



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
- 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 $+50^{\circ}\text{C}$

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

| CPM version | Compatible drones |
|-------------------|---|
| 4.0.x | <ul style="list-style-type: none"> • DJI M350 RTK • DJI M300 RTK • Custom frames based on DJI A3 flight controller |
| 3.19.x | <ul style="list-style-type: none"> • Pixhawk with ArduCopter / PX4 • DJI M210 / M210 V2 • DJI M600 / M600 Pro |
| Temperature range | -25°C to +50°C |

General

| | |
|--------------|--|
| 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 |

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

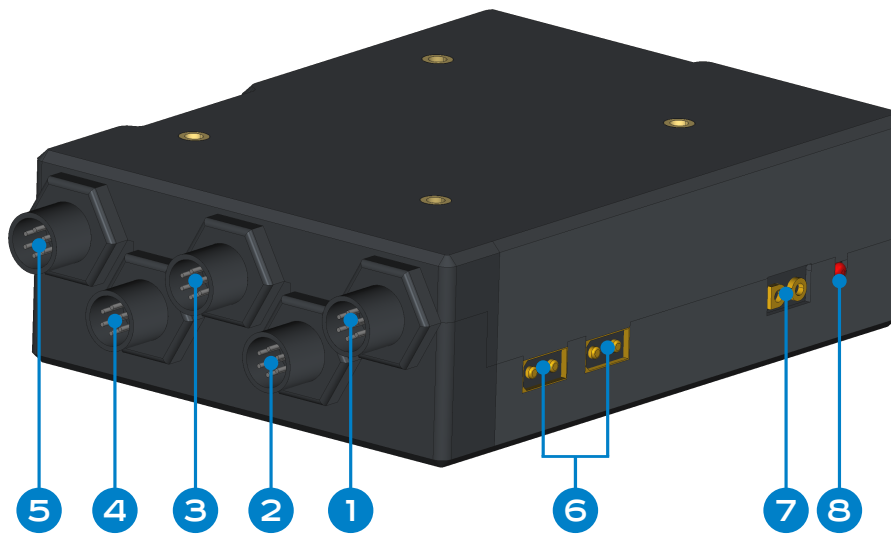
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|------------------------|-----------------|
| Dimensions (L × W × H) | 112 × 84 × 34mm |
|------------------------|-----------------|

Mechanical

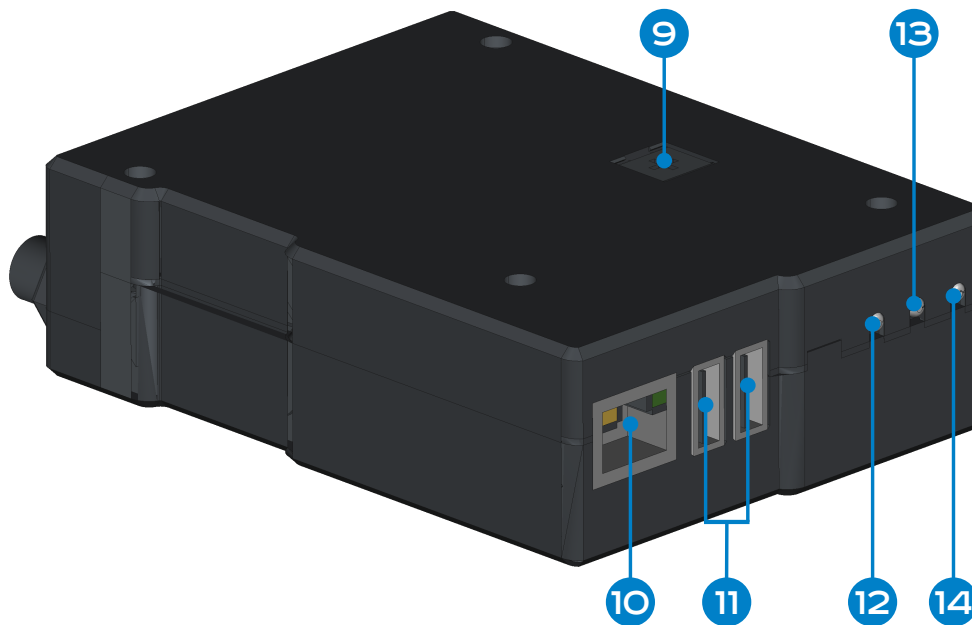
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| Weight | 195 g |
| Weight with mountings | 215 g for DJI M300 220 g for DJI M600 |

Overview

The main device elements are illustrated below.



SkyHub 3 overview. Side 1



SkyHub 3 overview. Side 2



SkyHub 3 elements outline

- 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

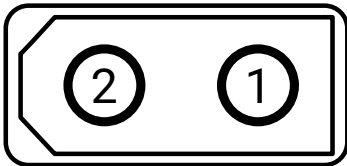
Connectors

Power Input

- Mating connector on the cable side: **Amass XT30U-F**
- Voltage range: **12 V to 60 V**.

- 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)

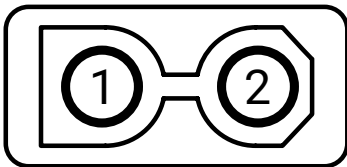


| Pin | Name | Description |
|-----|------|----------------------|
| 1 | +V | Power supply voltage |
| 2 | GND | Power supply ground |

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)

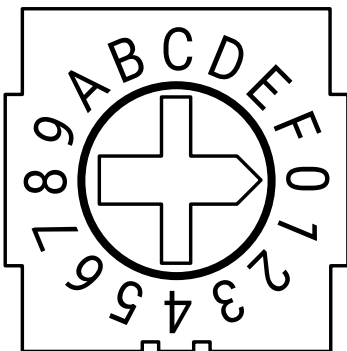


| Pin | Name | Description |
|-----|------|----------------------|
| 1 | +V | Power output voltage |
| 2 | GND | Power output ground |

Power Output Selector

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

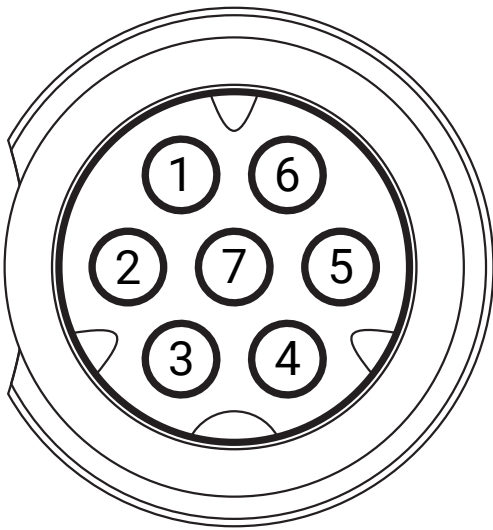
Positions



| 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

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 |

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**