Smart PDU Operating Manual / API document

Manual version 1 / For PDU software version A1.12
Applies to PNs: MS-PDU-S24, MS-PDU-S24-30, MS-PDU-S24L, MS-PDU-S24L-30

(+1) 469-588-2100
sales@moonshot-pods.com
www.moonshotglobal.io

Outlet numbering and phase assignment
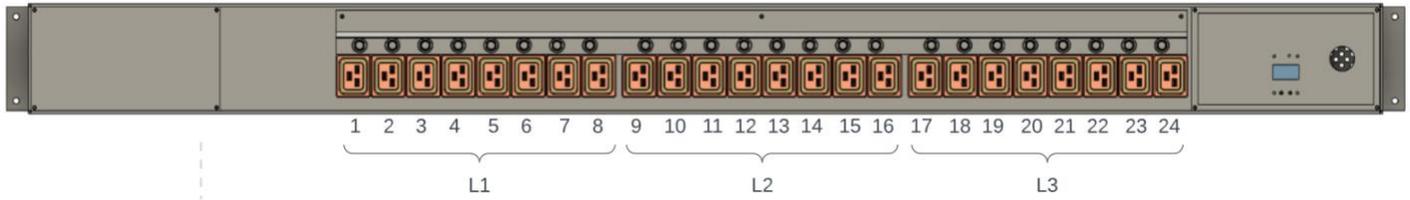
General features/notes

1. The PDU automatically schedules relay on/off to prevent imbalance and reduce inrush. Only one outlet at a time is turned on/off, even when all the outlets are requested to turn on/off at the same time. Also, if multiple outlets are requested to turn on/off at the same time, the PDU will automatically schedule the outlets switching so the operations are evenly distributed across phases, to prevent an imbalance.

2. When the PDU powers up, the default is to turn all relays on. Future software versions will have a setting to control this.

3. Time from powerup to when the software becomes active (boot time) is about 30s.

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LCD Display

The PDU has an LCD display for viewing status:
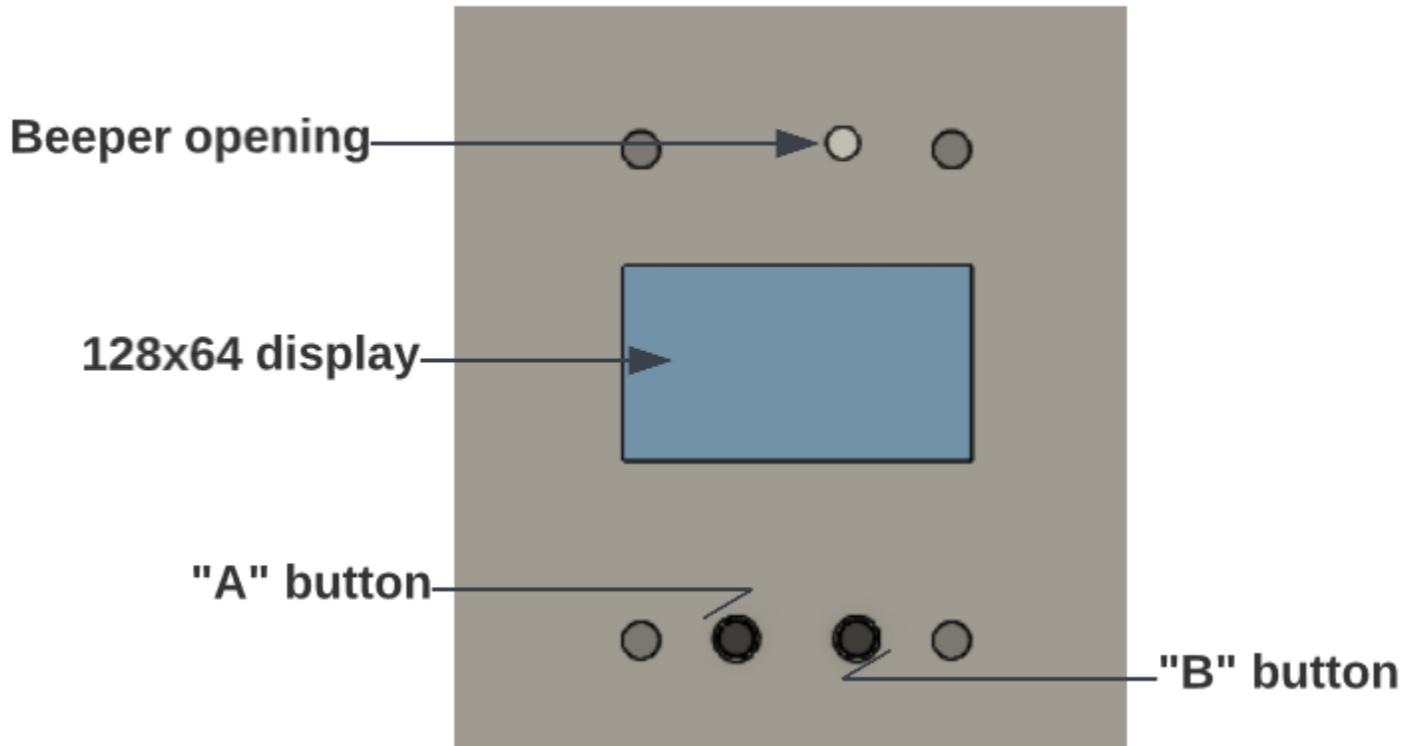
Display menu navigation

For this version of software, the B button is inactive. The A button is used to cycle between three different information screens

```
RUNTIME 1
  114V 41C
L1:100A L2:100A
L3:110A  N: 10A
```

↓ A

```
RELAY STATE
1-8:   0000 1000
9-16:  1111 1111
17-24:1111 1111
```

↓ A

```
INFORMATION
SPDU VRNS A1.12
HOSTNM:PDUA032C1
192.168.001.043
```

↓ A
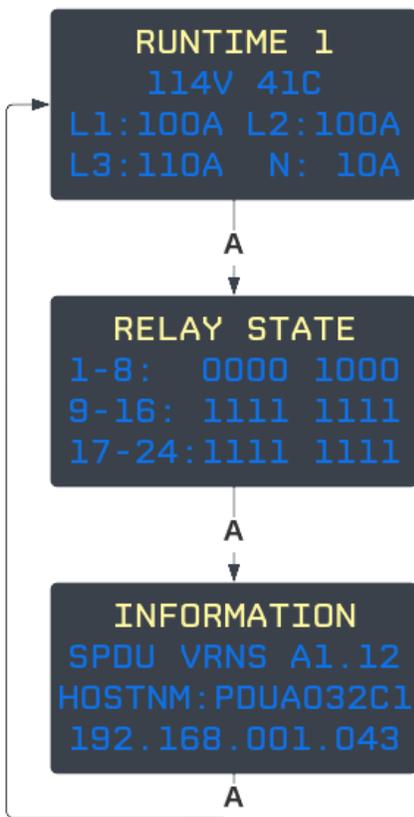
The RUNTIME 1 screen shows:

Line voltage (measured on L3)

CPU temperature in degrees C

RMS current of L1, L2, L3 and N lines

The RELAY STATE shows the current state of the outlet's control relay. A '1' means the relay is energized and the outlet is on. The example shows outlet 5 and 9-24 are turned on, the rest are off.

The INFORMATION screen shows:

Software version

Hostname. This same name is published via avahi, and you can also use this name in the address bar of the web browser. The host name's last 6 digits are always the last 6 digits of the PDU's MAC

IPV4 address.

PDU communication

The PDU communicates via TCP/IP over 10M/100M Ethernet. On powerup, the PDU gets its IP address via DHCP. Be sure to have a DHCP server accessible to the PDU's network connection.

Device discovery

Once the PDU gets its IP configuration via the network's DHCP server, its IP address/web service can be discovered using the Bonjour/Avahi/mDNS service. You can also use the front panel display to obtain the PDU's IP address and hostname.

Web Interface
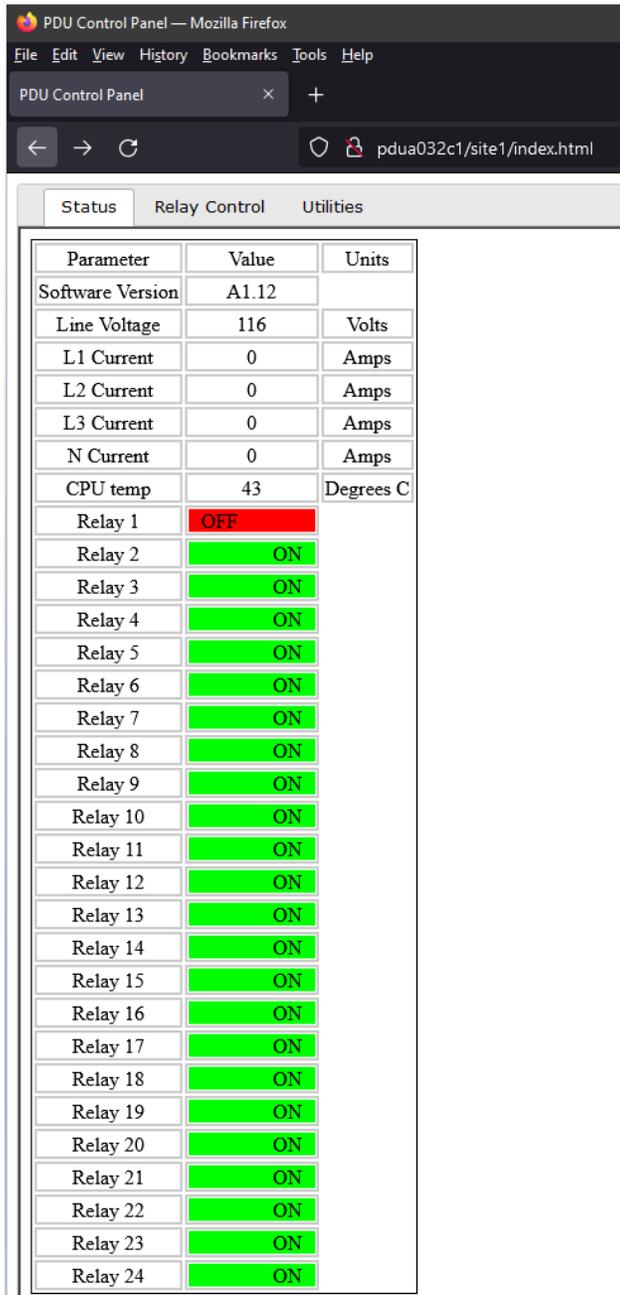
Parameter	Value	Units
Software Version	A1.12	
Line Voltage	116	Volts
L1 Current	0	Amps
L2 Current	0	Amps
L3 Current	0	Amps
N Current	0	Amps
CPU temp	43	Degrees C
Relay 1	OFF	
Relay 2	ON	
Relay 3	ON	
Relay 4	ON	
Relay 5	ON	
Relay 6	ON	
Relay 7	ON	
Relay 8	ON	
Relay 9	ON	
Relay 10	ON	
Relay 11	ON	
Relay 12	ON	
Relay 13	ON	
Relay 14	ON	
Relay 15	ON	
Relay 16	ON	
Relay 17	ON	
Relay 18	ON	
Relay 19	ON	
Relay 20	ON	
Relay 21	ON	
Relay 22	ON	
Relay 23	ON	
Relay 24	ON	

The PDU hosts a web page. To access the web page, just type the IP address of the PDU into a browser e.g., *http://192.168.1.123*. Alternatively, you can use the hostname e.g., *http://PDUA032C1*

Once you type the address, the PDU will redirect to the proper page, in this case, site1/index.html

The status tab is shown and displays PDU status items as well as relay status.

This tab is "safe"- nothing on this tab can change the state of the PDU

The Relay Control tab lets you change the relay state- turn the outlets on/off. Pulse will turn the outlet off for 10s then back on automatically.

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The utilities tab just has a link to the updater site.

PDU Control Panel — Mozilla Firefox

File Edit View History Bookmarks Tools Help

PDU Control Panel   ×   +

← → C   pdua032c1/site1/index.html

Status   Relay Control   Utilities

utilities click here for software update portal
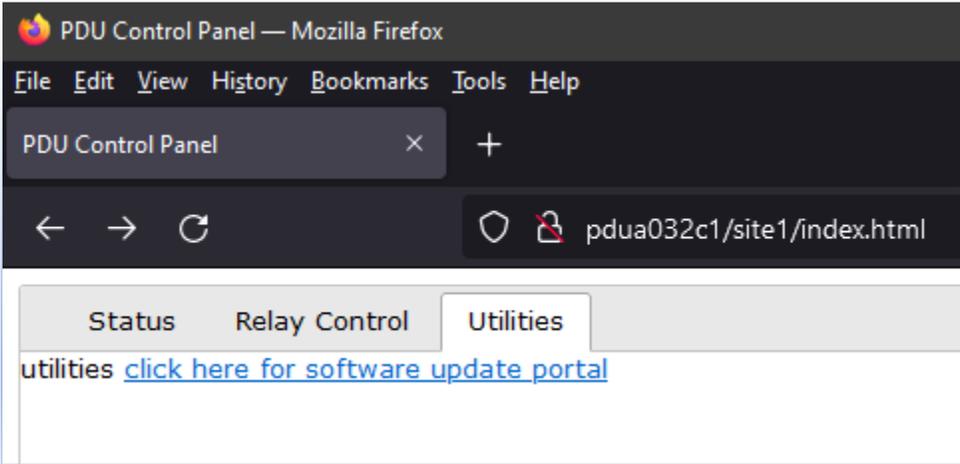
Use this page to update PDU software. The software packages are encrypted and signed, to prevent a user from uploading a file that isn't correct. This also prevents corrupt/damaged file from being used for updates as well.

PDU Update — Mozilla Firefox

File Edit View History Bookmarks Tools Help

PDU Update   ×   +

← → C   pdua032c1/updater/index.html

Browse... No file selected.   Update
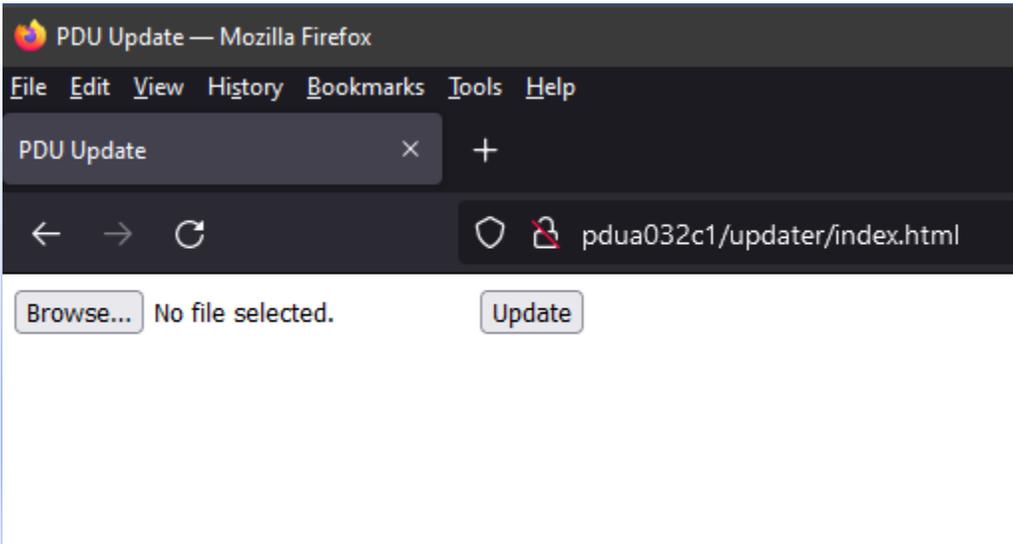
API

The PDU has an endpoint at http:<IP>/site1/cgi-bin/cmd.pl

HTTP API endpoint information	
Endpoint URL	http:<IP>/site1/cgi-bin/cmd.pl
Endpoint type	HTTP POST
Request content type	application/x-www-form-urlencoded; charset=UTF-8
Request content/parameters	cmd:{JSON cmd data structure}
Response content type	text/html; charset=ISO-8859-1
Response content	JSON response data structure

To use, issue a HTTP post to the above URL, with a urlencoded parameter named "cmd", set to a urlencoded JSON string. The format of the JSON string is described below. The PDU will respond with a JSON string.

 Note: The comments (// and following text) are not valid JSON, the PDU will not accept them; the comments are there to describe the purpose of the JSON element.

JSON cmd data structure:

```
{
 "saystatus":true,      // if true, or omitted, response will contain "devicestatus" element
 "sayoutletdata":true, // if true, or omitted, response will contain "outletdata" element
 "events": [array of events] // optional. If present, will trigger all events listed, in order listed
}
```

Events

Events are used to trigger actions in the PDU software. Events are 64-bit (8-byte) numbers but are encoded as a string type in JSON, to allow for 0x prefix.

General format for relay control events:

MS Byte [D63..D56]							LS Byte [D7..D0]
0	Relay action 0=turn off 1=turn on 2=pulse (off for 10s then back on)	Relay bitmask D47 is relay 48, D0 is relay 1. If the bit in the relay's position is 1, the action is performed					

Examples:

Turn on relay 1: {"events": ["0x00000000000001"]} or simply {"events": ["1"]}

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Turn off relay 1: {"events": ["0x01000000000001"]}

Pulse relay 1: {"events": ["0x01000000000001"]}

Turn on relays 1-24: {"events": ["0x00000000FFFFFF"]}

JSON response data structure

```
{
 "devicestatus": {          // PDU status, not per outlet, is here
  "CPU_DEGC": "42",         // CPU temperature in degrees C
  "L1_AMPS": "0",           // Line 1 total current in Amps RMS
  "L2_AMPS": "0",           // Line 2 total current in Amps RMS
  "L3_AMPS": "0",           // Line 3 total current in Amps RMS
  "L3_VOLTS": "117",        // Line 3 RMS voltage
  "LN_AMPS": "0",           // Neutral line current in Amps RMS
  "SW_VERSION": "A1.12"     // SW version
 },
 "message": "",             // If command didn't succeed, the reason will be here
 "outletdata": [                       // Array of outlet data
    {"energized": true,"number": 1},    // Outlet status.
    {"energized": true,"number": 2},    //  If "energized" is true, outlet is on.
 ...   [21 elements omitted]            //  "number" indicates outlet number
    { "energized": true,"number": 24}
    ],
 "status": "OK"             // one of: "OK", "DENIED" , "PARTIAL" , "FAILED"
                            // OK: command succeeded in full
                            // DENIED: Not authorized to issue command
                            // PARTIAL: Some actions specified by the command were executed OK, some failed
                            // FAILED: All actions specified by the command failed
}
```

Note: The comments (// and following text) are not returned by the PDU; the comments are there to describe the purpose of the JSON element.