

QBASE 915MHz Datalink System

The QBase 915MHz Datalink System consists of the following parts:

QBase Air Modem

A 915MHz transceiver Module for the integration in a fixed wing UAV.

QBase Ground Control Station

A 915MHz transceiver Module which has to be connected to a laptop

QBase Software

to plan the UAV flight mission

Technical Data:

Operation frequency: 903.213 - 927.008MHz

Modulation / channels: GFSK / 50 (FHSS)

Output Power: <20dBm EIRP

Antenna Air Modem: SMA 1/2 wave stubby antenna; Gain 2dBi

Antenna Ground Station: SMA external helical antenna; Gain 3.5dBi

Contained FCC ID: 2APABQBASE for limited modular approval





QBASE 915MHz Datalink Sytem

FCC Warning Statements

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

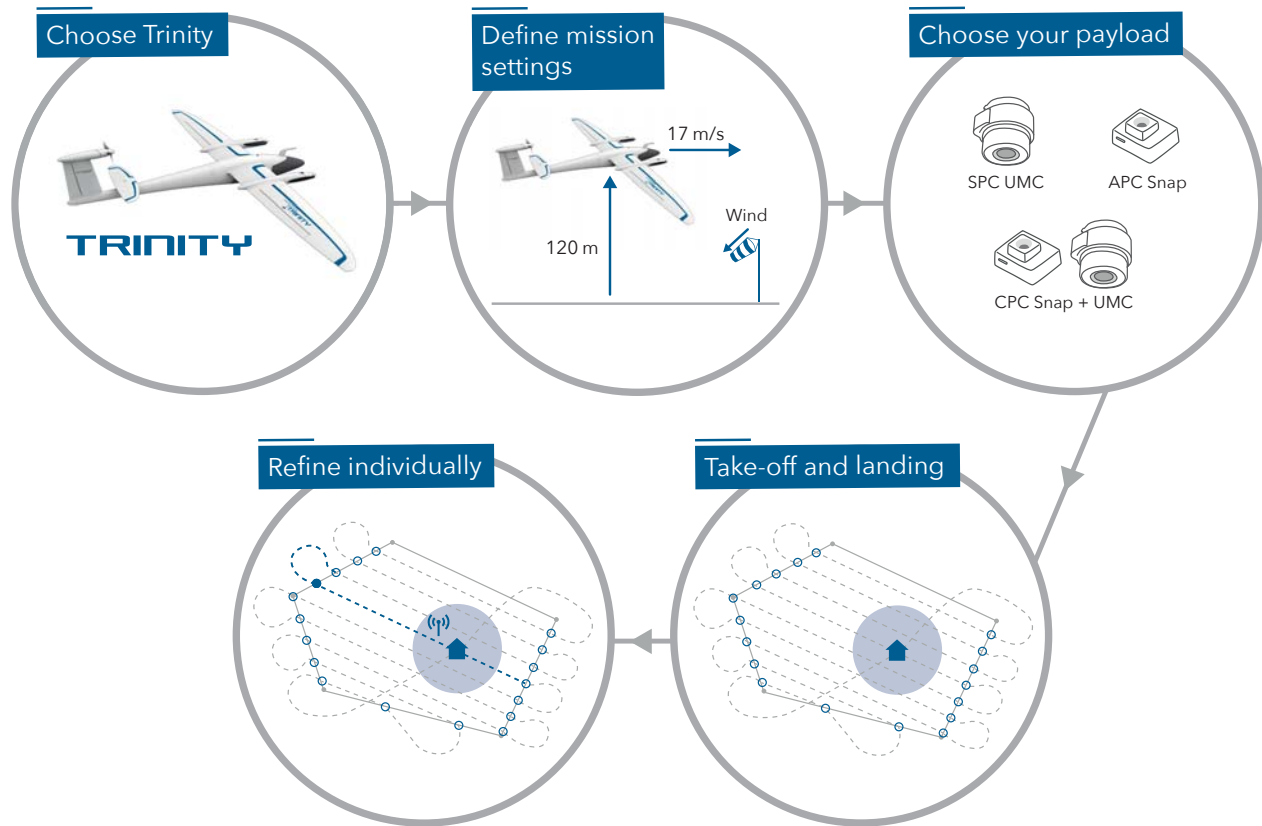
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

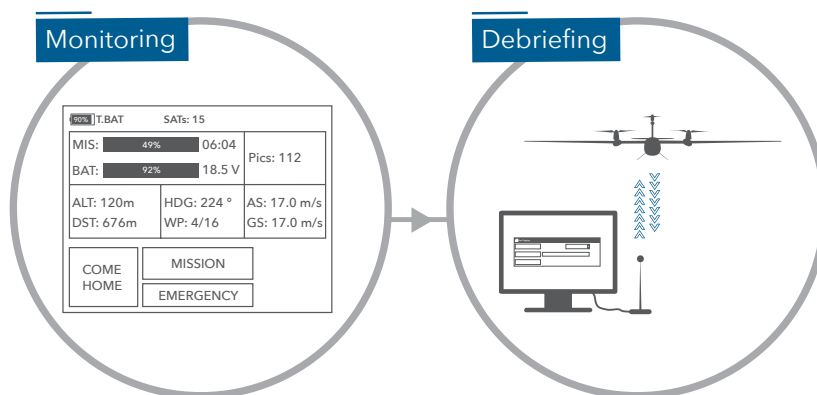
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

QBASE – GROUND CONTROL STATION

QBase is a Microsoft Windows based desktop software. QBase assists the user in planning a mission. The planning process is always accomplished in the following order:



After planning a mission QBase assists the user in monitoring and controlling the Trinity during the flight but also in debriefing the mission.



Find the QBase mission planning video tutorial on our YouTube channel. Just search for www.youtube.com/c/QuantumSystems

7.1 INSTALLING/UNINSTALLING QBASE

The following chapter will deal with the installing and the uninstalling of QBase.

7.1.1 Install QBase

1. QBase is provided by your reseller.
2. Open the QBase installer file and follow the instructions of the installation guide.
3. Open **Start QBase** to open the program.

Note: For the connection between QBase and the Trinity via the QBase modem a driver is required.
Visit www.ftdichip.com/Drivers/VCP.htm to install the driver.

MINIMUM SYSTEM REQUIREMENTS	
OS	Windows 7 / 8.1 / 10 64bit
CPU-Speed	2.5 GHz or higher (Hyper-threading or Multicore recommended)
RAM	4 GB or higher
Free Disk Space	100 MB
Display	24-bit color depth
Screen Resolution	1600 x 900 recommended or higher at normal size (96 dpi)
Video/Graphic Adapter	64 MB RAM minimum, 256 MB RAM recommended; NVIDIA, AMD, and Intel chipsets supported; Accelerated graphics card driver; Be sure to use the latest available driver

If you have problems starting QBase, make sure your installation of Microsoft Windows is up to date.

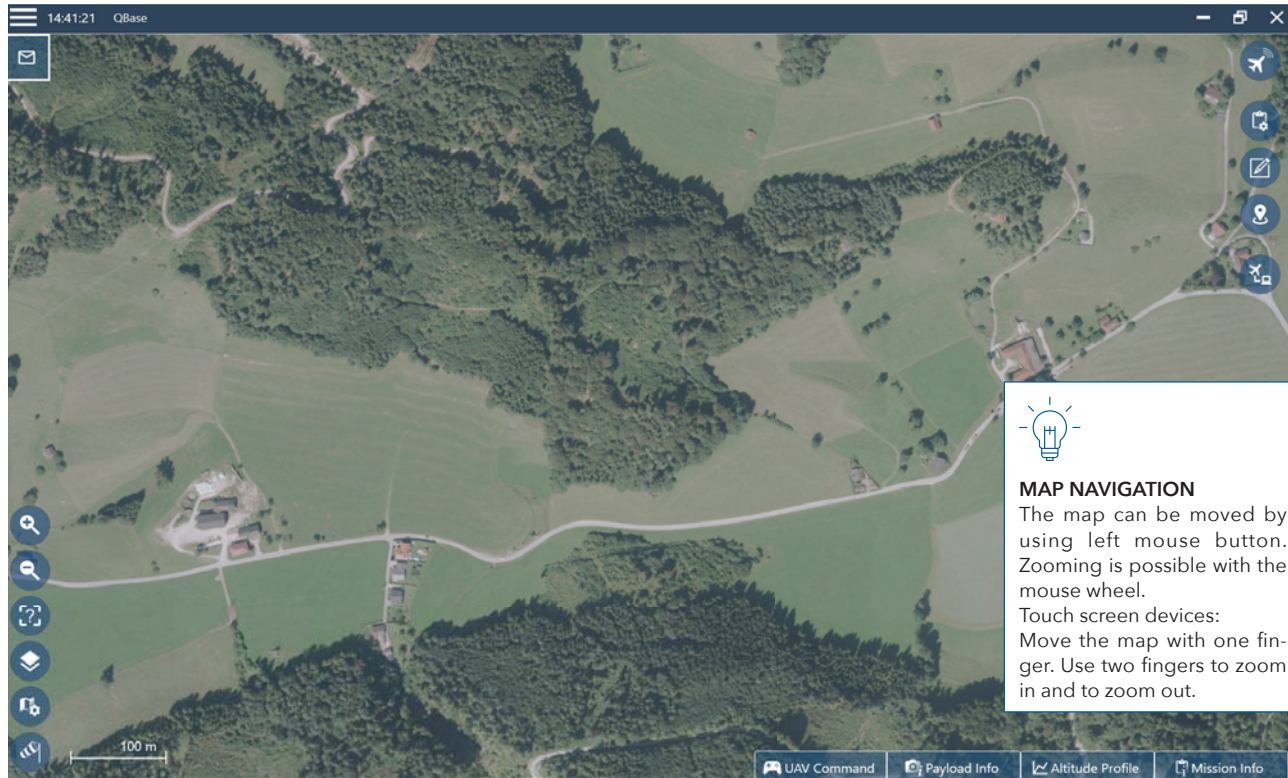
7.1.2 Uninstall QBase

1. Open the QBase installer and select **Remove QBase**.
2. Select **Finish** to remove QBase.

Alternative: Uninstall QBase from the program list of the Windows control panel.

7.2 MENU OVERVIEW

The graphical user interface of QBase is divided into several sections.



7.2.1 Main menu (top left corner)

Mission



New

Create a new mission. The current mission will be deleted.



Open a mission.



Save the current mission in Quantum-Systems proprietary XML file format using the known file name.



Save as

Save the current mission with a different file name.



Create Map

Create an offline map (see chapter 7.9).

Payload



Create Camera (see chapter 7.8)



FlyLog Debrief (see chapter 7.7.1)



Geo Tagging (see chapter 7.7.2)

Settings



QBase (see chapter 7.10.1)



View Manager (see chapter 7.10.2)



Flight Data Link (see chapter 7.10.3)

Maintenance



Updates (see chapter 7.11)



UAV Firmware (see chapter 7.12)



SD Card (see chapter 7.14)



Exit QBase

7.2.2 Left section



Message Window

Shows info (blue), warning (yellow) and error (red) messages.



Zoom In



Zoom Out



Map Settings

Adjust the display settings of the map.



Pan to ...

Select if you wish to pan to the UAV, to the mission or if you wish to search for an address.



Select Map

The list includes online and offline maps. To use online maps make sure QBase is connected to the internet.



Wind Settings

QBase determines the flight track under consideration of the wind influence. See chapter 7.3 for further details.



Zoom in to select the **Scale** and select **New Measurement** to measure a distance between two locations. The button becomes visible when zoomed in. Select the **Scale** again to close the measurement tool.

7.2.3 Right section

The right section of QBase includes the relevant buttons for planning and monitoring a mission (see chapter 7.3 & 7.6).



Monitoring UAV

Monitor the UAV during the mission accomplishment.



Mission Template

Define the general mission settings.



Flight Planning

Define the take-off and landing position and adjust the waypoints.



Area Planning

Define the flight area.



Read / Write Flight Plan

Upload the flight plan to the Trinity (see chapter 7.4).

7.2.4 Footer



UAV Command

UAV Command

Enables the user to control the Trinity via QBase (see chapter 7.6.2)



Payload Info

Payload Info

Information about the current state of the payload (see chapter 7.6.3.)



Altitude Profile

Altitude Profile

The altitude profile of the current flight track can be displayed in the bottom center.

Altitude Profile Navigation

- By clicking left on the *Altitude Profile* the altitude and the flight distance is displayed.
- The waypoints of the mission are numbered and shown in purple.
- The current waypoint is framed.
- Move the profile with the right mouse key.
- Zoom in and out with the mouse wheel.
- Use *Autoscale* to display the complete profile.



Mission Info

Mission Info

Gives an overview of the planned mission (see chapter 7.3 step 51).

7.3 PLANNING A PHOTOGRAMMETRY MISSION

The aim of planning a mission in QBase is to generate waypoints and camera trigger positions. This information is uploaded to the Trinity.

Mission planning – step by step

The planning process should be accomplished in the following order. With increasing step order the planning process becomes more detailed. Settings that are adjusted are not automatically updated in the previous steps. Therefore, it is not recommended to jump back and forth between the steps. See chapter 7 for an overview of the mission planning process.



Before planning the mission, it is recommended to visit the flight area to get an overview of the surrounding and the topographic conditions. See chapter 8.4 for choosing a good take-off position.



1. Set the **wind condition**. Get information of the wind speed and the wind direction online.

Set the wind speed [BFT or m/s]

Set the wind direction:

+ clockwise

- counter clockwise

2. Open the **Mission Template**  in the right section.



UAV

3. Select the UAV type **Trinity**.

4. Set the **Link Loss** conditions.

If the RC link as well as the flight data link is lost during the flight the Trinity returns to the link reestablishing waypoint after the selected time expired.

5. Set the **Loiter Time**.

At the link reestablishing waypoint the Trinity loiters for the selected time and tries to reestablish the connection to QBase and the transmitter. See chapter 5 for further information about the communication links. See step 42 to set the link reestablishing waypoint

General Mission

6. Set the **Speed (airspeed)**.

To receive optimal photogrammetry results the flight speed must be set depending on the wind speed.

RECOMMENDED SETTINGS	
Wind speed	Flight speed
0–3 m/s	17 m/s
3–6 m/s	18 m/s

7. Set the **Altitude**.

For the Trinity camera payload presets it is recommended to set the flight altitude to **120 meters (400 ft)**. Please do not exceed the maximum altitude that is allowed for your region. The flight altitude is defined as the altitude above the take-off position.

8. Set the **Side and Forward Overlap**.

Overlap settings are dependent on the payload. Overlap default settings in *Mission Template* are based on the payload settings.

Payload

9. Select the **Payload**.  Focal length of the camera.

GSD: The ground sample distance (distance on the ground between the mid of two pixels) is calculated based on the flight altitude and the camera properties.

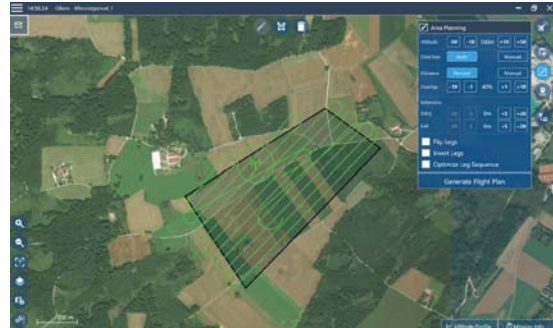
Trigger Speed: The trigger speed (interval between images) is calculated based on the flight speed, flight altitude and forward overlap. The wind speed and the wind direction is not considered at this point. For the exact trigger speed including the wind conditions see step 51.
If the selected camera can not manage the required trigger speed the trigger speed is displayed in red color.
In this case try to switch the side and forward overlap settings or select a higher flight altitude.

10. Either select **Pan to ...**  in the left section and search for the **desired location** or zoom to the desired location.
11. Open **Area Planning** by selecting  in the right section. A payload must be defined in the *Mission Template* before.
12. Select **Create a new area**  in the header section.

The flight area is created by defining the corners of the area. Each click on the map generates a corner of the area. The area is displayed after defining three corners. The orange highlighted circle represents the selected corner. To move a corner it must be selected.

-  Undo
  Redo
  Cancel
 Delete selected vertex (orange circle)

13. When the flight area is defined select .
14. If you wish to edit the **flight area** select .
15. If you wish to **delete** the flight area select .
16. Select  **Mission Info** to display the size of the planned area.



Note: Information about the flight path and mission payload are not available at this planning state.

The legs are numbered and displayed within the flight area. The first waypoint of the flight area is indicated by a green colored triangle ▲.



17. Adjust the **flight altitude**.
18. Set the **direction of the legs**. Set the direction to *Auto* to obtain the minimum amount of legs. Set the direction to *Manual* if it is useful to change the legs depending on the wind direction.
19. Set the **distance between the legs**.
Percent: distance based on side overlap in percent
Manual: distance between the legs
Gap: set the gap between the legs
Initial: set gap between the first leg and the flight area border
20. **Legs can be extended** at the entry and the exit of the flight area. By default the legs at the entry are extended by 10 meters.
21. Check **Flip Legs** to **change the waypoint order** of the complete flight plan.
22. Check **Invert Legs** to **change the entry and exit** on a leg.
23. Check **Optimize Leg Sequence** to **optimize the leg order** based on turn radius of the Trinity and the current leg distance.
24. Select **Generate Flight Plan**.

Note: If changes in *Area Planning* or *Mission Template* are made afterwards, the flight plan has to be updated by selecting *Generate Flight Plan* again.
The number of waypoints is limited to 200. If the amount is exceeded, the button is disabled.



25. The **Flight Planning** menu  opens and the waypoints are displayed within the flight area.
26. Waypoints can be **edited, added and deleted** in the header section.



View Settings

- Area:** Shows the area including the numbered legs.
Flight plan: Shows the flight track without consideration of the wind and flight dynamics.
Simulated path: Considers the wind direction and flight dynamics and is therefore more realistic than the green displayed flight plan.
Highlighted path: Highlights the simulated path between the previous, the current and the next waypoint.
Trigger positions: Displays the trigger positions (yellow dots).
Waypoints: Shows the waypoints.

**Lock/Unlock Waypoint Moving**

Enables/Disables the function to move any waypoint. Waypoints can be moved by selecting and dragging them.

**Set New Waypoints**

By selecting  on the map a new waypoint between two existing waypoints can be added.

**Delete Waypoints**

When selected choose the waypoints that you wish to delete.

**Delete Flight Plan**

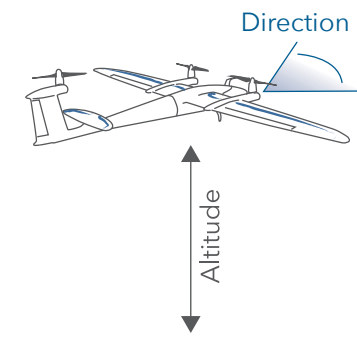
27. Set the **Home Waypoint** by selecting  in the header section.

Define the planned take-off and landing position. The real take-off position is automatically adjusted right before the start of the flight (see chapter 9.2 step 7 & 8).



The yellow part indicates the transition cone with the transition track which is by default 50 meters. Within this area the transition is performed. Make sure this area is free of obstacles. To adjust the direction and the angle of the transition cone see step 31.

28. Select the **Home Waypoint** on the map in order to set the transition waypoint properties.



Flight Planning						
	(A) 20 m		(C) 0:57		120 m (B)	
	Home		842 m		1	
29	Transition Altitude		-50	-10	20m	+10 +50
30	Direction		-30	-5	0°	+5 +30
31	Transition Cone		-45	-5	60°	+5 +45

A: Transition altitude (m)

B: Altitude of the first waypoint

C: Time between home waypoint and first waypoint (mm:ss).

D: Track length between the home waypoint and the first waypoint (m).

29. Set the **Transition Altitude**.

If the surrounding allows for it, set the transition altitude as low as possible in order to save energy by reducing the hover duration to a minimum.

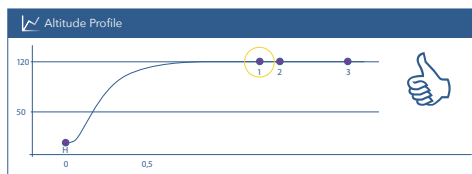
30. Set the **direction** of the transition.

Note: Choose the transition direction based on the surrounding. If possible set it against the wind direction.

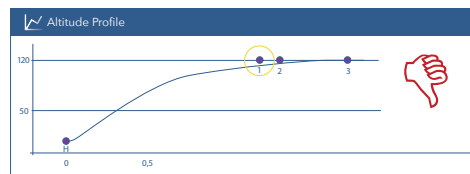
31. Set the **Transition Cone**.

The transition is performed within the defined cone. As long as the direction of the Trinity does not match the cone the Trinity will not enter the transition phase and the mission will be aborted. It is possible to manually adjust the direction of the Trinity (see chapter 9.2).

32. Open the **Altitude Profile** and ensure that the distance between the home waypoint and the first waypoint of the flight area is sufficient to reach the required flight altitude. For altitude profile navigation see chapter 7.2.4.



Flight altitude is reached at the first waypoint of the flight area



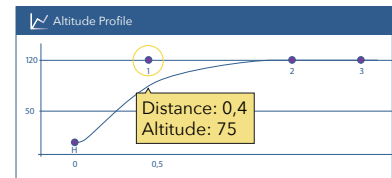
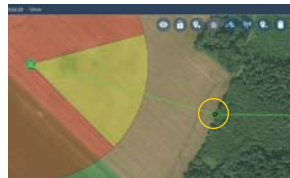
Flight altitude is NOT reached at the first waypoint of the flight area

33. If the altitude can not be reached

- try to flip or invert the legs (see step 21 – 23) or
- extend the track between the home waypoint and the first waypoint of the flight area by inserting extra waypoints in between (see step 26).

Remember to update the flight plan by selecting **Generate Flight Plan**.

34. If **obstacles are in the flight track** during climbing phase (between the transition and the first waypoint) ensure that the flight altitude is higher than the obstacles are. Add a waypoint at the obstacle. Check the flight altitude for this position in the altitude profile.

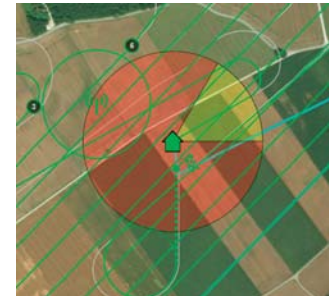


35. Set the **Retransition Waypoint** by selecting  in the header section.

Location at which the Trinity finishes the retransition and is in hover mode short before landing. The retransition track is indicated by the dotted path and is by default 150 meters. The retransition track must be free of any obstacles.



The retransition waypoint should be located close to the home waypoint (take-off and landing location), because the distance between the retransition waypoint and the home waypoint is covered in high energy demanding hover mode.



The flight track between the retransition waypoint and the home waypoint must be free of obstacles. Depending on the wind condition real retransition location might not comply with the retransition waypoint in QBase. Therefore, make sure an area with a radius of 20 meters around the retransition waypoint is free of obstacles.

36. Select the **retransition waypoint** on the map in order to set the **retransition properties**: Distance between the retransition point and the home waypoint. The distance is covered in hover mode. At the home waypoint the Trinity is landed manually (see chapter 9.2).

37. Set the **retransition altitude**.

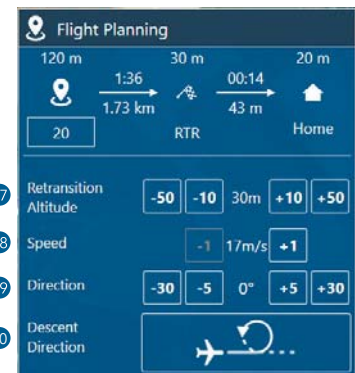
Defines the hover altitude at the end of the retransition. If the flight area allows for it, set the retransition altitude as low as possible in order to save energy by reducing the hover duration to a minimum.

38. Set the **speed** of the retransition. The flight track between the last waypoint and the beginning of the retransition is covered with the defined speed.

39. Set the **direction** of the retransition. If possible set the direction against the wind direction.

40. Set the **direction of the descent circle**.

Before the retransition, the Trinity enters the descent circle automatically in order to descend to the required retransition altitude. In case no link reestablishing waypoint is set the Trinity will use the descent circle as the link reestablishing waypoint. Set the direction of the circle depending on the surrounding and obstacles.



Make sure the descent circle is free of obstacles.

41. If **obstacles are in the flight track** between the last waypoint and the descent circle ensure that the flight altitude is higher than the obstacles are by checking the altitude profile. Add a waypoint at the obstacle. Check the flight altitude for this position in the altitude profile.



42. Locate the **Link Reestablishing Waypoint** by selecting  in the header section.

After link loss time out the Trinity returns and circles around the defined waypoint. If it is possible the link between QBase and the Trinity or between the RC transmitter and the Trinity is reestablished. If the connection is successful either continue the mission or select **COMING HOME** on the transmitter. Locate the **Link Reestablishing Waypoint** close to the home waypoint.

43. Set the **altitude** of the link reestablishing circle.

44. Set the **flight speed** of the link reestablishing circle.

45. Set the **radius** of the link reestablishing circle.

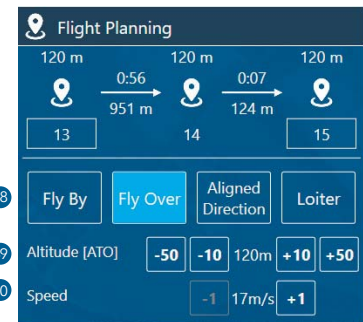
46. Set the **direction** of the link reestablishing circle.



47. If needed adjust the waypoints.

It is possible to adjust the settings for every waypoint individually.

Select the waypoint that you wish to modify.

48. Select the **waypoint type.** By default, the waypoint type is selected to meet the requirements to map the flight area properly.**49. Set the **flight altitude** at the selected waypoint.****50. Set the **flight speed** at the selected waypoint.****Waypoint types**

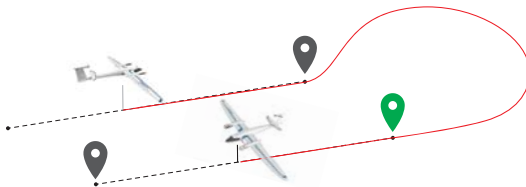
The selected waypoint is displayed in green.

**Fly By**

The waypoint is not directly overflown, but the Trinity turns before reaching the waypoint to smoothly align with the next leg.

**Fly Over**

The waypoint is directly overflown. The Trinity realigns with the next leg after the waypoint.

**Aligned Direction**

The flight track is automatically determined in order to match the waypoint and the direction of the next leg.

If needed subtypes can be selected in the waypoint property menu manually. For photogrammetry missions it is recommended to set the subtype to Auto. Not all subtypes are applicable for every scenario. Non applicable subtypes are indicated by a red dotted line between the waypoints.

**Loiter**

The Trinity enters a circular trajectory around the waypoint. The radius of the trajectory, the circling duration and the circling direction can be set in the waypoint property menu. The Trinity approaches and leaves the trajectory from the outside.

51. **Mission Info** Open the **Mission Info** menu in the bottom right corner, to obtain an overview of the planned mission.

Mission Info			
Wind	0.15 m/s ▼	Flight Path	Tetracam ADC Snap
Area Size	~ 0.3 km ²	Length	~ 14.936 km
		Time	~ 14:07
		Battery Usage	~ 21 %
			GSD ~ 6.1 cm/px
			Trigger Speed ~ 2.1 s
			Image Count ~ 210



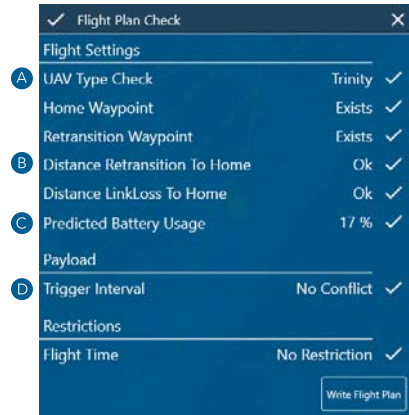
If the selected camera can not manage the required trigger speed the trigger speed is displayed in red color. In this case try to switch the side and forward overlap settings in the Mission Template (step 8). Other options are selecting a higher flight altitude or changing the direction of the legs (cross wind).

52. Select **Altitude Profile** if you wish to obtain an overview of the altitude profile.

7.4 UPLOADING A FLIGHT PLAN TO THE TRINITY

If QBase is successfully connected to the Trinity via the QBase modem the flight plan can be transferred to the Trinity. The flight plan that is saved on the Trinity is limited to the relevant information necessary for the flight operation and does not include information of the mission template and the area planning.

1. Select  in the right section.
2. Select **Write Flight Plan** .
3. The following **Flight Plan Check** gives an overview if every criteria to upload the flight plan is met.



A: UAV Type Check

It is not possible to write a flight plan to the Trinity that was planned for Tron.

B: Distance Retransition to Home

The user is warned if the distance between the home waypoint and the retransition waypoint exceeds 50 meters. If the distance exceeds 100 meters it is not possible to write the flight plan to the Trinity.

C: Predicted Battery Usage

A warning comes active if the required battery capacity exceeds 75 %.

D: Trigger Interval

The required payload trigger interval should not be shorter than the minimum trigger interval of the camera. If a conflict occurs please see chapter 7.3 step 51. It is not recommended to write the flight plan if a conflict occurs.

4. Select **Write Flight Plan**. The button is disabled if one of the criteria is not met. The window is closed automatically after 5 seconds. If the flight plan can not be written to the Trinity make sure QBase is connected correctly.

Note: It is not possible to save more than one flight plan on board of the Trinity.

For step by step flight setup including uploading the flight plan to the Trinity see chapter 8.

7.5 DOWNLOADING A FLIGHT PLAN FROM THE TRINITY

If the Trinity is connected to QBase via the QBase modem it is also possible to read a flight Plan from the Trinity. The mission is transferred from the Trinity to QBase. The current QBase mission is overwritten.

Note: The flight plan does not include information of the mission template and the area planning.

7.6 MONITORING AND CONTROLLING THE TRINITY DURING FLIGHT OPERATION

With QBase it is possible to monitor and to control the Trinity during a mission. When the Trinity is connected to QBase via the QBase modem the actual position of the Trinity is shown on the map . To connect QBase with the Trinity see chapter 8.3 & 8.7.



Monitoring UAV

The current status of the Trinity can be seen in the header section. UAV status messages and error messages are displayed on the left.



UAV Command

The **UAV Command** panel provides the user with the possibility to control the Trinity during a waypoint based mission.



Payload Info

During the mission the current state of the payload board can be displayed by selecting **Payload Info** in the footer section.

7.6.1 Header section



1: Sensor data shows the current state of the sensors.

green: OK

red: sensor error

2: Current airspeed

green: deviation between current and commanded airspeed <10%

orange: deviation between current and commanded airspeed 10% - 20%

red: deviation between current and commanded airspeed >20%

3: Commanded airspeed

4: Current ground speed

5: Current altitude

green: deviation between current and commanded airspeed <10%

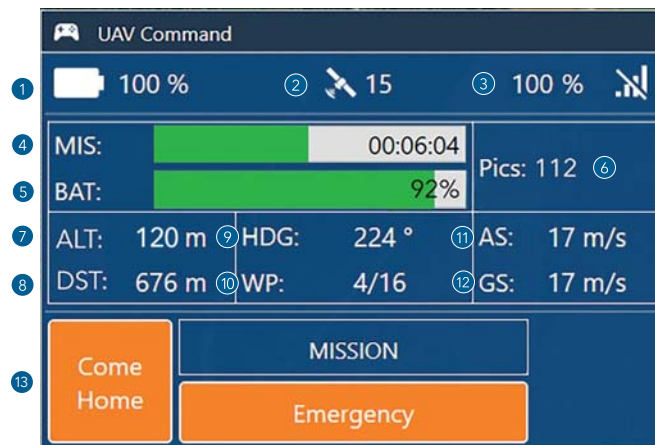
orange: deviation between current and commanded airspeed 10% - 20%

red: deviation between current and commanded airspeed >20%

7.6.2 UAV command

During the mission the Trinity can be controlled with the help of the *UAV Command* panel. As no control sticks are available the function is limited to automatic waypoint flight mode. It is not possible to fly manually in assisted flight.

Open the  **UAV Command** panel in the footer section. The control commands are equivalent to the commands on the transmitter.



1. Battery state of your tablet or laptop

2. Number of satellites

3. Status of the FDL connection

4. Remaining mission time

5. Battery state of the Trinity

6. Number of the taken pictures

7. Current altitude above take-off

8. Distance to the Home Waypoint

9. Heading (direction of the nose of the Trinity)

10. Waypoints (current/overall)

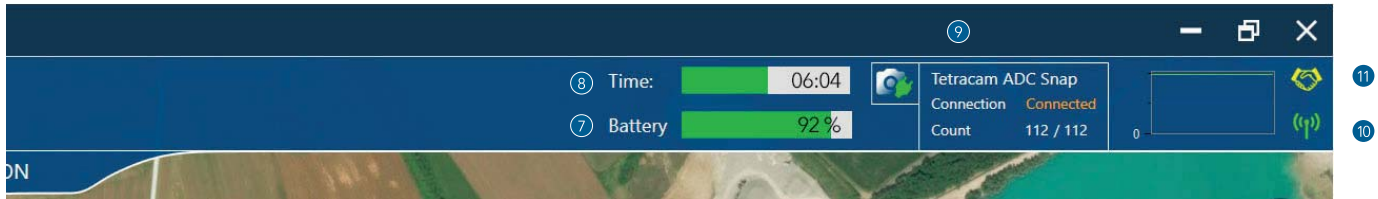
11. Current airspeed

12. Current ground speed

13. Flight operation commands (see chapter 9.2)

7.6.3 Payload info

 **Payload Info** The *Payload Info* interface provides the user with information about the state of the power supply of the payload during the flight. If problems occur the data is displayed in red. Please contact your reseller.



6: Commanded altitude

7: Remaining battery capacity in percent

8: Remaining mission time

9: Payload

The connection status of the cameras as well as the number of pictures are displayed.

Count: amount of pictures/amount of trigger attempts

10: State of the connection between QBase and the Trinity (green graph)

11: RSSI – state of the received data (yellow graph)



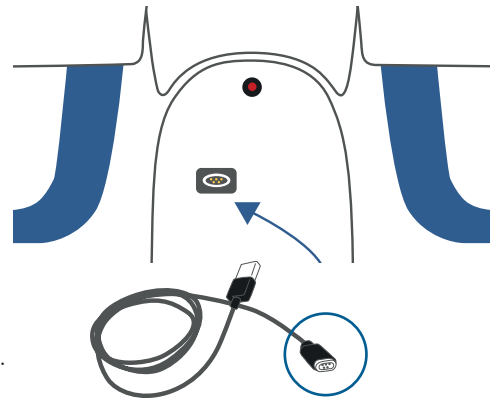
: no flight data link connection

7.7 DEBRIEFING OF A PHOTOGRAMMETRY MISSION

7.7.1 Download the FlyLog including KML and tagging files

FlyLogs are generated during the flight and saved on the autopilot board of the Trinity. With the help of QBase it is possible to transfer the FlyLog from the Trinity to your computer, laptop or tablet.

Moreover QBase offers the opportunity to create a KML (Keyhole Markup Language) file and a tagging file from the FlyLog. With the help of KML files the possibility is provided to display the flight path in an Earth browser like Google Maps or Google Earth. Download the FlyLogs to geotag the pictures with the geodata (see chapter 7.7.2).

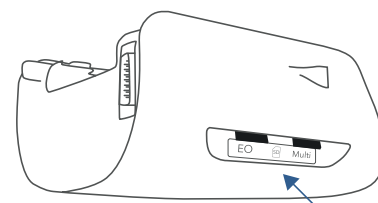


1. **Connect the Trinity** main body to your computer via USB. Do not connect the battery. The power is supplied by the USB connection.
2. Open the QBase **Main Menu**  and select **FlyLog Debrief** .
3. Show the list of Logs by selecting .
4. Select if you wish to download the FlyLog only or if you would also like to have the KML and the tagging file generated from the FlyLog.
5. Select the **log file** that you wish to download from the Trinity and select **Download**.
6. **Choose a directory**.
7. By selecting **Load from Folder** it is also possible to create a KML file and a tagging file from a FlyLog, that is saved on your computer.

7.7.2 Geotag the pictures with the geodata

QBase offers the possibility to geotag the pictures that were taken during the mission with geodata. This enables the user to post-process the pictures with the help of a photogrammetry software. The pictures are saved on a SD card which is on board of the Trinity.

1. **Download the FlyLog** from your Trinity (see chapter 7.7.1).
2. **Remove the SD card** from the **payload** compartment.
3. **Insert the SD card** into your **computer**, laptop or tablet.
4. **Save the pictures** on your computer, laptop or tablet.
5. Open the **Main Menu**  in QBase and select **Geo Tagging** .
6. Select the **FlyLog (.bin)**
7. Select **the camera** that the pictures were taken with.



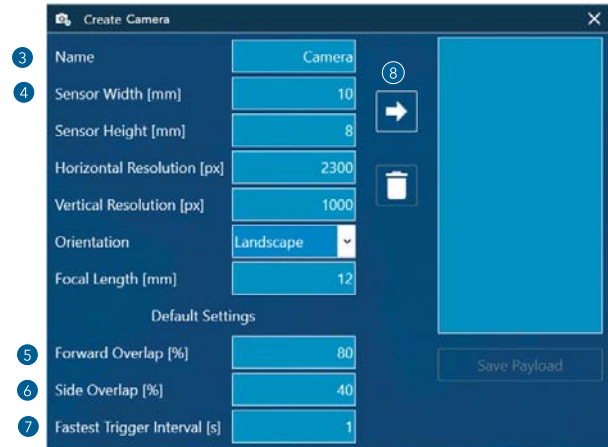
8. Select **the folder** that contains the pictures.
9. Select **Start**.
10. The geotagged pictures are saved in the folder GeoTagged, a subfolder of the folder that contains the original pictures.
After saving the pictures on your computer, laptop or tablet it is recommended to delete the pictures from the SD card.

7.8 PAYLOAD

Based on the three standard payload configurations, three payloads are pre-set in QBase. Please see chapter 11.2 for the three standard payload configurations.

Creating a new camera

1. Select the **Main Menu**  in the top left corner.
2. Select **Create Camera** .
3. Select a **camera name**.
4. Set **camera settings**.
The settings need to be obtained from the technical specifications of the camera.
5. Set default **forward overlap**.
6. Set default **side overlap**.
7. Set **fastest trigger interval**.
8. Select  to add the camera to the payload list.
9. If you wish to add another camera to the same payload repeat steps 3.–8.
10. Save the payload in the directory that is selected in settings (see chapter 7.10.1). The payload is automatically added to the payload list in the Mission Template if it is saved in the payload directory that was selected in the QBase settings.



7.9 CREATING AN OFFLINE MAP

QBase offers the opportunity to work with offline maps in case QBase is not connected to the internet. Offline maps can be created from a selected area. Offline maps are generated based on the information of the online maps. During the creation process QBase needs to be connected to the internet.

Note: The larger the selected area of an offline map is the longer it takes to generate it.

1. Select the **Main Menu**  in the top left corner.
2. Select **Create Map** .
3. Select **Load Map**.
4. Select an area that you wish to create the offline map of. The offline map is created of the currently displayed area.
5. Choose the level of detail.
6. Select **Estimate Cache Size** to calculate the size of the offline map.
7. Select **Export Tiles** to create the map. The map is saved in the maps directory that is set in QBase settings (see chapter 7.10.1). Depending on the size of the file it might take some time to create the offline map.

7.10 SETTINGS

7.10.1 Directory settings

With the help of this menu the directory of the offline maps, the updates, the missions and the payload can be set.

1. Select the **Main Menu**  in the top left corner.
2. Select **QBase** .
3. Select **Set Path** to change the directories. The new path is automatically saved when the QBase User Interface is closed.

Click  to set directory to the default settings.

7.10.2 View manager

With the help of the view manager it is possible to define which components are displayed at which planning or monitoring step.

1. Select the **Main Menu**  in the top left corner.
2. Select **View Manager** .

7.10.3 Flight data link

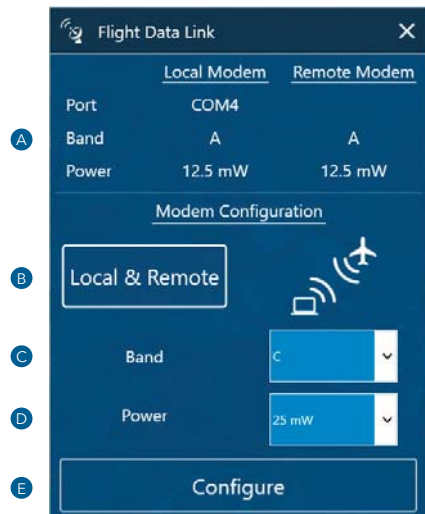
The frequency band and the transmission power of the QBase modem and of the Trinity modem can be changed. In order to guarantee a connection between the Trinity and the QBase modem the frequency bands need to match. Normally no changes need to be made except if you wish to fly with two Trinitys (see chapter 15).

1. **Connect the QBase modem** to your computer, laptop or tablet via USB.

If you wish to change the settings of the Trinity modem

- 1a. Connect the battery pack to the main body of the Trinity and power the Trinity.
- 1b. Ensure that the Trinity is connected to QBase via the flight data link.

2. Select the **Main Menu**  in the top left corner.
3. Select **Flight Data Link**.



A: Current settings of the **Local** (QBase) and **Remote** (Trinity) modem.

Modem configuration

Changing the frequency band or the transmission power of your Trinity includes automatically changing the settings of the QBase modem.

B: Select the **modem**. The currently selected modem is displayed

(**Local**  or **Local & Remote** ).

C: Select the **Band**.

D: Select the **transmission power**.

The transmission power of the QBase modem can be adjusted in a range of 1.3 mW – 100 mW. Please follow the local regulations for the maximum allowed transmission power.

E: Select **Configure** to save the settings.

Note: You can only change the frequency band or the transmission power of your Trinity if the local and remote modems are connected. Please ensure that only one Trinity and one QBase modem are active when changing the frequency band.

Special case: The frequency band of your Trinity is set to A and the frequency band of the QBase modem is set to B and you wish to change the frequency bands to B. First change the band of the QBase (local) modem to A in order to change both frequency bands to B afterwards.

7.11 UPDATING QBASE

If new QBase updates are available a information window informs you when you start QBase. It is recommended to download the new update as soon as it is available.

1. Select the **Main Menu**  in the top left corner.
2. Select **Updates** .
3. Select **Download** to start downloading the update. The update consists of an installer file.
4. **Close** QBase.
5. **Reinstall** QBase with the downloaded installer (see chapter 7.1). The old version of QBase is automatically overwritten.

7.12 UPDATING THE TRINITY

When a new Trinity firmware becomes available the user is informed via QBase. The Trinity firmware update is included in a new QBase update.

1. Follow the steps for downloading and installing a new QBase update (see chapter 7.11).
2. Connect main body of the Trinity with your computer, laptop or tablet via USB (see chapter 7.7.1). Do not connect the battery. The power supply is guaranteed by the USB connection.
3. Select the **Main Menu**  in the top left corner.
4. Select **Update Firmware**.
5. Select the downloaded .qs file in the *QBase → UAV Firmware → Trinity* directory.
6. Follow the instructions of the update guide.

It is important to always update QBase as well as the Trinity firmware as soon as updates become available. The highest level of flight safety can only be achieved with the latest software release. Therefore, Quantum-Systems can only offer warranty if the Trinity and QBase are updated as soon as an update becomes available.

7.13 ERROR MESSAGES AND USER NOTIFICATIONS DISPLAYED IN QBASE

QBase is equipped with two message windows. Please see chapter 14.7 for the messages.

1.  **Message Window** (in the left section)
2. **User Notifications** (in the header section)
The user is informed about the current state of the Trinity.



7.14 DOWNLOADING A LOG FILE FROM THE AUTOPILOT SD CARD

The log file includes all data of the flight and might be needed by your reseller for troubleshooting. In order to download the log file follow the steps:

1. Select the **Main Menu**  in the top left corner.
2. Select **SD Card** .
3. Select the latest *log.bin* file in the logs directory.
4. Save the log file on your computer.