# In-line Power Monitor

PPAA1xx, Manual




The PPAA1xx in-line power monitor solution provides insight into the power level in your measurement system, without disturbing the optical path and with very low insertion loss. The device continuously monitors the power level in the fiber and when power is detected it automatically activates.

Thanks to the unique power detection technology, the light is detected in the forward direction only, while the insertion loss is low in both directions.

The device is powered by 3 built-in AAA batteries or can be powered through the USB-C interface. The USB-C interface can be used (optional configuration) for SCPY communication between a PC and the monitor.

The unit can optionally be configured with a 30dB+ VOA (Variable Optical Attenuator) that can be configured at a fixed attenuation or at a fixed output power.

The unit can optionally be configured with PM (Polarization Maintaining) fiber.

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## 2. Product Description

The PPAA1xx is a compact, hand-sized optical power meter for in-line power monitoring. The optical light passes continuously through the fiber and through evanescent escaped light the power level in the fiber is measured.

Thanks to the location of the photo-diodes, light from the input to the output is detected, but light in the opposite direction is ignored. The optical loss is both directions is the same low value.

The PPAA1xx comes in a rectangular body with a display on top and 3 control buttons (MODE, + and -). On the top edge an input for a USB-C connector is present. Dependent on the configuration of the device the USB-C connector is used for power only or allows for communications.

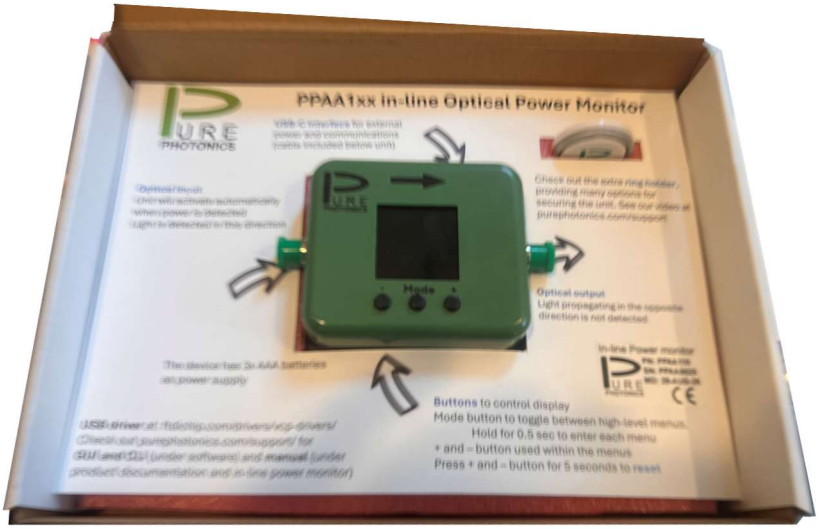
The device has an internal power source with 3x AAA batteries. These can be replaced by removing the back screws, letting the back surface come down, removing and unplugging the battery-holder and then replacing the batteries.

On both sides of the device an adapter for an optical FC/APC connector is present. Optionally the device can be configured with pigtails. The input is on the left side, the output is on the right side.



# 3. Unpacking the Device

The device is shipped in a box with a USB-C cable (to a flat USB connector), a ring-holder, a calibration statement and the device with installed batteries.




For first use the batteries need to be activated by removing the pull-tab in the back of the unit. The screws are not tightened to facilitate removal and should be tightened after removal.

The device will start up once a button is pressed.

The device is directly operational and can be installed in a setup. The setup optical cable will need to match the device input connector. The device output connector will need to match the setup optical connector.

The device can be connected to a power port for USB cables. This will provide power for the device and will prevent usage of the battery.

The device can be connected to a PC with the USB-C connector for digital communications. The device will (typically) be recognized by the PC and appropriate drivers will be automatically installed. In case drivers are missing, they can be found at https://ftdichip.com/drivers/vcp-drivers/ .

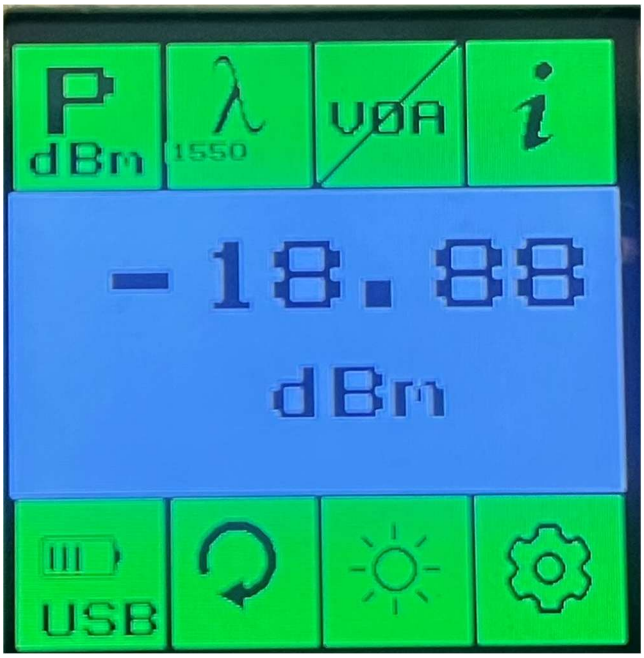
The device has magnets on the back to be mounted on a metal surface. It can also be stacked. Alternatively, the ring holder can be glued to the back of the unit and it can be used to lean the device back, either on the long side or the short side. It can also be used to hand-hold the device or to stack multiple devices on top of each other by ringing them through a backer-rod.

# 4. Front Panel Operation

The front-panel of the PPAA1xx has an upper and lower bar to access functions and a center region to display the information.

On the top-bar (left to right)

- Power settings: select the power mode (absolute dBm, relative dB, mW)
- Wavelength setting: select the wavelength
- VOA: if VOA is built-in, select the VOA mode (off, target absorption, target power)
- Information: provides device information




On the bottom-bar (left to right)

- Battery: Battery/USB information
- Rotation: select the desired screen rotation
- Brightness: select the device display current/brightness. On battery operation the brightness is limited to 50%.
- Debug: miscellaneous information on device operation. This field is typically blocked off, but can be accessed after issuing the appropriate SCPY command.

In standard configuration the center display will show the measured optical power, either absolute (dBm), relative (dB), or in mW.

Below the screen there are three buttons for customer input (Mode, + and -)




Pressing any button when the device screen is dark will activate the screen.

Pressing the + and the – button together for 5 seconds will reset the device.

The MODE button can be used to toggle between the different sub-screens.

- A short MODE button press will visibly move the highlight between the different sub-screens on the top and bottom row.
- Once the desired sub-screen is reached, the MODE button can be held for 0.5 seconds to enter the subscreen.
- Within the sub-screen, a 0.5 second press on the MODE button will exit the sub-screen.

### Power sub-screen

The mode button is used to toggle between absolute display (dBm), relative display (dB) and mW display. For relative display, the + and – button can be used to change the reference power. A short push will increment/decrement by 0.1dB. A longer push will increment or decrement by 1.0dB.

### Wavelength sub-screen

The + and – button are used to increment or decrement the wavelength within the allowed range. A short push increment/decrements by 1nm. A longer push by 5nm.

### VOA sub-screen

The mode button is used to toggle between OFF (the VOA is not powered and has low loss), target power (the VOA voltage is varied to achieve a target output power) and target absorption (the VOA voltage is fixed to achieve the target absorption). With target power and target absorption, the + and – button are used to adjust the setpoint. A short push will provide a small change in the value and a longer push enables bigger steps.

### Information sub-screen

Different screens are available with device information, such as partnumber, serial number etc. The + and – button are used to go through the different pages.

### Battery sub-screen

The battery subscreen provides information on what power source is being used. Moreover, it provides information on the state of the battery and how long the device has operated on the power source. On the icon (in the lower bar), a USB mark will appear if the USB source is connected. When operating on battery that USB mark is not visible.

### Rotation sub-screen

Pushing the mode button will rotate the screen.

### Brightness sub-screen

Pushing the + and – button will control the current for the LCD screen (changing the brightness). The maximum current is 15mA. In battery operation, the maximum current is 7.5mA.

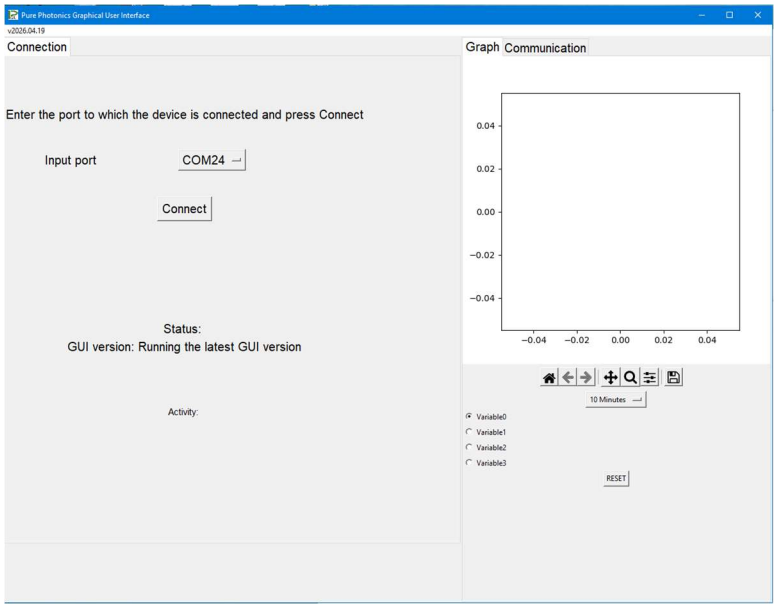
### Debug sub-screen

The debug sub-screen provides more detailed information on the inner workings of the device. This is mostly needed for troubleshooting and does not need to be accessed by the user. The contents of this sub-screen may change over time.

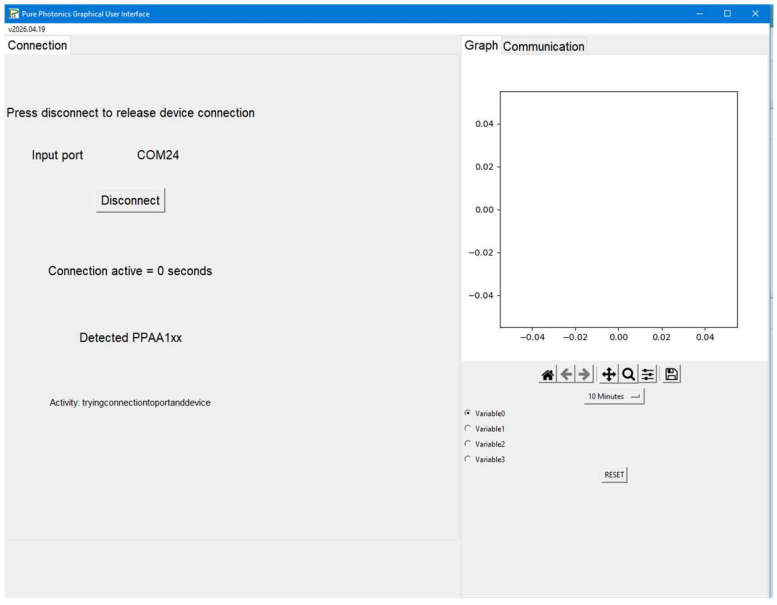
# 5. Graphical User Interface (GUI)

The Pure Photonics GUI, available on our support page (at the bottom), can be used to communicate with the PPAA1xx.

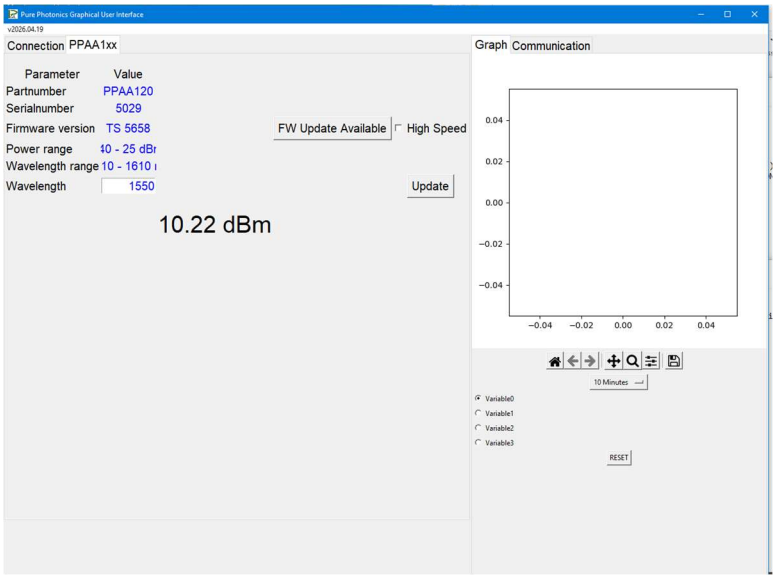
Upon activation of the GUI, the start screen is shown. You can select the COM port that the device is connected to and press ‘CONNECT’.




The program will go through a series of steps, shown in the status field, to detect the device and to determine it is a PPAA1xx.



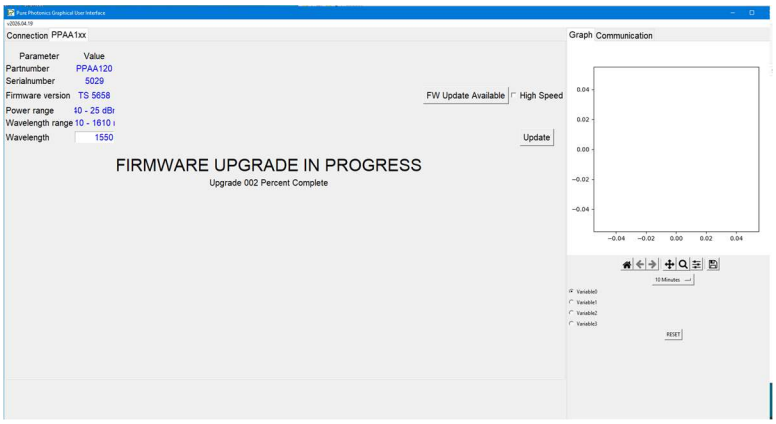

After completion, it shows a window with the power reading from the device and other key characteristics, such as the model, the serial number, the firmware revision, the power range, the wavelength range and the set wavelength.




The wavelength can be updated by pressing the update button.

The program will detect (on the internet) if an updated firmware version is available. If so, the ‘FW update’ button will show. Normally the update rate is at 9600 baud rate (about 5 minutes), but it can also be done at ‘high speed’ (115200 baud rate). To use the higher baud rate the latency time of the USB interface (in device manager) needs to be set to 1ms.

During the firmware upgrade, the device will show how much of the upgrade has completed.

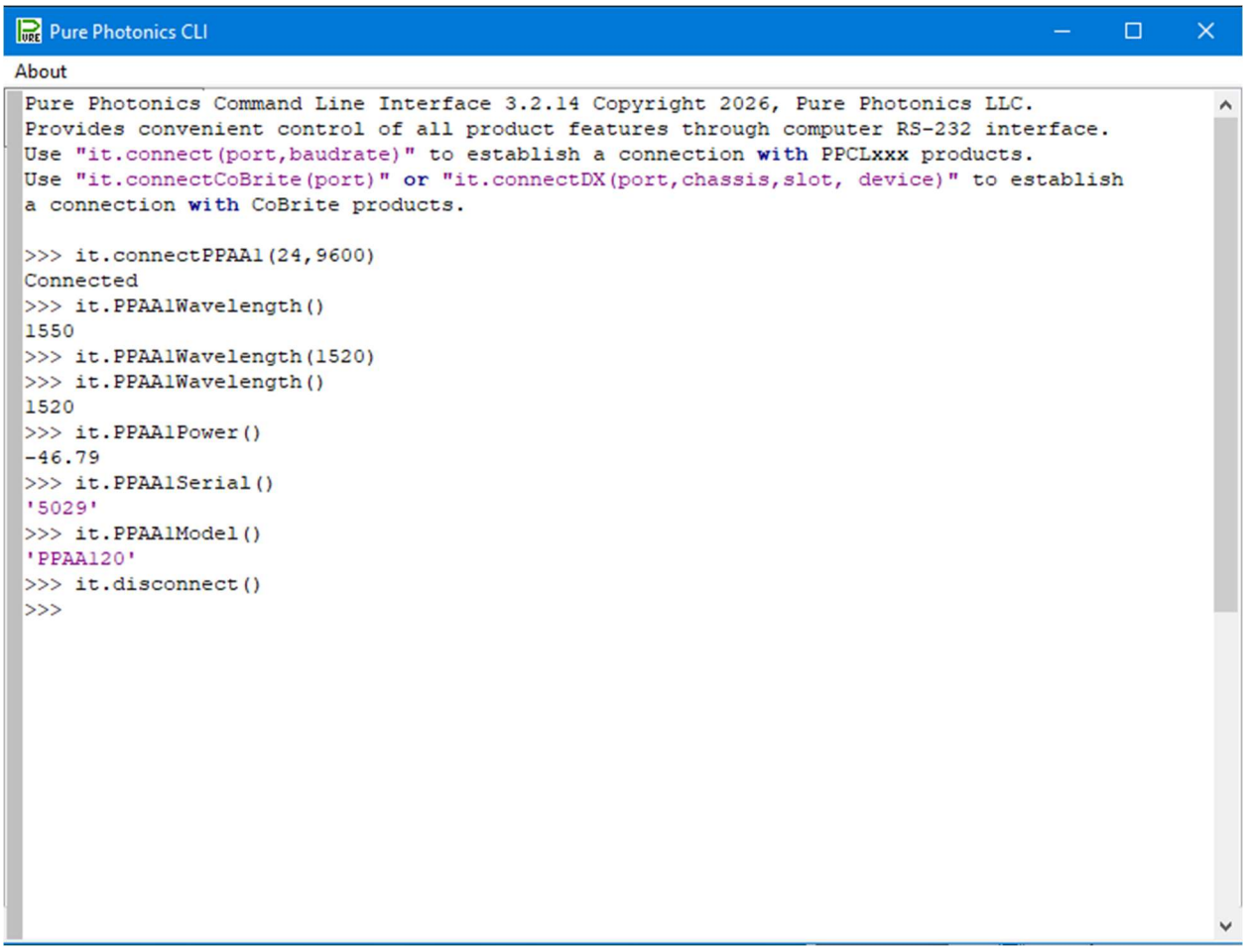


# 6. Command Line Interface (CLI)

Currently a number of basic commands are implemented in the Pure Photonics CLI, which can be downloaded from our support page at PurePhotonics.com.

In the below image the available commands are shown.

- connectPPAA1 takes the com port number (either the number or e.g. ‘COM24’) and the baudrate (9600 is default)
- PPAA1Wavelength either reads the currently set wavelength (empty) or sets the wavelength (in nm)
- PPAA1Power reads the current power level
- PPAA1Serial reads the serial number
- PPAA1Model reads the model number
- Disconnect terminates the serial connection



# 7. USB Communications

For select (most) configurations (except the basic version with B as the last digit), the USB-C port is enabled for communications. The port will be installed as a virtual COM port (FTDI chip) and will allow for standard serial communications at 9600 baud rate.

The communications protocol is SCPY:

- After receipt of a command the text string is interpreted by the processor and a response is provided. Interpretation starts:
  - after terminated by a semi-colon (;)
  - after termination by an EOL (/n)
  - After receipt of 80 characters (an error message is returned and the input buffer is cleared)
- Every command needs to start with a semi-colon (:) or star (*)
- Any character before a semi-colon (:) or star (*) is ignored
- All lower-case characters are converted to upper-case
- For most commands a long version and a short version of the text string is available. The short version is below listed in bold, meaning that the extended part of the command (not in bold) can be removed. Only the long version and the short version are allowed. All other configurations will result in an error message.

The following commands are available:

- ***IDN** provides system identification information, such as device type, model and serial number
- ***RST** resets the system to default values.
- **:SYS**tem**:CONFIG:BAUDRATE**
  - **:SYS**tem**:CONFIG:BAUDRATE** ?; provides the currently baudrate
  - **:SYS**tem**:CONFIG:BAUDRATE** 9600/115200; sets the baudrate (9600 or 115200)
- **:SYS**tem**:CONFIG:MODEL;** provides model ID
- **:SYS**tem**:CONFIG:SERIAL;** provides serial number
- **:SYS**tem**:CONFIG:MANUFACTURER;** provides manufacturer
- **:SYS**tem**:CONFIG:HWVERSION;** provides hardware version
- **:SYS**tem**:CONFIG:FWVERSION;** provides firmware version
- **:SYS**tem**:CONFIG:MFGDATE;** provides the manufacturing date
- **:SYS**tem**:CONFIG:CALDATE;** provides the last calibration date
- **:SYS**tem**:WAVELENGTH**
  - **:SYS**tem**:CONFIG:WAVELENGTH:MIN;** minimum wavelength in nm
  - **:SYS**tem**:CONFIG:WAVELENGTH:MAX;** maximum wavelength in nm
- **:SYS**tem**:POWER**
  - **:SYS**tem**:CONFIG:POWER:MIN;** minimum power in dBm
  - **:SYS**tem**:CONFIG:POWER:MAX;** maximum power in dBm

- :**SYS**tem**:POW**er
  - :**SYS**tem**:POW**er**:MOD**e ?; provides the current power mode (absolute or relative)
  - **:SYS**tem**:POW**er**:MOD**e ABS/REL; sets the current power mode
  - **:SYS**tem**:POW**er:**ABS**VALUE ?; provides the current reference value for relative power mode
  - **:SYS**tem**:POW**er**:ABS**VALUE 34.5; sets the current reference value for relative power mode. Note that whenever the relative power mode is set, this value gets overwritten with the then current value for power.
- :**SYS**tem:**VOA**
  - :**SYS**tem**:VOAMODE** ?; provides the current VOA mode (off, constant absorption, constant power
  - **:SYS**tem**:VOAMODE** OFF/ATT/POW; sets the current VOA mode
  - **:SYS**tem**:VOAATT** ?; gets the VOA absorption value in constant absorption mode
  - **:SYS**tem**:VOAATT** 5.5; sets the VOA absorption value in constant absorption mode
  - **:SYS**tem**:VOAPOW** ?; gets the power target in constant power mode
  - **:SYS**tem**:VOAPOW** 3.3; sets the power in constant power mode
- **:SYS**TEM**:BRI**GHTNESS
  - **:SYS**TEM**:BRI**GHTNESS ?; gets the display brightness
  - **:SYS**TEM**:BRI**GHTNESS 30; sets the display brightness; values 0-30 are allowed when powered by USB. 0-15 when powered by battery.
- **:SYS**TEM**:ENE**rgy **[currently not implemented]**
  - **:SYS**TEM**:ENE**rgy**:SOU**RCE ?; gets the currently used energy source
  - **:SYS**TEM**:ENE**rgy**:BAT**tery ?; gets the voltage on the battery
  - **:SYS**TEM**:ENE**rgy**:USB** ?; gets the voltage on the USB port
- **:SYS**TEM:**UPGRADE**
  - **:SYS**TEM:**UPGRADE** …..; allows for flashing a new firmware. We recommend to use the Pure Photonics GUI instead of using this command.
- :**MEAS**urement:**POW**er
  - **:MEAS**urement**:POW**er ?; gets the current read power level (relative or absolute dependent on setting)
- :**DEBUG:**
  - **:DEBUG:INTERFACE;** toggles the debug access on the front panel on and off.
  - Debug interface is not for customer access. If needed Pure Photonics can provide specific instructions on how to use.

# 8. Power Consumption

The module is either powered through the USB cable or the built-in 3xAAA 1.5V batteries (approximately 1000 mAhr capacity). Dependent on the power source and the user preference the unit can operate in several different power states:

| | Activity | On USB power | On Battery power | Battery life |
|---|---|---|---|---|
| **Deep Sleep** | Processor is shut-down. Can only wake up when button is pressed | Only first 5 seconds at startup | | 5000 hrs |
| **Sleep** | Processor is most of the time shut-down and periodically checks for light | Not available | Dependent on setting, check every 25 seconds | 2000 hrs |
| **Slumber** | Display off, monitoring signals | Default state without button press or power | Will go back to sleep if no power and no button press | (transient state when operating on battery) |
| **Awake** | Display on; 30 secs without power; continuous with power | | Display intensity limited | 50 hrs at low intensity |

The Deep Sleep state can be entered by holding the 2 buttons (+ and -) pressed in for 5 seconds. Touching any button will get the device out of the deep sleep.

# 9. Mechanical mounting

The PPAA1xx can be mounted in several ways

- The device can rest on its back surface for a flat installation
- The top and bottom surface are flat and the device can be mounted upright. The screen rotation can be controlled through the menu. Note that if the top surface is used, the insertion of the USB-C cable may not be possible.
- The back surface of the device has 2 magnets for upright installation on a metal back-surface
- The product comes with a mounting ring that can be glued onto the back surface. Note that in such a configuration the magnets on the back surface may not work anymore. With such a mounting ring the device can be configured to lean backwards or it can be installed onto a back pole for stacking multiple devices.

# 10. Versions

| | |
|---|---|
| Manual | 28 October 2026 |
| GUI | Version 2026.10.27 |
| CLI | Version 3.2.15 |
| Firmware | Version timestamp 7260 |