

A large red chevron graphic on the left side of the page, pointing to the right. It consists of four parallel, downward-pointing chevrons stacked vertically.

# MasterSwitch™ *plus*

Power Distribution Unit

AP9225  
AP9225EXP

User's Guide

The APC logo, consisting of the letters 'APC' in a bold, red, sans-serif font. A small registered trademark symbol (®) is located to the upper right of the letter 'C'.

**APC**®

# APC® MasterSwitch *plus*

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# APC® MasterSwitch *plus*

## Product Description

### Introduction

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#### **What MasterSwitch *plus* can do for you**

MasterSwitch *plus* allows you to individually control power to connected equipment and gracefully shut down or reboot up to eight connected servers of different operating systems. In order to manage your system effectively and efficiently, MasterSwitch *plus*:

- allows you to configure three password-protected accounts that ensure restricted access to system-, device-, and outlet-level services.
- automatically shuts down connected servers attached to an APC UPS when the UPS enters an on-battery state and turns off connected equipment after the server confirms shutdown.
- shuts down servers before cycling power to the connected equipment (Graceful Reboot).
- controls eight on-board power outlets for complete and flexible management of connected equipment.
- manages connected equipment through Web, Control Console, or SNMP interfaces.
- can power-down connected equipment outlet by outlet to conserve battery backup power.
- allows users to configure the sequence in which outlets receive power upon start-up.
- connects serially to up to three expansion units (AP9225EXP), providing control of 32 connected devices with one IP address.
- provides MD5 security—enhanced security for remote access through the World Wide Web.
- includes full SNMP support for all outlet and unit properties.
- offers Event Logging for descriptions of events that occur with MasterSwitch *plus*.

# Product Description

## Product Description *continued*

### Finding the information you are looking for

This User Guide provides detailed information on how to configure MasterSwitch *plus* to fit your needs, including discussions on how to operate MasterSwitch *plus* using unit and outlet properties (page 12), how to manage the unit through the available Web, Control Console and SNMP interfaces (page 24), and complete definitions for all unit and outlet properties (page 28). It also includes information for special circumstances such as:

- If you purchased only the expansion unit (AP9225EXP) and need information on how to manage the PDU without the management card included with AP9225, see “Managing the Expansion Unit” on page 48.
- If you need information on our Warranty and Life-Support policies, see “Product Information” on page 55.
- If you have PowerChute *plus* software or other management peripherals besides MasterSwitch *plus* and need to know how these accessories will be affected, see “Accessories Affected by MasterSwitch Plus” on page 55.

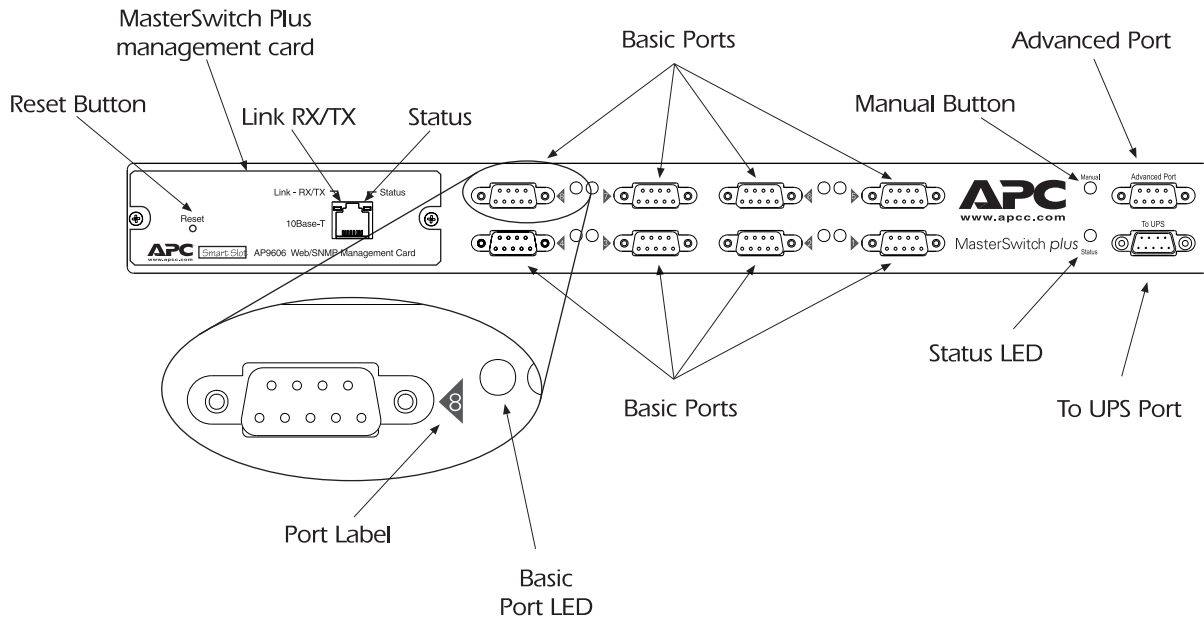
In addition to the information included in this user guide, you can find the following documents on the CD included with MasterSwitch *plus*:

Document	Description	Location
<i>MasterSwitch plus Installation and Quick Start Manual (Install.pdf)</i>	Procedures for setting up the unit and for configuring the required network settings.	Printed manual included with MasterSwitch <i>plus</i> and on the CD in the <b>MS_Plus</b> directory.
<i>Exonly.pdf</i>	Instructions for setting up and configuring the expansion unit (AP9225EXP) without AP9225.	On the CD in the <b>MS_Plus</b> directory.
<i>Addendum.pdf</i>	Detailed information on the Web/SNMP Card Wizard, firmware, and configuration file transfers.	On the CD in the <b>MS_Plus</b> directory.
<i>Refguide.chm</i>	Quick look-up reference guide to accompany the user guide.	On the CD in the <b>MS_Plus</b> directory.
<i>README.txt</i>	Instructions for auto-configuring your unit(s).	On the CD in the <b>apcConfigUtility</b> directory.
<i>Mibguide.pdf</i>	Procedures on how to manage your unit(s) using SNMP.	On the CD in the <b>Snmp</b> directory.

# Product Description

## Front Panel

### AP9225



<b>Basic Ports</b>	Connect the unit to servers running PowerChute or built-in UPS monitoring software. For specifications, see “Basic port pin assignments” on page 61.
<b>MasterSwitch <i>plus</i> management card</b>	Allows you to use a Web browser, Telnet, or a serial interface to remotely manage connected devices (AP9225 only).
<b>Manual Button</b>	Used to issue a Battery Capacity Override command or cancel a Master Power On Delay, depending on the situation. (See “Manual Button” on page 11.)
<b>Advanced Port</b>	Allows the connected server to communicate with a UPS operating in Smart Mode and can also be used as a management port. For information on Smart Mode, see the user manual supplied with your UPS. For Advanced Port specifications, see “Advanced port pin assignments” on page 62
<b>To UPS Port</b>	Used to connect the unit to a UPS or another unit with the supplied daisy-chain cable (APC part number 940-1000)
<b>Accessory Card Slot</b>	Provides slot for APC management peripheral cards (only on the Expansion unit—AP9225EXP).
<b>Reset Button</b>	Allows you to reset the MasterSwitch Plus network interface. This button is only available on AP9225 and has no affect on the state of the outlets.



# Product Description

## LEDs

### Descriptions

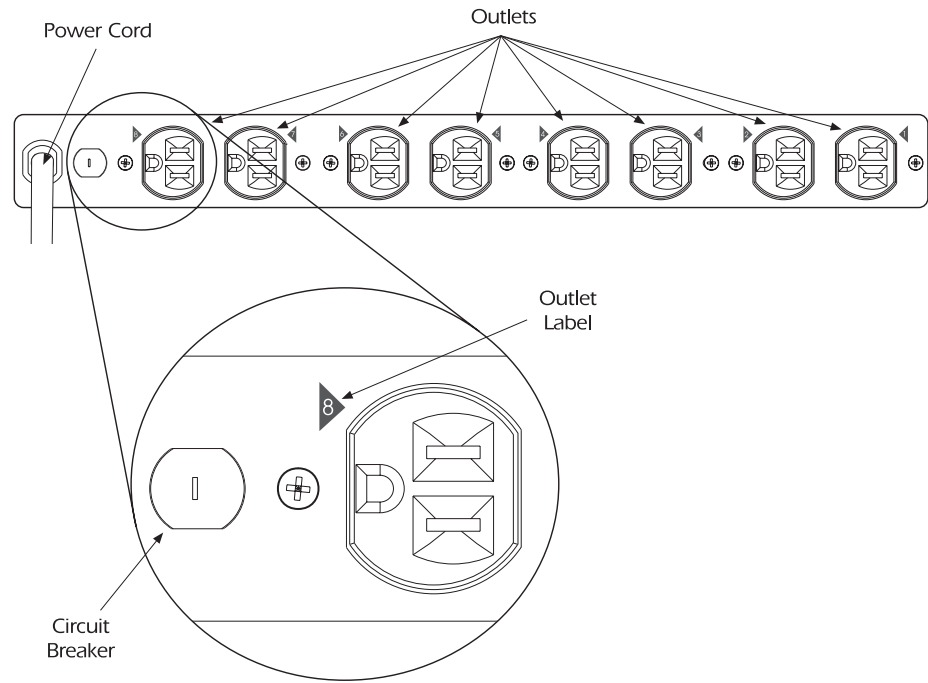
LED	Status	Description
Basic port	On	The Outlet is on.
	Off	The Outlet is off.
	Mostly off	The Outlet is scheduled to turn on.
	Mostly on	The Outlet is scheduled to turn off.
	Flashing green	The outlet cannot turn on due to an Environmental alarm.
MasterSwitch <i>plus</i> Status	Flashing green	The UPS is in Sleep mode.
	Steady green	The UPS is operating Normally.
	Steady red	The UPS has experienced an AC Fail condition (UPS is On Battery).
	Flashing red	The UPS has asserted a Low Battery indication.
	Flashing green and red	MasterSwitch Plus is unable to communicate with the UPS.
Management Card Status (AP9225 only)	Off	MasterSwitch Plus has no power.
	Solid green	MasterSwitch Plus has valid network settings.
	Flashing green	MasterSwitch Plus does not have valid network settings. See the Installation Manual for more information.
	Flashing red slowly	MasterSwitch Plus is making a BOOTP request.
	Solid red	A hardware failure has been detected by MasterSwitch Plus.
Management Card Link-RX/TX (AP9225 only)	Off	The device(s) that connects MasterSwitch Plus to the network, whether a router, hub, or concentrator, is off or not operating correctly.
	Constant Green	MasterSwitch Plus is connected to a functioning network.
	Flashing Green	MasterSwitch Plus is receiving data packets from the network.

*Continued on next page*

# Product Description

## Rear Panel

### AP9225



## Manual Button

### Description

The Manual button is used to cancel two different commands. If this button is pressed for at least  $\frac{1}{2}$  second and then released, one of the following results will occur:

- If the MasterSwitch *plus* is waiting for the Master Power On Delay to expire, then MasterSwitch *plus* will issue a cancel command. The diagram in “Unit/Outlet Start-up Sequence” on page 16 illustrates the outlet’s behavior when the Master Power On Delay is cancelled.
- If the configuration contains a UPS and the UPS is operating on AC power, then MasterSwitch *plus* will issue a Battery Capacity Override command. The diagram in “Unit/Outlet Start-up Sequence” on page 16 illustrates the outlet’s behavior when the Battery Capacity Override command is issued.
- If neither of the above conditions are true, then pressing the Manual button will have no effect.

## How MasterSwitch plus Works

### MasterSwitch plus Properties

#### Overview

There are two main categories of properties associated with MasterSwitch Plus: unit properties and outlet properties. Unit properties allow you to customize the behavior of MasterSwitch Plus; outlet properties allow you to customize the behavior of individual outlets.

#### Outlet properties

Outlet properties are governed by two operating modes: Annunciator and Graceful Shutdown. Some outlet properties are common to both control modes, while other properties are specific to an operating mode. The table below lists each outlet property and its default setting.

Property	Available in what control mode?	Default setting for outlet #s____							
		1	2	3	4	5	6	7	8
Outlet Control Mode	NA	Graceful Shutdown Mode							
Name: Outlet #____	Both	1	2	3	4	5	6	7	8
Power On Time Delay (seconds)	Graceful Shutdown	0	2	4	6	8	10	12	14
Battery Capacity Threshold	Graceful Shutdown	0%							
Low Battery Warning Control (minutes)	Graceful Shutdown	4.5							
Power Off Time Delay (seconds)	Graceful Shutdown	120							
UPS Low Battery Multiplier	Graceful Shutdown	1							
Will Device Confirm	Graceful Shutdown	No							
Restart Delay	Graceful Shutdown	Remain Off							
Reboot Duration (seconds)	Graceful Shutdown	5							
Initial State (non-alarm)	Annunciator	Off							
Alarm Action Delay (seconds)	Both	15							
Environment Alarm Masks	Both	Disabled (for each Environment alarm)							

**Note:** Unit and outlet properties retain their value (default or configured) even after power has been removed from MasterSwitch Plus.

# How MasterSwitch*plus* Works

## MasterSwitch*plus* Properties *continued*

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### **Configuring your MasterSwitch*plus* unit**

Configuration of MasterSwitch Plus is dependent upon your application. You can use only “on-demand” operations (On, Off, Shutdown, and Reboot) or you can couple on-demand operations with “unattended” shutdown features. If you plan to use only on-demand operations, see “Configuring an outlet for on-demand operation” on page 14. If you plan to use the “unattended” shutdown features of MasterSwitch Plus in addition to the on-demand operations also, see “Configuring an outlet for unattended shutdown” on page 15.

### **Learning the behavior of MasterSwitch*plus* properties**

The diagrams on pages 16–23 define the behaviors for every event recognized by the MasterSwitch *plus* unit. You customize the unit’s behavior by choosing specific values for the unit and outlet properties. All outlet and unit properties on the diagrams are a highlighted hotlink that lead you to the property’s definition. All outlet and unit properties are defined in the section titled “Menu Item Definitions”, starting on page 28.

# How MasterSwitch<sup>plus</sup> Works

## MasterSwitch<sup>plus</sup> Properties *continued*

### Configuring an outlet for on-demand operation

Configuring an outlet for On-demand operation requires selecting values for the following properties:

Property	Used in Sequence Diagram (Page #)	Definition (Page #)
Unit Properties		
Power On Time Delay	“Unit/Outlet Start-up Sequence” on page 16	page 30
Outlet Properties		
Outlet Control Mode	No sequence diagram available.	page 31
Reboot Duration	“Reboot Sequence” on page 22 and “Graceful Reboot Sequence” on page 23	page 31
Device Confirm	“Graceful Shutdown Sequence” on page 17, “Graceful Shutdown Sequence for On-battery Events” on page 18, “Graceful Shutdown Sequence for Environment Alarms” on page 19, and “Graceful Reboot Sequence” on page 23	page 31
Power Off Delay	“Graceful Shutdown Sequence” on page 17, “Graceful Shutdown Sequence for On-battery Events” on page 18, “Graceful Shutdown Sequence for Environment Alarms” on page 19, and “Graceful Reboot Sequence” on page 23	page 31
Restart Delay	“Graceful Shutdown Sequence” on page 17	page 31
Power On Delay	“Unit/Outlet Start-up Sequence” on page 16, “Graceful Shutdown Sequence” on page 17, “Graceful Shutdown Sequence for On-battery Events” on page 18, “Graceful Shutdown Sequence for Environment Alarms” on page 19, and “Delayed On Sequence” on page 21	page 31

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# How MasterSwitch<sup>plus</sup> Works

## MasterSwitch<sup>plus</sup> Properties *continued*

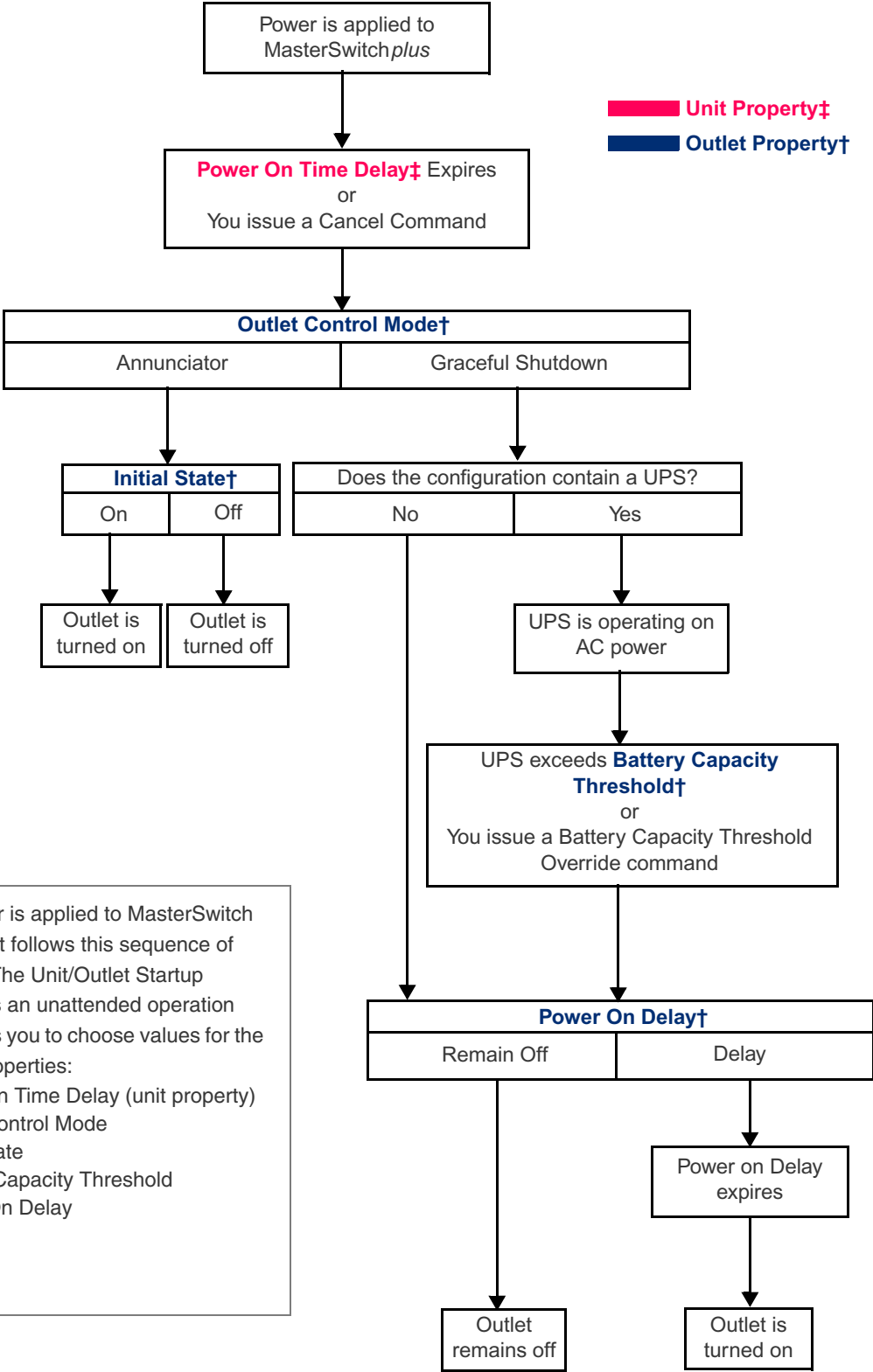
### Configuring an outlet for unattended shutdown

Configuring an outlet for unattended shutdown requires selecting values for the following properties:

Property	Used in Sequence Diagram (Page #)	Definition (Page #)
Unit Properties		
Power On Time Delay	“Unit/Outlet Start-up Sequence” on page 16	page 30
Outlet Properties		
Graceful Shutdown		page 31
<ul style="list-style-type: none"><li>• UPS Low Battery Multiplier</li></ul>	“Graceful Shutdown Sequence for On-battery Events” on page 18	page 32
<ul style="list-style-type: none"><li>• Low Battery Warning Control</li></ul>	“Graceful Shutdown Sequence for On-battery Events” on page 18	page 31
<ul style="list-style-type: none"><li>• Device Confirm</li></ul>	“Graceful Shutdown Sequence” on page 17, “Graceful Shutdown Sequence for On-battery Events” on page 18, “Graceful Shutdown Sequence for Environment Alarms” on page 19, and “Graceful Reboot Sequence” on page 23	page 31
<ul style="list-style-type: none"><li>• Power Off Delay</li></ul>	“Graceful Shutdown Sequence for On-battery Events” on page 18, “Graceful Shutdown Sequence for Environment Alarms” on page 19, and “Graceful Reboot Sequence” on page 23	page 31
Annunciator		page 31
<ul style="list-style-type: none"><li>• Alarm Action Delay</li></ul>	“Graceful Shutdown Sequence for Environment Alarms” on page 19, and “Annunciator Sequence for Environment Alarms” on page 20	page 32

# How MasterSwitchplus Works

## Unit/Outlet Start-up Sequence



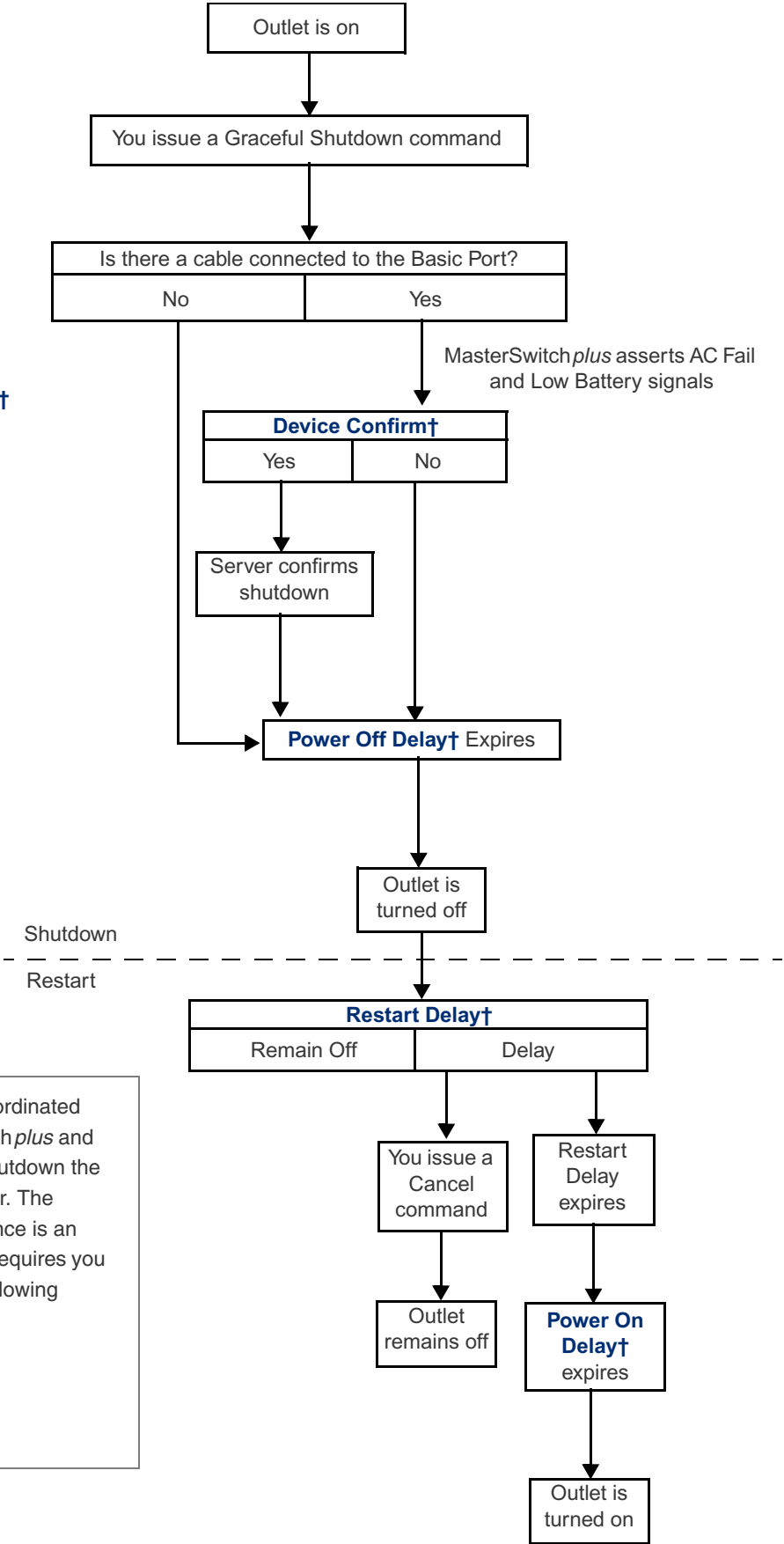
When power is applied to MasterSwitchplus, the unit follows this sequence of behaviors. The Unit/Outlet Startup Sequence is an unattended operation that requires you to choose values for the following properties:

- Power on Time Delay (unit property)
- Outlet Control Mode
- Initial State
- Battery Capacity Threshold
- Power On Delay

# How MasterSwitch*plus* Works

## Graceful Shutdown Sequence

**Unit Property†**  
**Outlet Property†**



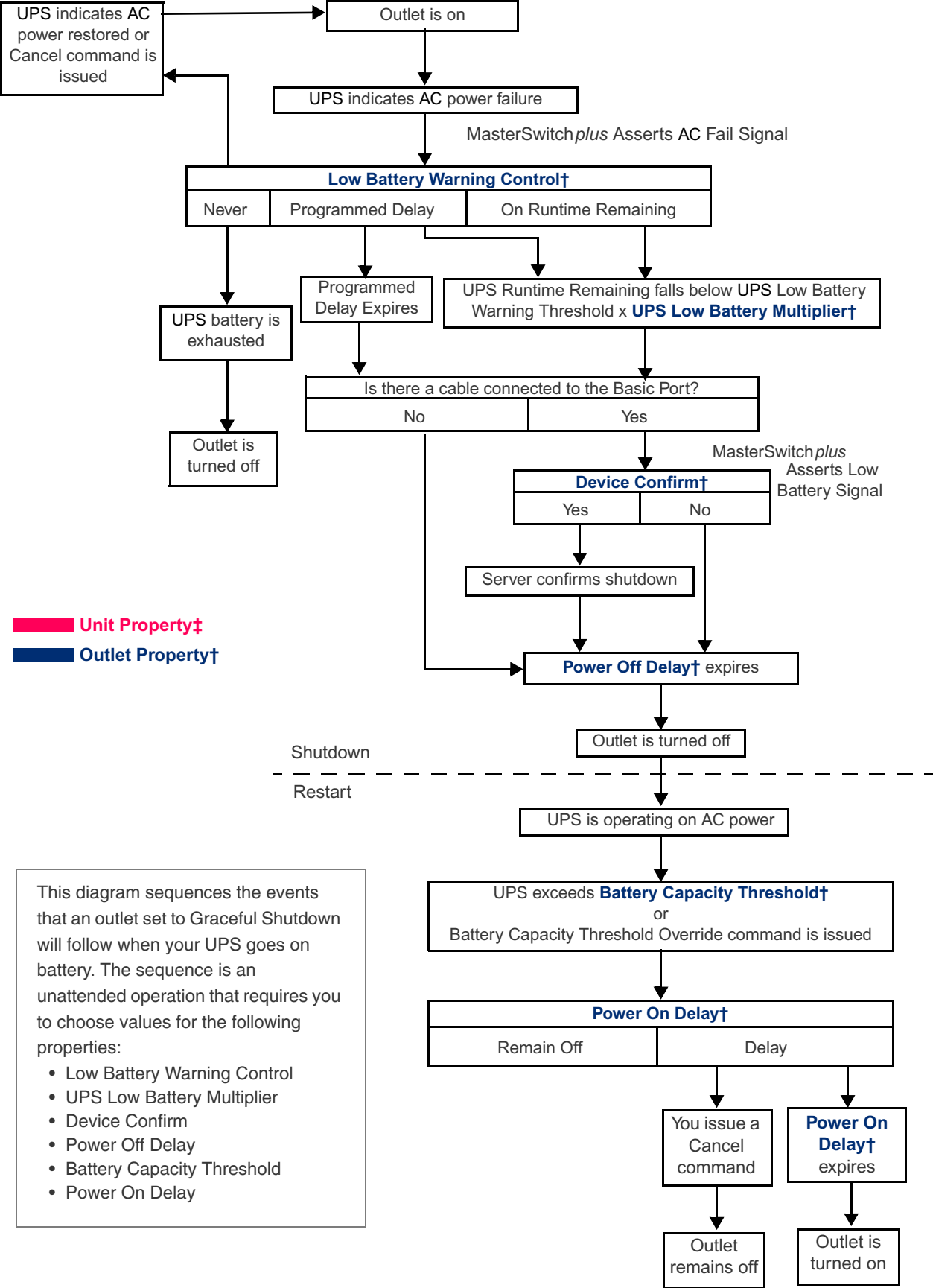
Graceful Shutdown is a coordinated effort between MasterSwitch*plus* and the connected device to shutdown the device in an orderly manner. The Graceful Shutdown Sequence is an on-demand operation that requires you to choose values for the following properties:

- Device Confirm
- Power Off Delay
- Restart Delay
- Power On Delay



# How MasterSwitch<sup>plus</sup> Works

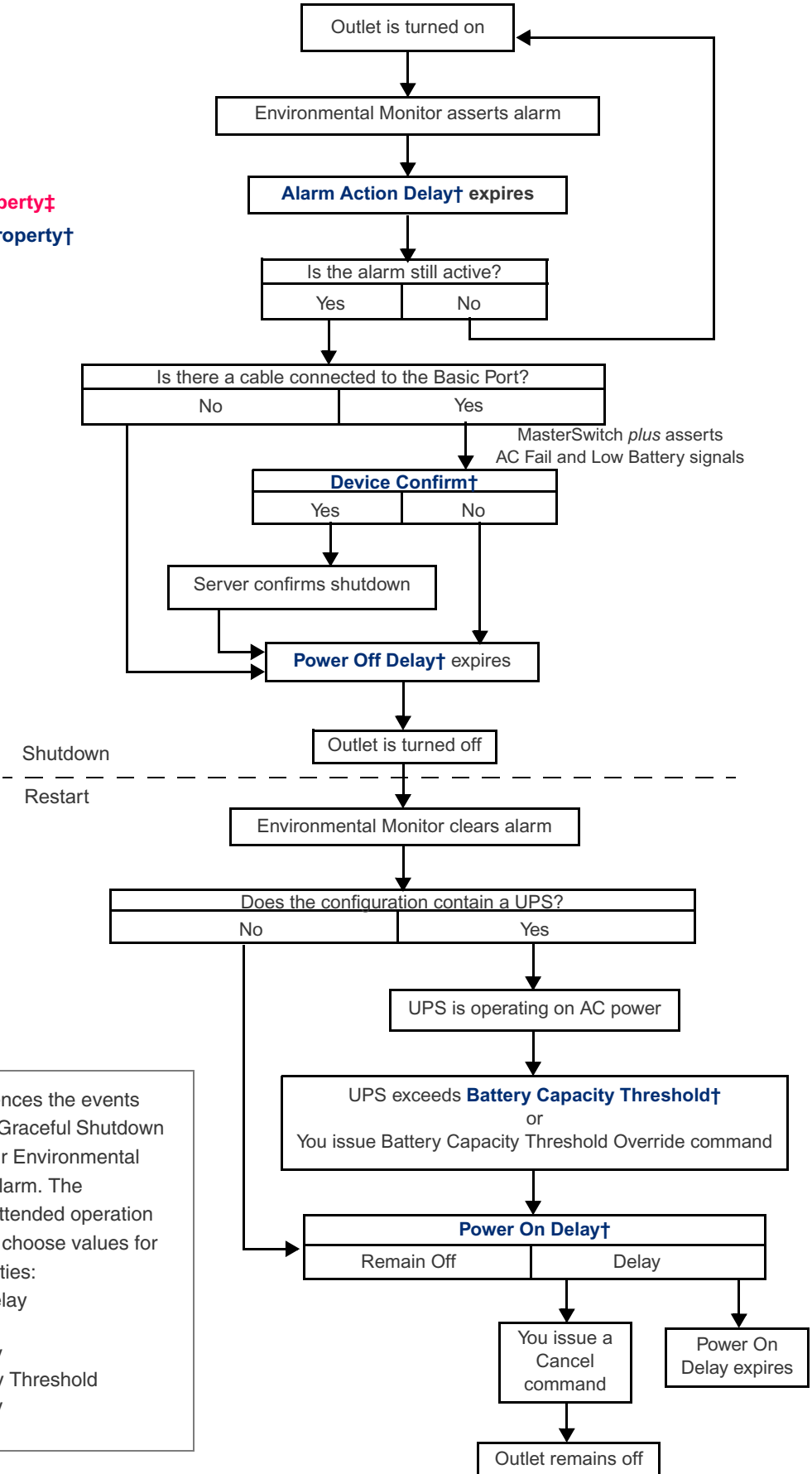
## Graceful Shutdown Sequence for On-battery Events



# How MasterSwitch*plus* Works

## Graceful Shutdown Sequence for Environment Alarms

■ Unit Property†  
■ Outlet Property†



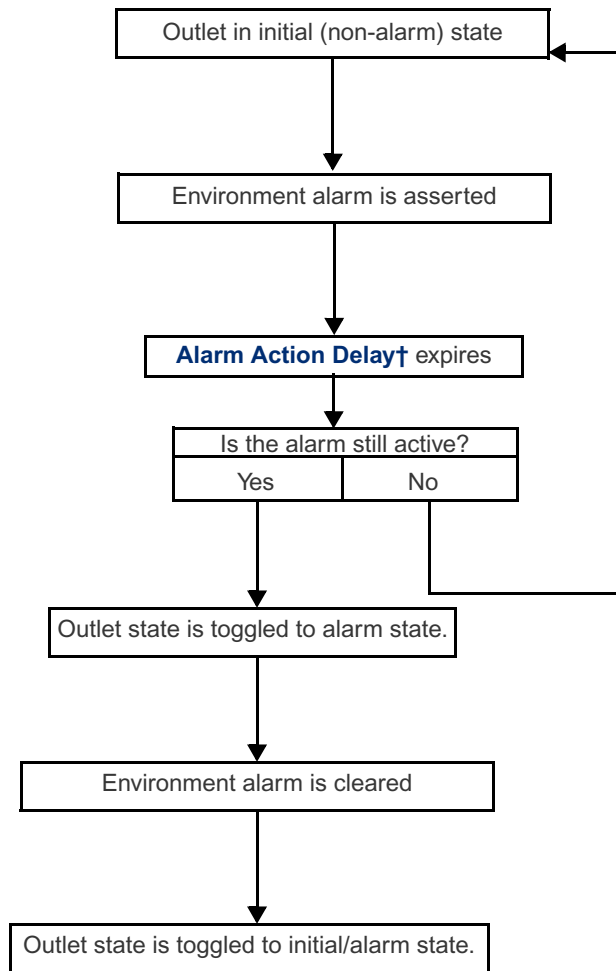
This diagram sequences the events that an outlet set to Graceful Shutdown will follow when your Environmental Monitor issues an alarm. The sequence is an unattended operation that requires you to choose values for the following properties:

- Alarm Action Delay
- Device Confirm
- Power Off Delay
- Battery Capacity Threshold
- Power On Delay

# How MasterSwitch*plus* Works

## Annunciator Sequence for Environment Alarms

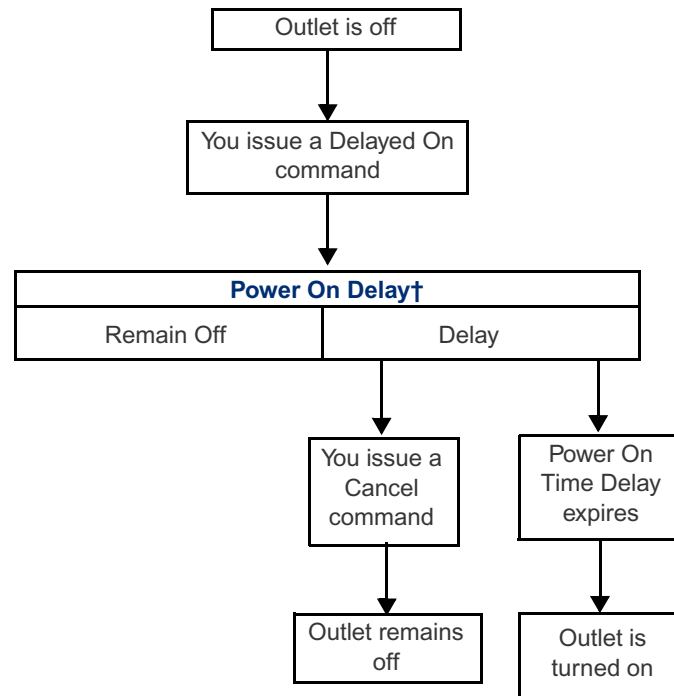
**Unit Property†**  
**Outlet Property†**



This diagram sequences the events that an outlet set to Annunciator will follow when your Environmental Monitor issues an alarm. The sequence is an unattended operation that requires you to choose a value for the Alarm Action Delay property.

# How MasterSwitch*plus* Works

## Delayed On Sequence

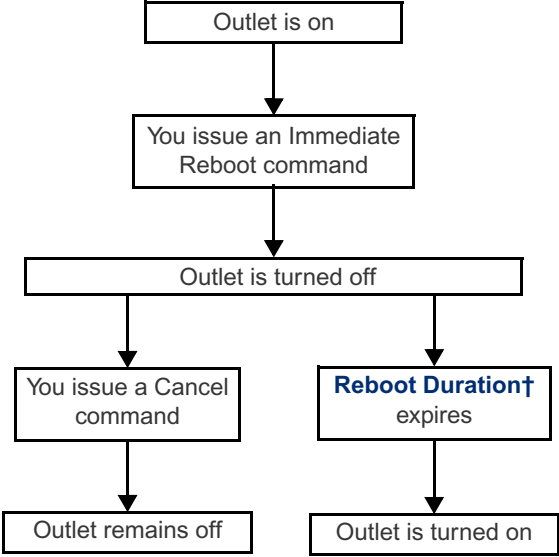


**Unit Property†**  
**Outlet Property†**

This diagram sequences the events that an outlet will follow when you issue a Delayed On command. The sequence is an on-demand operation that requires you to choose a value for the Power On Delay property.

# How MasterSwitch*plus* Works

## Reboot Sequence

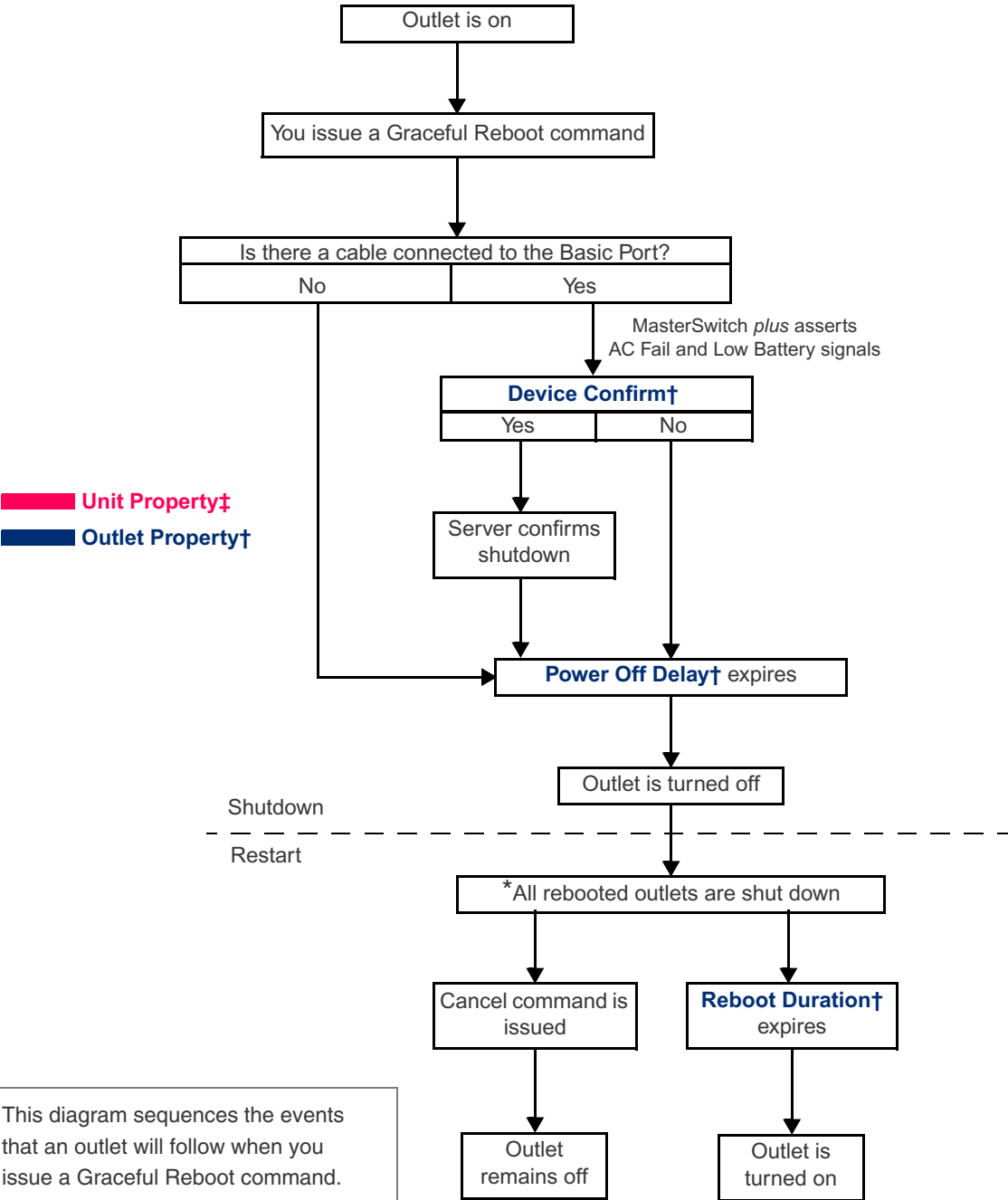


**Unit Property†**  
**Outlet Property†**

This diagram sequences the events that an outlet will follow when you issue an Immediate Reboot command. The sequence is an on-demand operation that requires you to choose a value for the Reboot Duration property.

# How MasterSwitch*plus* Works

## Graceful Reboot Sequence



This diagram sequences the events that an outlet will follow when you issue a Graceful Reboot command. The Graceful Reboot sequence is an on-demand operation that requires you to choose values for the following properties:

- Will Device Confirm?
- Power Off Delay
- Reboot Duration

\* If this command is applied to all outlets, the Reboot Duration delay for an outlet will not begin until all the outlets have shut down.

# APC® MasterSwitch *plus*

## How to Manage MasterSwitch *plus*

### Remote Management Interfaces

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#### Overview

Once MasterSwitch *plus* has the proper network settings (see the *MasterSwitch plus Installation and Quick Configuration Manual* for instructions), MasterSwitch *plus* and an Environmental Monitoring Card can be managed remotely on Web, Control Console, and SNMP interfaces. Only one user at-a-time may access your MasterSwitch *plus* unit. Serial Interface users have precedence over Telnet users and Telnet users have precedence over Web users. Maps of each interface are on page 64 and page 65.

#### Web interface

Use a Web browser to access the Web connection to MasterSwitch *plus*. In the URL Location field, type `http://` followed by your MasterSwitch *plus* unit's IP address. Alternately, you can enter the DNS name (requires a DNS server entry for the Management Card). See the example below:

```
http://170.241.17.51
```

If the MasterSwitch *plus* unit's Web Port is set to a value other than the default value of 80, enter the System IP address followed by a colon and the configured Web Port value (in this example 8000). See the example below:

```
http://170.241.17.51:8000
```

After entering your MasterSwitch *plus* unit's IP address, press ENTER; a prompt will ask for your user name and password. For first time use, the default Administrator user name and password is *apc*, all lower case. See page 64 for a map of the Web interface.

**Note:** Some Web interface features, including data verification, Assistant Online, and MD5 authentication require that you enable JavaScript or Java.

*Continued on next page*

# How to Manage MasterSwitch *plus*

## Remote Management Interfaces *continued*

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### Control Console interface

In addition to using the Web, you can also manage MasterSwitch *plus* and an Environmental Monitoring Card using Telnet for remote over-the-network management or using a serial interface for local management.

All menus on the Control Console list items by number and name. To enter an item, type the item number, press **ENTER**, follow any on-screen directions. Menus that configure values have an **Accept Changes** menu item. If you want to save any changes that you made before you exit a menu, use the **Accept Changes** item. In addition to saving changes before exiting a menu, you can also:

- Press **ENTER** to refresh the menu.
- Press **ESC** to go back to the previous menu.
- Type **?** and then press **ENTER** to access brief descriptions of menu items (if the menu has help available).
- Use **CTRL-D** to toggle between MasterSwitch *plus* and Environment menus.
- Use **CTRL-C** to return to the main menu (Control Console).

To access the Control Console through Telnet, start a Telnet session and follow the prompts. (See the *Installation and Quick Configuration Manual* for detailed instructions on starting a Telnet session.) To use a serial interface to access the Control Console:

1. Use the supplied smart-signaling cable (APC part number 940-0024C) to connect the terminal port to the Advanced Port on MasterSwitch *plus*.

*Continued on next page*



# How to Manage MasterSwitch *plus*

## Remote Management Interfaces *continued*

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### Control Console interface, continued

2. Check the terminal port for the following communication settings:

Baud Rate	2400
Data Bits	8
Stop Bits	1
Parity	None
Handshaking	None
Local Echo	Off
Terminal Type	ANSI (VT100)

**Note:** To change the communications settings using HyperTerminal, follow the steps below in the order given:

- a. Make the needed changes.
  - b. Select **Disconnect** in the Call menu.
  - c. Select **Connect** in the Call menu.
3. Press **ENTER** and log into the Control Console.  
The procedure for logging into the Control Console is the same for both Telnet and a serial interface. When prompted, type your user name and press **ENTER** and then type your password and press **ENTER**.

See page 65 for a map of the Control Console.

### SNMP

MasterSwitch *plus* fully supports SNMP—all unit and outlet properties are configurable through SNMP. For complete instructions on how to use SNMP to manage MasterSwitch *plus*, open the *Mibguide.pdf* file in the **Sntp** folder on the CD.

# How to Manage MasterSwitch *plus*

## Password-Protected User Accounts

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### Overview

MasterSwitch *plus* provides three types of password-protected accounts that allow you to control access to MasterSwitch *plus*. Each type of account provides a different level of access to the MasterSwitch *plus* menus. There is one Administrator account, one Device Manager Account and up to 32 User accounts.

### Account access to Main menu headings

Administrator and Device Manager accounts have access to all outlets. Outlet User accounts only have access to outlets assigned to their account. Users who have access to the Administrator account configure and manage all other accounts. For instructions on configuring Device Manager and Outlet User accounts, see “User Manager” on page 40 and “Outlet User Manager” on page 41. The table below lists the account access to each MasterSwitch *plus* Menu.

Account Type	Access to MasterSwitch <i>plus</i> Menus								
	Outlets	MasterSwitch <i>plus</i> Configuration	Environment	Event Log	Network	System	Logout	Help	Links
Administrator	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Device Manager	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Outlet User	Yes	No	No	No	No	No	Yes	Yes	Yes

### Auto-configuring MasterSwitch *plus*

Unit properties, outlet properties, and user accounts can be downloaded to MasterSwitch *plus* from a configuration file. For details on auto-configuring your MasterSwitch *plus* unit(s), open the *README.txt* file in the **apcConfigUtility** directory on the CD.

# APC® MasterSwitch *plus*

## Menu Item Definitions

### Outlets

#### Control

Item	Definition
Immediate On	Immediately turns an outlet on. This command is available any time after the unit's Power On Time Delay has expired and the outlet is off. (Available in both Annunciator and Graceful Shutdown modes.)
Sequenced On	Turns on every outlet according to its Power On Delay time. (This is only available for Master Control of Outlets in Graceful Shutdown mode.)
Delayed On	Turns an outlet on after the outlet's Turn On Delay expires. The "Delayed On Sequence" on page 21 illustrates this command. This command is available any time after the unit's Power On Time Delay has expired and the outlet is off. (Only available in Graceful Shutdown mode.)
Immediate Off	Immediately turns an outlet off. (Available in both Annunciator and Graceful Shutdown modes.)
Graceful Reboot	Gracefully shuts down and restarts an outlet. If the server is running shutdown software, such as PowerChute Plus, and is connected to MasterSwitch <i>plus</i> with the appropriate signaling cable, this operation will ensure that your server's operating system is shutdown before the outlet is turned off. Otherwise, it will turn off the outlet after the Power Off Time Delay expires. The outlet will be restarted after the Reboot Duration expires. The "Graceful Reboot Sequence" on page 23 illustrates the this command. (Only available in Graceful Shutdown mode.) <b>Note:</b> <i>If this command is applied to all outlets, then the Reboot Duration delay for an outlet will not begin until all the outlets have shut down.</i>

*Continued on next page*

# Menu Item Definitions

## Outlets *continued*

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### Control, continued

Item	Definition
Immediate Reboot	Immediately turns an outlet off and turns it back on after the outlet's Reboot Duration expires. The "Reboot Sequence" on page 22 illustrates the this command. (Only available in Graceful Shutdown mode.)
Shutdown	Gracefully shuts down and optionally restarts an outlet. If the server is running shutdown software, such as PowerChute Plus, and is connected to MasterSwitch <i>plus</i> with the appropriate signaling cable, this operation will ensure that your server's operating system is shutdown before the outlet is turned off. Otherwise, it will turn off the outlet after the Power Off Time Delay expires. You can program the outlet to restart automatically by specifying a Restart Delay. The Restart Delay can be set to as long as 999.9 hours. The "Graceful Shutdown Sequence" on page 17 illustrates the this command. (Only available in Graceful Shutdown mode.)
Override	Allows an outlet to restart when the UPS battery charge has not exceeded the Battery Capacity Threshold. The sequence diagrams on page 18 and page 19 illustrate the use of this command. (Only available in Graceful Shutdown mode.)
Cancel	Cancel a delayed startup or shutdown. The sequence diagrams on pages 18–19 and pages 21–23 illustrate the use of this command. (Only available in Graceful Shutdown mode.)

### Notes on outlets

On the Web interface, if the Outlet number is orange, the outlet is in Annunciator mode. This limits the Control Action of the outlet to No Action, Immediate On, and Immediate Off.

# Menu Item Definitions

## MasterSwitch *plus*

---

### Device configuration

Property	Description	Available Settings
Device Name	A string of characters used to identify the MasterSwitch <i>plus</i> unit.	A maximum of 23 printable ASCII characters <b>Default</b> = unnamed
Power On Time Delay	The time that MasterSwitch <i>plus</i> will delay after AC power is applied before starting the outlet's power on sequence.	<b>Range:</b> 0–2:46:39 <b>Default:</b> 0
Manual Button	Governs whether or not the manual button functions.	<b>Enabled:</b> the button functions according to the description in "Manual Button" on page 11. <b>Disabled:</b> no function <b>Default:</b> Enabled
Restore Factory Defaults	Reinstates the original settings for your MasterSwitch <i>plus</i> unit. All unit properties are set to the defaults shown in this table. Outlet Properties are restored to the defaults shown on page 12. (Control Console only)	Enter <b>Yes</b> to restore defaults or ESC to cancel request.
View Manufacturing Data	Displays the following information: Model Number, Manufacture Date, Hardware Rev, Firmware Rev, and Serial Number.	These items are provided for your information on the Control Console and cannot be configured.
View Self-Test Results	Allows you to display the results of the unit's last power up self-test. The tests performed are: Program Memory: confirms whether or not the EPROM chip is working properly. Non-Volatile Memory: confirms whether or not the EEPROM chip is working properly. (Control Console only)	Pass or Fail

*Continued on next page*

# Menu Item Definitions

## MasterSwitch *plus* continued

### Outlet configuration

Item	Definition	Available Settings
Outlet Name	Identifies each outlet.	23 characters maximum
Outlet Control Mode	Establishes mode for associated outlet. All on-demand operations are available when the Outlet Control mode is set to Graceful Shutdown. When set to Annunciator, only Immediate On and Immediate Off operations are available.	Graceful Shutdown or Annunciator
Outlet Link	The Outlet's HTTP link in URL form or a Telnet address.	(http://site.com page.htm) (789.456.123.456)
Restart Delay	The delay between an outlet shutting off due to a Graceful Shutdown and the outlet being restarted.	<b>Range:</b> 0–999:54 <b>Note:</b> <i>Time is rounded down by 6-minute intervals</i>
Power On Delay	Determines the time interval between the triggering event and the outlet being turned on.	<b>Range:</b> 0–2:46:39
Power Off Delay	The time from the triggering event (such as a server confirming a shutdown) until the outlet is turned off.	<b>Range:</b> 0–2:46:39
Reboot Duration	The delay between the outlet shutting off because of Reboot and the outlet restarting.	<b>Range:</b> 0–2:46:39
Device Confirm	Indicates whether the device connected to the outlet can assert a shutdown signal.	<b>Yes</b> <b>No</b>
Low Battery Warning Control	Selects the method MasterSwitch <i>plus</i> uses for determining when to assert the outlet's Low Battery signal after the UPS has gone on battery.	<b>Programmed Delay:</b> 0–16:39:54 <b>On Runtime Remaining:</b> When the UPS runtime remaining falls below the UPS's UPS Low Battery Signal Time <b>Never</b>

Continued on next page

# Menu Item Definitions

## MasterSwitch *plus* continued

---

### Outlet configuration, continued

Item	Definition	Available Settings
UPS Low Battery Multiplier	Adjusts the UPS Low Battery Signal Time. This property allows each outlet to be programmed to generate a low battery signal at a different time. MasterSwitch <i>plus</i> will assert the outlet's Low Battery signal when both of the following conditions apply: <ul style="list-style-type: none"><li>• the Low Battery Warning Control is set to On Runtime Remaining or Programmed Delay, and</li><li>• the UPS is on battery and the UPS runtime remaining falls below the product of the UPS Low Battery signal time and the UPS Low Battery Multipliers.</li></ul>	<b>Range:</b> 1–7
Battery Capacity Threshold	Sets the minimum percentage of Battery Capacity required of the UPS before an outlet can be turned on.	<b>Range:</b> 0–100%
Environment Alarm Actions	Enable or disable Environment alarms for each outlet independently.	<b>Enabled</b> <b>Disabled</b>
Initial State (non-alarm)	Defines the initial state of the outlet.	<b>Off</b> <b>On</b>
Alarm Action Delay	The amount of time that an Environment alarm must be asserted before the unit reacts to the alarm.	<b>Range:</b> 0–2:45:00

# Menu Item Definitions

## Environment

---

### Status

Item	Definition
Probes	
Temperature	The temperature (in Celsius) sensed by Environment probes.
High Temperature Violation	Reports whether the high temperature threshold is disabled or (when enabled) whether the current temperature exceeds the threshold (Yes or No).
Low Temperature Violation	Reports whether the low temperature threshold is disabled or (when enabled) whether the current temperature exceeds the threshold (Yes or No).
Humidity	The relative humidity (as a percentage) sensed by the Environment probes.
High Humidity Violation	Reports whether the high humidity threshold is disabled or (when enabled) whether the current humidity exceeds the threshold (Yes or No).
Low Humidity Violation	Determines whether the low humidity threshold is disabled or (when enabled) if the current humidity exceeds the threshold. (Yes or No)
Trap Thresholds	Defines the high and low temperature (in Celsius) and relative humidity (as a percentage) thresholds the Environmental Monitoring Card will use to identify a trap condition. (On the Control Console.)
Send Traps On	Enables or disables sending traps for each threshold. (On the Control Console.) <b>Note:</b> If your configuration contains an AP9225, you must enable the Send Traps On alarm property in order for the Environmental Monitor to generate an alarm.



# Menu Item Definitions

## Environment *continued*

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### Configuration

Item	Definition
Contacts	
Device 1 (Contact Zone 1) Alarm through Device 4 (Contact Zone 4) Alarm:	The contacts by number and name, and whether a contact alarm is disabled or (when enabled) if the contact senses an alarm condition (Yes or No).
Threshold (Probes 1 & 2): <ul style="list-style-type: none"><li>• High Temperature</li><li>• Low Temperature</li><li>• High Humidity</li><li>• Low Humidity</li></ul>	Thresholds that the Environmental Monitoring Card will use to identify a trap condition. (You must enable the Traps item (Send Traps on) in order for MasterSwitch <i>plus</i> to react to the alarm.)
Contact Name (Zones 1–4)	Defines a name for each contact (8 characters maximum) and enables or disables the contact alarm.

# Menu Item Definitions

## Event Log

---

### Event Log

The Event Log displays the MasterSwitch *plus* unit's last 300 events. You can view the Event Log by selecting the Event Log menu in the Web interface or by pressing CTRL + L in the Control Console.

Item	Description
Date	Date the event occurred (DD/MM/YYYY)
Time	Time the event occurred (HH:MM:SS)
Event	Description of the event.

### Accessing the Event Log using the FTP interface

You can retrieve the Event Log using client side FTP (For example, from an MS-DOS prompt, type `ftp card-ip` where *card-ip* is the IP address of your MasterSwitch *plus* unit.) After logging into the unit's FTP server, type `dir`. You will see a listing similar to the following:

```
ftp>dir
200 Command okay.
150 Opening data connection for /.
--wx-wx-wx 1 apc apc 262144 Dec 23 1999
aos253.bin
--wx-wx-wx 1 apc apc 458752 Dec 23 1999
msp202.bin
-r--r--r-- 1 apc apc 4096 Dec 29 1999 event.txt
226 Closing data connection.
ftp: 194 bytes received in 0.00Seconds
194000.00Kbytes/sec.
ftp>
```

*Continued on next page*

# Menu Item Definitions

## Event Log *continued*

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### Retrieving the Event Log using the FTP interface

To retrieve the Event Log, type `get event.txt`. The MasterSwitch *plus* unit will transmit the Event Log to your specified drive. The unit ensures that up to the last 300 events will be transmitted; however, it could be more. You will see a list similar to the following:

```
ftp>get event.txt
200 Command okay.
150 Opening data connection for event.txt
226 Closing data connection.
ftp: 3694 bytes received in 0.11Seconds
33.58Kbytes/sec.
ftp>
```

### Viewing the Event Log

After getting the *event.txt* file you can easily view it using your favorite spreadsheet. The file is TAB delimited so it will format nicely into columns.

**Note:** The MasterSwitch *plus* unit always uses four-digit year representation when logging and displaying event data. However, sometimes when importing the *event.txt* file into a spreadsheet, the spreadsheet will display the date fields as only two-digit years. This can be fixed by selecting a different date format in the spreadsheet.

The *event.txt* file includes some additional information not directly shown or necessary in the Web and Control Console Event Log screens. These include the following:

- The version of the *event.txt* file format (first field).
- The Date and Time the *event.txt* file was retrieved.
- The Name, Contact, Location, and IP address of the unit's management card.
- An unique Event Code for every type of event.

### Deleting an Event Log in the FTP interface

To delete the Event Log, type `del event.txt`. No confirmation is required. A new *event.txt* file is immediately created since a Deleted Log event occurs. You will see a list similar to the following:

```
ftp>del event.txt
250 Requested file action okay, completed.
ftp>
```

# Menu Item Definitions

## Network

---

### TCP/IP

Item	Description
System IP	The MasterSwitch <i>plus</i> IP address.
Subnet Mask	The network subnet mask.
Default Gateway	The local default gateway (router address).
BOOTP	Enables or disables BOOTP requests for TCP/IP settings at startup.

### TFTP/FTP

Item	Definition
TFTP Client	
Remote Server IP	The network address of the TFTP server used for downloads.
FTP Client	
Remote Server IP:	The network address of the FTP server used for downloads.
User Name	The user name for access to the FTP server.
Password:	The password for access to the FTP server.
FTP Server	
Access:	Enable or Disable FTP server access.
Port:	The TCP/IP port on which the FTP server for the Management Card resides. <b>Default:</b> port 21

# Menu Item Definitions

## Network *continued*

---

### Telnet/Web

Item	Definition
Telnet	
Access	Enables or Disables Telnet Access.
Port	The TCP/IP port where the Telnet server for the MasterSwitch <i>plus</i> unit resides. <b>Default:</b> port 23
Web	
Access	Enables or Disables Web Access.
Port	The TCP/IP port where the Web server for the MasterSwitch <i>plus</i> unit resides. <b>Default:</b> port 80

### SNMP

Item	Definition
SNMP Access	Enables or disables SNMP access.
Access Control	Controls access to each of the four SNMP channels.
Trap Receiver	Defines the NMSs (up to 4) that traps are sent to.

### SNMP: access control

Item	Definition
Community Name	Password the NMS (identified by the NMS IP option) must use for SNMP access to MasterSwitch <i>plus</i> . The allowed access type is defined by the Access Type option. <b>Note:</b> <i>Up to 15 characters.</i>
NMS IP	Configures the channel to allow only one NMS (using a specific NMS IP address), or all NMSs (using 0.0.0.0 for the NMS IP value), to have access to the channel.
Access Type	Defines whether an NMS (identified by the NMS IP option) can Write (use Gets and Sets), Read (use only Gets), or be Disabled (cannot use Gets and Sets at all).

*Continued on next page*

# Menu Item Definitions

## Network *continued*

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### SNMP: Trap

#### Receiver

Item	Definition
Community Name	Password MasterSwitch <i>plus</i> uses when it sends traps to the NMS identified by the Receiver NMS IP option. <b>Note:</b> Up to 15 characters.
Receiver NMS IP	The specific NMS (using its IP address) that will receive traps sent by MasterSwitch <i>plus</i> . <b>Note:</b> <i>To send no traps to any NMS set the Trap Receiver IP to 0.0.0.0</i>
Trap Generation	Enables or Disables MasterSwitch <i>plus</i> to send traps to the NMS identified by the Receiver NMS IP option
Authentication Traps	Enables or Disables MasterSwitch <i>plus</i> to send authentication traps to the NMS identified by the Receiver NMS IP

# Menu Item Definitions

## System

---

### User Manager

Item	Definition
Auto Logout	The amount of time of inactivity before the user is automatically logged out. <b>Default:</b> 3 minutes.
Authentication	A setting of Basic causes the Web Interface to use standard HTTP 1.1 login (base64 encoded passwords); MD5 causes the Web Interface to use an MD5-based authentication login. In order for MD5 to function properly, you must enable cookies in your browser. <b>Default:</b> Basic
Administrator	
User Name	User name (10 characters maximum). <b>Default:</b> apc
Password	Password only for HTTP 1.1 authentication (10 characters maximum). <b>Default:</b> apc
Authentication Phrase	Authentication phrase (only for MD5), Phrase must be 15–32 characters long. <b>Default:</b> admin user phrase
Device Manager User	
User Name	User name (10 characters maximum). <b>Default:</b> apc
Password	Password only for HTTP 1.1 authentication (10 characters maximum). <b>Default:</b> apc
Authentication Phrase	Authentication phrase for MD5. The phrase must be 15–32 characters long. <b>Default:</b> device user phrase

*Continued on next page*

# Menu Item Definitions

## System *continued*

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### Outlet User Manager

Item	Definition
User Name	Outlet user name for both HTTP 1.1 and MD5 authentication. (10 characters maximum.) <b>Note:</b> <i>A User Name in Orange indicates the user account has been disabled.</i>
Password	Outlet user password for HTTP 1.1 authentication. (10 characters maximum.)
Authentication Phrase	Outlet user authentication phrase for MD5. The phrase must be 15–32 characters long
User Description	Identification/description of outlet user. (30 characters maximum)
Account Status	Enables, disables, or deletes Outlet's account. <b>Note:</b> <i>A disabled account prevents the Outlet User of the account from logging in.</i>
Device Outlet Access	Selects the outlets users will only have access to.

**Outlet User List.** The Current Outlet User List is a summary of the existing enabled or disabled accounts. The Outlet Access column provides a summary of which outlets users have permission to access.

### Identification

Item	Definition
Name	The system name used to identify the device. Name will be used for sysName OID in SNMP agent.
Contact	The contact or owner of the device. Will be used for sysContact OID in SNMP agent.
Location	The physical location of the device. Will be used for sysLocation OID in SNMP agent

*Continued on next page*



# Menu Item Definitions

## System *continued*

---

### Date/Time

Item	Definition
Date	The date for the system in the form of: MM/DD/YY.
Time	The time for the system in the form of: HH:MM:SS (24 hour time).

### File Transfer

Item	Description
Describe the Current transfer settings	
Remote TFTP Server IP	IP address of the remote TFTP server defined in Network's TFTP/FTP settings. <b>TFTP:</b> Remote Server IP
Remote FTP Server IP	IP address of the remote FTP server defined in Network's TFTP/FTP settings. <b>FTP:</b> Remote Server IP
Remote FTP Server User Name	User name of the FTP server defined in Network's TFTP/FTP settings. <b>FTP Client:</b> User Name
Remote FTP Server Password	Password of the FTP server defined in Network's TFTP/FTP settings. <b>FTP Client:</b> Password
Configure the Name of the File to Download	
Filename	The name of the file to be downloaded
Initiate the Transfer	
Result of Last File Transfer	Displays the results of the last file transfer.
Initiate File Transfer Via	Chooses whether the file will be transferred via TFTP or FTP

*Continued on next page*

# Menu Item Definitions

## System *continued*

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### Tools

Item	Description
No Action	Causes no action.
Reboot Card	Re-initializes the Management Card's operation. <b>Note:</b> <i>Loads are NOT rebooted.</i>
Reset Card to Defaults	Restores all configuration settings to default (values are stored in Management Card's EEPROM). <b>Warning:</b> <i>This will reset the TCP/IP settings and enable BOOTP!</i>
Reset Card to Defaults Except TCP/IP	Restores all configuration settings to default except TCP/IP settings (values are stored in Management Card's EEPROM).

### Links

Item	Definition
User Links	
Name	The link name (up to 3) that will appear on the menu bar.
URL	The HTTP link in URL form: <i>http://mysite.com/mypage.com.</i>
APC Links	
Name	View the names of the APC links.
URL	Define the URL of each APC link.

**Note:** This option is not available on the Control Console interface.

## Security and Help Features

### Security Features

---

#### Overview

MasterSwitch *plus* provides several different security options, depending on the access interface you are using. This chapter describes these individual security elements. In general, MasterSwitch *plus* provides a reasonable level of access and authentication control. As a network device that passes information across the network, MasterSwitch *plus* is subject to the same exposure as other devices on the network. Protecting intranet networks that are connected to external networks (e.g., the Internet) with devices such as firewalls is also an important element in security.

#### Port assignments

It is possible to define the TCP ports that the Telnet, FTP, and Web servers are listening for. These ports are initially set at the standard “well known port” for the particular protocol. To hide the interfaces, you can use arbitrary port numbers from 5000–65535. When an interface uses a non-standard port, it is required to specify the port when using a client interface, such as a Web browser. Hiding the servers provides a level of security. The non-standard port address becomes an extra “password.”

#### User names, passwords and community names

The Administrator, Device Manager, and Outlet User names and passwords are for logging on to the Control Console and Web interfaces. All user names, passwords, and community names for SNMP are transferred over the network as plain text. A user who is capable of monitoring the network traffic can determine the user names and passwords required to access MasterSwitch *plus*. Any similar device using Telnet, a Web server, or an SNMPv1 agent will have the same constraints because of the limitations in the protocols.

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# Security and Help Features

## Security Features *continued*

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### **Authentication versus encryption**

MasterSwitch *plus* does not currently use any type of encryption. All the data and communication between MasterSwitch *plus* and the client interfaces, such as Telnet and the Web server, are able to be captured. For almost all applications, however, sensitive data is not being transferred. MasterSwitch *plus* does control access by providing basic authentication through user names, passwords and IP addresses. While these basic security features are sufficient for most environments, MasterSwitch *plus* can also provide a greater level of security by enabling MD5 authentication for the Web interface.

### **MD5 authentication**

The Web interface option for MD5 authentication enables a higher level of access security than that provided by the basic HTTP authentication scheme. The MD5 scheme is similar to CHAP and PAP remote access protocols. When MD5 is enabled, the Web server requests a user name and a password phrase (distinct from the password). The user name and password phrase are not transmitted over the network, as in basic authentication. A Java login applet combines the user name, password phrase, and a session-unique challenge number to calculate an MD5 hash number. The hash number is then returned to the server so that it can verify that the user has the correct login information. By passing back only the hash number, the login information is not revealed. In addition to the login authentication, each form post for configuration or control operations is also authenticated with a unique challenge and hash response. This scheme does not involve any encryption, so pages are transmitted in their plain-text form. After the authentication login, subsequent page access is restricted by IP addresses and a hidden session cookie. In order for MD5 authentication to function properly, you must have cookies enabled in your browser.

Since the MD5 authentication scheme is available only for the Web interface, you must disable the less secure interfaces, including Telnet, FTP, and SNMP. For SNMP, it is possible to disable write-only access so that read and trap facilities are still available.

*Continued on next page*

# Security and Help Features

## Security Features *continued*

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### MD5 authentication, continued

The MD5 authentication scheme provides a much higher level of security than the plain-text type access methods. However, sophisticated attacks are almost impossible to prevent. Well-configured firewalls are an essential element in an overall security scheme. For additional information on MD5 authentication, see RFC document #1321 at the Web site of the Internet Engineering Task Force. For CHAP, see RFC document #1994.

### Web interface MD5 authentication

Interface	Security Access	Notes
Serial Interface Control Console	<ul style="list-style-type: none"><li>– User name &amp; password</li></ul>	Always enabled.
Telnet Control Console	<ul style="list-style-type: none"><li>– User name &amp; password</li><li>– Selectable server port</li><li>– Server Enable/Disable</li></ul>	The user name and password are transmitted plain-text.
SNMP	<ul style="list-style-type: none"><li>– Community Name</li><li>– NMS IP filters</li><li>– Agent Enable/Disable</li><li>– Four access communities with read/write/disable capability</li></ul>	IP filters only allow access from designated IP addresses.
FTP Server	<ul style="list-style-type: none"><li>– User name &amp; password</li><li>– Selectable server port</li><li>– Server Enable/Disable</li></ul>	Administrator access only.
Web Server	<ul style="list-style-type: none"><li>– User name &amp; password</li><li>– Selectable server port</li><li>– Server Enable/Disable</li><li>– MD5 Authentication option</li></ul>	In basic HTTP authentication mode, the user name and password are transmitted base-64 encoded (no encryption). In MD5, authentication mode uses user name and password phrase.

# Security and Help Features

## Help Features

---

### Overview

MasterSwitch *plus* provides help menus on each interface to assist you if you are having trouble finding what you need. The help menu is located on the lower, left-hand side of the screen on the Web interface. On the Control Console, type ? to access the help menu.

### Navigating through the help files

**Contents.** The Contents screen provides a complete listing of the help information.

**Interactive Assistant.** Interactive Assistant brings APC Customer Service to the Web. When you select Interactive Assistant, MasterSwitch *plus* will transmit information about the Management Card to APC's Assistant Online server. The server will process the information and tell you if a newer version of firmware is available and how to proceed. Interactive Assistant can also link you to extensive context-sensitive help.

**About Card.** About Card provides information about MasterSwitch *plus* covering the Hardware factory, Application module, and APC OS (AOS) information. About Card is where you will find the serial number, hardware revision, and the date and time the version and AOS was loaded.

**Local Help Pages.** MasterSwitch *plus* has internal help pages that can be accessed by selecting Help in the Navigation frame or by clicking the ? at the end of black title bars.

# APC® MasterSwitch *plus*

## Managing the Expansion Unit

### Introduction

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#### Overview

If you have purchased only the MasterSwitch *plus* Expansion Unit (AP9225 EXP) and your configuration does not include an AP9225, you can configure the Expansion Unit through MasterSwitch *plus* menus. For information on how to access these menus, see the Control Console Interface Map on page 65.

**Note:** When logging in, you will not need a username.

#### Navigating through the menus

The MasterSwitch *plus* menus allow you to manage the MasterSwitch *plus* unit and an Environmental Monitoring Card. All menus list items by number and name. To navigate through the menus, you will need to remember the following list of operations:

- To enter a selection on any of the menus, type its related one- or two-character command and press ENTER.
- To see the results of the last changes you have made, it will sometimes be necessary to press ENTER.
- To return to the previous screen, press ESC.
- To exit the MasterSwitch *plus* menus, type Q (case-sensitive) at the Main menu.

# Managing the Expansion Unit

## Main Menu

---

### Item definitions

Item	Description
Version	Displays the version of the MasterSwitch <i>plus</i> firmware.
Unit Name	Identifies the MasterSwitch <i>plus</i> unit that has been accessed. <b>Note:</b> <i>The Unit Name can be changed in the Unit Properties menu.</i>
UPS State	Displays the status of the UPS. The possible states are: <b>Inactive:</b> UPS is in sleep mode <b>On Line:</b> UPS is operating normally <b>AC Fail:</b> UPS is operating on battery <b>Unknown:</b> communication with UPS has failed
Outlet Name	Identifies each outlet. <b>Note:</b> <i>Each outlet's names is changeable at the associated outlet properties menu.</i>
Outlet State	Displays the current state of the outlet. The possible states are: <b>On:</b> outlet is turned on <b>On in hh:mm:ss:</b> outlet will be turned on after the specified time period elapses <b>Off:</b> outlet is turned off <b>Off in hh:mm:ss:</b> outlet will be turned off after the specified time period elapses
To Change Unit Properties	Instructs you to enter an U to access the Unit Properties menu. <b>Note:</b> <i>The Enable/Disable Alarms setting on the Outlet Properties menus controls the behavior of an individual outlet with regard to Environment alarms</i>
To Change Outlet Properties	Instructs you to enter the associated outlet number (1–8) to access its outlet properties.
To Change Environmental Monitoring Card Properties	Instructs you to enter M to access the Environmental Monitoring Card properties menu (available only if an Environmental Monitoring Card is present).
To Change Units	Instructs you to enter an I to access the next MasterSwitch <i>plus</i> unit in the cascading setup.



# Managing the Expansion Unit

## Main Menu *continued*

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### Item definitions, continued

To Change Outlet States	<p>Instructs you to enter various commands to initiate on-demand outlet actions. After entering a command, you will be asked to enter an outlet number (1–8) to perform the action on the associated outlet or you will be asked to enter an <b>A</b> to perform the action on all of the outlets. The various commands you may enter are:</p> <p><b>N:</b> On—Immediately turns an outlet on. This command is available any time after the unit’s Power On Time Delay has expired and the outlet is off.</p> <p><b>S:</b> Shutdown—Gracefully shuts down and optionally restarts an outlet. If the server is running shutdown software, such as PowerChute Plus, and is connected to MasterSwitch <i>plus</i> with the appropriate signaling cable, this operation will ensure that your server’s operating system is shutdown before the outlet is turned off. Otherwise, it will turn off the outlet after the Power Off Time Delay expires. You can program the outlet to restart automatically by specifying a Restart Delay. The Restart Delay can be set to as long as 999.9 hours. The sequence diagram on page 17 illustrates the this command.</p> <p><b>C:</b> Cancel—Cancels a delayed startup or shutdown. The sequence diagrams on pages 16–19 and pages 21–22 illustrate the use of this command.</p> <p><b>D:</b> Delayed On—Turns an outlet on after the outlet’s Turn On Delay expires. The sequence diagram on page 21 illustrates this command. This command is available any time after the unit’s Power On Time Delay has expired and the outlet is off.</p> <p><b>F:</b> Off—Immediately turns an outlet off.</p> <p><b>R:</b> Reboot—Immediately turns an outlet off and turns it back on after the outlet’s Reboot Duration expires. The sequence diagram on page 22 illustrates the this command. After selecting Reboot, you are prompted with the following: “Shutdown Gracefully? (Y/N)”</p> <p><b>Y:</b> Graceful Reboot—Gracefully shuts down and restarts an outlet. If the server is running shutdown software, such as PowerChute <i>plus</i>, and is connected to MasterSwitch <i>plus</i> with the appropriate signaling cable, this operation will ensure that your server’s operating system is shutdown before the outlet is turned off. Otherwise, it will turn off the outlet after the Power Off Time Delay expires. The outlet will be restarted after the Reboot Duration expires. The sequence diagram on page 23 illustrates the this command.</p> <p><b>Note:</b> <i>If this command is applied to all outlets, then the Reboot Duration delay for an outlet will not begin until all the outlets have shut down.</i></p> <p><b>O:</b> Override—Allows an outlet to restart when the UPS battery charge has not exceeded the Battery Capacity Threshold. The sequence diagrams on pages 16 and 19 illustrate the use of this command.</p>
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# Managing the Expansion Unit

## Unit Properties Menu

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### Item definitions

Item	Description
Name	A string of characters used to identify the MasterSwitch <i>plus</i> unit. Allows a maximum of 23 printable ASCII characters <b>Default:</b> unnamed
Address	Allows you to specify the units address (1–4) in a cascading setup. Enter 1 for the unit connected closest to the UPS, 2 for the unit adjacent to unit 1, and so on for up to four units. See the document included on the CD titled <i>Setup of the MasterSwitch plus Expansion Unit</i> for instructions on setting up Expansion Unit addresses. <b>Default:</b> 1 <b>Note:</b> <i>If the addresses for all units are not set up properly, the units will not operate properly.</i>
Manual Button	Allows you to enable/disable the unit's manual button. If enabled, the button functions according to the description on page 11. If disabled, the button does not function. <b>Default:</b> Enabled
Password	Allows you to set the unit's password. The password is case-sensitive and can be up to 9 printable characters. <b>Default:</b> apc (lower case)
Restore Factory Defaults	Reinstates the original settings for your MasterSwitch <i>plus</i> unit. All unit properties are set to the defaults shown in this table. Outlet Properties are restored to the defaults shown on page 12.
View Manufacturing Data	Displays the following information: Model Number, Manufacture Date, Hardware Rev, Firmware Rev, and Serial Number. These items are provided for your information and cannot be configured.
View Self-Test Results	Allows you to display the results (Passed or Failed) of the unit's last power up self-test. The tests performed are: <b>Program Memory:</b> confirms whether or not the EPROM chip is working properly. <b>Non-Volatile Memory:</b> confirms whether or not the EEPROM is working properly.
Menu Timeout Period	Automatically logs you off after the specified period of inactivity.
Power On Time Delay	The time that MasterSwitch <i>plus</i> will delay after AC power is applied before starting the outlet's power on sequence. <b>Range:</b> 0–2:46:39 <b>Default:</b> 0

*Continued on next page*

# Managing the Expansion Unit

## Outlet Properties Menu

### Overview

MasterSwitch *plus* has eight Outlet Properties menus—one for each outlet. To access these menus, enter an outlet number (1–8) from the Main menu. The Outlet Properties menu varies according to the Outlet Control mode setting of the chosen outlet.

### Graceful Shutdown menu items

Item	Definition	Available Settings
Outlet Name	Identifies each outlet.	23 characters maximum
Outlet Control Mode	Establishes mode for associated outlet.	Graceful Shutdown or Annunciator
Will Device Confirm	Indicates whether the device connected to the outlet can assert a shutdown signal.	<b>Yes</b> <b>No</b>
Low Battery Warning Control	Selects the method MasterSwitch <i>plus</i> uses for determining when to assert the outlet's Low Battery signal after the UPS has gone on battery.	<b>Programmed Delay:</b> 0–16:39:54 <b>On Runtime Remaining:</b> When the UPS runtime remaining falls below the UPS's UPS Low Battery Signal Time <b>Never</b>
UPS Low Battery Multiplier	Adjusts the UPS Low Battery Signal Time. This property allows each outlet to be programmed to generate a low battery signal at a different time. MasterSwitch <i>plus</i> will assert the outlet's Low Battery signal when both of the following conditions apply: <ul style="list-style-type: none"><li>the Low Battery Warning Control is set to On Runtime Remaining or Programmed Delay, and</li><li>the UPS is on battery and the UPS runtime remaining falls below the product of the UPS Low Battery signal time and the UPS Low Battery Multipliers.</li></ul>	<b>Range: 1–7</b>

*Continued on next page*

# Managing the Expansion Unit

## Outlet Properties Menu *continued*

### Graceful Shutdown menu items, continued

Item	Definition	Available Settings
Restart Delay	The delay between an outlet shutting off due to a Graceful Shutdown and the outlet being restarted.	<b>Range:</b> 0–999:54 <b>Note:</b> <i>Time is rounded down by 6-minute intervals</i>
Power Off Delay	The time from the triggering event (such as a server confirming a shutdown) until the outlet is turned off.	<b>Range:</b> 0–2:46:39
Power On Delay	Determines the time interval between the triggering event and the outlet being turned on.	<b>Range:</b> 0–2:46:39
Reboot Duration	The delay between the outlet shutting off because of Reboot and the outlet restarting.	<b>Range:</b> 0–2:46:39
Battery Capacity Threshold	Sets the minimum percentage of Battery Capacity required of the UPS before an outlet can be turned on.	<b>Range:</b> 0–100%
Enable/ Disable UPS Alarms	Environment Alarm Masks: Indicates whether or not an outlet will react to a specific Environment alarm.	Enabled and disabled for each of the twelve Environmental alarms.
Select Another Outlet	Allows you choose an another outlet to configure.	
Alarm Action Delay	The amount of time that an Environment alarm must be asserted before the unit reacts to the alarm.	<b>Range:</b> 0–2:45:00

*Continued on next page*

# Managing the Expansion Unit

## Outlet Properties Menu *continued*

### Annunciator menu items

Item	Definition	Available Settings
Outlet Name	Identifies each outlet.	20 characters maximum
Outlet Control Mode	Establishes mode for associated outlet.	Graceful Shutdown or Annunciator
Initial State	Defines the initial state of the outlet.	<b>Off</b> <b>On</b>
Alarm Action Delay	The amount of time that an Environment alarm must be asserted before the unit reacts to the alarm.	<b>Range:</b> 0–2:45:00
Enable/Disable UPS Alarms	Environment Alarm Masks: Indicates whether or not an outlet will react to a specific Environment alarm.	Settings are enabled and disabled for each of the 12 Environmental Monitoring Card alarms.
Select Another Outlet	Allows you choose an another outlet to configure.	

### Environmental Monitoring Card menu

Item	Description
Temp (Celcius)	Displays the current ambient temperature reading of each attached probe. Temperature is displayed in ##.## degrees Celsius.
Humidity	Displays the current relative humidity reading of each attached probe. Humidity is displayed in ###.##% relative humidity.
Low Limit	Allows you to disable or set the low alarm threshold for temperature and humidity for each probe. Temperature threshold is in degrees Celsius and humidity is in percent relative humidity. If alarm limits are exceeded, an alarm will be asserted to all outlets whose Enable/Disable Alarm settings for that alarm are set to Enabled.
High Limit	Allows you to disable or set the low alarm threshold for temperature and humidity for each probe. Temperature threshold is in degrees Celsius and humidity is in percent relative humidity. If alarm limits are exceeded, an alarm will be asserted to all outlets whose Enable/Disable Alarm settings for that alarm are set to Enabled.
Disable All Alarms	Allows you to control Environmental Monitoring Card operation. The options are: <b>Yes:</b> all alarm limits are set to Disabled. MasterSwitch <i>plus</i> will ignore all Environment alarms. <b>No:</b> all alarm limits are reset to previous configuration.

# APC® MasterSwitch *plus*

## Product Information

### Accessories Affected by MasterSwitch *plus*

#### PowerChute Plus

The Scheduled Shutdown and Shut Down System Now commands are available in PowerChute Plus to perform actions on the server connected to Outlet #1 of MasterSwitch *plus*. However, the Shut Down System Now command will turn off Outlet #1 and will require you to turn it on through the User Interface to restart. Additional settings affected include those listed in the following table.

PowerChute Plus Setting	Relationship to MasterSwitch <i>plus</i>
UPS Low Battery Signal Time	Multiplied by the UPS Low Battery Multiplier for each outlet of MasterSwitch <i>plus</i> . See page 32 for more information.
UPS Turn Off Delay	Overridden by the Power Off Delay for each outlet of MasterSwitch <i>plus</i> . See page 31 for more information.
UPS Wakeup Delay Time	Overridden by the Power On Delay for each outlet in MasterSwitch <i>plus</i> . See page 31.
UPS Wakeup Delay (Capacity)	Overridden by the Battery Capacity Threshold for each outlet in MasterSwitch <i>plus</i> . See page 32 for more information.

#### Management Peripherals

UPS control commands available with APC accessories are not supported when used with MasterSwitch *plus*. Therefore, on-demand operation through APC accessories is not supported at this time.

# Product Information

## Warranty Information

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### Limited warranty

American Power Conversion (APC) warrants MasterSwitch *plus* to be free from defects in materials and workmanship for a period of two years from the date of purchase. Its obligation under this warranty is limited to repairing or replacing, at its own sole option, any such defective products. This warranty does not apply to equipment that has been damaged by accident, negligence, or misapplication or has been altered or modified in any way. This warranty applies only to the original purchaser.

### Warranty limitations

Except as provided herein, American Power Conversion makes no warranties, express or implied, including warranties of merchantability and fitness for a particular purpose.

Some jurisdictions do not permit limitation or exclusion of implied warranties; therefore, the aforesaid limitation(s) or exclusion(s) may not apply to the purchaser.

Except as provided above, in no event will APC be liable for direct, indirect, special, incidental, or consequential damages arising out of the use of this product, even if advised of the possibility of such damage.

Specifically, APC is not liable for any costs, such as lost profits or revenue, loss of equipment, loss of use of equipment, loss of software, loss of data, costs of substitutes, claims by third parties, or otherwise. This warranty gives you specific legal rights and you may also have other rights, which vary from state to state.

# Product Information

## Troubleshooting

### Troubleshooting suggestions

Problem	Possible Cause	Solution
A server connected to a Basic port does not detect On Battery or Low Battery signal.	Wrong cable is being used.	Verify that you are using the correct cable. Refer to “Choosing additional cables: Table 1,” in the <i>Installation and Quick Start Manual</i> .
	Server shutdown software is not configured for simple signaling.	Configure PowerChute Plus for simple signaling. For instructions, see the documentation supplied with PowerChute Plus.
One or more servers shuts down when the UPS is on battery, but does not reboot when power returns	PowerChute Plus is configured to start shutdown on an AC Fail event and the shutdown time for operating system is set too short.	If the MasterSwitch <i>plus</i> Low Battery Warning Control is set to Programmed Delay, make the delay shorter than the AC Fail shutdown delay in PowerChute Plus FlexEvents.
	MasterSwitch <i>plus</i> Low Battery Warning Control is set to Programmed Delay	If the server is capable of UPS shutdown, consider setting the Will Device Confirm property to Yes.
To UPS Status LED is flashing green and red.	Communication cable is not fastened securely or the wrong cable is being used.	Verify that all cables are securely fastened and that the cable has APC part number 940-1000.
	UPS is connected to the wrong port.	Verify that the UPS is connected to the To UPS port on MasterSwitch <i>plus</i> .

*Continued on next page*



# Product Information

## Troubleshooting *continued*

### Troubleshooting suggestions, *continued*

Problem	Possible Cause	Solution
To UPS Status LED is flashing green and red.	UPS is not capable of advanced communication.	Only Smart-UPS, Matrix-UPS and the Symmetra <i>PowerArray</i> can communicate with MasterSwitch <i>plus</i> .
	There is a problem with the UPS.	Contact Technical Support at the number listed on the back cover of this manual.
Cannot access the MasterSwitch <i>plus</i> Control Console.	Serial Interface is using incompatible terminal settings.	Change serial interface settings to match the MasterSwitch <i>plus</i> baud rate (2400), with 8 data bits, no parity, 1 stop bit, and no flow control.
One or more outlets turn off when the UPS is On Battery, but do not restart when power returns.	Power On Time Delay is set to Remain Off.	Change the Power On Time Delay setting.
	Battery Capacity Threshold has not been exceeded.	Reduce the Battery Capacity Threshold setting or perform an on-demand override.
	A Measure-UPS alarm for the outlet is active.	Clear the alarm.
The UPS is On Battery and the server does not shut down the OS.	Low Battery Warning Control is set to Never.	Change the Low Battery Warning Control setting.
	Will Device Confirm is set to Yes and: a) the server is not confirming OS shutdown, or b) the wrong cable is being used.	a) Some versions of PowerChute Plus do not support the Confirm feature. See the documentation supplied with PowerChute Plus. b) Verify that you are using the correct cable. Refer to “Choosing additional cables: Table 1,” in the <i>Installation and Quick Start Manual</i> .

*Continued on next page*

# Product Information

## Troubleshooting *continued*

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**If problems persist** For problems not covered in the troubleshooting chart (“Troubleshooting suggestions” on page 57) or if the problem persists, follow this procedure:

1. Note the serial number and date of purchase of the MasterSwitch *plus* unit. Contact Customer Support at a phone number or address on the back cover of this manual.
2. Be prepared to provide a description of the problem. A technician will help solve the problem over the phone, if possible, or will give you a return material authorization (RMA) number.
3. If the MasterSwitch *plus* unit is under warranty, repairs or replacement is free of charge. If the warranty has expired, there will be a charge for repair or replacement.
4. Pack the MasterSwitch *plus* unit carefully to avoid damage in transit. Damage sustained in transit is not covered under the warranty. Enclose a letter in the package with your name, address, RMA number, a copy of the sales receipt, daytime phone number, and check (if applicable).
5. Mark the RMA number clearly on the outside of the shipping carton. The factory will not accept any materials without this marking.
6. Return the MasterSwitch *plus* unit by insured, prepaid carrier to the address provided by the Customer Support technician.

# Product Information

## Life-Support Policy

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### General policy

As a general policy, American Power Conversion (APC) does not recommend the use of any of its products in life-support applications where failure or malfunction of the APC product can be reasonably expected to cause failure of the life-support device or to significantly affect its safety or effectiveness. APC does not recommend the use of any of its products in direct patient care. APC will not knowingly sell its products for use in such applications unless it receives in writing assurances satisfactory to APC that (a) the risks of injury or damage have been minimized, (b) the customer assumes all such risks, and (c) the liability of American Power Conversion is adequately protected under the circumstances.

### Examples of life-support devices

The term *life-support device* includes but is not limited to: neonatal oxygen analyzers, nerve stimulators (whether used for anesthesia, pain relief, or other purposes), autotransfusion devices, blood pumps, defibrillators, arrhythmia detectors and alarms, pacemakers, hemodialysis systems, peritoneal dialysis systems, neonatal ventilator incubators, ventilators for both adults and infants, anesthesia ventilators, and infusion pumps, and any other devices designated as “critical” by the U.S. FDA.

Hospital-grade wiring and leakage current protection may be ordered as options on many APC UPS systems. APC does not claim that units with these modifications are certified or listed as Hospital Grade by APC or any other organization. Therefore these units do not meet the requirements for use in direct patient care.

# Product Information

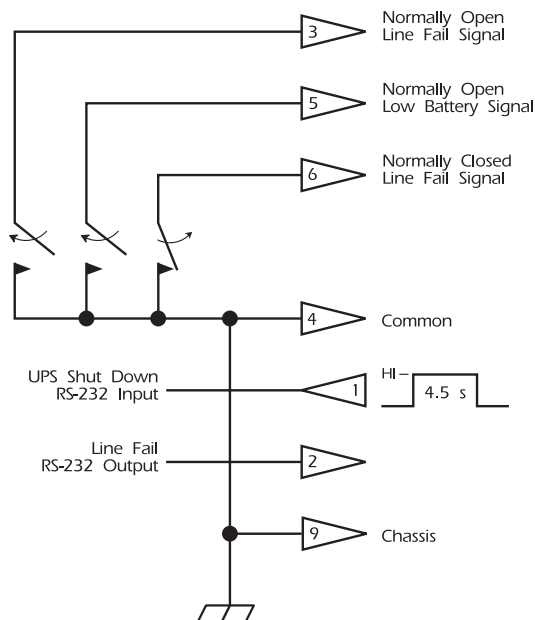
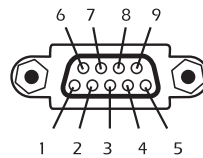
## Specifications

### Basic port interface

The following limitations and capabilities apply to the Basic port interface (Ports 1–8) of MasterSwitch *plus*:

- Pins 3, 5, and 6 are open collector outputs which must be pulled up to a common referenced supply no greater than +40 Vdc. The transistors are capable of a maximum non-inductive load of 25 mAdc. Use only Pin 4 as the common.
- The output at Pin 2 generates a LO-to-HI RS-232 level when the device is signaling an On Battery condition. The pin is normally at a LO RS-232 level.
- The MasterSwitch *plus* unit may be signaled to shut down the UPS by applying a HI RS-232 level to Pin 1 for 4.5 seconds. Shutdown is also dependent on the UPS status and the MasterSwitch *plus* shutdown mode (see “MasterSwitchplus Properties” on page 12).

### Basic port pin assignments



Continued on next page

# Product Information

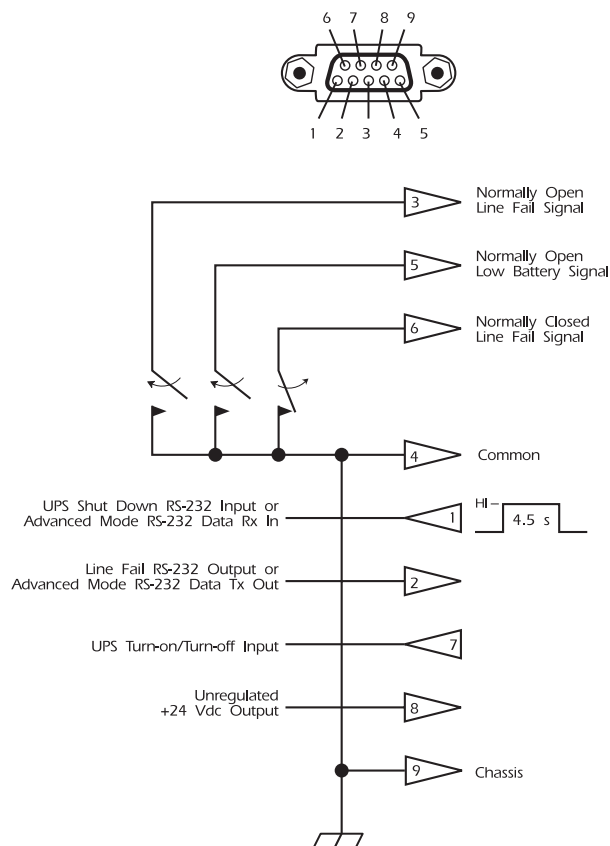
## Specifications *continued*

### Advanced port interface

The Advanced port of MasterSwitch *plus* has the same limitations and capabilities as the Basic ports (see “Basic port interface” on page 61), with the following additional limitations and capabilities:

- Applying a momentary (approximately 1 second) high RS-232 level to Pin 7 turns the UPS and its loads on. A momentary low RS-232 level turns the UPS and loads off. Pin 7 should be normally unconnected. This signal is passed through the MasterSwitch *plus*.
- DC operating voltage is available on Pin 8 of the Advanced port. This may be the UPS battery voltage or the voltage from an external adapter, whichever is greater.

### Advanced port pin assignments



*Continued on next page*

# Product Information

## Specifications *continued*

### Product specifications

Item	Specification
Electrical	
Input: Nominal input voltage Acceptable input voltage Nominal input frequency Overcurrent protection Input connector	120 VAC 100–140 VAC 50/60 Hz 15 A resettable circuit breaker 15 ft (4.5 m) attached NEMA 5-15 line cord
Output: Output connectors	8 NEMA 5-15 receptacles
Maximum total current draw:	15 A
Physical	
Size (H × W × D): Stand-alone  With mounting brackets	2.125 × 17.0 × 6.5 in (5.4 × 43.2 × 16.5 cm)  1.875 × 19.0 × 6.5 in (4.8 × 48.3 × 16.5 cm)
Weight:	7.75 lb (3.51 kg)
Shipping weight:	12.0 lb (5.45 kg)
Environmental	
Elevation (above MSL): Operating Storage	0 to 10,000 ft (0 to 3000 m) 0 to 50,000 ft (0 to 15 000 m)
Temperature: Operating Storage	32 to 104°F (0 to 40°C) 32 to 113°F (0 to 45°C)
Operating Humidity:	0 to 95%, non-condensing
Approvals	
EMC verification:	FCC Class A; DOC Class A
Safety Agency:	CSA; UL

# MasterSwitch *plus* Web Interface

---

## Status Summary

### **MasterSwitch *plus***

Describes the MasterSwitch *plus* status

### **Environment**

Describes the Environment status

### **Web/SNMP Management Card**

Describes the Management Card status

## Outlets

### **Control and Status of Outlets**

Master Outlet Control for accessible outlets

Control Actions: [Immediate On](#), [Sequenced On](#),  
[Immediate Off](#), [Graceful Reboot](#), [Immediate Reboot](#),  
[Shutdown](#), [Override](#), [Cancel](#)

Individual Outlet Control for accessible outlets

Control Actions: [Immediate On](#), [Delayed On](#),  
[Immediate Off](#), [Graceful Reboot](#), [Immediate Reboot](#),  
[Shutdown](#), [Override](#), [Cancel](#)

## MasterSwitch *plus*

### **Device configuration**

Configure the MasterSwitch *plus* device settings

[Device Name](#)  
[Manual Button](#) (enable/disable)  
[Power On Time Delay](#)

### **Outlet configuration**

Configure MasterSwitch *plus* outlet name, mode, and link settings

Outlet (unit #:outlet #): [Restart Delay](#), [Power On Delay](#),  
[Reboot Duration](#), [Alarm Action Delay](#), [Device Confirm](#),  
[Low Battery Warning Control](#), [UPS Low Battery](#),  
[Multiplier](#), [Battery Capacity Threshold](#), [Initial State](#)

[Outlet Name](#)  
[Outlet Control Mode](#) (Graceful Shutdown, Annunciator)  
[Outlet Link](#) (URL)

Enable/Disable [Environment Alarm Actions](#)

Outlets 1–8; Zones 1–4

Outlets 1–8; Probe 1

Outlets 1–8; Probe 2

## Environment

### **Status**

Current data reported from probes

Current Status of the contacts

### **Configuration**

Environment Probe Settings

[Threshold \(Probes 1 & 2\)](#): High Temperature, Low Temperature, High Humidity, Low Humidity  
[Traps](#) (enabled/disabled)

Environment Contact Settings

[Contact Name \(Zones 1–4\)](#)  
[Trap](#) (enabled/disabled)

## Event Log

These are the events that have occurred on this system

Date  
Time  
Event

## Network

### **TCP/IP**

Configure the TCP/IP settings

[System IP](#)  
[Subnet Mask](#)  
[Default Gateway](#)  
[BOOTP](#) (enable/disable)

### **TFTP/FTP**

Configure TFTP client settings

Configure FTP client settings

Configure FTP server access settings

### **Telnet/Web**

Configure Telnet Server Access Settings

Configure Web Server Access Settings

### **SNMP**

Configure SNMP access settings

Configure SNMP access control settings

Configure SNMP trap receiver settings

## System

### **User Manager**

Configure user access settings

[Auto Logout](#) (1, 2, 3, 4, 5, 8, 10 minutes)  
[Authentication](#) (Basic/MD5)

Configure the administrator settings

[User Name](#)  
[Password](#)  
[Authentication Phrase](#)

Configure the device manager user settings

[User Name](#)  
[Password](#)  
[Authentication Phrase](#)

### **Outlet User Manager**

[Current Outlet User List](#)

[Add New User](#)

### **Identification**

Configure the system name, contact, and location

### **Date/Time**

Configure the system date and time

### **File Transfer**

Describes the current file transfer settings

Configure the name of the file to download

Initiate file transfer

[Result of last file transfer](#)  
[Initiate file transfer via](#) (No action/FTP/TFTP)

### **Tools**

Initiate a system action

[Action](#) (No action, Reboot, Reset to defaults, Reset to defaults except TCP/IP)

### **Links**

Configure the User Links

Configure the APC Links

# MasterSwitch *plus* Control Console Interface

## Device Manager Menu

### MasterSwitch *plus* (1–4)

#### Name, State, Mode Outlet 1-8

Outlet Control	Outlet Configuration	Environment Alarms Configuration
Immediate On	Outlet Name	Zone 1–4 (enable/disable)
Delayed On	Outlet Control Mode	Probe 1 HUMIDITY LOW Limit
Immediate Off	Will Device Confirm	Probe 1 HUMIDITY HIGH Limit
Immediate Reboot	Low Batt Warn Ctrl	Probe 1 TEMP LOW Limit
Graceful Reboot	UPS Low Battery Multiplier	Probe 1 TEMP HIGH Limit
Shutdown	Restart Delay	Probe 2 HUMIDITY LOW Limit
Override	Power Off Delay	Probe 2 HUMIDITY HIGH Limit
Cancel	Power On Delay	Probe 2 TEMP LOW Limit
	Reboot Duration	Probe 2 TEMP HIGH Limit
	Battery Capacity Threshold	Accept Changes
	Accept Changes	

### Environment

#### About Environmental Monitor

Thresholds  
High Temperature  
Low Temperature  
High Humidity  
Low Humidity  
Send Traps On  
(enable/disable)

#### Contact Settings

Contact (1–4)  
Name  
Contact Zone (1–4)  
enable/disable

#### Threshold And Contact Details

Current Threshold Violations  
Current Contact Alarms

#### Trap Thresholds Probe 1, 2

Firmware version

## Network Menu

#### TCP/IP

IP System IP  
Subnet Mask  
Default Gateway  
BOOTP (enable/disable)

#### TFTP Client

Remote server IP address

#### FTP client

Remote Server IP  
User Name  
Password

#### FTP server

Access  
Port

#### Telnet

Access  
Port

#### Web

Access  
Port

#### SNMP

Settings  
Access control settings  
Trap receiver settings

#### Ping Utility

Ping Address

## System Menu

#### User Manager

Administrator  
Device Manager User  
Manage Outlet Users  
Auto Logout  
Authentication  
Accept Changes

#### Identification

Name  
Contact  
Location  
Accept Changes

#### Date/Time

#### File Transfer

Settings  
XMODEM  
TFTP Client  
FTP Client

#### Tools

Reboot  
Reset to Defaults  
Reset to Defaults Except TCP/IP

#### About System

MasterSwitch *plus*  
Model Number  
Serial Number  
Manufacture Date  
MAC Address  
Flash Vendor  
Web/SNMP Management Card AOS

## Logout



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