

Managed Power Distribution Unit

DMP-PDU-1-IP-MM-CC1420CC1316



Specification

General

Model	DMP-PDU-1-IP-MM-CC1420CC1316
Mains connectors	Input power: 2x IEC C14. Output power: 16x IEC C13
Ethernet interfaces	RJ45, 10MBit interface
Sensor interfaces ⁽¹⁾	Type "UA1A"; USB Type A socket (not compatible with standard USB devices)
Serial interfaces ⁽²⁾	The "Control Out" DB9 type "Serial Shift 1A" connector (not compatible with RS232) for Slave Modules
Buttons	The "Restore Factory Defaults" button
Security	The "Access Key" authentication; the Allowed Client IP restriction

Electrical

Mains	AC 220V
Power 1 In	Up to 10A
Power 2 In	Up to 10A
Outlets 1-8	Up to 10A total; up to 3A per outlet with inductive load, power factor $\cos=0.4$; up to 7A per outlet with resistive load (power factor $\cos=1$)
Outlets 9-16	Up to 10A total; up to 3A per outlet with inductive load, power factor $\cos=0.4$; up to 7A per outlet with resistive load (power factor $\cos=1$)

Physical

Dimensions	482.6 x 86 x 95 mm
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Warning 1: Do not plug any standard USB devices to the "Sensor" socket. For details please refer to the "Extensions" chapter.

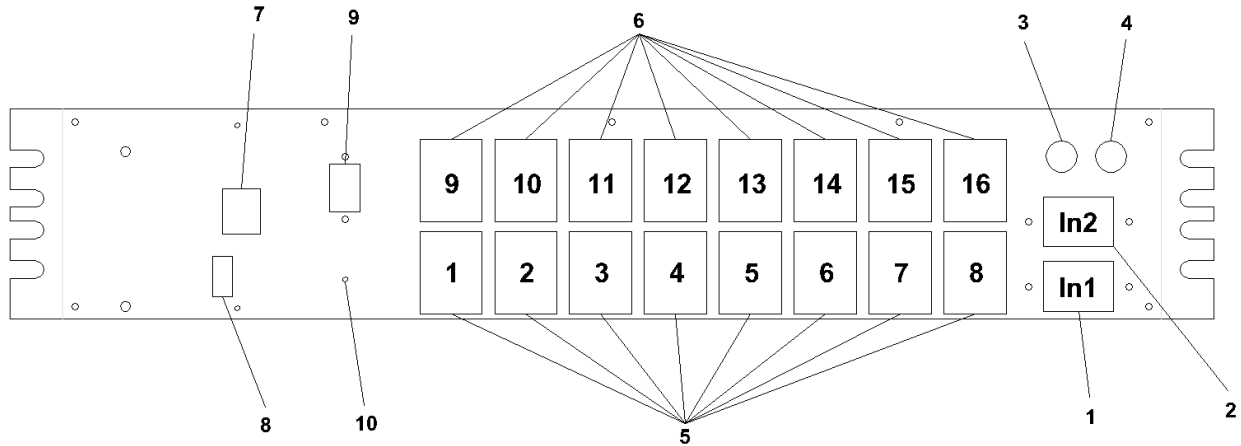
Warning 2: Do not plug any RS232 device to "Control Out" socket. For details please refer to the "Extensions" chapter.

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Product Overview

Front Panel:



Picture 1: front panel

1. “Power 1 In” connector. Provides power for internal electronics and outlets 1 to 8
2. “Power 2 In” connector. Provides power for outlets 9 to 16
3. “Fuse 1” for outlets 1 to 8
4. “Fuse 2” for outlets 9 to 16
5. Outlets 1 to 8
6. Outlets 9 to 16
7. Ethernet interface RJ45 connector
8. The “Sensor“ connector, type “UA1A”; USB Type A socket (not compatible with standard USB devices) ⁽¹⁾
9. The “Control Out” DB9 type “Serial Shift 1A” connector (not compatible with RS232) for Slave Modules ⁽²⁾
10. Hole with the “Restore Factory Defaults” button

Warning 1: Do not plug any standard USB devices to the “Sensor” socket. For details please refer to the “Extensions” chapter.

Warning 2: Do not plug any RS232 device to “Control Out” socket. For details please refer to the “Extensions” chapter.

Extensions

Temperature and/or Humidity Sensor

A temperature and/or humidity sensor can be connected to the “Sensor” socket. For details on receiving information from the sensor please refer to the “Receiving information from the sensor” chapter.

Features

- **Plug-and-play.** There is no need to configure the sensor. Just plug any supported sensor in the socket and the device will detect it within 5 seconds.
- **Hot-plugging.** A sensor can be connected and disconnected at any time - there is no need to restart the device.

Interface

Warning: Do not plug any standard USB devices to the “Sensor” socket. Please plug in only those devices which are:

- either explicitly stated to be compatible either in this documentation or in the documentation of the device in question
- or are being connected to type “UA1A” connector of the device manufactured by Digital Mind Projects.

Physical (connection)

The sensor uses a standard USB connection being used in personal computers.

Electrical

The sensor interface is NOT electrically compatible with the USB standard being used in personal computers. However, you CAN use a standard USB extension cable. Please note that the recommended maximum cable length from the Device to the sensor is 3 meters.

Software

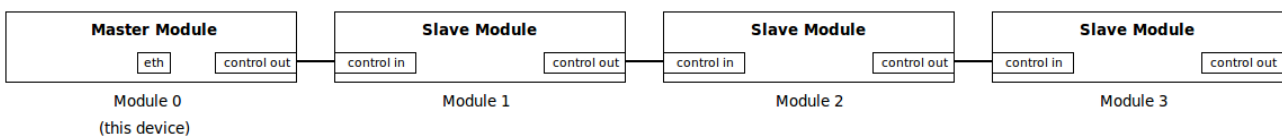
The sensor software interface is NOT compatible with the USB standard being used in personal computers.

Slave Modules

Warning: Do not plug any RS232 device to “Control Out” socket. Please plug only those devices which are:

- either explicitly stated to be compatible in this documentation
- or explicitly stated to be compatible in the documentation of the device in question
- or are being connected to “Control In” type “Serial Shift 1A” connector of the device manufactured by Digital Mind Projects.

This device can control up to 16 outlets. To extend this number you can connect more Slave Modules to this device. This device is referred as Master Module and has number 0. The Slave Module connected to “Control Out” connector of the Master Module has a number 1. Module connected to “Control Out” connector of Slave Module 1 has a number 2, and so on.



Picture 2: logical diagram - connecting several Modules

The software will allow you to have:

- up to 128 modules (including Master Module);
- up to 1024 outlets.

However, to have a stable operation we recommend to use up to 16 modules only.

Controlling the device

The device has an integrated web server through which the communication must occur. The web server listens on the standard port number 80. Only one client can be connected to the device at any given time.

Command interface

Communication with the device occurs using http GET method queries. You can use any TCP client (such as a web browser) for communication with the device. Please use the following syntax:

```
http://<device_ip>/[<command>[?<param_name>=<param_value>(&<param_name>=<param_value>)...]]
```

Refer to the “API of the Device” chapter for a reference of available commands, parameters and parameter values.

Graphical user interface

The Device does not have an integrated web GUI because of memory constraints. However, the web GUI can be hosted on one of your webservers running on your network. You have choices for setting up the web GUI:

- you can download from our website and use the GUI provided by us (note: the GUI is written in the popular PHP language);
- you can download from our website the API library (for PHP) and develop your own web GUI;
- you can use the device API reference and develop your web GUI completely from scratch in any programming language.

Security

The device uses two authentication mechanisms: the Access Key and Client IP Restriction.

For help on enabling/disabling authentication methods refer to the “Configuration” chapter.

Note: some improper combination of authentication settings may render device inaccessible. In that case you should restore factory default settings. For help on restoring factory default settings please refer to the “Configuration” chapter.

Access Key authentication

This authentication mechanism uses a secret string of characters called “Key”. The client is forced to include the parameter named „key“ in all queries. The clients who fail to do this receive the “Access Denied” message from the device.

The Key must contain 10 alphanumeric characters.

The Key can be changed. For description on how to change the Key please refer to chapter “Configuration”.

Please change the default Key value before running the device in the productional environment to avoid potential security issues.

Client IP Restriction

This authentication mechanism allows running queries from one IP address only, called “Allowed Client IP”. For description on how to change the Allowed Client IP please refer to the “Configuration” chapter.

API of the Device

Configuration

Factory Default Values

The device has the following default values:

Parameter	Value
Device IP	192.168.0.12
Allowed Client IP	192.168.0.5
Access Key	defaultkey
Authentication Method "Client IP Restriction"	1 (enabled)
Authentication Method "Access Key"	1 (enabled)

General Configuration

Changing the Device IP

Command: `deviceip`

Parameters:

Parameter name	Parameter value domain	Parameter description	Required
ip3	[0-255]	Byte 3 of new IP	Yes
ip2	[0-255]	Byte 2 of new IP	Yes
ip1	[0-255]	Byte 1 of new IP	Yes
ip0	[0-255]	Byte 0 of new IP	Yes

Result: OK\n

Example. Change the Device IP from 192.168.0.12 to 192.168.0.13:

<http://192.168.0.12/deviceip?ip3=192&ip2=168&ip1=0&ip0=13&key=defaultkey>

Changing the Allowed Client IP

Command: `clientip`

Parameters:

Parameter name	Parameter value domain	Parameter description	Required
ip3	[0-255]	Byte 3 of new IP	Yes
ip2	[0-255]	Byte 2 of new IP	Yes
ip1	[0-255]	Byte 1 of new IP	Yes
ip0	[0-255]	Byte 0 of new IP	Yes

Result: OK\n

Example. Set the Allowed Client IP to 192.168.0.6:

<http://192.168.0.12/clientip?ip3=192&ip2=168&ip1=0&ip0=6&key=defaultkey>

Changing the Access Key

Command: `key`

Parameters:

Parameter name	Parameter value domain	Parameter description	Required
<code>newkey</code>	10 alphanumeric characters	The value of new access Key	Yes

Result: OK\n

Example #1. Change the access Key from “defaultkey” to “mykey12345”:

`http://192.168.0.12/key?newkey=mykey12345&key=defaultkey`

Enabling/disabling Authentication Method “Allowed Client IP”

Command: `authmclip`

Parameters:

Parameter name	Parameter value domain	Parameter description	Required
<code>value</code>	0 or 1	0 to disable this authentication method; 1 to enable.	Yes

Enabling/disabling Authentication Method “Access Key”

Command: `authmkey`

Parameters:

Parameter name	Parameter value domain	Parameter description	Required
<code>value</code>	0 or 1	0 to disable this authentication method; 1 to enable.	Yes

The configuration of Slave Modules

You must indicate what Slave Modules are connected to the device (if any).

The “Size” parameter

When configuring the Slave Modules you have to provide the number of outlets on each module using the “size” parameter. The Size parameter should be:

- 1 – if the Module has from 1 up to 8 outlets;
- 2 – if the Module has from 9 up to 16 outlets;
- 3 – if the Module has from 17 up to 24 outlets;

etc. The Size value for Module with n outlets is: $\text{ceil}(n/8)$.

The “Flags” parameter

The “flags” parameter indicates various properties of the Module. The value domain of the “flags” parameter is higher 6 bits of a byte.

For the “flags” parameter value please consult the documentation of the particular Slave Module being added.

Adding a Slave Module to the end

Command: `addmodule`

Parameters:

Parameter name	Parameter value domain	Parameter description	Required
size	[1-4]	The size of the Module to be added	Yes
flags	[0-255] & 0b11111100	The flags of the Module to be added	Yes

Inserting a Slave Module in a particular location

Command: `insertmodule`

Parameters:

Parameter name	Parameter value domain	Parameter description	Required
at	[1-127]	The location where the Module should be inserted	Yes
size	[1-4]	The Size of the Module to be added	Yes
flags	[0-255] & 0b11111100	The flags of the Module to be added	Yes

Deleting the last Slave Module

Command: `cropmodule`

Deleting a particular Slave Module

Command: `deletemodule`

Parameters:

Parameter name	Parameter value domain	Parameter description	Required
at	[1-127]	Which Module should be deleted	Yes

Changing the Size parameter of a Slave Module

Command: `changemodulesize`

Parameters:

Parameter name	Parameter value domain	Parameter description	Required
at	[1-127]	Which Module should be modified	Yes
size	[1-4]	The new Size of the Module	Yes

Changing the Flags parameter of a Slave Module

Command: `changemoduleflags`

Parameters:

Parameter name	Parameter value domain	Parameter description	Required
at	[1-127]	Which Module should be modified	Yes
flags	[0-255] & 0b11111100	The new Flags of the Module	Yes

Getting the number of configured Modules

Command: `modulecount`

Getting the list of configured Modules

Command: `listmodules`

Returns the list in the following format:

[<module_0_size>[,<module_1_size>(<module_n_size>)...]].

Restoring Factory Defaults

You may want to restore the factory default settings in some cases such as (but not limited to):

- you forget the Key;
- you accidentally set such IP addresses (Device IP and Allowed Client IP) that does not allow you to connect to the device in any way;
- you forget the IP address of the device.

To restore default factory settings, please engage the reset button. To avoid accidental resets, the reset button is located inside the device and can be accessed through a small hole located below the “Control Out” connector. To engage the reset button, please use a sharp object such as a needle.

Controlling and Querying Outlets

Receiving the status of an outlet

Command: `outletstatus`

Parameters:

Parameter name	Parameter value domain	Parameter description	Required
module	[0-127]	The Module number	Yes
outlet	[1-256]	The outlet number on the Module	Yes

Result on success: `OK\n<bit>`

Where <bit> is “1” if outlet is powered on and “0” otherwise.

Result on failure: `ER\n<errorcode>`

Example #1. Get the status of outlet 14 of the Master Module:

`http://192.168.0.12/outletstatus?module=0&outlet=14&key=defaultkey`

Receiving the status of all outlets of a module

Command: `modulestatus`

Parameters:

Parameter name	Parameter value domain	Parameter description	Required
module	[0-127]	Module number	Yes

Result: `OK\n<bitstream>`

Where <bitstream> is a group of ones and zeros each one representing (refer to “receiving the status of an outlet”) the status of a corresponding outlet. The leftmost digit represents the outlet with the biggest number on the Module. The rightmost digit represents the outlet number 1 on the Module.

Result on failure: `ER\n<errorcode>`

Example #1. Get the status of all outlets of the Master Module:

`http://192.168.0.12/modulestatus?module=0&key=defaultkey`

Switching an outlet

Command: `switchoutlet`

Parameters:

Parameter name	Parameter value domain	Parameter description	Required
module	[0-127]	The Module number	Yes
outlet	[1-256]	The outlet number on the Module	Yes
value	0 or 1	0 to power off, 1 to power on.	Yes

Result on success: `OK\n`

Result on failure: `ER\n<errorcode>`

Example #1. Power off outlet 14 of the Master Module:

`http://192.168.0.12/switchoutlet?module=0&outlet=14&value=0&key=defaultkey`

Example #2. Power on outlet 14 of the Master Module:

`http://192.168.0.12/switchoutlet?module=0&outlet=14&value=1&key=defaultkey`

Example #3. Power on outlet 5 of the Slave Module connected directly to the Master Module:

`http://192.168.0.12/switchoutlet?module=1&outlet=5&value=1&key=defaultkey`

Sensor information

Receiving information from the sensor

Command: `environment`

Result when no sensor found: `OK\nNA`

Result when the temperature sensor found: `OK\nt=<t_value><t_units> rh=NA`

Result when the temperature and humidity sensor found: `OK\nt=<t_value><t_units> rh=<rh_value>%`

Information on symbols:

- `<t_value>` is a temperature value read from sensor. Type – float (with “.” as a decimal separator).
- `<t_units>` units of the temperature value: “C” for celsius; “F” for fahrenheit.
- `<rh_value>` is a relative humidity value (with “.” as a decimal separator) read from sensor. Type - integer.

Example #1. Result when no sensor found:

OK NA

Example #2. Result when temperature sensor found:

OK t=23.2C rh=NA

Example #3. Result when temperature and humidity sensor found:

OK t=24.3C rh=42%

Error codes

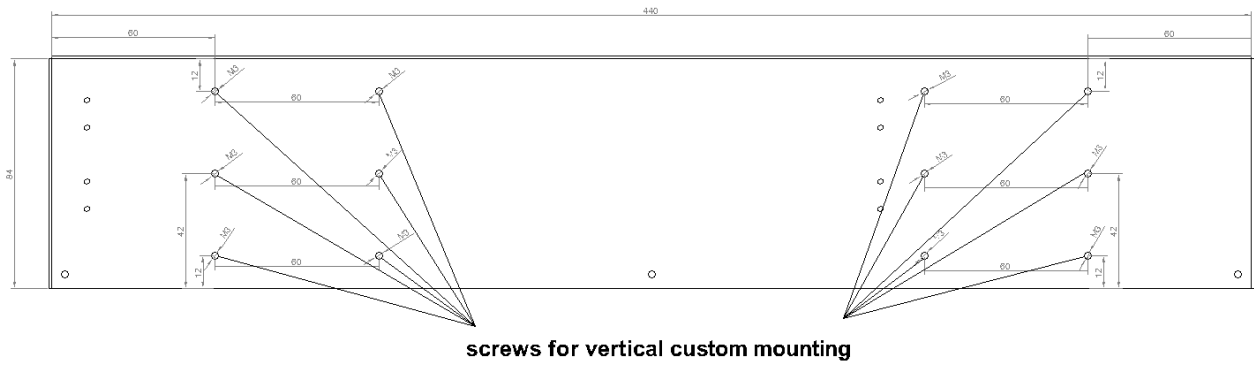
The list of error codes:

- 1: parameter “module” is out of range
- 2: parameter “outlet” is out of range for the module
- 3: memory block for configuration of modules is full

- 4: outlet is not powered on
- Master Module (this device) can not be modified

Mounting

The device has been designed primarily for horizontal mounting in 19 inch rack and takes 2U space. However, there are 12 additional M3 screws at the backside of the device for nonstandard vertical mounting (known as “Zero U”).



Picture 3: backside - position of the screws for vertical mounting

Maintenance

Changing fuses

The fuse sockets are located in the front panel. Refer to the “Product Overview” chapter for a location.

Fuse 1: 20A, 5x20mm

Fuse 2: 20A, 5x20mm