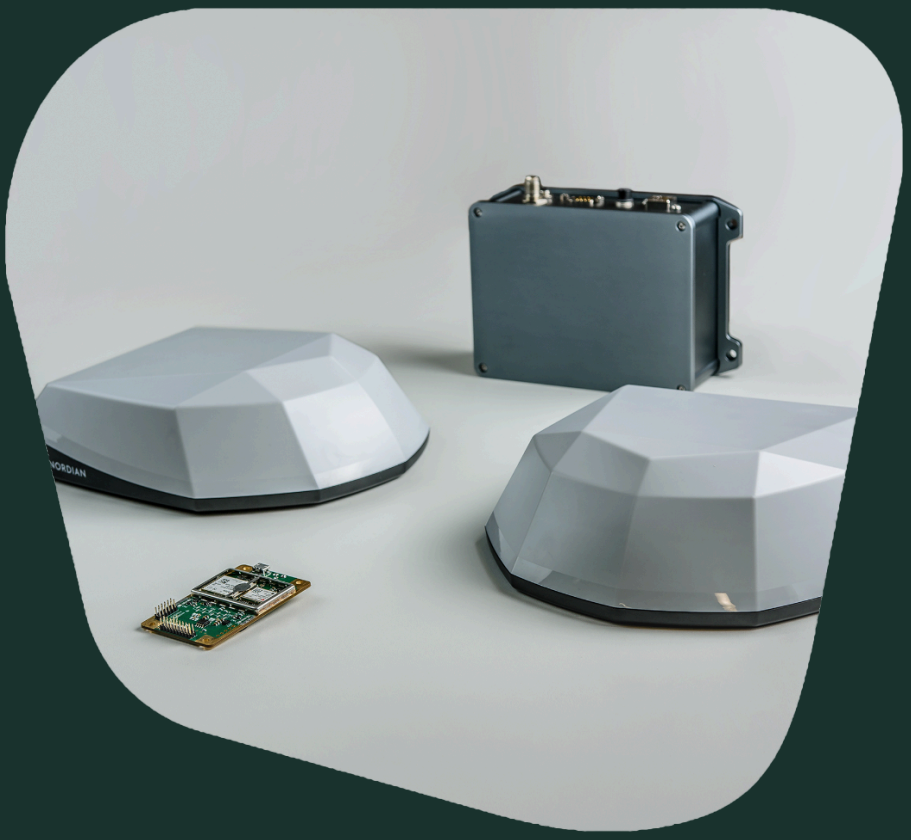
Nordian

# Firmware Release Notes

Firmware Version 2.9.9



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# Firmware Updates FW 2.9.9

**Release Date**: June 30th, 2025

## Release Notes

## General information

Improved antenna position handling with separate rear/center compensation, faster and more accurate reverse detection, and enhanced tilt calibration.
**Applicable Products**: PXULT, PXOEM, PXRTK and SXRTK
**Firmware Version**: FW 2.9.9

## New Features

- **Antenna Position Configuration**

  The system now supports independent antenna compensation for rear and center positions using the $ANTENNA_POSITION STATE ENABLE COORDINATES REAR/CENTER command—simply leave the second value empty to enable both simultaneously.

## Feature Improvements

- **Antenna Position**

  The Antenna Position algorithm has been enhanced to provide greater accuracy and responsiveness. These improvements result in more reliable position compensation and contribute to overall better system performance during dynamic operation.

- **Reverse Detection**

  The algorithm for detecting when the vehicle is in reverse is now significantly faster and more responsive.

- **Tilt Compensation**

  The Tilt Compensation algorithm has been improved with the addition of gyroscope-based correction, resulting in more accurate and stable calibration.

# Firmware Updates FW 2.9.8

**Release Date**: May 29th, 2025

## Release Notes

## General information

The latest firmware release introduces the Soft Intelligence feature, allowing scalable GNSS accuracy through three configurable modes: enhanced (P1) and high precision (P2), with a demo option to temporarily test P2-level performance. New serial commands have been added to configure the minimum GNSS signal quality, identify hardware faults, and check demo mode status. Tilt and terrain parameters are now adjustable via CAN.
Improvements include more stable true heading output, and localization-based MQTT correction topics. Certain defaults have changed, such as disabling the DGNSS_ONLY output and speed filter on PXOEM.
**Applicable Products**: PXULT, PXOEM, PXRTK and SXRTK
**Firmware Version**: FW 2.9.8

## New Features

- **Soft Intelligence**

  This firmware introduces the Soft Intelligence feature, enabling scalable GNSS performance through configurable precision levels. The system can operate under three defined accuracy modes, allowing seamless adaptation to different operational requirements and infrastructure availability:

  **P1** – Enhanced Accuracy: Can be activated with the updating to this firmware version of the product. Provide 40 cm RMS and 10 cm pass-to-pass accuracy.

  **P2** – High Precision: Also offered as a purchasable upgrade. Achieves 3 to 6 cm RMS and 2 cm pass-to-pass accuracy.

  **Demo Mode** – P2 Level Evaluation: A temporary P2-level precision mode can be activated for evaluation and testing purposes, with a configurable duration of 1 to 5 days. Demo mode can be initiated from P1 mode and is intended to showcase high-precision performance before subscription plan activation.

- **New Command – GNSS Minimum CNo Configuration**

  A new serial command allows users to configure the minimum GNSS carrier-to-noise ratio (CNo), helping filter out low-quality satellite signals and improve overall position reliability.

- **New Command – Hardware Fault Reason Identification**

  A dedicated serial command now provides information about the last detected hardware fault, assisting in faster diagnostics and troubleshooting.

- **New Commands – DEMO Status Request**

  Added support for the groups SOFT_INTELLIGENCE and LBAND to request the status of DEMO.

- **Tilt and Terrain Configuration via CAN**

  Tilt and terrain compensation parameters are now configurable via the CAN configuration protocol.

# Feature Improvements

- **True Heading Output Stability Enhancements**

  Algorithmic refinements result in smoother and more consistent heading output in dynamic environments.

- **DGNSS_ONLY Output Disabled by Default**

  Now the correction output DGNSS_ONLY is disabled by default.

- **Improved NMEA Message Robustness**

  Addressed an issue affecting the consistency of NMEA messages, reducing the occurrence of incomplete or invalid data fields.

- **SPEED FILTER Disabled by Default (PXOEM)**

  Default configuration for PXOEM variants now disables the speed filter.

- **Localized MQTT Correction Topic**

The default MQTT correction topic is now generated based on device localization parameters.

- **IMU Configuration Status Fix (PXOEM)**

  Corrects an issue affecting the reporting of IMU configuration status in PXOEM models.

# Firmware Updates FW 2.9.1

**Release Date**: April 22th, 2025

## Release Notes

## General information

Improvements on CAN Protocol data processing, enhancing its reliability.
**Applicable Products**: PXULT, PXOEM, PXRTK
**Firmware Version**: FW 2.9.1

## Feature Improvements

- **CAN Protocol:**

  Now CAN Protocol data processing is more stable and reliable.

# Firmware Updates FW 2.9.0

**Release Date**: April 16th, 2025

## Release Notes

## General information

This update brings enhanced precision and flexibility, introducing several key improvements. LBAND corrections are now enabled by default, ensuring more reliable positioning. The Reference Station ID is fully configurable (0–4095) for both GGA and NMEA2000 PGN129029, offering greater adaptability. NMEA2000 messages now support priority and source address customization, providing better control over data transmission. Additionally, the Course over Ground (CoG) output includes compensation for the distance from the rear axle, refining heading accuracy when the GNSS antenna is positioned ahead of it. To further enhance positioning accuracy, a new antenna compensation configuration has been introduced.

**Applicable Products**: PXULT, PXOEM, PXRTK

**Firmware Version**: FW 2.9.0

## New Features

- **Antenna position and Course Over Ground Compensation**

  A new group called ANTENNA_POSITION has been created, enabling users to set the longitudinal distance to the vehicle's rear axis and the transversal distance to the vehicle's longitudinal central axis. This configuration allows for accurate position. Also, adjusting this value enables a compensation that improves CoG accuracy when the GNSS antenna is not positioned at the rear axle.

- **Configurable Reference Station ID:**

  Creation of a new CORRECTION subgroup called REF_STATION_ID, that allows the Reference Station ID value from messages GGA (NMEA0183) and PGN129029 (NMEA2000) to be configurable from 0 to 4095. This configuration is available via Serial Configuration Protocol.

- **Configurable Priority and Source Address for NMEA2000**

Now it is possible to to configure the priority of each NMEA2000 message and the source address of all messages via Serial and CAN Configuration Protocol.

# Feature Improvements

- **Correction via LBAND Enabled by Default:**

  The CORRECTION group has been updated and now its STATE is enabled by default.

# Firmware Updates FW 2.8.2

**Release Date**: March 13th, 2025

## Release Notes

## General information

This firmware improves the NMEA 2000 message PGN 129025.
**Applicable Products**: PXULT, PXOEM, PXRTK
**Firmware Version**: FW 2.8.2

## Feature Improvements

#### 1. Improved NMEA 2000 PGN 129025:

This firmware update addresses an improvement with the NMEA 2000 PGN 129025 message, where latitude and longitude values were not being correctly transmitted. The updated firmware ensures that these position values are now accurately formatted and reported, improving compatibility with NMEA 2000-compliant systems and enhancing overall navigation performance.

# Firmware Updates FW 2.8.1

**Release Date**: March 11th, 2025

## Release Notes

## General information

This firmware improves the robustness of the heading output when operating in TRUE_HEADING mode.

**Applicable Products**: PXULT, PXOEM, PXSTD

**Firmware Version**: FW 2.8.1

## Feature Improvements

**1. Improved robustness of TRUE_HEADING output:**

The firmware now ensures an RTK fix on the Rover antenna before validating the heading output. Additionally, it adds output filtering to maintain a stable heading display, even during fluctuations in heading availability.

# Firmware Updates FW 2.8.0

**Release Date**: February 28th, 2025

## Release Notes

## General information

This firmware adds new NMEA 2000 and NMEA 0183 messages, making it possible to change serial data bits, parity, and stop bits, enhances overall GNSS features, and introduces the advanced Scintillation algorithm for improved performance. It also implements a new CAN configuration protocol for specific product groups and two new serial configuration groups: CAN_CONFIG_PROTOCOL and SCINTILLATION.
**Applicable Products**: PXULT, PXOEM
**Firmware Version**: FW 2.8.0

## New Features

**1. New NMEA 2000 messages:**

This implementation introduces PGN 127251, PGN 128001, PGN 129540, PGN 130312 and PGN 130578.

**2. New NMEA 0183 message:**

This firmware version introduces the NMEA 0183 GPGRS message, enhancing system capabilities by providing detailed GNSS residuals for improved position accuracy and diagnostic insights.

**3. Scintillation Algorithm:**

The firmware now includes Scintillation, an algorithm that detects and mitigates ionospheric disturbances affecting satellite navigation, improving both positioning accuracy and signal stability. This phenomenon is stronger in polar and equatorial regions, peaking 2 to 6 hours after sunset, while being less relevant in mid-latitude regions like Europe and North America. It can be configured through the new serial configuration protocol SCINTILLATION and the commands can be found in the version interface manual.

**4. Configuration Protocol via CAN (Controller Area Network):**

The product now supports configuration via CAN, with a message type compatible with J1939 protocol, with configurable priority and source address. This enables greater flexibility and seamless integration—while still maintaining Serial configuration support. The following groups are supported for CAN configuration: NMEA0183, NMEA2000, TRUE_HEADING, COM, CAN_CONFIG, CAN_LOGGER, INFO and CORRECTION.

**5. CAN_CONFIG_PROTOCOL Serial Configuration Protocol Group Added:**

The CAN_CONFIG_PROTOCOL group allows users to modify and define the ID field of the J1939 protocol.

**6. SCINTILLATION Serial Configuration Protocol Group Added:**

The SCINTILLATION group allows users to enable or disable the scintillation algorithm and configure its main functionality.

**7. Serial COM configuration commands**

This new functionality makes it possible to change serial data bits to 7, 8, or 9 bits, to add odd or even parity control, and to choose between 0.5, 1, 1.5, and 2 stop bits.

# Feature Improvements

**1. Improved GNSS Accuracy and Reliability:**

Now the firmware refines RTK accuracy, strengthens satellite tracking, and boosts signal reliability. It introduces advanced jamming detection, accelerates reconvergence, and enhances Galileo security, Beidou compatibility, and overall system stability—delivering a sharper, more dependable GNSS experience.