air avionics

AIR Connect

Integration Manual

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Telefon: +49 (0) 6224 82 83 87 0 · Fax: +49 (0) 6224 82 83 87 7
Internet: https://www.air-avionics.com · Mail: support@air-avionics.com

Important!

> Please read this manual carefully!

> Please pay attention to the restrictions on use!

Document-ID / Revision Status

This manual refers to the following product types:
P/N B104 “AIR Connect”

Changes

Rev.	*Datum*	*Status*	*Autor*	*Änderungen*	*Genehmigt*
0.4	2013/02/04	Release	M. Förderer	First Release	–
0.5	2014/01/02	Release	M. Förderer	Minor additions	–
0.6	2014/09/05	Release	M. Förderer	New IP Address	–
2.0	2014/09/05	Release	M. Förderer	New HW version and config infos	–

Contents

1.1 System description

AIR Connect is a compact, lightweight and rugged device wirelessly connecting Smartphones such as Apple iOS-devices or Android-devices to aircraft systems.
AIR Connect creates an IEEE 802.11 b/g wireless network (WiFi soft Accesspoint) and transmits RS232 data via the TCP/IP protocol. Many Smartphone-Apps are capable of displaying and using such data. Examples for data are current GPS-position, pressure altitude, traffic or engine data.
It features one central Power/Data connector (D-SUB 9) and a standard SMA antenna connector including a small quarter-wave antenna. AIR Connect is supplied by a DC source in the range of 4.8V to 32V and typically consumes less than 100mA. It can be easily mounted in many places inside the aircraft, remote antenna options with cables are available.

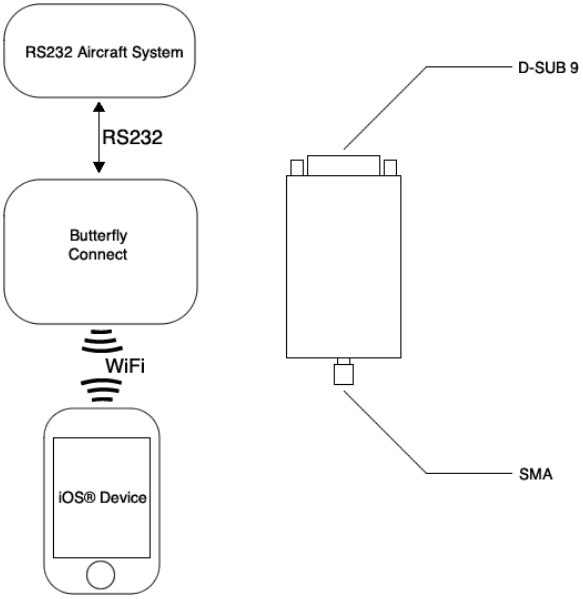

Figure 1.1: System Diagram

1.2 Purpose of this document

This document aims to provide third party system integrators like e.g. App Developers with basic information regarding the product AIR Connect, its capabilites, interfacing and configuration.

1.3 Safety instructions and restrictions on use

Installation and operation must be on the basis of non-interference with and no hazard to the existing suite of other equipment necessary for safe flying operation, or installed to comply with official requirements. Installation and operation must comply with official regulations and requirements.

> Never make safety critical decisions based on transferred information. Make sure to the users of your App that displayed data are for situational awareness only.

> AIR Connect does not have a ETSO or FAA-TSO airworthiness certification.

1.3.1 Intellectual Property and Liability

Butterfly Avionics GmbH will not be liable for errors/changes/omissions in this document - specifications are subject to change without notice. Garrecht Avionik its associates, development team, suppliers, manufacturers and data suppliers accept no responsibility for any damage or claims that may arise from use of AIR Connect.

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1.3.2 Developer Support

Please contact us before starting development on a project involving AIR Connect.
support@air-avionics.com or +49 (0) 6224 82 83 87 0

> For detailed descriptions on the use of AIR Connect, please refer to the *AIR Connect Pilot's and installation Manual*

2.1 Connectors and Wiring

2.1.1 Main Power and Data Connector

AIR Connect features one central D-SUB 9 connector for power and data.

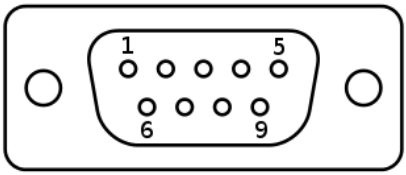

Figure 2.1: Main D-Sub 9 Power/Data connector

Pin Number D-SUB 9	Signal/Purpose
1	Do not connect!
2	RS232 RX - connect receives data
3	RS232 TX - connect sends data
4	Do not connect!
5	GND - main ground (minus)
6	Do not connect!
7	DC In - main power supply (plus)
8	Do not connect!
9	Do not connect!

2.1.2 RJ45 Cable

Included in delivery is a D-SUB 9 to RJ45 cable in IGC-Standard codeout. The cable allows for easy connection to many common aircraft systems such as FLARM-compatible collision avoidance devices or many IGC-approved GPS Loggers.

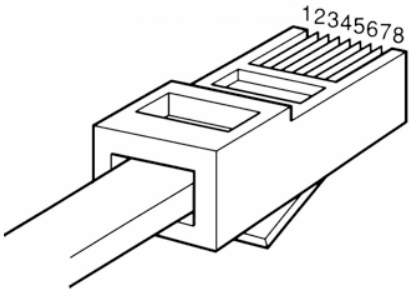

Figure 2.2: RJ45 Connector

Pin Number RJ45	Signal/Purpose
1	GND
2	Do not connect!
3	RS232 TX - connect sends data
4	RS232 RX - connect receives data
5	Do not connect!
6	Do not connect!
7	Do not connect!
8	DC IN - main power supply (plus)

Aditional Adapter Cables, Y-Splitters are available at AIR Store: www.air-store.eu

2.1.3 Power Consumption and Requirements

Item	Value
Input Voltage Range	4.8V to 32V DC
Recommended Fusing	1.0A CB
Typical current	80mA at 12V DC
Peak current	350mA at 12V DC
Power Requirements	$<$1.5W at 12V DC

Take care that the power supplied has the correct polarity, otherwise damage to the device may occur.

3.1 RS232 Interface

AIR Connect is compatible to any aircraft system that delivers data via the TIA-232-F ("RS232") standard. AIR Connect features bidirectional communication. Data received via RS232 is sent wirelessly to Smartphone-devices and data from Smartphone-devices is sent to RS232 aircraft systems.

3.1.1 RS232 Data-Rate

The RS232 interface features configurable data-rates. AIR Connect comes preconfigured with a data-rate of 19200 Baud. Other data-rates are possible. Please refer to the configuration part of this manual for details on data-rate configuration.

4 WiFi Interface

4.1 Network Mode and Protocol

AIR Connect connects to other devices through a WiFi connection. It then delivers received RS-232 data using the TCP/IP protocol on a fixed IP-Address and Port.

Item	Value
Network Type	Accespoint
Network Security	Passcode
IP-Adress	192.168.1.1
Port	2000
SSID	AIR Connect

The SSID of the network always consists of *AIR Connect* and a hexadecimal identifier.

4.1.1 Connection and Data transfer

AIR Connect delivers received RS-232 data using the TCP/IP protocol. On older versions of AIR Connect, a four-digit pin-code is required and requested after connection to the module has been established.

- Connect via TCP-IP to the defined IP-address using the defined port
- In older versions of AIR Connect, the Module will now answer requesting the pin-code with the phrase *PASS?*, in this case authenticate sending the four-digit pin-code. Newever versions will not request a pin code
- RS232 data is transferred

4.1.2 Joining the Network with iOS- or Android Devices

In order to establish a connection to a mobile device (end user) the following process is recommended.

- power up AIR Connect
- enter main Settings App.
- go to *Wi-Fi* and make sure Wi-Fi is activated
- in the *Choose a Network* list the SSID of your AIR Connect device should appear.
- tap on the Network to create a connection
- Newer version of AIR Connect feature network security, in such cases the network key printed onto the device has to be entered by the user.

Make sure your device remains connected, in some cases open WiFi-Networks are joined automatically which causes AIR Connect to loose connection. Activate *Ask to Join Networks* in iOS to avoid this.

5 Configuration

5.1 Latest Versions of AIR Connect

AIR Connect may be configured using a computer with a web browser. Enter the IP address 192.168.1. into the web browser address bar to access a configuration website.

After Configuration, AIR Connect has to be rebooted in order for the new configuration to take effect.

Legacy AIR Connect Configuration. 6

Older AIR Connect version can be configured using TELNET on a terminal application on a PC.

6.1 Connecting with a PC

6.1.1 Connection via WiFi

- Power up AIR Connect, data connection to RS232 devices is not required.
- connect AIR Connect to your computer using WiFi.
- open your terminal software, type the following command and execute it with typing *enter*: *telnet 192.168.1.1 2000*

6.1.2 Connection via RS232

- Power up AIR Connect, connect it using an RS232 cable, data connection via WiFi is not required.
- Start a serial connection at 19200Baud, 8N1, no flow control.
- You should now see some sentences at startup.

6.2 Configuration Mode

Entering configuration mode:

- Power up AIR Connect and connect via desired method
- AIR Connect will now answer requesting the 4-digit PIN-code printed to the top of the enclosure.
- Enter the PIN-code and execute with *enter*.
- Enter *$$$* and execute with *enter*.

Commands in configuration mode:

- To save configurations, type *save* and execute with *enter*.
- To exit configuration mode, type *exit* and execute with *enter*.
- To reboot the module, type *reboot* and execute with *enter*.

6.2.1 Configuration of Data-Rate

To configure the RS232 data-rate, first enter configuration mode and then type *set u b 19200* and execute with *enter*.
In this case *19200* may be interchanged with any desired baud-rate. Common data rates are *4800* for standard NMEA or *9600* for GARMIN TIS. One Example is shown below.

6.2.2 Configuration of PIN-Code

> Carefully write down and remember your set pin-code. There is no way to reset the module if your pin-code went missing. Modules with unknown pin-code may be rendered unusable

To configure the four-digit pin-code (first configuration printed on top of AIR Connect), first enter configuration mode and then type *set o p 1111* and execute with *enter*.
In this case *1111* may be interchanged with any desired pin-code.

6.2.3 Further Configuration

please consult the *Roving Networks RN171 usermanual* for further configuration options.

6.3 Configuration Example: Set RS232 Data-Rate

In this example the RS232 data-rate is set to the value 4800Baud.

6.3.1 Enter configuration mode

- Power up AIR Connect, data connection to RS232 devices is not required.
- connect AIR Connect to your computer using WiFi.
- open your terminal software, type the following command and execute it with typing *enter*: *telnet 192.168.1.1 2000*
- AIR Connect will now answer requesting the 4-digit PIN-code printed to the top of the enclosure.
- Enter the PIN-code and execute with *enter*.
- Enter *$$$* and execute with *enter*.

6.3.2 Set data-rate to 4800Baud

- type *set u b 4800* and execute with *enter*

6.3.3 Save Settings and exit

- type *save* and execute with *enter*
- type *exit* and execute with *enter*.

After Configuration, AIR Connect has to be rebooted in order for the new configuration to take effect.

7 Version Information

7.1 Available AIR Connect Versions

There are multiple versions available in the field. The following table shows the main differences. Please note that any AIR Connect unit in the field can have any software version.

> The most critical difference between the different versions is the IP address. It is recommended to either make the IP-Address user configurable or to implement automatic detection (i.e. to try all different possibilities in software).

	2012 Version	2013-2014 Version	2014-2018 Version	Current Version
Module SSID	WIFLY-GSX	WIFLY-EZX	AIR Connect	AIR Connect
IP-Address	169.254.1.1	1.2.3.4	192.168.1.1	192.168.1.1
Network Mode	Ad-Hoc	Soft AccessPoint	AccessPoint	AccessPoint
PIN Code	Required	Required	Required	-
Network Security	-	-	-	Printed on enclosure
Serial Number	from B104-1001	From B104-1101	From B104-1584	from 3D672F (HEX)

> The four-digit PIN-CODE used in all versipn up to 2018 is always calculated by adding the number *3642* to the devices serial number. Therefore individual device serial numbers may be calculated from the pin-code entered by the user.