



SETUP TRIMBLE R10/ R10-2 AND R12/R12I FOR EMESENT RTK

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Using this manual

Hovermap is a powerful system that can be used as a LiDAR mapping payload, but also as an advanced autopilot for drones and other platforms. We therefore recommended that you read the user manual thoroughly to make use of all its capabilities in a safe and productive way.

Disclaimer and safety guidelines

This product is *not* a toy and must not be used by any person under the age of 18. It must be operated with caution, common sense, and in accordance with the instructions in the user manual. Failure to operate it in a safe and responsible manner could result in product loss or injury.

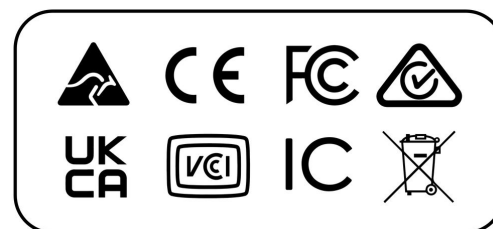
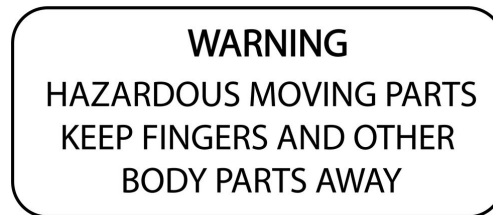
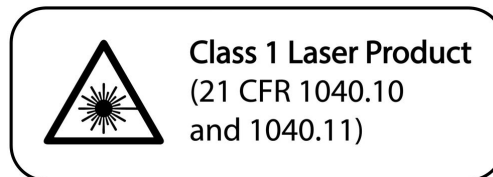
By using this product, you hereby agree that you are solely responsible for your own conduct while using it, and for any consequences thereof. You also agree to use this product only for purposes that are in accordance with all applicable laws, rules and regulations.

The use of Remotely Piloted Aircraft Systems (RPAS) may result in serious injury, death, or property damage if operated without proper training and due care. Before using an RPAS, you must ensure that you are suitably qualified, have received all necessary training, and read all relevant instructions, including the user manual. When using an RPAS, you must adopt safe practices and procedures at all times.



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- Do not attempt to disassemble, repair, tamper with, or modify the this product. This product contains no user-serviceable parts inside. Any disassembly of the product enclosure will invalidate the IP65 rating and disrupt the factory calibration of LiDAR. Contact Emesent for any repairs or modifications.
- Always be aware of moving objects that may cause serious injury, such as spinning propellers or other components. *Never* approach a drone while the propellers are spinning or attempt to catch an airborne drone.





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1. Overview

This document shows how to configure and set up supported Trimble receivers for use with Emesent's Backpack or Vehicle RTK units.

i The term "Trimble receiver", used throughout this guide, refers specifically to the devices supported by Vehicle RTK and Backpack RTK devices. Currently, these include the Trimble R12/R12i and R10/R10-2 receivers.





2. Scope

This document will not cover the setup of the Trimble receiver from scratch, connecting the receiver to the Field Controller, or connecting to a base station.

⚠ It is recommended that the receiver be configured through the Trimble web interface rather than the Trimble controllers to avoid overriding the receiver's settings.

i If 3G connectivity is unavailable in your location, you can stream corrections through your mobile device using these [instructions for the Trimble Mobile Manager](#) from the Trimble Help Portal.

3. Requirements

The following are required to set up the Trimble receiver:

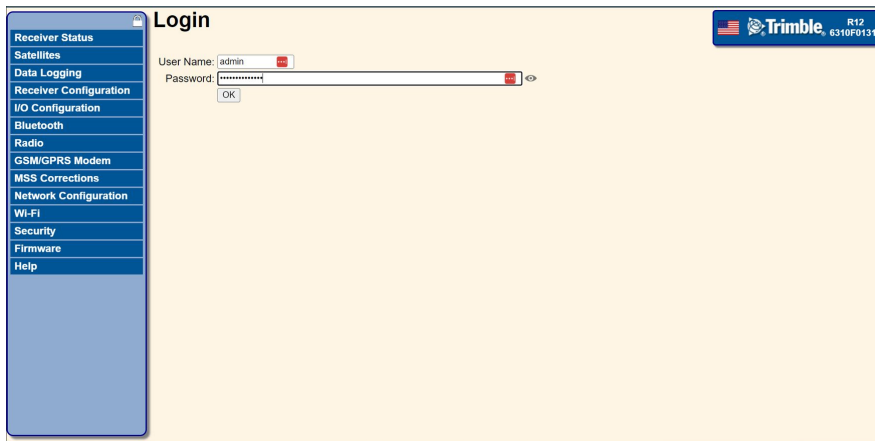
Hardware	Details
Computer	<ul style="list-style-type: none"> • PC or Laptop • Latest version of Chrome, Firefox, Safari, or Edge
Emesent RTK unit	<ul style="list-style-type: none"> • Backpack RTK • Vehicle RTK
Emesent accessories	<ul style="list-style-type: none"> • GNSS adaptor • Mounting plate
Cable	<ul style="list-style-type: none"> • Emesent Trimble GNSS cable



4. Configuring the Trimble Receiver

4.1 Connecting to the Trimble Receiver

1. Turn on the Trimble receiver then connect to the receiver's Wi-Fi network.
2. Once connected, enter **192.168.142.1** in the URL address bar on your Web browser.
3. Enter your credentials on the **Login** page.
 - a. The default username is **admin**
 - b. The default password is **password**





4.2 Checking the NMEA Installation

To avoid issues, check if the NMEA option is properly installed.

1. Go to **Receiver Status > Receiver Options** from the panel on the left. From the panel on the right, click **Option Detail** located at the bottom.

Receiver Options

Firmware Warranty Date: 2025-05-31

Precision Capability	Base	RTK	
	Rover	Precise RTK	
Frequency	Triple Frequency Tracking	Installed	
Constellation	GPS	Installed	L1-C/A, L1C, L2E, L2C, L5
	SBAS	Installed	L1-C/A, L5
	GLONASS	Installed	L1-C/A, L1P, L2-C/A, L2P, L3
	Galileo	Installed	E1, E5-A, E5-B, E5-A/BOC, E6
	BeiDou	Installed	B1, B1C, B2, B2A, B2B, B3
	QZSS	Installed	L1-C/A, L1C, L2C, L5, L6
	NavIC	Installed	L5-C/A
Correction Services	xFill	2099-12-08	Subscribed
	OmniSTAR HP/XP/G2/G4/G2+/G4+	2018-5-1	Expired
	OmniSTAR VBS	2012-7-13	Expired
Maximum Measurement Rate	20 Hz	Installed	
Communication	Bluetooth	Installed	
	Internal Radio	403-473 MHz	Rest of World
	Wi-Fi	Installed	
	GSM/GPRS Modem	Installed	
Additional Features	Inertial Navigation	Not Installed	
	Binary Outputs	Installed	
	Data Logging	6 GB	
	GNSS Subscription	Not Installed	

Option Code:

2. In the **Options** column, find **NMEA** in the list. Then in the **Installed** column, ensure an "X" is marked next to NMEA.

Receiver Options

Firmware Warranty Date: 2025-05-31
xFill Subscription: 1980-12-08 -- 2099-12-08

Option	Installed	Option	Installed	Option	Installed
GPS	X	GLONASS	X	Galileo	X
BeiDou	X	BeiDou B1C	X	QZSS	X
ALO		NavIC	X	L1C Tracking	X
QZSS L1C Tracking	X	Dual Frequency Tracking (L2)	X	L2C	X
Triple Frequency Tracking (L5)	X	QZSS LEX	X	BeiDou B3	X
Galileo E6	X	Everest	X	Maximum Measurement Rate	20Hz
Moving Base		VRS	X	HTTPS	
Dual Frequency MSS	X	CMR Input	X	No Static CMR Input	
CMR Output	X	No Static CMR Output		Force Float	
Force Float Position With Static CMR		CMRx Input	X	CMRx Output	X
RTCM Input	X	RTCM Output	X	RTCM DGNS Input	
RTCM DGNS Output		Heading Mode Only		RTK Baseline Length Limit	No Limit
NMEA	X	Binary Outputs	X	Data Logging	X
Bluetooth	X	Transmit	X	GPRS	X
Transmit High Power	X	Advanced RTCM Output		Trimcomm Login Required	X
Programmatic Interface		FW Upgrade Check		Enable 1PPS	
Sensors	X	RTK Support	X	Wi-Fi	X
Inertial Navigation		Spectrum Analyzer	X	ProPoint	X
Enhanced Security	X	-		-	

Summary

Option Code:



4.3 Configuring the NMEA Settings

Once connected, configure the NMEA settings to make sure the Trimble receiver can communicate properly with the Hovermap.

1. Go to **I/O Configuration > Port Summary** on the left panel. On the right panel, click **Serial** (under the **Type** column).
2. In the configuration window that appears, locate the two fields at the top of the page. Click on the drop-down arrow for the first field and select **Serial1/Lemo** from the list. Then for the second field, choose **NMEA**.
3. Under **Serial Port Setup**, configure the following settings:
 - Baud = 115200
 - Parity = N
 - Flow = Disabled
4. In the **Input/Output** section, you will see a list of NMEA messages. Click on the drop-down arrow beside each of the following messages and configure their settings:
 - GGA = 5 Hz
 - GSA = 5 Hz
 - GST = 5 Hz
 - ZDA = 5 Hz
 - SVG = 1 Hz



I/O Configuration

Serial / Lemo | NMEA

Baud: 115200 | Parity: N | Flow: Disabled

Input/Output

Output: NMEA-GGA (5 Hz), Output: NMEA-ZDA (5 Hz), Output: NMEA-GST (5 Hz), Output: NMEA-GSV (1 Hz), Output: NMEA-GSA (5 Hz)

NMEA

AVR: Off | GLL: Off | LLQ: Off | VHD: Off
 BPQ: Off | GNS: Off | PJK: Off | VTG: Off
 DP: Off | GRS: Off | PJT: Off | ZDA: 5 Hz
 DTM: Off | GSA: 5 Hz | REX: Off | EVT: Off
 GBS: Off | GST: 5 Hz | RMC: Off | PTMSX: Off
 GGA: 5 Hz | GSV: 1 Hz | ROT: Off | DG: Off
 G GK: Off | HDT: Off | VGK: Off

Standard

NMEA Legacy
 IEC61162-1:2010/NMEA 0183 V4.10
 Report Old Position

Variations from standard

Report max DQI=2 in NMEA GGA string
 Report max correction age 9 sec in NMEA GGA string
 Report extended information in NMEA GGA, GNS, and RMC strings
 Report GST message always as GPGST
 Report legacy talker id
 Report RTK Fixed if 1- σ estimated error is less than horizontal and vertical precision

OK | Cancel

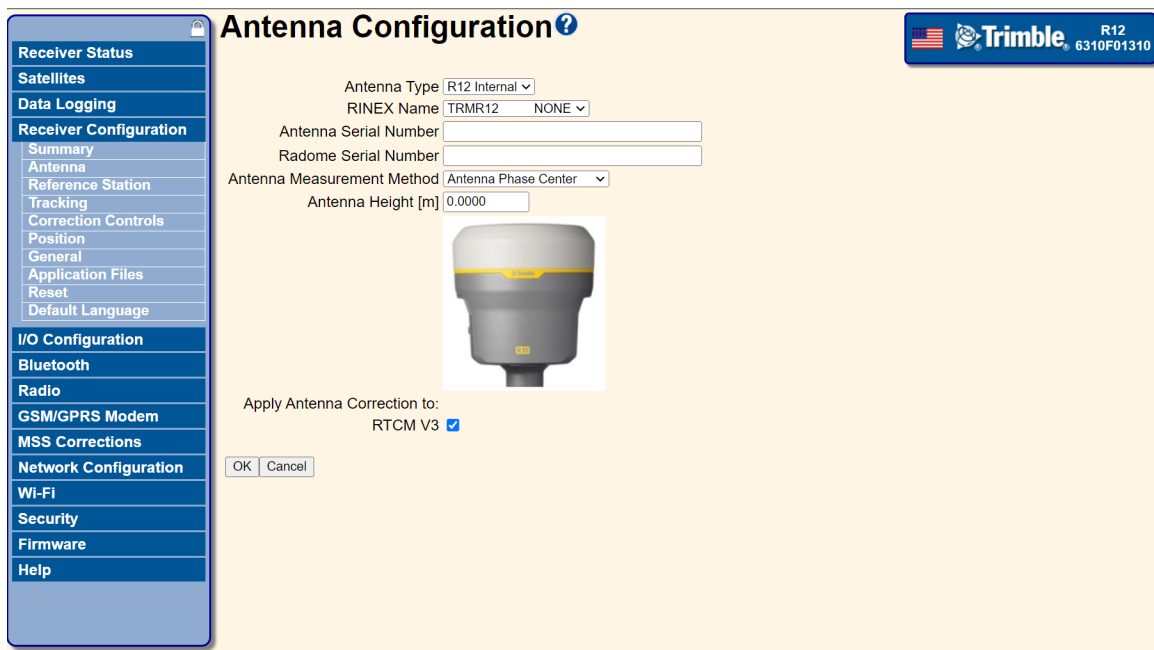
- Click **OK** to save your settings. The screenshot below shows the Port Summary page after configuration.

Type	Port	Input	Output
TCP/IP	5018	-	-
TCP/IP	28001	-	-
TCP/IP	28002	-	-
IBSS/NTRIP Client 1	-	-	-
IBSS/NTRIP Client 2	-	-	-
IBSS/NTRIP Client 3	-	-	-
IBSS/NTRIP Server 1	-	-	-
IBSS/NTRIP Server 2	-	-	-
IBSS/NTRIP Server 3	-	-	-
NTRIP Caster 1	2101	-	RTCMv2
NTRIP Caster 2	2102	-	-
NTRIP Caster 3	2103	-	-
Serial	Lemo (115K-8N1)	-	NMEA-GGA(5Hz), NMEA-ZDA(5Hz), NMEA-GST(5Hz), NMEA-GSV(1Hz), NMEA-GSA(5Hz)
Bluetooth	1	-	-
Bluetooth	2	-	GSOF(10Hz)
Bluetooth	3	-	-
USB	-	-	-
Radio	-	-	-



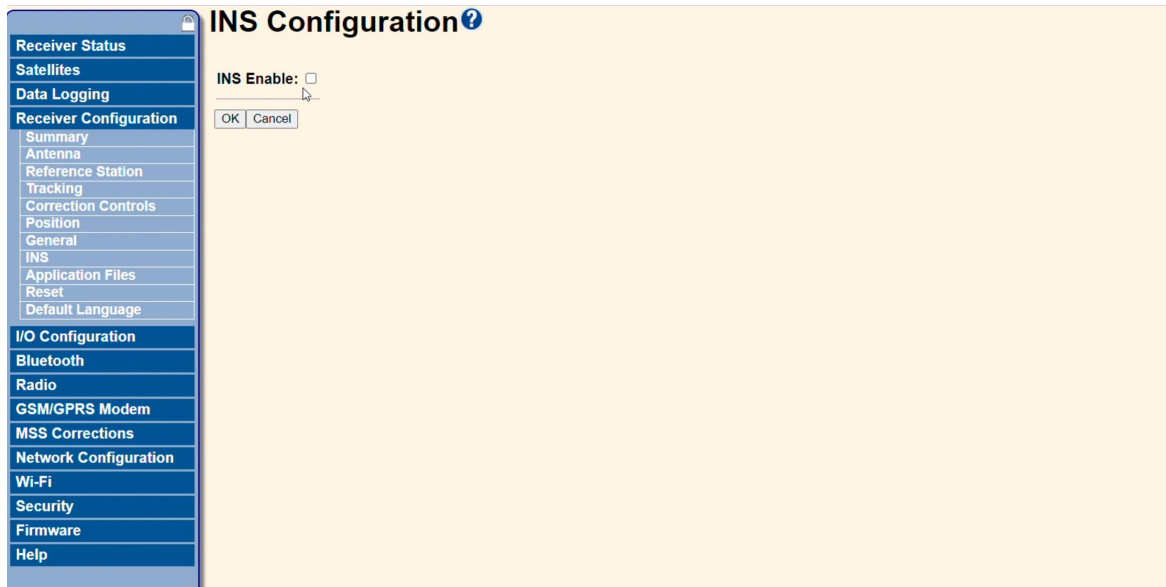
4.4 Configure the Tilt and Antenna Height

1. Go to **Receiver Configuration > Antenna** on the left panel.
2. From the available options on the right panel, configure the following settings:
 - Antenna Measurement Method = Antenna Phase Centre
 - Antenna Height = 0.000



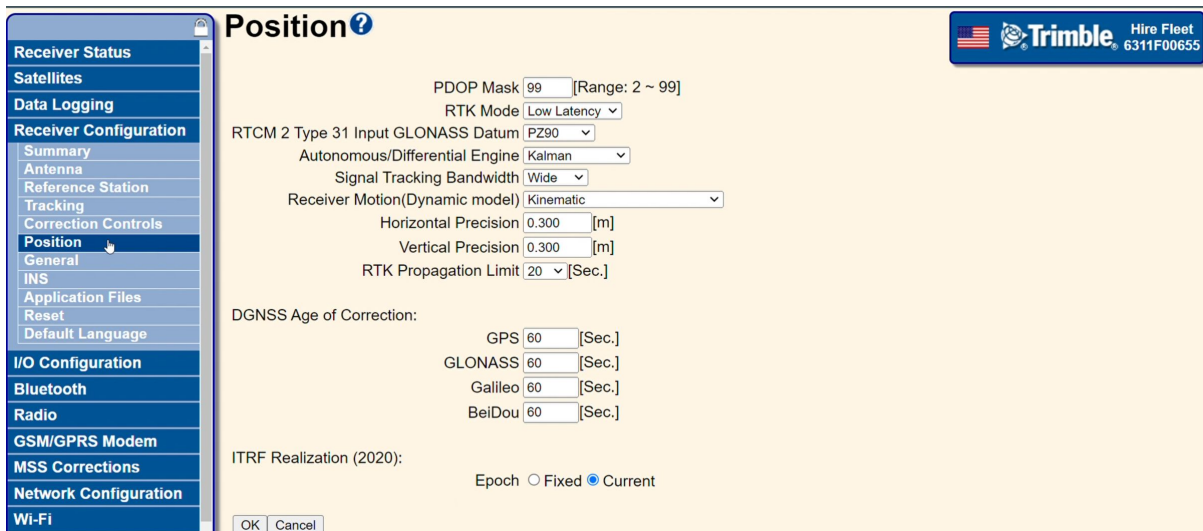
4.4.1 Using Tilt Compensation

If the **Antenna Height** is set to **0.000**, tilt compensation settings will not apply. However, it is still recommended to disable tilt compensation for optimal performance. To do this, go to **Receiver Configuration > INS** then unselect the **INS Enable** option, then press **OK** to save the settings.



4.4.2 Receiver Motion Profile

If your Trimble receiver is mounted on a vehicle, to get the best results make sure that **Receiver Motion** is set to **Kinematic** or another appropriate model. This setting can be found under **Receiver Configuration** > **Position**. Click **OK** to save the setting.





5. Connecting to Hovermap

1. Attach the Hovermap and Trimble receiver to the Vehicle RTK or Backpack RTK unit. Refer to the <https://4999118.hs-sites.com/en/knowledge/vehicle-rtk-user-manual> and <https://4999118.hs-sites.com/en/knowledge/backpack-rtk-user-manual> for instructions.



When using the R12, use the Trimble 50mm quick-release spacer and the 100mm Emesent spacer to ensure the correct offset.





2. Once attached, plug the GNSS adaptor cable into the RTK mount and fasten the adaptor to the magnetic plate.



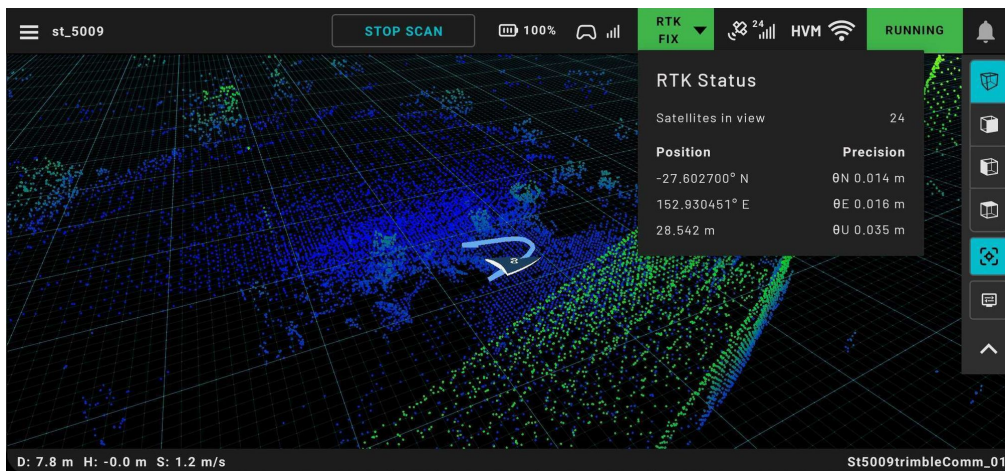
3. Plug the Trimble cable with the wire loop into the receiver and the other end (Black Lemo) into the **Adaptor** port. The Trimble receiver should now be set up to work with your Vehicle RTK or BackpacIRTK unit.





6. Monitoring RTK Status

The **Emesent Commander** application provides clear visibility of the RTK status before and during the mission. This enables you to monitor RTK quality without leaving the app to check for information via Trimble's native application.



i If the settings are configured correctly and the Trimble receiver is properly connected, Emesent Commander will display the Position and Accuracy without errors. Any communication errors are displayed as a warning notification in the app.

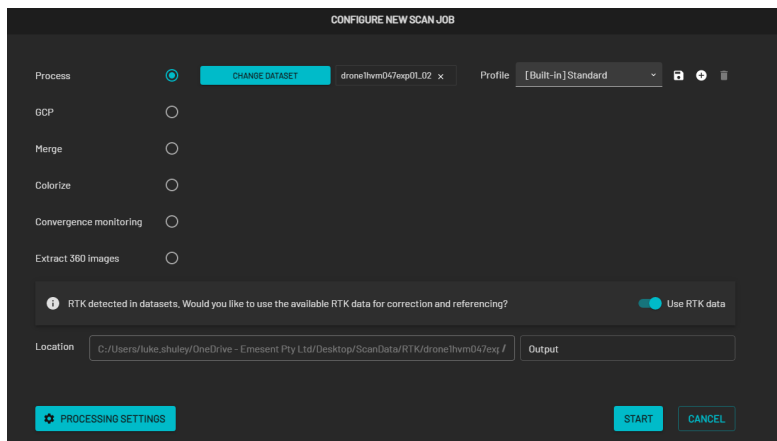
⚠ Hovermap cannot detect an incorrectly set antenna height so ensure it is properly configured.



7. Processing RTK Data

i You must have **Emesent Aura version 1.8** or newer to process Trimble RTK data.

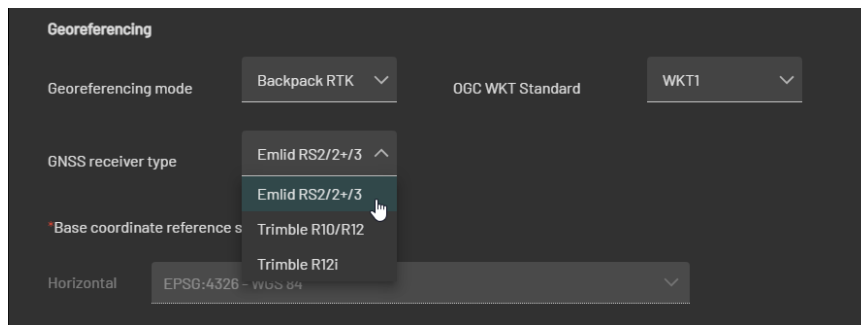
1. Open Emesent Aura and in the **Process** tab, click **Process Scan**.
2. In the **Configure New Scan Job** panel, select the **Process** workflow.
3. Click **Add Dataset** then browse for the folder that contains the raw RTK data to be processed. Select that folder.
4. You will be prompted once RTK data is detected in your dataset. Toggle on **Use RTK data**.



5. In the **Location** field, enter the preferred name for the output folder. A subfolder is created, which stores all the processed results and data.

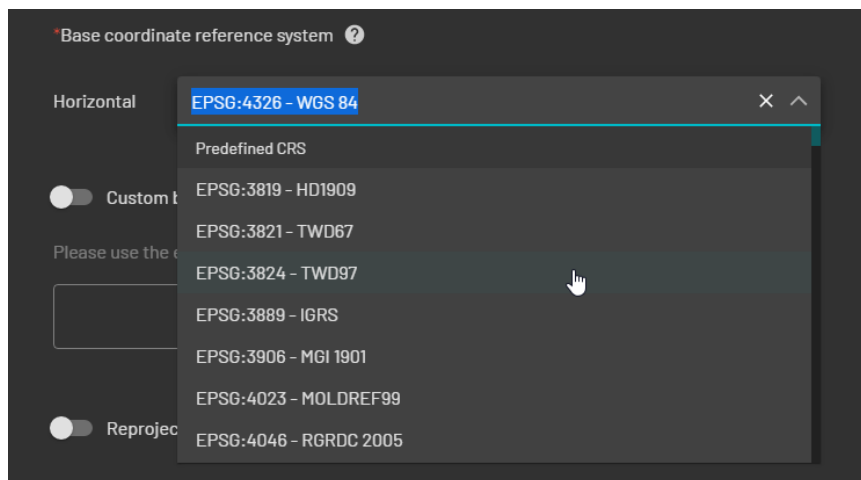


- Click **Processing Settings**. Under **Georeferencing** in the **General** tab, select the RTK device and GNSS receiver used to capture the RTK data.



For optimal results, ensure that the **Georeferencing mode** and **GNSS receiver type** match the hardware used during data collection. While the resulting point cloud remains usable, the accuracy may be affected.

- Under **Base coordinate reference system**, set the Coordinate Reference System in which the data was originally collected. This information is essential for accurate transformations and reprojections to the target CRS if you are reprojecting the point cloud.



- Click **Save** to apply the settings and return to the main screen. Then, click **Start** to process the scan.



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