Connex LR Manual

Abstract

Table of Contents

Getting Started – Air and Ground Units

The CONNEX LR can connect to both CONNEX transmitter and CONNEX Mini Transmitter, as long as the Transmitter and the CONNEX LR are in version 4.5 and above.

To get started with the Air Unit:

Please refer to the CONNEX\CONNEX mini\ CONNEX Fusion manual.

> **NOTE**
> The CONNEX LR is not paired with any air unit by default. For more information regarding the pairing process, please refer to page 25, "Pairing Additional Ground Units with an Air Unit" .

To get started with the CONNEX LR:
- Set up the Ground Unit, as described in Setting Up the CONNEX LR Ground Unit [15].
  The monitor connected to the Ground Unit then automatically displays video and an overlay of information received from the Air Unit, as described in Ground Unit – On Screen Display (OSD [22].

About CONNEX LR

AMIMON's CONNEX LR provide a high-end, high-performance wireless HD connection that can operate in challenging unmanned air or ground platforms under harsh conditions with zero latency, such as UAV/UGV. The small and lightweight CONNEX systems transmit commercial, industrial, inspection and monitoring video in real time to their Ground Unit(s), which can be located up to 3,000 meters away.
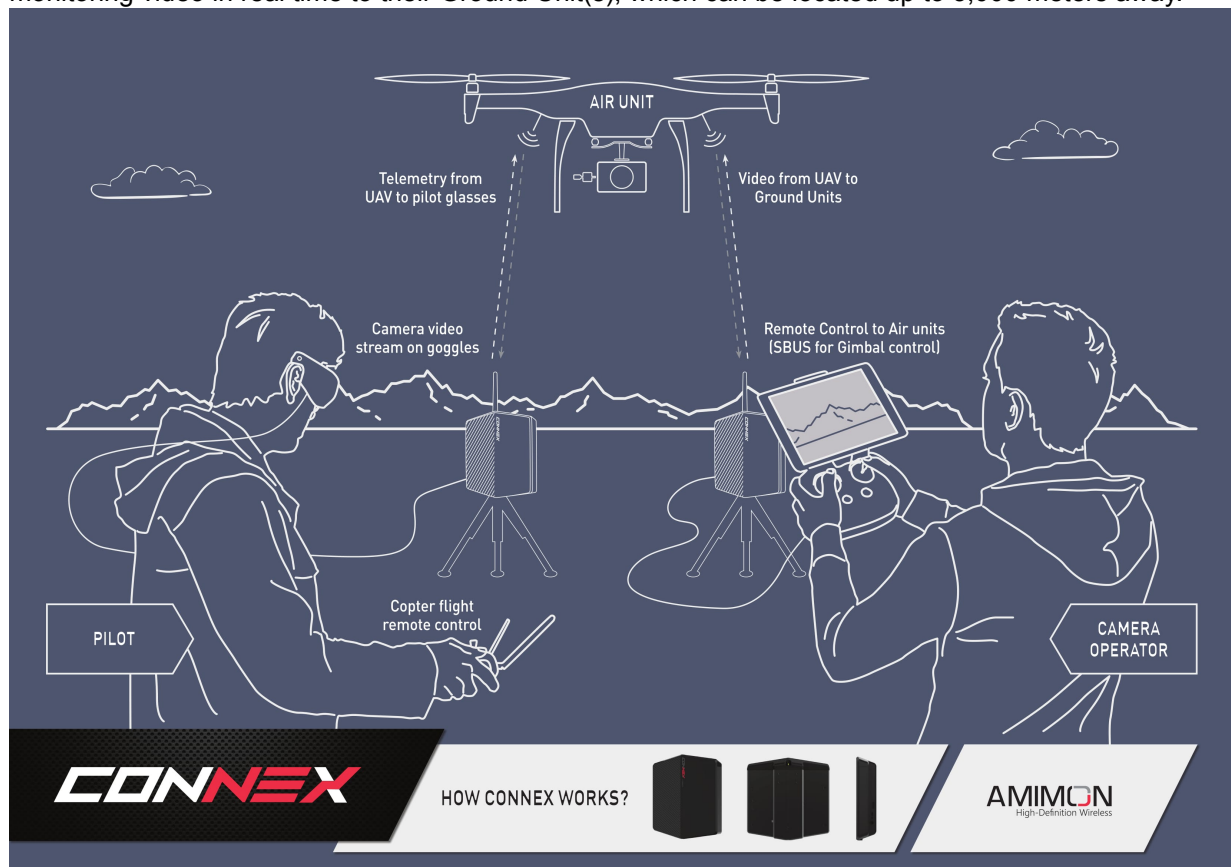
The figure above contains the following main components and people:

- **Air Unit:** The Air Unit is connected to a drone in order to capture video from the drone's camera and to transmit it to up to four Ground Units simultaneously (multicast), thus creating a wireless video link.

- **Ground Unit:** The Ground Unit connects to various types of monitors, video goggles or a portable video monitor via the HDMI port. This enables the pilot and/or camera operator to monitor the video transmitted from the Air Unit.
- **Pilot:** The pilot can view the video on a monitor or wear video goggles connected to the Ground Unit. Flight control (telemetry) information from the drone is overlaid on the video. The pilot uses a remote flight controller to control the drone.
- **Camera Operator:** The camera operator can hold a portable video monitor on which the video can be viewed. The camera operator can use a gimbal remote control to control the drone camera's gimbal through the S.BUS port of the Air Unit.

Key Features

The following features apply to all CONNEX Family products:

- Zero latency, real-time video
- True full HD 1080P at 60fps
- Extremely resilient 5GHz digital link
- Supports a 3,000m/10,000ft stable link in an LOS conditions
- Supports both 40 MHz bandwidth (for best quality) and 20 MHz bandwidth (for stability boost)
- Manual frequency selection option that enables setting a specific non-DSF frequency in the authorized regional spectrum.
- Automatic Frequency Selection (AFS) that fully complies with regulations and automatically selects the best free frequency available
- Encrypted and secure
- Sturdy design for harsh conditions
- Built-in OSD view with embedded MAVLInk-based telemetry
- Gimbal control over Futaba® S.BUS and PPM
- Plug-and-Fly, ready to operate out of the box
- DFS support enables multiple free channels, thus boosting robustness
- Android and MAC / Windows-based management support application

CONNEX LR Ground unit

The following figures show both sides of the Ground Unit.
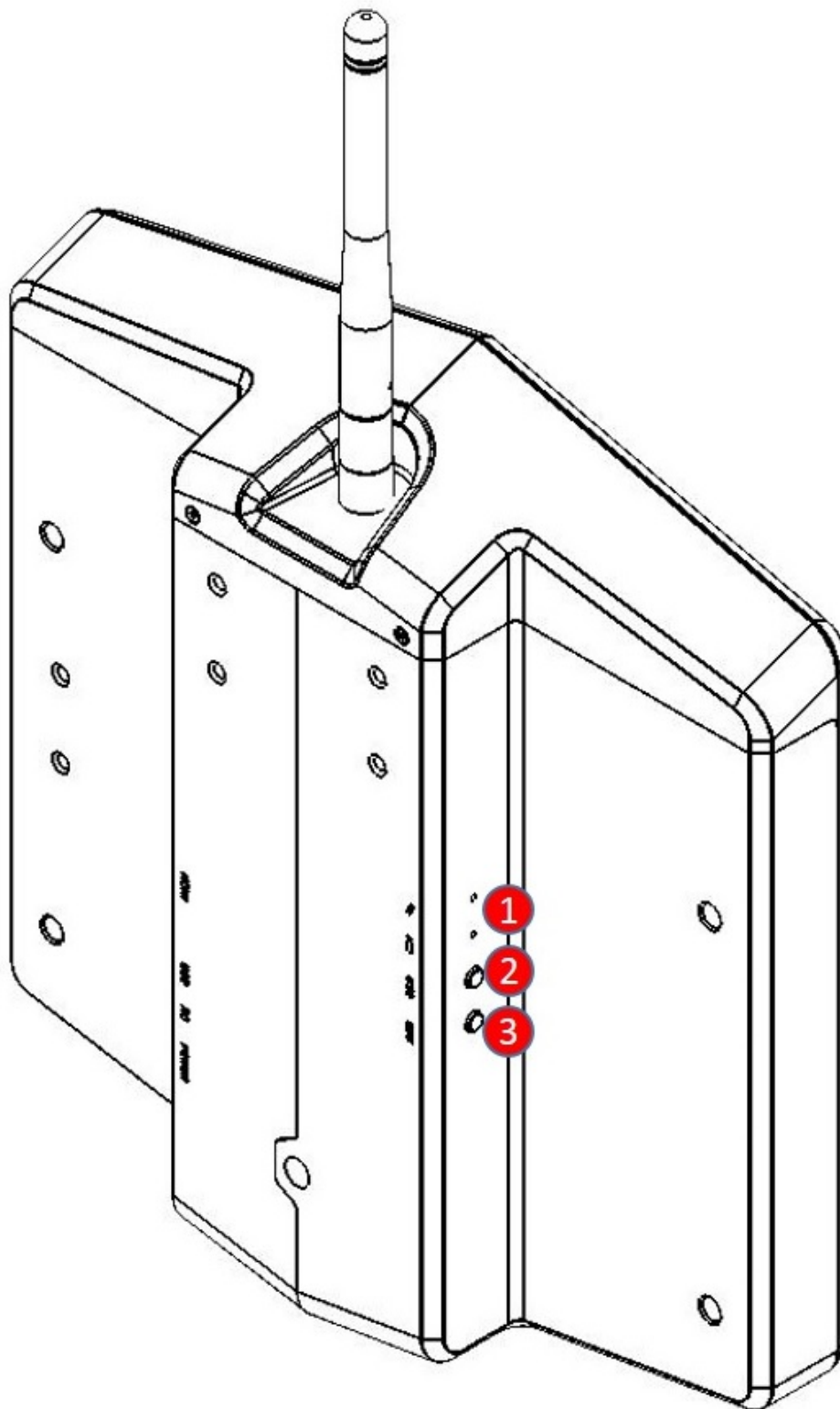
CONNEX LR– 1
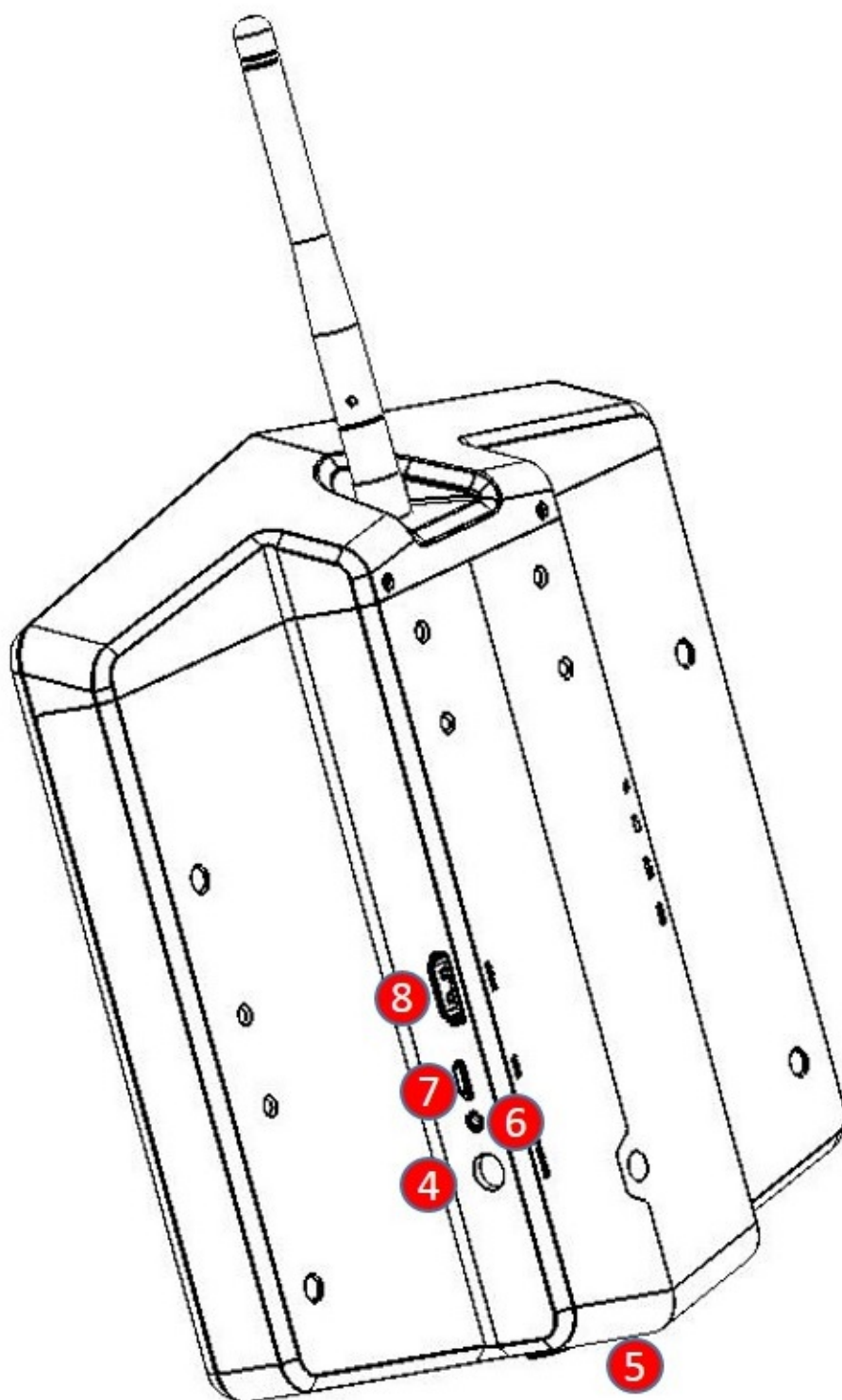
CONNEX LR– 2

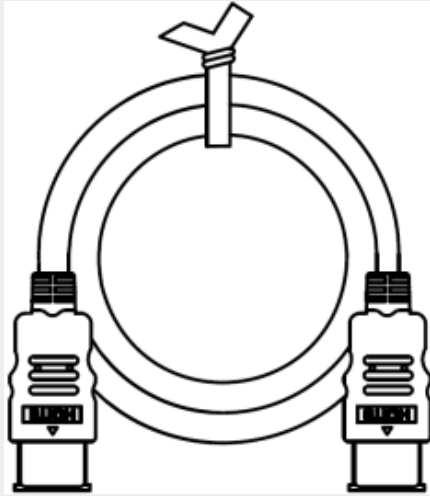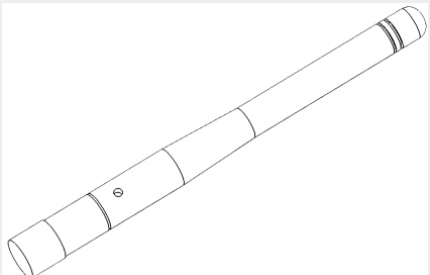| Key	Name	Description
1	LEDs	For a description of the Ground Unit LEDs, refer to Setting up the CONNEX Ground Unit [15].
2	OSD Button	Enables/disables the OSD display. This display presents a screen of telemetry information collected by the CONNEX system on the monitor connected to the Ground Unit (e.g., Air Unit flight parameters, height, direction, signal strength, and so on). For more information, refer to Ground Unit – On Screen Display (OSD [22]. By default, OSD is enabled (displayed). Pressing this button disables and re-enables OSD.
3	Link Button	The CONNEX systems supports up to four Ground Units per Air Unit. The **Link** button enables you to connect up to three additional Ground Units to the same Air Unit. For details, refer to Multicasting to Multiple Ground Units [25].
4	Power Port	Input rating: 8-26 VDC.
5	Tripod Mount Hole	Enables you to connect the Ground Unit to a tripod. Connection to a tripod is optional.
6	S.BUS / PPM Trainer	This port can be connected to the Remote Control trainer port. This port enables you to remotely control the gimbal on the drone using the link between the Ground Unit and the Air Unit. The Ground Unit supports both S.BUS and PPM inputs. The bit rate of this control can be configured in the **S.BUS Rate** field using the CONNEX Management application for Windows / MAC [38] or for Android devices [53].
7	Micro USB Port	This port enables configuration and upgrade of the Ground Unit software using the CONNEX Management application for Windows / MAC [38] or for Android devices [53].
8	HDMI Port	Enables display of the received video. Connect this port to a monitor's HDMI port using the provided standard HDMI cable.

Ground Unit Cables and Antennas

Cables and accessories for the Ground Unit are described in the table below.

Name	Description	
Standard HDMI Cable	1.2 meters.	
Power Connector	DC plug to XT-60 Male – 50cm length.	
S.BUS Trainer Port Cable	3-pin to Futaba – 1 meter cable.	
PPM Cable	PL 2.5mm male to PL3.5mm male.	

Rx Antennas	2dbi screw-on antenna.	
Micro USB Cable	Standard Micro USB cable for upgrading the CON-NEX LR software. The Micro USB connector connects to the USB port on the CONNEX LR. The mini USB connector connects to a computer on which the Ground Unit software is installed.	
USB to Micro USB Connector	Enables connection of the Air Unit to a tablet or mobile device.	
Brackets and screw	Enables connecting the CONNEX LR to a pole, and fastening the HDMI cable. for more in formation go to <LINK>	

Limitation of Liability and Warranty

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CE This equipment is in compliance with the essential requirements and other relevant provisions of Directives 1999/5/EC and 2011/65/EU.

The frequency range 5.15-5.35GHz, available under Indoor mode, is for indoor use only.

Safety Instructions and Maintenance

Safety Symbols and Instructions

Safety Symbols

⚠	**High Voltage Sign:** Warns the user of the presence of uninsulated *dangerous voltage* within the product enclosure, which may be of sufficient magnitude to constitute a risk.
⚠	**General Warning Sign:** Warns the user of the presence of important operating and maintenance (servicing) instructions.

Safety Instructions

- Do not open the Air Unit or Ground Unit enclosures. There are no user-serviceable parts inside. Refer servicing to qualified service personnel only. The use of controls, adjustments or procedures other than those specified in this user guide may result in exposure to shock and/or electrical or mechanical hazards.
- Do not immerse the units in water.
- Do not block the air ventilation openings.
- Always disconnect a unit's power by pulling the mains plug.
- Clean with a dry cloth only.
- Keep powered on units at least 20 cm away from your body.
- Do not expose the units to moisture or excessive heat. Unit operating temperature is 32–113°F or 0−45°C.
- Unplug the units during lightning storms and during long periods of storage.
- For CONNEX only: The provided power supply is for indoor use only.
- Use only the supplied accessories or those recommended on the AMIMON website. Accessories (including cables) must not be replaced, as this may affect performance or functionality, or damage the unit. We highly recommend that you use the provided AMIMON cables. If an alternate cable is used, make sure that it is of the highest quality.
- Do not use the product if there is any physical damage to the enclosure.
- For CONNEX only: It is normal for the product to become slightly hot during use. However, if the enclosure's temperature becomes too hot to touch, turn the product off and contact support. The internal fan of the Air Unit (transmitter) should work at all times when power is on.
- Do not let the product come into contact with corrosive materials.
- Do not let the product come into contact with fire.

Potential Hazards

The product's Transmitters and Receivers contain HD wireless video module devices that should be operated according to the same rules and limitations applicable to normal HD wireless video module devices. Do not operate the units in environments that may be susceptible to radio interference resulting in danger, specifically:

- **Areas where prohibited by law:** Follow any special rules and regulations and obey all signs and notices. Always ensure that the unit is turned off (the power switch is not lit) when instructed to do so or whenever it may cause interference or danger.
- **Where explosive atmospheres may be present:** Do not operate the units in any area where a potentially explosive atmosphere may exist. Sparks in such areas could cause an explosion or fire, resulting in bodily injury or even death. Be aware and comply with all signs and instructions.
- **It is not advisable to operate the units while at a refueling point or service station:** Users are reminded to observe restrictions on the use of radio equipment in fuel depots (fuel storage and distribution areas), chemical plants or where blasting operations are in progress.

- **Areas with a potentially explosive atmosphere are often, but not always, clearly marked:** Potential locations can include gas stations, below deck on boats, chemical transfer or storage facilities, vehicles using liquefied petroleum gas (such as propane or butane), areas where the air contains chemicals or particles (such as grain, dust or metal powders), and any other area where it would normally be advisable to turn off a vehicle's engine.
- **Near medical and life support equipment:** Do not operate the units in any area where medical equipment or life support equipment is in use, or near any equipment that may be susceptible to any form of radio interference. As the unit may transmit signals that could interfere with this equipment, the host communications device must be turned off in such areas.

For more information, visit www.AMIMON.com.

Specifications and Supported Features

Technical Specifications

The following table presents the technical specifications for CONNEX LR.

Transmission Distance Outdoor	Up to 3,000m/10,000 ft. (LoS)
Transmission Delay	Zero [Less than 1 msec.]
Radio Frequency	5.1-5.8 GHz, according to regional regulations
Channel Selection	Automatic frequency selection [AFS]
Video Formats	1080p60/59.94, 1080p/50, 1080i60/59.94, 1080i/50, 1080p30/29.97, 1080p24/23.98, 720p60/59.94, 720p/50, 480i60/59.94, 480p60/59.94, 576i50, 576p/50
Multicast Mode	Up to 4 receivers with no delay or quality degradation. [Requiring extra Ground Unit(s)]
OSD Support	MAVLink (3DR) and CAN bus (DJI) Telemetry
Gimbal Control	Ground unit PPM or S.BUS trainer port input / Air Unit S.BUS port output
Encryption	AES-128 & RSA 1024 for key exchange
Operating Temperature	0-45º Celsius
Regulation	CE, FCC, MIC
Video Interface	HDMI (Type A)
Antenna Connector	RP SMA
Power Connector	DC round
Power Input	8-26V (3S-6S)
Dimensions (mm)	200 x 200 x 52
Weight	660gr

Supported Remote Controls, Gimbals and Telemetry Flight Controllers

This section lists the Air Unit camera gimbals and remote controls that are supported by CONNEX and CONNEX mini.

Supported Air Unit Camera Gimbals (partial list, for pre-tested models)

• DJI - Zenmuse Z15-GH4 (HD), Z15-GH3, Z15-BMPCC, Z15-5D, Z15-5D III (HD)
• DJI - Ronin, Ronin-M
• FreeFly Movi M5
• Tarot T-2D

Supported Remote Controls (partial list, for pre-tested models)

** Please note that any RC unit that outputs PPM protocol over its trainer port can be supported only with CONNEX SW version 2.0.x and higher.

• Futaba T14GS
• Futaba FX-22
• Futaba T18MZ

- Futaba FX-32
- Futaba T14SG
- Futaba T10J
- DJI NPVT581
- DJI SR6
- Spektrum DX7S
- JR XG6

Supported Flight Controllers for Telemetry (partial list, for pre-tested models)

- DJI A2
- DJI NAZA
- 3DR Pixhawk
- 3DR APM
- 3DR ArduPilot

Supported Resolutions

The following table lists the video resolutions supported by CONNEX and CONNEX mini.

Video Format Timings	Format Name	CONNEX and CONNEX Mini	
		40MHz	20MHz
720(1440) x 480i @ 59.94/60Hz	480i	Yes	Yes
640 x 480p @ 59.94/60Hz	480p	Yes	Yes
720 x 480p @ 59.94Hz		Yes	Yes
720 x 480p @ 60Hz		Yes	Yes
720(1440) x 576i @ 50Hz	576i	Yes	Yes
720 x 576p @ 50Hz	576p	Yes	Yes
1280 x 720p @ 50Hz	720p	Yes	Yes
1280 x 720p @ 59.94/60Hz		Yes	Yes
1920 x 1080i @ 50Hz	1080i	Yes	Yes
1920 x 1080i @ 59.94/60Hz		Yes	Yes
1920 x 1080p @ 23.98/24Hz	1080p	Yes	Yes
1920 x 1080p @ 29.97/30Hz		Yes	Yes
1920 x 1080p @ 50Hz		Yes	No
1920 x 1080p @ 59.94/60Hz		Yes	No
PsF		No	No

Setting up the CONNEX LR

Setting Up the CONNEX LR Ground Unit

This section describes how to set up the CONNEX LR.

We highly recommend that you use the provided AMIMON accessories and cables. If alternate products are used, make sure that they are of the highest quality.

To set up the CONNEX LR:

1. Refer to the Placement Guidelines of CONNEX LR [18] for a description of mandatory requirements and best practices for optimal placement of the Ground Unit and its antennas.
2. Enable display of the received video by connecting the provided **standard HDMI cable** from the CONNEX LR **HDMI port** to the monitor's **HDMI** port.

Figure 1. Standard HDMI Cable
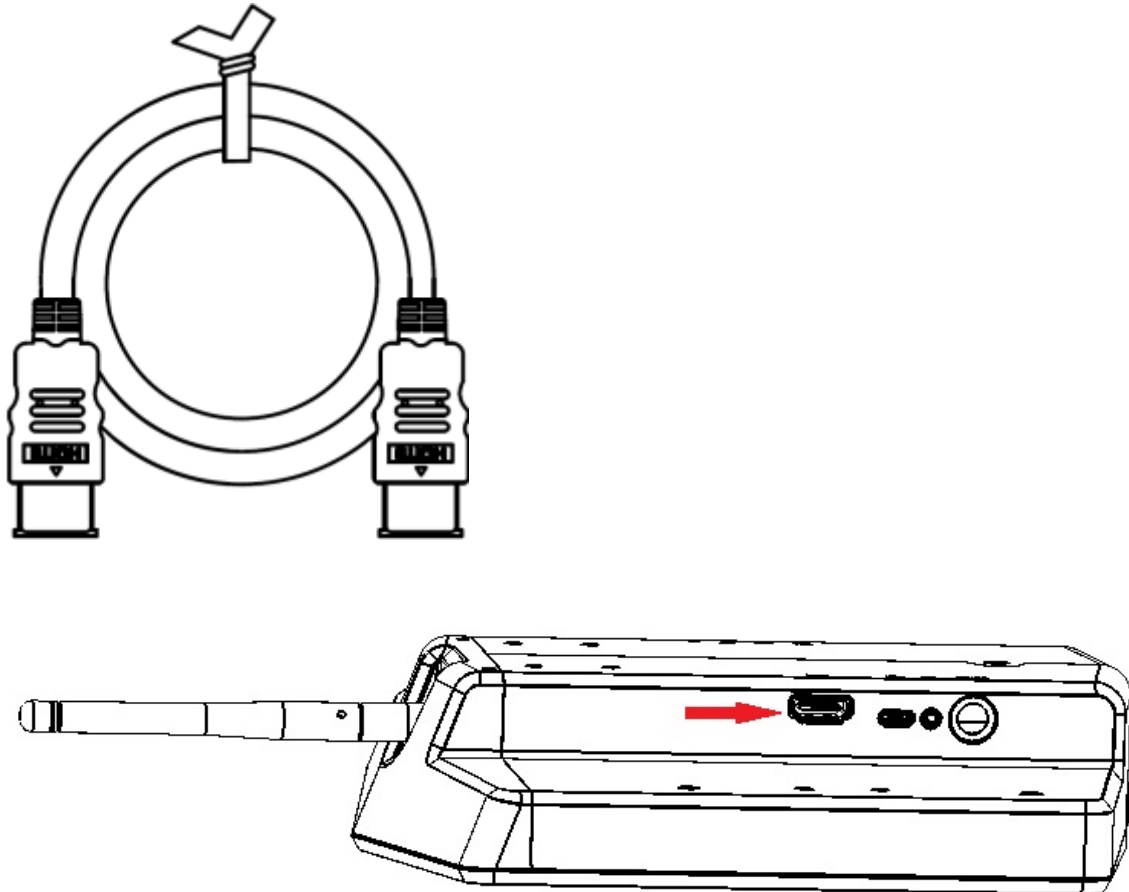
3. Connect the provided power cable to the power port on the Ground Unit labeled **8-26-VDC**, and connect the other end to a power source.
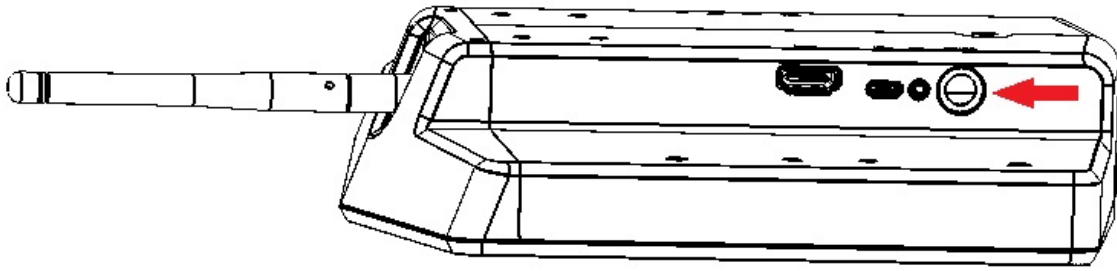
Verify that both LEDs on the Ground Unit light up, as described in the tables below.

LED Behavior

The CONNEX LR features two LED indicators: a Video LED and a Network LED. In normal operating conditions, both LEDs show a constant white color. No power (or low power) is indicated by the LEDs turning off.

When the indicators are blinking quickly (both LEDs), a system error has been detected. In this case, use the CONNEX Management application to update the software [31], or contact CONNEX support.

The behaviors of each individual LED are described in the tables below.

▢◁ Video LED

Solid	The video signal from the camera is locked (i.e., the signal is being received from the Air Unit).
Blinks Slowly	The video signal from the camera is not locked.
Blinks Quickly	The camera is transmitting a video resolution that is not supported.

✎ Network LED

Solid	A link has been established to the Ground Unit.
Blinks Quickly	Registration is in progress, or the Ground Unit has gone out of range.
Blinks Slowly	The Air Unit is establishing a link with the Ground Unit.

Controlling the Drone Camera Gimbal

The CONNEX Gimbal Control feature enables an operator on the ground to control the drone's camera gimbal using various remote controls over the video uplink channel. Only gimbals that can input S.BUS are supported.

This feature is supported only when an Air Unit is paired with a single Ground Unit. Before beginning the procedure below, verify that this is the case by using the CONNEX Management application to check the Ground Units that are registered to the Air Unit (see Checking the Ground Units Registered to an Air Unit (Windows / MAC) [35] and Configuring Fail Safe Parameters (Android) [53]).

To enable the CONNEX Gimbal Control feature:

1. Connect the Air Unit S.BUS/CTRL port to the S.BUS or D.BUS port on the camera's gimbal.
   In order to do that, please refer to the CONNEX FUsion/ CONNEX Mini Manual.
2. Connect the gimbal remote control's Trainer port to the CONNEX LR S.BUS/PWM/PPM port using the S.BUS/PWM/PPM Port cable.

Figure 2. S.BUS/PWM/PPM Port Cable

3. The default gimbal command transmission bit rate is FASSTest 12CH Mode (6.3m sec). If this bit rate is not supported by the gimbal controller, use the CONNEX Management application to configure the S.BUS Bit Rate manually (see Checking the Ground Units Registered to an Air Unit (Windows / MAC) [35] and Configuring Fail Safe Parameters (Android) [53]).

The CONNEX LR automatically detects the S.BUS/PWM/PPM and transmits the gimbal commands over the wireless return channel to the Air Unit's S.BUS/CTRL port.

For a list of supported remote controls and gimbals, see Supported Remote Controls, Gimbals and Telemetry Flight Controllers [13].

Placement Recommendations and Best Practices

Placement Guidelines of CONNEX LR

This section describes mandatory requirements and best practices for optimal placement of the CONNEX LR.

- **Place the CONNEX LR as High as Possible:** Place the CONNEX LR on a tripod or pole so that it is as high as possible. A height of 2 meters is optimal.
- **Place the CONNEX LR Facing the Air Unit:** Place the CONNEX LR so that its antenna plane is facing upwards in the general direction in which the drone will be flying, as seen in the illustration below.

Figure 3. Antennas Facing the Drone
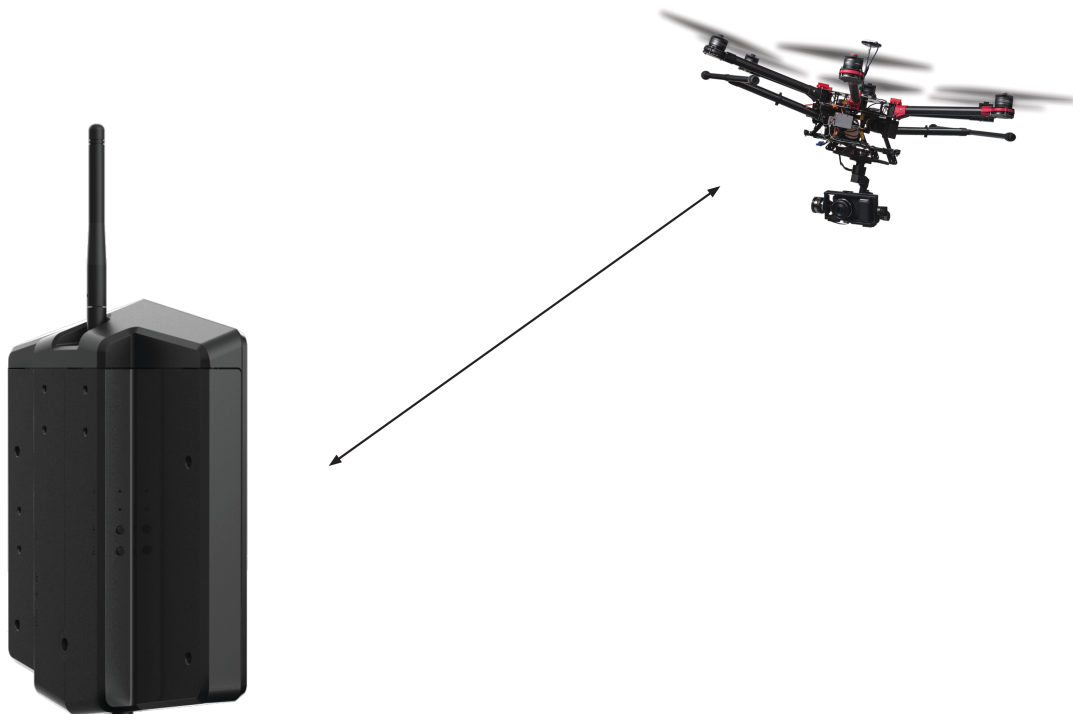
- **Avoid Interference:** Place the CONNEX LR as far away as possible from other transceiver devices, especially transmitters in the 5 GHz band.

Reception Range and Reception Areas

The CONNEX LR is supplied with its own antennas. 4 of the antennas are built-in to the receiver's body and does not require outside connection, and the fifth antenna is an external antenna.

Below, you can find the description of the CONNEX LR reception area.

When positioning the CONNEX LR on a tripod, the main lobe of its antennas spreads on a 70° horizontally, giving it a range of up to 3Km of stable reception in LoS condition.

NOTE
The CONNEX LR has no limitation range, so the user might be able to reach further than 3Km, with the right antenna positioning, clear line of sight and clear frequencies.

On the side and back lobes, the CONNEX LR has up to 400 meters range, letting the user have a safe and close landing when outside the main lobe reception area.

3,000M/
10,000FT

70 DEGREES

RANGE OF 400 METERS OUTSIDE
MAIN RECEPTION AREA
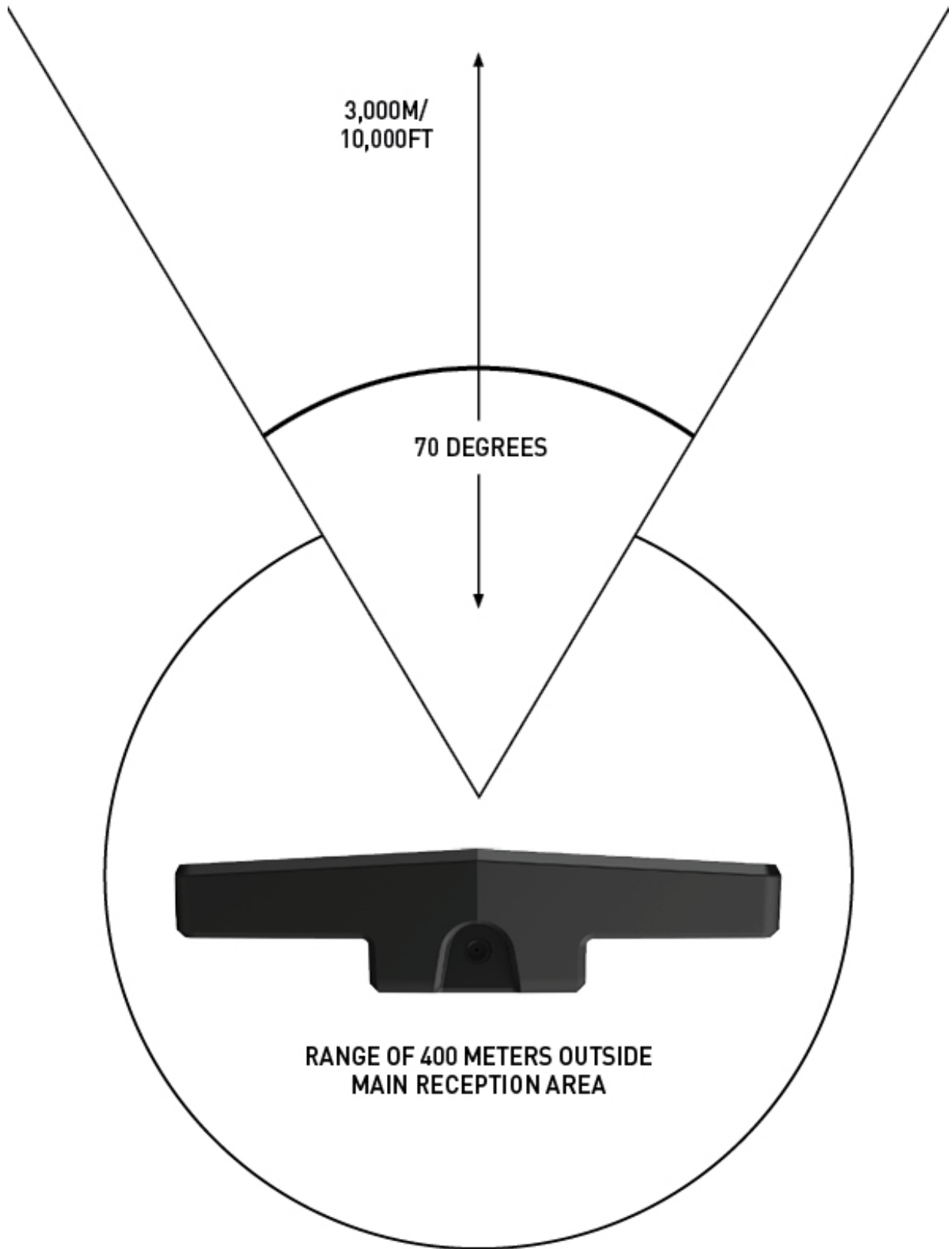
The CONNEX LR's main lobe is also spread vertically 25°. The vertical side and back lobes will also allow the user a range of up to 400 meters.

25
DEG
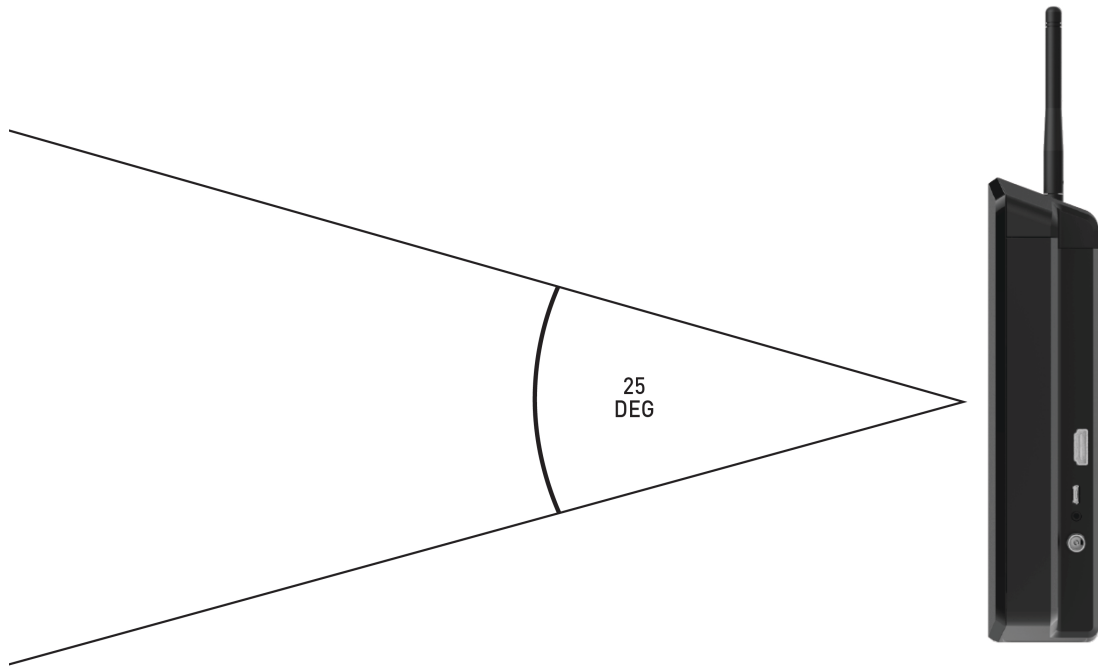
TIP
To ensure best reception for the entire 3Km, tilt the CONNEX LR to the estimated height the drone will fly at in most of its flight time.

TIP
To get the maximum range out of the CONNEX LR, configure the link for 20MHz bandwidth, which will increase the range of the system.

CONNEX LR Operational Instructions

Ground Unit – On Screen Display (OSD)

The Ground Unit monitor displays information collected by the CONNEX system overlaid on the video received from the Air Unit. The following types of information can be overlaid on the video:

- Default information
- Additional telemetry information (optional)
- Alert and System Messages [24]

Default Information Overlaid on Video

By default, the Ground Unit displays the following information overlaid on the bottom of the video in a black strip (indicated by the red arrow in the picture below).

Figure 4. OSD ON - Default View

The following information is provided:

	Air Unit to Ground Unit video signal strength.
	Distance of the Air Unit from the Ground Unit (in meters).
	Video resolution captured by the drone camera.
	The currently selected frequency option. CONNEX mini systems support automatic frequency only. When a fixed frequency is selected, the frequency is displayed in MHz.
	The currently selected bandwidth.
	Air Unit power voltage level.
	This arrow, which appears when three or more GPS satellites are detected, points in the direction of home. The arrow has eight positions (with 45 degrees between each), and the degrees to the home location is shown below the arrow. (The value is received from the drone's telemetry).

By default, this OSD information is enabled (displayed). Pressing the **OSD** button (see CONNEX LR Ground unit [5]) on the Ground Unit disables (hides) this OSD information. Pressing the button again redisplays it.

Additional Telemetry Information Overlaid on Video

Additional telemetry information can be overlaid on the video received from the drone's flight controller. This information appears in a black strip on the top of the video (indicated by the red arrow in the picture below).

Figure 5. OSD View - With Additional Telemetry Information

The following information is provided:

H: 17ₘ	Drone height.
YAW: 3	Rotation of the drone around the axis (in degrees), relative to the North.
GS: 3ₘ/ₛ	Ground speed.
UNK	Flight Mode. The following standard Arducopter flight modes may be displayed: • STBL (Stabilize) • ARCO • ALTH (Alt hold) • AUTO • GUID (Guided) • LOIT (Loiter) • RTL • CIRC (Circle) • POS (Position) • LAND • DRFT (Drift) • SPRT (Sport) • UNK (Unknown)
7	Number of connected GPS satellites.
23.8V	Aircraft battery charge.

The additional telemetry information is displayed when:

• The drone has a supported flight controller.
• The Air Unit Telemetry/MAVLink/CTRL port is connected to the drone's flight controller. (For more details, refer to the CONNEX Fusion/CONNEX Mini manual)

- The **OSD** button on the Ground Unit is set to enable the display of flight control (Telemetry) information.

When the Air Unit receives valid Telemetry messages from the drone flight controller, these messages are transmitted to the Ground Unit, which displays the additional Telemetry information on the OSD. This may require a few seconds to take effect.

For a list of supported remote controls and gimbals, see Supported Remote Controls, Gimbals and Telemetry Flight Controllers [13].

To display OSD information:

- While all LEDs on the Ground Unit are lit, press the **OSD** button on the Ground Unit. The following is an example of the OSD View:

Figure 6. OSD View - With Additional Telemetry Information

Alert and System Messages

The tables below describe messages that may appear on the monitor connected to the CONNEX LR HDMI port.

Alert Messages – Overlaid on Video During Link

These alert messages may be displayed on top of the live video:

Alert	Description
Video Signal Not Detected	A link has been established between the Air Unit and the Ground Unit, but no video signal has been detected. This message is displayed regardless of the OSD button position.

System Messages – No Link

These system messages may be displayed when no live video is displayed:

Alert	Description
Searching for Air Unit	This message is displayed until a link is established. This may occur when the Air Unit is out of range or unavailable, or when the Ground Unit has been removed from its list of paired devices.
Pairing in Progress	This message is displayed while the Air Unit is pairing with a Ground Unit. For a detailed description of the pairing process, see Multicasting to Multiple Ground Units [25].

Multicasting to Multiple Ground Units

A single Air Unit can transmit video downlink to up to four Ground Units. This is called *multicasting*. The following procedure describes how to pair an additional Ground Unit with the same Air Unit.

> **NOTE**
>
> **Note:**
>
> 1. The Air and Ground Units provided in the same box are preconfigured to automatically search for and connect to each other. Therefore, there is no need to perform this procedure on the Air Unit / Ground Unit provided in the same box.
> 2. Controlling the Air Unit's camera gimbal is not recommended when the Air Unit is registered to more than two Ground Units (even if only two of the registered Ground Units are powered ON).
> 3. Register one Ground unit at a time to each Air unit.

Pairing Additional Ground Units with an Air Unit

To pair an additional Ground Unit with an Air Unit:

1. Set up the additional Ground Unit, as described in Setting Up the CONNEX Ground Unit [15]or in the CONNEX Fusion/ CONNEX Mini Manual.

   The Ground Unit must be placed between one and 10 meters from the Air Unit. Each Ground Unit must be placed at least a few meters away from other Ground Units in order to enable optimal reception.

   The following message is then displayed on the monitor connected to the Ground Unit's **HDMI port**:

   "Ground Unit not registered to Air Unit."
2. Press and hold the **Link** button on the Ground Unit (for approximately five seconds) until its **Network** 🖉 LED starts blinking. The following message is displayed on the monitor connected to the Ground Unit:

   "Please activate registration on Air Unit."
3. Power on the Air Unit with which to pair this Ground Unit. This step assumes that the Air Unit has already been set up, as described in CONNEX Fusion/CONNEX Mini manual.

   Press the Air Unit's **Link** button for approximately five seconds until the Network LED starts blinking. After the LED begins blinking, the following message is displayed on the monitor connected to the Ground Unit.

   "Air Unit detected. Please press the Link button."
4. Press and release the **Link** button on the Ground Unit (do not press and hold). The following message is then displayed:

   "Pairing in progress."

   After a while, the monitor connected to the Ground Unit should display the video received from the Air Unit.

> **NOTE**
> **Note:** If a black screen is displayed, check that the camera on the drone is operating.

To see a list of Ground Units with which an Air Unit is currently paired and connected, you may use the CONNEX Management application to check the Ground Units that are registered to an Air Unit. For more information, see Checking the Ground Units Registered to an Air Unit (Windows / MAC) [35] and Checking the Ground Units Registered to an Air Unit (Android) [49].

To clear Ground Units with which an Air Unit is paired, you may use the CONNEX Management application to unregister Ground Units. For more information, see Unregistering Ground Units (Windows / MAC) [36] and Unregistering Ground Units (Android) [51].
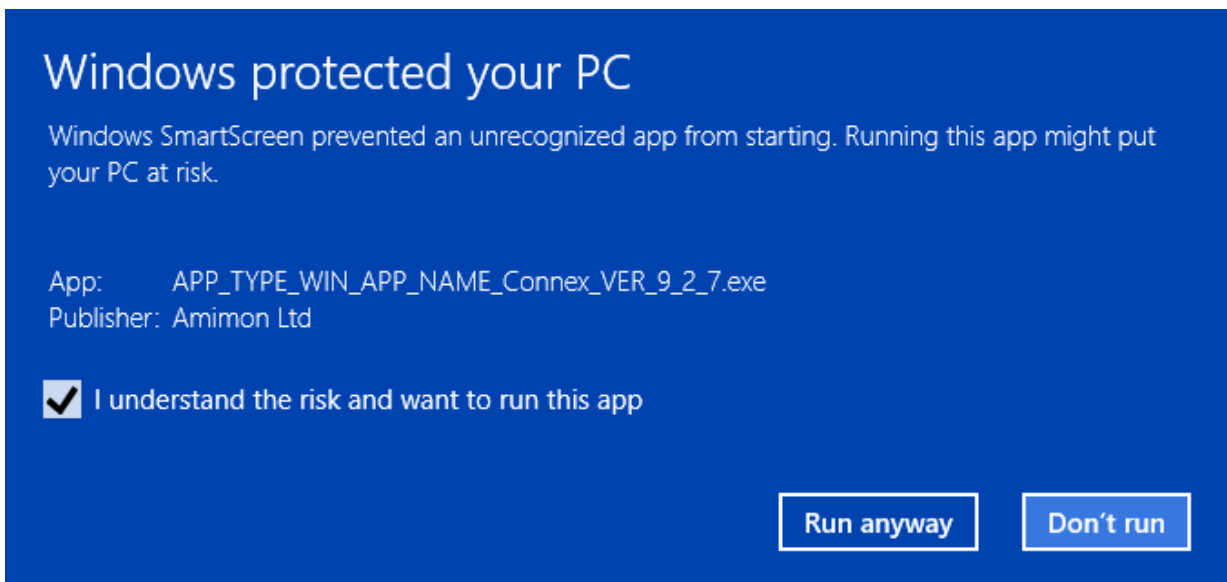
CONNEX Management Application for Windows/MAC

Message Alert when running the Management Tool Installation Process in Win8/10

When installing the CONNEX Management Tool in Windows 8 and Windows 10, the following alert may appear:
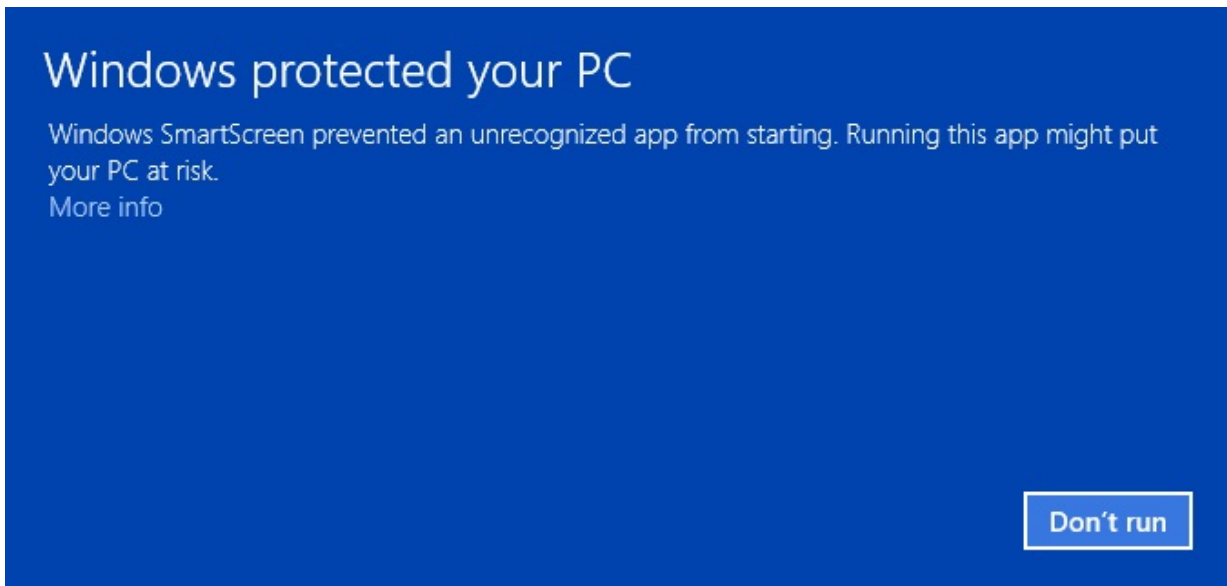
Continue with the installation by clicking the **More info** link.

Select the checkbox stating 'I understand the risk and want to run this app' and then click **Run anyway**.

When installation is complete, the application operates normally.

Management Application Overview (Windows / MAC)

The Air Unit and the Ground Unit come preinstalled with the latest firmware version, and are preconfigured to communicate with each other. The CONNEX Management application is used when the following updates and verifications are required:

- Configuring the Link Between the Ground and Air Units (Windows / MAC) [33]
- Upgrading the Air Unit or Ground Unit Firmware [31]
- Checking which Ground Units are registered to an Air Unit [35]
- Unregistering Ground Units [36] from an Air Unit.

To use the CONNEX Management application:

1. Install the CONNEX Management application, as described in Installing the CONNEX Management Application (Windows / MAC) [28]

2. Connect the Air Unit or Ground Unit to a computer, as described in Connecting the Air Unit or Ground Unit to a Computer [30].

> **NOTE**
>
> **Note:** Only a single CONNEX Air Unit or CONNEX Ground Unit can be connected to the CONNEX Management application at a time.
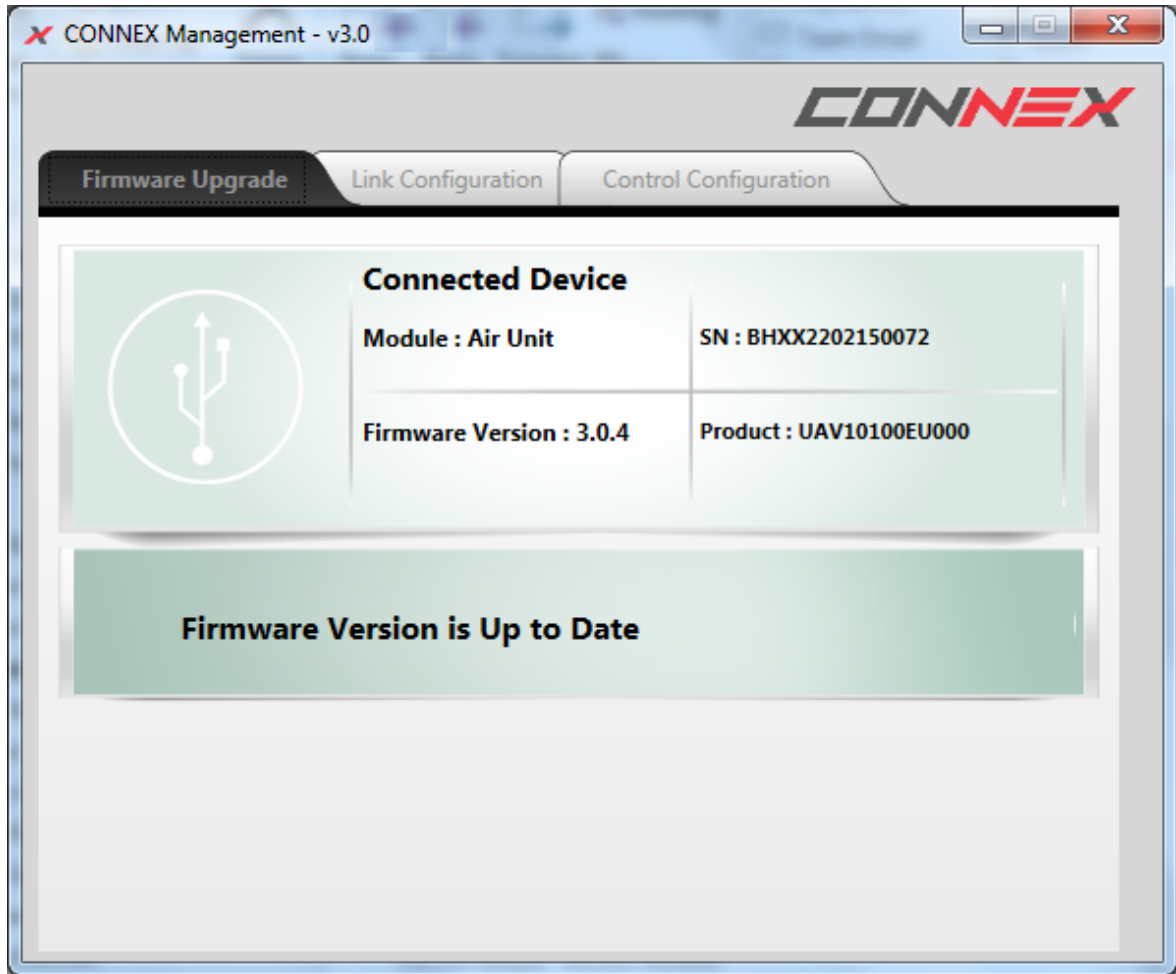
Installing the CONNEX Management Application (Windows / MAC)

This application can run on a standard computer running either OS X 10.7 and up, or Windows 7 and up.

For installation on Windows 8 or Windows 10 operating systems, please check Message Alert when running the Management Tool Installation Process in Win8/10 [27] .

To install or upgrade the CONNEX Management application:

1. Download the latest version from the Amimon website Here to a computer connected to an Air Unit or Ground Unit [30].
2. Run the installation file and follow the displayed instructions to install the CONNEX Management application.
3. Launch the application by double-clicking its desktop icon. The following window displays (Air Unit on left, Ground Unit on right):

CONNEX Management - v3.0

Firmware Upgrade | Link Configuration | Control Configuration

Connected Device

Module : Air Unit   SN : BHXX2202150072

Firmware Version : 3.0.4   Product : UAV10100EU000

Firmware Version is Up to Date

The current version of the CONNEX Management application is displayed in the upper left corner of the window.

Connecting the Air Unit or Ground Unit to a Computer

The Air Unit or Ground Unit must be connected to a computer on which the CONNEX Management application is installed in order to configure or upgrade that unit.

To connect the Air Unit or Ground Unit to a computer:

• Connect the Micro USB cable to the Air Unit's or Ground Unit's USB port.

If you launch the CONNEX Management application before connecting an Air Unit or Ground Unit to the computer, the following message is displayed. Connect the unit, as described above.

## Upgrading the Air Unit or Ground Unit Firmware

If the Connex Management tool displays an alert about a newer tool version, download the new version from: Here

Upgrading the Air Unit or Ground Unit firmware does not affect the settings of the wireless video downlink.

To supplement the instructions below, you can refer to the CONNEX Firmware Upgrade video.

**To upgrade the Air Unit or Ground Unit firmware:**

1. Make sure that the computer on which the CONNEX Management application is installed is connected to the Internet and is connected to the Air Unit/Ground Unit via a Micro USB cable.
2. Launch the CONNEX Management application by double-clicking its desktop icon. The following figures show the window displayed for the Air Unit (left) and for the Ground Unit (right). The **Firmware Upgrade** tab is selected by default. This is the only tab that appears for the Ground Unit.
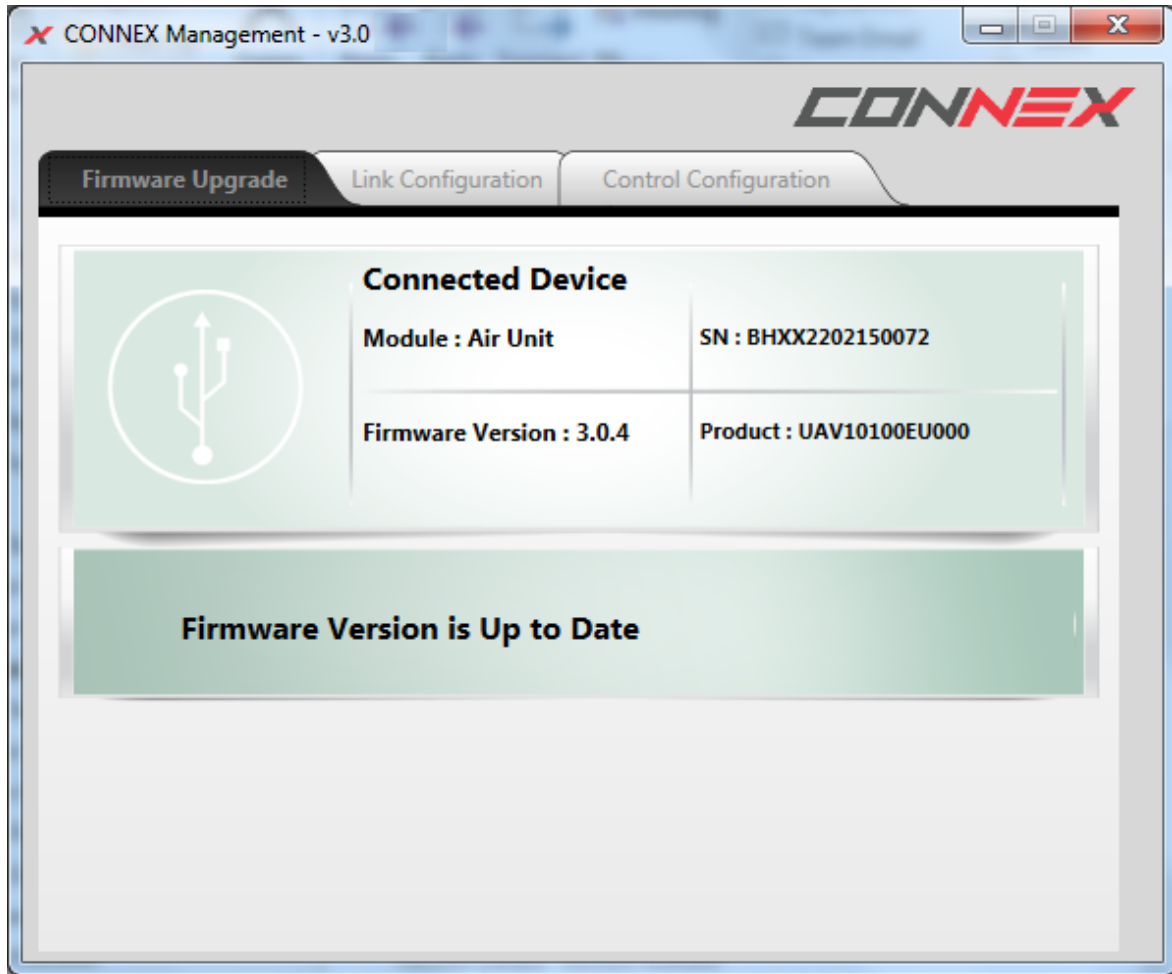
The window contains the following options:
- **Module:** Specifies whether the connected unit is an Air Unit (Tx) or a Ground Unit (Rx).
- **Firmware Version:** Specifies the version of the firmware currently installed on the unit.
- **SN:** Specifies the unique serial number of the unit.
- **Product:** Specifies the product ID of the unit.
- **Upgrade Button:** The application automatically checks with the AMIMON server whether the latest firmware version of the connected unit is installed. If the latest version is not installed, the **Upgrade** button is enabled and a **'Newer Firmware Version Exists x.x.x'** message appears.
3. Click the **Upgrade** button. The latest software version is automatically downloaded from the AMIMON server and installed on the connected unit. The lower portion of the window displays the progress of the upgrade and lists the processes as they are performed, as shown below:
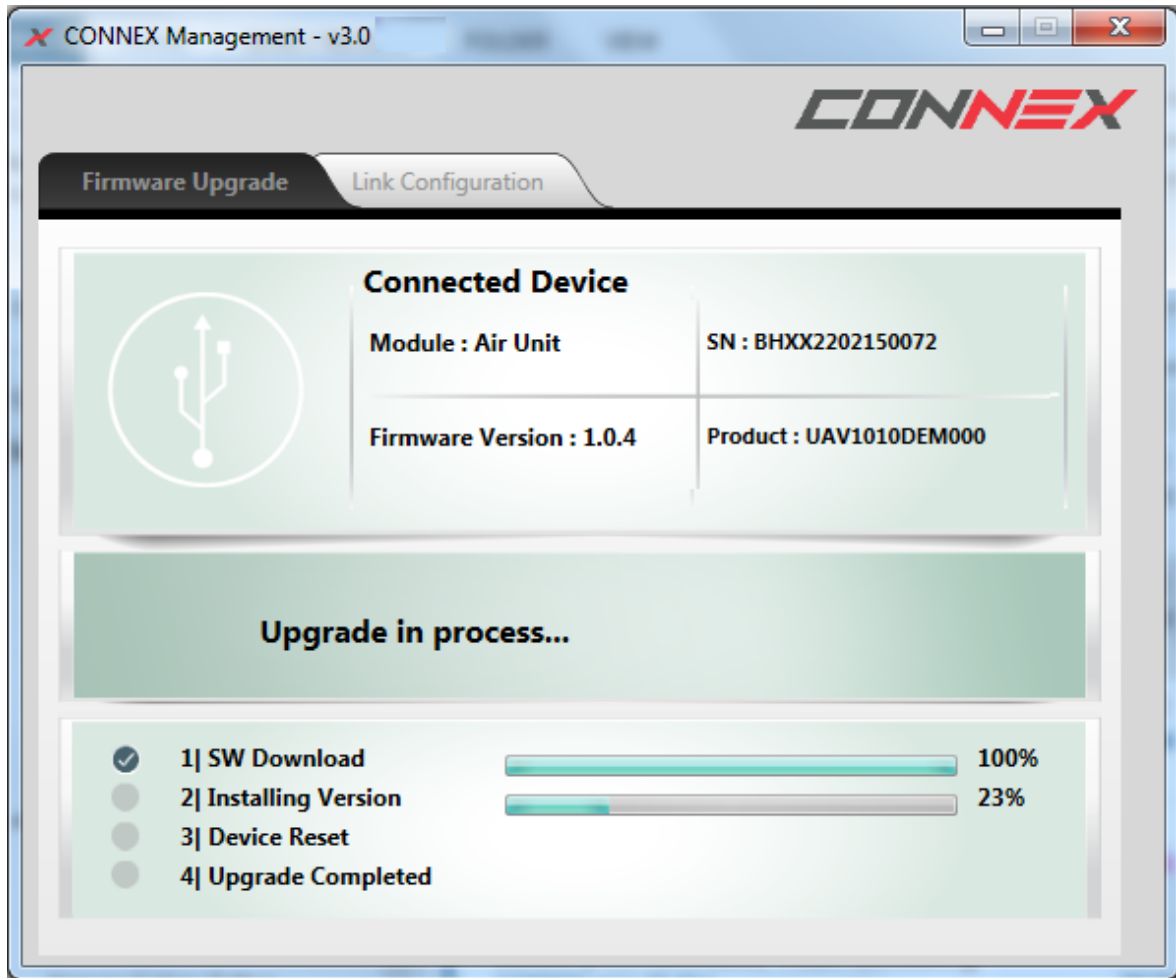
4. If you upgrade an Air Unit, you must also upgrade all Ground Units registered to it. We highly recommend that you begin the upgrade process only after the Air Unit and its Ground Units have been collected and are placed next to the computer.

⚠ An Air Unit and a Ground Unit with different software versions may not communicate with each other.

Configuring the Link Between the Ground and Air Units (Windows / MAC)

This article describes how to configure the link between an Air Unit and its Ground Units. This procedure is performed on an Air Unit only.

The **Link Configuration** tab of the Management application is shown in the following figures (CONNEX on left, CONNEX mini on right). The link parameters are described in the table below the diagrams.

Key	Description
1	**Channel Mode:** Determines the bandwidth of the wireless link. CONNEX users can select **High Quality** (40 MHz) or **Stability Boost** (20 MHz). **Note:** CONNEX mini units supports both modes from firmware version 4.5 and above.
2	**Frequency Mode:** Determines whether automatic or fixed frequency is used. The options available for fixed frequency vary according to other options selected (regional settings and Channel Mode). **Note:** CONNEX mini units supports Fixed Frequency from firmware version 4.5 and above.
3	**Regional Settings:** Allows you to set the operating mode of the unit, according to regional regulations. The options are relevant for European, Chinese, Japanese and Korean regions.

To configure the link:

1. Make sure that the computer on which the CONNEX Management application is installed is connected to the Air Unit via a Micro USB cable.
2. Launch the CONNEX Management application by double-clicking its desktop icon.
3. Select the **Link Configuration** tab.
4. **For CONNEX units , and CONNEX Mini units from Firmware version 4.5 and above,only:**
   Select the bandwidth channel mode, as follows:
   - **Optimized Quality (40 MHz):** This is the default option which provides the best quality. This is the only option that can be used with 1080P60 video resolution.
   - **Range Boost (20 MHz):** Use this mode in harsh RF conditions or for long range operations. This mode enables higher stability, but supports only lower resolutions on the video link.
5. **For CONNEX units , and CONNEX Mini units from Firmware version 4.5 and above:**

Specify the frequency mode by selecting either **Auto** or one of the fixed frequencies listed. The fixed frequencies that are available vary according to other options selected.

6. The Regional Settings dropdown menu appears for CONNEX and CONNEX mini units used in Europe, Japan, China and Korea. (This dropdown menu is hidden when units are used in United States and Australia regions.) Select options as follows:

    - In Europe, select either **Air To Ground** for 5.8 GHz, 25mW or **Indoor** for 5 GHz, 200mW, Ground use.
    - In Japan, select either **Indoor** or **Outdoor**.

    Make sure that you select the frequency setting that complies with the local RF regulations in the region in which you are operating.

7. To apply the configured changes to the Air Unit, click the **Update** button. The update affects how the Air Unit communicates with all the Ground Units with which it is registered (the units that are listed in the **Registered Receivers** list in the lower right portion of the window).

Checking the Ground Units Registered to an Air Unit (Windows / MAC)

This article explains how to check which Ground Units are paired with a specific Air Unit.

To verify which Ground Units are registered to an Air Unit:

1. Make sure that the computer on which the CONNEX Management application is installed is connected to the Air Unit via a Micro USB cable.
2. Launch the CONNEX Management application by double-clicking its desktop icon.
3. Click the **Link Configuration** tab.
4. The lower right portion of the window displays a list of the MAC IDs of the Ground Units registered with this Air Unit, for example:
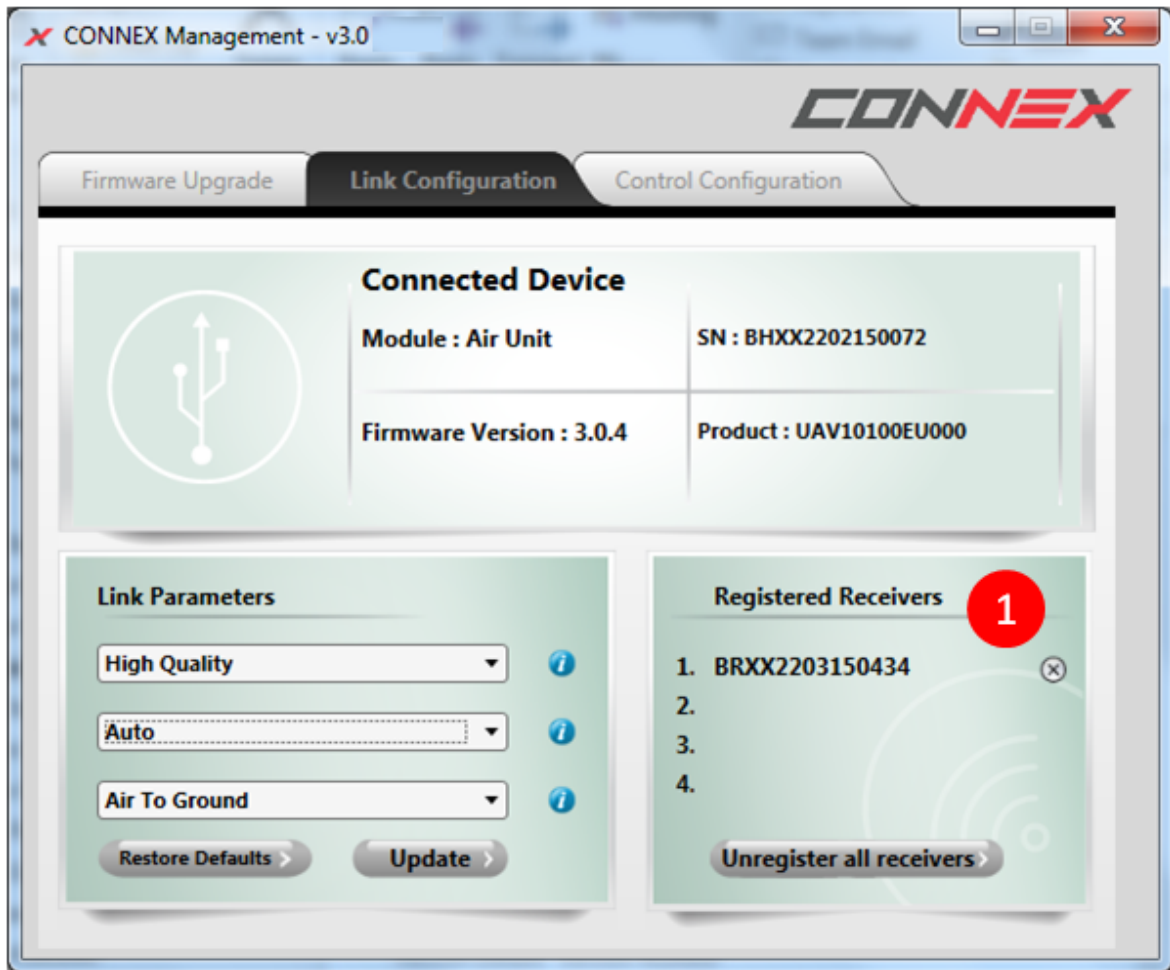
Key	Description
1	Ground Units Registered to the Air Unit

The MAC ID of a specific Ground Unit can be seen using the CONNEX Management application.

## Unregistering Ground Units (Windows / MAC)

There are two options for unregistering Ground Unit(s) from an Air Unit, as described in the procedures below:

• Unregistering one device at a time
• Unregistering all devices simultaneously

To view a video about unregistering Ground Units, click here.
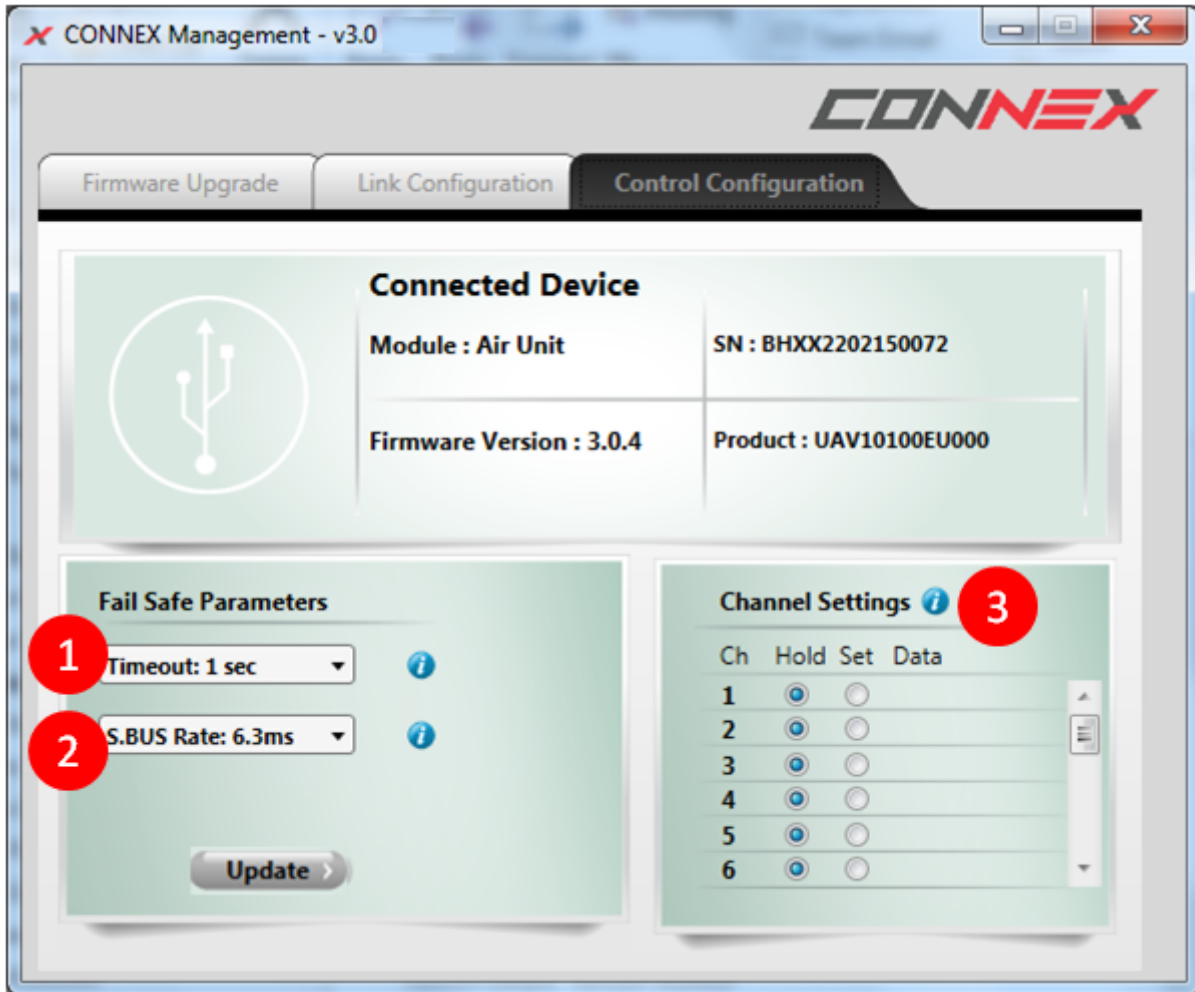
To unregister a single device:

1. Make sure that the computer on which the CONNEX Management application is installed is connected to the Internet and is connected to the **Air Unit** via a Micro USB cable.
2. Launch the CONNEX Management tool by double-clicking its desktop icon.
3. Click the **Link Configuration** tab.
   The lower right portion of the window displays a list of Ground Units registered with the Air Unit, as shown here:
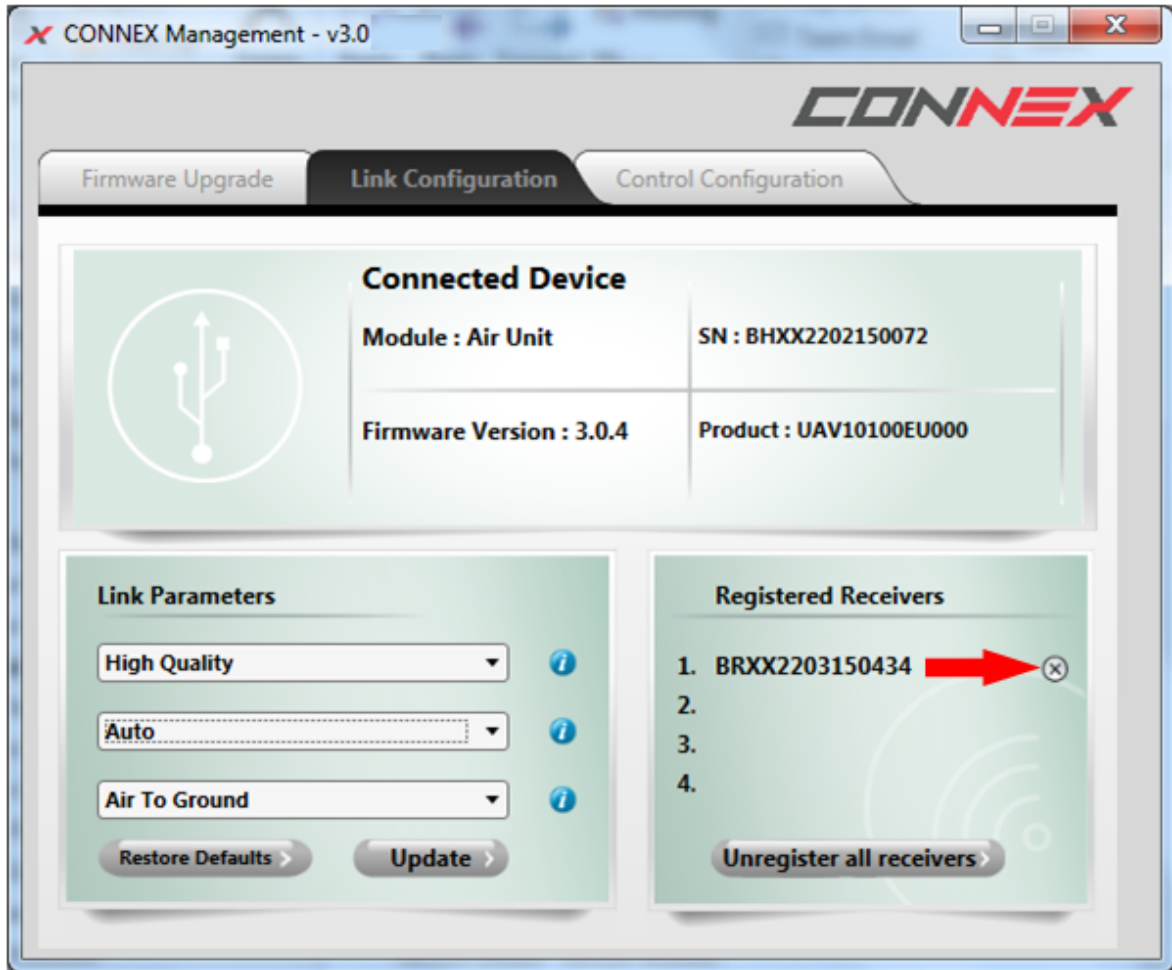
4. To unregister a Ground Unit, click on the X button in the relevant row (marked in RED in the image above).

To unregister all Ground Units:

1. Make sure that the computer on which the CONNEX Management application is installed is connected to the Internet and is connected to the **Air Unit** via a Micro USB cable.
2. Launch the CONNEX Management application by double-clicking its desktop icon.
3. Click the **Link Configuration** tab.
   The lower right portion of the window displays a list of Ground Units registered with the Air Unit, as shown here:
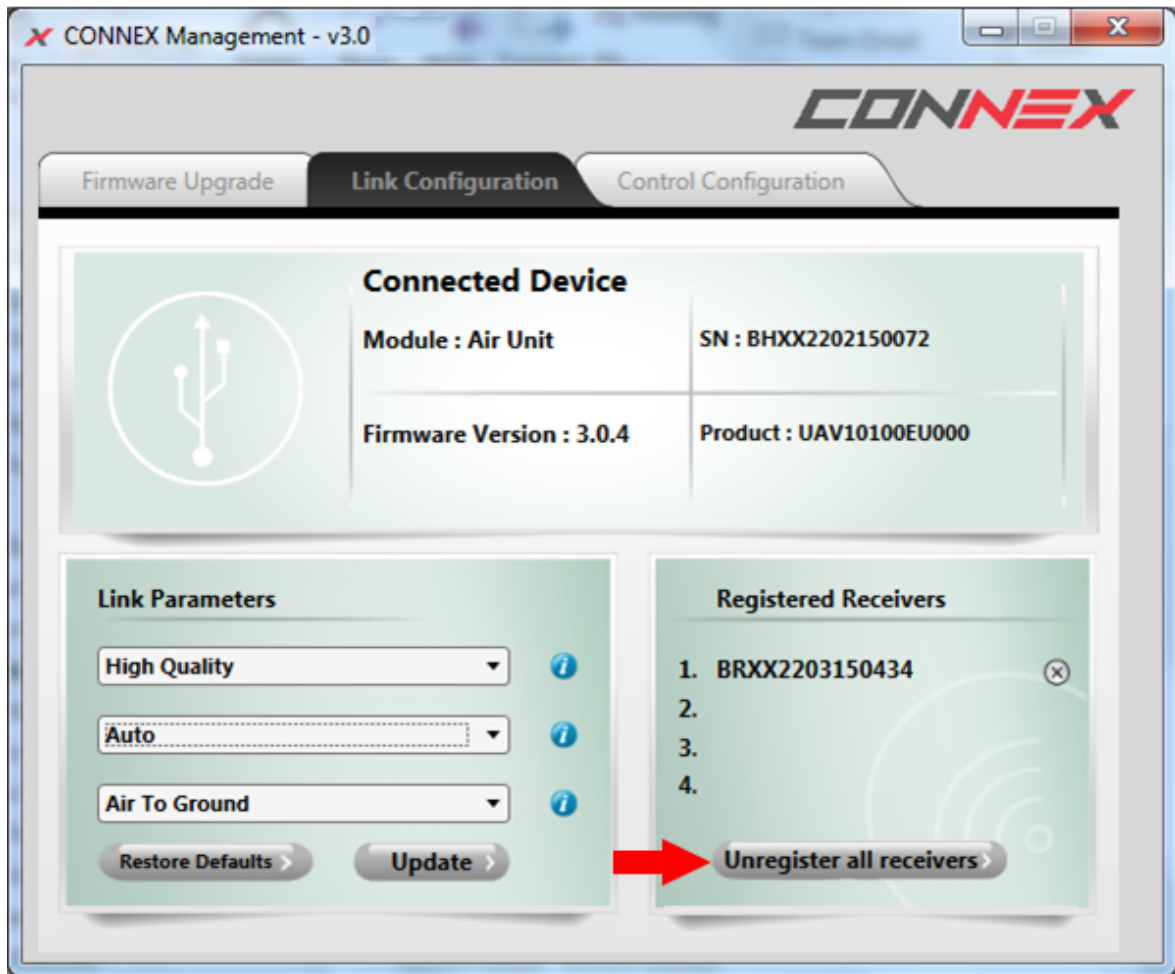
4. Click the **Unregisterall receivers** button (marked in RED in the image above).

Configuring Fail Safe Parameters (Windows / MAC)

The **Control Configuration** tab of the Management application allows you to set the parameters that are applied when the remote control wireless uplink is broken. The parameters are described in the table below the diagram.

Key	Description
1	**Timeout:** Determines the length of time (in seconds) between losing communication and applying Fail Safe values onto the output of the Air Unit.
2	**S.BUS Rate:** Specifies the data rate of the S.BUS link between the Ground Unit and the Air Unit that controls the Air Unit's camera gimbal. By default, the data rate of the S.BUS remote control is 6.3mSec (FASSTest 12CH).
3	**Channel Settings:** Determines the position of the gimbal following a loss of communication. Each channel can be set to: • **Hold:** The most recent value (prior to the communication loss) is maintained. • **Set:** A new value is used. Values are configured in % (from -100 to +100).

IMPORTANT: It is recommended to utilize the CONNEX link for gimbal control ONLY and NOT for full drone control.

To set Fail Safe parameters:

1. Make sure that the computer on which the CONNEX Management application is installed is connected to the Air Unit via a Micro USB cable and is connected to the Internet.
2. Launch the CONNEX Management application by double-clicking its desktop icon.
3. Select the **Control Configuration** tab.
4. From the **Timeout** dropdown menu, select the relevant option (1, 2, or 3 seconds).
5. If required, manually set the outgoing S.BUS bit-rate by selecting one of the following S.BUS Rate modes:
   • **Auto: 15m sec:** FASSTest 18CH or T-FHSS Mode. The S.BUS rate is received and sampled from the remote control trainer port. The Air Unit then automatically outputs the same S.BUS rate.

- **6.3m sec:** FASSTest 12CH Mode.
6. For each channel in the **Channel Settings** frame, select either the **Hold** or **Set** radio button.
   If you select the **Set** radio button, enter the required value in the field in the **Data** column. Values are configured in % and may range from -100 to +100.
7. To apply the configured changes, click the **Update** button. The update affects how the Air Unit communicates with all the Ground Units with which it is registered [35].

CONNEX Management Application for Android Devices

Management Application Overview (Android)

The Air Unit and the Ground Unit come preinstalled with the latest firmware version, and are preconfigured to communicate with each other. The CONNEX Management application is used when the following updates and verifications are required:

• Reconfiguring the wireless video datalink [47]
• Checking which Ground Units are registered to an Air Unit [49]
• Unregistering Ground Units [51] from an Air Unit

To use the CONNEX Management application:

1. Install the CONNEX Management application, as described in Installing the CONNEX Management application [41].

2. Connect the Air Unit or Ground Unit to a mobile device, as described in Connecting the Air or Ground Unit to Your Mobile Device [42].

> **NOTE**
>
> **Note:** Only a single CONNEX Air Unit or CONNEX Ground Unit can be connected to the CONNEX Management application at a time.

Installing the CONNEX Management Application (Android)

The CONNEX Management application for mobile devices is currently supported on Android devices with operating systems 4.4 and higher. In addition, the mobile device needs to support USB OTG capability.

To install the CONNEX Management application:

1. Download the latest version from Google Play to a device connected to an Air Unit or Ground Unit [42].
2. Run the installation file and follow the displayed instructions to install the application.
3. Launch the application.
   The **My Device** screen is displayed.
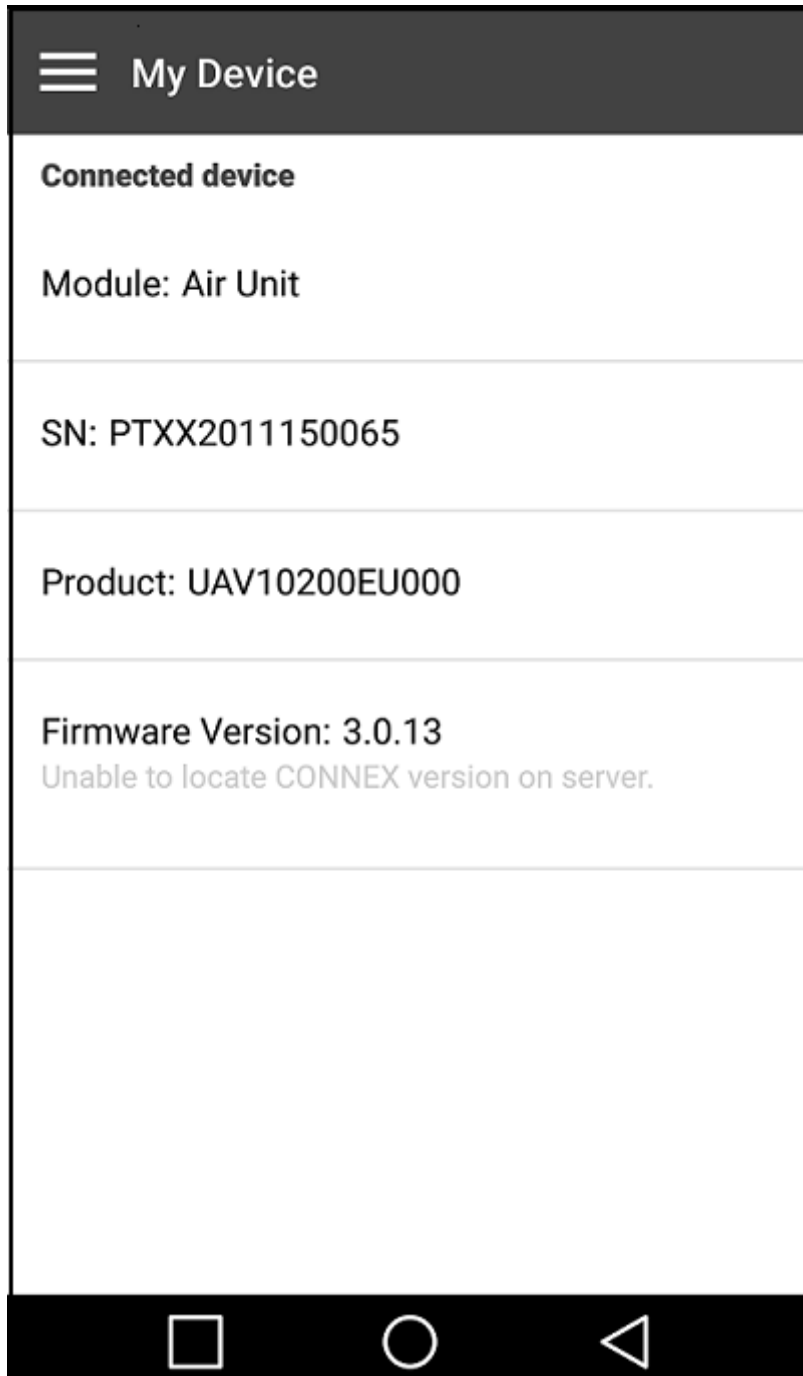
For more information about the **My Device** screen and the different menu options, refer to Working with the CONNEX Mobile Application [43].

Connecting the Air or Ground Unit to Your Mobile Device

The Air Unit or Ground Unit must be connected to a mobile on which the CONNEX Management application is installed in order to configure that unit.

To connect the Air Unit or Ground Unit to a mobile device:

• Connect the USB to Micro USB connector to the Air Unit's or Ground Unit's USB port.

If you launch the CONNEX Management application before connecting an Air Unit or Ground Unit to your mobile device, the following message is displayed. Connect the unit, as described above.
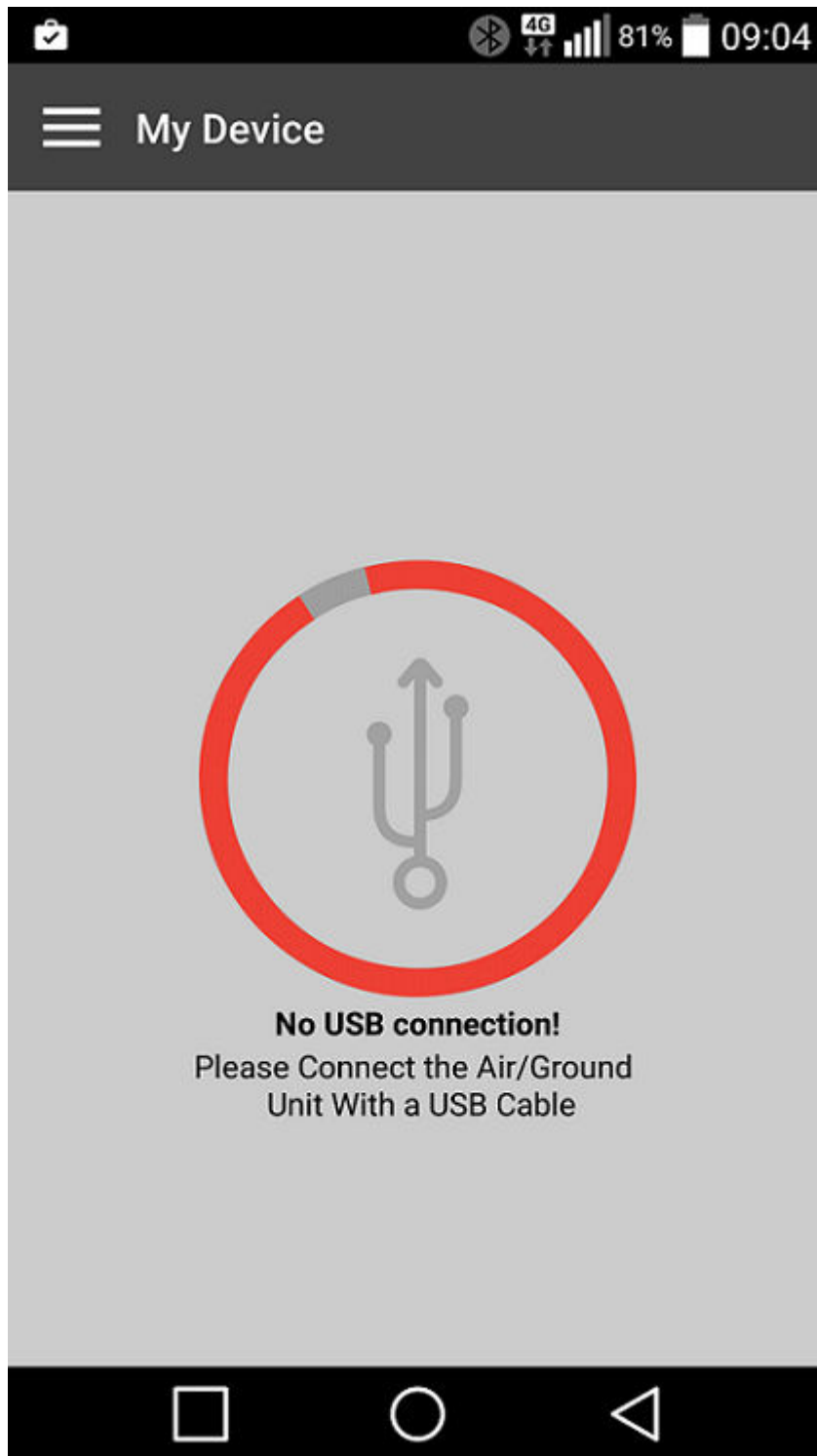
Working with the CONNEX Mobile Application

The following sections provide a general overview of the application's main screens and features:

- My Device Screen
- Main Menu options
- Basic Application Components

My Device Screen

When you launch the CONNEX Management application, the **My Device** screen opens:
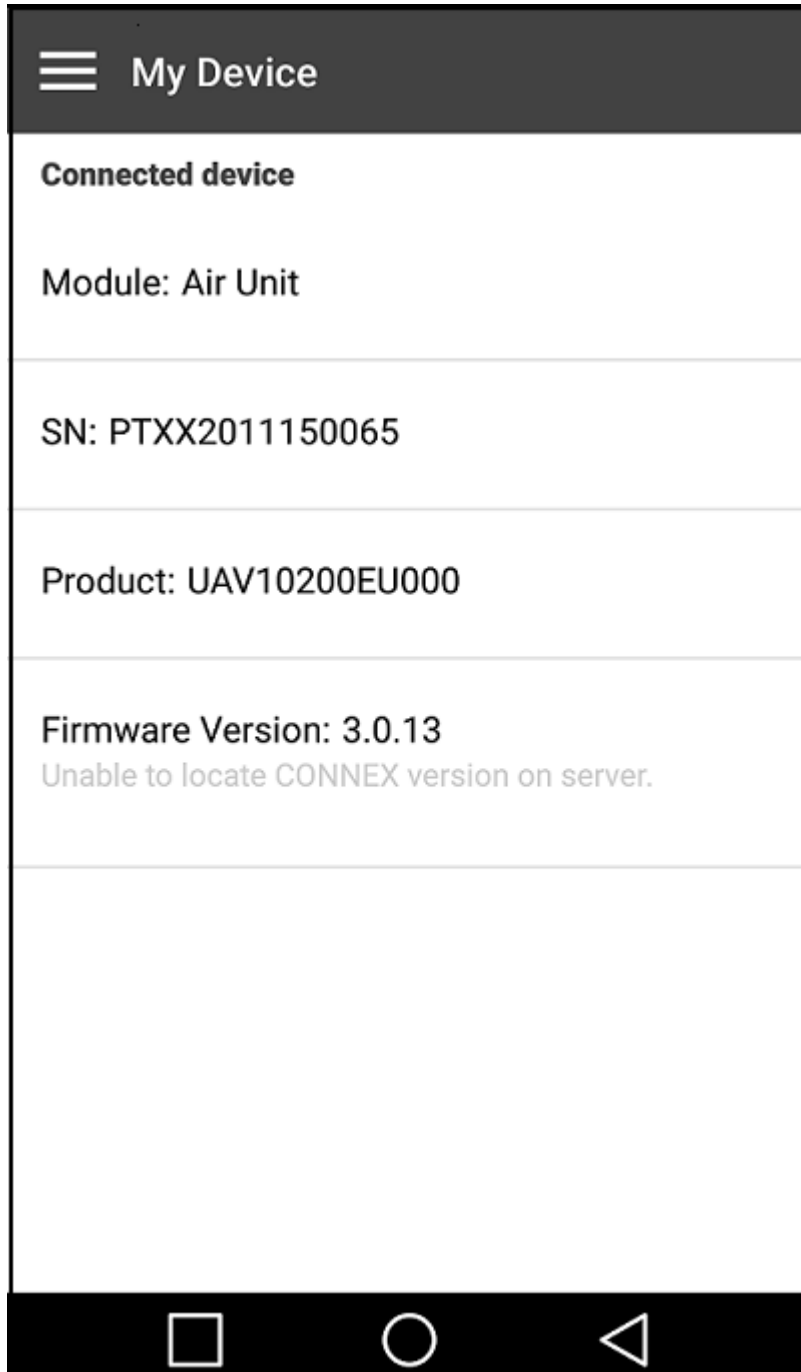
This screen displays the following information:

- **Module:** Specifies whether the connected unit is an Air Unit (Tx) or a Ground Unit (Rx).
- **SN:** The unique serial number of the unit.
- **Product:** The product ID of the unit.

- **Firmware Version:** The version of the firmware currently installed on the unit. The application automatically checks with the AMIMON server whether the latest firmware version of the connected unit is installed.
  If the latest version is installed, a *Firmware Version is Up to Date* message is displayed.

To exit the **My Device** screen and view the menu options, press the Navigation icon, at the upper left corner of the page: ☰

Main Menu Options

The main menu screens are shown below (Air Unit on left and Ground Unit on right). Note that when a Ground Unit is connected to your mobile device, only the **My Device** and **Support** options are available.
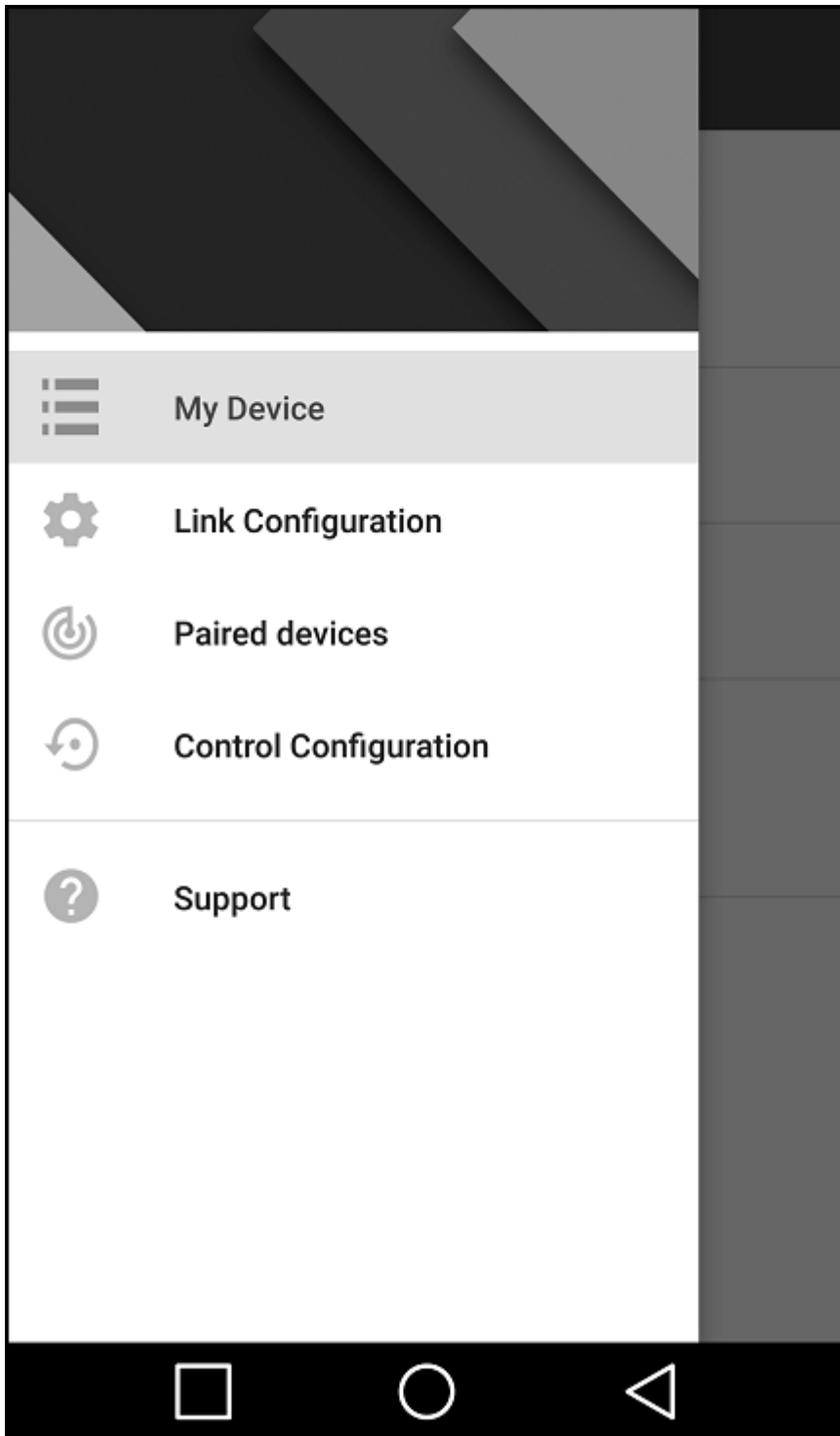
The menu options are summarized in the following table:

Option	Description	Supported for Ground Unit
My Device	Displays details about the Air or Ground Unit that is connected.	Yes
Link Configuration	Allows you to configure the link [47] between an Air Unit and its Ground Units.	No
Paired Devices	Lists the Ground Units that are registered with the connected Air Unit [49] , and enables you to unregister one or more of them [51].	No
Control Configuration	Allows you to view and modify Fail Safe parameters [53].	No
Support	Redirects you to the CONNEX online Help Center.	Yes

Basic Application Components

This section explains general features that enable you to work with the mobile application quickly and effectively. The components are described in the table below the diagram.
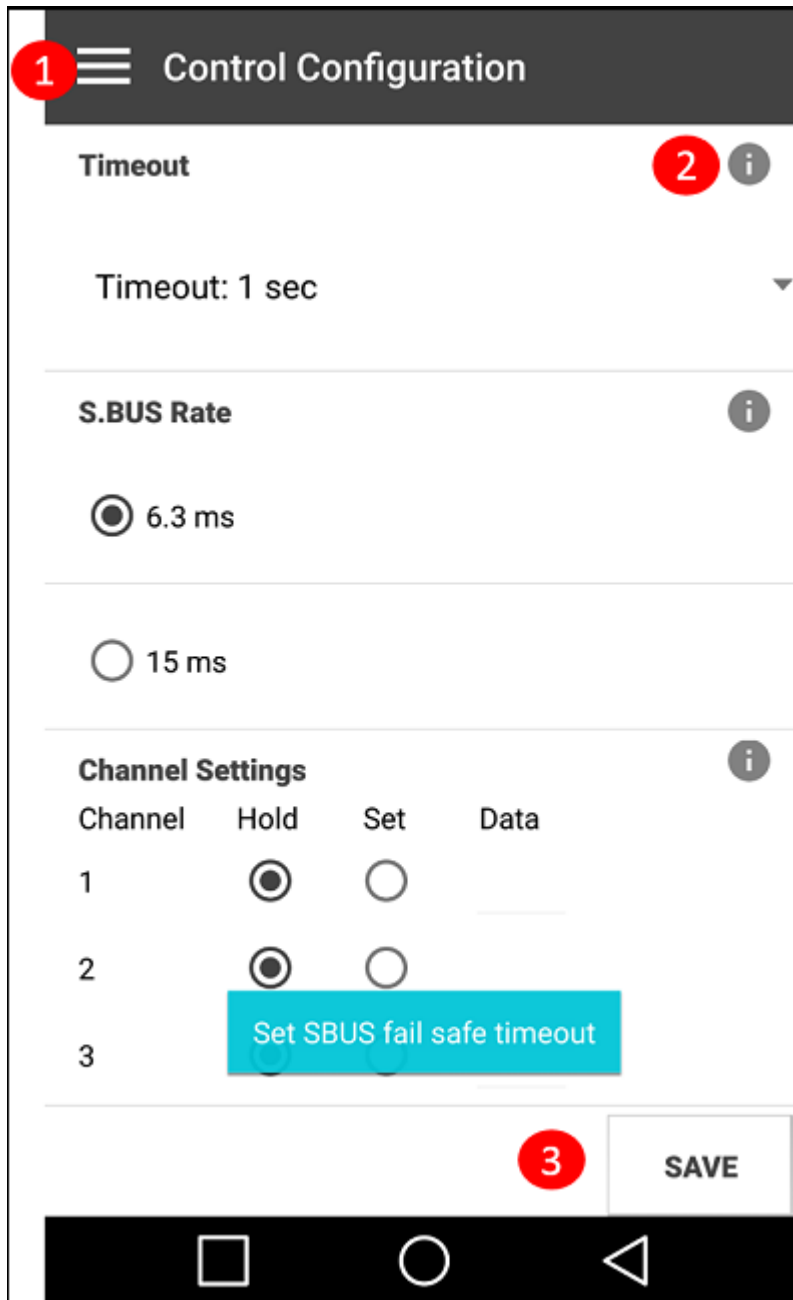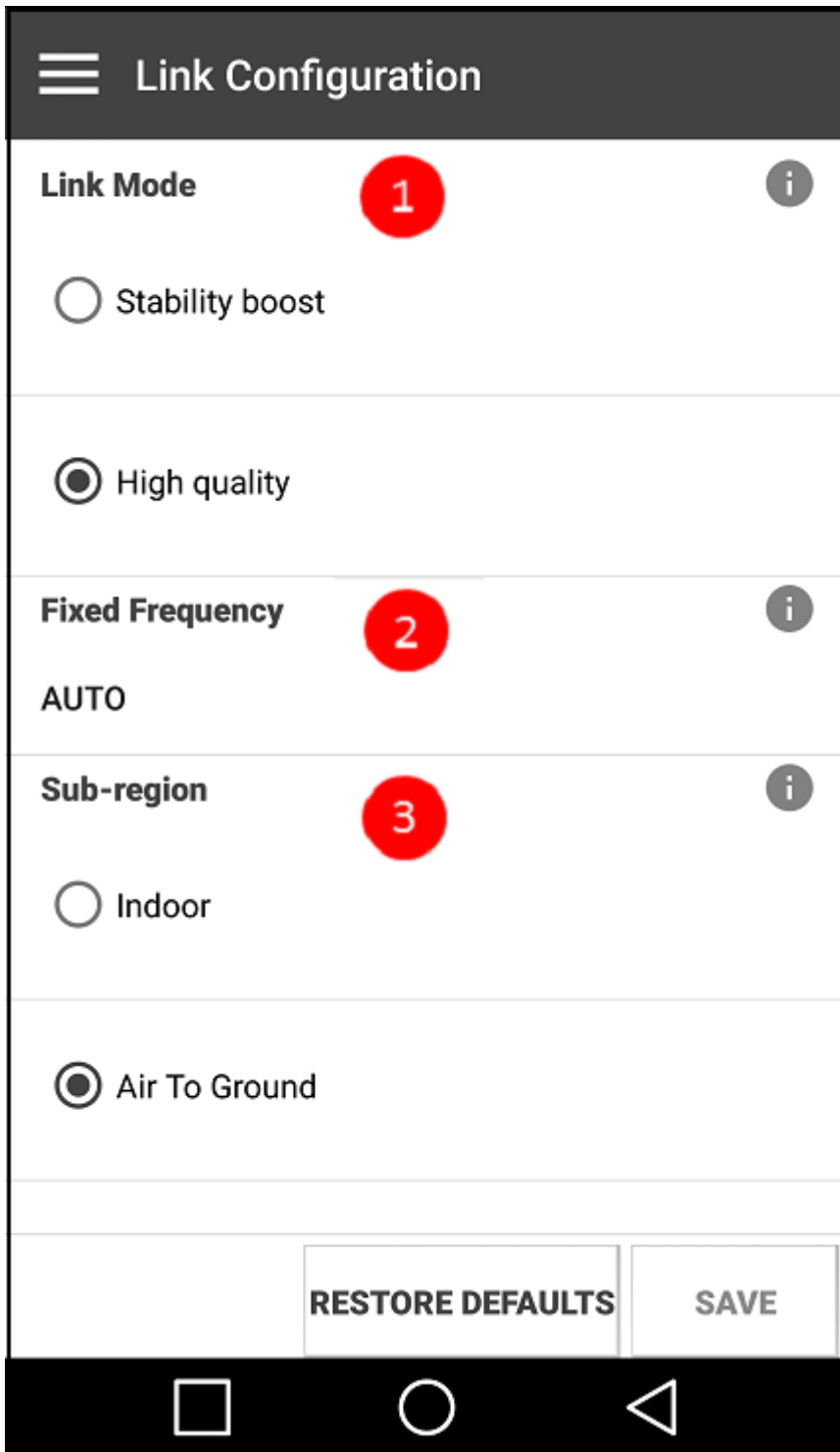

Number	Feature Name	Description
1	Navigation button	Use this button to navigate back to the main menu.
2	Information icon	Press these icons to open popups that provide short explanations about the relevant feature. An example is shown in the figure above.
3	**Save** button	Press this button to save any changes that you have made on a page. If you navigate back to the main menu without pressing **Save**, your changes will **not** be saved.

Configuring the Link Between the Ground and Air Units (Android)

This article describes how to configure the link between an Air Unit and its Ground Units. This procedure is performed on an Air Unit only.

The **Link Configuration** tab of the Management application is shown in the following figures (CONNEX on left, CONNEX mini on right). The link parameters are described in the table below the diagrams.

Key	Description

1	**Link Mode:** Determines the bandwidth of the wireless link. CONNEX users can select **High Quality** (40 MHz) or **Stability Boost** (20 MHz).
	NOTE **Note:** CONNEX mini units support High Quality mode only.
2	**Frequency Mode:** Determines whether automatic or fixed frequency is used. The options available for fixed frequency vary according to other options selected (regional settings and Channel Mode).
	NOTE **Note:** CONNEX mini units support Auto frequency mode only.
3	**Sub-region Settings:** Allows you to set the operating mode of the unit, according to regional regulations. The options are relevant for European, Chinese, Japanese and Korean regions.

To configure the link:

1. Make sure that the mobile device on which the CONNEX Management application is installed is connected to the Air Unit via a USB to Micro USB cable and is connected to the Internet.
2. Launch the CONNEX Management application, and navigate to the **Link Configuration** screen.
3. **For CONNEX units only:**
    Select the bandwidth channel mode, as follows:
    *   **High Quality (40 MHz):** This is the default option which provides the best quality. This is the only option that can be used with 1080P60 video resolution.
    *   **Stability Boost (20 MHz):** Use this mode in harsh RF conditions or for long range operations. This mode enables higher stability, but supports only lower resolutions on the video link.
4. **For CONNEX units only:**
    Specify the frequency mode by selecting either **Auto** or one of the fixed frequencies listed. The fixed frequencies that are available vary according to other options selected.
5. The **Sub-region** options appear for CONNEX and CONNEX mini units used in Europe, Japan, China and Korea. (This dropdown menu is hidden when units are used in United States and Australia regions.) Select options as follows:
    *   In Europe, select either **Air To Ground** for 5.8 GHz, 25mW or **Indoor** for 5 GHz, 200mW, Ground use.
    *   In Japan, select either **Indoor** or **Outdoor**.
    Make sure that you select the frequency setting that complies with the local RF regulations in the region in which you are operating.
6. To apply the configured changes to the Air Unit, press **Save**.
   To return to the out-of-the-box factory settings, press **Restore Defaults**.

NOTE
Note: A configuration update affects how the Air Unit communicates with all the Ground Units with which it is registered [49].

Checking the Ground Units Registered to an Air Unit (Android)

This article explains how to check which Ground Units are paired with a specific Air Unit.

To verify which Ground Units are registered to an Air Unit:

1. Make sure that the mobile device on which the CONNEX Management application is installed is connected to the Air Unit via a USB to Micro USB cable.
2. Launch the CONNEX Management application, and navigate to the **Paired Devices** screen.
   This screen displays a list of the MAC IDs of the Ground Units registered with this Air Unit. For example:
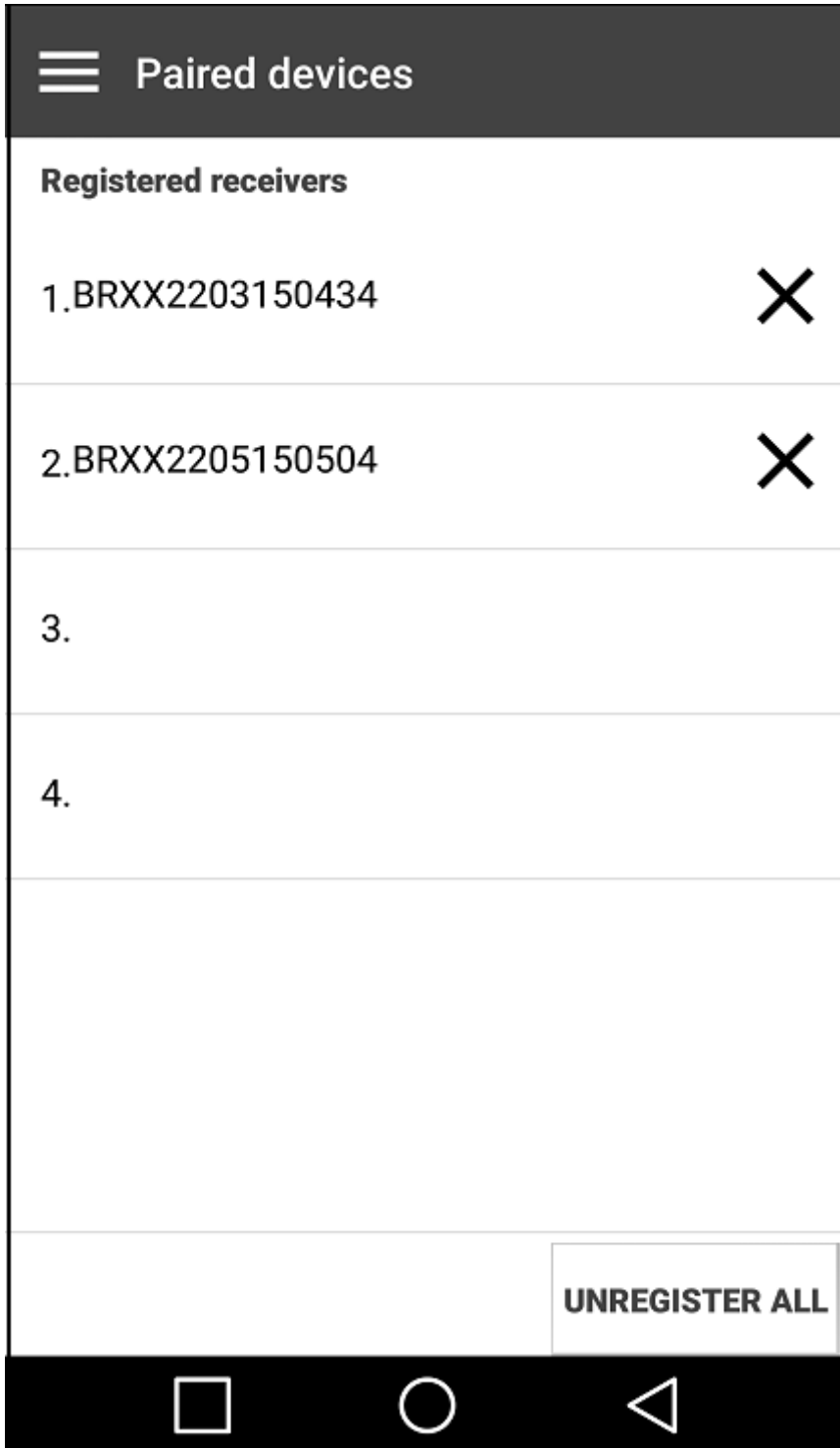
For more information, see Unregistering Ground Units (Android) [51].

Unregistering Ground Units (Android)

There are two options for unregistering Ground Unit(s) from an Air Unit, as described in the procedures below:

- Unregistering one device at a time
- Unregistering all devices simultaneously

To unregister a single device:

1. Make sure that the mobile device on which the CONNEX Management application is installed is connected to the Internet and is connected to the **Air Unit** via a USB to Micro USB cable.
2. Launch the CONNEX Management application, and navigate to the **Paired Devices** screen. This screen displays a list of Ground Units registered with the Air Unit. For example:
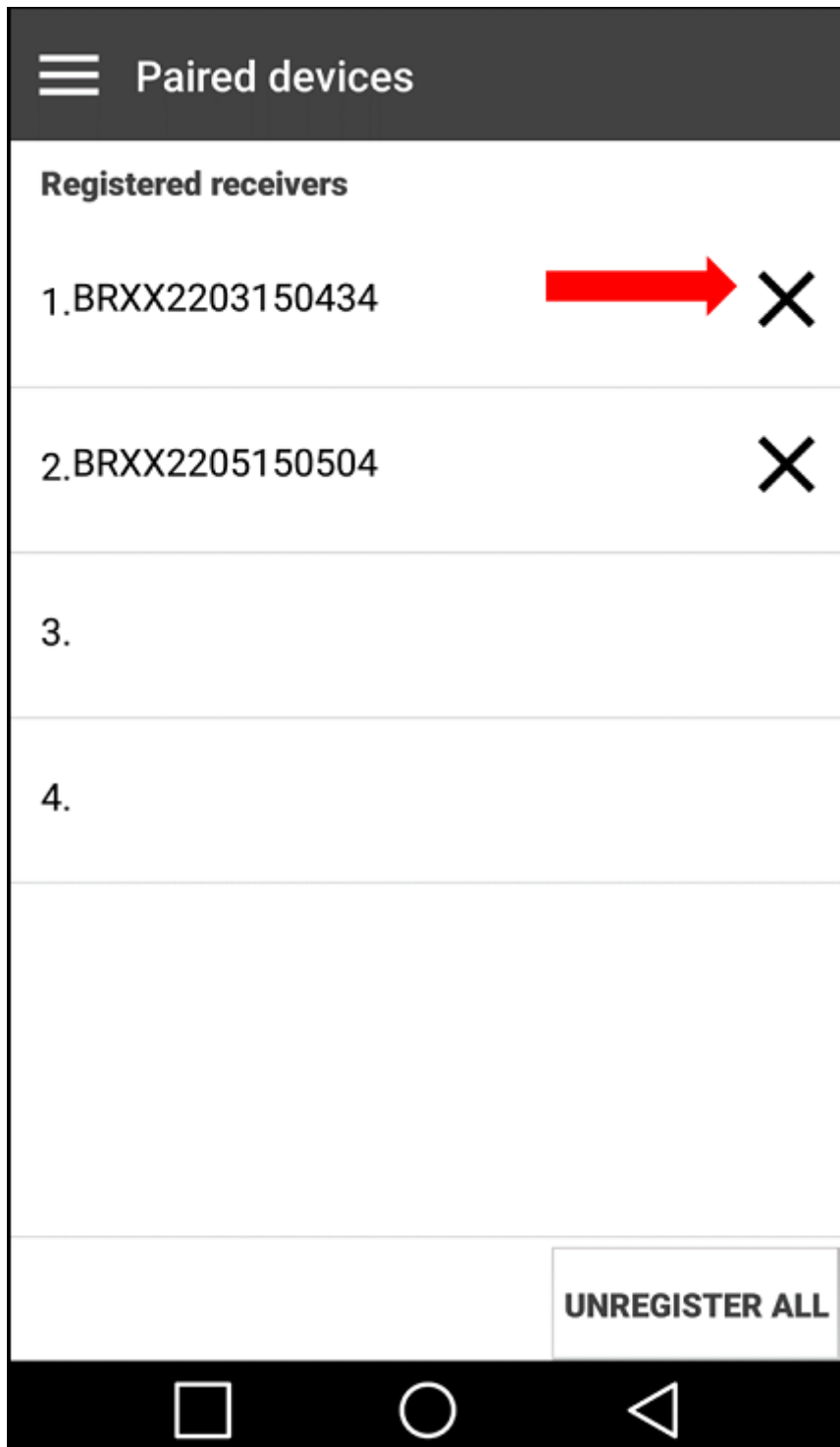
3. To unregister a Ground Unit, press the X button in the relevant row (marked in RED in the image above).

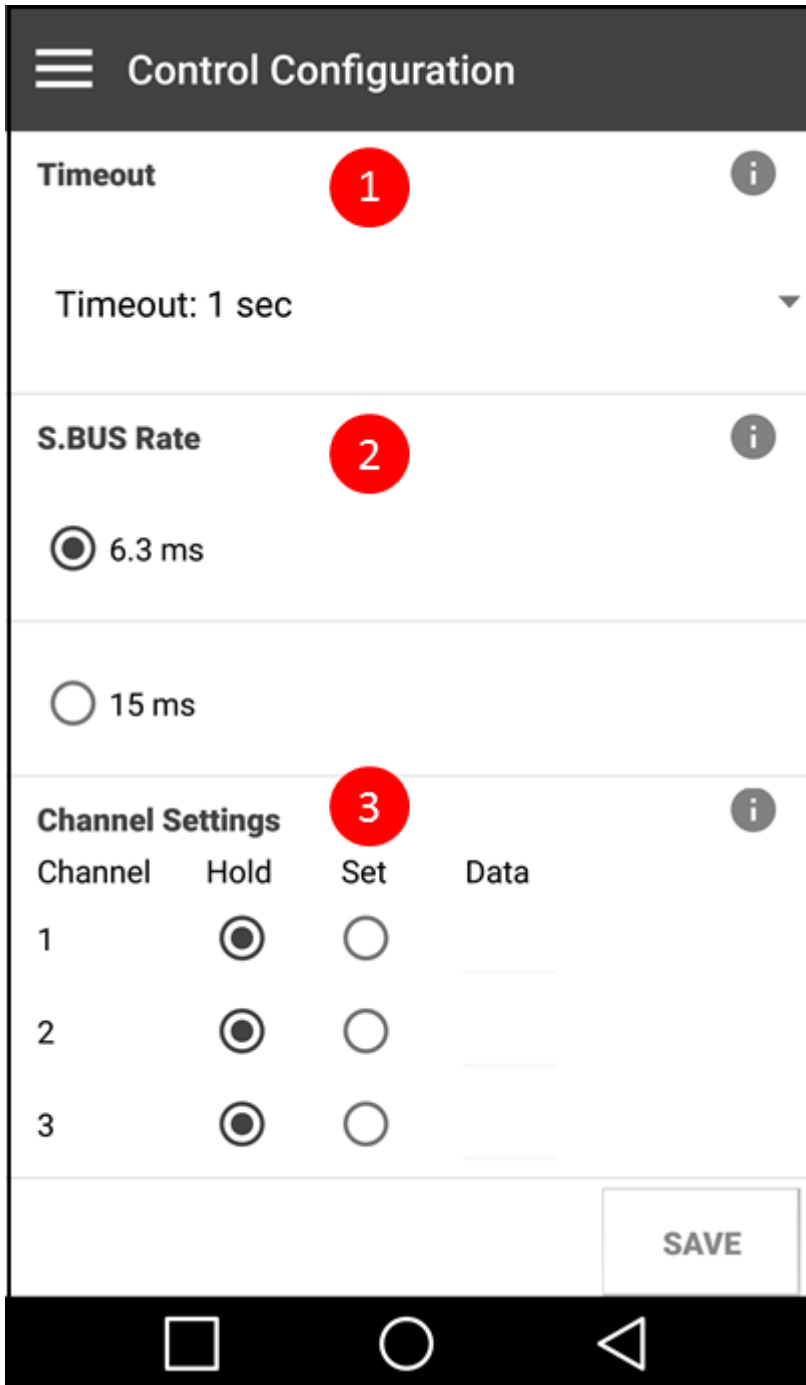**To unregister all Ground Units:**

1. Make sure that the mobile device on which the CONNEX Management application is installed is connected to the Internet and is connected to the **Air Unit** via a USB to Micro USB cable.
2. Launch the CONNEX Management application, and navigate to the **Paired Devices** screen. This screen displays a list of Ground Units registered with the Air Unit, as shown here:
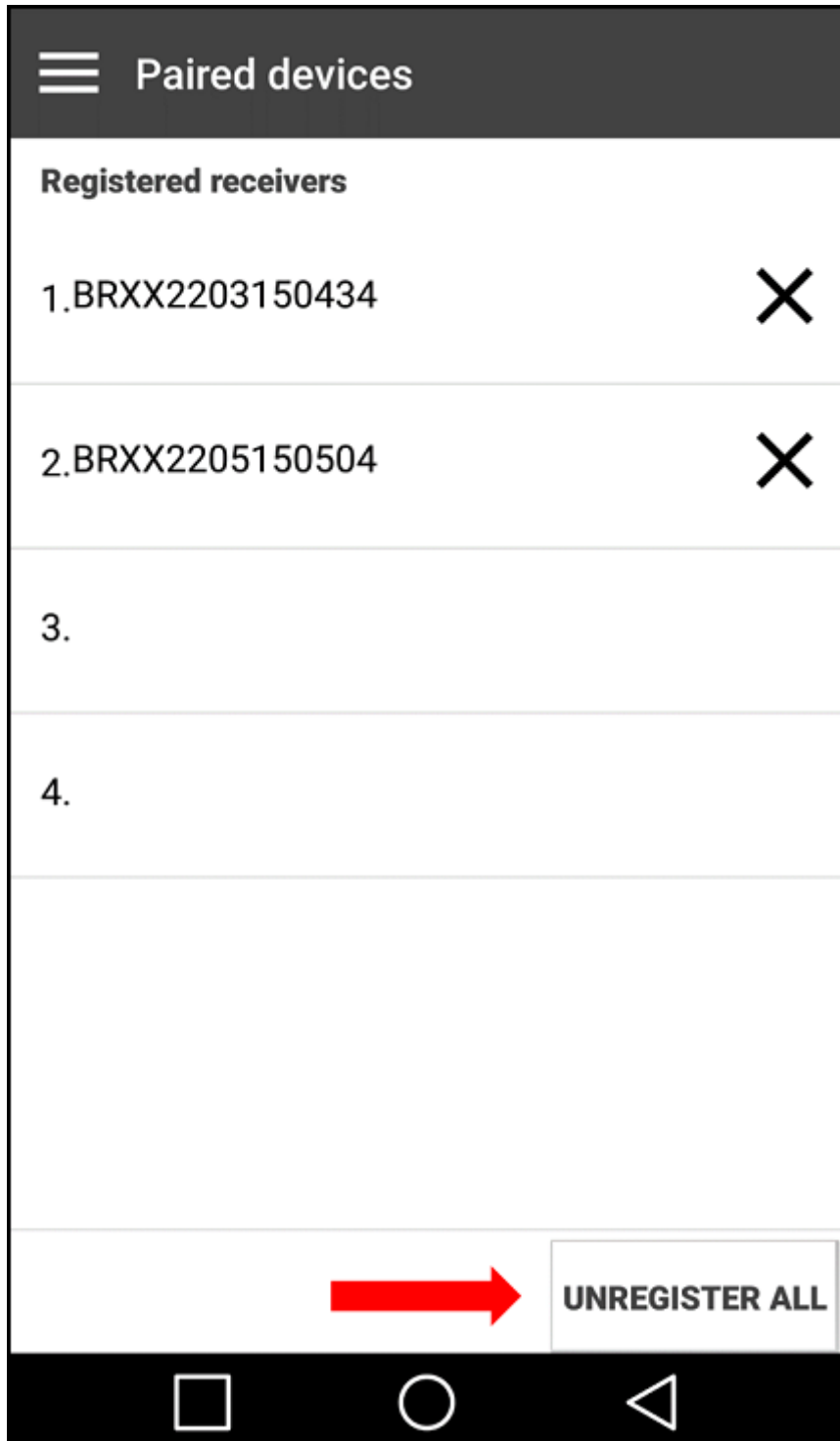
3. Press the **Unregister All** button (marked in RED in the image above).

Configuring Fail Safe Parameters (Android)

The **Control Configuration** tab of the Management application allows you to set the parameters that are applied when the remote control wireless uplink is broken. The parameters are described in the table below the diagram.

Key	Description
1	**Timeout:** Determines the length of time (in seconds) between losing communication and applying Fail Safe values onto the output of the Air Unit.
2	**S.BUS Rate:** Specifies the data rate of the S.BUS link between the Ground Unit and the Air Unit that controls the Air Unit's camera gimbal. By default, the data rate of the S.BUS remote control is 6.3mSec (FASSTest 12CH).
3	**Channel Settings:** Determines the position of the gimbal following a loss of communication. Each channel can be set to: • **Hold:** The most recent value (prior to the communication loss) is maintained. • **Set:** A new value is used. Values are configured in % (from -100 to +100).

> **⓪ IMPORTANT**
>
> **IMPORTANT:** It is recommended to utilize the CONNEX link for gimbal control ONLY and NOT for full drone control.

To set Fail Safe parameters:

1. Make sure that the mobile device on which the CONNEX Management application is installed is connected to the Air Unit via a USB to Micro USB cable and is connected to the Internet.
2. Launch the CONNEX Management application, and navigate to the **Control Configuration** tab.
3. From the **Timeout** dropdown menu, select the relevant option (1, 2, or 3 seconds).
4. If required, manually set the outgoing S.BUS bit-rate by selecting one of the following S.BUS Rate modes:
   - **Auto: 15m sec:** FASSTest 18CH or T-FHSS Mode. The S.BUS rate is received and sampled from the remote control trainer port. The Air Unit then automatically outputs the same S.BUS rate.
   - **6.3m sec:** FASSTest 12CH Mode.
5. For each channel in the **Channel Settings** frame, select either the **Hold** or **Set** radio button.
   If you select the **Set** radio button, enter the required value in the field in the **Data** column. Values are configured in % and may range from -100 to +100.
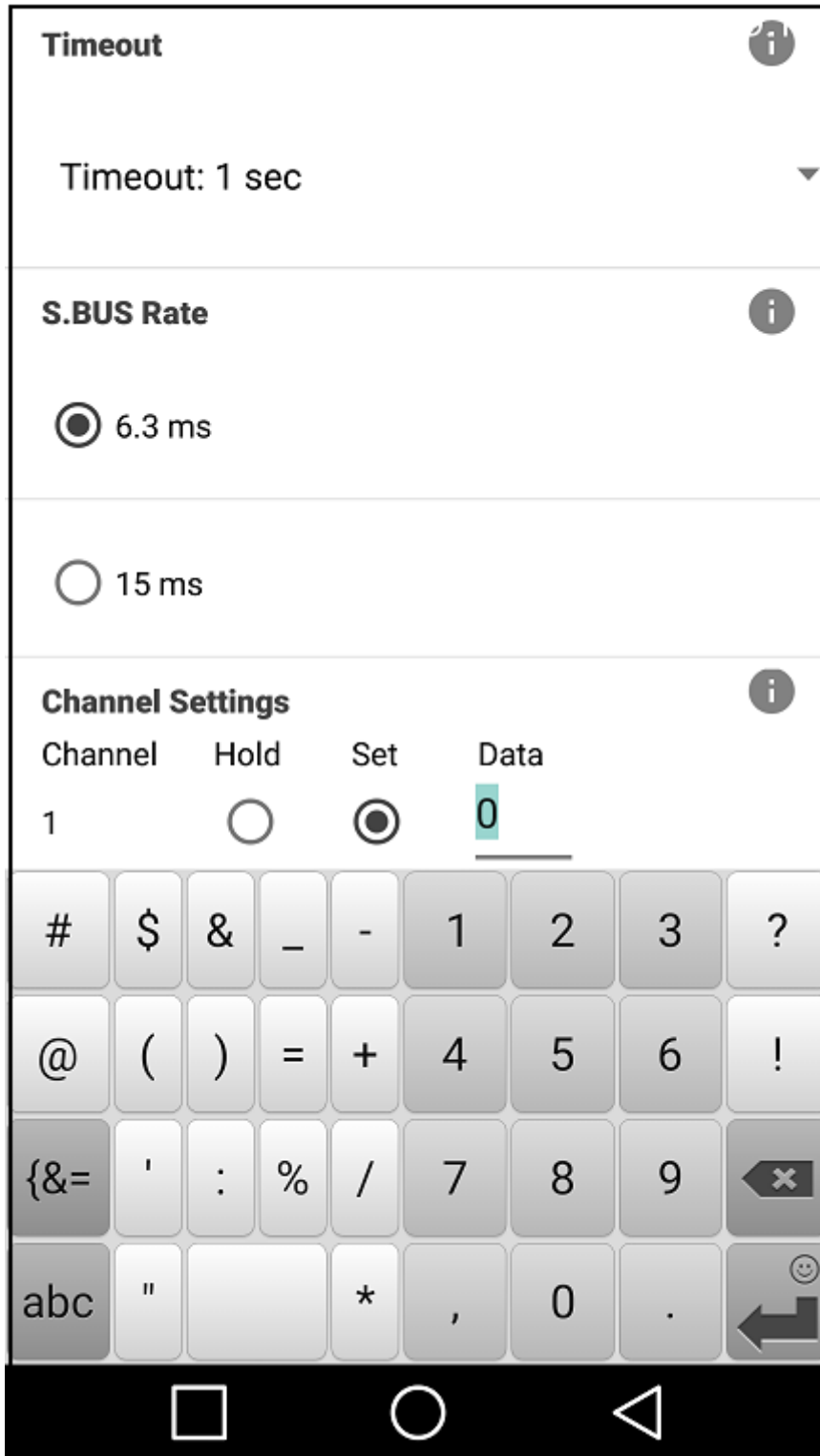
6. To apply the configured changes, press **Save**. The update affects how the Air Unit communicates with all the Ground Units with which it is registered [49].