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SkyHub 3

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Description

The 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
- 3× UART / 1x RS-232 / 1x UART/RS-232 combined / 2× 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

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Interfaces

The 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

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	• DJI M210 / M210 V2 • DJI M600 / M600 Pro • DJI M300 RTK • Custom frames based on DJI A3 flight controller • Pixhawk with ArduCopter / PX4
Temperature range	−25°C to +50°C
Power input	12 V to 60 V, SkyHub itself works from 9+ V
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

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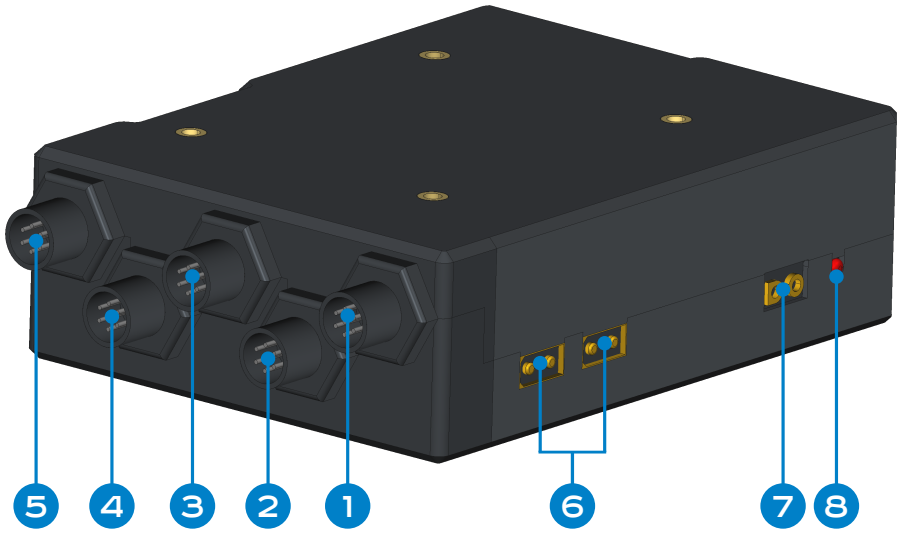
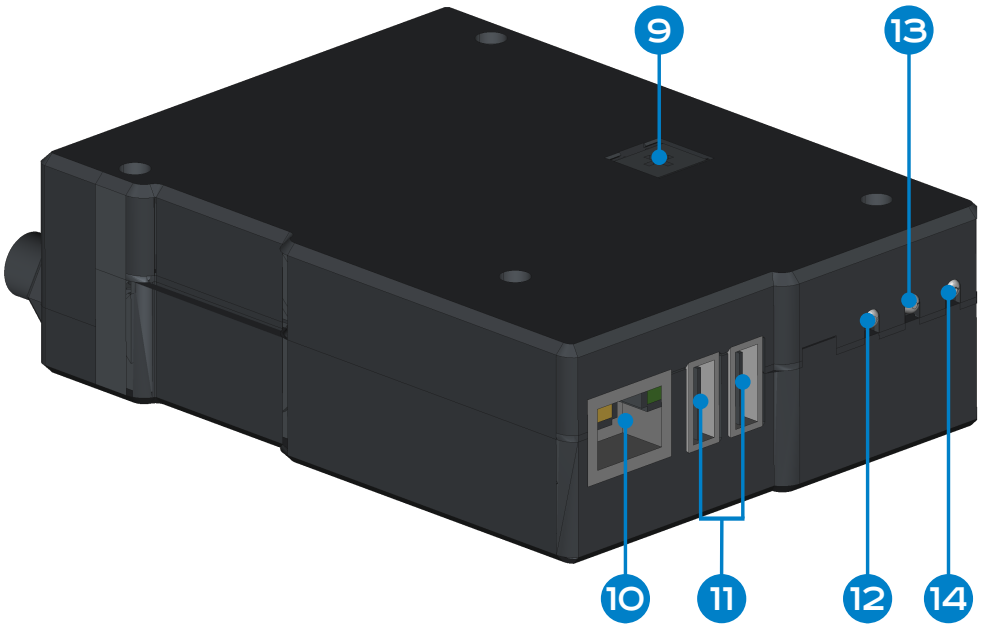
Overview

The main device elements are illustrated below.



SkyHub 3 overview. Side 1



SkyHub 3 overview. Side 2

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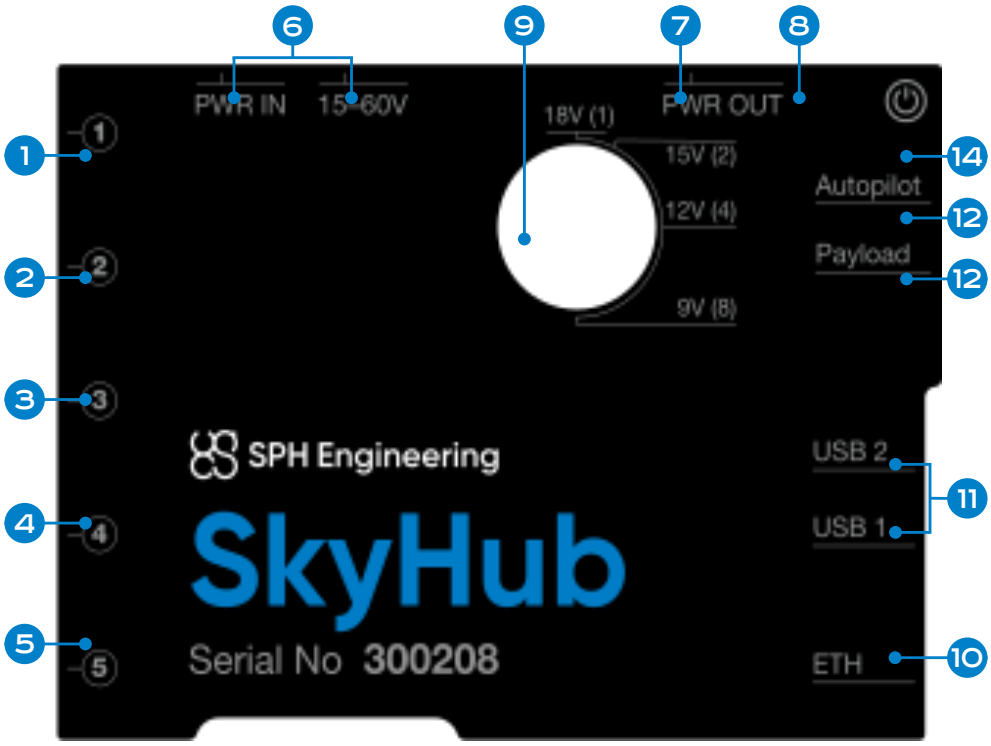

SkyHub 3 elements outline

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1. **Connector 1**

   By default for communicating with the altimeter (see UART / RS-232 / GPIO)

2. **Connector 2**

   By default for communicating with the flight controller (see UART / RS-232 / GPIO)

3. **Connector 3**

   Communicates with UART-based payloads (see UART / RS-232 / GPIO)

4. **Connector 4**

   By default for communicating with any UART-based or RS-232-based sensors (see UART / RS-232 / GPIO)

5. **Connector 5**

   Communicates with RS-232-based payloads (see UART / RS-232 / GPIO)

6. **Power input**

   Power input, two ports to enable drone power pass-through (see Power Input)

7. **Power output**

   Feeds the payload (see Power Output)

8. **Power output LED (Red)**

   Indicates the presence of power output

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**.

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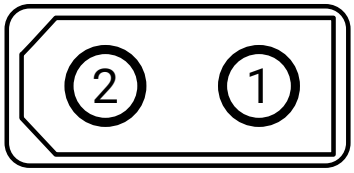
- The SkyHub device itself works from 9+ V
- Protected against reverse polarity
- One port to power the SkyHub device, another can be used to enable drone power pass-through to external payloads

Pinout (device side)



Pin	Name	Description
1	+V	Power supply voltage
2	GND	Power supply ground

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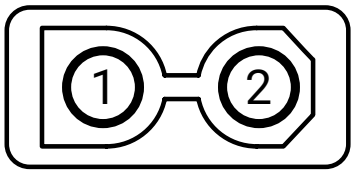
Power Output

- Mating connector on the cable side: **Amass XT30U-M**
- Voltage: **Nominal ± 1%**
- Output nominal voltage defines by Power Output Selector
- Current: **up to 5 A**

Pinout (device side)

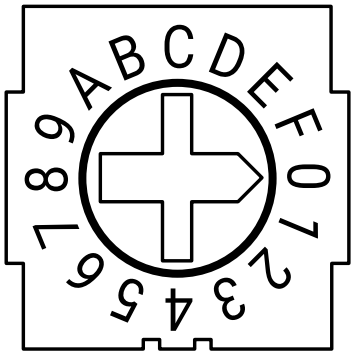


Pin	Name	Description
1	+V	Power output voltage
2	GND	Power output ground

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

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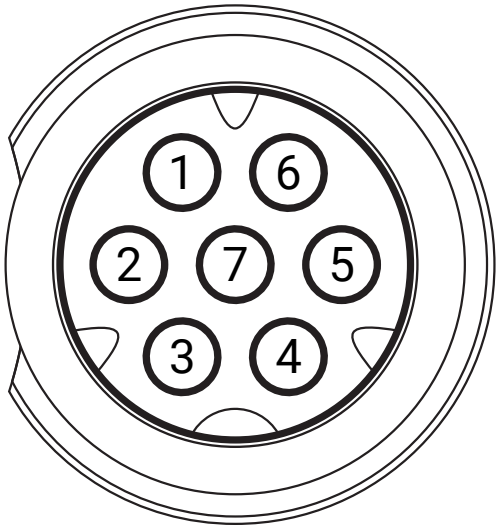
UART / RS-232 / GPIO

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	GPO19
5	UART _RX	UART_RX	UART_RX	UART_RX	GPI6
6	GPO18	GPO7	GPO17	RS232_TX	RS232_TX
7	GPI11	GPI23	GPI27	RS232_RX	RS232_RX

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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**