet.
<i>Secondary DNS server</i>	xxx.xxx.xxx.xxx	10.10.1.6	Secondary DNS server for Ethernet.
<i>BMS RS-485 address</i>	1...247	1	BMS slave address (RS-485).
<i>BMS RS-485 speed</i>	9600 / 19200 / 38400 / 56000 / 57600 / 76800 / 115200 bit/s	9600 bit/s	BMS bus speed (RS-485).
<i>BMS RS-485 parity</i>	None / Odd / Even	None	BMS bus parity (RS-485).
<i>BMS RS-485 stop-bits</i>	1 Stop-Bit / 2 Stop-Bits	1 Stop-Bit	BMS bus stop bits (RS-485).

## 4.6 Modbus

### 4.6.1 Modbus properties

Protocol	RS-485 Modbus RTU / Modbus TCP
Bus speed	9600*/14400/19200/38400/57600/115200 bit/s
Data bits	8
Parity	none*/odd/even
Stop bits	1* / 2
Network size	up to 127 devices per segment
	* factory setting

## 4.6.2 Modbus function codes

The device supports the following Modbus function codes.

0x01	Read Coils
0x02	Read Discrete Inputs
0x03	Read Holding Registers
0x04	Read Input Registers
0x05	Write Single Coil
0x06	Write Single Register
0x0F	Write Multiple Coils
0x10	Write Multiple Registers
0x17	Read/Write Multiple Registers

## 4.6.3 Modbus registers

### 4.6.3.1 Input registers for base unit

#### Input registers for device identification

Register	Parameter description	Data type	Values	Range
10001	Hextet 0 for device type.	Unsigned 16	0...65535	0...65535
10002	Hextet 1 for device type.	Unsigned 16	0...65535	0...65535
10003	Hextet 0 for serial number.	Unsigned 16	0...65535	0...65535
10004	Hextet 1 for serial number.	Unsigned 16	0...65535	0...65535
10005	Hextet 0 for MAC address.	Unsigned 16	0...65535	0...65535
10006	Hextet 1 for MAC address.	Unsigned 16	0...65535	0...65535
10007	Hextet 2 for MAC address.	Unsigned 16	0...65535	0...65535

#### Input registers for device status

Register	Parameter description	Data type	Values	Range
10200	Number of transmitters paired with the base unit.	Unsigned 16	0...100	0...100 pcs
10201	Transmitters installed, ID 1...16.	Unsigned 16	bits 0...15	ID 1...16
10202	Transmitters installed, ID 17...32.	Unsigned 16	bits 0...15	ID 17...32
10203	Transmitters installed, ID 33...48.	Unsigned 16	bits 0...15	ID 33...48
10204	Transmitters installed, ID 49...64.	Unsigned 16	bits 0...15	ID 49...64
10205	Transmitters installed, ID 65...80.	Unsigned 16	bits 0...15	ID 65...80
10206	Transmitters installed, ID 81...96.	Unsigned 16	bits 0...15	ID 81...96
10207	Transmitters installed, ID 97...100.	Unsigned 16	bits 0...3	ID 97...100
10208	Number of transmitters that are seen in the network.	Unsigned 16	0...100	0...100 pcs
10209	Transmitters online, ID 1...16.	Unsigned 16	bits 0...15	ID 1...16
10210	Transmitters online, ID 17...32.	Unsigned 16	bits 0...15	ID 17...32
10211	Transmitters online, ID 33...48.	Unsigned 16	bits 0...15	ID 33...48
10212	Transmitters online, ID 49...64.	Unsigned 16	bits 0...15	ID 49...64
10213	Transmitters online, ID 65...80.	Unsigned 16	bits 0...15	ID 65...80
10214	Transmitters online, ID 81...96.	Unsigned 16	bits 0...15	ID 81...96

Register	Parameter description	Data type	Values	Range
10215	Transmitters online, ID 97...100.	Unsigned 16	bits 0...3	ID 97...100
10216	Number of transmitters that are sending low battery alarm.	Unsigned 16	0...100	0...100 pcs
10217	Transmitters that are sending low battery alarm, ID 1...16.	Unsigned 16	bits 0...15	ID 1...16
10218	Transmitters that are sending low battery alarm, ID 17...32.	Unsigned 16	bits 0...15	ID 17...32
10219	Transmitters that are sending low battery alarm, ID 33...48.	Unsigned 16	bits 0...15	ID 33...48
10220	Transmitters that are sending low battery alarm, ID 49...64.	Unsigned 16	bits 0...15	ID 49...64
10221	Transmitters that are sending low battery alarm, ID 65...80.	Unsigned 16	bits 0...15	ID 65...80
10222	Transmitters that are sending low battery alarm, ID 81...96.	Unsigned 16	bits 0...15	ID 81...96
10223	Transmitters that are sending low battery alarm, ID 97...100.	Unsigned 16	bits 0...3	ID 97...100

### Input registers for the last seen times

Register	Parameter description	Data type	Values	Range
10300	Time that has elapsed since the transmitter has been last seen on network, ID 1.	Unsigned 16	0...65535	0...65535 s
10301	Time that has elapsed since the transmitter has been last seen on network, ID 2.	Unsigned 16	0...65535	0...65535 s
...	...	...	...	...
10399	Time that has elapsed since the transmitter has been last seen on network, ID 100.	Unsigned 16	0...65535	0...65535 s

### Input registers for network topology

Register	Parameter description	Data type	Values	Range
10400	Parent device ID for the device with ID 1.	Unsigned 16	0...100 / 255	0 = base unit, ID 1...100, 255 = transmitter is not connected to network
10401	Parent device ID for the device with ID 2.	Unsigned 16	0...100 / 255	0 = base unit, ID 1...100, 255 = transmitter is not connected to network
...	...	...	...	...
10499	Parent device ID for the device with ID 100.	Unsigned 16	0...100 / 255	0 = base unit, ID 1...100, 255 = transmitter is not connected to network

### Input registers for wireless network message rates

Register	Parameter description	Data type	Values	Range
10950	Average received message rate. The rate is calculated from the latest 1 minute interval.	Unsigned 16	0...65535	0...6553,5 messages/s

Register	Parameter description	Data type	Values	Range
10951	Average sent message rate. The rate is calculated from the latest 1 minute interval.	Unsigned 16	0...65535	0...6553,5 messages/s
10952	All time received message peak rate. The rate is calculated from a 1 minute interval.	Unsigned 16	0...65535	0...6553,5 messages/s
10953	All time sent message peak rate. The rate is calculated from a 1 minute interval.	Unsigned 16	0...65535	0...6553,5 messages/s

### Input registers for extreme measurement values

Register	Parameter description	Data type	Values	Range
12000	Lowest measured temperature value.	Signed 16	-1000...1000	-100,0...100,0 °C
12001	Device ID for the lowest measured temperature value.	Unsigned 16	1...100	ID 1...100
12002	Register of the lowest measured temperature value.	Unsigned 16	37...48	37...48
12003	Highest measured temperature value.	Signed 16	-1000...1000	-100,0...100,0 °C
12004	Device ID for the highest measured temperature value.	Unsigned 16	1...100	ID 1...100
12005	Register of the highest measured temperature value.	Unsigned 16	37...48	37...48
12006	Lowest measured humidity value.	Unsigned 16	0...10000	0...100,00 %rH
12007	Device ID for the lowest measured humidity value.	Unsigned 16	1...100	ID 1...100
12008	Register of the lowest measured humidity value.	Unsigned 16	37...48	37...48
12009	Highest measured humidity value.	Unsigned 16	0...10000	0...100,00 %rH
12010	Device ID for the highest measured humidity value.	Unsigned 16	1...100	ID 1...100
12011	Register of the highest measured humidity value.	Unsigned 16	37...48	37...48
12012	Lowest measured CO <sub>2</sub> value.	Unsigned 16	0...10000	0...10000 ppm
12013	Device ID for the lowest measured CO <sub>2</sub> value.	Unsigned 16	1...100	ID 1...100
12014	Register of the lowest measured CO <sub>2</sub> value.	Unsigned 16	37...48	37...48
12015	Highest measured CO <sub>2</sub> value.	Unsigned 16	0...10000	0...10000 ppm
12016	Device ID for the highest measured CO <sub>2</sub> value.	Unsigned 16	1...100	ID 1...100
12017	Register of the highest measured CO <sub>2</sub> value.	Unsigned 16	37...48	37...48

### Input registers for measurement groups

Table reading instruction: The register numbers include an X in the middle. Replace the X with the measurement group number (1...5) you are reading.

**NOTE** **Note:** The values that are marked with "-" depend on the transmitters' properties.

Register	Parameter description	Data type	Values	Range
12X00	Lowest measured value in group.	-	-	-
12X01	Device ID for the lowest measured value in group.	Unsigned 16	1...100	ID 1...100
12X02	Register of the lowest measured value in group.	Unsigned 16	37...48	37...48



Register	Parameter description	Data type	Values	Range
12X03	Highest measured value in group.	-	-	-
12X04	Device ID for the highest measured value in group.	Unsigned 16	1...100	ID 1...100
12X05	Register of the highest measured value in group.	Unsigned 16	37...48	37...48
12X06	Average value of the measurements in the group. Values that exceed the validation limits and values from the offline devices are excluded from the calculation.	-	-	-

### Input registers for measurement alarms

Register	Parameter description	Data type	Values	Range
12800	Low temperature alarm, ID 1...16.	Unsigned 16	bits 0...15	ID 1...16
12801	Low temperature alarm, ID 17...32.	Unsigned 16	bits 0...15	ID 17...32
12802	Low temperature alarm, ID 33...48.	Unsigned 16	bits 0...15	ID 33...48
12803	Low temperature alarm, ID 49...64.	Unsigned 16	bits 0...15	ID 49...64
12804	Low temperature alarm, ID 65...80.	Unsigned 16	bits 0...15	ID 65...80
12805	Low temperature alarm, ID 81...96.	Unsigned 16	bits 0...15	ID 81...96
12806	Low temperature alarm, ID 97...100.	Unsigned 16	bits 0...3	ID 97...100
12807	High temperature alarm, ID 1...16.	Unsigned 16	bits 0...15	ID 1...16
12808	High temperature alarm, ID 17...32.	Unsigned 16	bits 0...15	ID 17...32
12809	High temperature alarm, ID 33...48.	Unsigned 16	bits 0...15	ID 33...48
12810	High temperature alarm, ID 49...64.	Unsigned 16	bits 0...15	ID 49...64
12811	High temperature alarm, ID 65...80.	Unsigned 16	bits 0...15	ID 65...80
12812	High temperature alarm, ID 81...96.	Unsigned 16	bits 0...15	ID 81...96
12813	High temperature alarm, ID 97...100.	Unsigned 16	bits 0...3	ID 97...100
12814	Low humidity alarm, ID 1...16.	Unsigned 16	bits 0...15	ID 1...16
12815	Low humidity alarm, ID 17...32.	Unsigned 16	bits 0...15	ID 17...32
12816	Low humidity alarm, ID 33...48.	Unsigned 16	bits 0...15	ID 33...48
12817	Low humidity alarm, ID 49...64.	Unsigned 16	bits 0...15	ID 49...64
12818	Low humidity alarm, ID 65...80.	Unsigned 16	bits 0...15	ID 65...80
12819	Low humidity alarm, ID 81...96.	Unsigned 16	bits 0...15	ID 81...96
12820	Low humidity alarm, ID 97...100.	Unsigned 16	bits 0...3	ID 97...100
12821	High humidity alarm, ID 1...16.	Unsigned 16	bits 0...15	ID 1...16
12822	High humidity alarm, ID 17...32.	Unsigned 16	bits 0...15	ID 17...32
12823	High humidity alarm, ID 33...48.	Unsigned 16	bits 0...15	ID 33...48
12824	High humidity alarm, ID 49...64.	Unsigned 16	bits 0...15	ID 49...64
12825	High humidity alarm, ID 65...80.	Unsigned 16	bits 0...15	ID 65...80
12826	High humidity alarm, ID 81...96.	Unsigned 16	bits 0...15	ID 81...96
12827	High humidity alarm, ID 97...100.	Unsigned 16	bits 0...3	ID 97...100
12828	Low CO <sub>2</sub> alarm, ID 1...16.	Unsigned 16	bits 0...15	ID 1...16
12829	Low CO <sub>2</sub> alarm, ID 17...32.	Unsigned 16	bits 0...15	ID 17...32
12830	Low CO <sub>2</sub> alarm, ID 33...48.	Unsigned 16	bits 0...15	ID 33...48
12831	Low CO <sub>2</sub> alarm, ID 49...64.	Unsigned 16	bits 0...15	ID 49...64



Register	Parameter description	Data type	Values	Range
12832	Low CO <sub>2</sub> alarm, ID 65...80.	Unsigned 16	bits 0...15	ID 65...80
12833	Low CO <sub>2</sub> alarm, ID 81...96.	Unsigned 16	bits 0...15	ID 81...96
12834	Low CO <sub>2</sub> alarm, ID 97...100.	Unsigned 16	bits 0...3	ID 97...100
12835	High CO <sub>2</sub> alarm, ID 1...16.	Unsigned 16	bits 0...15	ID 1...16
12836	High CO <sub>2</sub> alarm, ID 17...32.	Unsigned 16	bits 0...15	ID 17...32
12837	High CO <sub>2</sub> alarm, ID 33...48.	Unsigned 16	bits 0...15	ID 33...48
12838	High CO <sub>2</sub> alarm, ID 49...64.	Unsigned 16	bits 0...15	ID 49...64
12839	High CO <sub>2</sub> alarm, ID 65...80.	Unsigned 16	bits 0...15	ID 65...80
12840	High CO <sub>2</sub> alarm, ID 81...96.	Unsigned 16	bits 0...15	ID 81...96
12841	High CO <sub>2</sub> alarm, ID 97...100.	Unsigned 16	bits 0...3	ID 97...100

### Input registers for setting change notifications

Register	Parameter description	Data type	Values	Range
13000	Settings changed in transmitter, ID 1...16.	Unsigned 16	bits 0...15	ID 1...16
13001	Settings changed in transmitter, ID 17...32.	Unsigned 16	bits 0...15	ID 17...32
13002	Settings changed in transmitter, ID 33...48.	Unsigned 16	bits 0...15	ID 33...48
13003	Settings changed in transmitter, ID 49...64.	Unsigned 16	bits 0...15	ID 49...64
13004	Settings changed in transmitter, ID 65...80.	Unsigned 16	bits 0...15	ID 65...80
13005	Settings changed in transmitter, ID 81...96.	Unsigned 16	bits 0...15	ID 81...96
13006	Settings changed in transmitter, ID 97...100.	Unsigned 16	bits 0...3	ID 97...100
13007	Settings locked in transmitter, ID 1...16.	Unsigned 16	bits 0...15	ID 1...16
13008	Settings locked in transmitter, ID 17...32.	Unsigned 16	bits 0...15	ID 17...32
13009	Settings locked in transmitter, ID 33...48.	Unsigned 16	bits 0...15	ID 33...48
13010	Settings locked in transmitter, ID 49...64.	Unsigned 16	bits 0...15	ID 49...64
13011	Settings locked in transmitter, ID 65...80.	Unsigned 16	bits 0...15	ID 65...80
13012	Settings locked in transmitter, ID 81...96.	Unsigned 16	bits 0...15	ID 81...96
13013	Settings locked in transmitter, ID 97...100.	Unsigned 16	bits 0...3	ID 97...100
13014	Settings changed in base unit.	Unsigned 16	bits 0...1	0. Device settings changed 1. Transmitter list updated

### Input registers for cloned registers

Table reading instruction: The register numbers include an X in the middle. Replace the X with the cloned register slot (0...9) you are reading.

The cloned registers are defined in the holding registers 18000...18009.

**NOTE** Note: The values that are marked with "-" depend on the transmitters' properties.

Register	Parameter description	Data type	Values	Range
18X00	Cloned register from transmitter ID 1.	-	-	-
...	...	...	...	...
18X99	Cloned register from transmitter ID 100.	-	-	-

### 4.6.3.2 Input registers for wireless transmitters

#### Input registers for wireless transmitter device identification

Table reading instruction: The register numbers include an XX in the middle. Replace the XX with the transmitter ID - 1 value. For example, a transmitter with the ID 6: XX = 05.

Register	Parameter description	Data type	Values	Range
2XX01	Hextet 0 for device type.	Unsigned 16	0...65535	0...65535
2XX02	Hextet 1 for device type.	Unsigned 16	0...65535	0...65535
2XX03	Hextet 0 for serial number.	Unsigned 16	0...65535	0...65535
2XX04	Hextet 1 for serial number.	Unsigned 16	0...65535	0...65535
2XX05	Hextet 0 for MAC address.	Unsigned 16	0...65535	0...65535
2XX06	Hextet 1 for MAC address.	Unsigned 16	0...65535	0...65535
2XX07	Hextet 2 for MAC address.	Unsigned 16	0...65535	0...65535

#### Input registers for transmitter status

Table reading instruction: The register numbers include an XX in the middle. Replace the XX with the transmitter ID - 1 value. For example, a transmitter with the ID 6: XX = 05.

Register	Parameter description	Data type	Values	Range
2XX20	Knob position.	Signed 16	-10000...10000	-100,00...100,00 %
2XX21	Button press counter.	Unsigned 16	0...65535	0...65535
2XX22	Extra time timer. The time left in the timer.	Unsigned 16	0...65535	0...65535 s
2XX23	Battery status.	Unsigned 16	0...100, 255	0...100 %, 255 = the device is not battery powered
2XX24	Signal strength.	Unsigned 16	0...100	0...100 %. Amount of successful messages.
2XX25	Routing mode.	Bit	0 - 1	0. Routing node 1. Leaf node
2XX26	Hextet 0 for uptime.	Unsigned 16	0...65535	0...65535 s
2XX27	Hextet 1 for uptime.	Unsigned 16	0...65535	0...65535 s
2XX28	Available measurements in EXT1.	Unsigned 16	bits 0...5	0. Voltage 1. Current 2. Resistance, high 3. Resistance, low 4. NTC 10 5. PT 1000
2XX29	Available measurements in EXT2.	Unsigned 16	bits 0...5	0. Voltage 1. Current 2. Resistance, high 3. Resistance, low 4. NTC 10 5. PT 1000
2XX30	Available measurements in EXT3.	Unsigned 16	bits 0...5	0. Voltage 1. Current 2. Resistance, high 3. Resistance, low 4. NTC 10 5. PT 1000

Register	Parameter description	Data type	Values	Range
2XX31	Available measurements in EXT4.	Unsigned 16	bits 0...5	0. Voltage 1. Current 2. Resistance, high 3. Resistance, low 4. NTC 10 5. PT 1000
2XX32	Number of supported I2C sensors.	Unsigned 16	0...255	0...255
2XX33	Sensor fault alarms.	Unsigned 16	bits 0...15	0. Temperature 1. Humidity 2. Meas1 3. Meas2 4. Meas3 5. Meas4 6. Ext1 7. Ext2 8. Ext3 9. Ext4 10.I2C value 1 11.I2C value 2 12.I2C value 3 13.Connection error in I2C value 1 14.Connection error in I2C value 2 15.Connection error in I2C value 3
2XX34	Available outputs.	Unsigned 16	bits 0...15	0. Output 1, voltage 1. Output 1, current 2. Output 1, relay 3. Output 1, triac 4. Output 2, voltage 5. Output 2, current 6. Output 2, relay 7. Output 2, triac 8. Output 3, voltage 9. Output 3, current 10.Output 3, relay 11.Output 3, triac 12.Output 4, voltage 13.Output 4, current 14.Output 4, relay 15.Output 4, triac
2XX35	Configuration compatibility number.	Unsigned 16	0...65535	0...65535

### Input registers for transmitter value types

Table reading instruction: The register numbers include an XX in the middle. Replace the XX with the transmitter ID - 1 value. For example, a transmitter with the ID 6: XX = 05.

**NOTE** **Note:** The values that are marked with "-" depend on the transmitters' properties.

Register	Parameter description	Data type	Values	Range
2XX36	Value type for transmitter specific measurement 1.	-	-	-
2XX37	Value type for transmitter specific measurement 2.	-	-	-
2XX38	Value type for transmitter specific measurement 3.	-	-	-
2XX39	Value type for transmitter specific measurement 4.	-	-	-
2XX40	Value type for external input 1.	-	-	-
2XX41	Value type for external input 2.	-	-	-
2XX42	Value type for external input 3.	-	-	-
2XX43	Value type for external input 4.	-	-	-
2XX44	Value type for I2C sensor 1 value 1.	-	-	-
2XX45	Value type for I2C sensor 1 value 2.	-	-	-
2XX46	Value type for I2C sensor 2 value 1.	-	-	-
2XX47	Value type for output 1.	-	-	-
2XX48	Value type for output 2.	-	-	-
2XX49	Value type for output 3.	-	-	-
2XX50	Value type for output 4.	-	-	-

### Input registers for transmitters' measurements

Table reading instruction: The register numbers include an XX in the middle. Replace the XX with the transmitter ID - 1 value. For example, a transmitter with the ID 6: XX = 05.

**NOTE** **Note:** The values that are marked with "-" depend on the transmitters' properties.

Register	Parameter description	Data type	Values	Range
2XX51	Temperature value.	Signed 16	-1000...1000	-100,0...100,0 °C
2XX52	Humidity value.	Unsigned 16	0...10000	0...100,00 %rH
2XX53	Value of transmitter specific measurement 1.	-	-	-
2XX54	Value of transmitter specific measurement 2.	-	-	-
2XX55	Value of transmitter specific measurement 3.	-	-	-
2XX56	Value of transmitter specific measurement 4.	-	-	-
2XX57	Value of external input 1.	-	-	-
2XX58	Value of external input 2.	-	-	-
2XX59	Value of external input 3.	-	-	-
2XX60	Value of external input 4.	-	-	-
2XX61	Value of I2C sensor 1 value 1.	-	-	-
2XX62	Value of I2C sensor 1 value 2.	-	-	-
2XX63	Value of I2C sensor 2 value 1.	-	-	-

### Input registers for transmitter outputs

Table reading instruction: The register numbers include an XX in the middle. Replace the XX with the transmitter ID - 1 value. For example, a transmitter with the ID 6: XX = 05.

**NOTE** Note: The values that are marked with "-" depend on the transmitters' properties.

Register	Parameter description	Data type	Values	Range
2XX64	Output 1 value.	-	-	-
2XX65	Output 2 value.	-	-	-
2XX66	Output 3 value.	-	-	-
2XX67	Output 4 value.	-	-	-

#### 4.6.3.3 Holding registers for base unit

##### Holding registers for general settings

Register	Parameter description	Data type	Values	Range	Default
10900	Transmitter offline alarm time. If a transmitter is not seen during this time, offline alarm is activated for that transmitter.	Unsigned 16	0 / 3600...65535	0 = alarm off, 3600...65535 s	0
10901	Battery low alarm limit. If transmitter's battery level drops below this level, low battery alarm is activated for that transmitter.	Unsigned 16	50...100	50...100 %	0
10902	Poll frequency for transmitters. Base unit polls transmitters with this interval.	Unsigned 16	0 / 120...65535	0 = polling off, 120...65535 s	900
10903	Global setting for transmitters' measurement frequency. The value 0 deactivates the feature and the frequency is set in the transmitters.	Unsigned 16	0 / 120...65535	0 = not set, 120...65535 s	0

##### Holding registers for common value over bus 1 configuration

**NOTE** Note: The values that are marked with "-" depend on the transmitters' properties.

Register	Parameter description	Data type	Values	Range	Default
10910	Common value sending for all transmitters over the bus 1. If disabled, the transmitter specific VOB settings are used.	Unsigned 16	0 - 1	0. Enabled 1. Disabled	0
10911	Value type over the bus 1.	Unsigned 16	0 - 1 - 2 - ... - 12	See the list of available values at the chapter "Available value over bus (VOB) value types".	0
10912	Value to send over the bus 1.	Unsigned 16	-	-	0

##### Holding registers for common value over bus 2 configuration

**NOTE** Note: The values that are marked with "-" depend on the transmitters' properties.

Register	Parameter description	Data type	Values	Range	Default
10913	Common value sending for all transmitters over the bus 2. If disabled, the transmitter specific VOB settings are used.	Unsigned 16	0 - 1	0. Enabled 1. Disabled	0
10914	Value type over the bus 2.	Unsigned 16	0 - 1 - 2 - ... - 12	See the list of available values at the chapter "Available value over bus (VOB) value types".	0
10915	Value to send over the bus 2.	Unsigned 16	-	-	0

### Holding registers for common value over bus 3 configuration

**NOTE** **Note:** The values that are marked with "-" depend on the transmitters' properties.

Register	Parameter description	Data type	Values	Range	Default
10916	Common value sending for all transmitters over the bus 3. If disabled, the transmitter specific VOB settings are used.	Unsigned 16	0 - 1	0. Enabled 1. Disabled	0
10917	Value type over the bus 3.	Unsigned 16	0 - 1 - 2 - ... - 12	See the list of available values at the chapter "Available value over bus (VOB) value types".	0
10918	Value to send over the bus 3.	Unsigned 16	-	-	0

### Holding registers for transmitter value over bus 1 configuration

Register	Parameter description	Data type	Values	Range	Default
11300	Transmitter value type, ID 1.	Unsigned 16	0 - 1 - 2 - ... - 12	See the list of available values at the chapter "Available value over bus (VOB) value types".	0
11301	Transmitter value type, ID 2.	Unsigned 16	0 - 1 - 2 - ... - 12	See the list of available values at the chapter "Available value over bus (VOB) value types".	0
...	...	...	...	...	
11399	Transmitter value type, ID 100.	Unsigned 16	0 - 1 - 2 - ... - 12	See the list of available values at the chapter "Available value over bus (VOB) value types".	0

### Holding registers for transmitter value over bus 2 configuration

Register	Parameter description	Data type	Values	Range	Default
11400	Transmitter value type, ID 1.	Unsigned 16	0 - 1 - 2 - ... - 12	See the list of available values at the chapter "Available value over bus (VOB) value types".	0
11401	Transmitter value type, ID 2.	Unsigned 16	0 - 1 - 2 - ... - 12	See the list of available values at the chapter "Available value over bus (VOB) value types".	0
...	...	...	...	...	
11499	Transmitter value type, ID 100.	Unsigned 16	0 - 1 - 2 - ... - 12	See the list of available values at the chapter "Available value over bus (VOB) value types".	0

### Available value over bus (VOB) value types

Register value	Value description	Data type	Values	Range
0	VOB is not in use.	-	-	-
1	Temperature	Signed 16	-1000...1000	-100,0...100,0 °C
2	Humidity	Signed 16	0...10000	0...100,00 %rH
3	CO <sub>2</sub>	Signed 16	0...10000	0...10000 ppm
4	Voltage	Signed 16	0...1000	0...10,00 V
5	Current	Signed 16	0...2000	0...20,00 mA
6	Resistance, low	Signed 16	0...20000	0...2000,0 Ω
7	Resistance, high	Signed 16	0...30000	0...300000 Ω
8	Hot water consumption (Finnish)	Signed 16	0...30000	0...30000 m <sup>3</sup> LV
9	Cold water consumption (Finnish)	Signed 16	0...30000	0...30000 m <sup>3</sup> KV
10	Time	Signed 16	0...99	0...99 h
11	Indoor temperature	Signed 16	-1000...1000	-100,0...100,0 °C C <sub>IN</sub>
12	Outdoor temperature	Signed 16	-1000...1000	-100,0...100,0 °C C <sub>OUT</sub>

### Holding registers for transmitter value over bus 1

Register	Parameter description	Data type	Values	Range	Default
11600	Transmitter value to send over bus 1, ID 1.	Unsigned 16	-	-	0
11601	Transmitter value to send over bus 1, ID 2.	Unsigned 16	-	-	0
...	...	...	...	...	...

Register	Parameter description	Data type	Values	Range	Default
11699	Transmitter value to send over bus 1, ID 100.	Unsigned 16	-	-	0

### Holding registers for transmitter value over bus 2

Register	Parameter description	Data type	Values	Range	Default
11700	Transmitter value to send over bus 2, ID 1.	Unsigned 16	-	-	0
11701	Transmitter value to send over bus 2, ID 2.	Unsigned 16	-	-	0
...	...	...	...	...	...
11799	Transmitter value to send over bus 2, ID 100.	Unsigned 16	-	-	0

### Holding registers for measurement alarm limits

Register	Parameter description	Data type	Values	Range	Default
12000	Low temperature alarm limit.	Signed 16	-1000...1000	-100,0...100,0 °C	0
12001	High temperature alarm limit.	Signed 16	-1000...1000	-100,0...100,0 °C	0
12002	Low humidity alarm limit.	Signed 16	0...10000	0...100,00 %rH	0
12003	High humidity alarm limit.	Signed 16	0...10000	0...100,00 %rH	0
12004	Low CO <sub>2</sub> alarm limit.	Unsigned 16	0...10000	0...10000 ppm	0
12005	High CO <sub>2</sub> alarm limit.	Unsigned 16	0...10000	0...10000 ppm	0

### Holding registers for measurement group settings

Table reading instruction: The register numbers include an X in the middle. Replace the X with the measurement group number (1...5) you are adjusting.

**NOTE** **Note:** The values that are marked with "-" depend on the transmitters' properties.

Register	Parameter description	Data type	Values	Range	Default
12X00	Measured property.	Unsigned 16	0 - 1 - 2 - 3	0. N/A 1. Temperature 2. Humidity 3. CO <sub>2</sub>	0



Register	Parameter description	Data type	Values	Range	Default
12X01	Sensor mask.	Unsigned 16	bits 0...11	0. Internal temperature 1. Internal humidity 2. Internal CO <sub>2</sub> 3. Additional measurement 1 4. Additional measurement 2 5. Additional measurement 3 6. Additional measurement 4 7. Additional measurement 5 8. External input 1 9. External input 2 10.External input 3 11.External input 4	0
12X02	Transmitters that are included in the group, ID 1...16.	Unsigned 16	bits 0...15	ID 1...16	0
12X03	Transmitters that are included in the group, ID 17...32.	Unsigned 16	bits 0...15	ID 17...32	0
12X04	Transmitters that are included in the group, ID 33...48.	Unsigned 16	bits 0...15	ID 33...48	0
12X05	Transmitters that are included in the group, ID 49...64.	Unsigned 16	bits 0...15	ID 49...64	0
12X06	Transmitters that are included in the group, ID 65...80.	Unsigned 16	bits 0...15	ID 65...80	0
12X07	Transmitters that are included in the group, ID 81...96.	Unsigned 16	bits 0...15	ID 81...96	0
12X08	Transmitters that are included in the group, ID 97...100.	Unsigned 16	bits 0...3	ID 97...100	0
12X09	Highest value used in the average calculation.	Unsigned 16	-	-	0
12X10	Lowest value used in the average calculation.	Unsigned 16	-	-	0

### Holding registers for input register cloning

Register	Parameter description	Data type	Values	Range	Default
18000	Register to be cloned, set 1. The selected Modbus address will be cloned from all transmitters to the input registers 18000....18099.	Unsigned 16	0...99	0...99 (Transmitter Modbus register number)	51
18001	Register to be cloned, set 2. The selected Modbus address will be cloned from all transmitters to the input registers 18100....18199.	Unsigned 16	0...99	0...99 (Transmitter Modbus register number)	52
18002	Register to be cloned, set 3. The selected Modbus address will be cloned from all transmitters to the input registers 18200....18299.	Unsigned 16	0...99	0...99 (Transmitter Modbus register number)	53

Register	Parameter description	Data type	Values	Range	Default
18003	Register to be cloned, set 4. The selected Modbus address will be cloned from all transmitters to the input registers 18300....18399.	Unsigned 16	0...99	0...99 (Transmitter Modbus register number)	54
18004	Register to be cloned, set 5. The selected Modbus address will be cloned from all transmitters to the input registers 18400....18499.	Unsigned 16	0...99	0...99 (Transmitter Modbus register number)	57
18005	Register to be cloned, set 6. The selected Modbus address will be cloned from all transmitters to the input registers 18500....18599.	Unsigned 16	0...99	0...99 (Transmitter Modbus register number)	58
18006	Register to be cloned, set 7. The selected Modbus address will be cloned from all transmitters to the input registers 18600....18699.	Unsigned 16	0...99	0...99 (Transmitter Modbus register number)	59
18007	Register to be cloned, set 8. The selected Modbus address will be cloned from all transmitters to the input registers 18700....18799.	Unsigned 16	0...99	0...99 (Transmitter Modbus register number)	60
18008	Register to be cloned, set 9. The selected Modbus address will be cloned from all transmitters to the input registers 18800....18899.	Unsigned 16	0...99	0...99 (Transmitter Modbus register number)	23
18009	Register to be cloned, set 10. The selected Modbus address will be cloned from all transmitters to the input registers 18900....18999.	Unsigned 16	0...99	0...99 (Transmitter Modbus register number)	24

#### 4.6.3.4 Holding registers for wireless transmitters

##### Holding registers for transmitter user interface settings

Table reading instruction: The register numbers include an XX in the middle. Replace the XX with the transmitter ID - 1 value. For example, a transmitter with the ID 6: XX = 05.

**NOTE** **Note:** The values that are marked with "-" depend on the transmitters' properties.

Register	Parameter description	Data type	Values	Range	Default
2XX27	Display brightness.	Unsigned 16	1...10	0...10	5
2XX28	Display scrolling mode.	Unsigned 16	0 - 1	0. Upper value scrolling, lower value is static 1. Lower value scrolling, higher value is static	0

Register	Parameter description	Data type	Values	Range	Default
2XX29	Static value selection.	Unsigned 16	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10 - 11 - 12 - 13 - 14 - 15 - 16	1. Temperature 2. Humidity 3. Meas1 4. Meas2 5. Meas3 6. Meas4 7. Ext1 8. Ext2 9. Ext3 10. Ext4 11. I2C value 1 12. I2C value 2 13. I2C value 3 14. Value over bus 1 15. Value over bus 2 16. Value over bus 3	1
2XX30	Scrolling value selection.	Unsigned 16	bits 0...15	0. Temperature 1. Humidity 2. Meas1 3. Meas2 4. Meas3 5. Meas4 6. Ext1 7. Ext2 8. Ext3 9. Ext4 10. I2C value 1 11. I2C value 2 12. I2C value 3 13. Value over bus 1 14. Value over bus 2 15. Value over bus 3	2
2XX31	Scrolling delay. Time to show each value on display. Affects also to display off delay. Display off delay = (number of items in scrolling value selection) * (display scrolling delay).	Unsigned 16	1...30	1...30 s	10
2XX32	Not in use.	-	-	-	0
2XX33	Not in use.	-	-	-	0
2XX34	Not in use.	-	-	-	0
2XX35	Button function. The first press activates the display if the display is not on.	Unsigned 16	0 - 1 - 2	0. Manual value scroll 1. Button function is managed in base unit 2. Extra time function	0
2XX36	Not in use.	-	-	-	0
2XX37	Not in use.	-	-	-	0

### Holding registers for transmitter measurement settings

Table reading instruction: The register numbers include an XX in the middle. Replace the XX with the transmitter ID - 1 value. For example, a transmitter with the ID 6: XX = 05.

Register	Parameter description	Data type	Values	Range	Default
2XX38	External input 1.	Unsigned 16	0 - 1 - 2 - 3 - 4 - 5 - 6	0. Off 1. 0...10 V 2. 0...20 mA 3. Resistance x 0,1 4. Resistance x 10 5. NTC 10 6. Pt1000	0
2XX39	External input 2.	Unsigned 16	0 - 1 - 2 - 3 - 4 - 5 - 6	0. Off 1. 0...10 V 2. 0...20 mA 3. Resistance x 0,1 4. Resistance x 10 5. NTC 10 6. Pt1000	0
2XX40	External input 3.	Unsigned 16	0 - 1 - 2 - 3 - 4 - 5 - 6	0. Off 1. 0...10 V 2. 0...20 mA 3. Resistance x 0,1 4. Resistance x 10 5. NTC 10 6. Pt1000	0
2XX41	External input 4.	Unsigned 16	0 - 1 - 2 - 3 - 4 - 5 - 6	0. Off 1. 0...10 V 2. 0...20 mA 3. Resistance x 0,1 4. Resistance x 10 5. NTC 10 6. Pt1000	0
2XX42	I2C input 1.	Unsigned 16	0...65535	Upper 8 bits = I2C sensor type. Lower 8 bits = value selection (each known sensor has list of values that can be read)	0
2XX43	I2C input 2.	Unsigned 16	0...65535	Upper 8 bits = I2C sensor type. Lower 8 bits = value selection (each known sensor has list of values that can be read)	0
2XX44	I2C input 3.	Unsigned 16	0...65535	Upper 8 bits = I2C sensor type. Lower 8 bits = value selection (each known sensor has list of values that can be read)	0
2XX45	Automatic self-calibration of CO <sub>2</sub> measurement.	Unsigned 16	0 - 1	0. Disabled 1. Enabled	1
2XX46	PIR detection delay.	Unsigned 16	0...5	0...5 s	0
2XX47	Measurement update interval.	Unsigned 16	0 / 30...65535	0 = function disabled, 30...65535 s	0

Register	Parameter description	Data type	Values	Range	Default
2XX48	Change of value (COV) selection.	Unsigned 16	bits 0...12	0. Temperature 1. Humidity 2. Meas1 3. Meas2 4. Meas3 5. Meas4 6. Ext1 7. Ext2 8. Ext3 9. Ext4 10.I2C value 1 11.I2C value 2 12.I2C value 3	0

### Holding registers for COV settings

Table reading instruction: The register numbers include an XX in the middle. Replace the XX with the transmitter ID - 1 value. For example, a transmitter with the ID 6: XX = 05.

**NOTE** Note: The values that are marked with "-" depend on the transmitters' properties.

Register	Parameter description	Data type	Values	Range	Default
2XX49	COV limit for temperature.	Signed 16	-500...500	-50,0...50,0 °C	0
2XX50	COV limit for humidity.	Signed 16	-5000...5000	-50,00...50,00 %rH	0
2XX51	COV limit for transmitter specific value 1.	-	-	-	0
2XX52	COV limit for transmitter specific value 2.	-	-	-	0
2XX53	COV limit for transmitter specific value 3.	-	-	-	0
2XX54	COV limit for transmitter specific value 4.	-	-	-	0
2XX55	COV limit for external measurement 1.	-	-	-	0
2XX56	COV limit for external measurement 2.	-	-	-	0
2XX57	COV limit for external measurement 3.	-	-	-	0
2XX58	COV limit for external measurement 4.	-	-	-	0
2XX59	COV limit for I2C value 1.	-	-	-	0
2XX60	COV limit for I2C value 2.	-	-	-	0
2XX61	COV limit for I2C value 3.	-	-	-	0

### Holding registers for transmitter measurement tuning

Table reading instruction: The register numbers include an XX in the middle. Replace the XX with the transmitter ID - 1 value. For example, a transmitter with the ID 6: XX = 05.

**NOTE** Note: The values that are marked with "-" depend on the transmitters' properties.

Register	Parameter description	Data type	Values	Range	Default
2XX49	Temperature offset.	Signed 16	1...500	0,1...50,0 °C	0
2XX50	Humidity offset.	Signed 16	1...5000	0,01...50,00 %rH	0
2XX51	Transmitter specific measurement 1 offset.	-	-	-	0
2XX52	Transmitter specific measurement 2 offset.	-	-	-	0
2XX53	Transmitter specific measurement 3 offset.	-	-	-	0
2XX54	Transmitter specific measurement 4 offset.	-	-	-	0
2XX55	Transmitter external measurement 1 offset.	-	-	-	0
2XX56	Transmitter external measurement 2 offset.	-	-	-	0
2XX57	Transmitter external measurement 3 offset.	-	-	-	0
2XX58	Transmitter external measurement 4 offset.	-	-	-	0
2XX59	Transmitter I2C value 1 offset.	-	-	-	0
2XX60	Transmitter I2C value 2 offset.	-	-	-	0
2XX61	Transmitter I2C value 3 offset.	-	-	-	0

### Holding registers for transmitter output settings

Table reading instruction: The register numbers include an XX in the middle. Replace the XX with the transmitter ID - 1 value. For example, a transmitter with the ID 6: XX = 05.

Register	Parameter description	Data type	Values	Range	Default
2XX75	Output 1 mode.	Unsigned 16			0
2XX76	Output 2 mode.	Unsigned 16			0
2XX77	Output 3 mode.	Unsigned 16			0
2XX78	Output 4 mode.	Unsigned 16			0
2XX79	Output 1 overdrive value.	Unsigned 16	0...10000	0...100,00 %	0
2XX80	Output 2 overdrive value.	Unsigned 16	0...10000	0...100,00 %	0
2XX81	Output 3 overdrive value.	Unsigned 16	0...10000	0...100,00 %	0
2XX82	Output 4 overdrive value.	Unsigned 16	0...10000	0...100,00 %	0

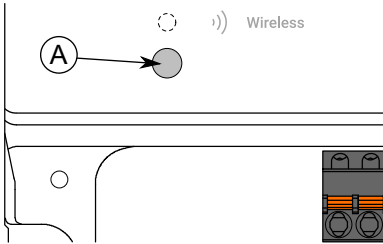
# 5 Commissioning the wireless network

## 5.1 Setting up a new wireless network

**Important:** Configure all needed base unit settings (Modbus settings, output configurations etc.) before setting up the wireless network.

1. Enable the Bluetooth in the device by pressing the connection button until the *Wireless* indicator light illuminates.

**NOTE:** The Bluetooth is enabled when the supply voltage is connected for the first time.

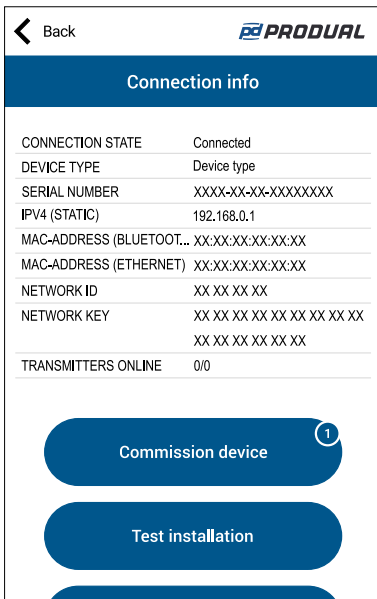


A. Connection button

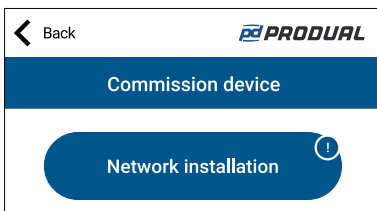
**NOTE:** Use a small screwdriver or a similar tool to push the button.

**NOTE:** Turn off the control unit Bluetooth after commissioning. This prevents unauthorised access to the device.

2. Connect Produal MyTool® to Produal Proxima® WBU base unit.



3. Press the *Commission device* button.



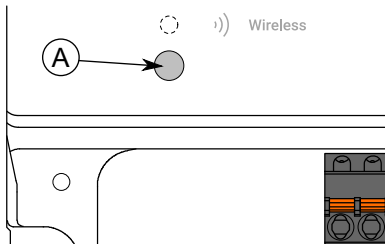
4. Press the *Network installation* button.  
A random network key is generated. A new key can be generated by pressing the *Generate a new ID* button.
5. Press the *Next* button.

6. Set the device name for the base unit.  
The device name is also used for the network name.  
**NOTE:** Don't use any special characters (ä, ö, å, :, [, etc.) in the device name.
7. Press the *Next* button.
8. Review the network configuration and press the *INITIALIZE NETWORK* button.
9. Press *OK* button on the *Configuration finished* view.  
The base unit deactivates the Bluetooth communication and moves to MIRA communication mode.  
The wireless network is now visible in the *Wireless installation projects* view.

## 5.2 Modifying existing wireless network

**Important:** When enabling the Bluetooth in the base unit, the network communication stops. It can take up to several hours for a big network to resume fully functional condition.

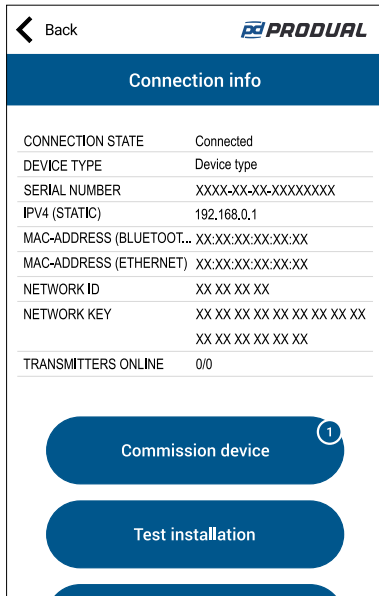
1. Enable the Bluetooth in the device by pressing the connection button until the *Wireless* indicator light illuminates.



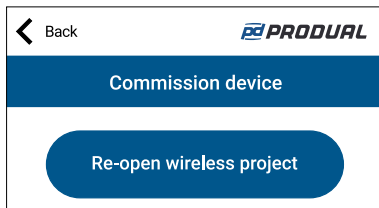
A. Connection button

**NOTE:** Use a small screwdriver or a similar tool to push the button.

2. Connect Produal MyTool® to Produal Proxima® WBU base unit.



3. Press the *Commission device* button.



4. Press the *Re-open wireless project* button.  
Existing network settings are displayed.



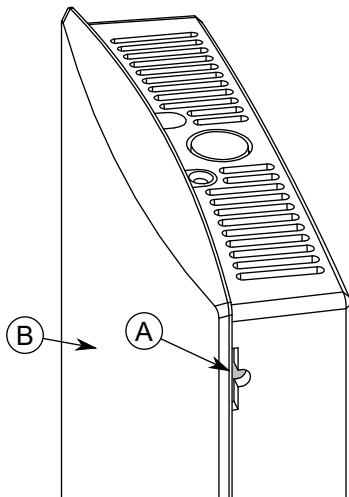
5. Review the network configuration and press the *Rebuild Network* button.
6. Press *OK* button on the *Configuration finished* view.  
The base unit deactivates the Bluetooth communication and moves to MIRA communication mode.  
The wireless network is now visible in the *Wireless installation projects* view.

## 5.3 Adding devices to wireless network

1. Enable the Bluetooth in the transmitter by pressing the connection button until the indicator light illuminates.



**Note:** The Bluetooth is enabled when the supply voltage is connected for the first time.

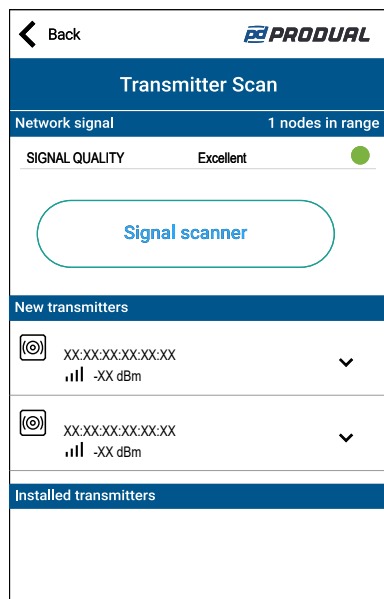


- A. Connection button
- B. Indicator light

2. Press the *Wireless installation projects* button in the MyTool main view.  
The list of open wireless projects opens.

3. Select the project and press the *ADD DEVICES* button.

The *Transmitter Scan* view is displayed.



All devices that can be connected to the gateway are listed in the *New transmitters* section. The transmitters that are already connected to the network are listed in the *Installed transmitters* section.



**Note:** Make sure that the wireless devices to be connected are in the installation mode and they are not connected to other network.



**Note:** By pressing the *Signal scanner* button you can analyse the network.

4. Select the device to be connected to the network.

5. Press the *Connect* button.

6. Press the *Commission device* button.



**Important:** Configure all needed transmitter settings before connecting to the wireless network. See the device specific instructions for more information.

7. Press the *Network installation* button.

8. Select manual or automatic ID for the device.

When selecting the manual ID, there are few things to be considered.

- The ID can be 1...100.
- The ID must be unique inside the network.
- If the ID is already used inside the network, the application asks to replace the existing device. The existing device is disconnected from the network if replaced.

If you select automatic ID generation, the base unit gives the ID's to the devices when they connect to the network. If you want specific ID's to certain devices, it is recommended to use manual ID.

9. Press the *Next* button.

10. Write the device name.

The application warns about names that are already used during the same commissioning session.



**Note:** Don't use any special characters (ä, ö, å, :, [, etc.) in the device name.

11. Press the *Next* button.

12. Review the network configuration and press the *INITIALIZE NETWORK* button.

13. Press *OK* button on the *Configuration finished* view.

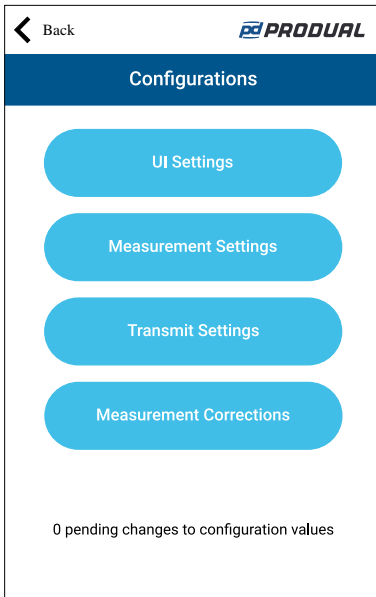
The base unit deactivates the Bluetooth communication and moves to MIRA communication mode. MyTool returns to the *Transmitter Scan* view.

**14.** Add more devices if needed.

**15.** When all needed devices are added, press the *END INSTALLATION* button.

## 6 Configuring wireless transmitter device settings

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.



The *Configurations* view has the following menus:

<i>UI Settings</i>	Set up display settings.
<i>Measurement Settings</i>	Set up measurement settings.
<i>Transmit Settings</i>	Set up transmit settings.
<i>Measurement Corrections</i>	Tune the measurement values. The menu is applicable only for devices equipped with display.

### 6.1 Configuring user interface

1. Press the *UI Settings* button in the *Configurations* view.
2. Make the settings.
3. Press the *Confirm changes* button to save the changes.
4. Press *Install to device* button to write the changes to the device.

#### 6.1.1 Available settings for user interface

Parameter name	Values	Default	Description
<i>Display brightness</i>	1...10	5	Display brightness level.
<i>Display mode</i>	<i>Upper value scrolling, lower value static / Upper value static, lower value scrolling</i>	Upper value scrolling, lower value static	Display scrolling settings.

Parameter name	Values	Default	Description
<i>Display static value</i>	<i>Temperature / Relative humidity / Measurement 1...4 / External measurement 1...4 / I2C measurement 1..3 / VOB value 1..3</i>	<i>Temperature</i>	Static value selection.
<i>Scrolling values to show</i>	<i>Temperature / Relative humidity / Measurement 1...4 / External measurement 1...4 / I2C measurement 1..3 / VOB value 1..3</i>	<i>Humidity</i>	Scrolling values selection.
<i>Autoscroll time</i>	<i>1...30 s</i>	<i>10 s</i>	Scrolling value change interval. Time to show each value on display. Affects also to display off delay. Display off delay = (number of items in scrolling value selection) * (display scrolling delay).
<i>Button function</i>	<i>Manual scroll / Handle button events on Gateway / Extra time function</i>	<i>Manual scroll</i>	Button function. The first press activates the display if the display is not on.

## 6.2 Configuring measurement settings

1. Press the *Measurement Settings* button in the *Configurations* view.
2. Make the settings.
3. Press the *Confirm changes* button to save the changes.
4. Press *Install to device* button to write the changes to the device.

### 6.2.1 Available measurement settings

Parameter name	Values	Default	Description
<i>External input 1 type selection</i>	<i>Off / 0-10V / 0-20mA / Ohms x0.1 / Ohms x10 / NTC10K / PT1000</i>	<i>Off</i>	Input 1 type. The parameter is available only if the device is equipped with inputs.
<i>External input 2 type selection</i>	<i>Off / 0-10V / 0-20mA / Ohms x0.1 / Ohms x10 / NTC10K / PT1000</i>	<i>Off</i>	Input 2 type. The parameter is available only if the device is equipped with inputs.
<i>External input 3 type selection</i>	<i>Off / 0-10V / 0-20mA / Ohms x0.1 / Ohms x10 / NTC10K / PT1000</i>	<i>Off</i>	Input 3 type. The parameter is available only if the device is equipped with inputs.
<i>External input 4 type selection</i>	<i>Off / 0-10V / 0-20mA / Ohms x0.1 / Ohms x10 / NTC10K / PT1000</i>	<i>Off</i>	Input 4 type. The parameter is available only if the device is equipped with inputs.
<i>CO2 ABC logic state</i>	<i>Disabled / Enabled</i>	<i>Enabled</i>	Automatic self-calibration of CO <sub>2</sub> measurement. The parameter is available only if the device is equipped with CO <sub>2</sub> measurement.

Parameter name	Values	Default	Description
<i>PIR detection delay</i>	0...5 s	0 s	PIR detection delay. The parameter is available only if the device is equipped with PIR.
<i>Transmitter update interval</i>	0 = Off / 30...65535 s	Off	Update interval of transmitter.
<i>COV selection</i>	Temperature, Relative humidity / Measurement 1..4 / External measurement 1..4 / I2C measurement 1..3 / VOB value 1..3	Temperature	COV settings.

## 6.3 Configuring transmit settings

1. Press the *Transmit Settings* button in the *Configurations* view.
2. Make the settings.
3. Press the *Confirm changes* button to save the changes.
4. Press *Install to device* button to write the changes to the device.

### 6.3.1 Available transmit settings

Parameter name	Values	Default	Description
<i>COV limit, temperature</i>	0,1...50,0 °C	0,5 °C	COV limit for temperature.
<i>COV limit, relative humidity</i>	0,01...50,00 %rH	5,00 %rH	COV limit for humidity.
<i>COV limit, CO2</i>	10...500 ppm	100 ppm	COV limit for CO <sub>2</sub> value.

## 6.4 Tuning measurements

1. Press the *Measurement Corrections* button in the *Configurations* view.
2. Make the settings.
3. Press the *Confirm changes* button to save the changes.
4. Press *Install to device* button to write the changes to the device.

### 6.4.1 Available tuning values

Parameter name	Values	Default	Description
<i>Correction offset, temperature</i>	-50,0...50,0 °C	0,0 °C	Temperature value tuning.
<i>Correction offset, relative humidity</i>	-50,00...50,00 %rH	0,00 %rH	Relative humidity value tuning.
<i>Correction offset, CO2</i>	-200...200 ppm	0 ppm	CO <sub>2</sub> value tuning.