Ellipse Series

Product Change Notice

This notice is intended to provide information regarding a major firmware release for the **Ellipse v3** product family including the associated changes and their implications for your upcoming orders.

1. Impacted products

This update concerns only Ellipse Boxed and OEM with a hardware code ≥ 3.0.

Below is the list of affected products.

P/N	Product name
100-2422	ELLIPSE-D | Marine INS - GNSS RTK
100-2423	ELLIPSE-D | Marine INS - GNSS RTK - CAN
100-2424	ELLIPSE-D | Land Air INS - GNSS RTK
100-2425	ELLIPSE-D | Land Air INS - GNSS RTK - CAN
100-2426	ELLIPSE-D | High Dynamics INS - GNSS RTK
100-2427	ELLIPSE-D | High Dynamics INS - GNSS RTK - CAN
100-2428	ELLIPSE-D | OEM Marine INS - GNSS RTK
100-2429	ELLIPSE-D | OEM Land Air INS - GNSS RTK
100-2430	ELLIPSE-D | OEM High Dynamics - GNSS RTK
100-2489	ELLIPSE-A | Marine AHRS
100-2490	ELLIPSE-A | Marine AHRS - CAN
100-2491	ELLIPSE-A | Land Air AHRS
100-2492	ELLIPSE-A | Land Air AHRS - CAN
100-2493	ELLIPSE-A | High Dynamics AHRS
100-2494	ELLIPSE-A | High Dynamics AHRS - CAN
100-2495	ELLIPSE-E | Marine INS - Ext. GNSS
100-2496	ELLIPSE-E | Marine INS - Ext. GNSS - CAN
100-2497	ELLIPSE-E | Land Air INS - Ext. GNSS
100-2498	ELLIPSE-E | Land Air INS - Ext. GNSS - CAN

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100-2499	ELLIPSE-E | High Dynamics INS - Ext. GNSS
100-2500	ELLIPSE-E | High Dynamics INS - Ext. GNSS - CAN
100-2501	ELLIPSE-N | Marine INS - GNSS RTK
100-2502	ELLIPSE-N | Marine INS - GNSS RTK - CAN
100-2503	ELLIPSE-N | OEM Marine INS - GNSS RTK
100-2504	ELLIPSE-N | Land Air INS - GNSS RTK
100-2505	ELLIPSE-N | Land Air INS - GNSS RTK - CAN
100-2506	ELLIPSE-N | OEM Land Air INS - GNSS RTK
100-2507	ELLIPSE-N | High Dynamics INS - GNSS RTK
100-2508	ELLIPSE-N | High Dynamics INS - GNSS RTK - CAN
100-2509	ELLIPSE-N | OEM High Dynamics - GNSS RTK
100-2581	ELLIPSE-A | OEM Marine
100-2582	ELLIPSE-A | OEM Land Air
100-2583	ELLIPSE-A | OEM High Dynamics
100-2584	ELLIPSE-E | OEM Marine INS - Ext. GNSS
100-2585	ELLIPSE-E | OEM Land Air INS - Ext. GNSS
100-2586	ELLIPSE-E | OEM High Dynamics INS - Ext. GNSS

The change is a major software update without hardware modifications. Therefore, it does not result in a change to the hardware version or part number.

2. Description of the change

This update introduces the Firmware v3.x for the Ellipse product line. It brings significant improvements in performance, reliability, and new features.

The major changes are listed below.

2.1   New firmware architecture

Firmware v3 introduces a thorough redesign of critical low-level components, providing a stronger and more stable foundation. These technical improvements enhance system stability, reliability, and overall performance.

2.2   Modern navigation and heave algorithm

The sensor fusion algorithms have been upgraded to more modern and advanced versions. The new algorithms focus on providing reliable, robust and stable orientation, position and velocity.

The main features of these latest generation algorithms are:

- **Improved accuracy and resilience:** the new algorithms provide enhanced precision and are more resistant to environmental changes and varying conditions.
- **Optimized AHRS algorithm:** tailored for accurate orientation in AHRS mode (without GNSS), even in dynamic conditions.
- **Magnetometer enhancements:** redesigned to improve performance during GNSS outages and to resist interference from magnetic disturbances.
- **Advanced heave filter:** the updated filter delivers improved performance in rough sea conditions and computes the solution at the vessel's center of rotation for improved accuracy.

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- **Standard deviation refinement**: Standard deviation values now better represent actual errors, offering a more accurate characterization of uncertainty, even if the reported values may, at times, appear higher.

2.3   New features

This change introduces several enhancements around the user experience and new capabilities, such as:

- **REST API for configuration**: the newly added REST API simplifies the configuration process of the Ellipse for Software integrators. While traditional configuration methods remain supported, certain new features are exclusively accessible via the REST API.
- **JSON-based settings format**: the outdated, non-human-readable binary format has been replaced with a more user-friendly JSON format for settings management.
- **Higher data output rates**: up to 1 kHz for IMU and INS data.
- **Increased serial baud rate**: the serial baudrate now supports up to 2Mbps.
- **Deported output point**: this new feature allows defining custom output monitoring points offering greater flexibility for system integrators.
- And much more…

2.4   Revised features

As part of the new v3 Firmware, two features have been reevaluated and adjusted:

- **Air data integration**: the internal barometer and external air data input have been temporarily disabled within the filter. However, external air data input remains available for logging purposes. Algorithm fine-tuning is underway, and this feature will be reintroduced in a future Ellipse firmware release, planned for 2025, with significantly improved accuracy and robustness.
- **Aiding lever arms**: in previous firmware versions, the algorithms continually evaluated GNSS, odometer, and DVL lever arms. However, this approach has shown limited benefits. In the new firmware, this constant evaluation has been removed to enhance robustness and accuracy. As a result, **lever arms will now require more precise configuration**. To assist our clients, we will provide a free lever arm estimation tool to ensure accurate setup. A dedicated user guide and additional communication will be provided.

3. Impact of change

SBG Systems has taken all actions to facilitate a smooth transition for all users upgrading to Firmware v3.x

3.1   Operational impact and recommended actions

The changes introduced in Firmware v3.x bring significant enhancements to the performance, robustness, and reliability of the Ellipse under all operating conditions compared to previous versions.

Due to the substantial nature of these updates, it is strongly recommended to requalify the firmware within your specific setup to ensure optimal integration. As part of these improvements, certain indicators and conventions have been revised. If utilized, adjustments to your integration may be required:

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- **Revised standard deviation calculation**: The algorithm has been updated to more accurately reflect solution accuracy. Integrators who rely on this metric should review and adjust their thresholds accordingly, as standard deviation values may appear higher in this version. This change does not indicate reduced precision but rather a more accurate representation of actual errors.
- **DVL convention update**: Previously, only DVLs using the ENU convention were supported, necessitating internal conversions since SBG products operate in the NED frame. With Firmware v3.x, the Ellipse now natively supports both NED and ENU conventions. Consequently, DVL aiding configuration has been updated to align with this improvement. Users should consult the updated documentation for detailed implementation guidelines.

In addition to these specific changes, the new algorithms may alter the overall behavior of the Ellipse. For instance, they may now accept or reject certain aidings (e.g., GNSS position or heading, magnetic heading) differently than in previous versions. Users are encouraged to carefully test and verify the behavior of their setup under the new firmware.

3.2   Compatibility impact

SBG Systems has made efforts to ensure Firmware v3 remains fully compatible with existing integrations. However, some reserved fields in certain messages have been utilized to introduce new features without disrupting current implementations.

Users are encouraged to refer to the updated sbgECom documentation for detailed information.

3.3   User configuration

Following the firmware upgrade, your existing settings will be preserved. They will either be migrated as-is or replaced with equivalent configurations to ensure the integrity of your integration.

Users are encouraged to refer to the migration guide documentation for detailed information.

3.4   Downgrade possibility

If needed, downgrading from Firmware v3 to a previous version is fully supported. However, please note that the device settings will be set to default and your settings will be lost.

3.5   Availability and firmware transition

A public release candidate version of firmware v3 is available since the 5th of December enabling you to qualify the updated algorithm. The stable version will be available on March 18th.
Effective April 23rd, 2025, all Ellipse units will be delivered with firmware v3.x as the default configuration.

3.6   Ordering information and repair policy

There will be no changes to the part numbers associated with the Ellipse product line. You can continue to order from the part numbers you are already familiar with.

In the event that a product is returned for repair, SBG Systems reserves the right to perform upgrades automatically if necessary.

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4. Point of contact

If you have any concerns or require further clarification regarding this change, please do not hesitate to reach out to our customer support team by e-mail or phone.

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