RT3000 v4

QUICK START GUIDE

GNSS/INS for accurate localisation, even in harsh environments.

OXTS

Install the RT3000 v4 in your vehicle

Step 1. Mount the RT3000 v4

+ Ensure that the RT3000 v4 device is mounted rigidly to the vehicle.

Step 2. Position the antenna(s)

+ Mount the antenna(s) to the highest point on the vehicle with the clearest view of the sky. These should be at least 20 cm from the roof edge.

+ If using dual antenna these will be at least 1 m apart and the cables must exit in the same direction.

Step 3. Connect the cables

+ Ensure all the required ethernet, serial, CAN, triggers and power connections are in place.

Step 4. Supply power

+ Use a UPS or, if available, the vehicle supply directly.

Step 5. Set-up IP connection to device

+ Ensure your PC's IPv4 address settings enable you to connect via ethernet to configure the unit. Please see the OxTS support article 'connecting to an OxTS INS using ethernet' for more information.

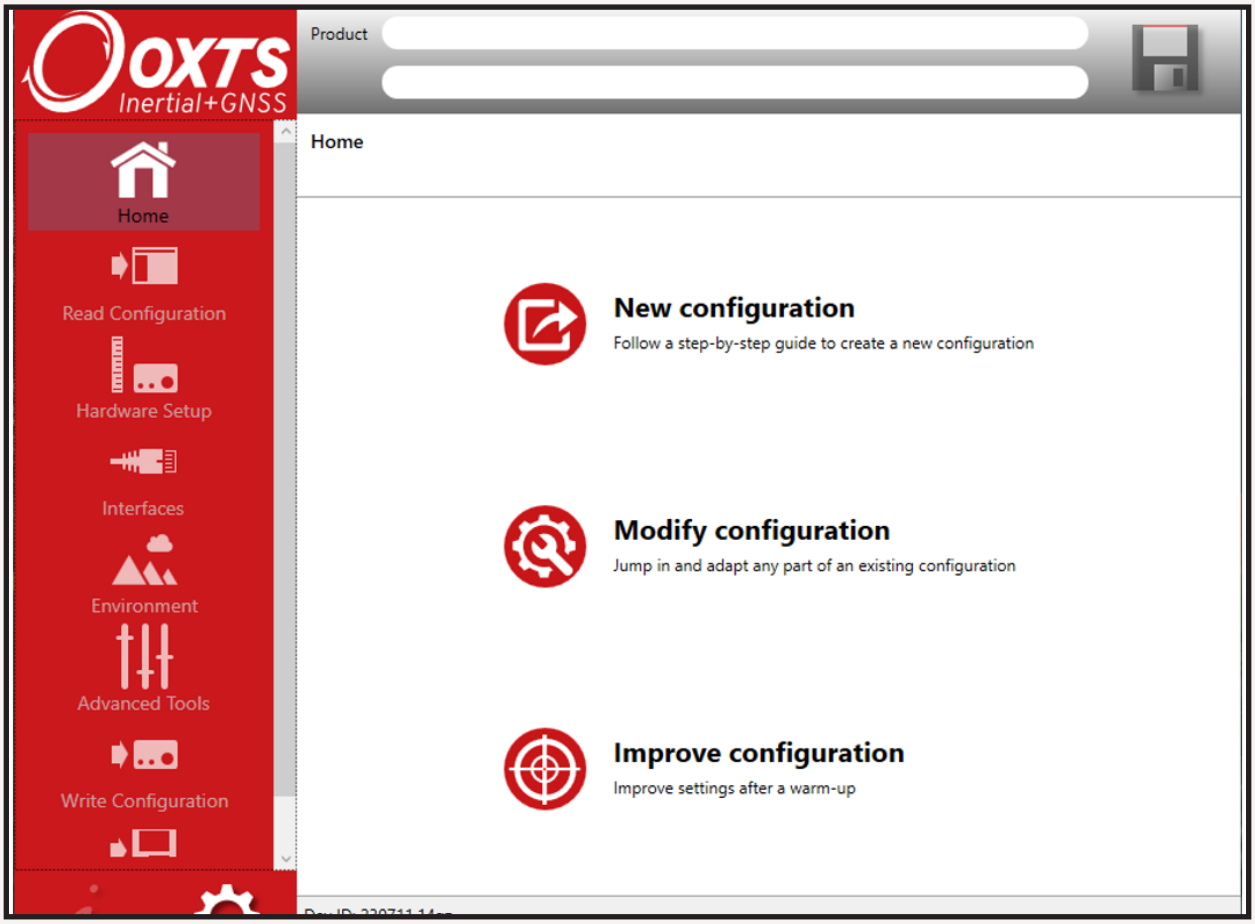
+ By default, the IP address will be 192.168.25.XX where the last two digits are the same as the last two digits of the device's serial number.

Configuring the RT3000 v4

OxTS units are configured using the NAVconfig application in NAVsuite. To begin, click 'New configuration' and then select your device from the drop down menu and vehicle type.

There are four sections that you will need to work through in order to configure the RT3000 v4 device:

+ Hardware Setup
+ Interfaces
+ Environment
+ Advanced Tools



Hardware Setup

This section considers how the device is orientated on the vehicle and where the antennas are located.

- **IMU orientation** - set the Y&Z axes of the device within the vehicle.
- **Antenna lever arms** - XYZ position to primary and secondary (if applicable) antennas.
- **Lateral/vertical advanced slip** - distance to steered and non-steer axles if mounted on a four wheeled vehicle. This helps to improve heading and constrain drift.
- **Differential corrections** - select source of GNSS differential correction if RTK is required (skip if using PPK).

Interfaces

This section considers what real-time data outputs are required from the unit.

- Ethernet
- CAN
- Serial (RS232)
- Input and output triggers
- PTP

Environments

This section considers the environment in which the unit will be operating.

- **Initialisation** - determines the point at which the unit will start producing trajectory data.

  For dual antenna on a drone, static initialisation is recommended. For all other scenarios, dynamic initialisation is recommended. The dynamic initialisation speed must be passed moving forwards in a straight line.

- **Environment**- considers how good the GNSS environment is during operation. If this is set to frequent obstructions, this will put less trust in GNSS observations.
- **Vibration -** considers how significant the vibrations are on the unit. If set too high, this will reduce trust in the IMU measurements.

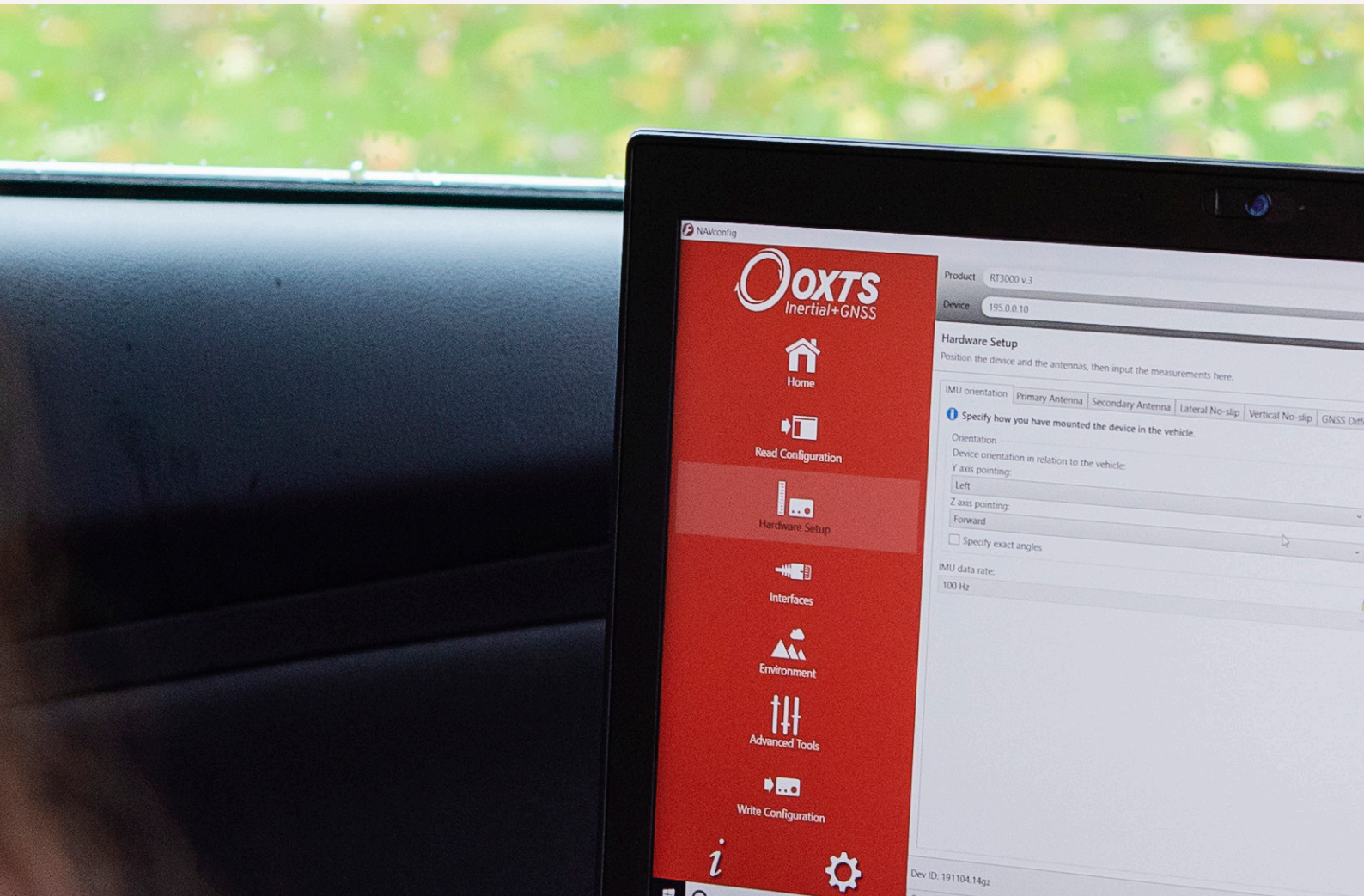
Advanced Tools

This section considers any advanced tools that may be required from the unit. None of these settings need to be changed or enabled. Options include:

- **GNSS algorithm -** this is recommended to be set to mixed mode as standard.
- **Coordinate system -** datum and altitude reference model required.
- **Displaced output -** set the output to a different location on the vehicle. If using this option, accelerations will increase in amplitude due to angular rates being propagated over a distance.
- **Commands** - if any advanced commands need to be added to the config write them in this box.

Commit

Once you are happy with the configuration, press 'commit' on the write configuration page. This will send the configuration to the device and initiate a reboot. The new configuration will be applied once booted again.



Installation optimisation

We recommend you perform an installation optimisation run each time you install the RT3000 v4 within the vehicle. This procedure eliminates errors in your alignment and lever arm measurements and enables your RT3000 v4 more readily on all future data collections.

You can optimise your installation using real-time data, if you are using RTK corrections, or in post-process if you are not. The process is slightly different for each option. We cover both here. Choose the one that's best for you.

Option 1: Installation optimisation with RTK corrections.

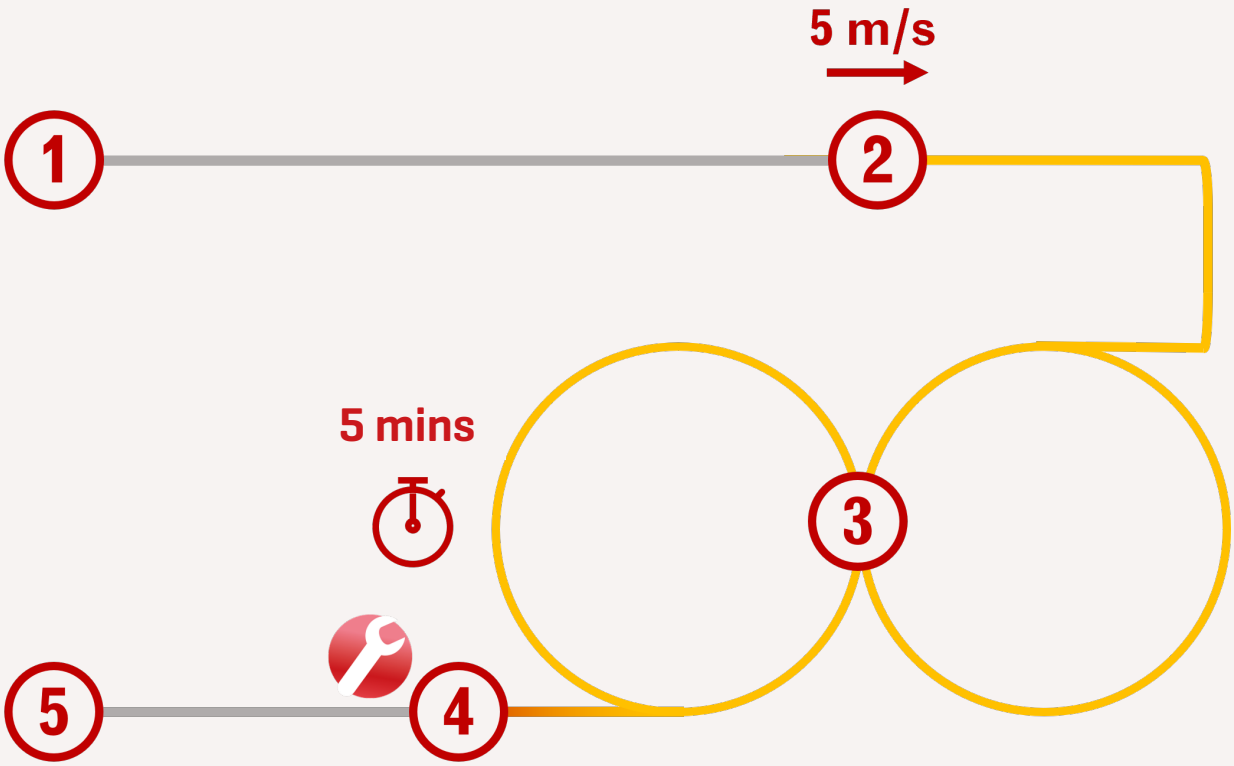
1, **Power on -** Ensure the RT3000 v4 is powered on and tracking satellites so that it is ready to initialise. The Status LED on the device will be red. NAVdisplay will show a number of satellites being tracked.

2, **Initialise -** Move in a straight line with good visibility of the sky, accelerating through your set initialisation speed. The default is 5 m/s (18 km/h or 11.2 mph).

3, **Warm Up -** Move the vehicle in a number of figure of 8s. Complete several figures-of-eight manoeuvres in your vehicle, braking into turns and accelerating out. Move the vehicle in a circle at a fixed speed, and decrease the radius of your turns in both clockwise and anti-clockwise directions.

4, **Improve configuration** - follow the "improve configuration" workflow in NAVsuite to tighten alignment and leaver arm measurements.

5, **Power down -** disconnect the unit from power. The next time you use the RT3000 v4, no more than three minutes of low dynamics movement will be required for it to perform to specification.



Option 2: Installation optimisation with PPK corrections.

1, **Power on -** Ensure the RT3000 v4 is powered on and tracking satellites so that it is ready to initialise. The Status LED on the device will be red. NAVdisplay will show a number of satellites being tracked.

2, **Initialise -** Move in a straight line with good visibility of the sky, accelerating through your set initialisation speed. The default is 5 m/s (18 km/h or 11.2 mph).

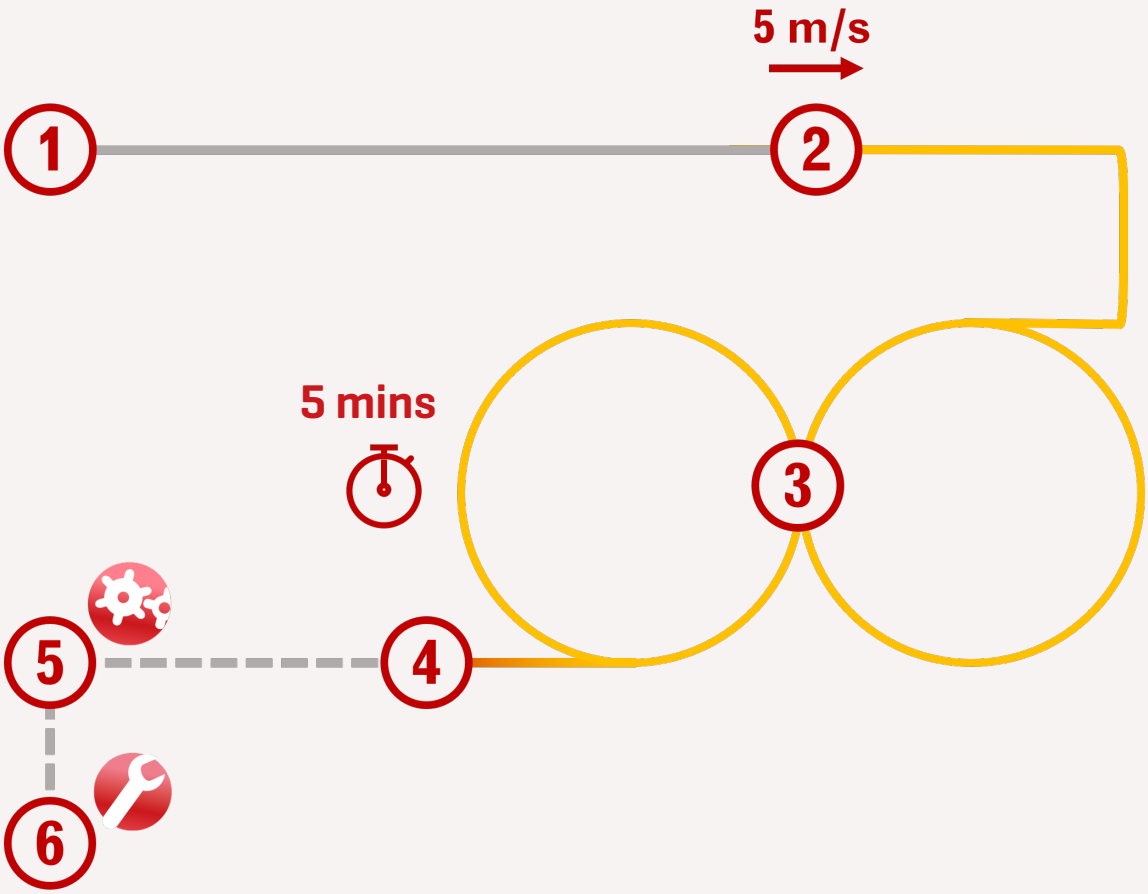
3, **Warm Up -** Move the vehicle in a number of figure of 8s. Complete several figures-of-eight manoeuvres in your vehicle, braking into turns and accelerating out. Move the vehicle in a circle at a fixed speed, and decrease the radius of your turns in both clockwise and anti-clockwise directions.

4, **Power down -** Disconnect the unit from power until you return to your workstation.

5, **Add PPK corrections** - Open NAVsolve and follow the workflow to add your RINEX file(s) to the raw data file (.RD) for your installation optimisation data collection and produce a corrected .NCOM file.

This process is outlined in more detail here: https://support.oxts.com/hc/en-us/articles/115003212489-Differential-corrections-on-OxTS-units-RINEX-files-in-post-processing

6, **Improve configuration** - Follow the "improve configuration" workflow in NAVconfig to tighten alignment and leaver arm measurements. The next time you use the RT3000 v4, no more than three minutes of low dynamics movement will be required for it to perform to specification.



Data collection procedure

1, **Power on -** Ensure the RT3000 v4 is powered on and tracking satellites so that it is ready to initialise. The Status LED on the device will be red. NAVdisplay will show a number of satellites being tracked.

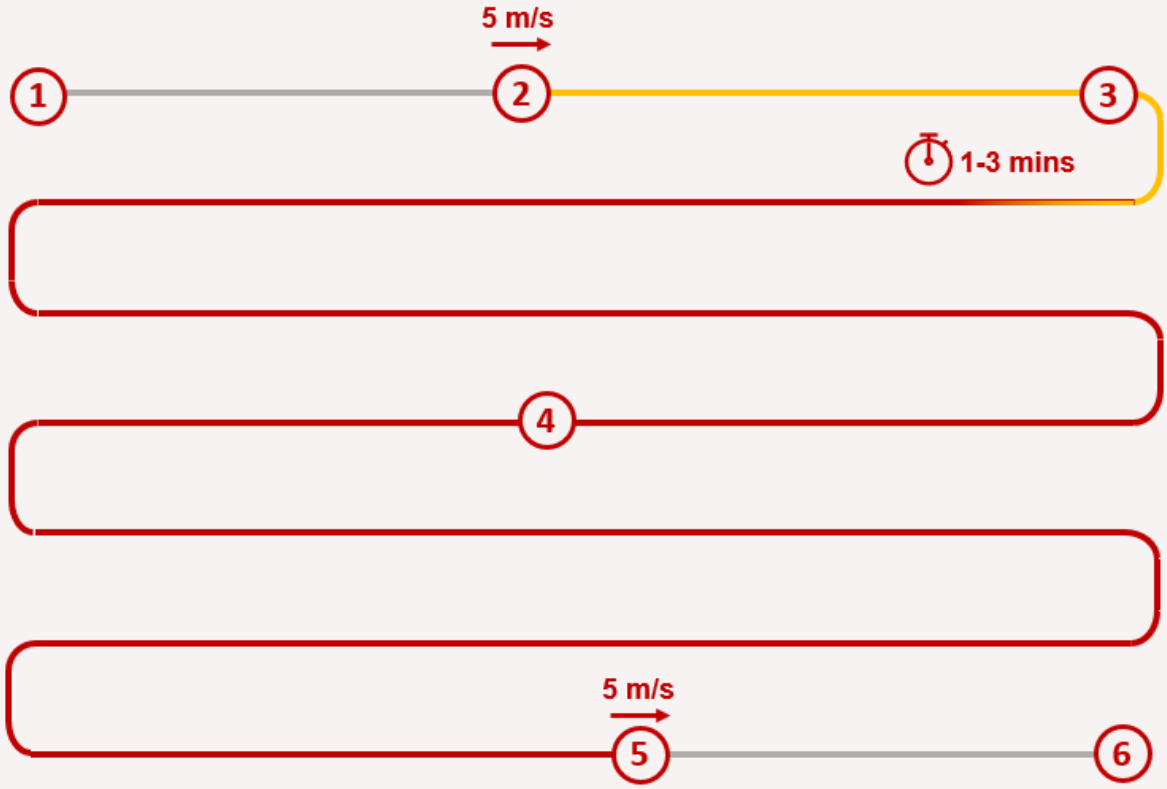
2, **Initialise -** Move in a straight line with good visibility of the sky, accelerating through your set initialisation speed. The default is 5 m/s (18 km/h or 11.2 mph).

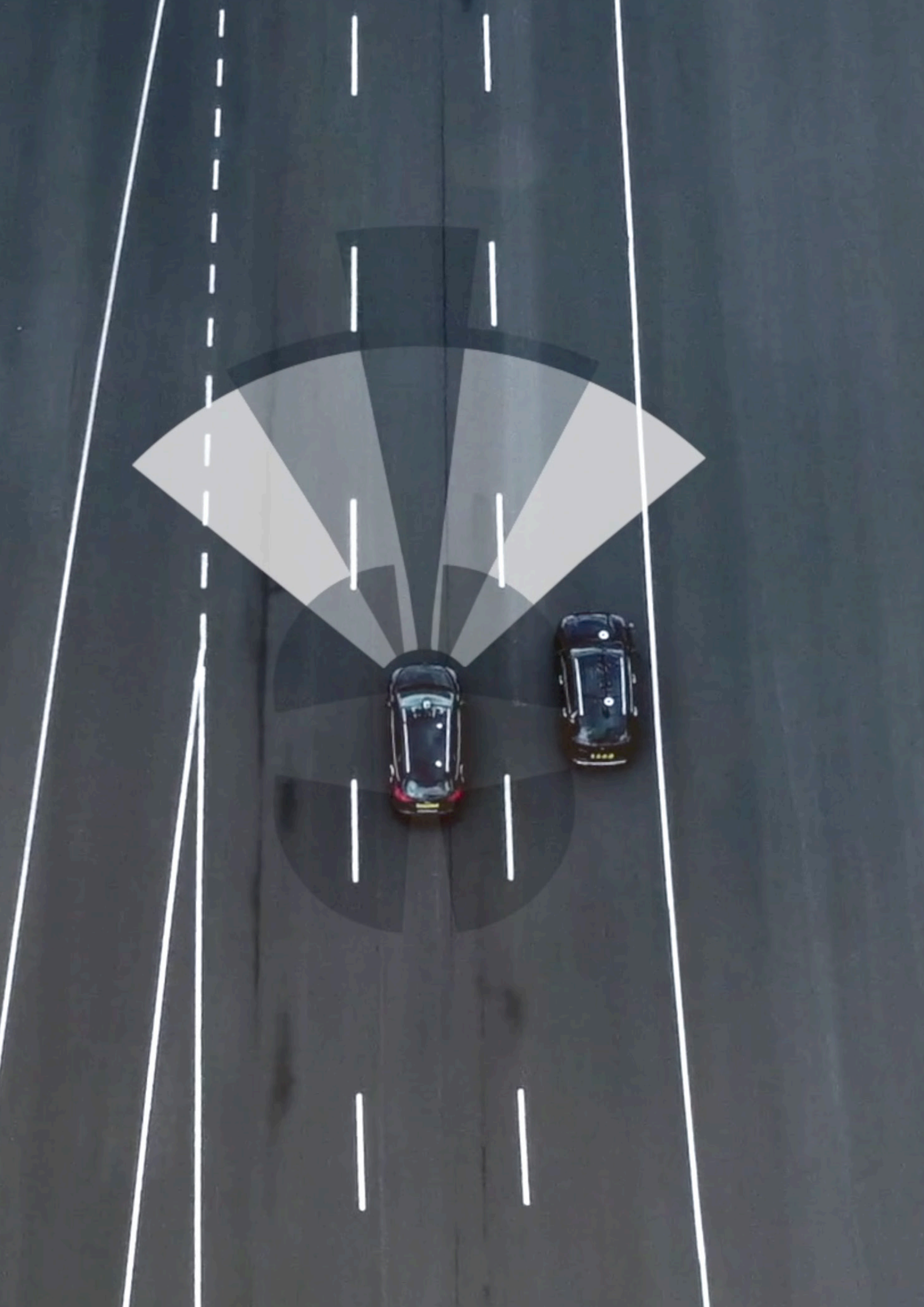
3, **Low-dynamics warm up -** The RT3000 v4 will only require a very short period of low dynamics to begin outputting data to specification. Typical driving patterns, even on public roads, of non-aggressive acceleration and braking with a couple of left and right turns will be sufficient.

4, **Run data collection** - perform your testing as normal.

5, **(Optional) De-initialisation** - Once you have completed your data collection, deccelerate in a straight line to a complete stop from a speed above your chosen initialisation threshold (EG: 5 m/s). This allows for increased accuracy using combined processing.

6, **Download data** - Download the raw data (.rd) file from the unit via FTP. Files are named using the date and time of file creation: yymmdd_hhmmss.rd

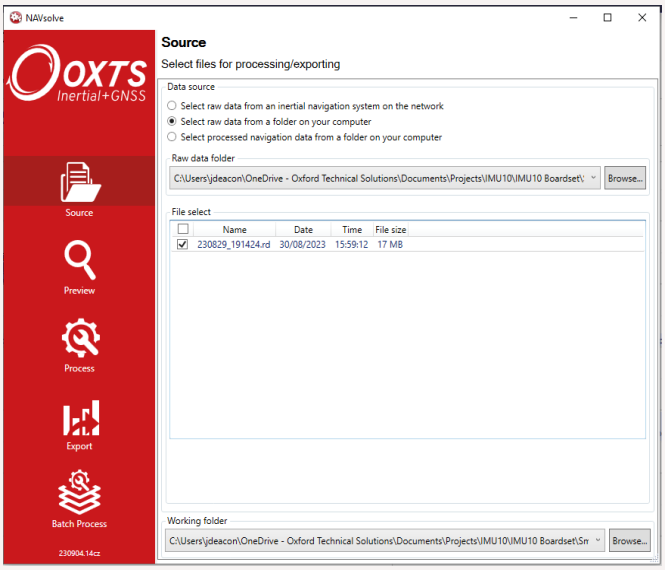




Raw data processing

+ Data from OxTS devices can be processed using the NAVsolve application in NAVsuite. To begin, load in RD files from the device/folder in the source tab and select the file you want to process.

+ You can then view the raw GNSS and IMU data in the preview tab. This is useful for sense checking the data.



Process type

There are two main processing types:

+ **Simulated** - processes the data forwards in time to replicate the real time output of the unit.

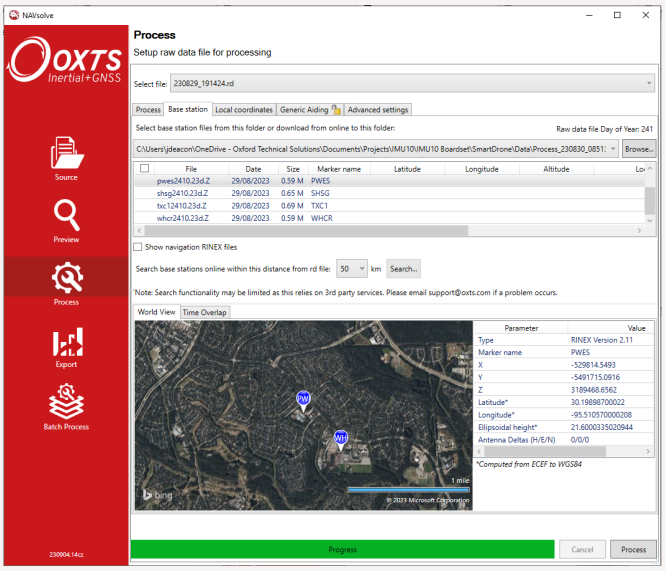
+ **Combined** - processes the data forwards and backwards then combines these two streams to increase accuracy and reduce periods of drift. It is essential to de-initialise to use this processing mode.

Base stations

If real-time corrections were not present during the data collection, RINEX files can be added in post-process to improve data quality.

+ **Local base** - navigate to where the file is located on your PC.

+ **RINEX autodownloader** - Select a radius and press search. This will return a list of free base stations in the area from a list of thousands worldwide. You can then download and select the base station you want to use. Usually these files are uploaded the day after they are recorded.



Process

To run the processing, click process.

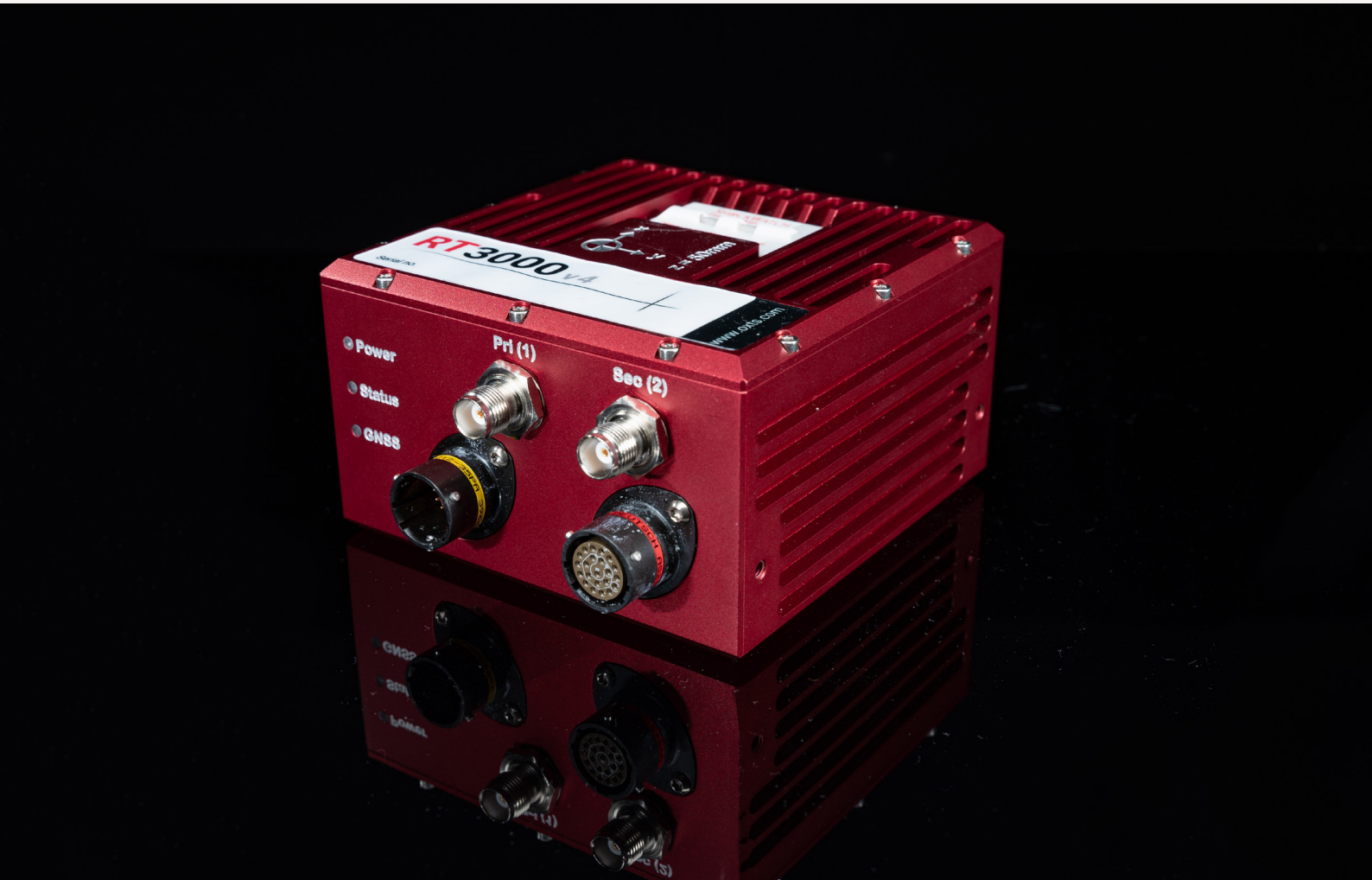
This will return an output folder containing an NCOM file - this is OxTS' processed trajectory format. More info is available in the NCOM manual which is available to download from the OxTS support site.

Export

NAVsolve can export trajectory data to the following formats:

- CSV
- POS
- OTA
- 3DP
- SBET

Trigger output files can also be exported to CSV.



Need further assistance?

Visit the support website
support.oxts.com

Get in touch if you can't find
what you need:
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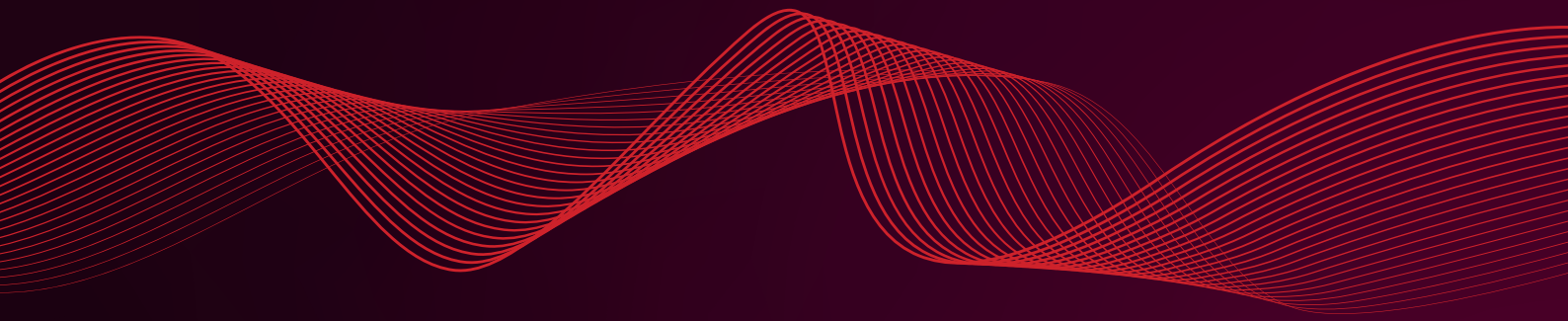

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