MasterSwitch plus

Power Control Unit

AP9225
AP9225EXP

User Guide

Thank You!

Thank you for selecting APC MasterSwitch Plus power control unit or the MasterSwitch Plus Expansion Unit. It has been designed for many years of reliable, maintenance-free service in combination with your American Power Conversion (APC) uninterruptible power supply (UPS) or as a stand-alone device. APC is dedicated to the development of high-performance electrical power conversion and control products. We hope that you will find this product a valuable, convenient addition to your computing system.

Please **read this manual!** It provides important safety, installation, configuration, and operating instructions that will help you get the most from your MasterSwitch Plus power control unit. See the *User Guide* on the supplied CD for more detailed information on the operation of MasterSwitch Plus power control unit.

Save **this manual!** It includes instructions for obtaining warranty service.

Radio frequency interference

Warning: *Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.*

Note: *This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this user manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference. The user will bear sole responsibility for correcting such interference.*

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

APC MasterSwitch Plus

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Chapter 1 Introduction

Product Description

Overview

MasterSwitch Plus (AP9225) is a power control unit with a Web SNMP Management Card (AP9606) pre-installed. This combination allows you to manage a MasterSwitch Plus, up to three MasterSwitch Plus Expansion Units (AP9225EXP), and a Measure-UPS II, using a Web browser, Telnet, or DTE equipment (a dumb terminal or a computer running terminal emulation software).

Front panel

Figure 1 shows the front panel of MasterSwitch Plus. The paragraphs that follow Figure 1 describe each of the labeled parts.

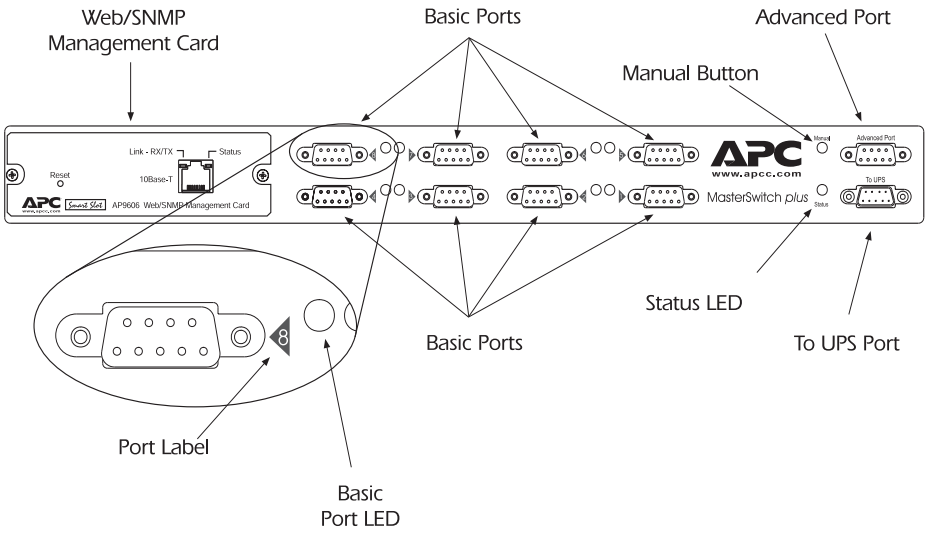

Figure 1: Front Panel

Note: AP9225EXP does not have a Web/SNMP Management Card installed in the SmartSlot housing.

Continued on next page

Introduction

Product Description *continued*

Basic ports

The eight Basic ports connect MasterSwitch Plus to servers running PowerChute or built-in UPS monitoring software. Each Basic port has its own label and LED. For specifications concerning the Basic ports, see "Basic port pin assignments" on page 67.

Note: Smart signaling allows you to use the advanced reporting features of PowerChute Plus. If you are using the Advanced port, Basic port #1 is not available.

Advanced port

The Advanced port allows the connected server to communicate with a UPS operating in Smart Mode (Smart-UPS®, Matrix-UPS™, or Symmetra™PowerArray™). For information on Smart Mode, see the user manual supplied with your UPS. For specifications concerning the Advanced port, see "Advanced port ***interface***" on page 68.

Note: The Advanced port may also be used for configuring MasterSwitch Plus. For instructions on configuring your unit through the Advanced port, see "Managing the Expansion Unit" on page 51.

To UPS port

The To UPS port is used to connect MasterSwitch Plus to a UPS or another MasterSwitch Plus unit with the supplied daisy-chain cable (APC part number 940-1000).

Web/SNMP Management Card

MasterSwitch Plus is pre-installed with a Web/SNMP Management Card. Using a Web browser, Telnet, or DTE equipment, you can remotely manage connected devices and configure password-protected Administrator, Device Manager, and Outlet User accounts that ensure restricted access to system, device, and outlet attributes and services.

SmartSlot accessory housing (AP9225EXP only)

The MasterSwitch Plus Expansion Unit provides housing for APC SmartSlot accessories on the front panel. SmartSlot accessories enhance your ability to monitor an APC UPS and to manage your system. For instructions on how to install and operate a SmartSlot accessory, refer to the user manual supplied with the accessory.

Continued on next page

Product Description *continued*

LEDS

Refer to Table 1 for a description of the conditions related to LED status.

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.
To UPS port	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.
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 "Remote Management Interfaces" on page 22 for more information.
	Flashing red slowly	MasterSwitch Plus is making a BOOTP request.
	Solid red	A hardware failure has been detected by MasterSwitch Plus.
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.

Table 1: MasterSwitch Plus LED Indicator Descriptions

Continued on next page

Product Description *continued*

Manual button

The Manual button is used to cancel two different commands. If this button is pressed for at least ½ second and then released, one of the following results will occur:

- if MasterSwitch Plus is waiting for the Master Power On Delay to expire, then MasterSwitch Plus will issue a cancel command. The sequence in Figure 3 on page 11 illustrates the outlet's behavior when the Master Power On Delay is canceled.
- 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 sequence in Figure 3 on page 11 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.

Reset button

The reset button 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.

Rear panel

Figure 2 shows the rear panel of MasterSwitch Plus.

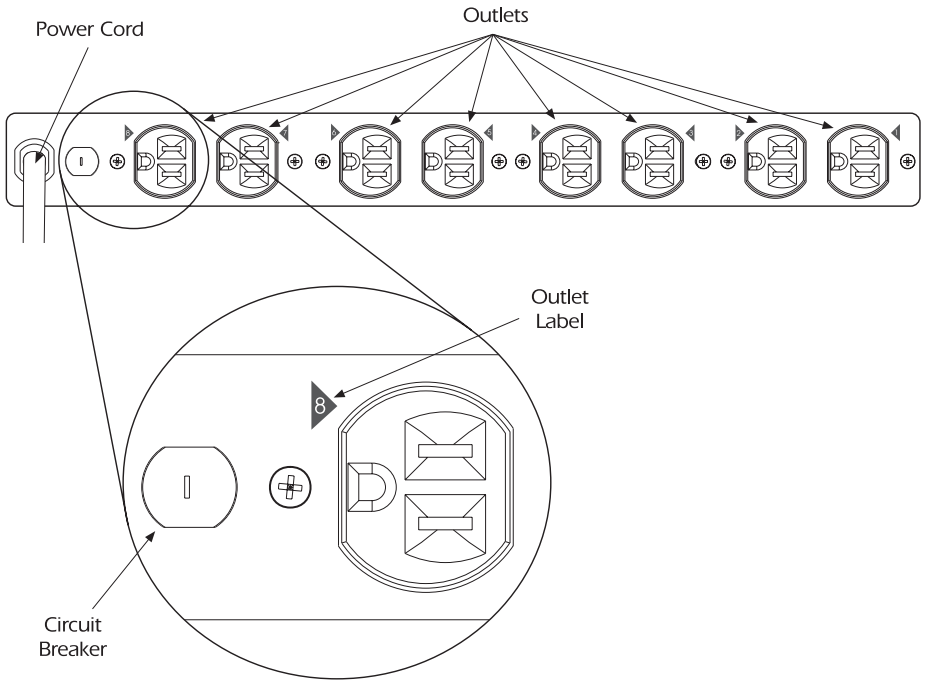

Figure 2: Rear Panel

Introduction

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, and outlet properties allow you to customize the behavior of individual outlets.

Unit properties

Table 2 lists the Unit properties and provides a description and the available settings for each property.

Property	Description	Available Settings
Device Name	A string of characters used to identify the MasterSwitch Plus unit.	A maximum of 23 printable ASCII characters **Default** = unnamed
Power On Time Delay	The time that MasterSwitch Plus will delay after AC power is applied before starting the outlet's power on sequence.	**Range**: 0–2:46:39 **Default**: 0
Manual Button	Governs whether or not the manual button functions. (This item is only available if you are using Telnet or DTE equipment.)	**Enabled**: the button functions according to the description in "Manual button" on page 4 **Disabled**: no function **Default**: Enabled

Table 2: Unit Properties

Note: Unit properties retain their value even after power has been removed from MasterSwitch Plus.

Outlet properties

Outlet properties are governed by two operating modes: Annunciator and Graceful Shutdown. (See "Planning Your Configuration" on page 9 for more information on these modes.) Some outlet properties are common to both operating modes, while other properties are specific to each operating mode. The following three paragraphs describe the outlet properties with respect to the mode(s) they can operate under.

Continued on next page

MasterSwitch Plus Properties *continued*

Outlet properties: both operating modes

Table 3 describes the properties common to both operating modes and the available settings for each.

Property	Description	Available Settings
Outlet Control	Controls the operation of the outlet.	Graceful Shutdown mode and Annunciator mode.
Name	Identifies the outlet being accessed.	A maximum of 23 printable ASCII characters.
Measure-UPS II Alarm Masks	Indicates whether or not an outlet will react to a specific Measure-UPS II alarm.	Enabled or disabled for each of the 12 Measure-UPS II alarms.

Table 3: Common Outlet Properties

Note: Outlet properties retain their value even after power has been removed from MasterSwitch Plus.

Outlet properties: Graceful Shutdown mode

Table 4 describes the outlet properties that are specific to Graceful Shutdown mode and the available settings for each. See Table 6 on page 8 for the default settings for these items.

Property	Description	Available Settings
Restart Delay	The delay between an outlet shutting off due to a Graceful Shutdown and the outlet being restarted.	**Range**: 0–999:54 *Note: Time is rounded down by 6-minute intervals*
Power On Time Delay	Determines the time interval between the triggering event and the outlet being turned on.	**Range**: 0–2:46:39
Power Off Time Delay	The time from the triggering event (such as a server confirming a shutdown) until the outlet is turned off.	**Range**: 0–2:46:39
Reboot Duration	The delay between the outlet shutting off because of Reboot and the outlet restarting.	**Range**: 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.	**Range**: 0–100%

Table 4: Outlet Properties for Graceful Shutdown Mode

Continued on next page

MasterSwitch Plus Properties *continued*

Outlet properties: Graceful Shutdown mode, continued

Property	Description	Available Settings
Low Battery Warning Control	Selects the method MasterSwitch Plus uses for determining when to assert the outlet's Low Battery signal after the UPS has gone on battery.	**Programmed Delay**: 0–16:39:54 **On Runtime Remaining**: When the UPS runtime remaining falls below the UPS's UPS Low Battery Signal Time **Never**
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 Plus will assert the outlet's Low Battery signal when both of the following conditions apply: the Low Battery Warning Control is set to On Runtime Remaining or Programmed Delay, and 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.	**Range**: 1–7
Will Device Confirm	Indicates whether the device connected to the outlet can assert a shutdown signal.	**Yes** **No**

Table 4: Outlet Properties for Graceful Shutdown Mode, continued

Outlet properties: Annunciator mode

Table 5 describes the outlet properties that are specific to Annunciator mode and the available settings for each.

Property	Description	Available Settings
Initial State	Defines the initial state of the outlet.	**Off** **On**
Alarm Action Delay	The amount of time that a Measure-UPS II alarm must be asserted before the outlet is toggled.	**Range**: 0–2:45:00

Table 5: Outlet Properties for Annunciator Mode

Continued on next page

MasterSwitch Plus Properties *continued*

Defaults for outlet properties

Table 6 gives the default settings for the outlet properties of each outlet.

Property	Default setting for outlet #s___							
	1	2	3	4	5	6	7	8
Outlet Control Mode	Graceful Shutdown Mode							
Name: Outlet #___	1	2	3	4	5	6	7	8
Power On Time Delay (seconds)	0	2	4	6	8	10	12	14
Battery Capacity Threshold	0%							
Low Battery Warning Control (minutes)	4.5							
Power Off Time Delay (seconds)	120							
UPS Low Battery Multiplier	1							
Will Device Confirm	No							
Restart Delay	Remain Off							
Reboot Duration (seconds)	5							
Initial State	Off							
Alarm Action Delay (seconds)	15							
Measure-UPS II Alarm Masks	Disabled (for each Measure-UPS II alarm)							

Table 6: Outlet Properties Default Settings

Introduction

Planning Your Configuration

Overview

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 this page. If you plan to use the "unattended" shutdown features of MasterSwitch Plus in addition to the on-demand operations, see "Configuring an outlet for unattended shutdown" on page 10.

Configuring an outlet for on-demand operation

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

- Unit Properties
  - Power On Time Delay: See "Outlet start-up sequence" on page 11 for detailed information about how this property affects the start-up sequence.
- Outlet Properties
  - Outlet Control mode: All on-demand operations are available when this property is set to Graceful Shutdown. When it is set to Annunciator, only Immediate On and Immediate Off operations are available.
  - Reboot Duration: Used by the Reboot and Graceful Reboot operations.
  - Will Device Confirm: Used by the Shutdown and Graceful Reboot operations.
  - Power Off Time Delay: Used by the Shutdown and Graceful Reboot operations.
  - Restart Delay: Used by the Shutdown operation.
  - Power On Time Delay: Used by the Delayed On and Shutdown operations.

See "On-demand operation" on page 16 for detailed information about how these outlet properties affect outlet behavior.

Continued on next page

Planning Your Configuration *continued*

Configuring an outlet for unattended shutdown

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

- Unit Properties
  - Power On Time Delay: See "Outlet start-up sequence" on page 11 for detailed information about how this property affects the start up sequence.
- Outlet Properties
  - Outlet Control Mode
    - Graceful Shutdown mode: Selecting this value requires selecting values for the following properties:
      - Low Battery Warning Control: Used by UPS shutdowns.
      - UPS Low Battery Multiplier: Used by UPS shutdowns.
      - Will Device Confirm: Used by UPS and Measure-UPS II shutdowns.
      - Power Off Time Delay: Used by UPS and Measure-UPS II shutdowns.

      See"Graceful Shutdown sequence" on page 12 for detailed information about this setting.
    - Annunciator mode: Selecting this value requires selecting values for the Alarm Action Delay property. (See "Annunciator sequence for Measure-UPS II alarms" on page 15 for detailed information about this setting.)
  - Measure-UPS II Alarm Masks: Used to specify the Measure-UPS II alarms that the outlet will react to.

Note: If your configuration contains an AP9225, you must enable the Send Traps On alarm property in order for the Measure-UPS II to generate an alarm. See "Device Manager: Measure-UPS II" on page 36 for more information.

Note: All on-demand operations are available when the Outlet Control mode is set to Graceful Shutdown. When it is set to Annunciator, only Immediate On and Immediate Off operations are available.

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Planning Your Configuration *continued*

Outlet start-up sequence

Figure 3 shows what happens when AC power is applied to MasterSwitch Plus.

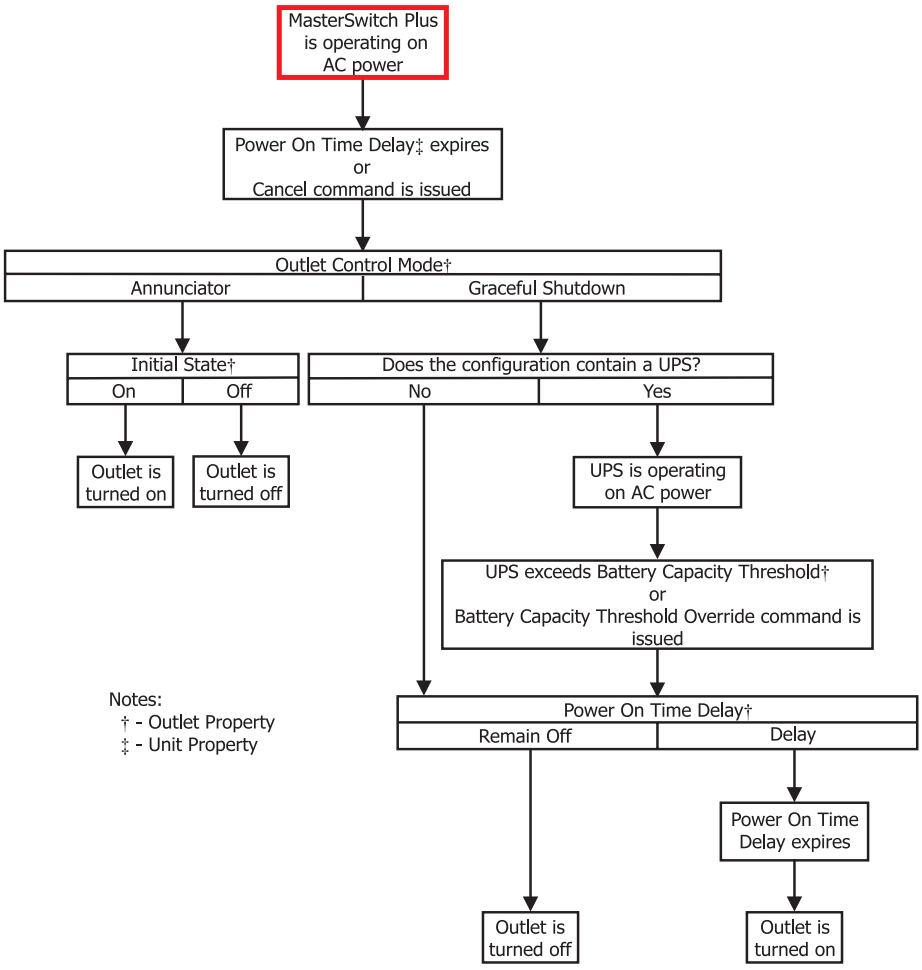

Figure 3: Outlet Start-up Sequence

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Planning Your Configuration *continued*

Graceful Shutdown sequence

When an outlet is set to Graceful Shutdown mode and MasterSwitch Plus is connected to an APC UPS or a Measure-UPS II environmental monitor, MasterSwitch Plus will automatically shut down outlets in response to a UPS On Battery condition or a Measure-UPS II alarm. Servers can be shut down gracefully if they are running PowerChute Plus shutdown software and are connected to a MasterSwitch Plus signaling port. The server can be automatically restarted once the main power returns and Measure-UPS II alarms are cleared. By varying outlet properties, you can program servers and other peripherals to shut down at different times, which allows you to extend battery run-time for critical servers by shutting down less critical equipment. Figure 4 shows the Graceful Shutdown sequence of events.

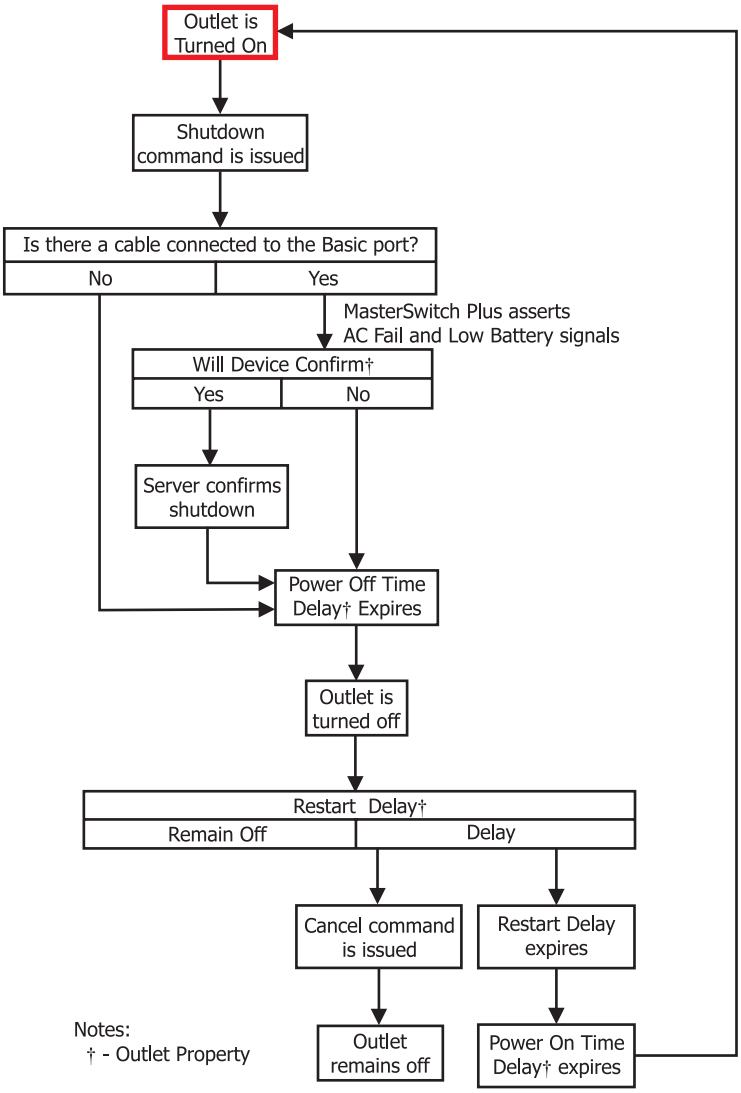

Figure 4: Graceful Shutdown Sequence

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Planning Your Configuration *continued*

Graceful Shutdown sequence for on-battery events

Figure 5 shows what happens when an outlet has been configured for Graceful Shutdown and the UPS goes on battery.

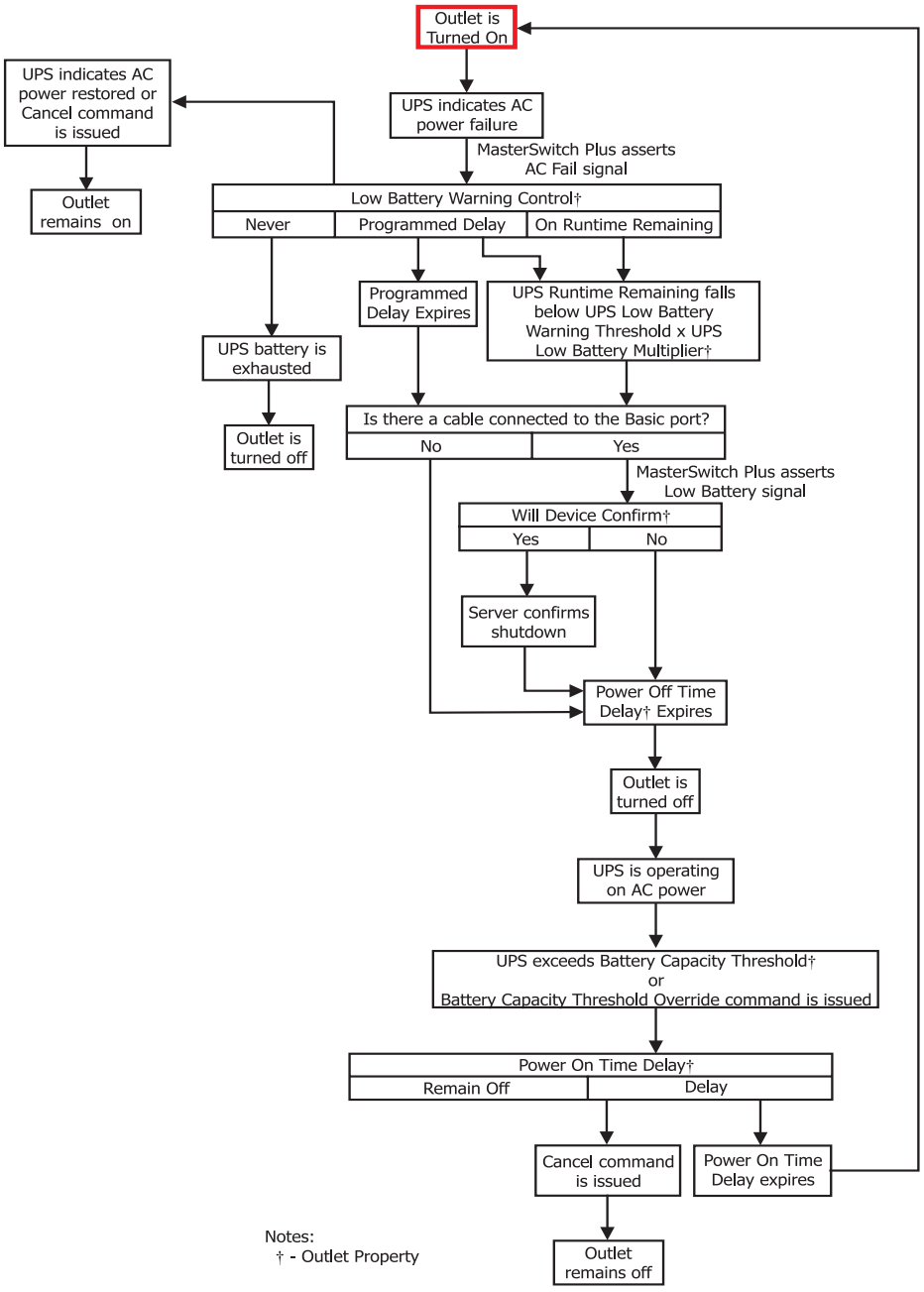

Figure 5: Graceful Shutdown Sequence for On-Battery Events

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Planning Your Configuration *continued*

Graceful Shutdown sequence for Measure-UPS II alarms

Figure 6 shows what happens when an outlet has been configured for Graceful Shutdown and a connected Measure-UPS II issues an alarm.

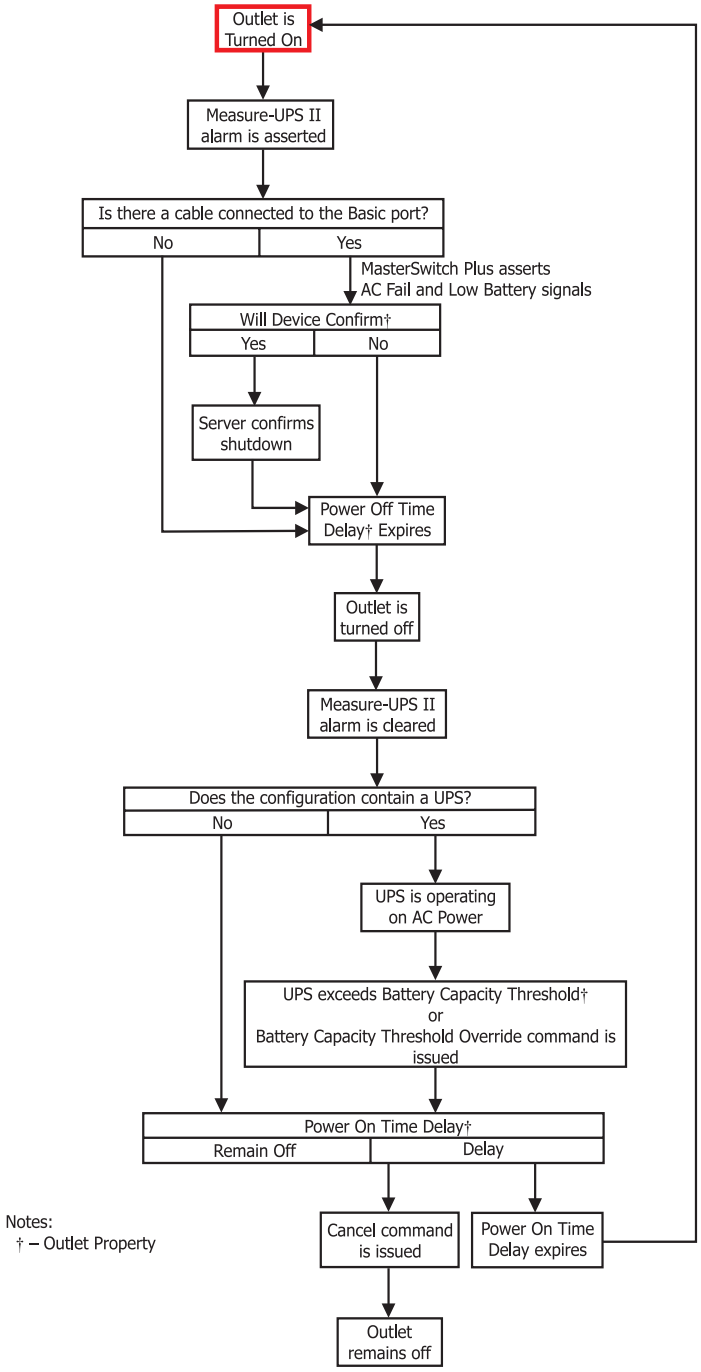

Figure 6: Graceful Shutdown Sequence Triggered by Measure-UPS II

Continued on next page

Planning Your Configuration *continued*

Annunciator sequence for Measure-UPS II alarms

An outlet can be configured to respond to any number of Measure-UPS II alarms. When an outlet is set to Annunciator mode and MasterSwitch Plus is connected to a Measure-UPS II environmental monitor, the outlet can be configured to toggle its state based upon the presence of Measure-UPS II alarms. The sequence in Figure 7 illustrates this behavior.

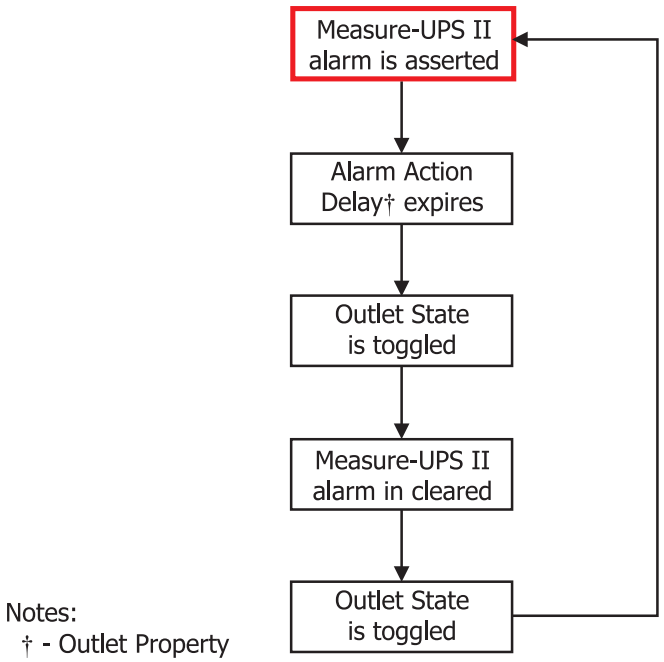

Figure 7: Annunciator Mode Event Sequence

Measure-UPS II alarm signals

The alarm signal for an outlet will be asserted if at least one of the enabled Measure-UPS II alarms occurs; the alarm signal will remain asserted until all enabled Measure-UPS II alarms are cleared. This applies for both Annunciator and Graceful Shutdown modes. See "Outlet configuration" on page 34 for more information on enabling alarms for an outlet.

Continued on next page

Planning Your Configuration *continued*

On-demand operation

Table 7 lists the available outlet control commands. These commands can be applied to a single outlet or to all outlets.

Command	Behavior
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.
Delayed On† ("Sequenced On" when applied to all outlets)	Turns an outlet on after the outlet's Turn On Delay expires. The sequence diagram in Figure 8 illustrates this command. This command is available any time after the unit's Power On Time Delay has expired and the outlet is off.
Immediate Off	Immediately turns an outlet off.
Immediate Reboot†	Immediately turns an outlet off and turns it back on after the outlet's Reboot Duration expires. The sequence diagram in Figure 9 illustrates the this command.
Shut Down†	Gracefully shuts down and optionally restarts an outlet. If the server is running shutdown software, such as PowerChute *plus*, and is connected to MasterSwitch *plus* 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 in Figure 10 illustrates the this command.
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 *plus* 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 in Figure 11 illustrates the this command. **Note:** 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.
Cancel†	Cancels a delayed startup or shutdown. The sequence diagrams in Figures 3–6 and Figures 8–11 illustrate the use of this command.
Batter Capacity Threshold Override†	Allows an outlet to restart when the UPS battery charge has not exceeded the Battery Capacity Threshold. The sequence diagrams in Figure 3 and Figure 5 illustrate the use of this command.

Table 7: Outlet Control Commands

† Only available in Graceful Shutdown mode

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Planning Your Configuration *continued*

Delayed On sequence

Figure 8 shows what happens when MasterSwitch Plus executes the Delayed On sequence.

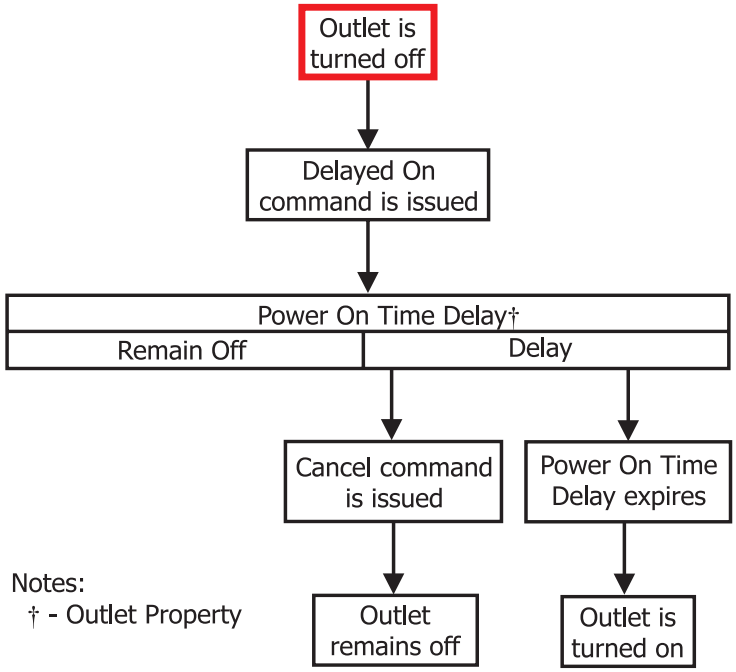

Figure 8: Delayed On Sequence

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Planning Your Configuration *continued*

Reboot sequence

Figure 9 shows what happens when MasterSwitch Plus executes the Reboot sequence.

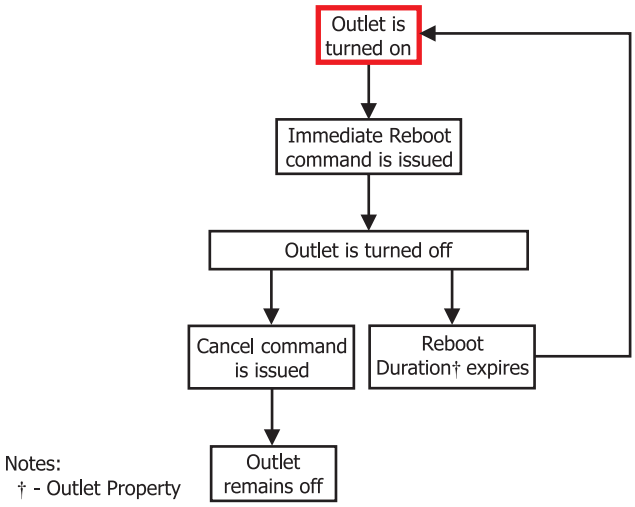

Figure 9: Reboot Sequence

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Planning Your Configuration *continued*

Shutdown sequence

Figure 10 shows what happens when MasterSwitch Plus executes the Shutdown sequence.

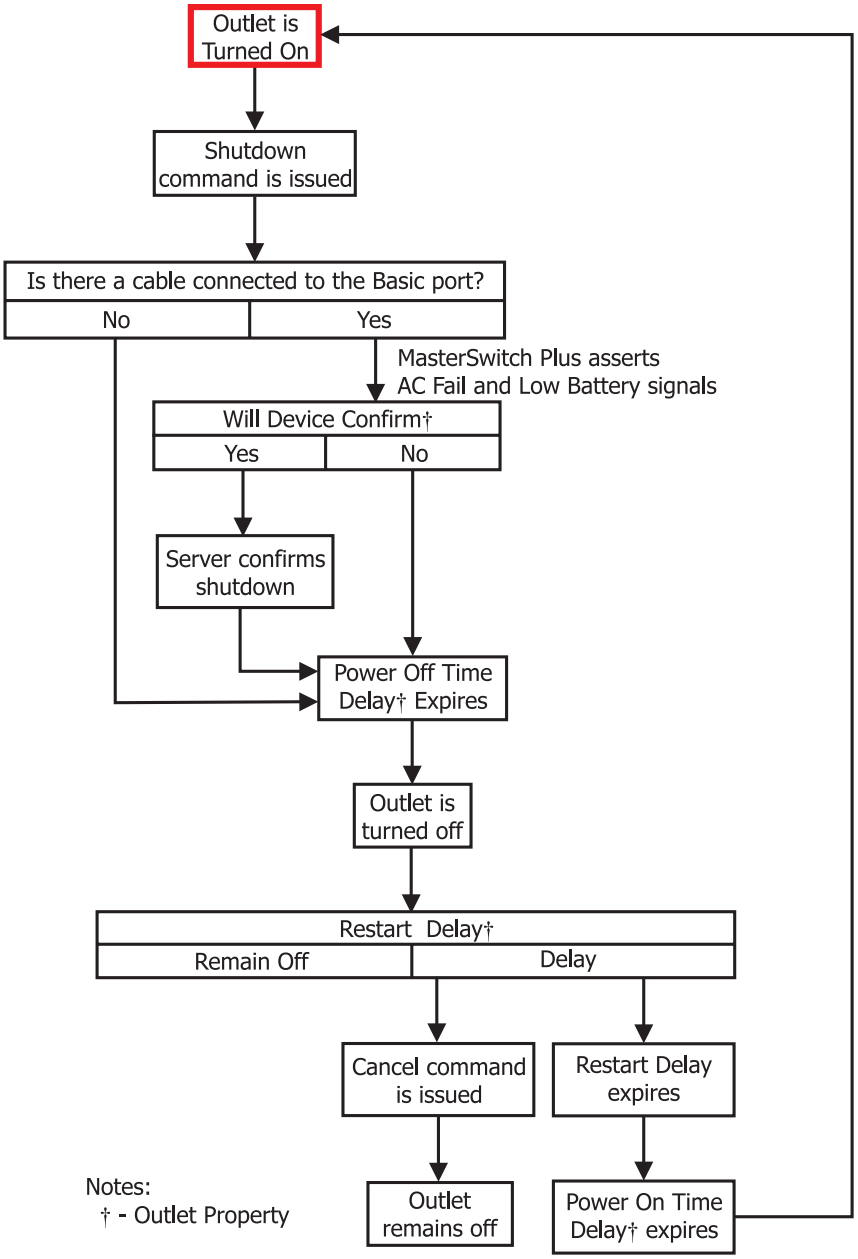

Figure 10: Shutdown Sequence

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Planning Your Configuration *continued*

Graceful reboot sequence

Figure 11 shows what happens when MasterSwitch Plus executes the Graceful Reboot sequence.

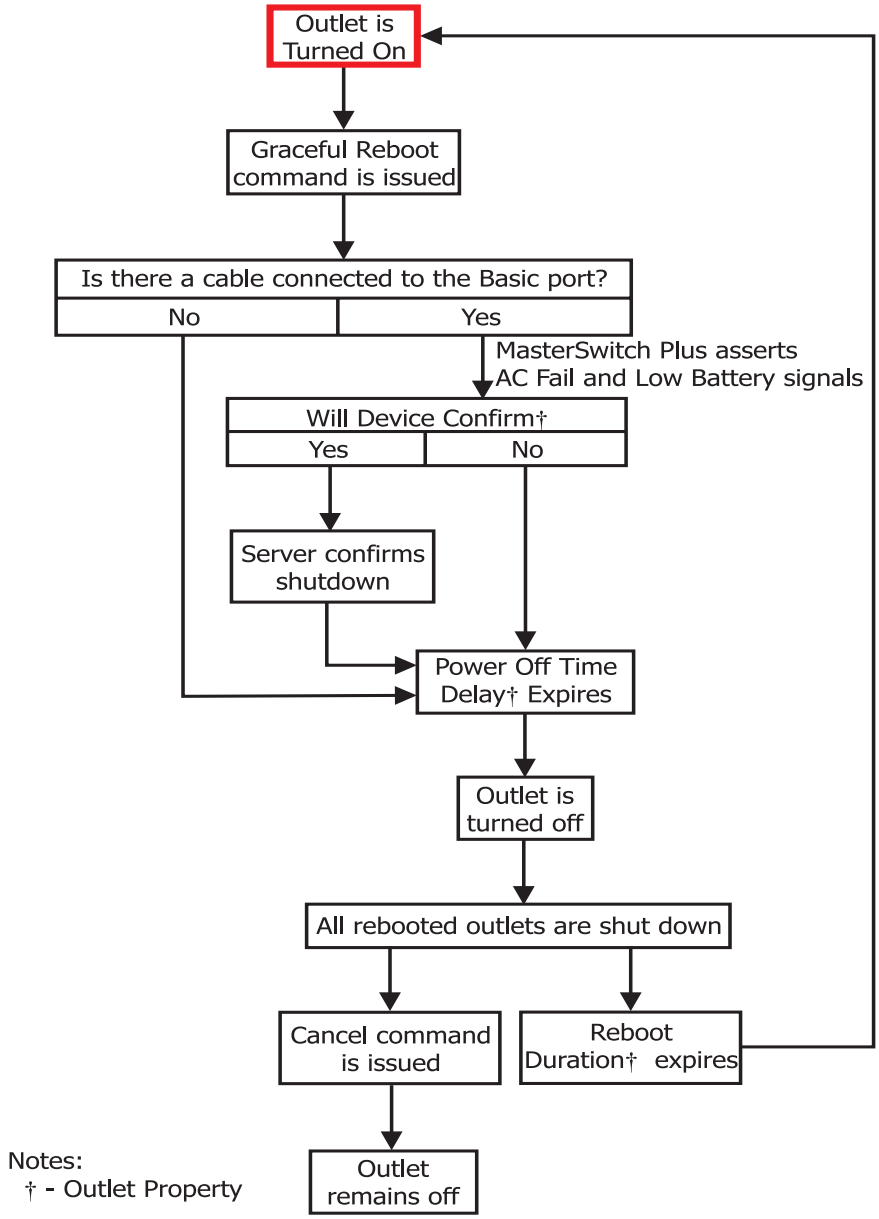

Figure 11: Graceful Reboot Sequence

Chapter 2 Managing MasterSwitch Plus

Introduction

Overview

Using a Web browser, Telnet, or DTE equipment, you can manage your MasterSwitch Plus unit and outlet properties and configure password-protected Administrator, Device Manager, and Outlet User accounts. This chapter will familiarize you with the interfaces and accounts by covering the following topics:

- Remote management interfaces (Web and Control Console) used to manage MasterSwitch Plus and connected devices, and
- Password-protected Administrator, Device Manager, and Outlet User accounts.

Managing MasterSwitch Plus

Remote Management Interfaces

Overview

Once MasterSwitch Plus has its proper network settings (see the *MasterSwitch Plus Installation and Quick Configuration Manual* for instructions), MasterSwitch Plus and Measure-UPS II can be managed remotely on Web and Control Console interfaces. The following sections describe each interface and provide instruction on how to access and log into each one.

Web interface

You can manage MasterSwitch Plus and Measure-UPS II by an easy-to-use Web interface. To access the Web interface, you will need one of the following supported Web browsers:

- Internet Explorer 3.0.2 and later
- Netscape 3.0 and later
- Other 3.0 Web browsers

Only one user at-a-time may access your MasterSwitch Plus unit. DTE users have precedence over Telnet users and Telnet users have precedence over Web users.

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

Note: The Web interface does not support all available MasterSwitch Plus properties. To access all MasterSwitch Plus properties, use the Control Console. (For more information on what properties each interface supports, see "Differences in configurable items," on page 29.)

Web interface: accessing MasterSwitch Plus

Use any of the supported Web browsers to access the Web connection to MasterSwitch Plus. In the URL Location field, type in 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
```

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Remote Management Interfaces *continued*

Web interface: logging in

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 (or authentication phrase) is **apc**, all lower case.

Note: The user name, password, and time-out values can be changed through the Web interface in the System Menu (see "System" on page 42 for more information).

Control Console interface

In addition to using the Web, you can also manage MasterSwitch Plus and a Measure-UPS II environmental monitor using Telnet for remote over-the-network management or using DTE equipment (a dumb terminal or a computer running terminal emulation software) for local management.

Note: Only one user at-a-time may access MasterSwitch Plus. DTE users have precedence over Telnet users and Telnet users have precedence over Web users.

Control Console structure

The Control Console provides comprehensive remote and local management of MasterSwitch Plus and Measure-UPS II. All menus list items by number and name. To enter an item:

1. Type the item number.
2. Press <ENTER>.
3. 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 <?> <ENTER> to access brief descriptions of menu items (if the menu has help available).
- Use Ctrl-D to toggle between MasterSwitch Plus and Measure-UPS II menus.
- Use Ctrl-C to return to the main menu (Control Console).

Continued on next page

Accessing the 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 DTE equipment to access the Control Console, perform the following steps in the order given:

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

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)

Figure 12: Terminal Communication Settings

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. (See "Logging into the Control Console" on this page.)

Logging into the Control Console

The procedure for logging into the Control Console is the same for both Telnet and DTE equipment. When prompted, follow the steps below:

1 Type your user name and press <ENTER>.

2 Type your password and press <ENTER>.

Note: The default values of both name and password for the Administrator is **apc**, all lowercase. For the procedure on how to change user names, see the section titled "User Manager" on page 42 and the section titled "Outlet User Manager" on page 43.

Password-Protected User Accounts

Overview

MasterSwitch Plus provides three types of password-protected accounts that allow you to control access to MasterSwitch Plus and the devices it manages. 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. This section describes the different access levels, details each user account, and lists the menus available to each account.

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. Table 8 lists each account and the access privileges each one carries. For instructions on configuring Device Manager and Outlet User accounts, see "User Manager" on page 42 and "Outlet User Manager" on page 43.

Account Type	Access to MasterSwitch Plus Menus							
	Outlets	MasterSwitch Plus Configuration	Measure-UPS	Network	System	Logout	Help	Links
Administrator	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Device Manager	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Outlet User	Yes	No	No	No	No	Yes	Yes	Yes

Table 8: Types of MasterSwitch Plus Access

Continued on next page

Password-Protected User Accounts *continued*

Administrator account

MasterSwitch Plus permits only one Administrator account. The Administrator has unrestricted access.

Administrator access

Figure 13 presents the Main Menu Headings available to the Administrator and lists the settings that are available under each menu.

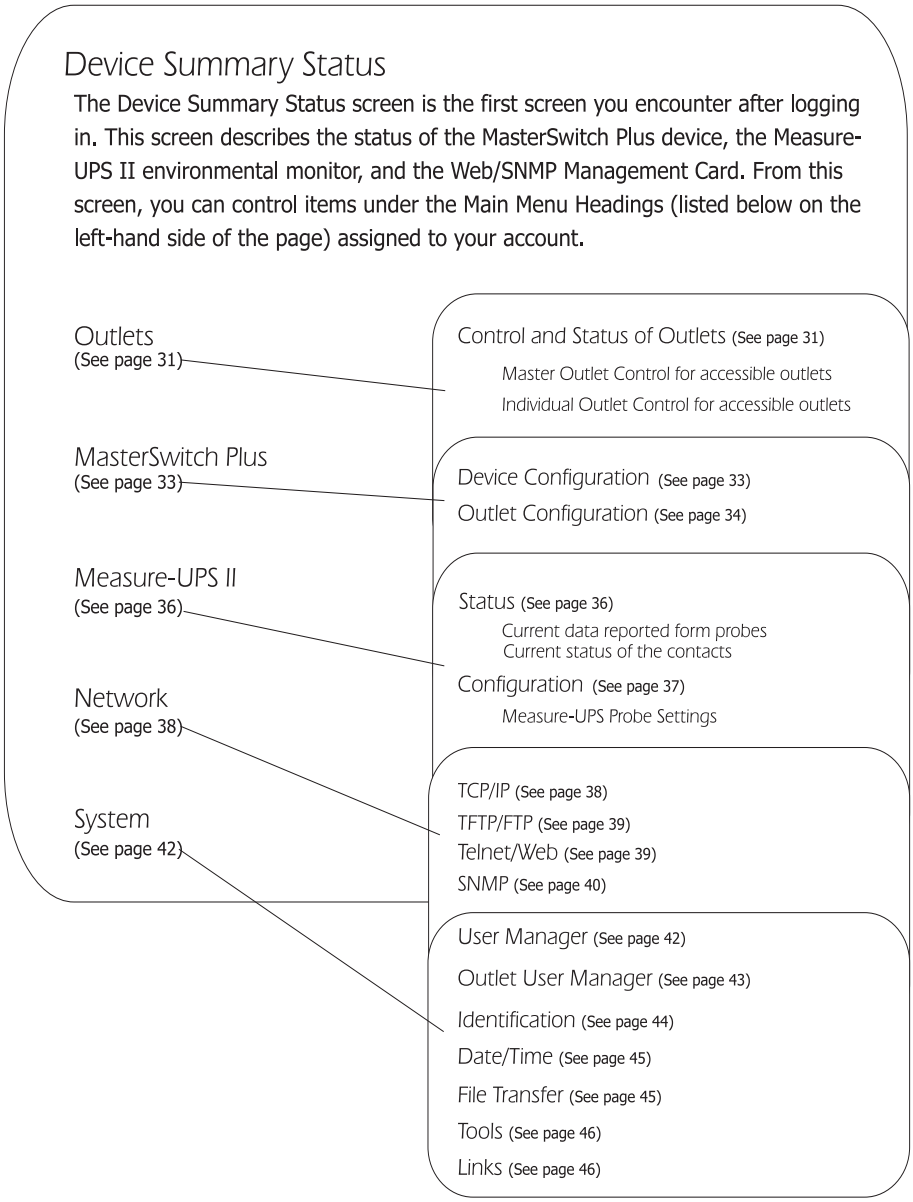

Figure 13: Administrator Account Access

Continued on next page

Password-Protected User Accounts *continued*

Device Manager account

MasterSwitch Plus permits only one Device Manager Account. The Device Manager can access all outlets and devices (MasterSwitch Plus, MasterSwitch Plus Expansion Unit, and Measure-UPS II).

Device Manager access

Figure 14 presents the Main Menu Headings available to the Device Manager and lists the main settings that are available under each menu.

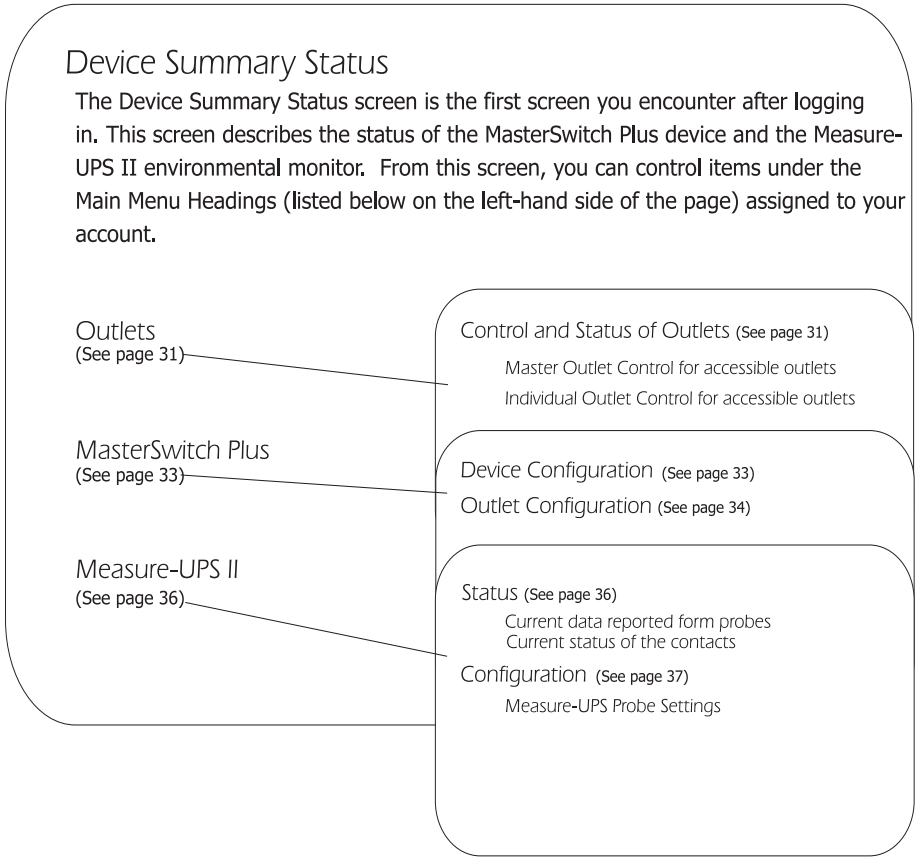

Figure 14: Device Manager Account Access

Password-Protected User Accounts *continued*

Outlet User accounts

MasterSwitch Plus permits up to thirty-two Outlet User Accounts. Outlet users only have access to and control over the outlets assigned to their account.

Outlet User access

Figure 15 presents the top-level menu items available to the Outlet User and lists the settings that are available under each menu.

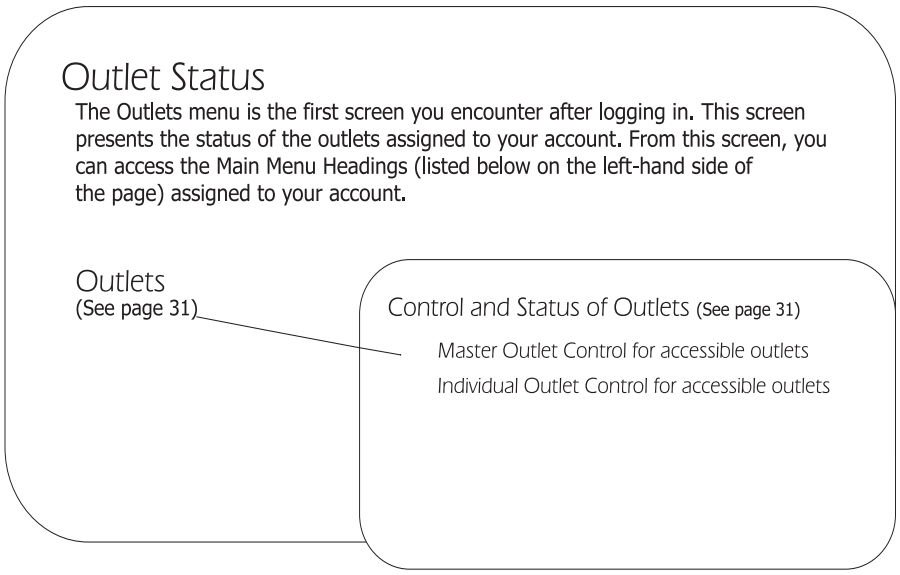

Figure 15: Outlet User Account Access

Chapter 3 Main Menu Headings

Introduction

Overview

Each interface offers menu items for configuring MasterSwitch Plus and its outlets. The configurable items are divided among MasterSwitch Plus Main Menu Headings. Access to Main Menu Headings and the configurations they house depends upon your assigned user account. (See "Password-Protected User Accounts" on page 25 for more information on user accounts.) To familiarize you with the configurable items for MasterSwitch Plus, this chapter:

- Discusses the differences between the Web and Control Console interfaces.
- Presents each Main Menu Heading and describes the settings under these headings that you can configure based on your user account.
- Lists and defines each item under the five Main Menu Headings.

Differences in configurable items

The Control Console and Web interfaces differ in the items available for MasterSwitch Plus outlet and device configuration.

MasterSwitch Plus Configurable Item		Web	Control Console
Outlet Configuration	Outlet Name	Yes	Yes
	Restart Delay	Yes	Yes
	Power On Delay	Yes	Yes
	Power Off Delay	Yes	Yes
	Reboot Duration	Yes	Yes
	URL	Yes	No
	Outlet Control Mode	No	Yes
	Battery Capacity Threshold	No	Yes
	Low Battery Warning Control	No	Yes
	UPS Low Battery Multiplier	No	Yes
	Will Device Confirm	No	Yes
	Toggle Measure-UPS II alarms	No	Yes
	Initial State	No	Yes
	Alarm Action Delay	No	Yes

Table 9: Configurable Items Available for Each Interface

Continued on next page

Differences in configurable items, continued

MasterSwitch Plus Configurable Item		Web	Control Console
Device Configuration	Device Name	Yes	Yes
	Power On Time Delay	Yes	Yes
	Manual Button	No	Yes
	Restore Factory Defaults	No	Yes
	View Manufacturing Data	No	Yes
	View Self Test Results	No	Yes

Table 9: Configurable Items Available for Each Interface, continued

Note: The information in this chapter is based on the Web interface. If you are using the Control Console, some of the terminology used in this chapter will be different from the terminology in the interface you are using.

Main Menu Headings

Device Manager: Outlets

Overview

The Outlets menu provides the number, name, state, and control action for each outlet. From this menu, you can control all outlets assigned to your account at once or you can control individual outlets.

Note: On the Control Console, you can access outlet information by selecting the Device Manager (1).

Control of outlets

Table 10 lists and defines the items available for Outlet 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.
Sequenced On†	Turns on every outlet according to its Power On Delay time. (This is only available for Master Control of Outlets.)
Delayed On†	Turns an outlet on after the outlet's Turn On Delay expires. The sequence diagram in Figure 8 on page 17 illustrates this command. This command is available any time after the unit's Power On Time Delay has expired and the outlet is off.
Immediate Off	Immediately turns an outlet off.
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 Plus 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 in Figure 11 on page 20 illustrates the this command. **Note:** 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.

Table 10: Outlet Control Items

† Only available in Graceful Shutdown mode

Continued on next page

Device Manager: Outlets *continued*

Control of outlets, continued

Item	Definition
Immediate Reboot†	Immediately turns an outlet off and turns it back on after the outlet's Reboot Duration expires. The sequence diagram in Figure 9 on page 18 illustrates the this command.
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 Plus 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 in Figure 10 on page 19 illustrates the this command.
Batter Capacity Threshold Override†	Allows an outlet to restart when the UPS battery charge has not exceeded the Battery Capacity Threshold. The sequence diagrams in Figure 3 on page 11 and Figure 5 on page 13 illustrate the use of this command.
Cancel†	Cancels a delayed startup or shutdown. The sequence diagrams in Figures 3–6 and Figures 8–11 illustrate the use of this command.

Table 10: Outlet Control Items, continued

† 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. The Control Mode (Annunciator or Graceful Shutdown) can only be assigned using the Control Console.

For more information on assigning individual outlets to users, see "Outlet User Manager," on page 43. For additional information on Control Modes, see "Outlet properties," on page 5.

Main Menu Headings

Device Manager: MasterSwitch Plus

Overview

Administrators and Device Managers configure the MasterSwitch Plus unit and its outlets through this menu.

Device configuration

Table 11 lists and defines the device configuration items available for MasterSwitch Plus.

Property	Description	Available Settings
Device Name	A string of characters used to identify the MasterSwitch Plus unit.	A maximum of 23 printable ASCII characters **Default** = unnamed
Power On Time Delay	The time that MasterSwitch Plus will delay after AC power is applied before starting the outlet's power on sequence.	**Range**: 0–2:46:39 **Default**: 0
Manual Button	Governs whether or not the manual button functions. (This item is only available if you are using the Control Console.)	**Enabled**: the button functions according to the description in "Manual button" on page 4 **Disabled**: no function **Default**: Enabled
Restore Factory Defaults	Reinstates the original settings for your MasterSwitch Plus unit. All unit properties are set to the defaults shown in this table. Outlet Properties are restored to the defaults shown in Table 6 on page 8.	Enter Yes 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 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.	Pass or Fail

Table 11: Device Configuration

Continued on next page

Outlet configuration

Table 12 lists and defines the Outlet Configuration items available. See Table 6 on page 8 for the default settings for the Outlet Configuration items.

Item	Definition	Available Settings
Outlet Name	Identifies each outlet.	23 characters maximum
Restart Delay	The delay between an outlet shutting off due to a Graceful Shutdown and the outlet being restarted.	**Range**: 0–999:54 *Note: Time is rounded down by 6-minute intervals*
Power On Delay	Determines the time interval between the triggering event and the outlet being turned on.	**Range**: 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.	**Range**: 0–2:46:39
Reboot Duration	The delay between the outlet shutting off because of Reboot and the outlet restarting.	**Range**: 0–2:46:39
URL	The Outlet's HTTP link in URL form or a Telnet address.	(http://site.com page.htm) (789.456.123.456)
Outlet Control Mode	Establishes mode for associated outlet.	Graceful Shutdown or Annunciator
Battery Capacity Threshold	Sets the minimum percentage of Battery Capacity required of the UPS before an outlet can be turned on.	**Range**: 0–100%
Low Battery Warning Control	Selects the method MasterSwitch Plus uses for determining when to assert the outlet's Low Battery signal after the UPS has gone on battery.	**Programmed Delay**: 0–16:39:54 **On Runtime Remaining**: When the UPS runtime remaining falls below the UPS's UPS Low Battery Signal Time **Never**

Table 12: Outlet Configuration Items

Continued on next page

Device Manager: 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 Plus will assert the outlet's Low Battery signal when both of the following conditions apply: • the Low Battery Warning Control is set to On Runtime Remaining or Programmed Delay, and • 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.	**Range**: 1–7
Will Device Confirm	Indicates whether the device connected to the outlet can assert a shutdown signal.	**Yes** **No**
Toggle Measure-UPS II alarms	Accesses submenu to enable or disable Measure-UPS II alarms.	**Enabled** **Disabled**

Table 12: Outlet Configuration Items, continued

Main Menu Headings

Device Manager: Measure-UPS II

Overview

This menu provides status information about the temperature and humidity values sensed by up to two Measure-UPS II probes; this menu also allows you to configure settings for Measure-UPS II.

Status: probes

Table 13 lists and defines the status information reported by the Measure-UPS II probes.

Item	Definition
Temperature	The temperature (in Celsius) sensed by Measure-UPS II 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 Measure-UPS II 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 Measure-UPS II will use to identify a trap condition.
Send Traps On	Enables or disables sending traps for each threshold

Table 13: Measure-UPS II Status

Device Manager: Measure-UPS II *continued*

Status: contacts

The status section also reports information about the status of the four contact switches and includes the Firmware Version of the Measure-UPS II environmental monitor.

Item	Definition
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).

Table 14: Measure-UPS II Contact Settings

Configuration

The Configuration section provides the definable Trap Threshold settings for both probes and Measure-UPS II contact names and trap settings. Table 15 lists and defines the configurable items available for Measure-UPS II.

Item	Definition
Trap Threshold Options	Define the high and low temperature (in Celsius) and relative humidity (as a percentage) thresholds that the Measure-UPS will use to identify a trap condition. (You must enable the Send Traps item in order for MasterSwitch Plus to react to the alarm.)
Contact Name 1–4	Defines a name for each contact, with each name having up to eight (8) characters.
Contact Zone 1–4	Enables or disables the contacts.

Table 15: Measure-UPS II Probe Settings

Main Menu Headings

Network

Overview

The Network menu provides control and status information of the Network parameters. Only the Administrator can access the Network menu and settings.

TCP/IP

The TCP/IP section provides the necessary settings for MasterSwitch Plus and allows you to configure TCP/IP settings. Table 16 lists and defines the TCP/IP items available in the TCP/IP section.

Item	Description
System IP	The MasterSwitch Plus 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.

Table 16: TCP/IP Items

Continued on next page

TFTP/FTP

For control of file transfers, the TFTP/FTP section allows access to the settings for the TFTP and FTP Client and FTP Server. Table 17 lists and defines the items available on the TFTP/FTP menu.

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. Default port: 21

Table 17: TFTP/FTP Items

Telnet/Web

Table 18 lists and defines the items available for Telnet and Web ports.

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

Table 18: Telnet/Web Access Ports Items

Continued on next page

SNMP

The SNMP section displays the SNMP settings, including the Access Control and Trap Receiver Settings. Table 19 lists and defines the items available on the SNMP menu.

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.

Table 19: SNMP Items

SNMP: access control

The Access Control section (Table 20) identifies the current settings for all four SNMP channels and provides the configurable values for a selected channel.

Item	Definition
Community Name	Password the NMS (identified by the NMS IP option) must use for SNMP access to MasterSwitch Plus. The allowed access type is defined by the Access Type option. *Note: Up to 15 characters.*
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).

Table 20: SNMP Access Control Items

Continued on next page

Network *continued*

SNMP: Trap Receiver

The Trap Receiver section (Table 21) identifies the current settings for all four trap receivers. You can also change the values for a selected trap receiver through this menu.

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

Table 21: SNMP Trap Receiver Items

Main Menu Headings

System

Overview

The System menu provides control and status information for the User Manager and Outlet User Manager. The configurable System parameters include User Accounts, Identification Values, Date/Time, File Transfers, and URL links. Only the Administrator has access to the System menu.

User Manager

Under the User Manager section, the properties of the Administrator and Device Manager are configured. The Administrator has unrestricted access, but the Device Manager can only configure MasterSwitch Plus and Measure-UPS II; the Device Manager cannot configure Network and System parameters. Table 22 lists and defines the items available under the User Manager menu.

Item	Definition
Auto Logout	The amount of time of inactivity before the user is automatically logged out. **Default**: 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. **Default**: Basic
Administrator	
User Name	User name (10 characters maximum). **Default**: apc
Password	Password only for HTTP 1.1 authentication (10 characters maximum). **Default**: apc
Authentication Phrase	Authentication phrase (only for MD5), Phrase must be 15–32 characters long. **Default**: admin user phrase
Device Manager User	
User Name	User name (10 characters maximum). **Default**: apc
Password	Password only for HTTP 1.1 authentication (10 characters maximum). **Default**: apc
Authentication Phrase	Authentication phrase for MD5. The phrase must be 15–32 characters long. **Default**: device user phrase

Table 22: User Manager Options

Continued on next page

System *continued*

Outlet User Manager

Thirty two individual outlets can be assigned to users, each with their own password. An Outlet User account allows control of only those outlets assigned to the particular account. Accounts can also be disabled to prevent an Outlet User from logging in. Only the Administrator can create and manage individual Outlet User accounts. The table below lists and defines the items available to configure the individual account access.

Item	Definition
User Name	Outlet user name for both HTTP 1.1 and MD5 authentication. (10 characters maximum.) *Note: A User Name in Orange indicates the user account has been disabled.*
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. *Note: A disabled account prevents the Outlet User of the account from logging in. The User Name will appear in Orange if the account has been disabled.*
Device Outlet Access	Selects the outlets users will only have access to.

Figure 16: Outlet User Manager Items

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.

Continued on next page

System *continued*

Identification

The Identification section defines MasterSwitch Plus system identification values. Each option shows its current value.Table 23 lists and defines the configurable items for System 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

Table 23: System Identification Items

Date/Time

The System menu's Date/Time section defines the MasterSwitch Plus unit's current date and time settings. Table 24 lists and defines the Date/Time items.

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).

Table 24: Date and Time Options

Continued on next page

File Transfer

The File Transfer menu provides access for managing file transfers.Table 25 lists and defines the items available for file transfers.

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

Table 25: File Transfer Options

Continued on next page

Tools

In the Tools section, you can reset or reboot the Management Card. The Access options are chosen from a pull-down menu. Table 26 lists and defines the items available in the Tools section.

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

Table 26: Tools Options

Links

In the Links section, you can configure URL links in the form of http address that appear on the left hand side Navigation menu. (The APC Links are pre-defined.) Table 27 lists and defines the hyper-link items available from this menu.

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: *http://mysite.com/mypage.com.*
APC Links	
Name	View the names of the APC links.
URL	Define the URL of each APC link.

Table 27: Links Options

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

Chapter 4 Security and Help Features

Security Features

Overview

MasterSwitch Plus provides several security features whose availability depends on the interface you are using. This chapter describes each security option. In general, the security features of MasterSwitch Plus provide a reasonable level of access and authentication control. As a device that passes information across the network, MasterSwitch Plus is subject to the same security risks as other network devices. If your network is connected to the Internet or other external networks, you must incorporate additional security measures, for example, firewalls.

Authentication versus encryption

MasterSwitch Plus does not currently use encryption. The data and communication between MasterSwitch Plus and the client interfaces, such as Telnet and the Web server, is read by capturing the network traffic going to and from MasterSwitch Plus. Most applications do not transfer sensitive data that would pose a security risk.

The card does provide basic authentication using user names and passwords to control access and to verify the IP address. Basic authentication is sufficient for most environments. MasterSwitch Plus can provide a greater level of security by enabling MD5 authentication for the Web interface. For information on using MD5 see "MD5 Authentication" on page 48.

User names, passwords and community names

The Administrator, Device Manager, and Outlet user names and passwords are for logging into the Control Console and Web interfaces. All user names, passwords and community names for SNMP are transferred over the network as plain text. Anyone capable of monitoring the network traffic can determine the user names and passwords required for access to MasterSwitch Plus. Any similar device using Telnet, a Web server, or an SNMPv1 agent will face the same security risk because of the limitations of the protocols.

Security Features *continued*

Port assignments

You can define the TCP ports to be detected by Telnet, FTP, or Web servers. These ports are set initially at the standard "well known port" for the particular protocol. To hide the interfaces, you can use arbitrary ports from 5000–65535. Once an interface uses a non-standard port, you must specify the port when using a client interface, such as a Web browser. Hiding the servers provides an added level of security.

MD5 Authentication

The Web interface option for MD5 authentication enables a higher level of access security than provided by the basic HTTP authentication scheme. The MD5 scheme is very 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. In addition, after the authentication login, subsequent page access is restricted by IP addresses and a hidden session cookie.

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.

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.

Continued on next page

Security Features *continued*

Web interface MD5 authentication

Table 28 describes each of the interfaces and access methods.

Interface	Security Access	Notes
DTE Control Console	– User name & password	Always enabled.
Telnet Control Console	– User name & password – Selectable server port – Server Enable/Disable	The user name and password are transmitted plain-text.
SNMP	– Community Name – NMS IP filters – Agent Enable/Disable – Four access communities with read/write/disable capability	IP filters only allow access from designated IP addresses.
FTP Server	– User name & password – Selectable server port – Server Enable/Disable	Administrator access only.
Web Server	– User name & password – Selectable server port – Server Enable/Disable – MD5 Authentication option	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.

Table 28: Security Access

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

Listed below are the various subjects that the help files offer.

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

Assistant Online. Assistant Online brings APC Customer Service to the Web. When you select Assistant Online, 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. Assistant Online 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.

Chapter 5 Managing the Expansion Unit

Introduction

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 "Accessing the Control Console" on page 24.

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 Measure-UPS II. 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 RETURN (or ENTER, depending on the keyboard you are using).
- To see the results of the last changes you have made, it will sometimes be necessary to press RETURN or ENTER.
- To return to the previous screen, press ESC.
- To exit the MasterSwitch Plus menus, type Q (case-sensitive) at the Main menu.

Continued on next page

Main Menu

Description

The main menu displays:

- The state of the UPS,
- Information about the MasterSwitch Plus unit,
- Available commands for the unit and its outlets (on demand operation),
- Available submenus for configuring the accessed unit and its outlets,
- Available submenus for the Measure-UPS II, and
- A command for accessing the next unit (cascading setup only).

Item definitions

The following table lists and defines the menu items available from the Main menu.

Item	Description
Version	Displays the version of the MasterSwitch Plus firmware.
Unit Name	Identifies the MasterSwitch Plus unit that has been accessed. *Note: The Unit Name can be changed in the Unit Properties menu.*
UPS State	Displays the status of the UPS. The possible states are: **Inactive**:UPS is in sleep mode **On Line**: UPS is operating normally **AC Fail**: UPS is operating on battery **Unknown**:communication with UPS has failed
Outlet Name	Identifies each outlet. *Note: Each outlet's names is changeable at the associated outlet properties menu.*
Outlet State	Displays the current state of the outlet. The possible states are: **On**: outlet is turned on **On in hh:mm:ss**: outlet will be turned on after the specified time period elapses **Off**: outlet is turned off **Off in hh:mm:ss**: 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. *Note: The Enable/Disable Alarms setting on the Outlet Properties menus controls the behavior of an individual outlet with regard to Measure*-UPS *II alarms*

Table 29: Main Menu Definitions

Continued on next page

Main Menu *continued*

Item definitions, continued

Item	Description
To Change Outlet Properties	Instructs you to enter the associated outlet number (1–8) to access its outlet properties.
To Change Measure-UPS II Properties	Instructs you to enter M to access the Measure-UPS II properties menu (available only if an Measure-UPS II is present).
To Change Units	Instructs you to enter an I to access the next Master-Switch Plus unit in the cascading setup.
To Change Outlet States	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 A to perform the action on all of the outlets.The various commands you may enter are: **N**: 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. **S**: 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 Plus 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 in Figure 10 on page 19 illustrates the this command.

Table 29: Main Menu Definitions, continued

Continued on next page

Main Menu *continued*

Item definitions, continued

To Change Outlet States, continued	**C**: Cancel—Cancels a delayed startup or shutdown. The sequence diagrams in Figures 3–6 and Figures 8–11 illustrate the use of this command. **D**: Delayed On—Turns an outlet on after the outlet's Turn On Delay expires. The sequence diagram in Figure 8 on page 17 illustrates this command. This command is available any time after the unit's Power On Time Delay has expired and the outlet is off. **F**: Off—Immediately turns an outlet off. **R**: Reboot—Immediately turns an outlet off and turns it back on after the outlet's Reboot Duration expires. The sequence diagram in Figure 9 on page 18 illustrates the this command. 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 *plus* 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 in Figure 11 illustrates the this command. *Note: 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.* **O**: Override—Allows an outlet to restart when the UPS battery charge has not exceeded the Battery Capacity Threshold. The sequence diagrams in Figure 3 on page 11 and Figure 5 on page 13 illustrate the use of this command.

Table 29: Main Menu Definitions, continued

Unit Properties Menu

Description

The Unit Properties menu is accessible by entering U at the Main menu.

The Unit Properties menu displays:

- Information about the MasterSwitch Plus unit,
- Available commands for configuring the accessed unit, and
- Available commands for displaying more detailed information.

Item definitions

Table 30 lists and defines the items available from the Unit Properties menu.

Item	Description
Name	A string of characters used to identify the MasterSwitch Plus unit. Allows a maximum of 23 printable ASCII characters **Default**: 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 1, and so on for up to 4 units. See the document included on the CD titled *Setup of the MasterSwitch Plus Expansion Unit* for instructions on setting up Expansion Unit addresses. **Default**: 1 *Note: If the addresses for all units are note set up properly, the units will not operate properly.*
Manual Button	Allows you to enable/disable the unit's manual reset button. If enabled, the button functions according to the description on page 4. If disabled, the button does not function. **Default**: Enabled
Password	Allows you to set the unit's password. The password is case-sensitive and can be up to 9 printable characters. **Default**: apc (lower case)
Restore Factory Defaults	Reinstates the original settings for your MasterSwitch Plus unit. All unit properties are set to the defaults shown in this table. Outlet Properties are restored to the defaults shown in Table 6 on page 8.
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.

Table 30: Unit Properties definitions

Continued on next page

Unit Properties Menu *continued*

Item definitions, continued

Item	Description
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: **Program Memory**: confirms whether or not the EPROM chip is working properly. **Non-Volatile Memory**: 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 Plus will delay after AC power is applied before starting the outlet's power on sequence. **Range**: 0–2:46:39 **Default**: 0

Table 30: Unit Properties definitions, continued

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

Table 31 describes the menu items that appear on the Outlet Properties menu when the Outlet Control Mode is set to Graceful Shutdown.See Table 6 on page 8 for the default settings for these 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.	**Yes** **No**
Low Battery Warning Control	Selects the method MasterSwitch Plus uses for determining when to assert the outlet's Low Battery signal after the UPS has gone on battery.	**Programmed Delay**: 0–16:39:54 **On Runtime Remaining**: When the UPS runtime remaining falls below the UPS's UPS Low Battery Signal Time **Never**
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 Plus will assert the outlet's Low Battery signal when both of the following conditions apply: • the Low Battery Warning Control is set to On Runtime Remaining or Programmed Delay, and • 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.	**Range**: 1–7

Table 31: Graceful Shutdown Items

Continued on next page

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.	**Range**: 0–999:54 *Note: Time is rounded down by 6-minute intervals*
Power Off Delay	The time from the triggering event (such as a server confirming a shutdown) until the outlet is turned off.	**Range**: 0–2:46:39
Power On Delay	Determines the time interval between the triggering event and the outlet being turned on.	**Range**: 0–2:46:39
Reboot Duration	The delay between the outlet shutting off because of Reboot and the outlet restarting.	**Range**: 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.	**Range**: 0–100%
Enable/Disable UPS Alarms	Measure-UPS II Alarm Masks: Indicates whether or not an outlet will react to a specific Measure-UPS II alarm.	Enabled and disabled for each of the 12 Measure-UPS II alarms.
Select Another Outlet	Allows you choose an another outlet to configure.	

Table 31: Graceful Shutdown Items, continued

Continued on next page

Outlet Properties Menu *continued*

Annunciator menu items

Table 32 lists and defines the items that appear on the Outlet Properties menu when the Outlet Control mode is set to Annunciator.See Table 6 on page 8 for the default settings for these 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.	**Off** **On**
Alarm Action Delay	The amount of time that a Measure-UPS II alarm must be asserted before the outlet is toggled.	**Range**: 0–2:45:00
Enable/Disable UPS Alarms	Measure-UPS II Alarm Masks: Indicates whether or not an outlet will react to a specific Measure-UPS II alarm.	Settings are enabled and disabled for each of the 12 Measure-UPS II alarms.
Select Another Outlet	Allows you choose an another outlet to configure.	

Table 32: Annunciator Menu Items

Measure-UPS II menu

The Measure-UPS II Properties menu is accessible by entering M at the Main menu when a Measure-UPS II accessory is present.

The Measure-UPS II Properties menu displays current information for:

- Current temperature and humidity reading for two probes,
- High and low temperature thresholds for two probes, and
- High and low humidity thresholds for two probes.

To change a threshold setting, enter the number next to it on the menu.

Continued on next page

Outlet Properties Menu *continued*

Measure-UPS II menu items

The following table describes the menu items that appear on the Measure-UPS II Properties menu. After selecting an alarm threshold (1–8), press SPACEBAR to change to the next available setting. Continue pressing SPACEBAR to cycle through the available list of threshold settings, including the Disabled setting.

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 Measure-UPS II operation. The options are: **Yes**: all alarm limits are set to Disabled. MasterSwitch Plus will ignore all Measure-UPS II alarms. **No**: all alarm limits are reset to previous configuration.

Table 33: Measure-UPS II Properties menu

Chapter 6 Product Information

Using MasterSwitch Plus with PowerChute Plus and APC Accessories

PowerChute Plus and on-demand operation

The following commands are available in PowerChute Plus to perform actions on the server connected to Outlet #1 of MasterSwitch Plus:

- Scheduled Shutdown
- Shut Down System Now

Note: The Shut Down System Now command will turn off Outlet #1 and will require you to turn it on with the Manual button (or through the Change Outlet States item on the Main menu) to restart.

MasterSwitch Plus and PowerChute Plus settings

Several settings in PowerChute Plus are affected by the configuration of MasterSwitch Plus. Refer to the following table for information concerning each affected setting and its new meaning.

PowerChute Plus Setting	Relationship to MasterSwitch Plus
UPS Low Battery Signal Time	Multiplied by the UPS Low Battery Multiplier for each outlet of MasterSwitch Plus. See "Outlet properties: Graceful Shutdown mode" on page 6 for more information.
UPS Turn Off Delay	Overridden by the Power Off Delay for each outlet of MasterSwitch Plus. See "Outlet properties: Graceful Shutdown mode" on page 6 for more information.
UPS Wakeup Delay Time	Overridden by the Power On Time Delay for each outlet in MasterSwitch Plus. See "Outlet properties: Graceful Shutdown mode" on page 6 for more information.
UPS Wakeup Delay (Capacity)	Overridden by the Battery Capacity Threshold for each outlet in MasterSwitch Plus. See "Outlet properties: Graceful Shutdown mode" on page 6 for more information.

APC Accessories and UPS control commands

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

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 which 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.

Obtaining service

To obtain service under warranty you must obtain a Returned Material Authorization (RMA) number from APC or a designated APC service center. Products must be returned to APC or an APC service center with transportation charges prepaid and must be accompanied by a brief description of the problem encountered and proof of date and place of purchase. See "If problems persist" on page 65 for further information on obtaining service.

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

Overview

If you have problems with your MasterSwitch Plus power control unit, the troubleshooting chart (Table 35) covers many of the problems that might arise with MasterSwitch Plus. If you encounter a problem with your MasterSwitch Plus, refer to the troubleshooting chart first. There may be a simple solution you are overlooking.

Troubleshooting suggestions

The following table shows the solution to common problems with connecting and configuring MasterSwitch Plus.

Problem	Possible Cause	Solution
A server connected to a Basic port does not detect On Battery or Lo Battery signal.	Wrong cable is being used.	Verify that you are using the correct cable. Refer to "Choosing additional cables: Table 1," in the *Installation and Quick Start Manual*.
	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 Plus Low Battery Warning Control is set to Programmed Delay, make the delay shorter than the AC Fail shutdown delay in PowerChute Plus FlexEvents.
	MasterSwitch Plus 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 Plus.

Table 35: Troubleshooting

Continued on next page

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 *PowerArray* can communicate with MasterSwitch Plus.
	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 Plus Control Console.	DTE equipment is using incompatible terminal settings.	Change DTE equipment settings to match the MasterSwitch Plus 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 *Installation and Quick Start Manual*.

Table 35: Troubleshooting, continued

Continued on next page

Troubleshooting *continued*

If problems persist

For problems not covered in the troubleshooting chart (see Troubleshooting, Table 35), or if the problem persists, follow this procedure:

1. Note the serial number and date of purchase of the MasterSwitch Plus unit. Contact Technical Support at the 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 are free of charge. If the warranty has expired, there will be a nominal charge for repair.
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 U.S. address on the back cover of this manual.

Product Information

Life Support Policy

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

Life-support devices include but are 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 as well as any other devices designated as "critical" by the U.S. FDA.

Hospital-grade wiring devices and leakage current protection may be ordered as options on many APC UPS systems. APC does not claim that units with this 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 "Outlet properties" on page 5).

Basic port pin assignments

The following figure shows the Basic port pin assignments.

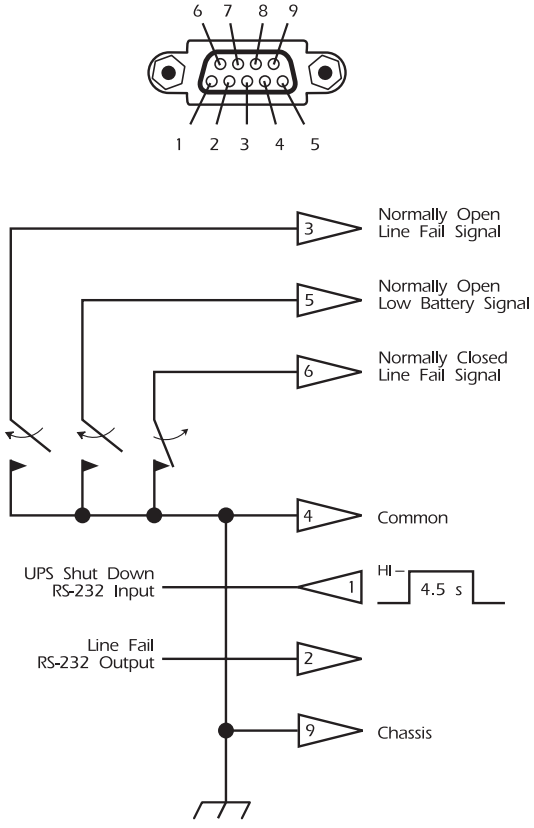

Figure 17: Basic port pin assignments

Continued on next page

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 67), 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

The following figure shows the Advanced port pin assignments.

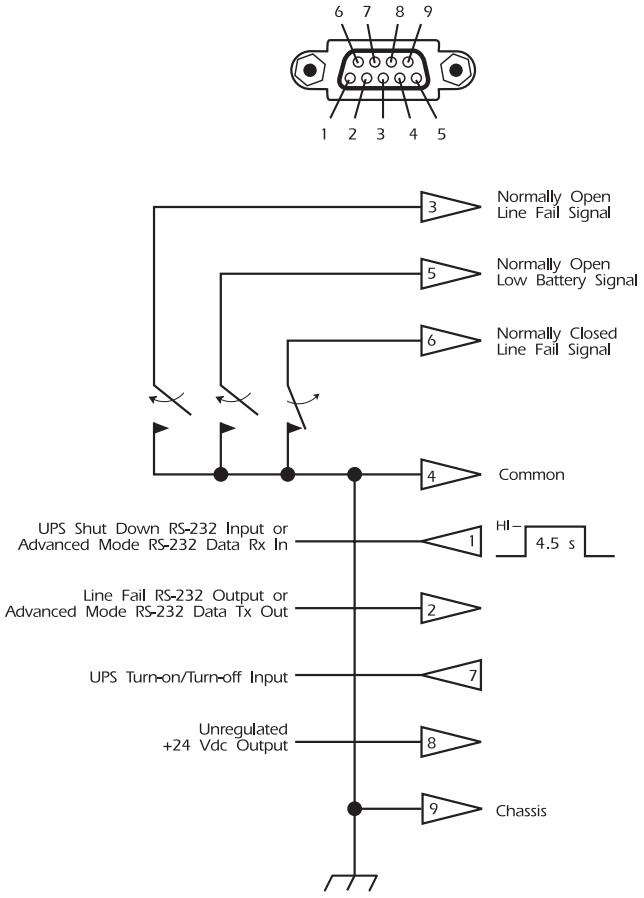

Figure 18: Advanced Port Pin Assignments

Continued on next page

Specifications *continued*

Product specifications

The following table shows the product specifications for MasterSwitch Plus.

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

Table 36: Product specifications

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Toll-free Customer Support:

U. S. & Canada 1-800-800-4272

Online Customer Support:

U.S. & Canada http://support.apcc.com/

Addresses:

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132 Fairgrounds Road
P. O. Box 278
West Kingston, Rhode Island 02892
USA

990-6012 **8/99**