Data logger “SKH3”

A platform for airborne data collection

Preview version – all features are supported in hardware
but not all have firmware support or are rigorously tested yet.

Sparv Embedded uses the experience from years of drone integration work to deliver their second-generation logger SKH3. The logger has many built-in features. It optimizes size, weight and power (SWaP) but also puts high emphasis on reliability, extensibility and usability, in particular in streamlining troubleshooting.

The final appearance differs a bit from this pre-production unit.

Basics

Size: 80x45 mm plus battery. (Smaller than a credit card.)
Weight: 70 grams plus battery, can be reduced to ca 25 grams
240MHz dual-core processor with FPU, 2.5 MB RAM and 4 MB flash *(subject to change)*.
Logging to internal 128 MB flash and/or a micro SD card.
The PCB follows IPC-2221B and IPC-2222B. All ports are protected against ESD and electrical faults.

User interaction

2.4” color touchscreen. Four mechanical pushbuttons and three LEDs. Speaker.
USB C, Wifi (2.4 GHz, 802.11 b/g/n), Bluetooth (5 LE).
Long-range telemetry can be added via the extension card or as separate modules.

Easy troubleshooting

The device can identify many issues. The screen ranks and presents any issues and explains what can be done about them in plain English. Also transient issues are recorded for later review.

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Power

Options for internal (3-5V) or external battery (5-17V).
Low power. Microampere hibernation mode with scheduled wakeup.
Measures battery current and voltage. Estimates battery life.
Backup battery for power glitches and safe shutdown.
Protected against up to 60 V voltage and reverse voltage.
Software and hardware fuses.

Built-in sensors

- GPS with support for an active or passive antenna
- Dual calibrated barometers
- High-accuracy timing from the GPS and from a real-time clock (RTC)

External sensors

The ports by default use the Sparv Embedded “SSP” protocol, giving plug-and-play support for sensors from Sparv Embedded. Other sensors are converted to SSP by use of adapters. The ports can also be reconfigured for third-party protocols.

- 4 I2C ports, isolated from each other
- 1 RS485 port with a ribbon cable connector, as point-to-point or multidrop bus

Other sensors are supported by extension cards.

Extension card

SKH3 supports a plug-in extension PCB for connectivity and extra hardware features. By offloading the specific connectors to an extension, the motherboard isn’t bogged down with various connectors that may or may not be used. Extensions are plugged in with a board edge connector and secured with a screwdriver. They are auto-detected by SKH3.

PC connection

A graphical program that connects over USB is included. The program can read logs, check the status, view and plot real-time data and configure sensors. The program is compatible with Windows and Linux. The program is structured with independent building blocks for interacting with sensors and data. This allows quick customization of PC scripts or graphical programs that interact with SKH3 and connected sensors.

Development cooperation

Commission Sparv to customize the system for your use case.
As an option, Sparv also offers an additional agreement that enables customers to:

- **Extend the firmware code** (C/C++). It just takes minutes to get started thanks to PlatformIO and Arduino support.
- **Develop their own hardware integrations.** A template KiCAD PCB project is available.
- **Develop PC programs (Python).** The Python library simplifies many tasks concerning interfacing with sensors, visualizing and processing data and creating GUIs, for example for calibration procedures.