Flightcell SmartHUB & Camera

Installation Manual

Section 1: Revisions & Approval

Revision	Effective Date	Approved By	Reasons for Change
1.0	31 May 2022	James Mace	First issue of manual

CONTENTS

Section 2: Introduction

This manual provides information on installation and configuration of the Flightcell SmartHUB and the optional Flightcell U2C Camera.

The SmartHUB is a powerful networking device that can be installed stand alone or interfaced to a Flightcell DZMx or DZMx Plus.

The SmartHUB

» Is a Flight Data Recorder, recording critical flight data including:

» Video and ambient (cockpit) audio from one or two optional Cameras

» ICS and radio audio from the aircraft audio system

» Flight data from its inbuilt flight data recorder using the built-in accelerometer and gyros

» Ambient air pressure (Altitude)

» GPS positional data

» Is a data hub, with a number of data interfaces:

» Ethernet

» Optional Wi-Fi

» USB

» RS232 serial

» Provides USB charge port(s).

User interface

The SmartHUB user interface is comprised of an OLED display and a **MENU** button.

The UI is used to show various status information, and to carry out certain actions such as downloading flight data records and turning Cameras on or off.
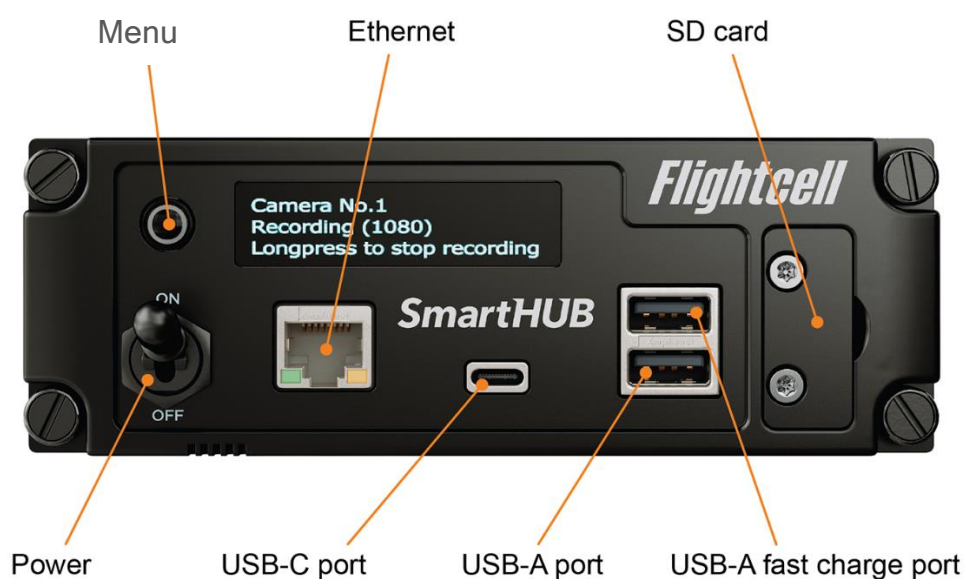
The SmartHUB **MENU** button is used to navigate through the SmartHUB screens. The SmartHUB has a responsive user interface, so screens and options are only shown if the

function is available (e.g. the option to turn a Camera on or off is only shown if a Camera is connected).

The **MENU** button supports two actions, a short press and a long press. A short press is usually used to advance between pages or through a list, and a long press to initiate and confirm an action.

Press **MENU** to activate the display and access the SmartHUB menus.

Section 3. System configurations

The SmartHUB can be installed in a range of configurations:

» Stand alone, with or without the optional Cameras;

» Integrated with the Flightcell DZMx, connecting the SmartHUB to the DZMx high speed data service over the DZMx 4G data connection.

Optional installation with Flightcell DZMx

Ethernet

One or two optional USB cameras
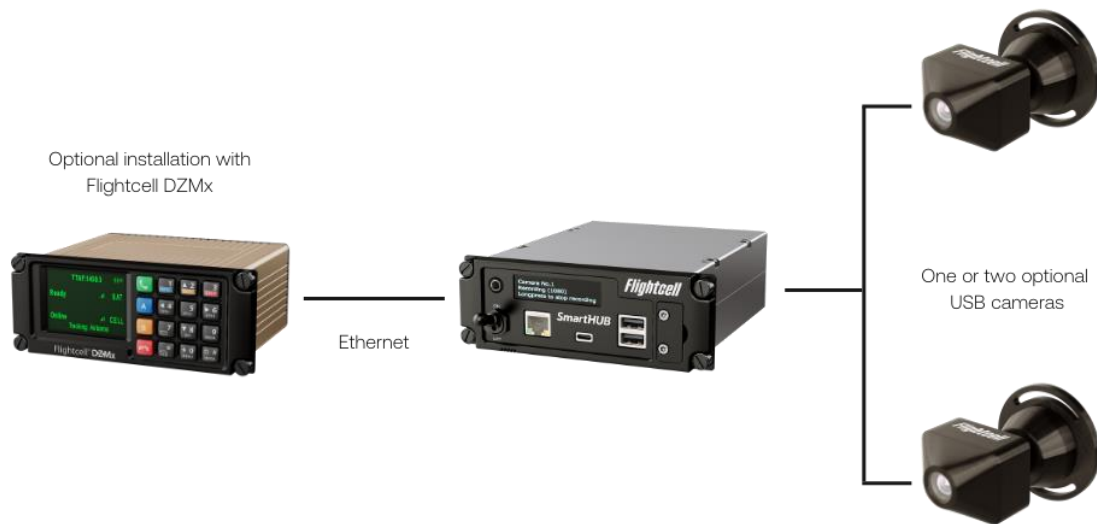
Section 4: Specifications

SmartHUB

Electrical specification

Parameter		Specification
Input Voltage		28VDC (22 - 32VDC)
Power Supply Current (Max)		~1.93A @ 28VDC
Display		256 x 64 White OLED 150 cd/m^2
Line Audio	Input Levels	20mVrms to 1.15Vrms
		775mVrms
	Input Impedance	600Ω
USB		USB 2.0
Ethernet		10/100/1000 BASE T ports
Wi-Fi		Wi-Fi 802.11ac/a/b/g/n
		Dual Frequency 2.4/5GHz support
GPS Voltage	Antenna Bias	5V
	Antenna current	Up to 100mA
	Sensitivity	-162dBm (with Flightcell Antenna)
	Time to First Fix	26s

Dimensions and weight

Parameter	Value
Faceplate width	145.2 mm
Chassis width	122.0mm
Faceplate height	50.6 mm
Chassis height	50.0 mm
Depth (from front face to rear face)	160.0 mm
Weight	750G

Materials

All metalwork in the SmartHUB is machined from 6061 aluminium and passivated with Oxsilan conversion coating (except for the front panel) to prevent corrosion.

The front panel is anodised.

Environmental qualifications

The SmartHUB is designed to meet RTCA-DO160G standards.

DO-160 testing is pending.

Details of the DO160G test categories are provided in the SmartHUB Declaration of Design and Performance (DDP), document 120-00004 SHP_00001 Flightcell SmartHUB DDP.

Camera

The Flightcell U2C Camera enclosure and mount are machined from 6061 aluminium and powder coated.

Dimensions and weight

Parameter	Specification
Width	50.0 mm
Height	38.0 mm
Depth	85.0 mm
Weight	150g

Environmental qualifications

The U2C Camera is designed to meet RTCA-DO160G standards.

DO-160 testing is pending.

Details of the DO160G test categories are provided in the USB Camera Declaration of Design and Performance (DDP), document 120-00005 Flightcell U2C Camera DDP.

Section 5: Installation

Supporting documents

The following documents provide details to support the installation and certification of the SmartHUB and Camera.

These are available on the Flightcell website at www.flightcell.com/resources.

SmartHUB	
Wiring diagrams	114-00012 SH Wiring Diagram
SmartHUB dimensioned drawings and installation details	115-0006 SHGeneral Arrangement Drawing
SmartHUB design specification	117-00015 Smart Hub Design Specification
SmartHUB Declaration of Design and Performance	120-00004 SHP_00001 Flightcell SmartHUB DDP

USB Camera	
USB Camera General Arrangement Drawing, wiring details and installation details	115-00007 Flightcell USB Camera

Solid models for the SmartHUB and Camera are available on request from tech@flightcell.com.

Installing the SmartHUB

Mounting the SmartHUB

The SmartHUB and Cameras are designed to operate automatically, so the SmartHUB is not required to be accessible to the pilot in flight.

It can therefore be installed in any convenient location in the aircraft, including the instrument panel, the pedestal or other location.

In locating the SmartHUB, the following should be considered:

» The SmartHUB should be located where it can be readily accessed to download flight data

» If used with a Flightcell U2C Camera, the SmartHUB and Camera must be installed such as to keep the cable run to less than 5m between hub and camera/s.

The SmartHUB can be mounted in a DZUS rack or fastened using the available mounting points on the top or bottom covers.

Mounting details are provided in the drawing *115-00006 SH General Arrangement Drawing.*

Wiring Guide

Wiring drawings and wiring guide are provided in drawing *114-00012 SH Wiring diagram.*

Connectors

The SmartHUB uses two High Density D-Sub 44-Way connectors and two SMA antenna connectors.

A connector kit containing mating connectors is supplied with the SmartHUB. Contents of the connector kit are detailed in Appendix 1.

Wi-Fi antenna

If the SmartHUB Wi-Fi service is used, a Wi-Fi antenna will be required.

An antenna will be supplied if the SmartHUB Wi-Fi application is purchased

GPS connection

The SmartHUB requires a GPS feed to enable flight data recording. The SmartHUB can receive GPS data from its internal GPS or can receive an NMEA GPS feed from a connected DZMx or other device over an Ethernet or RS232 serial connection.

If using the internal GPS module to supply a GPS signal, an L1 GPS active antenna is required to be connected to the SMA GPS connector on the rear plate.

A signal can be obtained from a dedicated GPS antenna or from a splitter connected to a shared antenna.

Installing the USB Camera

The USB Camera can be used as a Cockpit Camera, recording cockpit video and audio, but may also be used to record video and audio in other parts of the aircraft as required.

Locating the Cameras

When used as a cockpit camera, it should be installed behind the pilots where there is a clear view of the instrument panel.

Wiring the Cameras

The Camera is connected to the SmartHUB via one of the SmartHUB hard wired USB ports (USB P4, P5 or P6).

Due to the limitations of USB signal, the Camera should have a wiring run of no more than 5m. The Camera is supplied with 5m of aviation grade USB cable fitted.

SmartHUB Connections to Aircraft Systems

A number of connections to aircraft systems are necessary for operation of the SmartHUB. Full details of the connections are provided in the document 114-00012 Rev 2.1_SH Wiring Diagram.

Power Supply

The SmartHUB and optional Cameras require DC power. Operating range is 22-32VDC. It is recommended that the SmartHUB be connected to the emergency (primary) power bus on the aircraft. The SmartHUB should be wired so it turns on automatically with aircraft power.

When operating on a nominal 28V supply, a 2.5 amp circuit breaker/fuse is recommended to protect the SmartHUB.

Audio system

In order to operate as a cockpit voice recorder, the SmartHUB must be connected to the aircraft audio system (ICS). The SmartHUB should be connected to the pilot's receive audio circuit.

General purpose inputs

In order to capture key events for the flight data recording system, it is recommended that the SmartHUB General Purpose Inputs should be connected:

» To record take-off and landing events, a squat switch or collective switch on a helicopter, or a weight on wheels switch on an aeroplane

» To record engine start and stop (helicopter), the transmission oil pressure warning light.

Signal LED

The SmartHUB can support a signal LED which can be installed in the instrument panel to indicate either:

» The SmartHUB is powered up and operating

» The SmartHUB is recording.

Section 6: Configuration

Configuring the SmartHUB using SmartHUB Connect

The SmartHUB and Camera are configured using the SmartHUB Connect application.

SmartHUB Connect is a browser application which can be run on a laptop or tablet.

To access SmartHUB Connect, connect to the SmartHUB:

» Using Ethernet, connect a laptop to the Ethernet port on the front of the SmartHUB, and enter 192.168.16.1 into the web browser address line

» Using Wi-Fi,

  » Connect a laptop or tablet to the SmartHUB Wi-Fi (if enabled)

  » Enter 192.168.2.1 into a web browser. Default SSID is *SHC WiFi*, default Wi-Fi password is *flightcell*

» Select the SmartHUB shown on the Discover page

» Log in to the SmartHUB.

Permission levels

Permission levels allow control over access to data recorded on the SmartHUB and to SmartHUB configurations.

Two access levels with individually configurable passwords are provided within SmartHUB Connect.

Permission levels	PIN number	Responsibility
Installer	2468	An installer can » Access all SmartHUB applications » Edit all settings and hardware options » Download data files » Delete data files. » Upgrade SmartHUB firmware
User	2580	A user can: » Access all SmartHUB applications » Download data files

Changing the Installer and User Passwords

To change the Installer or Administrator passwords, in SmartHUB Connect go to *Settings > Preferences > Access Management*.

> **Note**: It is important to record the installer password. If the password is forgotten, an Emergency Password can be obtained from tech@flightcell.com

Copying settings to additional SmartHUBs

The configuration settings on a SmartHUB can be copied and uploaded to other SmartHUB, for example where several aircraft have SmartHUBs installed.

>> To save a settings file, go to *Settings* and click the *Download* button. The settings file will be saved as a TSV file

>> To upload settings files to another SmartHUB, in SmartHUB Connect, go to *Settings*, click the *Upload* button, and browse or drag and drop the settings file.

Configuring the U2C Camera

The Flightcell U2C Camera is configured on the Camera page in SmartHUB Connect.

Previewing the camera field of view

Under *Mode Control*, select *Enter Preview Mode* for a live view of the field of view.

Set resolution and frame rate

Both resolution and frame rate can be set. Using a lower resolution and frame rate extends the number of hours that can be recorded and stored on the SmartHUB memory card.

These settings can be previewed under *Preview Parameters*.

Configuring the SmartHUB GPS feed

On SmartHUB Connect:

>> Go to *Settings > Flight Data > GPS*

>> If the GPS data is from the internal GPS module, set to *Internal*

>> If the feed is NMEA data from a DZMx or other device, set to one of the following as applicable:

>> *GPS Source RS232*
>> *GPS Source UDP*
>> *GPS Source TCP*

>> For RS232 serial, go to *Settings > Interfaces > UART* and set the connection in use (debug port or data port) to *NMEA.*

>> For UDP or TCP

>> In *Settings> Flight Data > GPS* set the source IP address and port.

If receiving the GPS data feed from a DZMx, it is necessary to activate the NMEA data output on the DZMx. See the 117-00008 DZMx Installation Manual for details.

For any other source device, it will be necessary to consult its configuration manual or technical support to determine the required settings.

Configuring the SmartHUB display

The SmartHUB display does not need to be readable during normal operation. The display can be set to turn off automatically if required, especially during night operation.

Display inactivity timeout is set in SmartHUB Connect, by going to *Settings > UI > Inactivity Timer*.

Timeout interval can be set up to 15 seconds. If it is desired to have the display active at all times, set the timeout interval to 0 (the display will stay on).

Enabling SmartHUB Wi-Fi

The SmartHUB has an optional Wi-Fi service (see Section 7: SmartHUB Data Interfaces on page 18 below).

The SmartHUB Wi-Fi is a licensed feature. A licence can be purchased with the SmartHUB or after installation if required.

To activate the Wi-Fi licence:

- » Obtain a licence file from Flightcell or via your installer and save to a known location on your laptop
- » In SmartHUB Connect, go to *About*, then under Licence, click *Upload*
- » Browse for or drag and drop the file, then click *Upload*
- » Go to *Settings > Network > WiFi* and enable Wi-Fi
- » Restart the SmartHUB to activate Wi-Fi.

Configuring the SmartHUB General Purpose Inputs

The SmartHUB has three digital (two state) Inputs.

The inputs can be used for the following pre-designated events.

- » Engine start and stop (connected to the oil pressure warning light circuit)
- » Take-off and landing (connected to a squat switch or collective switch)
- » Wi-Fi Radio status.

Configuring the digital inputs

- » Go to *Settings > IO*
- » For the required event, select Input 1, 2 or 3
- » For a take-off switch, designate if it is connected to a collective switch or squat switch
- » Designate if the switch is normally open (when airborne, or when engine is running) or normally closed.

To confirm that the digital input is set correctly

- » In SmartHUB Connect, go to *Inputs*
- » Check that the input is showing the designated function (e.g. take-off Switch)
- » The light will show green if the input is open, or black if closed

Or

- » On the SmartHUB, press **MENU** then advance through the screens then longpress to open the Diagnostics pages
- » Advance to the *Inputs* screen
- » For each input, a value of 1 will show that the switch is open, and 0 if it is closed.

Configuring the SmartHUB Remote Signal LED

- » In SmartHUB Connect, go to *Settings > IO > Signal LED*

» Select *Power On/Off* or *Recording On/Off*

» Set the blink output pattern and blink frequency as required.

Configuring the SmartHUB Flight Data Recorder

The SmartHUB contains an inbuilt flight data recorder.

This records data from a number of sources:

» Position, track, altitude and speed from a GPS source:

　　» An inbuilt GPS module, or

　　» An NMEA data feed from a connected device (usually the Flightcell DZMx)

» Pressure altitude from an inbuilt barometer (unpressurised aircraft only)

» Orientation (pitch, roll, yaw) and acceleration from a 9-axis gyro, accelerometer and compass.

Configuring the SmartHUB to record flight events

The SmartHUB records take-off and landing events to mark the start and end of flight segments.

These events can be triggered by speed, or a signal from a squat/weight on wheels switch or (for helicopters) a collective switch.

Setting take-off and landing speed thresholds

» Go to *Settings > Flight Data > Speed Thresholds*

» Set the appropriate take-off and landing speeds.

Recording take-offs and landings from a collective or squat switch

To record from a signal from a collective or squat/WoW switch, one of the SmartHUB inputs must be connected to the switch. See Enabling SmartHUB Wi-Fi

The SmartHUB has an optional Wi-Fi service (see Section 7: SmartHUB Data Interfaces on page 18 below).

The SmartHUB Wi-Fi is a licensed feature. A licence can be purchased with the SmartHUB or after installation if required.

To activate the Wi-Fi licence:

» Obtain a licence file from Flightcell or via your installer and save to a known location on your laptop

» In SmartHUB Connect, go to *About*, then under Licence, click *Upload*

» Browse for or drag and drop the file, then click *Upload*

» Go to *Settings > Network > WiFi* and enable Wi-Fi

» Restart the SmartHUB to activate Wi-Fi.

Configuring the SmartHUB General Purpose Inputs on page 14 above.

Setting the SmartHUB orientation - important

The SmartHUB may be installed offset from the aircraft axes. The SmartHUB flight recorder must be calibrated for this orientation to provide a baseline for measures of pitch and roll.

The baseline is set based on the aircraft orientation on the ground.

The SmartHUB factory setting has zero offsets. To set its Mounting Offsets:

- » Install the SmartHUB in its final location
- » In SmartHUB Connect, go to *Flight Data*
- » Note down the pitch and roll shown on the artificial horizon (AH) gauge
- » If the SmartHUB installed at an angle to the longitudinal axis of the aircraft, estimate the offset in degrees
- » Click on the gear icon on the top right
- » Enter the following (in degrees)
    - o Pitch recorded from the AH
    - o Roll recorded from the AH
    - o Estimated yaw.
- » Click *Enter* to confirm the orientation on the flight display. The AH should now show zero pitch or roll.

Setting exceedance thresholds

The SmartHUB can record exceedances for any or all of the following:

- » Rate of climb
- » Rate of descent
- » G force
- » Turn exceedance (roll and roll rate)
- » Change in pitch.

To activate the exceedance recorders and set the desired exceedance values, go to *Settings > Flight Data > Exceedances*.

Managing Data Storage and Downloads

The SmartHUB records its data on a 256 GB SD Card inserted in the card slot on its front panel.

A number of different files are recorded for each flight and saved together in a folder (a "data file"). Each time the SmartHUB is powered on, a new data file is created.

The data file for the current flight is labelled *Current*. The data files for previous flights are labelled with a UTC date and timestamp, e.g. *Flight_22-04-07_20-52-41.* The timestamp is recorded when the data file is created.

Data storage policies

Two data storage policies are available on the SmartHUB:

- » Preserve Data – all data is retained on the SmartHUB memory card and must be manually deleted to make room for more data. To set this policy, go to *Settings > Flight Data > Storage* and select *Preserve Data*
- » Overwrite Oldest – once a configured threshold has been reached, the oldest data is overwritten by new data. To configure:
    - o Go to *Settings > Flight Data > Storage* and select *Overwrite Oldest*
    - o Set the threshold value (GB remaining) which triggers an overwrite.

Downloading data files

While the SD card can be removed to access the data, this is not normally necessary, nor recommended, as the data can be downloaded by other means.

Download onto a USB memory stick

» Insert a memory stick in one of the SmartHUB USB ports

» Repeat press **MENU** until the display shows *USB drive mounted, longpress to select data file to download*

» Longpress to show the first file, then longpress to confirm download or shortpress and follow the on-screen prompts to advance to the next file to be downloaded.

This may take 1 to 5 minutes per GB, depending on the write speed of the memory stick.

Data files (apart from the current file) are named with date and time stamp in the format YY-MM-DD_HH-MM-SS.

Download via SmartHUB Connect

» Connect a laptop to the SmartHUB via Ethernet or Wi-Fi

» Open SmartHUB Connect

» Login as a User or Installer

» Go to *Flight Explorer.* All the data files currently on the SmartHUB memory card will be shown

» Click on the flight you wish to download. This may take 1 to 5 minutes per GB, depending on your connection.

Removing the SD card

» With the unit off, remove the cover plate for the card slot

» As this is fastened by captive screws, unscrew the top screw halfway, then fully unscrew the bottom screw, then finish unscrewing the top screw

» Push and release the memory card to remove.

Deleting data files

If the *Overwrite* policy is selected, it will normally not be necessary to delete data files.

If the *Preserve Data Files* policy is selected, it will be necessary to periodically delete old data files. This can only be down when logged in as an installer.

» In SmartHUB Connect, log in as an Installer

» Click on the trash icon next to the selected data file.

Section 7: SmartHUB Data Interfaces

The SmartHUB provides a range of data interfaces.

IP data

The SmartHUB provides multiple IP data ports via Ethernet or Wi-Fi. The SmartHUB can optionally be connected to the internet via the Flightcell DZMx cellular data connection.
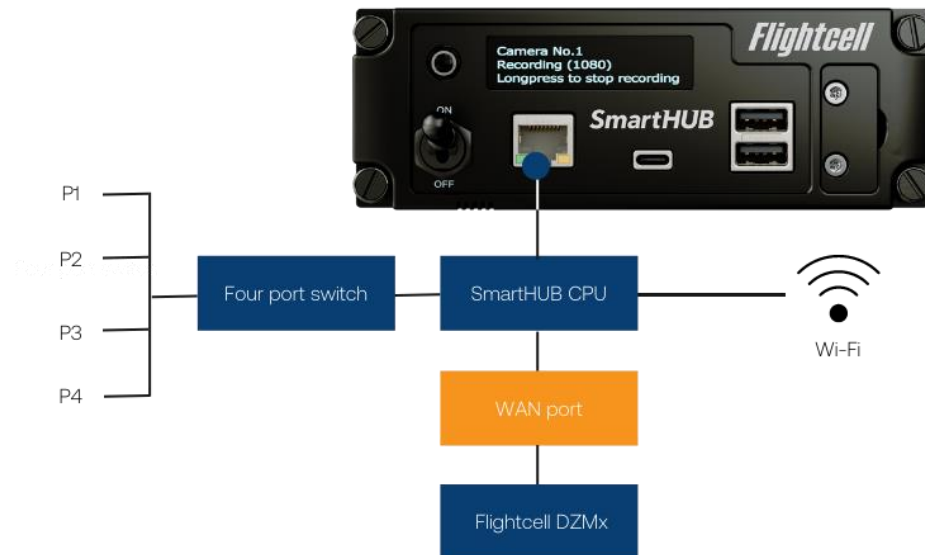
Ethernet

The SmartHUB has six 10/100/1000 base-T Ethernet ports:

» A 4-port switch, used to connect devices such as a mission computer or other Ethernet-capable device

» A WAN port, used to connect to a Flightcell DZMx (if installed), providing an internet gateway

» A Management Port on the SmartHUB front panel, used to connect a laptop or other device, to configure the SmartHUB or to download data files.

Wi-Fi

The SmartHUB can optionally provide a Wi-Fi connection. This is enabled via an App and allows access to the data service from connected tablets or phones.

Configuring the data ports

The Ethernet and Wi-Fi data ports are highly configurable to meet the user's networking requirements.

Setting a firewall between Ethernet and Wi-Fi services

In some applications, it is necessary to prevent data packet exchange between the Wi-Fi and Ethernet services.

To activate a firewall between Ethernet and Wi-Fi:

» In SmartHUB Connect, go to *Settings > Network > Firewall*

» Set the switch to *Off* to prevent data packet forwarding.

USB

The SmartHUB contains a USB hub supporting six USB ports.

These include:

» On the front panel, three on-demand ports

- o One USB-A quick charge port providing up to 3A
- o One USB-A standard port providing up to 500 mA
- o One USB-C port providing up to 3A.

» On the main connectors, three wired ports, used to connect the Flightcell U2C Camera or other permanently wired devices.

Configuring the USB ports

If the quick charge function cannot be used due to certification requirements, it can be disabled. In SmartHUB Connect, go *to Settings > USB > Quick Charge.*

Note: If Quick Charge is off, the top USB-A port and the USB-C port are disabled. Only the lower USB-A port is available.

Section 8: Maintenance, Diagnostics and Support

Firmware Upgrades

Flightcell regularly releases firmware upgrades to provide new features, enhancements to existing features and bug fixes.

The latest SmartHUB firmware can be downloaded from the Flightcell website at www.flightcell.com/resources.

SmartHUB firmware can be upgraded using SmartHUB Connect or from a USB memory stick inserted in the SmartHUB USB slot.

Upgrading SmartHUB firmware using SmartHUB Connect

» Download the firmware file to a known location

» In SmartHUB Connect, go to *About*

» Click *Upgrade* and follow the prompts.

Upgrading SmartHUB firmware over USB

» Copy the firmware file to a USB memory stick.

» Plug the memory stick into a SmartHUB USB port; the SmartHUB will identify that there is a firmware file on the memory stick

» Repeat press **MENU** until the SmartHUB shows *Longpress to upgrade to: SmartHUB-xxx-upgrade.package*

» Longpress then Longpress again to confirm the upgrade.

Diagnostics

In case there is a need for technical support, comprehensive operating logs can be downloaded and sent to Flightcell to assist with diagnosis. To download the logfiles:

» In SmartHUB Connect, go to *About*

» Click on the bar graph icon on the top right of the screen

» Click on *Download All*.

Section 8: Obtaining Documentation and Information

Documentation

Comprehensive documentation is available on the Flightcell website at
www.flightcell.com/resources.

Technical support

For technical support contact Flightcell

> » By email, tech@flightcell.com

> » By phone, +64 3 545 8651

Contact Details

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Website	http://www.flightcell.com

Section 9: Warranty

Flightcell International Limited's quality products are proudly designed and manufactured to the highest standards in New Zealand. Your SmartHUB is warranted for one year from date of sale. Your warranty can be extended to five years if you have purchased the extended warranty and your SmartHUB is registered on our product registration system. To register your product, go to www.flightcell.com/support.

The SmartHUB warranty covers Flightcell manufactured items only. Any ancillary items may be covered by individual manufacturer warranties.

The warranty is void if any labels are removed or if it is determined that your SmartHUB has been:

» Connected to a power supply delivering more than 32 Volts

» Connected with reverse polarity

» Installed in direct contravention to the guidelines outlined in the Flightcell SmartHUB Installation Manual

» Physically damaged, or a fault has occurred due to the product being used beyond what is considered normal use, causing unusual deterioration of the product.

If the product is deemed to be faulty or in need of repair, please complete a Returned Materials Authorization form on www.flightcell.com/support or contact Flightcell International.

Appendix 1: Connector Kit Supplied with the SmartHUB

Flightcell part number	Manufacturer	Manufacturer's P/N	Description	Quantity
CNC_00026	TE Connectivity	5-1478762-3	Metal Back Shell for DB Size connectors Straight (25 way)	2
CNC_00003	Amphenol RF	132113	SMA Straight Crimp Plug, RG58	2
M24308/2-19F/-13Z	MIL-STD Part	M24308/2-19F	DB44S M24308 Crimp and Poke Socket with Contacts (Female)	1
M24308/4-19F	MIL-STD Part	M24308/4-19F	DB44P M24308 Crimp and Poke Plug with Contacts (Male)	1

Appendix 2. Connector Pinouts

Main Connector

Connector type: HD44 D Type Male

Mating part: M24308/2-13Z (or equivalent)

Pin No	Function	Direction	Notes
33	ARINC-429 RX CH1-	Input	Optional: ARINC-429 RX Channel 1 -
34	ARINC-429 RX CH1+	Input	Optional: ARINC-429 RX Channel 1 +
35	ARINC-429 RX CH2-	Input	Optional: ARINC-429 RX Channel 2 -
36	ARINC-429 RX CH2+	Input	Optional: ARINC-429 RX Channel 2 +
18	CHASSIS GND	Ground	Internally connected to SmartHUB Chassis
15	DC IN	PWR	DC Supply Input
30	DC IN	PWR	DC Supply Input
41	DEBUG RXD	Ouput	
29	DEBUG TXD	Input	
13	DEBUG GND	Ground	
40	EXT SWITCH	Input	External Power Control Input
7	GND	Ground	
8	GND	Ground	
14	GND	Ground	
17	GND	Ground	
1	LINE IN N	Input	Audio Input
2	LINE IN P	Input	Audio Input
6	ETH 10/100/1000 BI_DA-	I/O	Ethernet P4 1G
22	ETH 10/100/1000 BI_DA+	I/O	Ethernet P4 1G
5	ETH 10/100/1000 BI_DB-	I/O	Ethernet P4 1G
21	ETH 10/100/1000 BI_DB+	I/O	Ethernet P4 1G
4	ETH 10/100/1000 BI_DC-	I/O	Ethernet P4 1G
20	ETH 10/100/1000 BI_DC+	I/O	Ethernet P4 1G
3	ETH 10/100/1000 BI_DD-	I/O	Ethernet P4 1G
19	ETH 10/100/1000 BI_DD+	I/O	Ethernet P4 1G
12	ETH 10/100/1000 BI_DA-	I/O	WAN 1G
28	ETH 10/100/1000 BI_DA+	I/O	WAN 1G
11	ETH 10/100/1000 BI_DB-	I/O	WAN 1G
27	ETH 10/100/1000 BI_DB+	I/O	WAN 1G
10	ETH 10/100/1000 BI_DC-	I/O	WAN 1G
26	ETH 10/100/1000 BI_DC+	I/O	WAN 1G
9	ETH 10/100/1000 BI_DD-	I/O	WAN 1G
25	ETH 10/100/1000 BI_DD+	I/O	WAN 1G
23	NC		
24	NC		
16	P4 USB VBUS	PWR	
31	P4 USB D-	I/O	
32	P4 USB D+	I/O	
37	P5 USB VBUS	PWR	
38	P5 USB D-	I/O	
39	P5 USB D+	I/O	
42	P6 USB VBUS	PWR	
43	P6 USB D-	I/O	
44	P6 USB D+	I/O	
HD44 SHELL	CHASSIS GND	Ground	

Secondary Connector

Connector type: HD44 D Type Female
Mating Part: M24308/4-19F (or equivalent)

Pin No	Function	Direction	Notes
34	CAN -	I/O	Optional: CAN -
33	CAN +	I/O	Optional: CAN +
44	CHASSIS GND	PWR	
35	DATA GND	Ground	
31	DATA RX	Output	
32	DATA TX	Input	
36	GND	Ground	
37	GND	Ground	
38	GND	Ground	
41	INPUT 1	Input	General Purpose Input 1 (open collector active ground)
40	INPUT 2	Input	General Purpose Input 2 (open collector active ground)
39	INPUT 3	Input	General Purpose Input 3 (open collector active ground)
1	ETH 10/100/1000 BI_DA-	I/O	Ethernet P1 1G
16	ETH 10/100/1000 BI_DA+	I/O	Ethernet P1 1G
2	ETH 10/100/1000 BI_DB-	I/O	Ethernet P1 1G
17	ETH 10/100/1000 BI_DB+	I/O	Ethernet P1 1G
3	ETH 10/100/1000 BI_DC-	I/O	Ethernet P1 1G
18	ETH 10/100/1000 BI_DC+	I/O	Ethernet P1 1G
4	ETH 10/100/1000 BI_DD-	I/O	Ethernet P1 1G
19	ETH 10/100/1000 BI_DD+	I/O	Ethernet P1 1G
23	ETH 10/100/1000 BI_DA-	I/O	Ethernet P2 1G
8	ETH 10/100/1000 BI_DA+	I/O	Ethernet P2 1G
24	ETH 10/100/1000 BI_DB-	I/O	Ethernet P2 1G
9	ETH 10/100/1000 BI_DB+	I/O	Ethernet P2 1G
25	ETH 10/100/1000 BI_DC-	I/O	Ethernet P2 1G
10	ETH 10/100/1000 BI_DC+	I/O	Ethernet P2 1G
26	ETH 10/100/1000 BI_DD-	I/O	Ethernet P2 1G
11	ETH 10/100/1000 BI_DD+	I/O	Ethernet P2 1G
27	ETH 10/100/1000 BI_DA-	I/O	Ethernet P3 1G
12	ETH 10/100/1000 BI_DA+	I/O	Ethernet P3 1G
28	ETH 10/100/1000 BI_DB-	I/O	Ethernet P3 1G
13	ETH 10/100/1000 BI_DB+	I/O	Ethernet P3 1G
29	ETH 10/100/1000 BI_DC-	I/O	Ethernet P3 1G
14	ETH 10/100/1000 BI_DC+	I/O	Ethernet P3 1G
30	ETH 10/100/1000 BI_DD-	I/O	Ethernet P3 1G
15	ETH 10/100/1000 BI_DD+	I/O	Ethernet P3 1G
5	NC		
6	NC		
7	NC		
20	NC		
21	NC		
22	NC		
42	OUTPUT A	Output	Single-pole, normally-open (1-Form-A) solid state relay
43	OUTPUT B	Output	Single-pole, normally-open (1-Form-A) solid state relay
44	CHASSIS GND	Ground	
HD44 SHELL	CHASSIS GND	Ground	
			OUTPUT A/B form single-pole relay output