

— Ekinox AHRS & INS

External Septentrio GNSS integration

Operating handbook



Document
Revision

EKINOXOHSEPTENTRIO.1
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Support

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This brief document guides you in the process of connecting an external Septentrio GNSS receiver to your Ekinox.

Step 1: GNSS and Ekinox connections

Connect GPS Tx signal(s) to one of the following pins on Ekinox connectors: PORT A, B, C, D, E Rx pins.

You can also use an Ethernet connection if required – not covered by this document.

Connect GPS PPS signal to Sync A, B, C, D or E input.



Note 1: Only the physical PORT A is available for the Ekinox-A. You can still use Eth 1 to Eth 4 virtual serial ports to input GPS data.



Note 2: Septentrio PPS signal strength is usually very weak (3V pulse with a few microseconds duration). If the PPS cable is too long, this signal may require pre-amplification using third party hardware for proper interfacing with the Ekinox.

Step 2: GNSS module configuration

Configure your Septentrio GNSS receiver using RxControl.

Messages outputs

Configure the following outputs and output rates on your GPS receiver:

- **PVTGeodetic** @ 10 Hz
- **PosCovGeodetic** @ 10 Hz
- **VelCovGeodetic** @ 10 Hz
- **AttEuler** @ 10 Hz (if applicable, on dual antenna systems)
- **AttCovEuler** @ 10 Hz (if applicable, on dual antenna systems)
- **ReceiverTime** @ OnChange
- **xPPSOffset** @ OnChange

Other GNSS Configuration

Datum is set to WGS84.

Receiver dynamics should be set to:

- Acceleration / Jerk: **High**
- Motion: **Unlimited**

Smoothing options must be disabled

In addition, the GPS **PPS** signal must be sent at 1 Hz for proper operation.



Note: The Septentrio Binary Format (SBF) protocol must be used as it provides the fastest transfer rate and lowest CPU consumption for data handling.

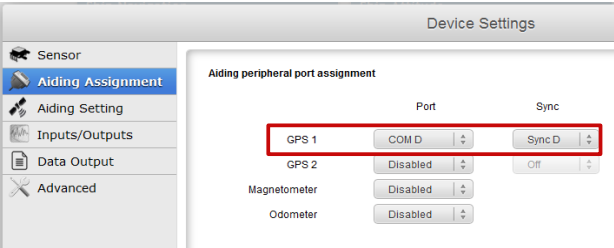
Step 3: Ekinox configuration

In order to configure the Ekinox, you need to connect to the Web interface and open the configuration window. Simply follow those instructions:

Set Aiding Assignment

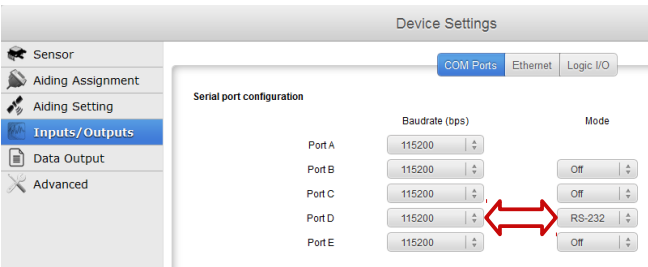
In this window, you just indicate where you connected your GNSS receiver.

Both communication port **and** Sync In pin must be set.



Set correct baudrate and mode for serial port

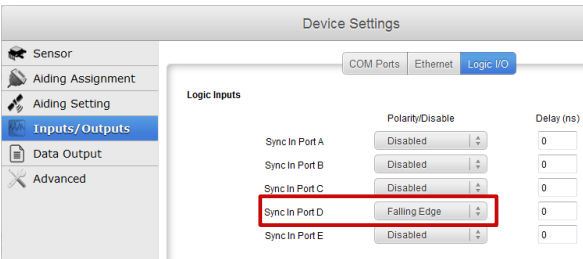
In our example we configured the GPS to be connected on PORT D in RS-232 mode.



Set Logic input configuration for PPS signal

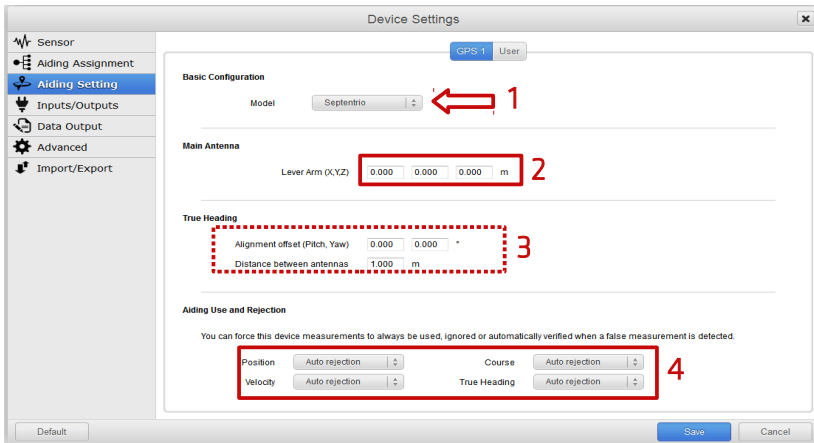
In order to use correctly PPS signal information, you must enable the corresponding logic input. Here we configured PPS on Sync D.

Polarity should be set accordingly with the actual GPS signal.



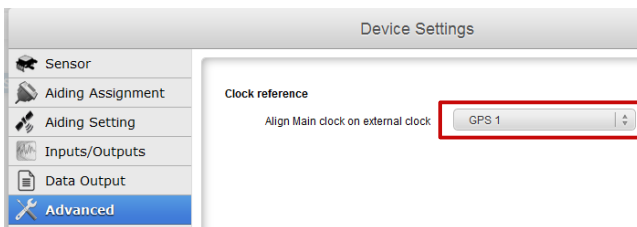
Set correct GPS model and configuration

1. GPS model should be set to **Septentrio**.
2. GPS lever arm is measured within 5cm FROM the Ekinox, TO the antenna.
3. In case of Dual antenna system, the alignment offset must also be entered as well as antenna separation (within 3mm).
4. Finally, each available measurement (position, velocity, course and true heading if available) should be configured to be used or not.



Set Clock alignment

Finally, you should define which GPS should be used to align the internal clock and provide UTC time data. This is done into the advanced settings section:



Note: If you have two connected GPS receivers, the Ekinox doesn't need a PPS signal for the second GPS receiver to accurately time stamp the data.

Step 4: Checking status

Main Screen

Global Status

Information

Raw values

General

Main Power

Imu Power

GPS Power

Settings

Temperature

Data Logger

IMU

General

Communication

Built In Test

Sensors

x

y

z

In Range

Accelero

Gyro

GPS 1

Position Status

Position Type

Velocity Status

Velocity Type

Heading Status

GPS

GLONASS

Solution computed

Single Point

Solution computed

Doppler

Insufficient obs.

L1 L2 L5

L1 L2

GPS 2

Position Status

Position Type

Velocity Status

Velocity Type

Heading Status

GPS

GLONASS

Insufficient obs.

No Solution

Insufficient obs.

No Solution

Insufficient obs.

L1 L2 L5

L1 L2

Solution mode

Nav position

Quality

Position

Velocity

Attitude

Heading

✓

✓

✓

✗

Used for solution

GPS1 Position

GPS1 Velocity

GPS1 Course

GPS1 True Head.

GPS2 Position

GPS2 Velocity

GPS2 Course

GPS2 True Head.

User Position

User Velocity

User Heading

Odometer

Magnetometer

DVL

USBL

✓

✓

✓

✗

✗

✗

✗

✗

✗

✗

✗

✗

✗

✗

✗

Heave

Valid

Velocity compens.

✓

✓

Magnetometer

x

y

z

In Range

Magnetometer

Accelerometer

✗

✗

✗

✗

✗

✗

Aiding Inputs

Velocity

Heading

Position

UTC

GPS 1

GPS 2

Odo.

Mag.

DVL

USBL

EM

Depth

User

✓

✗

✗

✗

✗

✗

✗

✗

✗

✗

✗

✗

✗

✗

✗

Interfaces

Opened

Receive

Transmit

Com A

Com B

Com C

Com D

Com E

Eth 0

Eth 1

Eth 2

Eth 3

Eth 4

✓

✗

✗

✓

✗

✗

✓

✗

✗

✗

✗

Clock

Input

Input Clock

Clock Alignment

✓

Valid

UTC

UTC synchro

UTC info

✓

Valid

- Once fully configured, the global status must be checked:
1. Corresponding COM port must be OK.
 2. GPS 1 or GPS 2 line in “Aiding Inputs” section must show active data.
 3. After that, you can check if the GPS solution has been calculated for the position and velocity.
 4. Then you can check at the Clock section. Input clock must be OK and UTC time should be set to valid after a few minutes in alignment mode.
 5. Once the GPS acquired a solution, the Kalman filter should pass in Full Navigation mode and show active items in the “Used for Solution” field.

Note: The Kalman filter will run into navigation mode once a correct heading could be estimated (requires magnetometers, true heading or some accelerations).

Support

If you have any trouble or question with the use of the Ekinox, feel free to contact our support team:

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