Vector & Scorpion

Release Notes

Dear Vector Operator,

We would like to inform you that there is a

new QOS and QBase Tactical release coming today.

Please find the more detailed look of the most important changes on the next pages.

The complete list of changes is listed separately.

Please remember that it is important to update the new version before the next flight.

The highest level of flight safety can only be achieved with the latest software release.

Therefore, Quantum-Systems can only offer warranty if the UAV and QBase are up to date as soon as an update becomes available. If you have any questions, please contact the Quantum-Systems support.

QUANTUM SYSTEMS

New QBase Features

QBase Tactical 2.34.241

General Release Notes

- Added support for Scorpion Skynode
- Added visualization of Scorpion tethering connection to battery header
- Added visualization of ADS-B contacts received by aircraft transponder → *Explained in more detail on the following pages*
- Allow to disable GNSS before take-off for training purposes (Vector/Scorpion Skynode, for more information see Vector/Skynode Manual chapter 7.1.8)
- Added option to disable optical flow sensor for training purposes (for more information see Vector/Skynode Manual chapter 7.1.8)
- Added alert and controller vibration if optical flow is lost during GNSS denied landing (Vector/Scorpion Skynode)
- Added option to configure the aircraft logging mode (Vector/Scorpion Skynode)→ *Explained in more detail on the following pages*
- Added continuous mode for strobe lights → *Explained in more detail on the following pages*
- Added setting for disabling hardware-accelerated video decoding (fixes playback on AMD graphics hardware)

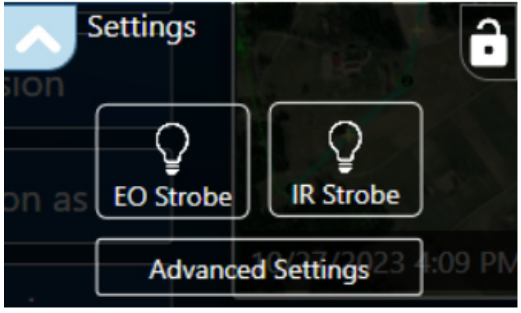
General Release Notes

- Added option to disable take-off aborts in strong wind conditions (Vector/Scorpion Skynode) → *Explained in more detail on the following pages*
- Added planning check for strong wind and hilly terrain scenarios (for more information see Vector/Scorpion Skynode Manual chapter 8.2.3)
- Improved highlighted upload button when changes are made to the mission while aircraft is flying
- Increased maximum AGL waypoint altitude to 1500m
- Selected mission elements are now highlighted in altitude plot
- Combined take-off and landing into a single planning element
- Added option to select a linear landing (Vector/Scorpion Skynode) → *Explained in more detail on the following pages*
- Added option to select remote landing (Vector/Scorpion Skynode) → *Explained in more detail on the following pages*

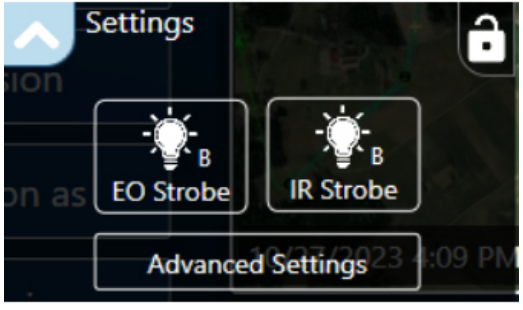
Continuous Mode for Strobe Lights

Strobe lights can be toggled via the aircraft header in the "*Settings*" widget. Both *EO* and *IR* strobe lights can be toggled separately.

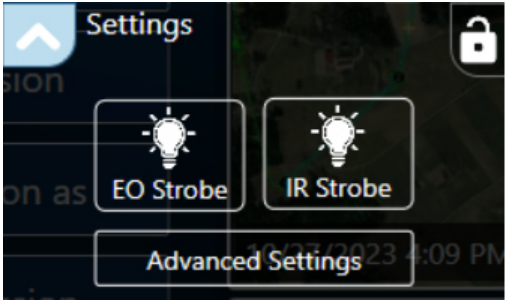
- Lights *Off*



- Lights *Blinking*



- Lights *On*



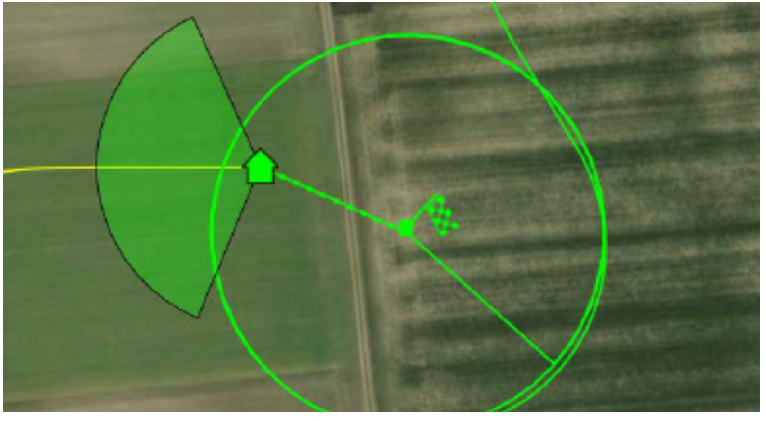
Linear Landing

The Skynode Vector will approach the retransition point in a linear flight pattern. The Skynode Vector starts reducing altitude at the first linear approach waypoint. Please note that the descending pattern during the linear approach is not linear but split into two sections with a higher descending rate in the first part. Please always check the plot section for your individual flight.
Please also note that it is not possible to align the linear approach waypoints < 90° to each other.

Up to 3 waypoints can be inserted to define the linear path. Depending on the distance of the path an additional circle is inserted before entering the linear approach. This behaviour is simulated in QBase.

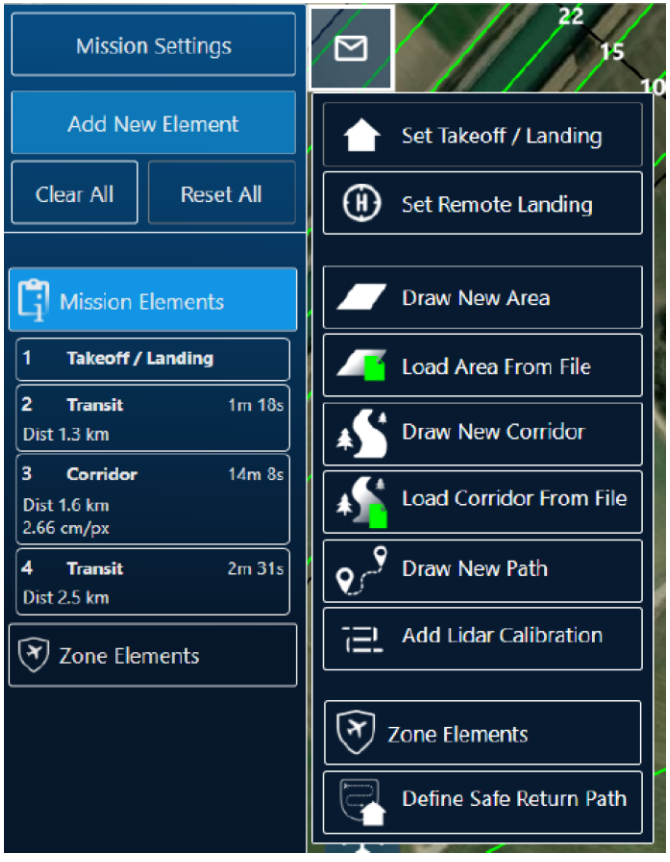
Circular Landing

The Skynode Vector will reduce the altitude within the circular pattern located around the retransition waypoint.
The retransition is performed approaching the retransition waypoint (flag) towards the inside of the circle on the defined retransition altitude.



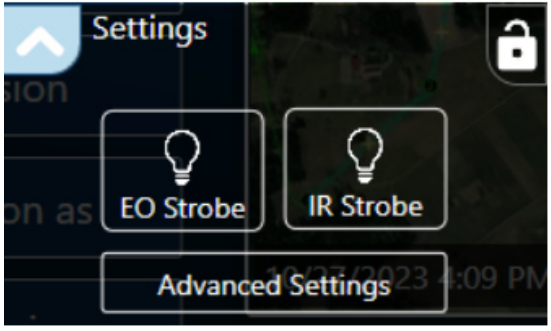
Remote Landing

If you want the Skynode Vector to land on a different location than your take-off spot you can now set a Remote Landing in QBase. To do this click on “Add new Element” and select “Set Remote Landing”. A Safe Return Path needs to be set in QBase for a remote landing.

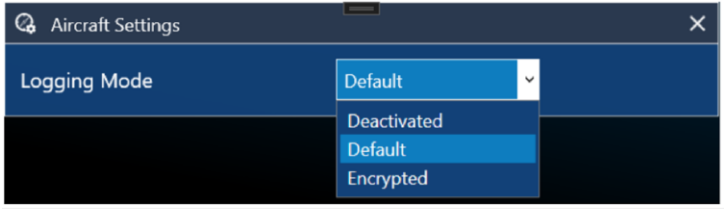


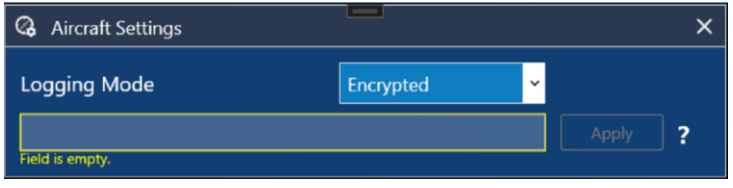
Autopilot Logging Modes

The autopilot logging mode is configured via the "*Advanced Settings*" menu accessible from the aircraft settings menu in the QBase header.



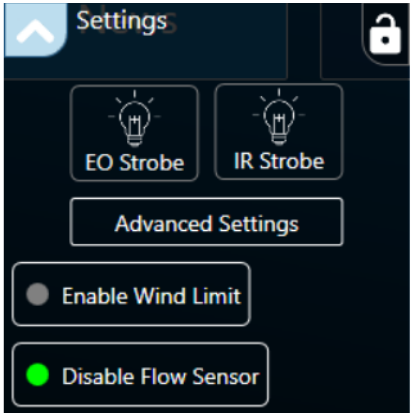
To change the logging mode, select the desired option from the drop down menu. For the mode "Encrypted", an additional passphrase must be provided.





Wind Limit Override

If the wind is too strong, the aircraft's autopilot may abort the takeoff. To prevent this, disable the wind limit via the QBase aircraft header. The green circle indicates that the wind limit is enabled. Press the button to disable the wind limit. The circle will change color to grey, which indicates that the wind limit is now disabled. **Please note:** that disabling the wind check will lead to a loss of warranty.



ADS-B Traffic Visualization

If the Vector aircraft is equipped with an ADS-B transponder, recognised traffic signals are sent from the Vector to the GCS and displayed in QBase. An additional USB receiver is no longer required.

QUANTUM SYSTEMS

New Skynode Autopilot Features

QOS 2.5.2.25

Skynode Autopilot - General Release Notes

- Disabled climb function with manual right control stick (pitch stick)

  → *Explained in more detail on the following pages*

- Capability to determine position in GNSS denied based on Multi TOF

  → *Explained in more detail on the following pages*

- Support for 3h smart battery types (SB180)
- Efficient usage of front / rear motors when flying through variant altitude profiles
- Improved altitude tracking during cruise flight
- Improved autopilot capabilities to maintain positive ground speed in high wind conditions
- Closed safety-relevant bugs

Vector - GNSS Denied

- Allow GNSS denied take-off → *Explained in more detail on the following pages*
- Overall GNSS denied performance improved
- Improved wind estimation in GNSS denied environments
- Reduced number of false positive switches to GNSS denied mode

Scoprion - General Release Notes

- Enable LIDAR-based autolanding feature
- Automatic mission begin / autoland
- Magnetometer health monitoring during take-off
- Closed safety-relevant bugs

Scorpion - GNSS Denied

- Optical flow stabilized hover in GNSS denied environments
- Allow GNSS denied take-off

Multi TOF (Multi Time of Flight)

To provide even more *precise position information* in *GNSS denied conditions*, this QOS release enables using three, non-moving Silvus Ground Stations.

Functional Method

The position of the Vector is determined using the TOF signal under GNSS denied conditions. For this purpose, it is necessary that the additional Silvus nodes on the ground, which are not connected to QBase, are equipped with a GPS dongle. This transmits automatically its position via the Silvus network. The Silvus which is connected to the ground control station does not require a GPS dongle, as the position is known by the take-off location set in QBase. *Note* that there is no extra interface for the Multi TOF feature settings in QBase. It is sufficient to set up the additional Ground Silvus and power them.

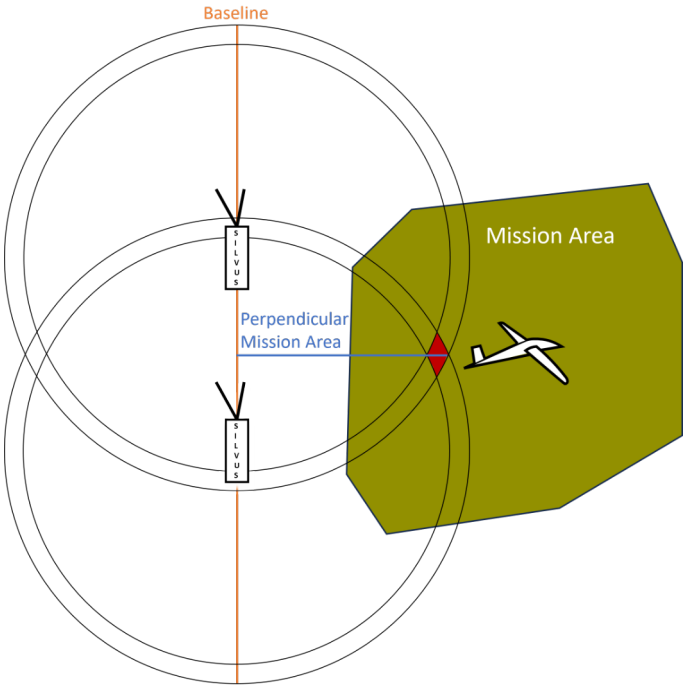
Note the following operational instructions:

The geometry of how all four Silvus nodes (up to three Ground, one Air) are positioned in relation to each other is important. Different geometries are listed below.

Good Geometry with dual Ground Silvus Setup

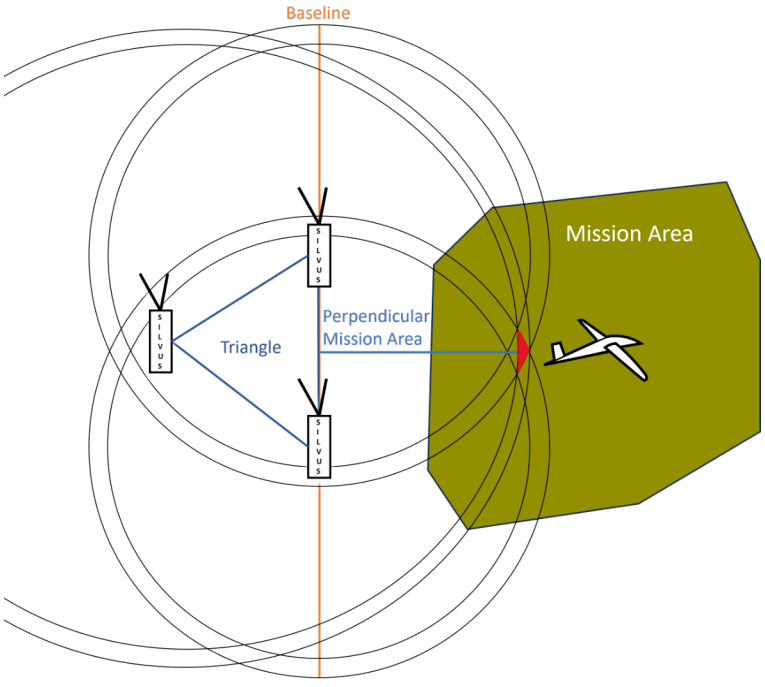
For best performance, the separation of the two Silvus nodes ("baseline distance") should be approx. 1:10 of the mission distance. E.g. 1km distance results in 100m separation; smaller baseline distances result in worse positioning accuracy in the mission area. The red area is the possible location of the aircraft, taking a 30m uncertainty into account. The larger the area, the worse the position accuracy.

The geometry also applies to wind. Having tangential (relative to Silvus distances) wind may affect position accuracy. This could be improved by flying parallel to the wind.

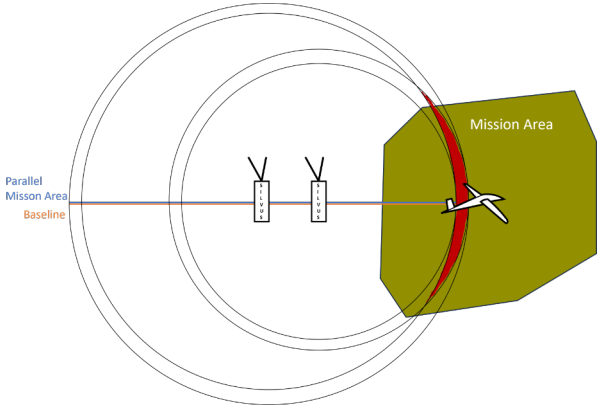


Good Geometry with triple Ground Silvus Setup

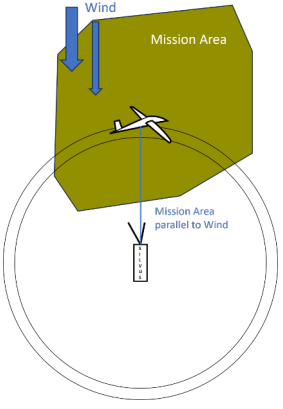
To increase accuracy of the position determination, it is also possible to set up a third Silvus Ground Staion. This reduces the size of the possible area in which the Vector is expected to be located based on the TOF measurement (see red marked area). Please note that the three Silvus Staions must be set up in a triangle. One side of the triangle should be perpendicular to the mission area. The distance between the Silvus stations should still be approx. 1:10 of the mission distance.



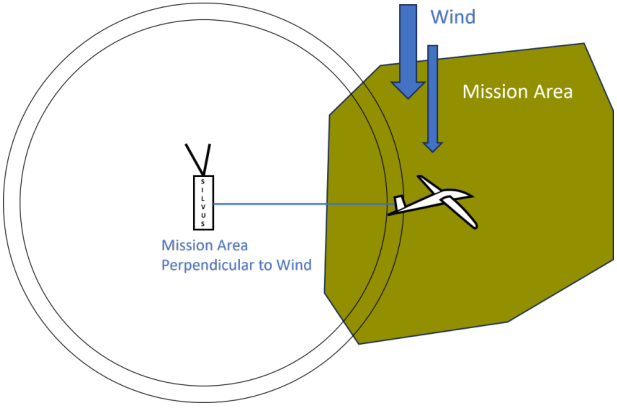
Bad Geometry with dual Silvus Setup



Good Geometry with single Silvus setup respective to wind

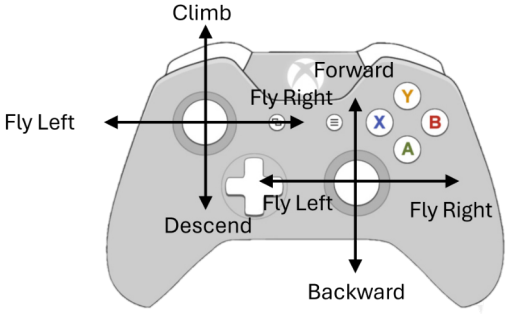


Bad Geometry with single Silvus setup respective to wind

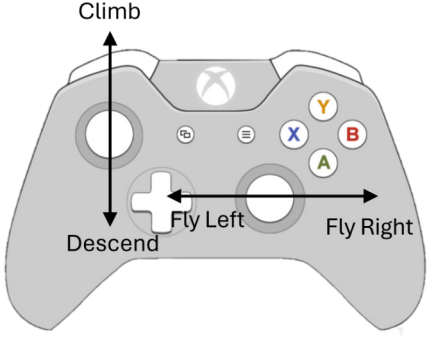


Controller configuration

Copter Mode



Aero Mode



GNSS denied Take-Off

This release introduces the GNSS denied take-off function. Therefore a GNSS fix must be available for a short time on the ground prior to take off. After the initialization process is finished the GNSS signal can be switched off manually in the QBase header (figure to the right). During the take-off, the autopilot no longer requires GNSS reception.

If GNSS is lost after arming or during takeoff, autoclimb or transition, the climb and transition are continued without GNSS.

QUANTUM SYSTEMS

New Vector Autopilot Features

For non Skynode Autopilot

2.3.0.94

Vector Autopilot - General Release Notes

- Navigation system improvements for GNSS-denied operation
- Improved hover control performance
- Improved alignment into wind in GNSS-denied hover operation
- Improved joystick command handling
- Use of theta for tau compensation in GNSS-denied hover
- NAV filter allows takeoff based on barometric altitude
- Improved remaining flight time calculations in GNSS denied mode
- Improved data consolidation for LIDAR
- Improved robustness of TOF corrections if position has drifted over time
- Online magnetometer calibration
- Increased preflight check vibration threshold

- Bugfix in navigation filter moding
- Bugfix in Lidar device driver
- Bugfix in telemetry logging

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