

PMX TCR

Users Manual

Rev. 06

This user manual is intended for persons responsible for the configuration and software integration of PMX Radar Object Counters with the alternative PMX firmware.

The reader is supposed to have a basic technical understanding of traffic monitoring systems and LoRaWAN networks.

Please note that this manual is specific to PMX Firmware V1.2 and may not be applicable to other versions of the firmware.



Introduction.....2

Planning..... 6

Pro Features.....9

Preparation.....13

Configuration via PMX Setup Tool..... 17

Maintenance.....30

FAQ..... 33

Additional Documents..... 36

Revisions.....37

Legal Disclaimer..... 38

Introduction

Congratulations on purchasing a PMX LoRaWAN Radar Object Counter!

PMX TCR offers incredible versatility and performance, making it ideal for applications as diverse as people counting, traffic statistics, or other applications that require anonymous object counting.

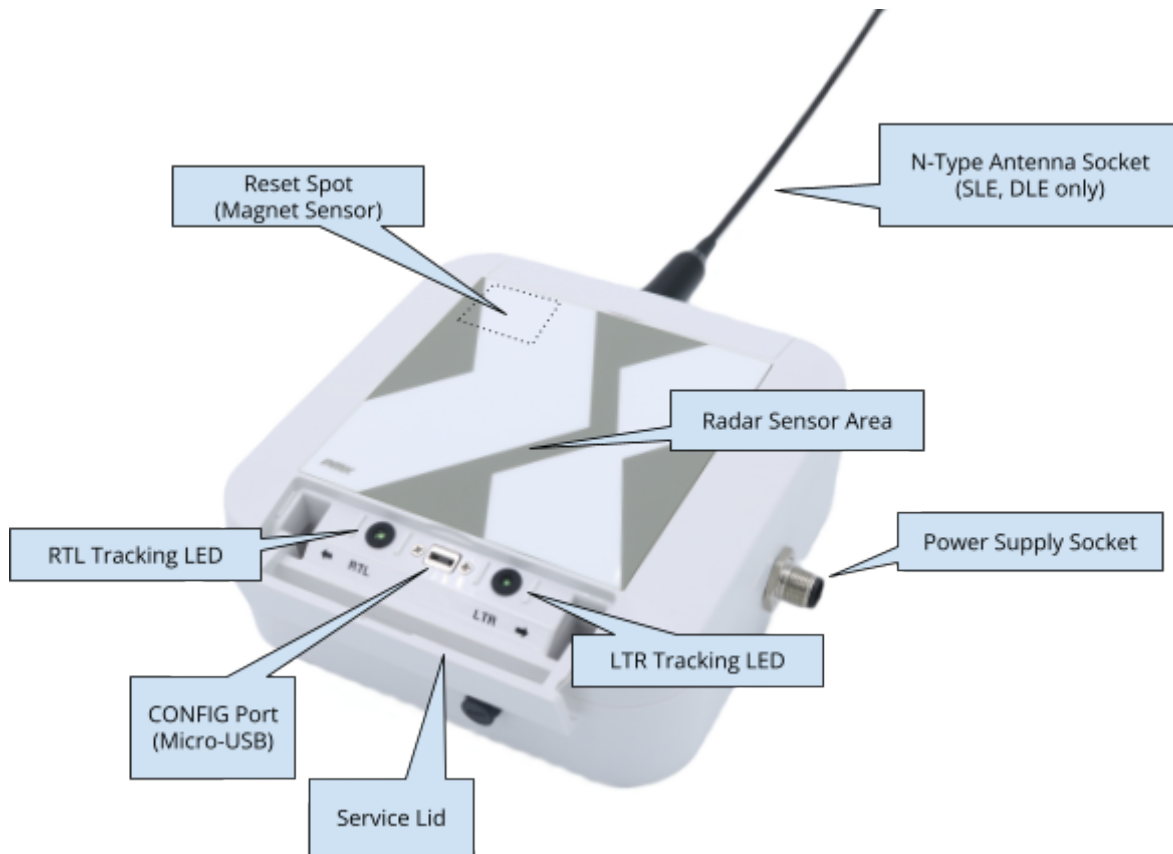
These counters are capable of categorising counted objects into up to four different groups using speed and object size filters. A key feature of PMX TCR counters is their ability to periodically transmit count values to a LNS (LoRaWAN Network Server).

TCR-SLE or TCR-SLI models include a built-in solar charger and temperature-controlled NiMH backup battery. The battery capacity allows the counter to operate for up to four consecutive foggy days without the need for external power. This feature makes solar powered models ideal for remote locations where access to electricity may be limited or unavailable.

For fixed installations where external power is available, such as street lights, the TCR-DLE or TCR-DLI models can be used. These models do not have the internal solar charger and batteries included. In fixed installations with access to external power, like street lights, the TCR-DLE and TCR-DLI models are suitable options. These models lack an internal solar charger and batteries due to the availability of external power.

PMX TCR systems boast flexible installation capabilities, enabling them to adapt to diverse locations. From bustling urban areas with intense traffic to remote regions lacking access to electricity, they can be effortlessly deployed to gather crucial data. Their versatility ensures compatibility with various settings, delivering a comprehensive and accurate monitoring solution.

Get to Know Your PMX TCR



Radar Sensor Area

Radar antennas are behind the "X-Label". Keep the front clean and free from obstacles. Don't put stickers or paint on that area as it could disturb radar signals.

RTL Tracking LED

RTL LED is on when an object from the right is currently tracked

LTR Tracking LED

LTR LED is on when an object from the left is currently tracked

CONFIG-Port

Use this MicroUSB-Port to configure the device using a USB-to-MicroUSB Cable (not supplied)

Power Supply Socket

8-Pin M12 socket for device power.

Magnet Sensor

Hold a magnet to the device's top left corner to issue a restart without opening the device.

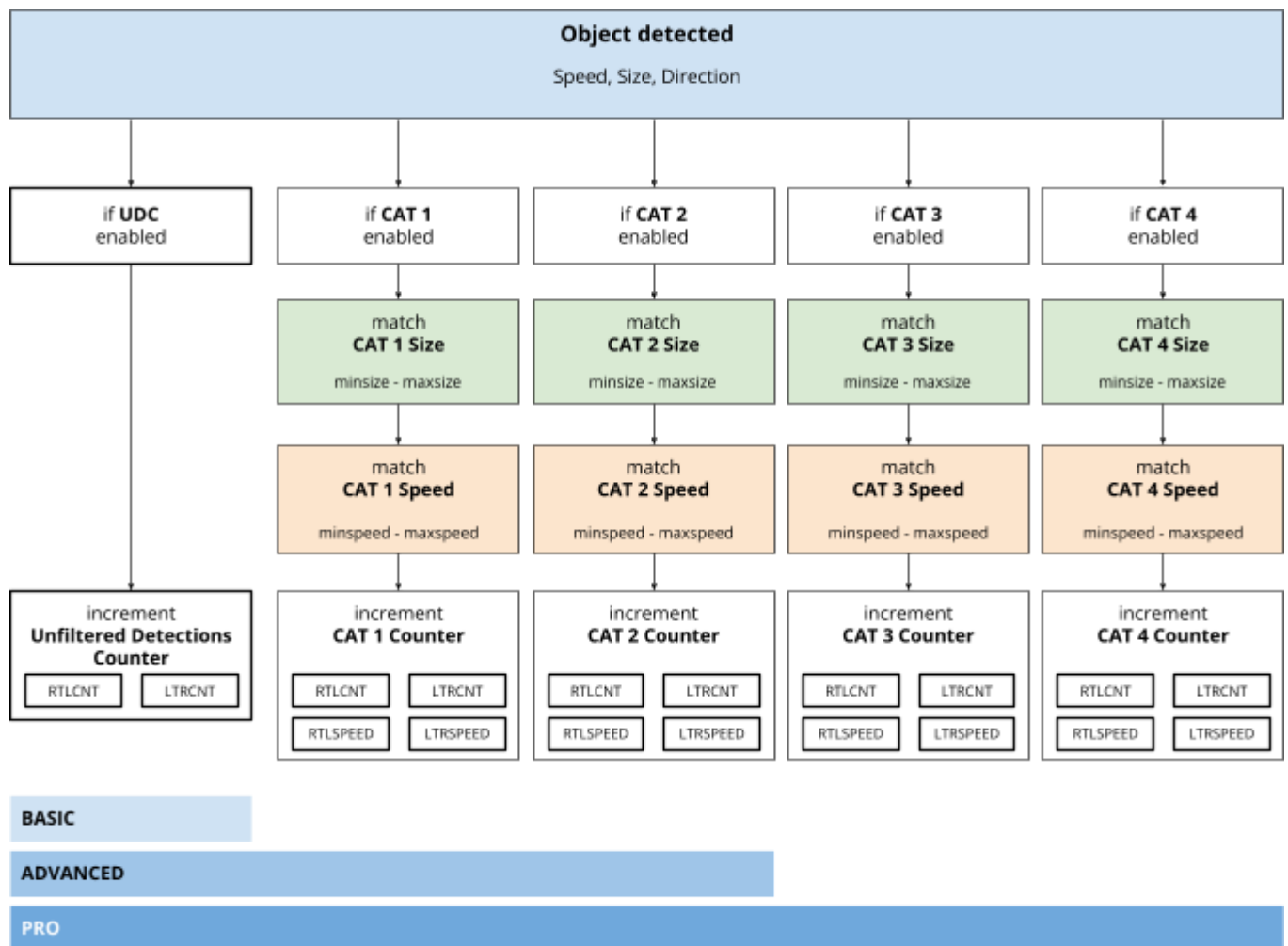
External Antenna Socket (Optional)

Some PMX TCR types are equipped with an N-Type Antenna Socket to mount a long range antenna for creator LoRaWAN coverage in remote locations.

Object categorization using speed and size filters

Up to four filter counters (**CAT1-CAT4**) are available for categorising objects based on size and speed. These filters have predefined settings suitable for most applications (see Appendix A). However, users can enable/disable or modify these filters through the CLI or LoRaWAN Downlinks.

Additionally, there's an Unfiltered Detections Counter (**UDC**) that increments with every object detection. This can be useful in "catch-all applications" or when categorization isn't necessary.



All Counters can hold values up to 65535 (16Bit). After a successful uplink, counters are cleared.

Measure Intervals

The measurement interval is the time period during which objects are counted and classified. By default, this interval is set to 10 minutes, indicating that the collected data represents the sum of all counts within the last 10 minutes.



To simplify comparisons with other IoT sensors or to ensure synchronised operation of multiple PMX TCRs, measurement intervals are aligned to the full hour.

In other words, measurement intervals always start at the full hour, such as 1:00, 2:00, 3:00, etc.

Available interval values

Interval Period [min]	2 ¹	3	4	5	6	10	12	15	30	60
Intervals / h	30	20	15	12	10	6	5	4	2	1
Min Daily LoRaWAN Uplink Transmissions (if only UDC enabled)	720	480	360	288	240	144	120	96	48	24
Max Daily LoRaWAN Uplink Transmissions (if all filters enabled)	3600	2400	1800	1440	1200	720	600	480	240	120

¹ It is recommended to use 10 minute intervals. It is not recommended to set the interval to less than 3 minutes due to the duty cycle limits in the LoRaWAN standard. This could result in unpredictable behaviour.

Planning

Energy options

Option A: Solar powered

The [Photovoltaic Geographical Information System \(PVGIS\)](https://re.jrc.ec.europa.eu/pvg_tools/en/#PVP) is a useful tool for simulating off-grid solar systems, particularly for understanding the runtime of autonomous systems. It facilitates the simulation of systems like the PMX TCR-SLE or PMX TCR-SLI when paired with a solar panel. This simulation capability provides insights into the system's performance and energy generation potential, allowing for informed decisions regarding the installation of PMX TCR Counters.

Important: Weather models used are based on statistical values from the past. Reality can of course differ in case of weather extremes.

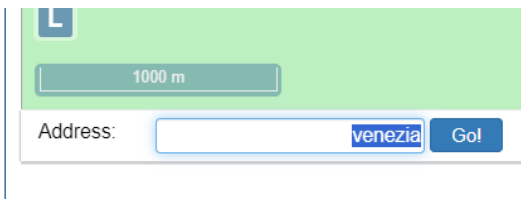
The screenshot displays the PVGIS web application interface. The top navigation bar includes the European Commission logo and the title "PHOTOVOLTAIC GEOGRAPHICAL INFORMATION SYSTEM". Below this, a breadcrumb trail reads "European Commission > EU Science Hub > PVGIS > Interactive tools". The main interface is divided into several sections:

- Map:** A map of Europe and North Africa is shown, with a cursor positioned over Italy. The map includes a scale bar (2000 km) and a search bar at the bottom.
- Cursor:** A section on the right side of the map displays the selected location: "Selected: Select location!". It also shows the elevation in meters (m).
- Use terrain shadows:** A section on the right side of the map allows users to select "Calculated horizon" or "Upload horizon file".
- PERFORMANCE OF OFF-GRID PV SYSTEMS:** A section on the right side of the map provides a summary of the system's performance, including solar radiation database, installed peak PV power (Wp), battery capacity (Wh), discharge cutoff limit (%), and consumption per day (Wh).
- Simulation Parameters:** A section on the right side of the map allows users to select the solar radiation database, installed peak PV power (Wp), battery capacity (Wh), discharge cutoff limit (%), consumption per day (Wh), and upload consumption data.
- Visualization:** A button labeled "Visualize results" is located at the bottom of the interface.

The interface also includes a footer with the text "Last update: 15/10/2019 Top".

1. Location

Open [PVGIS](#) and enter the location where you plan to install the PMX TCR counters Solar panel.

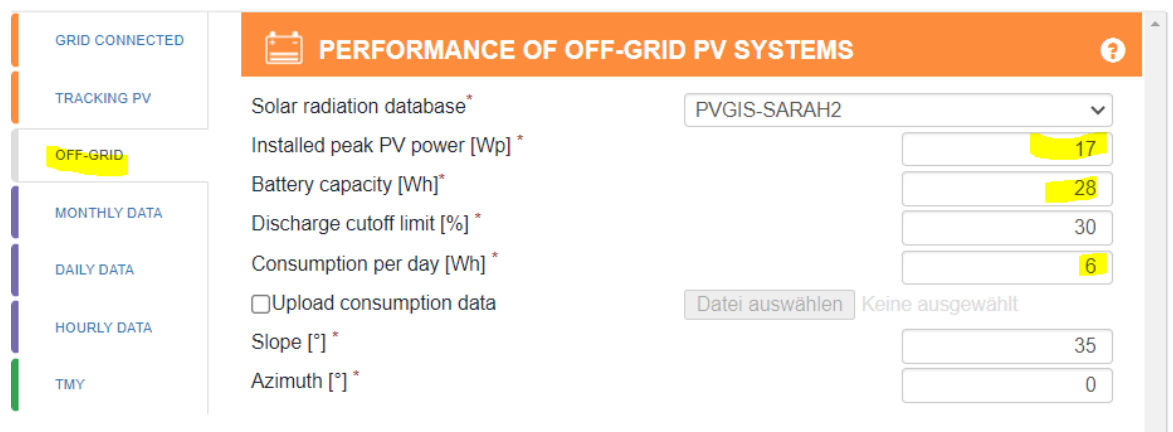


A screenshot of the PVGIS location input form. It features a green header bar with a location pin icon and a '1000 m' scale bar. Below this is an 'Address:' label followed by a text input field containing 'venezia' and a blue 'Go!' button.

2. Enter Off-Grid Data

Enter the typical data of a solar powered PMX TCR:

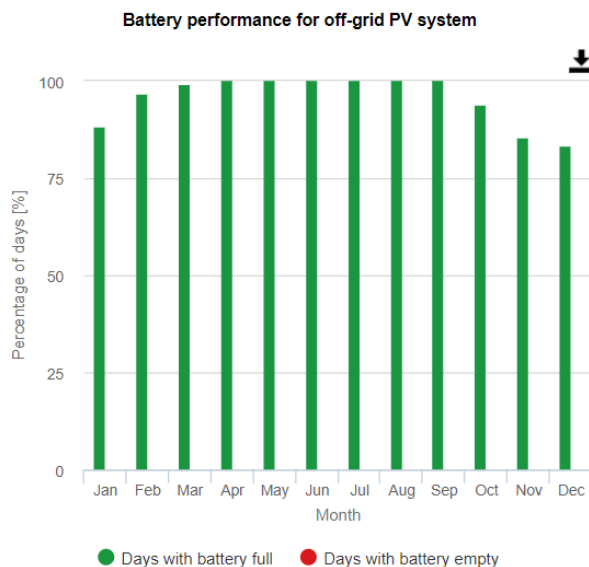
- Installed Peak PV: **17 W** when using **SOL17-KIT**, **9 W** when using the **SOL9-KIT**
- Battery capacity: **28 Wh** for TCR-SLE or TCR-SLI
- Consumption: **6 Wh** for TCR-SLE or TCR-SLI



A screenshot of the 'PERFORMANCE OF OFF-GRID PV SYSTEMS' form in PVGIS. The left sidebar shows navigation options: GRID CONNECTED, TRACKING PV, OFF-GRID (highlighted), MONTHLY DATA, DAILY DATA, HOURLY DATA, and TMY. The main form area has an orange header. It includes a dropdown for 'Solar radiation database*' set to 'PVGIS-SARAH2'. Input fields for 'Installed peak PV power [Wp]*' (17), 'Battery capacity [Wh]*' (28), 'Discharge cutoff limit [%]*' (30), and 'Consumption per day [Wh]*' (6) are shown, with the last three highlighted in yellow. There is an 'Upload consumption data' checkbox and a 'Datei auswählen' button. At the bottom, 'Slope [°]*' is set to 35 and 'Azimuth [°]*' is set to 0.

3. Optimise

Optimise solar panel or location or parameters. You might need a bigger panel or other power source for your planned location.



Option B: DC power

The TCR's internal batteries are recharged by an external power source that provides a voltage ranging from 5 to 12 volts DC. This feature is particularly beneficial for streetlamps that are turned off during the daytime. This option is available on solar powered devices only.

Option C: alternative power

TCR can be charged by many alternative power sources that can about 2Wh per day:

- Solar panels: steady power, inexpensive, and easy to install.
- Wind turbines: less reliable due to intermittent wind.
- Fuel cells: reliable but more expensive. Good for outdoor applications in the North
- External batteries: convenient but require regular recharging.

Important: Input Voltage must not exceed 20V and ripple voltage should be below 150mVpp

Option C is available on solar powered devices only.



Pro Features

Pro features provide increased functionality, improved performance and more flexibility. We introduced Pro features in the PMX firmware for the PMX TCR so that the counters can be used for simple applications, such as pedestrian counting, without the complexity of a full traffic statistics application. This makes it easier to set up and users only pay for what they use. You'll need a license key to activate the Pro features. This key is unique to your specific device and can be obtained from [PMX Systems AG](#) or your local [PMX Solution Partner](#).

90-Day Trial

All **newly purchased PMX TCR** units come with a 90-day trial of the PRO features. This trial period allows you to explore the full potential of the PMX TCR and see how it can benefit your operation. I

During the trial period, you will have access to the following PRO features:

- Higher Speed Classes (LS and HS)
- Cat 1, Cat 2, Cat 3, and Cat 4 Counters
- Advanced Reporting and Analytics

Install a license key during the trial period to keep the PRO features active. The licence key can be entered directly in the [PMX Setup Tool](#) or you can do it using [LoRaWAN Downlink](#).

The following list shows the features available at each feature level.

License Type	BASIC ²	ADVANCED	PRO
Feature level	0	1	2
Speed Classes			
P: Pedestrians (2-10 km/h)	•	•	•
LS: Low Speed (2-40 km/h)	-	•	•
HS: High Speed (10-80 km/h)	-	-	•
Object Size Range	0.3-2m	0.3-3m	0.3-30m
Counting Functionality			
MBR Algorithm	•	•	•
AI Autoconfig	•	•	•
Bidirectional Counting	•	•	•
Unfiltered Detections Counter	•	•	•
AI Autosens	-	•	•
Multitarget Tracking	-	•	•
Filter Category 1	-	•	•
Filter Category 2	-	•	•

² PMX Firmware installed on a TCR, no licence activated

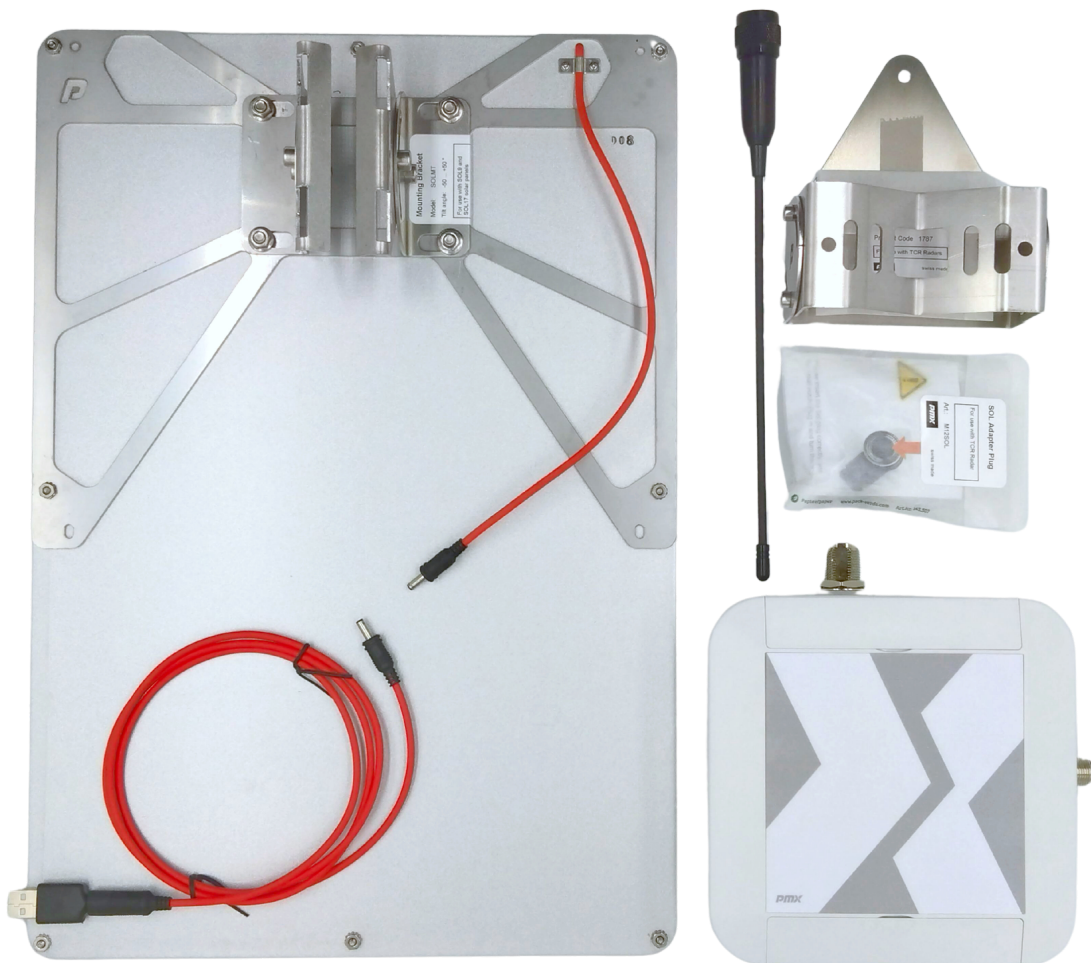
License Type	BASIC ²	ADVANCED	PRO
Filter Category 3	-	-	•
Filter Category 4	-	-	•
Advanced Speed Statistics	-	-	•
Oversize Objects	-	-	•
Max Concurrent Objects	1	2	4
LoRaWAN Connectivity			
LoRaWAN Regions supported	EU868, AS923, AU915		
LoRaWAN 1.1.0 / 1.0.4	•	•	•
TimeSync	•	•	•
LinkChecks	•	•	•
Confirmed Uplinks	•	•	•
Unconfirmed Uplinks	•	•	•
Device ID Uplink	•	•	•
UDC Uplink (Port 13)	•	•	•
CAT1 Uplink (Port 14)	-	•	•
CAT2 Uplink (Port 15)	-	•	•
CAT3 Uplink (Port 16)	-	-	•
CAT4 Uplink (Port 17)	-	-	•
Maintenance			
CONFIG Port (USB)	•	•	•
LoRaWAN Config Downlinks	•	•	•
Lifetime Firmware Updates (DFU)	•	•	•
License Installation Downlink	•	•	•

Getting a license

All-in-One Counting Kits

When you purchase one of the new PMX Radar Counting Kits, the PMX TCR comes with the appropriate license pre-installed and activated at a very attractive price.

SKU		Pre-installed License
TCR-DLE-K/P	PMX TCR Basic Kit, DC	BASIC (none)
TCR-SLE-K17/P	PMX TCR Basic Kit, Solar 17W	BASIC (none)
TCR-SLE-K/LS	PMX TCR Low Speed Kit, DC	ADVANCED
TCR-SLE-K17/LS	PMX TCR Low Speed Kit, Solar 17W	ADVANCED
TCR-SLE-K/HS	PMX TCR Smart City Kit, DC	PRO
TCR-SLE-K17/HS	PMX TCR Smart City Kit, Solar 17W	PRO



Upgrading a Parametric TCR



PMX Systems AG acquired the intellectual property rights to the Parametric Radar Counting Technology on January 1, 2024.

PMX is committed to providing ongoing service and support to former Parametric customers during the 24-month warranty period and provides repair services beyond that period.

If you purchased a TCR GEN2 Counter from Parametric GmbH or a reseller after 1/1/2022, you are entitled to a free permanent PRO license.

To request a free license key for your Parametric TCR, please use the [license request form](#) on our website and provide the device's serial number(s).

Note: You can still download and use the Legacy Firmware developed by Parametric from the [Download Archive](#).

Lifetime Free Firmware Updates

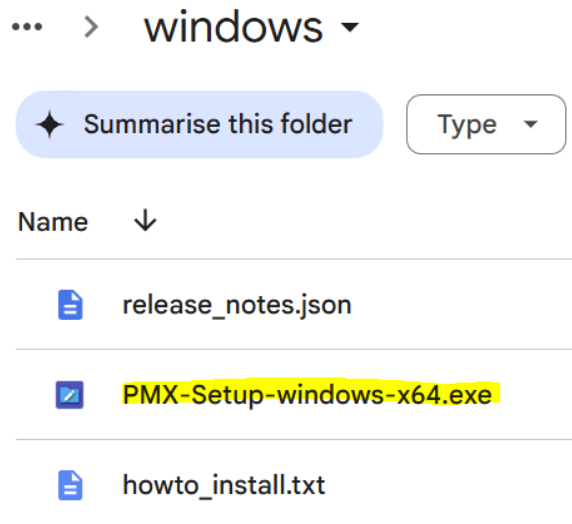
A license key is node-locked to your device and is permanent.

You will be able to update your PMX Firmware in the future without buying a new license key. Firmware updates can be downloaded for free from Downloads Archive.

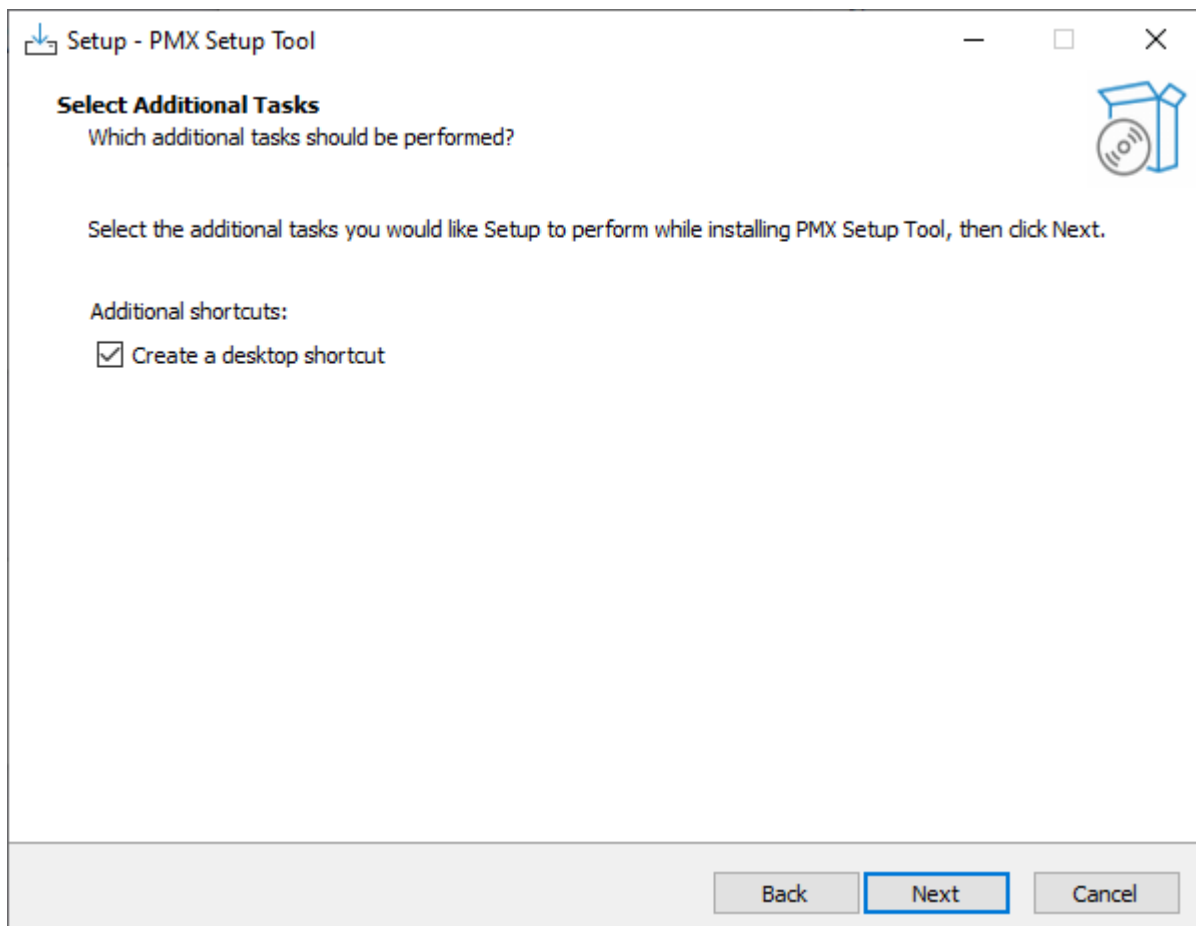
Preparation

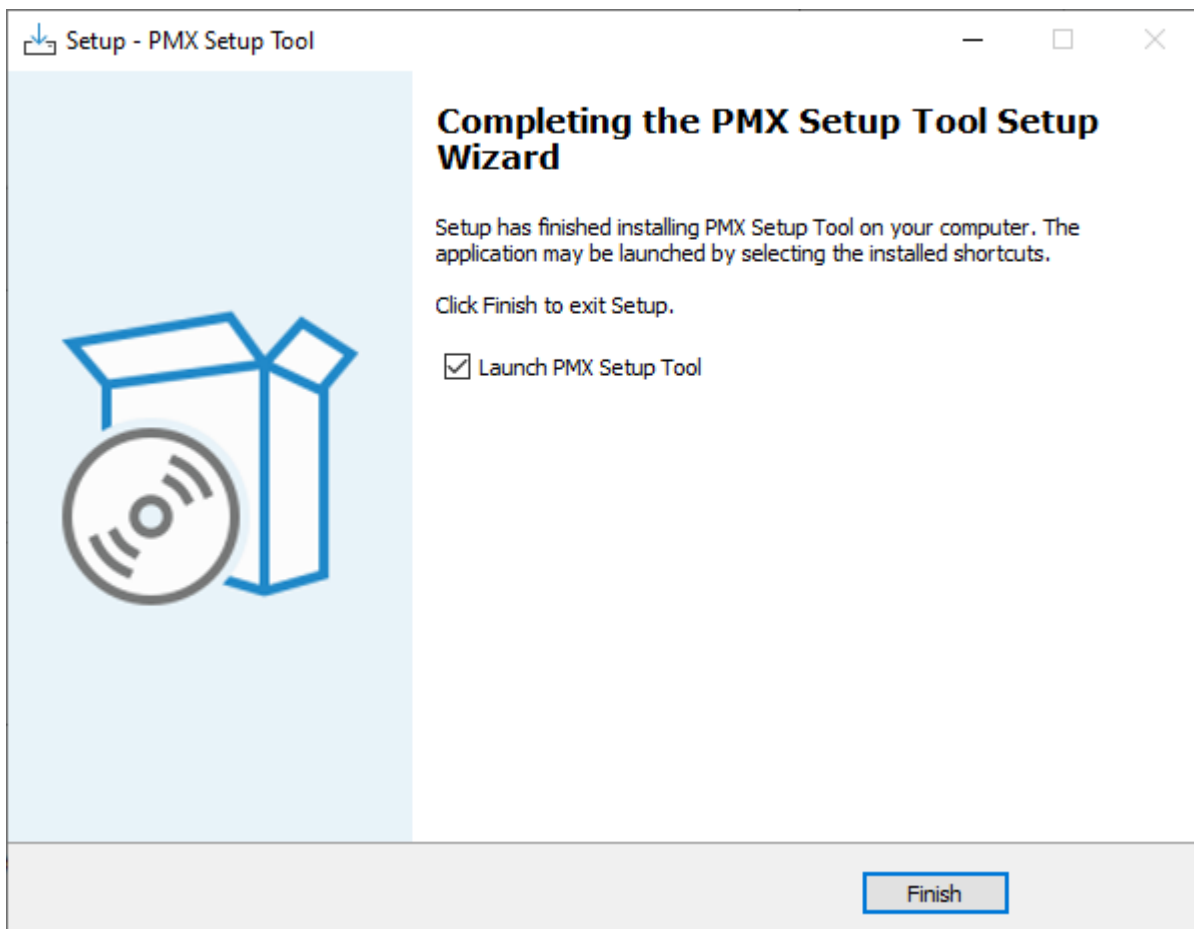
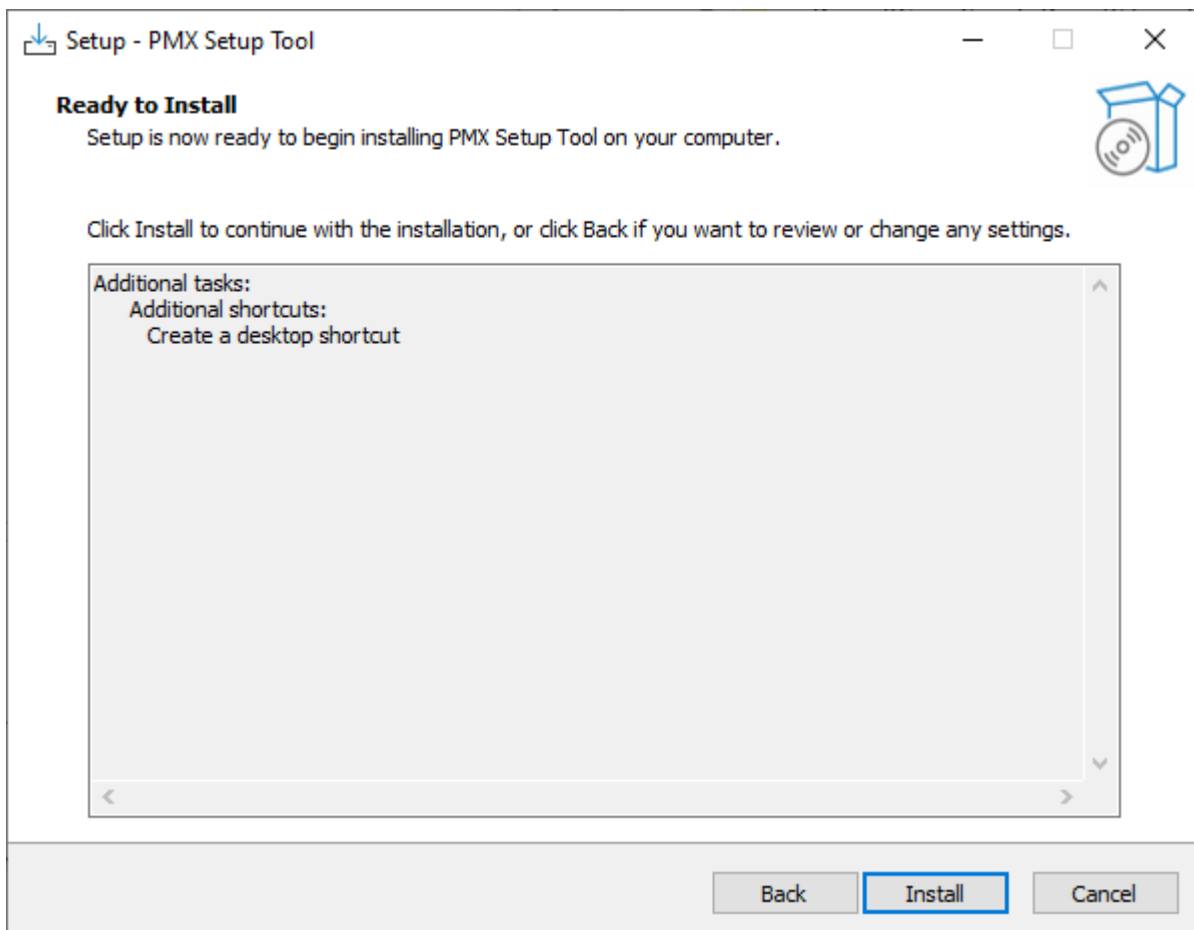
Install PMX Setup Tool for Windows

[Download](#) the PMX Setup Tool for Windows. You can find it in the Download section on our website.



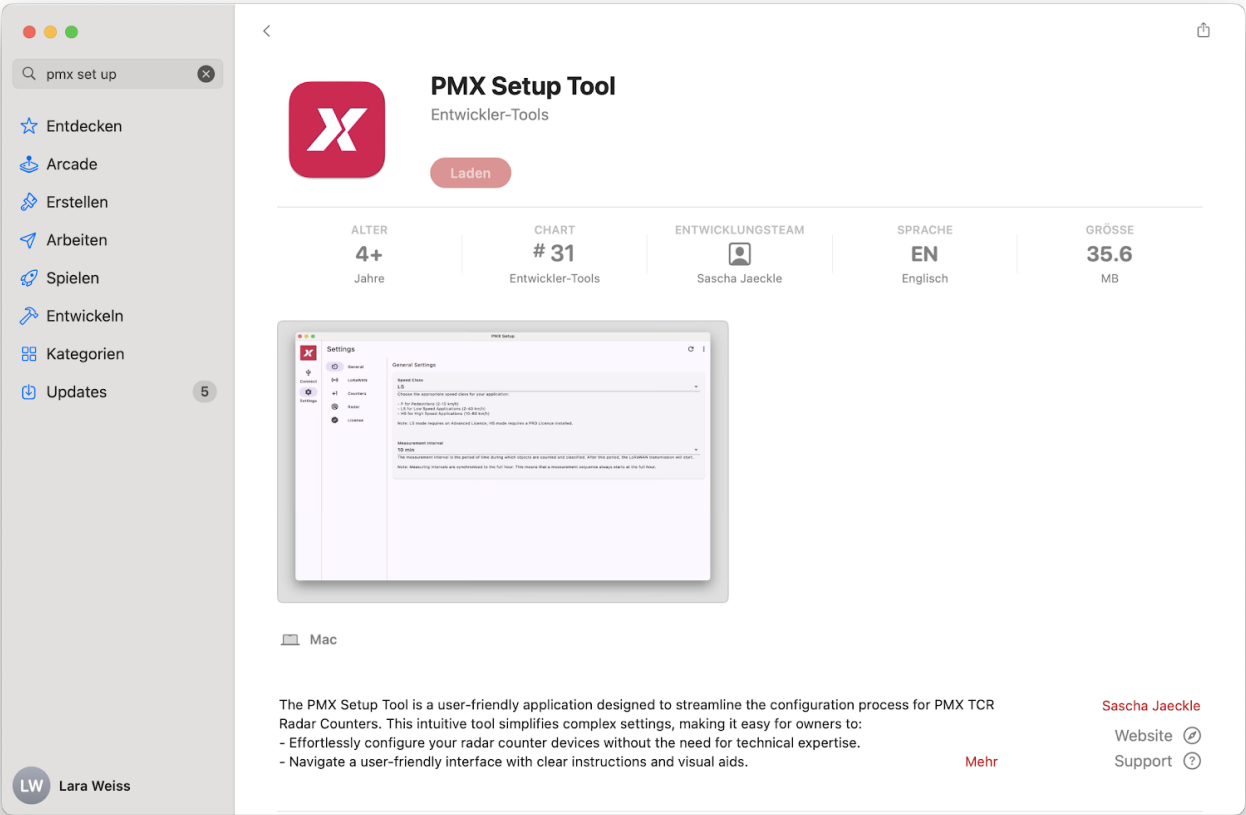
Click on the Installer file. Ignore Windows Warnings (Blue Screens).





Install PMX Setup Tool for macOS

Open the App Store on your Mac and search for the PMX Setup Tool. Then click 'Install'.

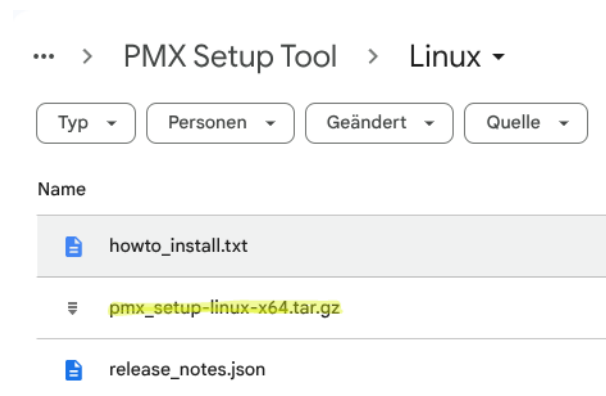


Install PMX Setup Tool on Linux

Prerequisites:

*Debian Linux 11 or later and Ubuntu Linux 20.04 LTS

1. [Download](#) the `pmx\_setup-linux-x64.tar.gz` file. You can find it in the Download section on our website.

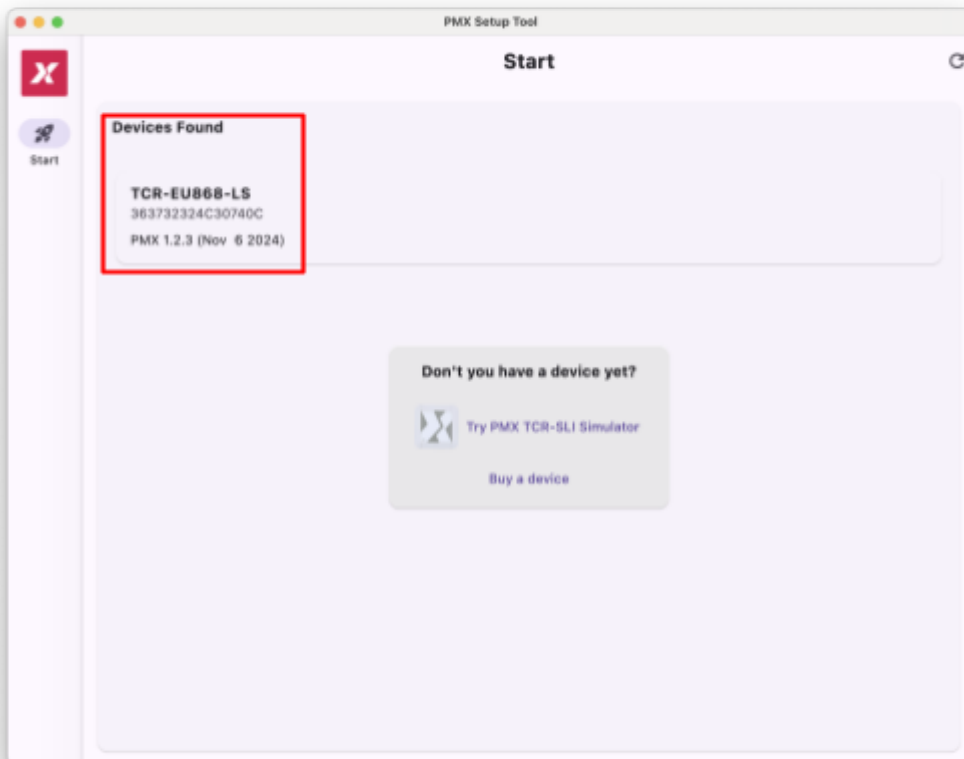
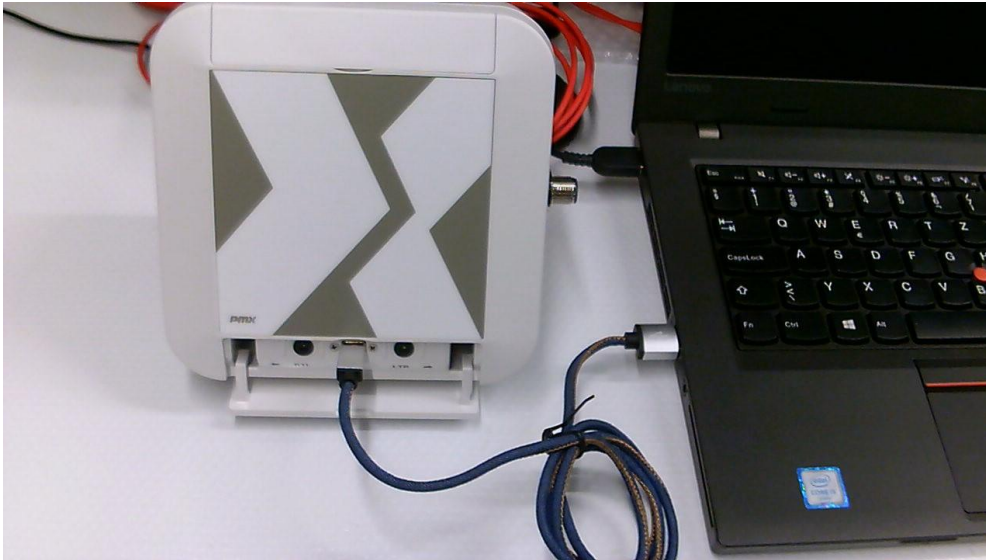


2. Follow the **howto_install.txt**. guidelines

Configuration via PMX Setup Tool

Connect your TCR

Open PMX Setup Tool, connect your TCR with an extension cable USB type A and micro USB and click on the device found.



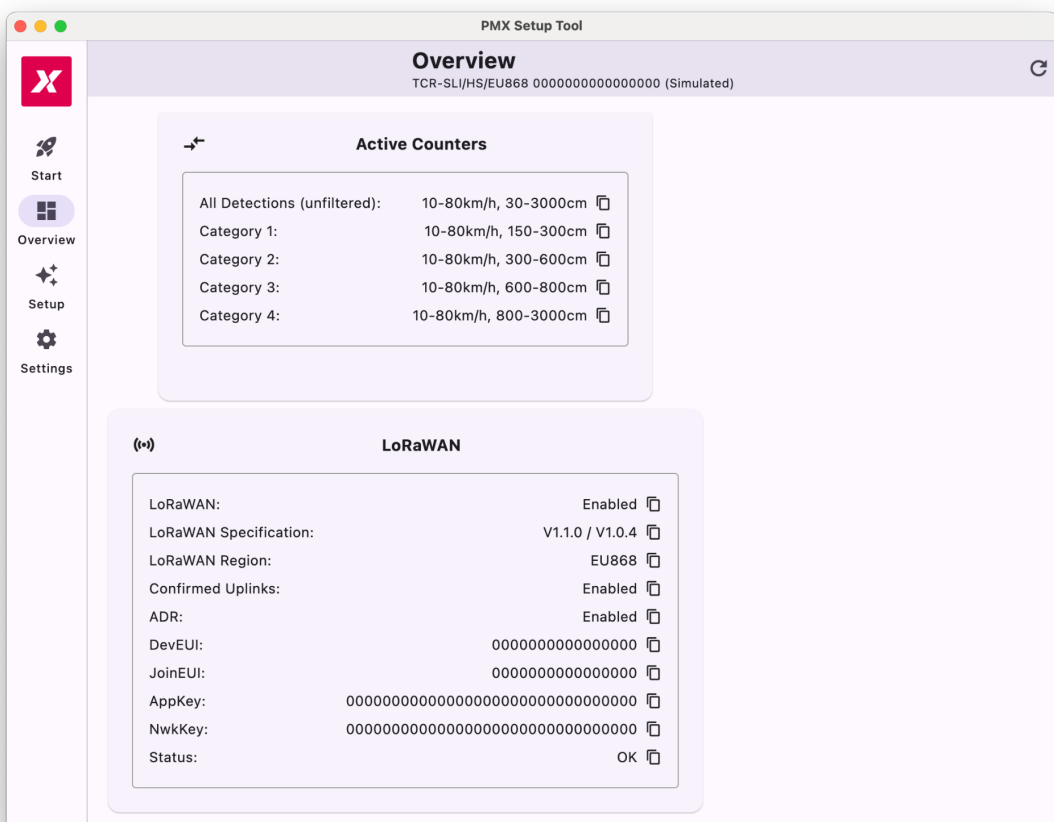
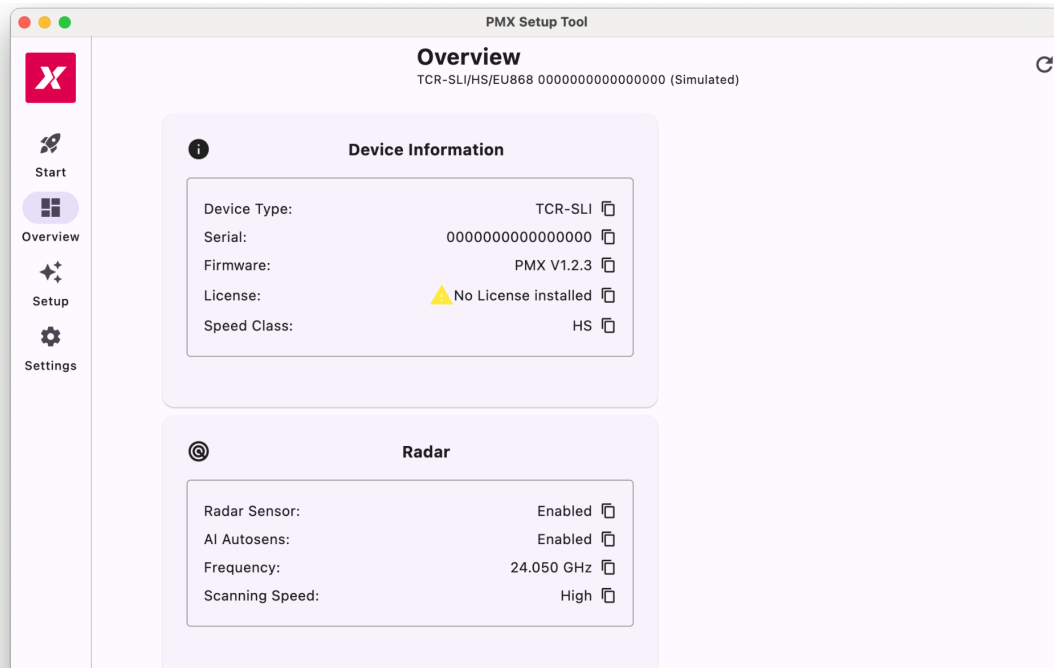
PMX TCR SLI Simulator

If you don't have a device yet, try the PMX TCR SLI Simulator.
With the simulator you are able

Overview

The Overview page shows the summary of the data. Click on  to copy data.

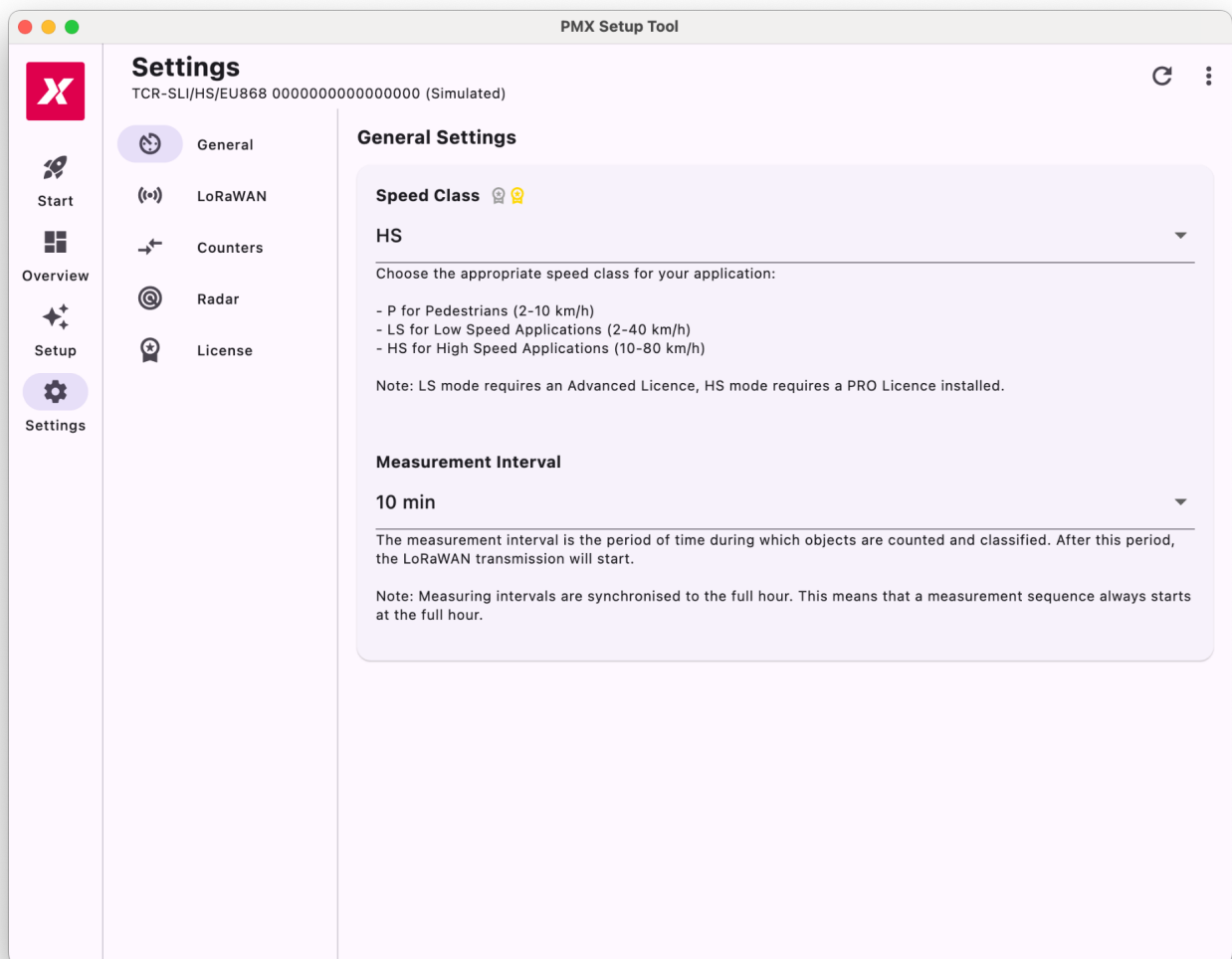
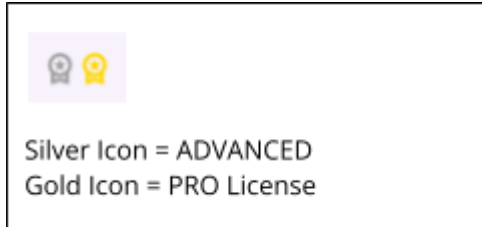
- **Device Information**
- **LoRaWAN Data**
- **Radar configuration**
- **Active Counters**



Settings

General Settings

Select the Speed Class here. First, with our 90 Days trial you are able to set all 3 (P, LS, HS) speed classes. After the trial period, you will need the Advanced licence for **LS** and the PRO licence for **HS** Applications.

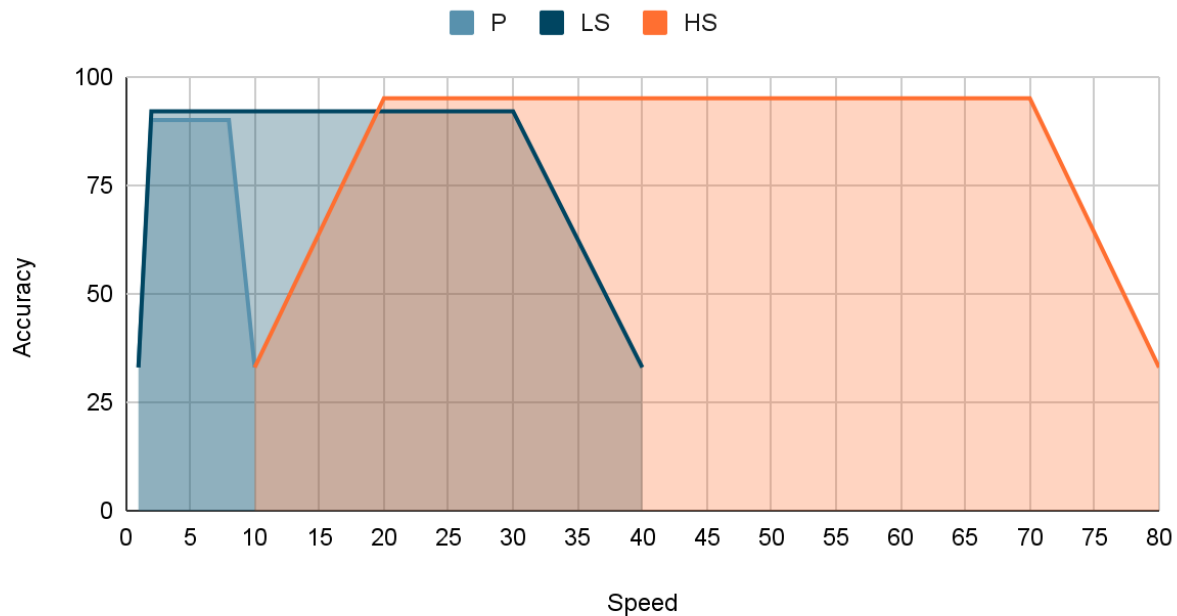


Measurement Interval

Change the interval here and adapt it to your needs.

Speed Class

Doppler radar counters use dynamic sampling rates and adaptive electronic amplifiers to accurately measure the speed of objects. To achieve good counting accuracy, it is important to choose the appropriate speed class for your application. PMX TCR counters can scan either slow motion with higher resolution or fast motion up to 80 km/h. **It is therefore essential to choose the right compromise between speed and resolution.**



■ P = People / Pedestrian
■ LS = Low Speed
■ HS = High Speed

Speed Class	Used for	Counters available
P	Pedestrians 2-10 km/h	Unfiltered Detections Counter (UD)
LS³	Low Speed Traffic 2-40 km/h	Unfiltered Detections Counter (UD) Filter Category 1 Counter (CAT1) Filter Category 2 Counter (CAT2)
HS⁴	High Speed Traffic 10-80 km/h	Unfiltered Detections Counter (UD) Filter Category 1 Counter (CAT1) Filter Category 2 Counter (CAT2) Filter Category 3 Counter (CAT3) Filter Category 4 Counter (CAT4)

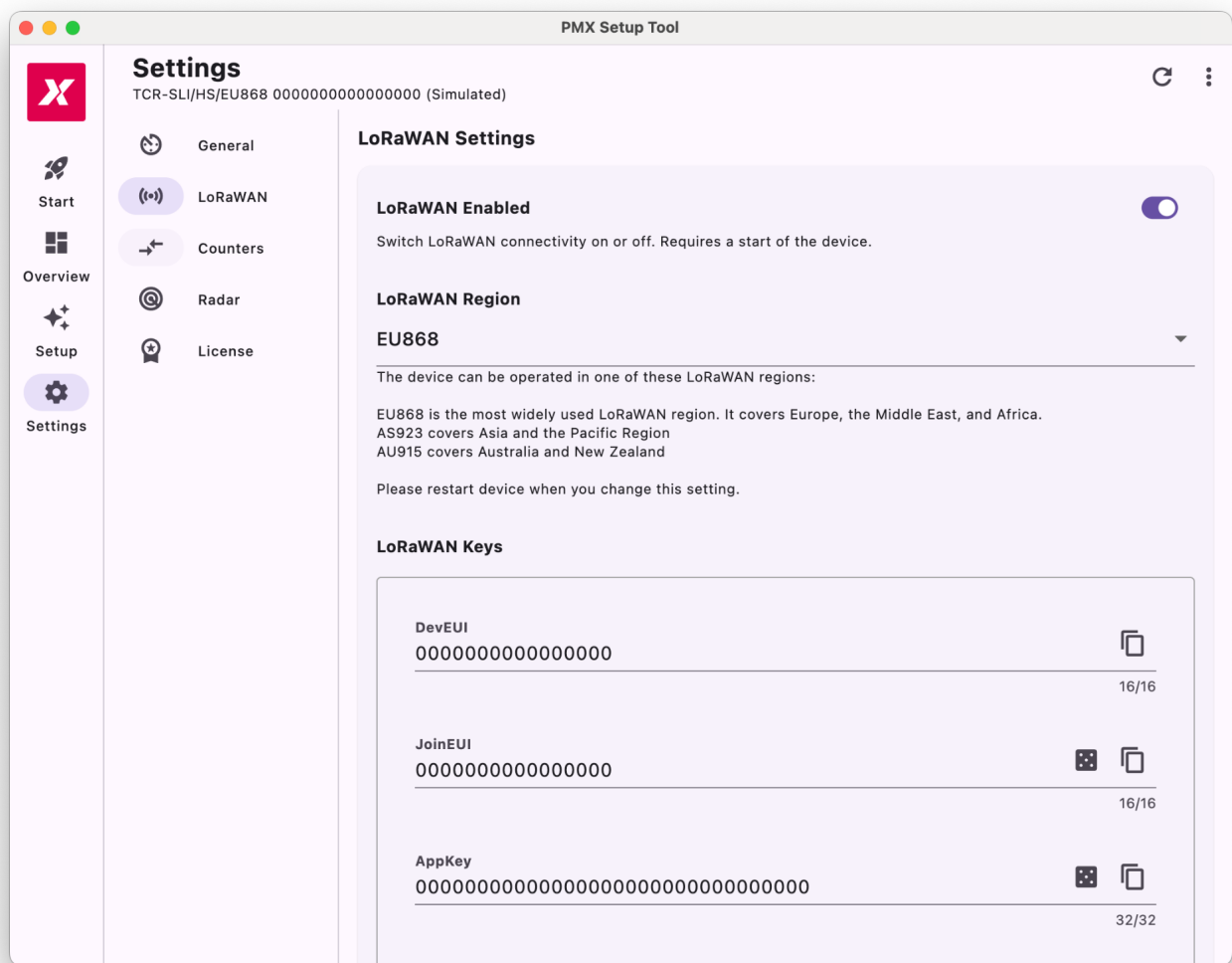
³ a 60-day trial period applies. After that, an ADVANCED or PRO licence must be active.

⁴ a 60-day trial period applies. After that, a PRO licence must be active.

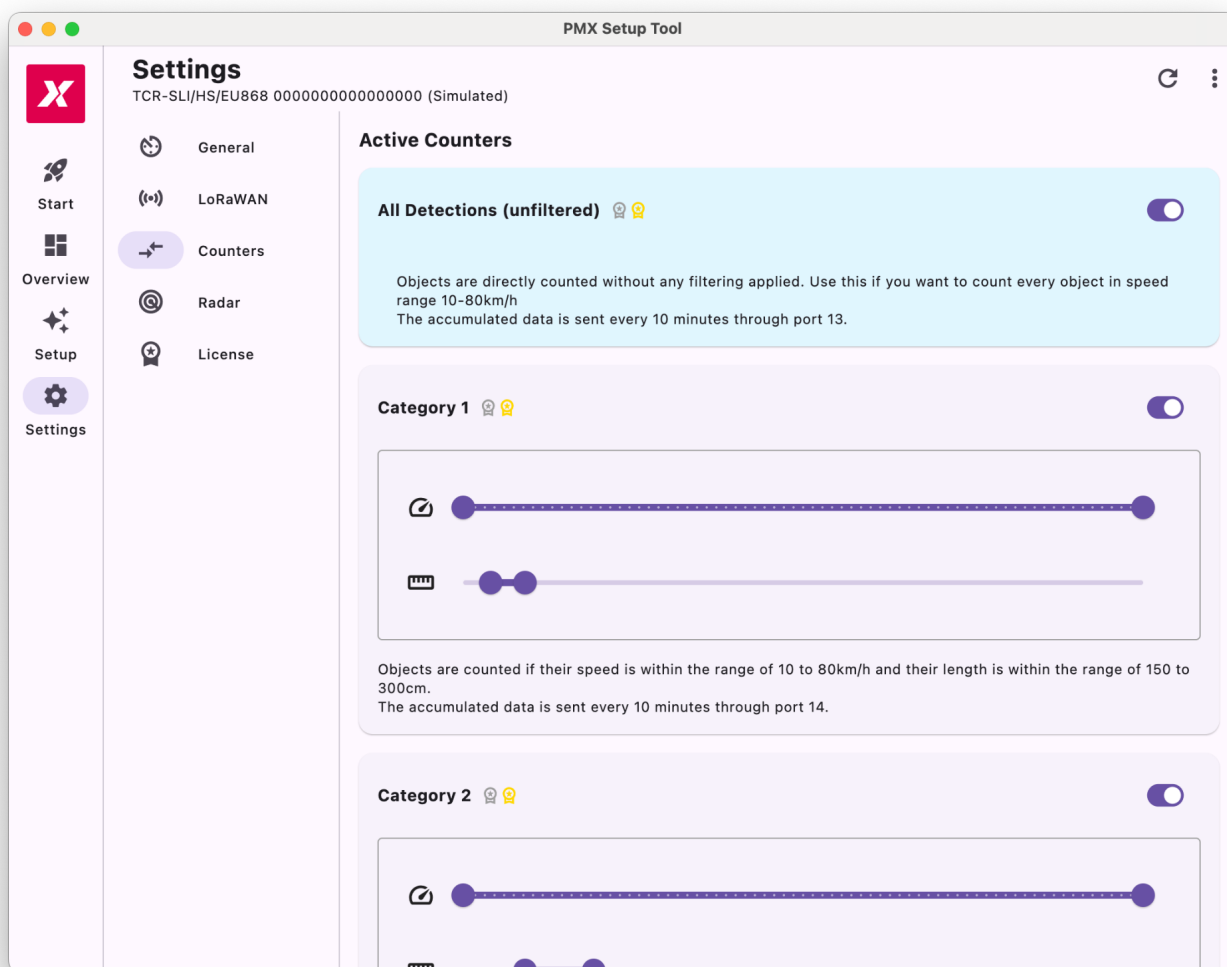
LoRaWAN

Lorawan settings can be changed here and fine-tuned according to individual requirements

Confirmed Uplinks



Counters



NOTE: Ideally, use “[Filter Teaching](#)” first and then fine tune filters here.

Filter Settings of Categories

The PMX Setup Tool allows you to adjust the **speed** and **length** of the object for each category effortlessly using intuitive sliders. Tailor the settings to your needs, ensuring optimal performance for your specific application.

Silver and Gold Icon



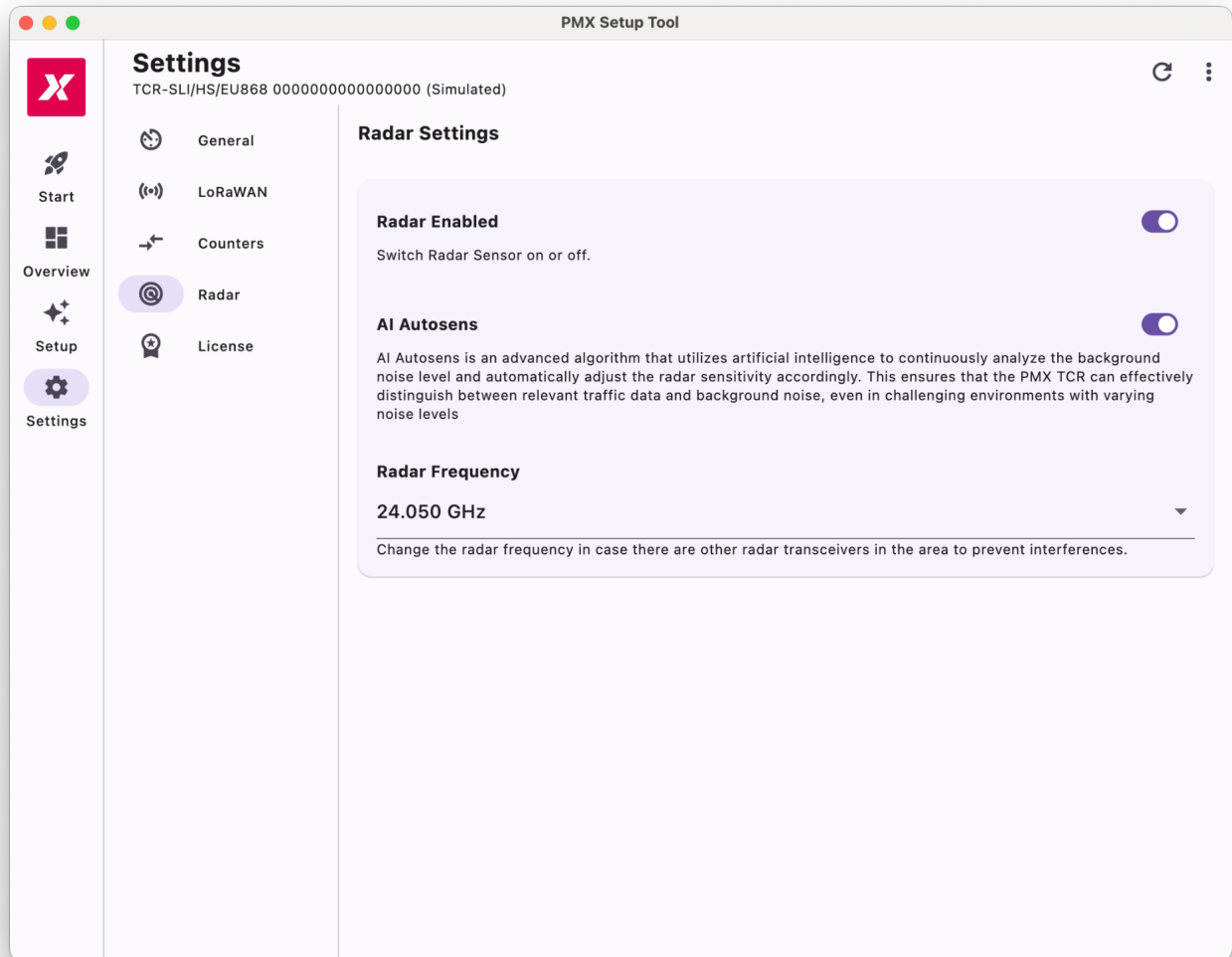
Category 1 and 2 available for ADVANCED and PRO License
Category 3 and 4 are available for PRO License only

Enable “**All Objects Counter**” if you want to count every object in the speed range of your selected Speed Class.

The factory values ([see page](#)) can be reloaded at any time with a restart.

Radar

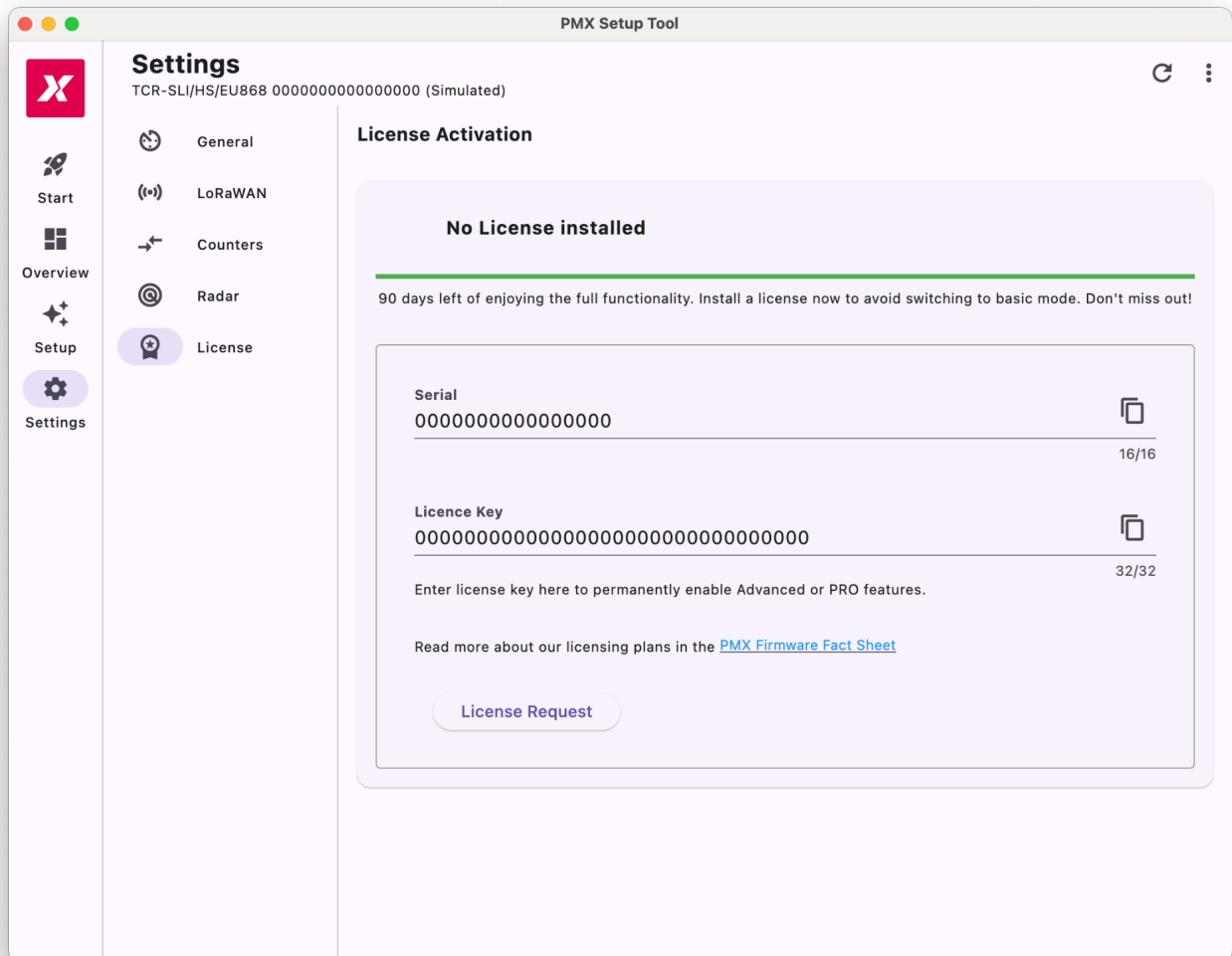
Switch off AI Autosense is not recommended.
Change the Radar Frequency to prevent interference.



License (Optional)

NOTE: If you purchased a new PMX TCR skip this step as your devices comes with a pre-installed license

If you are updating an older Parametric TCR, use the PMX Setup Tool to activate the license.

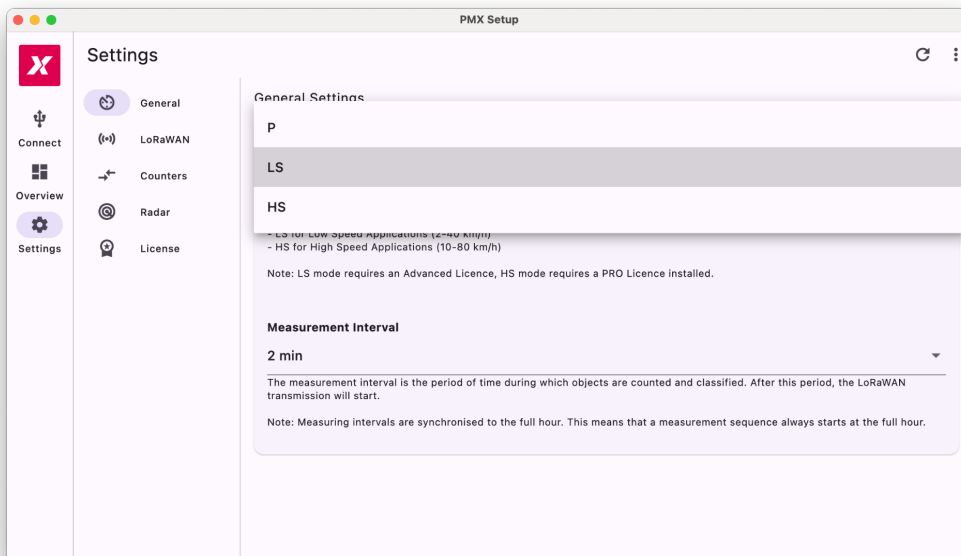


Configuration with PMX Setup Tool

The PMX Setup Tool helps you to configure the device and check the set values right in place.

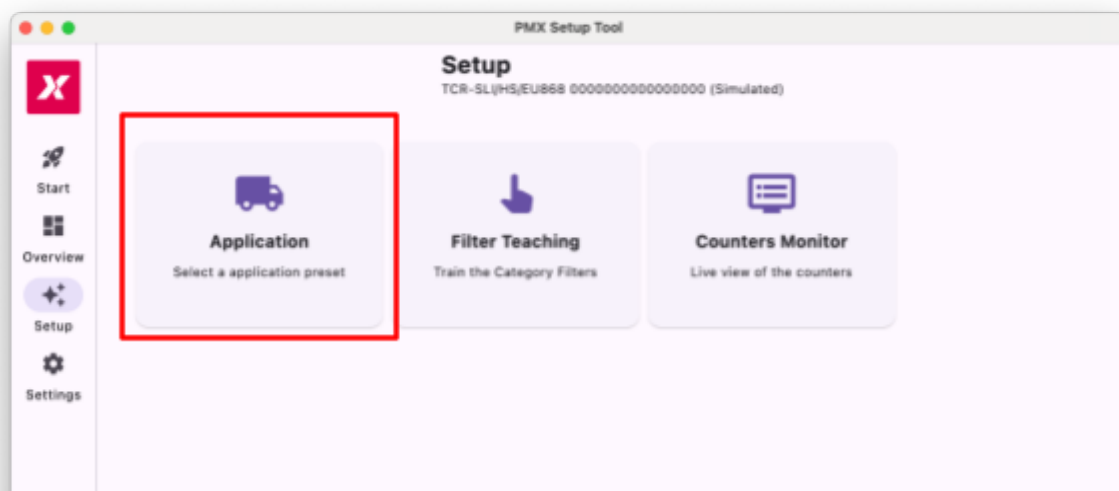
Step 1 - Set Speed Class

Set the correct speed class needed

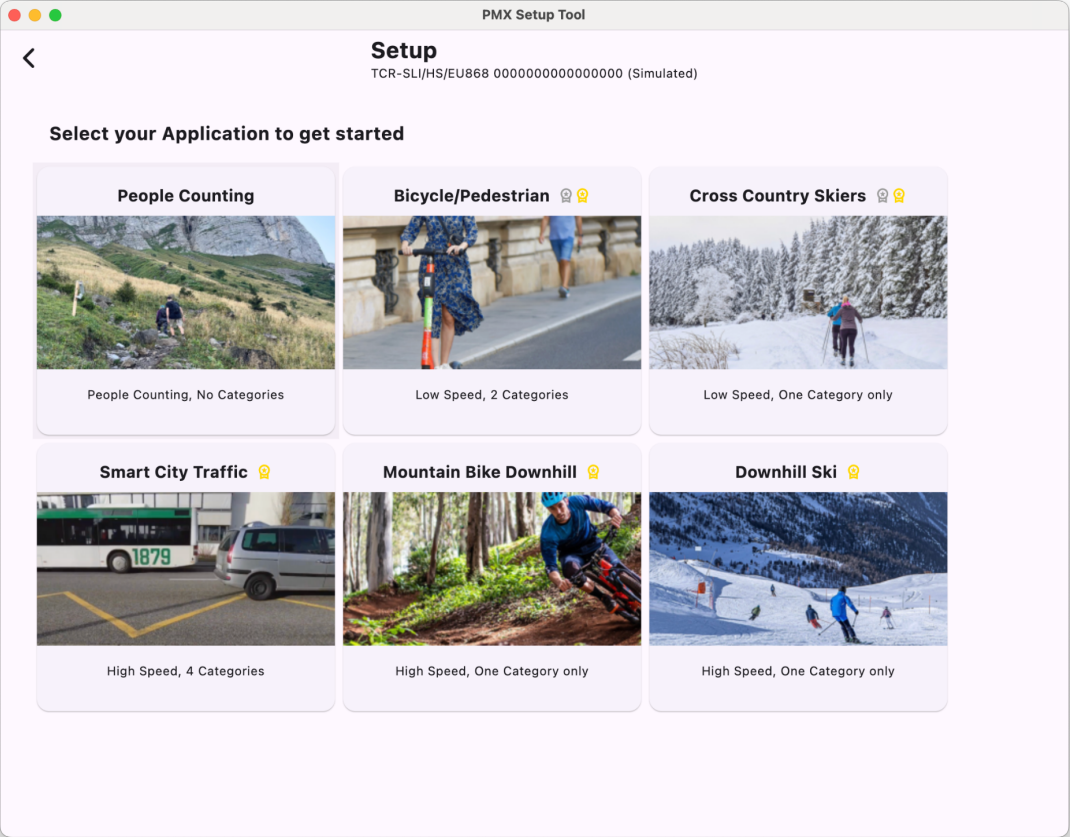


Step 2 - Choose Application

Choose the appropriate Application

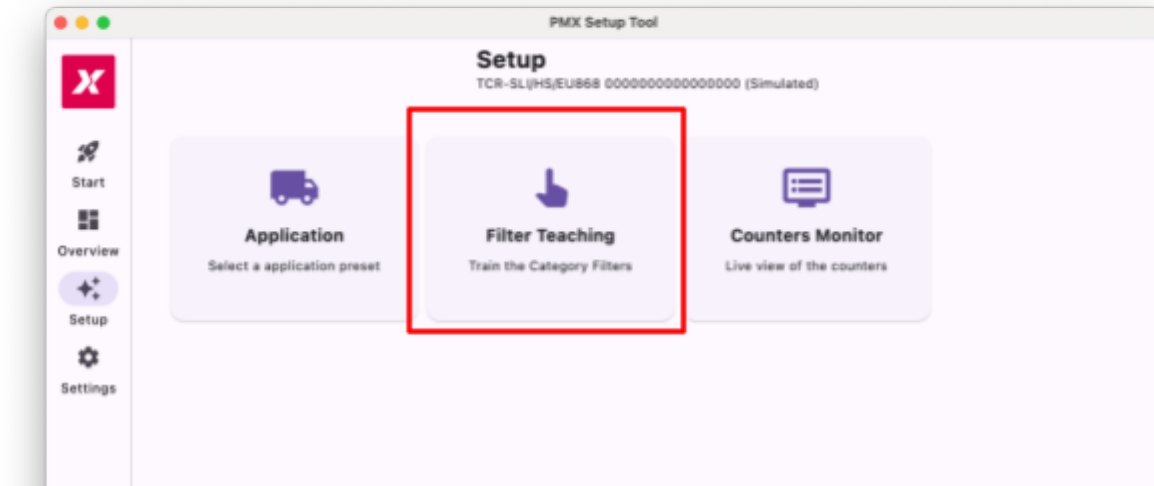


Choose appropriate applications such as People Counting, Smart City Traffic or Mountain Bike. This is helpful if you want to use preset settings from a specific application. This means that many settings for the corresponding application are made in the background.

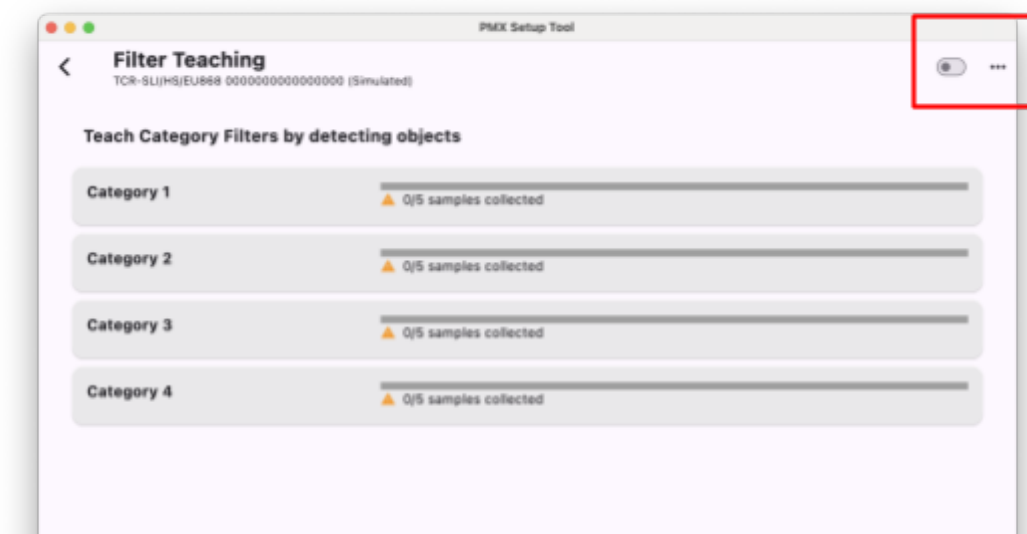


Step 3 - Filter Teaching

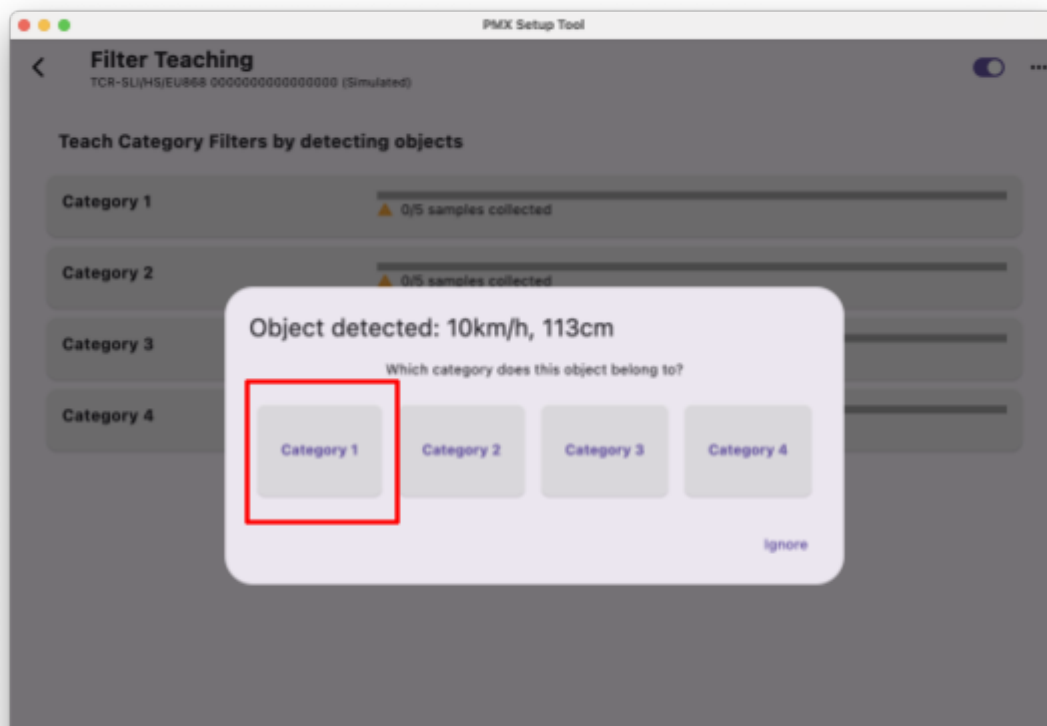
With Filter Teaching users can measure real objects and assign them to the appropriate category. The filters are optimally set in the background so that the counter can then perform the categorisation optimally. Filter Teaching can also be used to fine tune your settings.



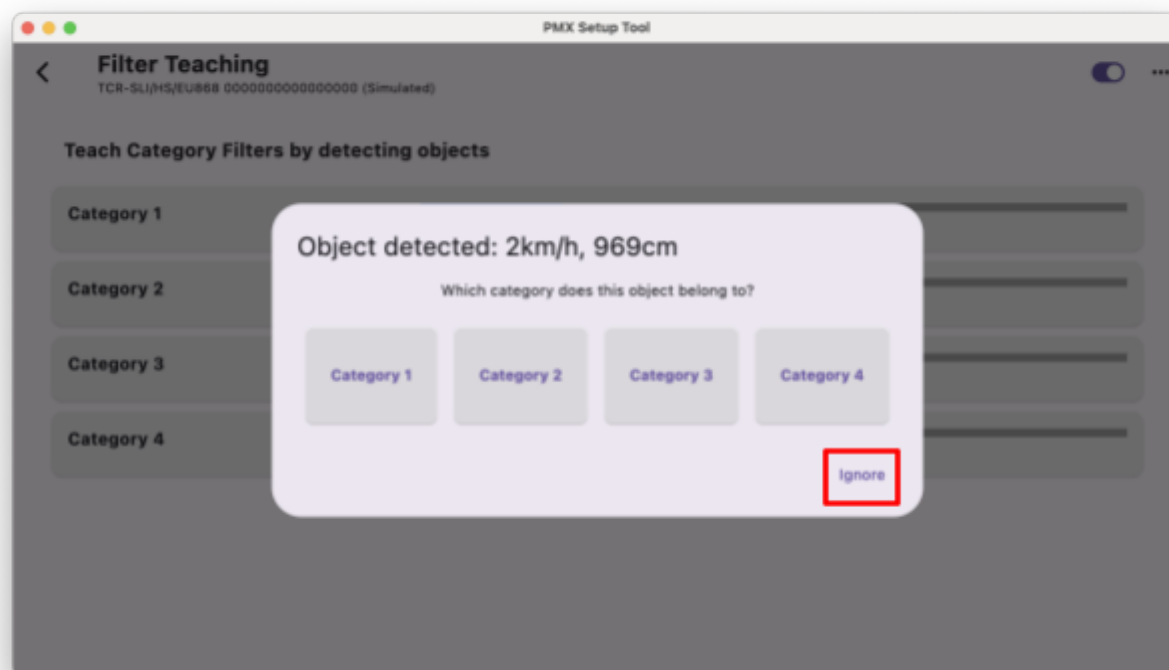
Click on "Start Teaching" on top right to start.



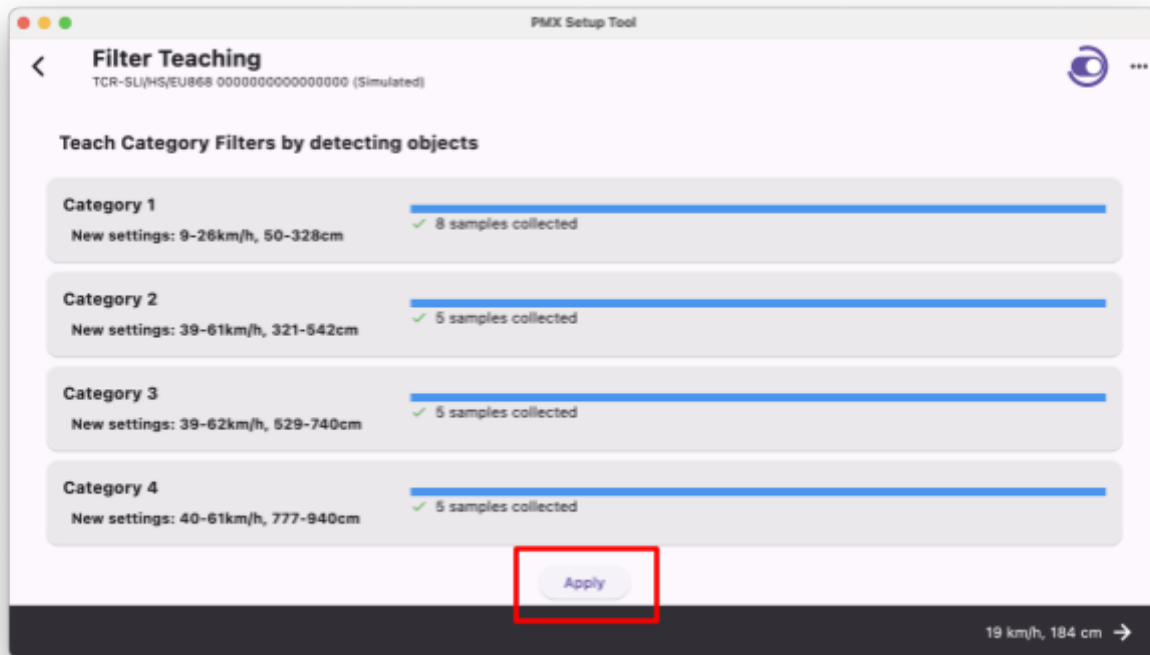
If an object has been detected it shows you the speed and length. You can now decide to which category the detected object belongs. Click on the appropriate category.



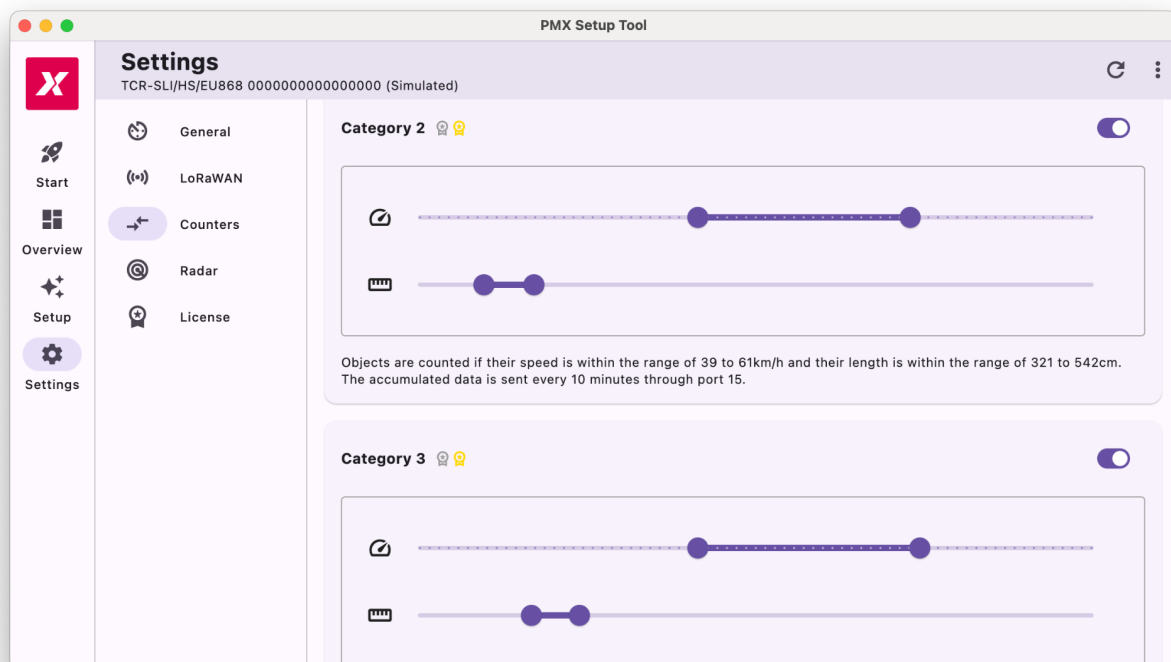
Click on "ignore" if you receive faulty and impossible detections.



If done teaching and all samples are collected (at least 5 objects per category). Click on “apply” and the new settings for the categories are saved.

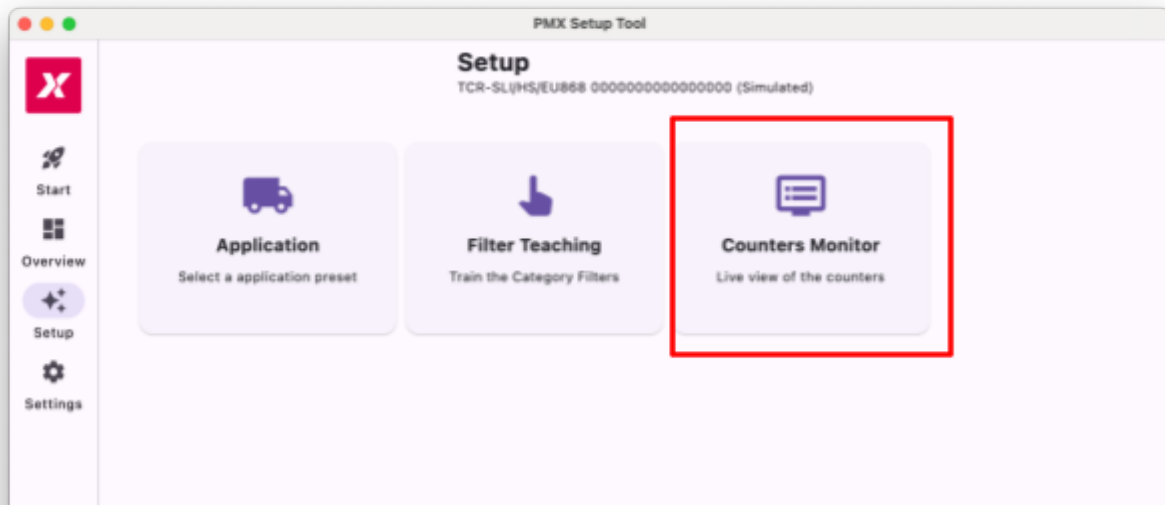


You can then go to Settings / Counters and check the set values. If requested, you can again fine tune the speed and size here.



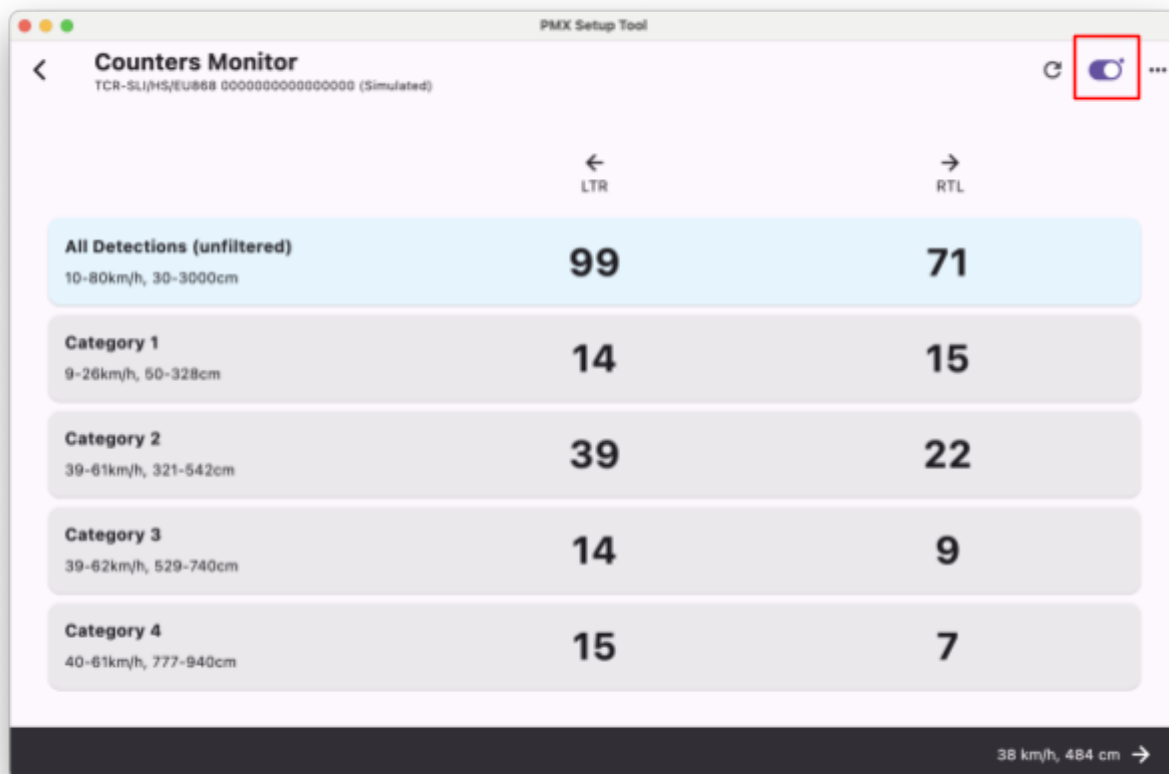
Step 4 - Counters Monitor

If you click on Setup / Counters Monitor you can see all active categories with its settings.



Click on "Enable automatic refresh" on the top right so you can start testing the counts live.

If you notice that an object is categorised incorrectly, you can adjust the values in the active counters Enable automatic refresh



IMPORTANT: Don't worry about the miscounts at the beginning. The first round of the AI auto sense takes approx. 3 minutes to set up correctly. Allow the TCR this time before starting the test count.

More information about the configuration with the PMX Tool can be found here [PMX TCR User Manual](#).

Factory Defaults

This appendix provides a comprehensive list and enumeration of all production-level defaults for reference. You can reset the unit to these settings using the [Set Defaults Command](#).

Measurement Settings	Default	Unit
Measuring Interval	10	min
Measuring Timeout	120	min
Totalizer	0	on/off

Counter Settings	If SpeedClass = 0 (P)	If SpeedClass = 1 (LS)	If SpeedClass = 2 (HS)	Unit
UDC Enabled	1	1	1	on/off
UDC MinSize	30	30	30	cm
UDC MaxSize	200/300/3000 ⁵			cm
UDC MinSpeed	2	2	10	km/h
UDC MaxSpeed	10	40	80	km/h
Filter Category 1 Enabled	0	1	1	on/off
Filter Category 1 MinSize	0	30	150	cm
Filter Category 1 MaxSize	0	180	300	cm
Filter Category 1 MinSpeed	0	2	10	km/h
Filter Category 1 MaxSpeed	0	7	80	km/h
Filter Category 2 Enabled	0	1	1	on/off
Filter Category 2 MinSize	0	100	300	cm
Filter Category 2 MaxSize	0	300	600	cm
Filter Category 2 MinSpeed	0	8	10	km/h
Filter Category 2 MaxSpeed	0	40	80	km/h

⁵ UDC MaxSize depends on the installed licence.

Filter Category 3 Enabled	0	0	1	on/off
Filter Category 3 MinSize	0	0	600	cm
Filter Category 3 MaxSize	0	0	800	cm
Filter Category 3 MinSpeed	0	0	10	km/h
Filter Category 3 MaxSpeed	0	0	80	km/h
Filter Category 4 Enabled	0	0	1	
Filter Category 4 MinSize	0	0	800	cm
Filter Category 4 MaxSize	0	0	3000	cm
Filter Category 4 MinSpeed	0	0	10	km/h
Filter Category 4 MaxSpeed	0	0	80	km/h

Radar Settings		Unit
Radar Enabled	1	
Radar Channel	1	
Radar Sensitivity	100	%

License Type	BASIC	ADVANCED	PRO	Unit
Radar AI Autosens	0 (n/a)	1 (enabled)	1 (enabled)	on/off

LoRaWAN Settings		Unit
LoRaWAN Enabled	1	
LoRaWAN Confirmed Uplinks	0	
LoRaWAN ADR	1	
LoRaWAN DR	0	-
LoRaWAN DevEUI	(Serial Number)	-
LoRaWAN JoinEUI	8CAE49CFFFFFFF02	-
LoRaWAN AppKey	00000000000000000000000000000001	-
LoRaWAN NwkKey	00000000000000000000000000000001	-
LoRaWAN LinkCheck Interval	720	min

LoRaWAN Join Timeout	30	min
----------------------	----	-----

Device Registration

Loriot.io (Recommended)

PMX Systems AG recommends using [Loriot.io](https://loriot.io) server products based on our experience with their stability, ease of use and support. A free community server is also available to start.

This chapter shows how to register a PMX TCR on your Loriot.io network server using the keys from the previous step.

The screenshot displays the Loriot.io web interface. On the left is a dark sidebar with navigation links: 'Back to Applications', 'SENSORHUB TCR' (with ID 'BE-7A-21-66'), '+ Enroll Device' (highlighted), 'Bulk Import', 'Devices', 'Devices Map', 'Output', 'Output Data Format', 'Statistics', 'Join Server', 'Access Tokens', 'Log', and 'Downloads'. The main content area is titled 'Enroll a new device'. It contains several sections: 'LoRaWAN® Version' (dropdown menu set to 'LoRaWAN® 1.0.x'), 'Enrollment Process' (dropdown menu set to 'OTAA'), 'Location' (with 'DISABLED' and 'ENABLED' toggle buttons, and a note: 'You can define coordinates for static devices enabling this option.'), 'Details' section with fields for 'Title' (filled with 'TCR-DLI/P/EU868 Balkon SG'), 'Device EUI' (filled with '343531316830710A'), 'Join EUI' (filled with '8CAE49CFFFFFFF0'), 'Description (Optional)' (empty text area), 'Application Key (Optional)' (filled with '00000000000000000000000000000001'), and 'Device Template (Optional)' (input field with placeholder 'Search by name...'). At the bottom right of the form are three buttons: 'Create Another' (disabled), 'Enroll' (active), and 'Reset'.

Maintenance

LED Blink Codes



Left LED (RTL)	Right LED (LTR)	Status	Cause
Off	Off	Active	PMX TCR is counting
On	On	Starting	PMX TCR is initialising
On	Off	RTL Tracking	Tracking an object coming from the right
Off	On	LTR Tracking	Tracking an object coming from the left
Both flash synchronous (2Hz)		LoRaWAN TX Error	No ACK received to Join or Confirmed Uplink
Both flash synchronous (10Hz)		DFU	Firmware Update in progress. This happens only once after you upload a new firmware and the device starts for the first time with the new firmware. Do not disconnect from power while the LEDs blink very fast.
Both flash alternately		DP Error	The device profile is invalid or an attempt has been made to tamper with the device.

Updating the firmware

The device firmware can be updated over USB, allowing you to keep your device up to date with the latest developments.

Prerequisites

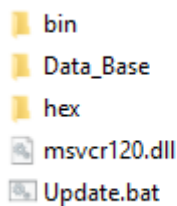
To perform a firmware update, you will need

- a Windows 10 or Windows 11 PC (sorry, no Mac, no Linux, no ChromeOS)
- a USB to micro-USB cable
- a Philips screwdriver to open the PMX TCR Enclosure

Download the PMX Firmware for TCR

Download the latest firmware from the [Download Archive](#). For security reasons, we ask you to provide an email address to gain access to our shared drives.

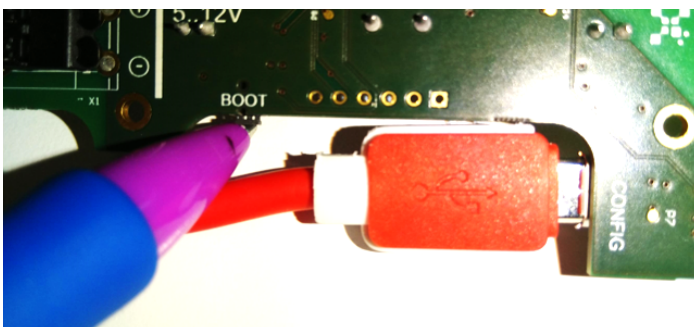
Download and extract the ZIP-Archive to a local folder.



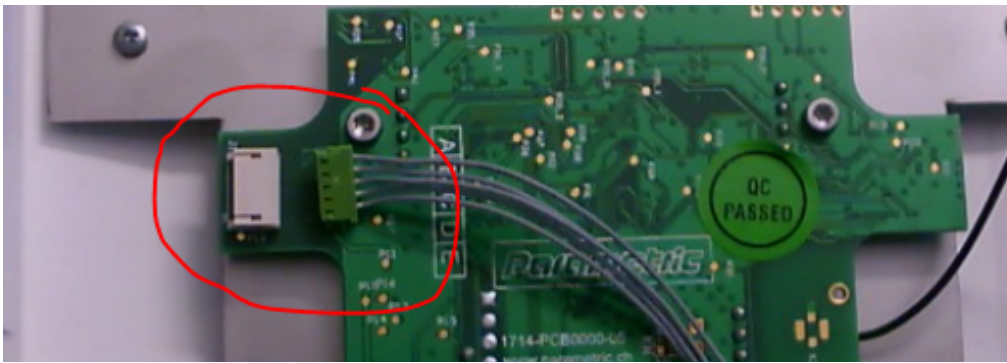
Enable DFU Mode

The PMX TCR comes with pre-installed software that can handle device firmware updates (DFU) over USB.

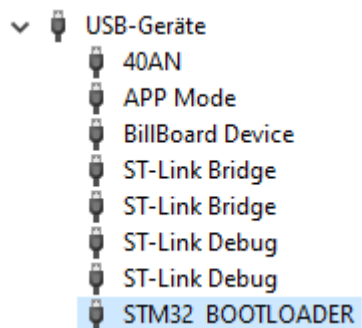
The DFU mode is activated by pressing and holding the BOOT button on the motherboard and then connecting the USB cable on the PC side.



If your PMX TCR is equipped with an SBX solar charger, you must first disconnect the connection cable from the mainboard. Otherwise, the unit will not enter DFU mode.



Once DFU mode is enabled, Windows 10 or Windows 11 should automatically install a device driver (STM32 BOOTLOADER) to communicate with the device in DFU mode.



Start the Update

Execute **Update.bat** to start the update process.

```
erasing sector 1325 @: 0x08029680 done
erasing sector 1326 @: 0x08029700 done
erasing sector 1327 @: 0x08029780 done
erasing sector 1328 @: 0x08029800 done
erasing sector 1329 @: 0x08029880 done
Download in Progress:
100%
File download complete
Time elapsed during download operation: 00:00:31.090
Verifying ...
Read progress:
100%
Download verified successfully
RUNNING Program ...
Address: : 0x8000000
Start operation achieved successfully
```

Do not disconnect and wait until you see "Start operation achieved successfully".

Installing a New License Key Using LoRaWAN Downlink

The new PMX TCR offers a 60-day trial period of its PRO Features. To continue using the PRO Features beyond the trial period, a permanent license key can be sent via a LoRaWAN downlink.

Downlink **C251** followed by 32 hex characters (16 bytes) representing your license key to **Port 1**. The following images show how this is done using the Lorient.io LNS.

The screenshot shows the Lorient.io LNS web interface. The left sidebar contains navigation links: Back to Devices, TCR-DLI/P/EU868 BALKON SG (34-35-31-31-68-30-71-0A), Statistics, Location, LoRaWAN® Parameters, Channel Plan, Downlinks, and Mac Commands Log. The main content area is titled 'Downlinks' and shows '0 Downlinks'. Below this is a table with columns: Creation date, Payload, Port, Priority, Confirmed, and Encrypted. The message 'Queue is empty' is displayed. The 'Enqueue Downlink' section contains a form with the following fields: 'Port (decimal number, 1 to 223)' set to 1, 'Priority (0 is the lowest priority)' set to 0, and 'Payload (hex string)' set to C25106DD4B3B9F2FFDAFA7BA1028770F74EA. There is an unchecked checkbox for 'Request confirmation' and an 'Enqueue' button.

	Args Hex String	Port	Description
C251		1	Request an uplink that includes the current license key
C251xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxx	byte[16]	1	Install a new license key by appending the 16 bytes long key to
C252		1	Request an uplink with the current feature level Returns: 0000: BASIC features 0001: ADVANCED features 0002: PRO features
C253		1	Request an uplink with the current speed class setting
C253xxx	0000-0002	1	Change speed class of device 0000: P 0001: LS (Pro Feature) 0002: HS (Pro Feature)
C2EE		1	Restart device with the new settings

FAQ

General questions

What are the advantages of the PMX Firmware?

The new firmware team of PMX Systems did a complete rewrite of the firmware using a model based software engineering (MBSE) approach resulting in an tremendous improvement in speed measurement and lengths estimation accuracy and enabling flexibility in vehicle length.

Improvements of PMX Firmware include:

- Best accuracy possible with such a sensor
- Drastically simplified set-up
- Oversize vehicle counting is no problem anymore
- High interference immunity due to model based analytics
- AI Autosens eliminates the need to adapt sensitivity to the situation
- Newest LoRaWAN Stack V4.7.0 now supports latest [LoRaWAN Specification 1.1](#)
- Tailor TCR counter's capabilities with license upgrades
- Compatible with TCR Hardware Rev. 03/04/05

Can I still use the Legacy Firmware for TCR?

Yes. You are free to install and use the original TCR Firmware developed by Parametric GmbH that comes without the licensing model.

Licensing

I want to count people with a TCR. Which license should I use?

If only people are to be counted, it is generally sufficient to install the PMX firmware for TCR and select speed class 0. If you want to count people simultaneously from different directions, we recommend installing a LS license.

I want to count bicycles and people. Which license should I use?

The LS license is required to count people and bicycles individually. Groups can be formed to analyse and count objects up to a speed of 30km/h according to their length and speed.

If you purchase the "PMX Slow Traffic and Pedestrians Kit" the LS license is already pre-installed.

I do have a Smart City Application. Which license should I use?

Smart City applications typically require full flexibility. On a typical city street, there are bicycles, cars, buses and even heavy goods vehicles.

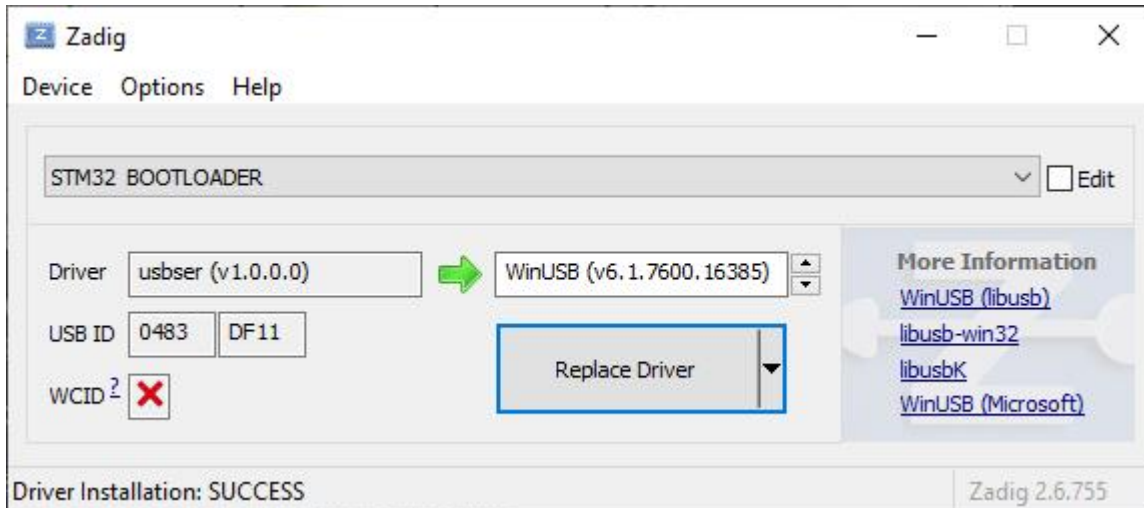
With the PRO functions, several vehicles can be categorised simultaneously and in up to 4 categories. Even extra-long vehicles are no problem with the new MBR Algorithm introduced with the PMX Firmware.

Firmware Update

Windows 10/11 does not recognize the device. What should I do?

If Windows driver allocation fails you might reinstall the driver with the Zadig tool.

Zadig is a Windows application that install generic USB drivers, such as WinUSB, libusb-win32/libusb0.sys or libusbK, to help you access USB devices. It is also useful to uninstall broken drivers.



1. Download Zadig from <https://zadig.akeo.ie>
2. Start the Tool and choose Options>List All Devices to show all available USB devices
3. Connect your device while holding the BOOT button (Start DFU Mode)
4. Look for a device with name "STM32 BOOTLOADER" or "STM32 Device in DFU Mode"
5. Select "WinUSB" and press the "Replace Driver" button. Zadig removes the installed driver and installs the generic WinUSB driver.
6. Try the DFU again

Additional Documents

Document name
TCR-SLx Installation Instructions
TCR-DLx Installation Instructions
PMX Firmware CLI Description
PMX Firmware for TCR Factsheet 04
PMX TCR LoRaWAN Payload Description

Revisions

Revisions of this user manual

Rev	Date	Changes
00	2024-06-23	Initial release
01	2024-06-25	Added LoRaWAN Config Downlink Information
02	2024-07-30	Firmware V1.1 Improved text due to customer feedbacks
03	2024-09-14	Firmware V1.2 - New device types - updated default values
04	2024-10-26	Firmware V1.2.2 overlapping default values filters when using LS mode
05	2024-12-16	Moved the chapter “installation instruction” to a new document
06	2025-01-20	Moved the chapter “command line description” to a new document and entered the instruction about the PMX Setup Tool

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