



DESCRIPTION

The UgCS SkyHub solution is a hardware and software set designed to enhance commercial-off-the-shelf UAVs capabilities for industrial purposes and to support integration of diverse sensors.

Applications

- Custom payload integration with drone
- Advanced UAV flight control scenarios
- Using drones in an adverse environment

Features

- Fully isolated and ESD-protected external interfaces
- Reliable and convenient connectors with lock, ideal for airborne applications
- Selectable power output (9 V / 12 V / 15 V / 18 V) with switch-off function for payload connecting
- Drone power pass-through to external payloads
- 3x UART / 1x RS-232 / 1x UART/RS-232 combined / 2x USB / Ethernet / Wi-Fi / Bluetooth interfaces
- 4x GPIO pin pairs for general purpose input/output
- Protection against input power's inverse polarity
- Extended operating temperature range from -25°C to +50°C

Interfaces

The UgCS SkyHub 3 device provides a connection to different payloads via several interfaces:

- 3× UART interfaces
- 1× UART / RS-232 interface
- 1× RS-232 interface
- 4× GPIO pin pairs
- Ethernet interface
- Bluetooth interface
- 2× USB 2.0

Power outputs

UgCS SkyHub 3 eliminates the need to have a separate battery or power circuit for the sensors. Every connector with communication ports has pins with +5V and +12V covering 99% of power requirements for the sensors. One additional power connector is configurable and may output 9, 12, 15, 18V with 5A load maximum. Other possibility to power sensors is from a drone power pass-through connector.

Specifications

GENERAL

Compatible drones	<ul style="list-style-type: none">• DJI M210 / M210 V2• DJI M600 / M600 Pro• DJI M300 RTK• Custom frames based on DJI A3 flight controller• Pixhawk with ArduCopter / PX4
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Temperature range	-25°C to +50°C
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Power input	12 V to 60 V, UgCS SkyHub itself works from 9+ V
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Power output	selectable 9 V / 12 V / 15 V / 18 V, up to 5 A
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COMPUTATIONAL CORE

System-on-Module	Raspberry Pi Compute Module 4
CPU	Cortex-A72 (ARM v8) 64-bit
CPU frequency	up to 1.5 GHz
RAM	8 GB
Flash, eMMC	32 GB
OS	Ubuntu Server 21.04

INTERFACES

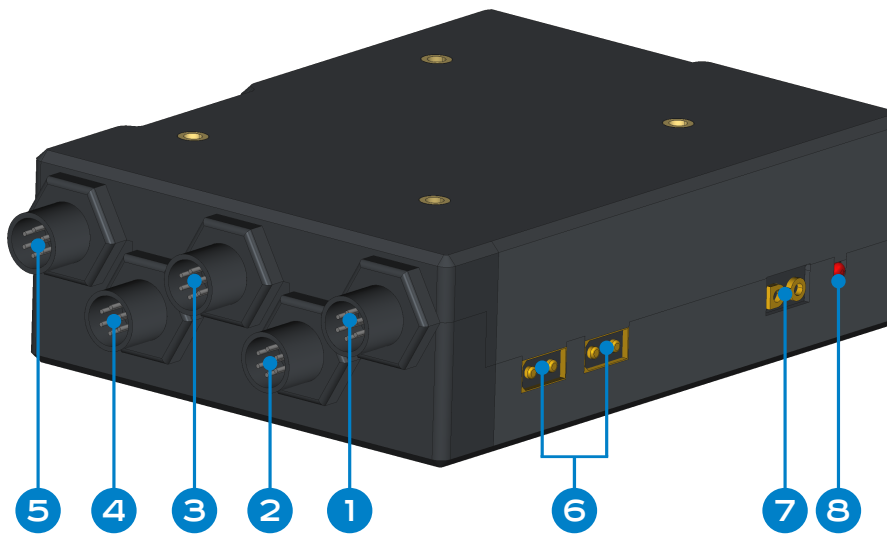
UART	up to 4
RS-232	up to 2
GPIO	up to 4
USB	up to 2
Wi-Fi	Dual-band 802.11 b/g/n/ac
Bluetooth	5.0 with BLE support
Ethernet	10/100 Mbit

MECHANICAL

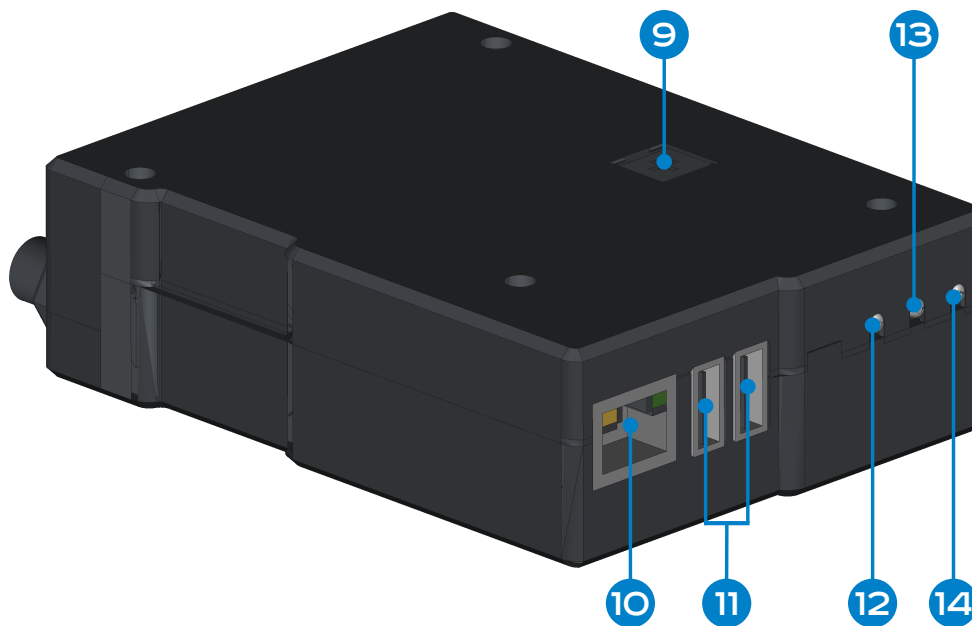
Dimensions (L × W × H)	112 × 84 × 34mm
Weight	195 g
Weight with mountings	215 g for DJI M300 220 g for DJI M600

Overview

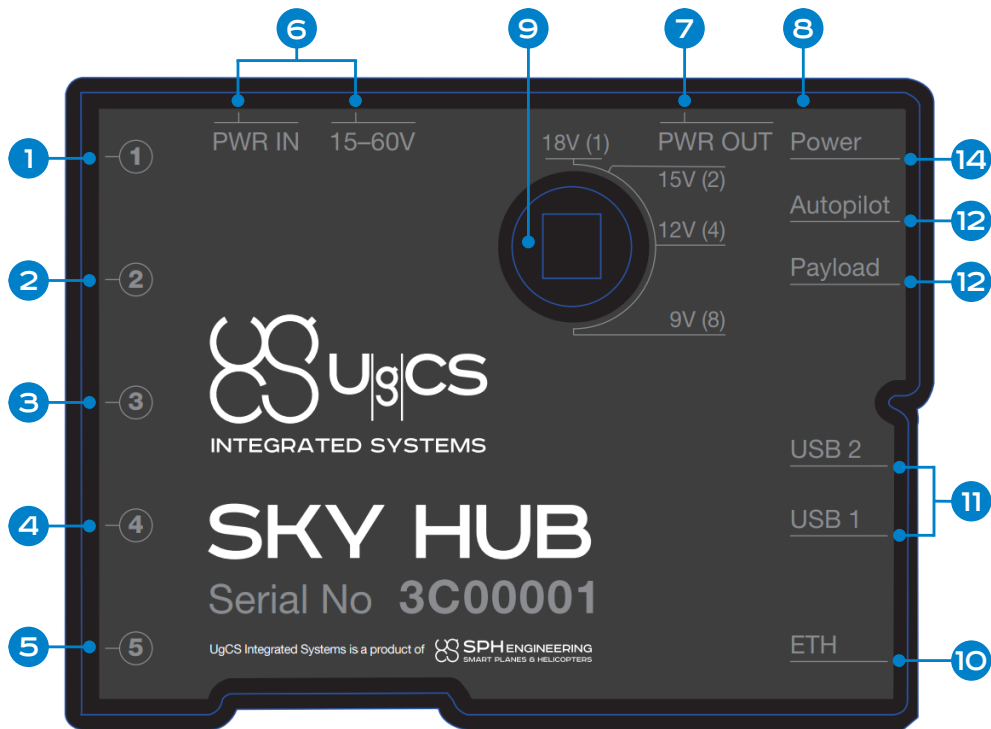
The main device elements are illustrated below.



UgCS SkyHub 3 overview. Side 1



UgCS SkyHub 3 overview. Side 2



UgCS SkyHub 3 elements outline

- | | |
|--|--|
| <p>1 Connector 1
By default for communicating with the altimeter (see UART / RS-232 / GPIO)</p> <p>2 Connector 2
By default for communicating with the flight controller (see UART / RS-232 / GPIO)</p> <p>3 Connector 3
Communicates with UART-based payloads (see UART / RS-232 / GPIO)</p> <p>4 Connector 4
By default for communicating with any UART-based or RS-232-based sensors (see UART / RS-232 / GPIO)</p> | <p>5 Connector 5
Communicates with RS-232-based payloads (see UART / RS-232 / GPIO)</p> <p>6 Power input
Power input, two ports to enable drone power pass-through (see Power Input)</p> <p>7 Power output
Feeds the payload (see Power Output)</p> <p>8 Power output LED (Red)
Indicates the presence of power output</p> |
|--|--|

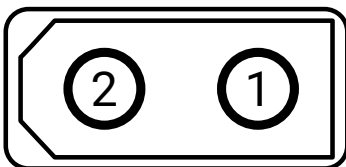
- 9 Power Output Selector**
Defines power output for payloads (see [Power Output Selector](#))
- 10 Ethernet connector**
Communicates with Ethernet-based payloads (see [Ethernet](#))
- 11 USB ports**
Double USB-port to communicate with USB-based payloads or through USB-UART adapter (see [USB ports](#))
- 12 Payloads LED**
Indicates the connection to payloads (support coming soon)
- 13 Autopilot LED (Green / Red)**
Indicates the connection of an autopilot. Green when autopilot works well. Red when autopilot isn't connected. Turned off when support for autopilot turns off
- 14 Core power LED (Yellow)**
Indicates the presence of core power

Connectors

Power Input

- Mating connector on the cable side: **Amass XT30U-F**
- Voltage range: **12 V to 60 V**.
- The UgCS SkyHub device itself works from 9+ V
- Protected against reverse polarity
- One port to power the UgCS SkyHub device, another can be used to enable drone power pass-through to external payloads

Pinout (device side)

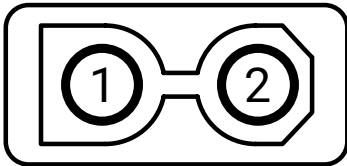


PIN	NAME	DESCRIPTION
1	+V	Power supply voltage
2	GND	Power supply ground

Power Output

- Mating connector on the cable side: **Amass XT30U-M**
- Voltage: **Nominal $\pm 1\%$**
- Output nominal voltage defines by [Power Output Selector](#)
- Current: **up to 5 A**

Pinout (device side)

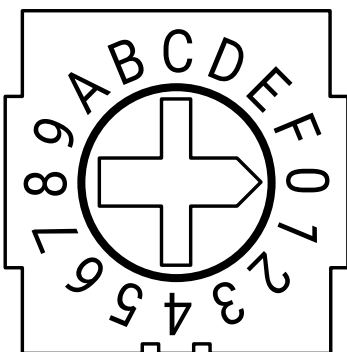


PIN	NAME	DESCRIPTION
1	+V	Power output voltage
2	GND	Power output ground

Power Output Selector

- Switcher: **C&K RTE16**
- Available voltages: **9 V, 12 V, 15 V, 18 V**

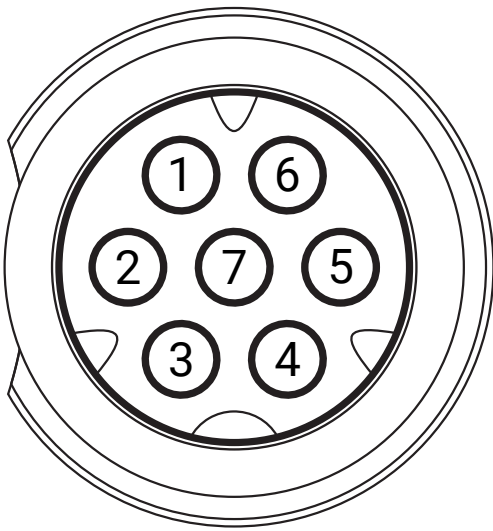
Positions



POSITION	DESCRIPTION
1	18 V output voltage
2	15 V output voltage
4	12 V output voltage
8	9 V output voltage

UART / RS-232 / GPIO

UgCS SkyHub 3 has five identical connectors to be dedicated to communicating with the flight controller, payloads equipped with the UART or RS-232 interface.



- One of the connectors is the combined UART / RS-232 interface.
- Four connectors provide support for GPIO line. GPIO pin pairs have no fixed reserved usage, depending on the payload they can be used for payload power switching, PPS input/output or other tasks.
- Mating connector on the cable side: **Switchcraft W16982-7SG-P-518**
- Logic level: **3.3 V**
- Isolated from the CPU
- ESD-protected

Pinout (device side)

PIN	CONNECTORS				
	1	2	3	4	5
1	GND	GND	GND	GND	GND
2	+5 V	+5 V	+5 V	+5 V	+5 V
3	+12 V	+12 V	+12 V	+12 V	+12 V
4	UART_TX	UART_TX	UART_TX	UART_TX	GP019
5	UART_RX	UART_RX	UART_RX	UART_RX	GPI6
6	GP018	GP07	GP017	RS232_TX	RS232_TX
7	GPI11	GPI23	GPI27	RS232_RX	RS232_RX

Pins description

PIN NAME	DESCRIPTION
GND	Ground
+5 V	5 V output voltage up to 1 A
+12 V	12 V output voltage up to 1 A
UART_TX	UART transmit line
UART_RX	UART receive line
RS232_TX	RS-232 transmit line
RS232_RX	RS-232 receive line
GPO	GPIO output line
GPI	GPIO input line

Serial device paths

CONNECTOR NUMBER	SERIAL DEVICE PATHS
Connector 1	/dev/ttyAMA1
Connector 2	/dev/ttyS0
Connector 3	/dev/ttyAMA2
Connector 4	/dev/ttyAMA3
Connector 5	/dev/ttyAMA4

USB ports

Double USB-port to communicate with USB-based payloads or through USB-UART adapter. Where possible, UART has to be used instead of USB to avoid the time lag introduced by USB communications overhead.

- Mating connector on the cable side: **USB A**
- Total current: **up to 3 A**

Ethernet

Dedicated to communicating with the payload equipped with the Ethernet interface.

- Mating connector on the cable side: **RJ-45**
- Bitrate: **10/100 Mbit**