

pdu guide

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Registration Number: 04630774

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Introduction

Spook are leaders in managed server room power and environmental monitoring.

We are pleased to present our complete range of power distribution units manufactured to the highest standards. PDU's are available as stand alone units or integrated into our leading Spook Console Application Software; simply look for the logo  for compatible devices.

| | LAN Attached Unit | Local LCD Display | Spook Console Ready | Remote GUI Interface | Remote Kwh Output | Remote Volts Output | Remote Amps Output | Remote Watts Output | Remote Apparent Power | Remote Real Power | Remote Power Factor | Remote Socket Switching | Remote Socket Monitoring |
|------------------------------------|-------------------|-------------------|---------------------|----------------------|-------------------|---------------------|--------------------|---------------------|-----------------------|-------------------|---------------------|-------------------------|--------------------------|
| Standard Power | | | | | | | | | | | | | |
| Local Monitoring | | ✓ | | | | | | | | | | | |
| Current Monitoring | ✓ | ✓ | ✓ | ✓ | | | ✓ | | | | | | |
| Power Monitoring | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| Power Management | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

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Quality Checked Construction

As part of ISO 9001-2000 accreditation every PDU is subjected to a rigorous multi-level electrical test before it leaves the manufacturing plant, meaning that you can trust our quality products.

Each unit is inspected to ensure 100% integrity and quality of finish. All units are individually tested and issued with their own unique serial number allowing complete audit status. With notification of the serial number we can tell who wired the unit and when it was made, tested and inspected. Test results are electronically retained and are available upon request.



Electrical acceptance testing

Part of our Quality Control process is to ensure continued shipping of the high quality PDU's that our customers expect. To achieve this we have implemented a testing system built by MK Test, who possess an excellent reputation in the field of automated electrical inspection.

It is through the use of MK Test's 'AutoMeg' system that we employ the same high testing standards as those widely adopted by both the aerospace and defence industries. The 'AutoMeg' system generates a PDU acceptance test report and a unique serial number for that individual PDU. This serial number is printed on a label attached to the PDU as well as archived with the assembly documents, and for additional security is backed up off-site. At any point in the future if a customer needs a duplicate unit, by providing the unique serial number we can track the unit back through testing and production to its original order form.



Continued →

Quality Checked Construction

Thermal acceptance testing

As the general demand for power increases so does the responsibility on manufacturers to maintain a high level of component quality and guaranteed design tolerances.

With all new product releases and key component changes, we apply the new components and PDU's as a whole, to a power/thermal acceptance test. Using the custom designed load-test bay at our production facility we expose both the components and the PDU to the maximum amount of power its rating allows. Using our in-house designed heat bank load test we can apply loads from 10Amp single phase 240V to 63Amps 3 phase 415V.

The thermal changes within the PDU are mapped over a period of time, enabling us to clearly see any effects of short, medium and long term exposure to the unit's maximum rated current. From the results we can determine with certainty that the components used in our PDU's will function safely during a long operation of the unit in the field, as well as helping to address cooling problems within the rack itself.



A PDU and its components are tested over a period of a day and will only pass if the components do not exceed 70% of their maximum rated operating temperature. A stress test is also applied to the PDU and its individual components by exposing the unit to an increase of 10-15% Amps beyond the PDU's rated capacity. The unit will only pass this test if components do not exceed 80% of their maximum operating temperature range over a period of four hours.

The final quality assessment involves random spot checks carried out on any PDU currently in production. As part of the ISO 9001-2000 procedures any number of PDU's can be checked for potential electrical, mechanical or aesthetic faults.

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Standard PDU's

A Standard PDU is the simplest method of distributing power to equipment installed within a computer cabinet. Standard PDU's have no in-built monitoring or remote control. Constructed and individually tested to the same high standards as all our products they form the backbone of our product range. All Spook PDU's are available to be customised with the following plug and cable options:

Any plug type – including:

- 16 Amp Commando Plug (BS4343, IEC60309)
- 32 Amp Commando Plug (BS4343, IEC60309)
- 63 Amp Commando Plug (BS4343, IEC60309)
- IP67 BS4343
- IEC C14 60320
- IEC C20 60320
- Schuko/French CEE 7-7
- Ackerman
- Britmac
- Electrax
- EPOS
- Nema 5-15
- Wieland
- Wago
- Starline
- Neutrik
- Non Standard Earth Pin
- BS 546
- Italian
- Swiss
- Danish

Any type of mains cable - including:

- LSOH
- CIDA FHMD Approved LSZH
- H07RNF
- PVC 3183Y
- Arctic Grade blue or yellow
- SWA
- YY
- Flexible Steel Conduit
- Braided
- Shielded
- High temperature heat proof
- CY
- YY LSOH
- Retractable Spiral
- Switched
- Monitoring
- Circuit protection
- Per socket circuit protection via fuse
- Any length or type of mains cable
- RFI filter 10A, 16A & 32Amp
- Branch circuit protection
- Surge protection

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Local Monitoring

Understanding what current is being drawn through a PDU is very important. If this is not known it is possible that a circuit breaker may trip or a fuse may blow should more equipment be added. Current draw cannot reliably be calculated from the information contained on equipment makers' plates. A local digital display ammeter is the most economical way of keeping track of the amount of current being drawn through a PDU and is a small price to pay for peace of mind.

POWER FACTOR

This is the ratio of Real Power to Apparent Power; the calculation of Volts RMS (Root Mean-Squared) and Amps RMS. By comparing values on the meter it is possible to determine how much energy is being provided against how much is being used. 1 = 100% and 0 = 0% efficiency.

AMPS

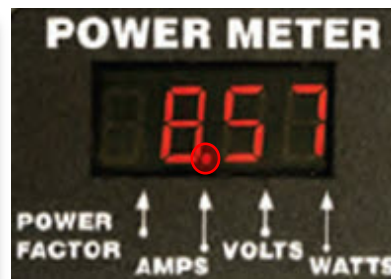
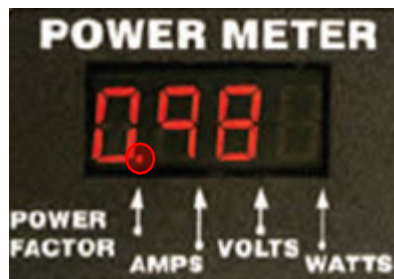
Displays current draw in Amps RMS, referring to a complex calculation involving the volts and amps over a period of time, determining how power is consumed by the devices on a circuit.

VOLTS

Displays Voltage RMS. Volts represent a standard measure of electricity potential which is a fixed value for every circuit, measured with respect to a reference point, most usually between the two respective legs of the circuit.

WATTS

Displays power in Watts RMS. Its value is recorded by the integration of instantaneous Volts and instantaneous Current, referred to as **Real Power**; the RMS value of Watts. When divided by **Apparent Power**, it provides a measurement of the efficiency of power usage on a circuit.



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Network and SNMP Configuration

Each PDU has an in-built Web Server providing an IP address/Subnet and Gateway. The SNMP configuration allows a custom SNMP Read & Trap community address to be used.

**Configuration
Network Settings**

DHPC Enabled:

IP Address:

Subnet Mask:

Gateway:

MAC Address:

Save Changes

Read Community:

Trap IP Addresses:

Trap Community:

Note: Leave trap IP address blank to disable traps

Save Changes

XML Output

The Remote Monitoring - Current option also provides an XML data output. By using XML it is possible to easily integrate the units reporting into 3rd party programs and applications such as the Spook Console Application software, SQL databases, RSS feeds or any kind of application that can read and parse XML.

All Single/3-Phase / per-outlet readings are detailed out in XML to 2 decimal places giving a higher resolution than SNMP. Details of the PDU and its status are also provided via XML so that the entire PDU can be embedded into a database / real-time reporting software.

```
<?xml version="1.0" ?>
- <server host="EM8 PDU 8" address="192.168.111.123" address-backup="192.168.123.123"
name="EM8/G6" version="2.91" pversion="4.02" mac-address="00:40:9D:24:04:B2" datetime="(NTP
server unavailable)" company="Spook Limited" company-url="http://spook.co.uk" support-
email="support@spook.co.uk" support-phone="+44 (0) 845 2000 751" console-id="wxg" buzzer="0"
tempunit="C">
- <devices>
- <device id="20A8BA04000000EE" name="EM8 PDU" type="em8_g6" available="1" index="0">
<field key="Circuit1" value="1.06" niceName="Amps Circuit 1" min="0" max="30" type="2" />
<field key="Circuit2" value="0.84" niceName="Amps Circuit 2" min="0" max="30" type="2" />
<field key="Circuit3" value="1.26" niceName="Amps Circuit 3" min="0" max="30" type="2" />
<field key="Circuit4" value="1.80" niceName="Amps Circuit 4" min="0" max="30" type="2"/>
<field key="Circuit5" value="2.00" niceName="Amps Circuit 5" min="0" max="30" type="2" />
<field key="Circuit6" value="2.00" niceName="Amps Circuit 6" min="0" max="30" type="2" />
</devices>
</device />
- <alarms>
<alarm device-id="20A8BA04000000EE" field="Circuit1" em-trip"1" em-warn"0" enabled="2"
status="clear" cid="1"/>
<alarm device-id="20A8BA04000000EE" field="Circuit1" em-trip"0" em-warn"0" enabled="2"
```

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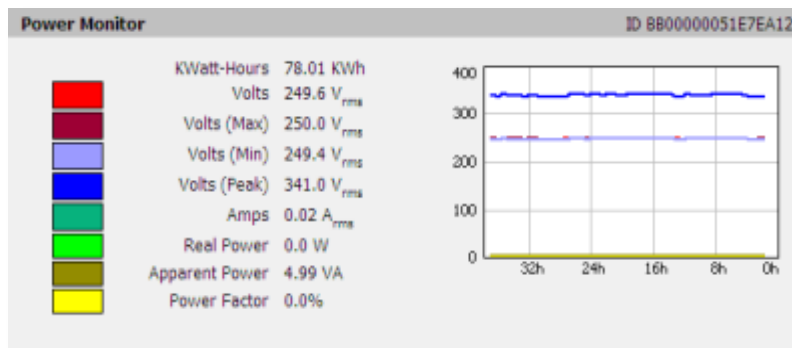
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Data common to all LAN devices



Data Management

Within each PDU is an internal log that provides detailed history of every aspect of the PDU. This data can be viewed in graphical format via the GUI where the user can select which individual readings they wish to view. The detailed log is also exported in .CSV file format for manual inclusion in 3rd party spreadsheets and data-bases.



| Power Monitor | | ID B800000051E7EA12 | | |
|----------------|------------------------|---------------------|-----------|----------------|
| Sensor | Current | Low Trip | High Trip | Alarm State |
| Volts | 249.9 V _{rms} | 0 | 300 | Send E-Mail |
| Volts (Max) | 250.1 V _{rms} | 0 | 300 | Send SNMP Trap |
| Volts (Min) | 249.6 V _{rms} | 0 | 300 | Send SNMP Trap |
| Volts (Peak) | 341.1 V _{rms} | 0 | 450 | Send SNMP Trap |
| Amps | 0.02 A _{rms} | 0 | 30 | Send SNMP Trap |
| Real Power | 0.0 W | 0 | 9000 | Send SNMP Trap |
| Apparent Power | 5.00 VA | 0 | 9000 | Send SNMP Trap |
| Power Factor | 0.0% | 0 | 100 | Disabled |

Do not send alarms when sensors become unplugged: Enabled

Save Changes

Alarms & Reporting

Every sensor can have a High & Low trip threshold alarm assigned, which can report to any one of five email addresses, two SNMP Management software systems and a local rack based audio/visual alarm. This ensures that the relevant alarms go to the right people. Sensors that breach their threshold will simultaneously report via Email, SNMP and locally. The alarm will continue until the issue is resolved and the alarm reset.

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Alarms: There are 3 types of alarms:

- Trip – High/Low threshold has been reached
- Clear – The Sensor has returned to its nominal operating threshold
- Unplugged – The Sensor has been disconnected or an error has occurred

| SNMP | |
|----------------------------------|-----------|
| SNMP Service: | Enabled ▼ |
| Read Community: | Public |
| Listen Port for GET: | 101 |
| Trap Community: | Private |
| Write Community: | Private |
| Trap Type: | V1 Trap ▼ |
| Trap IP Address: port 1: | |
| Trap IP Address: port 2: | |
| Save Changes | |
| Initial SNMP3 data | |
| Unauthenticated User: | Initiated |
| Authenticated Manager: | Manager |
| Manager Authentication Password: | 123456789 |
| Manager Privacy Password: | 123456789 |
| Trap User: | Trap |
| Trap Authentication: | 123456789 |

SNMP

The PDU supports the retrieval of information using SNMP v1 and v2. Support for two IP addresses for SNMP Traps is included allowing either redundancy or split monitoring systems to be supported.

Each unit comes complete with MiB built into the GUI, so no additional software is required to make the PDU fully operational.

SNMP v3 is also supported to enable fully secured access to the PDU and all its functions. Each PDU can also have embed-

| E-mail | |
|------------------------|-----|
| SMTP Server: | |
| SMTP Port: | 25 |
| "From" E-mail Address: | |
| To e-mail Address 1: | |
| To e-mail Address 2: | |
| To e-mail Address 3: | |
| To e-mail Address 4: | |
| To e-mail Address 5: | |
| POP3 Server: | |
| POP3 Port: | 110 |
| User Name: | |
| Password: | |
| Save Changes | |

SMTP and POP 3 Integration

Assigning multiple email addresses to Threshold alarms ensures that the information reaches the right people. Alarms on Power can be separated from Environmental Alarms. Critical PDU issues can also be separated from non-critical alarms.

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Diagnostics and Continuity of Service

Each PDU provides feedback on its status via a Syslog report. Using this report it is possible to diagnose issues concerning up to 21 separate operational components of the PDU.

Syslog

Facility:

Daemon Address:Port 1:

Syslog Configuration

| Subsystems: | Severity: | | | | | | | |
|-------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | emergency: | alert: | critical: | error: | warning: | notice: | inform: | debug: |
| os | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| lwip | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| socket | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| macphy | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| flashfl | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| webserv | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Access Security

Access security to the PDU is split into three levels, each with a unique username and password:

- **Viewer** – View readings only. No configuration
- **User** – Configure alarms, logging and reporting
- **Administrator** – Full access and configuration rights

Network Security

An SSL certificate can be used to ensure that access is limited to authorised terminals / servers via a certificate and private key. Access to the Web browser can also be allowed through HTTPS only.

PDA /Phone Access

Remote viewing of the status of the PDU is available through a PDA compatible web page built into each PDU. A custom template is integrated to allow easy and quick viewing of all Power and Environmental readings. For speed of access, it is possible to disable detailed images such as graphs and integrated IP camera feeds.



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Current Monitoring

Remote PDU Current Monitoring is the most cost-effective way to integrate PDU's into an automated NMS/BMS solution for remote monitoring and logging of rack Current usage. The unit incorporates a Local Digital Display showing the Current Draw of either the Single or 3 Phase Supply.

Remote Monitoring of Current comes in 3 different forms:

- Single Phase Current Monitoring
- 3 Phase Current Monitoring
- Per Socket Current Monitoring (Single & 3 Phase)



Single Phase Current Monitoring

The overall PDU Current draw is shown on the integrated digital display.

Total Amps

| | | |
|-----------|------|----------|
| Circuit 1 | 1.07 | Phase L1 |
| Circuit 2 | 0.92 | Phase L2 |
| Circuit 3 | 0.89 | Phase L3 |
| Circuit 4 | 0.76 | Neutral |

3-Phase Current Monitoring

Remote Current Monitoring is also available for 3 Phase PDU's.

Monitoring is provided each individual Phase and the Neutral to help the process of load-balancing.



3 Phase In-Line Current Monitor

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Current Monitoring

The Remote 3-Phase Current Monitoring provides SNMP Traps for Warning and Critical alerts to NMS / BMS, plus simultaneous XML output for integration into a SQL/Database application for cost-saving or revenue analysis.

Per Socket Current Monitoring

This solution is ideal for applications that require high resolution Current Monitoring. It allows monitoring of the overall PDU Current draw as well each individual socket, and is available for both Single & 3-Phase PDU's. Each socket has a unique 'Friendly Name' that provides easy identification in the HTML page as well as SNMP and XML output.

| Total Amps | | |
|------------|------|----------------|
| Circuit 1 | 1.07 | Amps Circuit 1 |
| Circuit 2 | 0.92 | Amps Circuit 2 |
| Circuit 3 | 0.89 | Amps Circuit 3 |
| Circuit 4 | 0.76 | Amps Circuit 4 |
| Circuit 5 | 1.02 | Amps Circuit 5 |
| Circuit 6 | 0.95 | Amps Circuit 6 |
| Circuit 7 | 0.80 | Amps Circuit 7 |
| Circuit 8 | 0.79 | Amps Circuit 8 |

| | Warning | Alarm |
|-----------|---------|-------|
| Circuit 1 | 8 | 10 |
| Circuit 2 | 6 | 8 |
| Circuit 3 | 8 | 10 |
| Circuit 4 | 12 | 14 |
| Circuit 5 | 10 | 12 |
| Circuit 6 | 8 | 10 |

SNMP Alarms

Both SNMP Warning & SNMP Alarms can be configured for every monitored circuit. Alarms are sent via an SNMP trap to a user-configured Server.

PDU and per Outlet Names

Each PDU and each monitored circuit can be given a unique 'Friendly Name'. These names are reflected throughout the GUI as well as the SNMP and XML output.

| Friendly Names | |
|---------------------|---------------------|
| Unit Name | Server Rack #14 |
| Unit Location | Machine Room B |
| Admin Account | ben.timms@abc.co.uk |
| Save Changes | |
| Circuit 1 | Blade Server #1 |
| Circuit 2 | Blade Server #2 |
| Circuit 3 | Switch #1 |
| Circuit 4 | NAS Array |
| Circuit 5 | Exchange #1 |
| Circuit 6 | MySQL#1 |
| Save Changes | |

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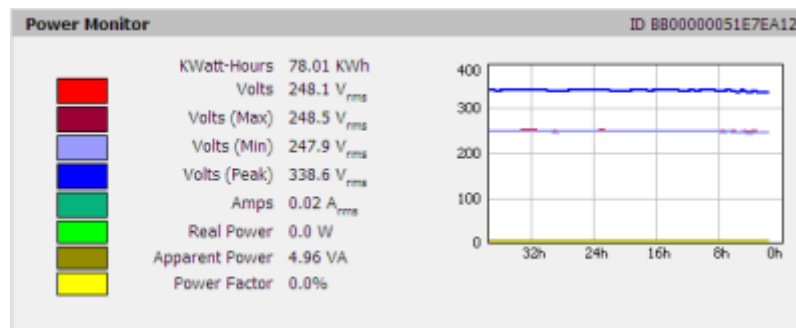
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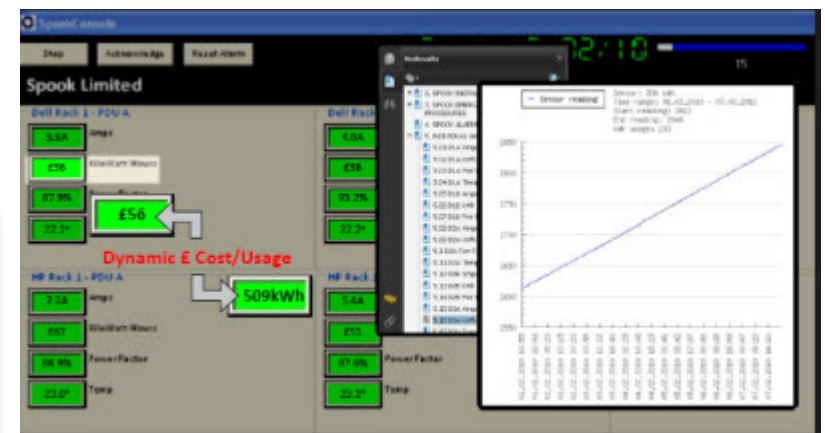
Remote Power Monitoring provides the end user with valuable data regarding the state of the rack. Each PDU comes with a full range of monitoring and reporting tools as well as optional external environmental sensors. This enables end users to scale their PDU architecture to include full power and environmental monitoring at rack level through a single interface. Each PDU comes with two external sensor ports that can be expanded to a total of 17 sensor ports.

Monitor, log and report on multiple power readings as well as accumulative KWh's. All readings can be assigned high/low thresholds and linked to automated alarms which operate if a threshold is exceeded.



PDU Power Monitoring

- KWh
- Volts
- Amps
- Watts
- Apparent Power
- Real Power
- Power Factor



When integrated into Spook's Console Application software, the KWh metric alternates between KWh usage and cost (Month-to-date).

The KWh usage is also charted on the Spook Weekly Management Report.

Note: Information contained on this page applies to Spook Power Monitoring PDU's and Power Management PDU's.

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
















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Power Monitoring

3-Phase Power Monitoring

As with Single Phase power monitoring, 3-Phase Power Monitoring provides a full complement of readings. With the demands of power consumption increasing, the move has been to branch into 3-Phase power distribution at the rack level. All features are available in both Single Phase and 3-Phase.

The PDU will individually log, report and alert on all readings on any phase, giving complete visibility of the condition and 3-Phase power supply in the rack.

| | |
|---|--------------------|
|  | KWatt-Hours [A] |
|  | Volts [A] |
|  | Volts (Peak) [A] |
|  | Amps [A] |
|  | Amps (Peak) [A] |
|  | Real Power [A] |
|  | Apparent Power [A] |
|  | Power Factor [A] |
|  | KWatt-Hours [B] |
|  | Volts [B] |
|  | Volts (Peak) [B] |
|  | Amps [B] |
|  | Amps (Peak) [B] |
|  | Real Power [B] |
|  | Apparent Power [B] |
|  | Power Factor [B] |
|  | KWatt-Hours [C] |
|  | Volts [C] |
|  | Volts (Peak) [C] |
|  | Amps [C] |
|  | Amps (Peak) [C] |
|  | Real Power [C] |
|  | Apparent Power [C] |
|  | Power Factor [C] |
















Note: Information contained on this page applies to Spook Power Monitoring PDU's and Power Management PDU's.



Hybrid Power and Environmental Overview

Sensors for both power and environmental conditions are built into our hybrid PDU's and can be linked to both automated and manual alarm/reporting systems, ensuring continual rack status visibility.

In addition to the internal sensors, it is possible to add further external sensors such as temperature, humidity, water ingress, smoke, UPS* Status and generator* status. *Subject to voltage free contacts being available.

| | | | |
|---|-------------------|------------------------|--------------------------|
|  | Temperature [C] | 33.1°C | |
|  | Relative Humidity | 36% | |
|  | Light Level | 96 | 0: dark - 100: bright |
|  | Air Flow | 28 | 20: still - 100: rushing |
|  | Sound Level | 17 | 0: quiet - 99: loud |
|  | IO-1 | 99 | 0.0: vdc - 99: vdc |
|  | IO-2 | 99 | 0.0: vdc - 99: vdc |
|  | IO-3 | 99 | 0.0: vdc - 99: vdc |
|  | Volts | 117 V _{rms} | |
|  | Volts (Peak) | 128.4 V _{rms} | |
|  | Amps | 0.0 A _{rms} | |
|  | Amps (Peak) | 0.0 A _{rms} | |
|  | Real Power | 0.0 watts | |
|  | Apparent Power | 0.0 watts | |
|  | Power Factor | 100.0% | |

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Power Management - to socket level

Remote Power Management provides the end user with similar information as with Remote Power Monitoring but with the added functionality of monitoring and management to individual socket level. Each PDU comes with two external sensor ports that can be expanded to a total of 17 sensor ports.

Note: Information contained in the Power Monitoring section applies to Power Management

Remote Socket Management:

- Sequential Start-up – program individual time delay for each socket
- Socket status memory. Reboot at 'Last State', On or Off after power cycle
- Remote On/Off and Reboot per socket and in user configured groups
- Individual Socket Time Delay On/Off (1 second – 9999999 seconds)
- Internal diagnostics to confirm socket has performed its switching task
- Automated control of outlets via secure SNMP as part of a wider automated BMS solution.

| | Outlet | Name | Status |
|--------------------------|--------|----------|------------|
| <input type="checkbox"/> | 1 | Outlet 1 | Re-booting |
| <input type="checkbox"/> | 2 | Outlet 2 | On |
| <input type="checkbox"/> | 3 | Outlet 3 | On |
| <input type="checkbox"/> | 4 | Outlet 4 | Off |
| <input type="checkbox"/> | 5 | Outlet 5 | On |
| <input type="checkbox"/> | 6 | Outlet 6 | Off |
| <input type="checkbox"/> | 7 | Outlet 7 | On |
| <input type="checkbox"/> | 8 | Outlet 8 | Re-booting |

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Configure a sequential start-up for each socket with individual time delays.

| Outlet | Name | Delay (seconds) | Action | | |
|--------|----------|--------------------------------|----------------------------------|----------------------------------|----------------------------------|
| | | | Off | On | Last |
| 1 | Outlet 1 | <input type="text" value="1"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> |
| 2 | Outlet 2 | <input type="text" value="1"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> |
| 3 | Outlet 3 | <input type="text" value="1"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> |
| 4 | Outlet 4 | <input type="text" value="0"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 5 | Outlet 5 | <input type="text" value="1"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> |
| 6 | Outlet 6 | <input type="text" value="0"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> |
| 7 | Outlet 7 | <input type="text" value="1"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 8 | Outlet 8 | <input type="text" value="0"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> |

All sockets also remember their 'Last State' to enable the PDU to power up only those sockets that were last used and not the complete PDU.

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Each socket can also be given a delayed On/Off time if they are required to power up or down sequentially; a very important feature for equipment required to boot up/re-boot in the correct sequence.

Per Outlet Monitoring

Advanced per-outlet monitoring is a feature of Remote Power Managed PDU's requiring the highest resolution possible in the rack.

Per socket Amps, Watts and KWh is available as well as Voltage.

| Outlet | Name | Delay (seconds) | | |
|--------|----------------|-----------------|-----------|--------|
| | | Power-On | Power-Off | Reboot |
| 1 | Exch Server | 30 | 0 | 0 |
| 2 | Network Switch | 1 | 0 | 0 |
| 3 | Outlet 3 | 0 | 0 | 0 |
| 4 | Outlet 4 | 0 | 0 | 0 |
| 5 | Outlet 5 | 0 | 0 | 0 |
| 6 | Outlet 6 | 0 | 0 | 0 |
| 7 | Outlet 7 | 0 | 0 | 0 |
| 8 | Outlet 8 | 0 | 0 | 0 |

| Group A | | 235.00V | 12:30 A _{rms} | | | |
|-------------------------------------|------------------|---------|------------------------|-------|-------|-----|
| <input type="checkbox"/> | Outlet Name | Status | A _{rms} | Kwh | Watts | URL |
| <input type="checkbox"/> | 1 Exch Server | On | 0.00 | 0.001 | 0 | |
| <input type="checkbox"/> | 2 Network Switch | On | 0.00 | 0.000 | 0 | |
| <input checked="" type="checkbox"/> | 3 ADSL1 | On | 4.10 | 5.163 | 957 | |
| <input checked="" type="checkbox"/> | 4 ADSL2 | On | 0.00 | 0.205 | 0 | |
| <input type="checkbox"/> | 5 FileServer | On | 4.10 | 0.382 | 965 | |
| <input type="checkbox"/> | 6 Spare | Off | 0.00 | 0.000 | 0 | |
| <input type="checkbox"/> | 7 Spare | Off | 0.00 | 0.000 | 0 | |
| <input type="checkbox"/> | 8 Spare | Off | 0.00 | 0.000 | 0 | |

This advanced level of monitoring allows the user to determine the power factor for each outlet on the PDU. By knowing the Power Factor value for each outlet the user can identify which pieces of equipment are operating most or least efficiently.

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Per Socket Monitoring and Management is available for 3-Phase as well as Single Phase Power.

| Group A 235.00V 12:30 A _{rms} | | | | | | Group B 000.00V 00.00 A _{rms} | | | | | | | | | |
|--|-------------|----------------|------------------|------|-------|--|--------------------------|--------|--|-------------|----------|------------------|------|-------|-----|
| <input type="checkbox"/> | Outlet Name | Status | A _{rms} | Kwh | Watts | <input type="checkbox"/> | Outlet Name | Status | A _{rms} | Kwh | Watts | URL | | | |
| <input type="checkbox"/> | 1 | Exch Server | On | 0.00 | 0.001 | 0 | <input type="checkbox"/> | 1 | Spare | Off | 0.00 | 0.000 | 0 | | |
| <input type="checkbox"/> | 2 | Network Switch | On | 0.00 | 0.000 | 0 | <input type="checkbox"/> | 2 | Spare | Off | 0.00 | 0.000 | 0 | | |
| <input checked="" type="checkbox"/> | 3 | ADSL1 | On | 4.10 | 5.163 | 957 | <input type="checkbox"/> | 3 | Group C 237.00V 13.10 A _{rms} | | | | | | |
| <input checked="" type="checkbox"/> | 4 | ADSL2 | On | 0.00 | 0.205 | 0 | <input type="checkbox"/> | 4 | <input type="checkbox"/> | Outlet Name | Status | A _{rms} | Kwh | Watts | URL |
| <input type="checkbox"/> | 5 | FileServer | On | 4.10 | 0.382 | 965 | <input type="checkbox"/> | 5 | <input checked="" type="checkbox"/> | 1 | Mercedes | On | 1.72 | 5.640 | 453 |
| <input type="checkbox"/> | 6 | Spare | Off | 0.00 | 0.000 | 0 | <input type="checkbox"/> | 6 | <input type="checkbox"/> | 2 | Apollo | On | 2.00 | 2.405 | 476 |
| <input type="checkbox"/> | 7 | Spare | Off | 0.00 | 0.000 | 0 | <input type="checkbox"/> | 7 | <input type="checkbox"/> | 3 | Jupiter | On | 1.60 | 0.600 | 435 |
| <input type="checkbox"/> | 8 | Spare | Off | 0.00 | 0.000 | 0 | <input type="checkbox"/> | 8 | <input type="checkbox"/> | 4 | Spare | Off | 0.00 | 0.000 | 0 |
| | | | | | | | | | <input type="checkbox"/> | 5 | Saturn | On | 4.02 | 5.530 | 915 |
| | | | | | | | | | <input checked="" type="checkbox"/> | 6 | Neptune | On | 3.00 | 2.905 | 654 |
| | | | | | | | | | <input type="checkbox"/> | 7 | Spare | Off | 0.00 | 0.000 | 0 |
| | | | | | | | | | <input type="checkbox"/> | 8 | Spare | Off | 0.00 | 0.000 | 0 |

Sockets can be controlled both individually as well as in user-configured groups.

In 3-Phase PDU's the Voltage is displayed per group of sockets.