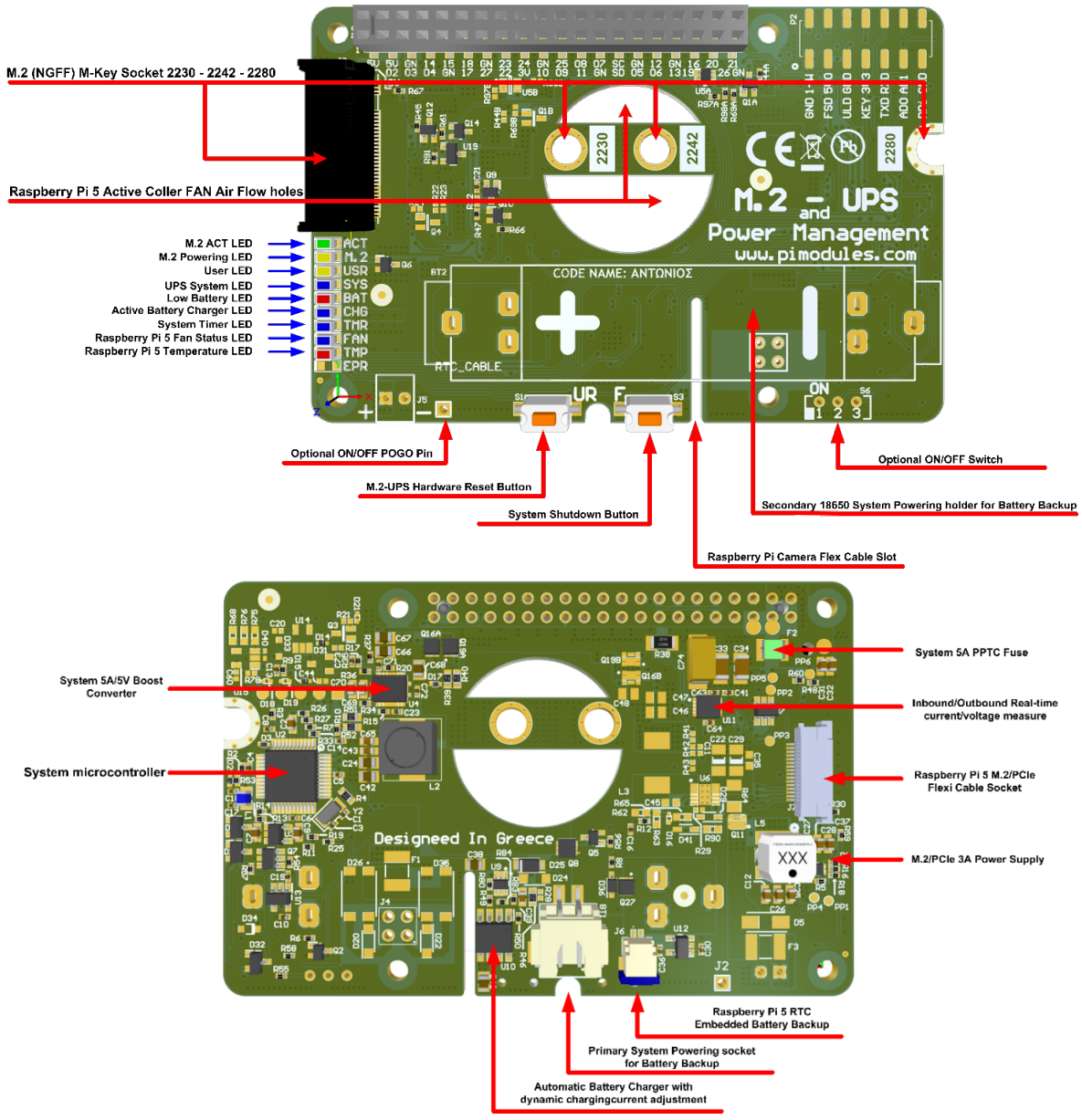
M.2 UPS PMH

UPS and Power Management HAT for Raspberry Pi 5

Standard | PM_590

M.2 PCIe storage, power backup and browser access from your phone.

Prospectus revision 2.0 | 25 October 2026 | Application V8B5



Original top and underside board illustrations. Fitted accessories depend on the ordered configuration.

Designed and Manufactured in Europe by
Pi Modules Technologies L.P.
www.pimodules.com

Power backup and storage

M.2 UPS PMH combines a PCIe M-key SSD interface and an uninterruptible power supply on an 85 × 56 mm HAT designed specifically for Raspberry Pi 5. It supports SSD lengths 2230, 2242 and 2280 and works with the airflow opening above the official Raspberry Pi active cooler.

The Standard model uses the Raspberry Pi 5 V power path during normal USB-C operation. It provides the core UPS, storage, RTC and control functions without the Advanced external-power and application-header hardware.

Function	Operation
Cable power	The Raspberry Pi runs from its external source while the controller manages charging according to available power.
Power failure	A suitable backup source supports the Pi and SSD. The controller can request File Safe Shutdown (FSSD) after a configured interval or a low-battery condition.
Controlled shutdown	The Linux daemon processes the request so Linux can shut down before the controller completes its power sequence.
LPR standby and recovery	After shutdown, the controller enters low-power standby. A qualified cable-power return can start the Pi according to the selected operating mode.
Optional Magic ON/OFF switch	The fitted slide switch provides controlled startup and an OFF action that requests shutdown. Normal UPS mode and switch mode have different runtime behavior.

Backup source and charging

Use one compatible cable-connected source or one cell in the 18650 holder at a time. Supported profiles cover LiPo, Li-ion, $LiFePO_4$ and the designated 4000 F / 4.2 V supercapacitor. Match the profile to the physically connected source; capacity alone does not establish adequate discharge capability.

Maximum charging current is 580 mA. Charging demand adapts to the available input power. The actual source must also supply the running Pi, SSD and peripherals. Backup output is specified at 5.25 V, up to 5 A continuous, subject to the source, wiring, load and thermal conditions.

Default or supported setting	Value
Normal UPS runtime before FSSD	Approximately 70 seconds at the default runtime value 0x01, plus any configured startup hold.
Linux shutdown grace period	30 seconds by default; allow enough time for the actual workload.
Unlimited elapsed runtime	0xFF removes the elapsed-time limit; low-battery protection remains active.

The supplied daemon and the documented Pi power-button connection are required for the intended shutdown and restart behavior. A programmed runtime is not a guarantee that the selected battery can sustain the load for that interval.

Monitoring from a phone or computer

The optional Web Panel V02 runs on Raspberry Pi 5 and provides an English, responsive interface for a phone, tablet or computer. Use a modern browser on Android, iOS, Windows, Linux or macOS.



***M.2 UPS PMH** assembly and an illustrative mobile dashboard. Sample readings are shown; the phone image is not a captured screen.*

Access path	How to connect
Local network	Use http://<Pi-LAN-IP>:8080 from a device on the same network.
Internet through Tailscale	Connect Tailscale on the Pi and viewing device to the same authorized private network. Open http://<Pi-Tailscale-IP>:8080.
Panel accounts	Administrators can review and apply supported settings. Viewers can monitor without writing. The panel login is separate from the Tailscale login.

The panel shows cable/battery state, battery voltage, UPS RTC, Pi CPU temperature and Linux fan state. Advanced hardware also supplies the selected external ADC voltage and detected DS18B20 readings when the corresponding interfaces are enabled. Fan state is a Linux request, not an RPM measurement.

No public router port forwarding is required for Tailscale access. The Pi must be powered, running the panel and connected to the network. The panel does not turn on an unpowered Pi or flash firmware through a browser.

Automatic installation and daily operation

The automatic Linux installer V08 sets up dependencies, the heartbeat/shutdown service and matching terminal tools. It supports clean installation and upgrades of recognized older installations, with backups. Unknown service conflicts stop installation for review. It does not flash firmware or select a new physical battery profile.

```
cd ~
unzip -o M2_UPS_PMH_Customer_V8B5.zip
cd ~/M2_UPS_PMH_Customer_V8B5/installer
sudo python3 install_M2_UPS_PMH.py --upgrade
```

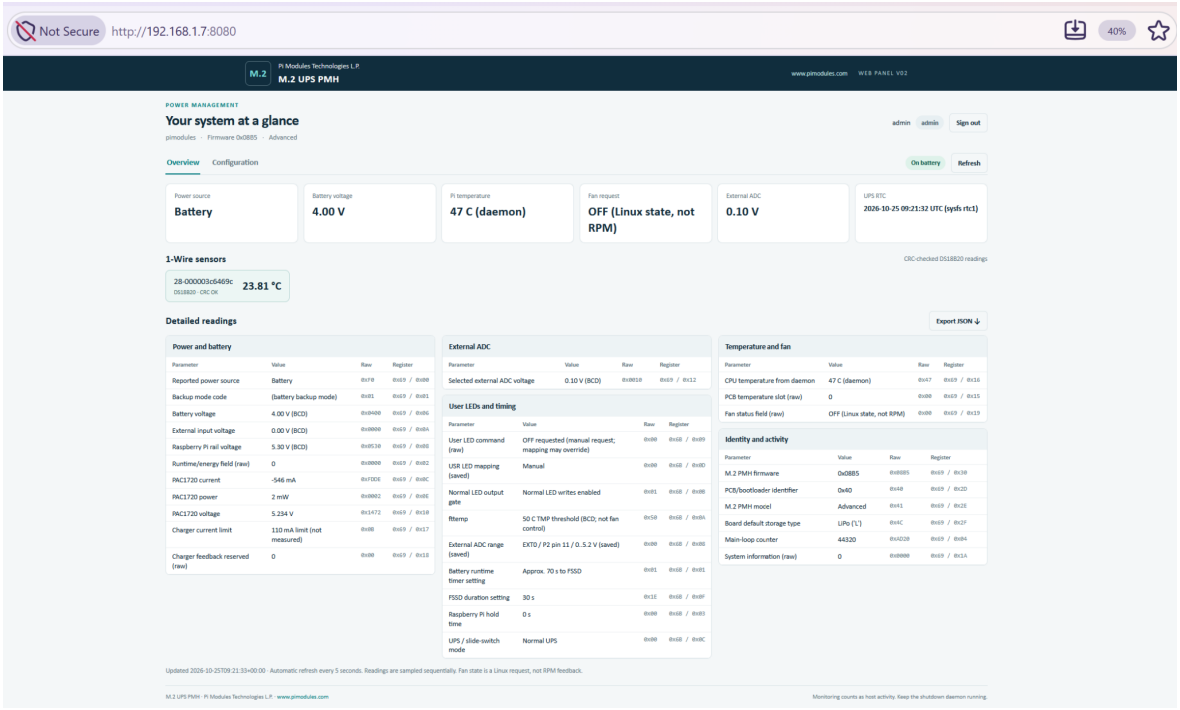
If the installer requests a reboot, reboot on stable cable power. Reconnect through SSH and run the installation check:

```
cd ~/M2_UPS_PMH_Customer_V8B5/installer
sudo python3 install_M2_UPS_PMH.py --check
```

Optional web panel and Internet access

```
cd ~/M2_UPS_PMH_Customer_V8B5/web_panel
sudo python3 install_webpanel.py --with-tailscale
```

Open the current authorization link printed in SSH and authorize the Pi. Install Tailscale on the phone or remote computer and join the same private network. Use the Pi private address on port 8080, then sign in with the panel account. Existing panel accounts are retained during upgrades.



Actual Web Panel V02 overview. An Advanced assembly is shown; available readings depend on fitted hardware.

```
sudo python3 /opt/M2_UPS_PMH/M2_PMH_status.py
sudo python3 /opt/M2_UPS_PMH/M2_PMH_config.py
```

Use monitor 0B and configurator 06 for V8B5. Older tools can reject the map. Keep the shutdown daemon running during normal operation.

Indicators and system control

Indicator or control	Function
USR	User LED: manual ON/OFF or Flash-saved SYS/BAT/TMR/FAN/TMP mapping.
SYS	System and power-state indication.
BAT	Battery-related indication.
CHG	Charger activity indication.
TMR	System timer indication according to the active firmware function.
FAN	Linux fan-state telemetry from the daemon; not measured RPM.
TMP	Pi CPU-temperature indication using the configured threshold; does not control Pi cooling.
ACT and M.2	SSD activity and M.2 power indication.
RESET and FSSD	Controller reset and documented shutdown/bootloader entry controls.

User LED for an enclosure

The user LED can follow SYS, BAT, TMR, FAN or TMP, with its source selection saved in MCU Flash. The original source LED remains active. Standard uses the documented soldered-wire arrangement for an external LED; the Advanced P2 header is not fitted on Standard. The intended user-LED circuit includes the on-board R7 = 3.6 kΩ current limiter.

Two RTC functions

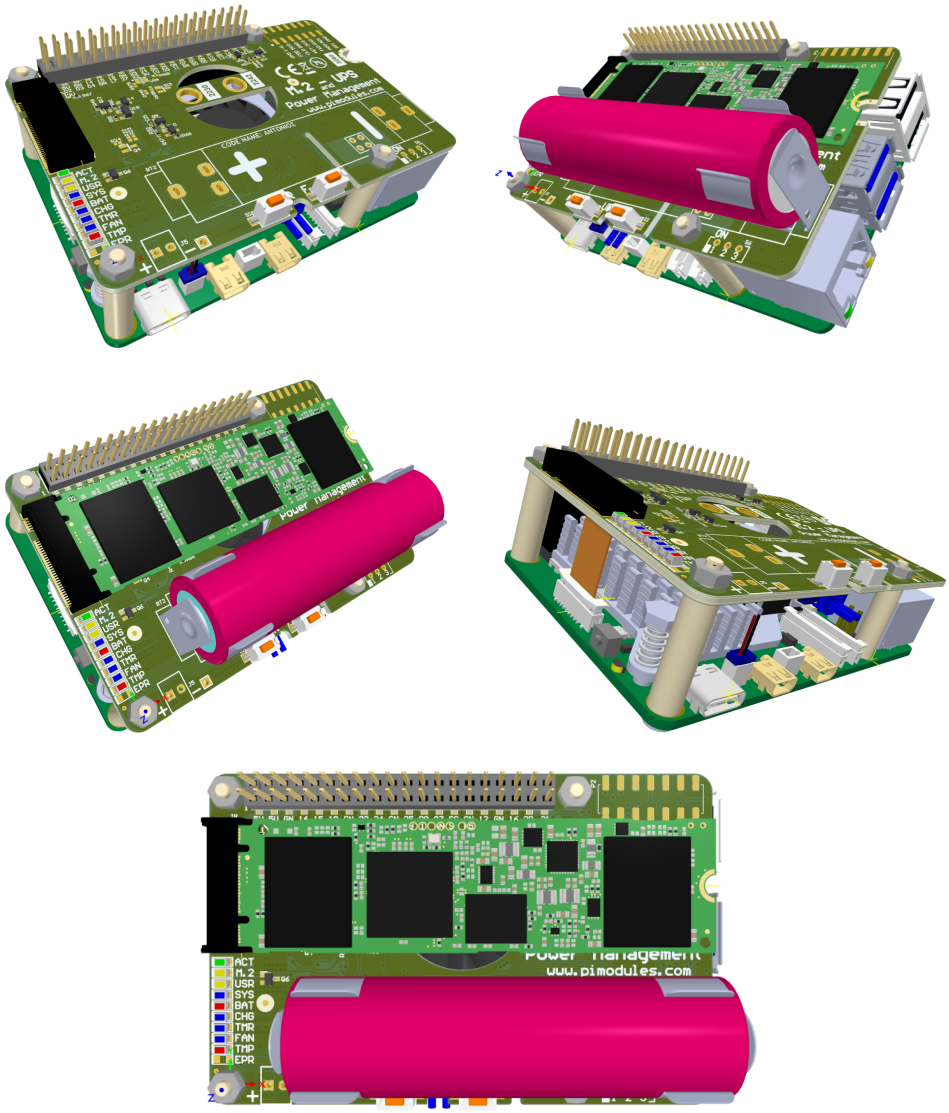
M.2 UPS PMH has an independent hardware RTC exposed through a DS1307-compatible I²C bank. The Linux daemon synchronizes it to UTC only after confirmed NTP synchronization. A separate dedicated cable supplies the Raspberry Pi 5 RTC from the main M.2 backup supply, eliminating a separate Pi RTC cell while that supply remains available.

When to choose Advanced

Choose Advanced for the EPR input, passive PoE, protected 1-Wire connector, external analogue measurement, auxiliary backed supplies and application header. Installing software on Standard does not add these hardware connections.

Assembly options and integration

The following original product illustrations show board and battery arrangements. Raspberry Pi, SSD, backup source, cooler and accessories depend on the selected order. Use one backup source at a time and fit the matching protective cap and enclosure.



Original assembly illustrations with optional 18650 battery and M.2 SSD.

Complete the installation

A dedicated enclosure is available for Raspberry Pi 5 and **M.2 UPS PMH**. Pi Modules also offers the battery protective cap, RTC backup cable and supported switch/POGO accessories. Confirm the exact fitted and supplied parts when ordering.

Follow the current M2_UPS_PMH_Manual_V99 for connector pinouts, battery preparation, automatic installation, commissioning, firmware updating and Tailscale setup. The public firmware does not print development diagnostics. Email broadcasting, IR decoding and a general event scheduler are not implemented by the supplied daemon.

Software baseline: application V8B5 (0x08B5), protected bootloader V88 at 38400 bit/s, daemon v1.6, installer V08, configurator 06, monitor 0B and Web Panel V02.