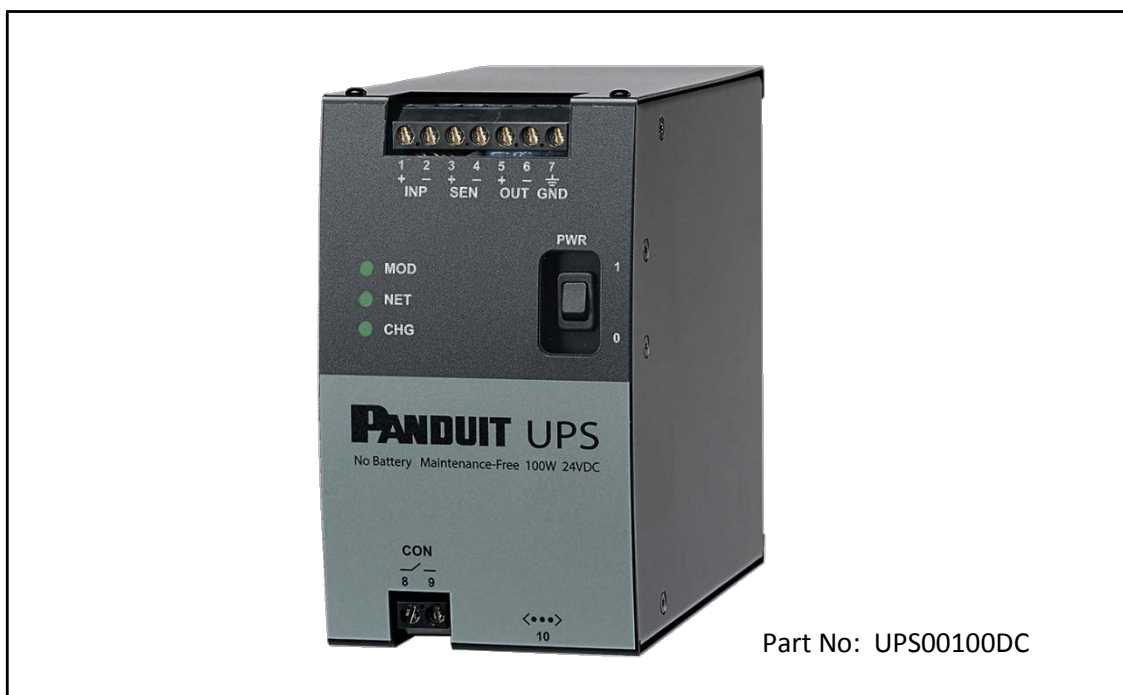


English



TO REDUCE RISK OF INJURY, THE USER
MUST READ THE USER MANUAL



NOTE: Throughout this document, the UPS00100DC (Uninterruptible Power Supply)
may also be referred to as "UPS".

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NOTE: In the interest of higher quality and value, Panduit products are continually being improved and updated. Consequently, pictures may vary from the enclosed product

1. INTRODUCTION

1.1. BACKGROUND

The UPS Uninterruptible Power Supply (UPS) is designed to provide backup power to a DC load in the event of a power outage. The unit utilizes Electrochemical Double-Layer Capacitors (EDLCs), as the energy storage device, to provide a long operating life without the need for battery replacement. The UPS accepts a 24 to 28VDC input voltage and provides a 21 to 28VDC output voltage to a load with a maximum output power of 100W. The bank of twelve 350F EDLCs provide energy storage of approximately 15kJ which can supply a 100W load for a minimum run time of 2 minutes. The UPS can be used in a redundant power supply system and as such, it can monitor the power delivered by a second supply to the load through an external sense resistor. Operating status and control is provided via a web server running on the UPS that may be accessed via a web browser running on a PC connected to the same network as the UPS. The ON/OFF switch may be used to turn the UPS off which removes voltage from the terminals so that the unit is safe for installation or transportation.

The UPS utilizes multiple EDLC cells in series and the charge voltage is applied across all cells in the series or the “stack” of cells. Due to small differences in cell capacitance and leakage current, it is possible for one cell to charge to a slightly higher voltage than other cells in the series stack. As the cells are run very close to their maximum operating voltage, it is necessary to monitor each of the twelve cells and adjust the individual cell voltages to ensure that they do not exceed their maximum voltage rating. The UPS includes a microcontroller that performs this “cell balancing” function by monitoring each of the twelve cell voltages and connecting a “bleed resistor” across the cell if the voltage across any one cell gets too high. This process is also used to increase the voltage of any cell that has a very low cell voltage to ensure that the average cell voltage is not any higher than necessary. The UPS also uses the cell balancing circuitry to measure the capacitance and equivalent series resistance (ESR) of each cell. This information can be used to calculate the energy storage capability of the UPS as well as to estimate the operating lifetime of the unit.

Figure 1 shows a photo of the UPS system excluding the optional load sense module.

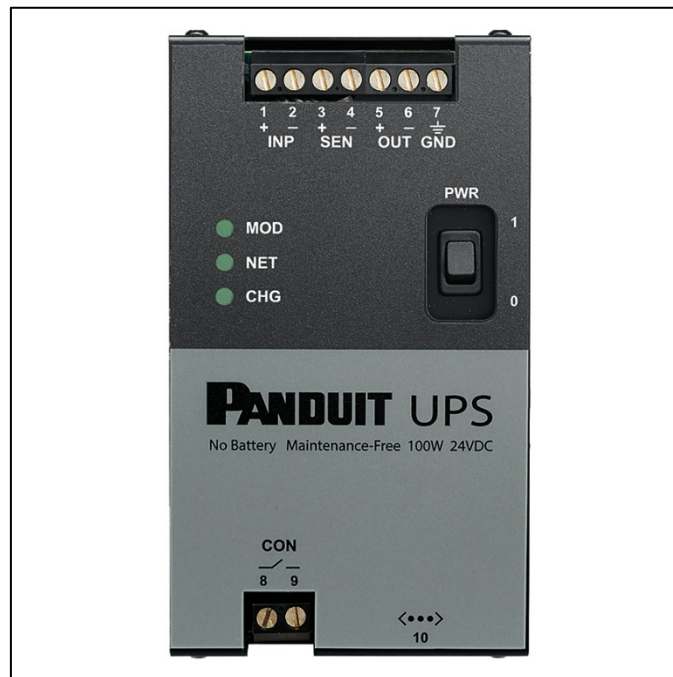


Figure 1: Front view of UPS

1.2. PURPOSE

The purpose of this document is to provide the user with the information necessary to operate the UPS.

1.3. EQUIPMENT OVERVIEW

Box Contents:

- The Uninterruptible Power Supply box contains the following:
 - Uninterruptible Power Supply (UPS), model number UPS00100DC

1.4. OPTIONAL LOAD SENSE MODULE

Please see the Load Sense Module UPS003LSM instruction manual for integrating the load sense module to your system. Document number PA27224A01 is included with the LSM or on www.panduit.com. The schematic in Figure 6 on page 15 shows the wiring interface.

1.5. CABLE DETAILS

- The UPS hardwire terminals can receive up to 12 AWG wiring maximum. Consult with a qualified electrician
- The network cable uses a RJ45 CAT5E or greater Ethernet cable.

1.6. TERMS AND ABBREVIATIONS

- A: Ampere
- DC: Direct Current
- EDLC: Electrochemical (Electric) Double-Layer Capacitor
- ESR: Equivalent Series Resistance
- F: Farad
- WBI: Web Browser Interface
- LED: Light Emitting Diode
- MOSFET: Metal Oxide Semiconductor Field Effect Transistor
- PC: Personal Computer
- PCB: Printed Circuit Board
- UPS: Uninterruptible Power Supply
- V: Volts
- W: Watts

2. UPS GENERAL SPECIFICATIONS

2.1. Model Part Number

- UPS00100DC

2.2. Input Power

- Voltage: 24.0 to 28.0 VDC
- Power Minimum: 24 W with no load, charging on slow charge setting per section 6.8
- Power Maximum: 156W with 100W load, charging on fast charge setting per 6.8
- Protection: Over-voltage shut down at 32VDC. Maximum overvoltage is +50 VDC at 25°C ambient.
- Reverse voltage maximum is -50 VDC at 25°C ambient.

2.3. Output Power

- Input present:
 - o Voltage: 24VDC
 - o Current: 6.5A max.
 - o 500 mV drop at 100W load
- Input not present:
 - o Voltage: 24VDC pass through
21.0 to 23.0 VDC charging

- o Current: 4.5A pass through
4.55 charging at 22VDC
- Short circuit rating: 6.1 A to 7.7 A

2.4. Environmental

- Operating Temperature: -40 to +60°C.
- Storage (non-operational) Temperature: -40 to +70°C. Humidity: 0 to 95% RH, noncondensing
- Operational Vibration: 2G at 10 to 500 Hz
- Operational Shock: 20G (11ms 3 bumps / direction, 18 bumps in total)

2.5. Compliance

- FCC Title 47 CFR 15 Subpart B Emissions Class A
- CAN ICES-3(A)/NMB-3(A), ICES-003 Issue 5
- UL 1778 and CSA C22.2 No. 107.3-05 "Uninterruptible Power Supply Equipment"
- UL 508 and CSA-C22.2 No. 14 "Industrial Control Equipment"
- UL 60950-1, 2nd ed, 2011-12-19, CSA C22.2 No. 60950-1-07, 2nd ed, 2011-12
"Information Technology Equipment - Safety - Part 1: General Requirements"
- (Low-Voltage Directive*) IEC 60950-1:2005, A2:2013,
EN60950-1:2006+A11:2009+A1:2010+A12:2010+A2:2013
"Information Technology Equipment - Safety - Part 1: General Requirements"
- RoHS All materials and components used must meet the material restrictions of European Directive 2011/65/EU on the Restriction of Hazardous Substances
- IP20 per IEC 60529
- Hazardous Location:
 - o ExTR Reference Number: US/UL/ExTR14.0020/00
 - o ExTR Free Reference Number: 4786279664
 - o ISA 12.12.01:2013, CSA C22.2 No. 213-1987M (R2013) "Standard for Nonincendive Electrical Equipment for Use in Class I and II, Division 2, Groups A, B, C, and D and Class III, Divisions 1 and 2 Hazardous (Classified) Locations"
 - o IEC 60079-15, 4th Edition (2010-01)
 - o IEC 60079-0, 6th Edition (2011-06)
 - o IECEx: IECEx UL 17.0077X
 - o ATEX: DEMKO 14 ATEX 1236X

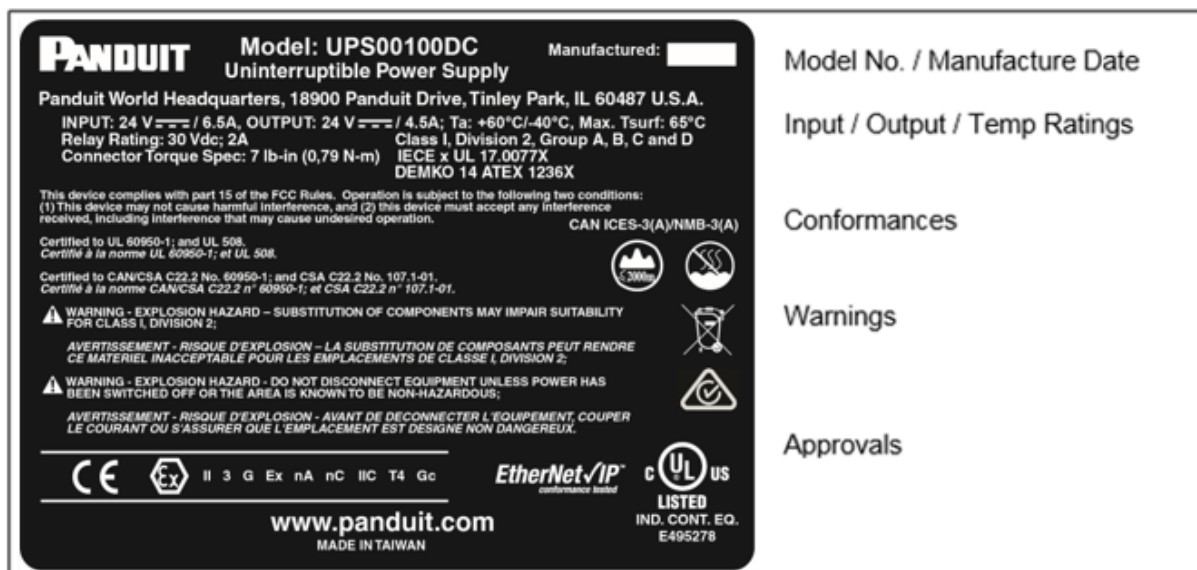


Figure 2: Product Label and Descriptions

 **NOTE:** For use in Class I, Zone 2 environment, the UPS/LSM must be used in an enclosure certified for use in Class I, Zone 2, Groups IIC. The equipment shall only be used in an area of not more than pollution degree 2, as defined in IEC 60664-1. The equipment shall be installed in an enclosure that provides a degree of protection not less than IP 54 in accordance with IEC 60079-15 (tool accessible). Transient protection shall be provided that is set at a level not exceeding 140 % of the peak rated voltage value at the supply terminals to the equipment. The enclosure must have a door or cover accessible only by the use of a tool.

 **NOTE:** This product is intended for use in a restricted location, such as inside a machine, control cabinet, enclosure or similar structure. Restricted access can be provided by a door, cover or similar physical means that requires the use of tools, keys or other secure methods to gain access. The level of security required should determine the location, protection and access methods. Not for use in a computer room as defined in the Standard for the Protection of Information Technology Equipment, ANSI/NFPA 75.

2.6. Installation

- Top hat (DIN) rail EN 50022
- Width: 81mm (3.2 in)
- Depth: 178mm (7.0 in)
- Height: 145mm (5.7 in)
- Weight: 5 lbs, max.
- Switch: Output On/Off, recessed
- Terminals: screw type, accepts #12 to #18 AWG, stranded/solid/terminated
- Control wiring is along the top edge.
- Output: Isolated, Form A contact, rated 30VDC at 1A maximum.

Input	Output	Charge Status	Control Output
0 VDC	0 VDC	N/A	Off
24 VDC	24 VDC pass through	Charging	On
24 VDC	24 VDC pass through	Charged	On
0 VDC	18-22 VDC backup	Discharging	On
0 VDC	0 VDC	Discharged	Off

- Communications: RJ45 socket for Ethernet (10BaseT)

2.7. Performance

- Hold Time: 2.0 to 2.45 minutes at 100W load.
- Extraction Efficiency: 83% minimum of stored energy
- Voltage Drop: 500mV maximum from Input to Output when Input power is present
- Output Transient: 5 msec max during $18 \leq VDC_{OUT} \leq 22$ at 100W load
- Ripple Voltage: 50mVp-p max. over 20 Hz to 20 MHz.
- Sense Inputs: 2, for determining the current draw of the load through the use of a 4-terminal current-sense resistor
- Accessory: DIN Rail, 4 terminal load sense resistor
- Charge Times:
 - o Fast: 10 to 13 minutes at nominal 56W Input Power
 - o Medium: 12 to 16 minutes at nominal 35W Input Power
 - o Slow: 16 to 21 minutes at nominal 24W Input Power

2.8. Indicators

- Module Status: per The EtherNet/IP Specification (Volume 2, Chapter 9) (see Section 14.2, 14.4 and 14.5)
- Network Status: per The EtherNet/IP Specification (Volume 2, Chapter 9) (see Section 14.2, 14.4 and 14.5)
- Charge Status
 - Green = Charged
 - Flashing Green = Charging
 - Flashing Red = Discharging
 - Red = Discharged/Disconnected

2.9. User Interface

- IP Address: dynamic, requires DHCP server on the same subnet
- Content:
 - Module
 - Network
 - Charge
 - Settings

2.10. Network Interface

- Protocol: Ethernet/IP, operating as a slave, Generic Profile
- Certification: ODVA

2.11. Maintenance

- Time Remaining to 80% of original capacity
 - 20 years at 20°C maximum (UPS ambient)
 - 1.7 years at 40°C maximum (UPS ambient)
 - 0.75 years at 60°C maximum (UPS ambient)

3. PRECAUTIONS AND GENERAL GUIDELINES

The basic condition for safe use and proper operation of the UPS is the knowledge and attention to the safety information provided in this manual. The following safety information must be observed by all persons who will work with the UPS. All rules and instructions for the work place must be observed, especially those pertaining to the prevention of accidents.

The information and instructions contained in this document are not intended to be utilized as a substitute for proper training and experience in the safe installation and operation of said product. Prior to installation, it is the Buyer's responsibility to consult with the appropriate local Authority Having Jurisdiction (AHJ) for all applicable codes, permits, regulations and standards.

This product, should only be installed and serviced by a licensed electrical contractor, or competent technician, that meets the following qualifications:

- Is thoroughly familiar with this product and the instructions for installation and operation.
- Is trained (accredited) in industry-accepted safe operating practices and procedures regarding identification and mitigation of high- and low- voltage hazards and situations.
- Is trained to identify and install appropriately-sized Branch Circuit Disconnect(s) with appropriately-sized Branch-Circuit Protective Rating and Short-Circuit Current Rating (SCCR), before connecting Panduit product to the branch circuit.
- Is trained and authorized to energize, de-energize, clear and ground power distribution equipment.
- Is trained in the care and use of PPE (personal protective equipment) including, but not limited to; arc-flash protective clothing, safety glasses, face shield, hard hat, gloves, and non-conductive tools (clamp stick, hot stick, etc...)



This symbol is used to call your attention to hazards or unsafe practices which could result in an injury or property damage. The signal word, defined below, indicates the severity of the hazard. The message after the signal word provides information for preventing or avoiding the hazard.



WARNING

Hazards which, if not avoided, COULD result in severe injury or death.



CAUTION

Hazards or unsafe practices which, if not avoided, MAY result in injury or property damage.

3.1. Safety Warnings



WARNING

- Read all safety warning and all instructions. Failure to follow the warnings and instructions may result in electric shock, fire and/or serious injury.
- Save all warnings and instructions for future reference.

	Panduit Corp. recommends the UPS be used with all installed safety features. Customer assumes all liability for injury that could result from improper use of this UPS and responsibility for all necessary training to ensure safe operation of this UPS.
	• FOR INSTALLATION AND USE BY TRAINED PERSONNEL ONLY.
	• IF ANY DAMAGE TO THE PRODUCT IS APPARENT OR SUSPECTED, DO NOT USE THE PRODUCT. REFER PRODUCT TO QUALIFIED SERVICE PERSONNEL.
	• FCC WARNING: CHANGES OR MODIFICATIONS TO THE PRODUCT COULD VOID THE USER'S AUTHORITY TO OPERATE THE PRODUCT.
	• USE RECOMMENDED ACCESSORIES. CONSULT THE OWNER'S MANUAL FOR RECOMMENDED ACCESSORIES. THE USE OF IMPROPER ACCESSORIES MAY CAUSE RISK OF INJURY TO PERSONS.

3.2. Electrical Safety Practices

GROUNDING:

In the event of a malfunction or breakdown, grounding provides a path of least resistance for electric current which reduces the risk of electrical shock.

Improper connection of the equipment grounding conductor can result in a risk of electric shock. The conductor with insulation having an outer surface that is green with or without yellow stripes is the equipment-grounding conductor.



Check with a qualified electrician, or service personnel if the grounding instructions are not completely understood; or if in doubt as to whether the UPS is properly grounded.

Avoid body contact with earthed or grounded surfaces, such as pipes, radiators, ranges and refrigerators.

There is an increased risk of electric shock if your body is earthed or grounded.

3.3. Operation

	! WARNING ONLY OPERATE THE UPS IN A CLEAN, DRY, INDOOR ENVIRONMENT. DO NOT EXPOSE THE UPS TO RAIN OR WET CONDITIONS. <i>Water entering a UPS will increase the risk of electric shock.</i>
	! KEEP AWAY FROM LIVE CIRCUITS: • Operating personnel must not remove covers. • Replacement of components and internal adjustments must be made by qualified maintenance personnel. • Disconnect power when replacing components. • Dangerous voltages may exist even with the power removed. • To avoid injuries, always disconnect power and turn power switch to OFF. • Input connection to the product must remain accessible as a disconnect device. • DO NOT work on the product; connect or disconnect cables during periods of lightning. • Provide wiring per national and local electrical codes.

3.4. Personal Safety



WARNING

- **Use personal protective equipment. Safety glasses must be worn at all times by all persons installing the UPS.**

3.5. Service



Have your UPS serviced by a qualified repair person using only identical replacement parts.

Contact Panduit Customer Service and Technical Support at the following locations:

Customer Service

General Technical Support

800-777-3300

email: TechSupport@panduit.com

Email: cs@panduit.com

The information contained in this manual is based on our experience to date and is believed to be reliable. It is intended as a Web Interface for use by persons having technical skill at their own discretion and risk. We do not guarantee favorable results or assume any liability in connection with its use. Dimensions contained herein are for reference purposes only. For specific dimensional requirements consult the factory. This publication is not to be taken as a license to operate under, or a recommendation to infringe any existing patents.

4. HARDWARE INSTALLATION

4.1. BACKGROUND

The Uninterruptible Power Supply (UPS) are designed to be installed on a the EN 60715 NS35 DIN rail. Use of this product in other applications is acceptable, but other precautions may be required to allow for specific installations not covered here.

4.2. PRODUCT INSPECTION

Before installing your UPS ensure that it has been inspected. If the product has any visible signs of damage, please contact Panduit customer support at 800-777-3300 or cs@panduit.com. Please register your product to receive notification of firmware and product updates at: <https://pages.panduit.com/Product-Registration-Request.html>

4.3. OVERVIEW

The physical connections to the UPS are arranged on the top edge of the front panel of the unit which includes external sense resistor connections, chassis ground, and the input and output voltage connections. The front panel contains an ON/OFF power switch and three indicator LEDs. The front panel is shown in Figure 3. The bottom edge of the front panel includes connections for a control output relay and Ethernet port. Figure 4 shows the location of the reset button and serial number.

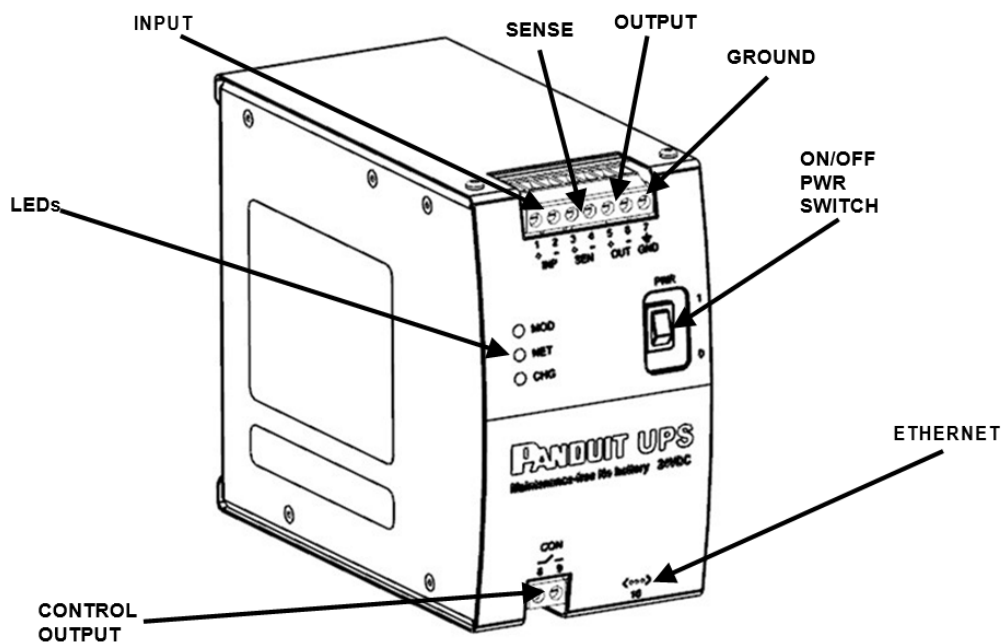


Figure 3: UPS Front Panel Details

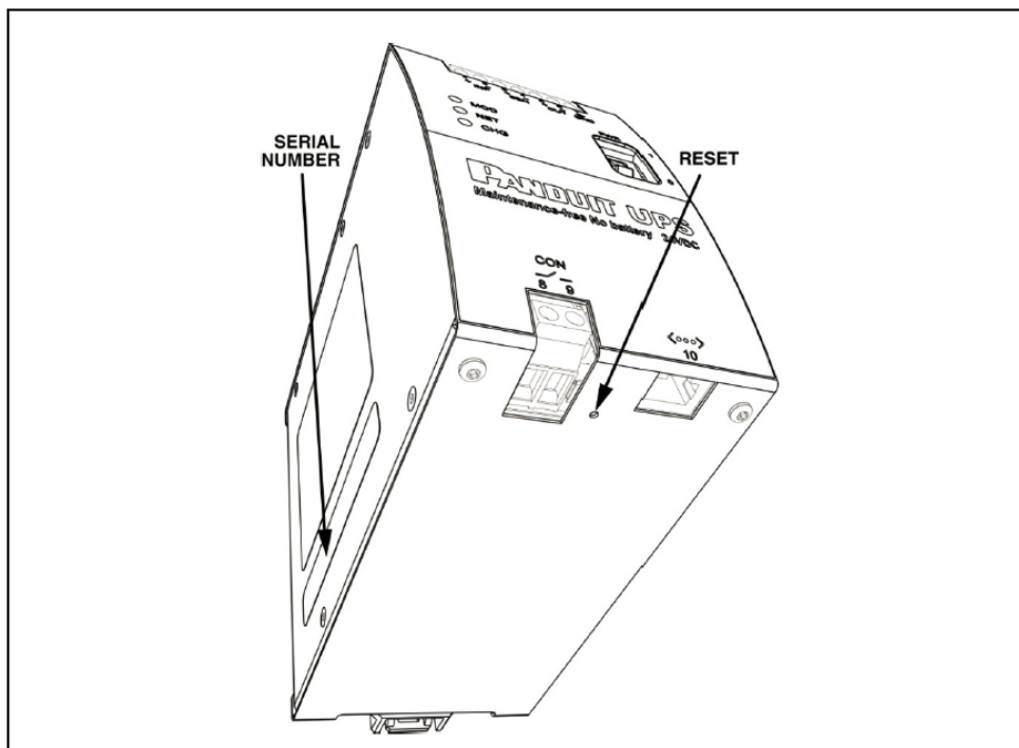


Figure 4: Reset Button and Serial Number

4.4. HARDWARE INSTALL

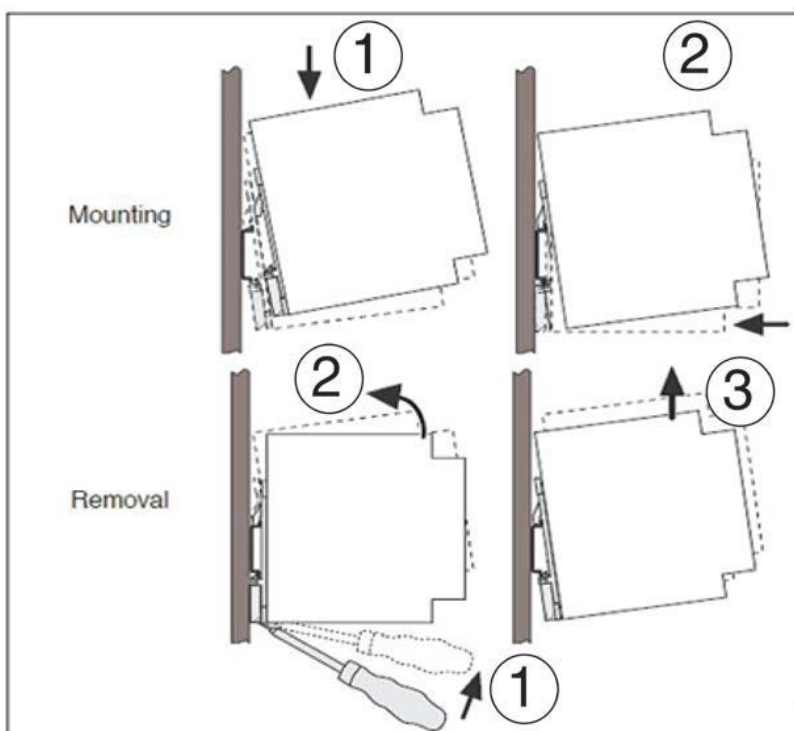


Figure 5: DIN Rail Installation

No minimum spacing to other modules is required for proper operation of the device. However, ensure there is ample space to cable components to protect the cabling integrity. Also ensure there is access to the switches, including the reset button and Ethernet port on the underside of the device.

To install the UPS, place the module with the DIN rail guide on the top edge of the DIN rail and then snap it downwards as shown in Figure 5. To remove, release the snap-on catch using a screwdriver and then detach the module from the bottom edge of the DIN rail as shown in Figure 5.

4.5. WIRING

This product is intended to be hardwired at the customer site/location. It must be installed by a qualified electrician in compliance with all local and national regulations.



NOTE: To install ensure the **power** switch is in the off position.

No minimum spacing to other modules is required for proper operation of the device. However, ensure there is ample space to cable components to protect the cabling integrity. Also ensure there is access to the switches, including the reset button and Ethernet port on the underside of the device.

The UPS supports backup power for a load with redundant power supplies as shown in Figure 6. The primary AC/DC converter provides to the load through the provided optional load sense module. The AC/DC converter is connected to pin 3 of the current sense resistor while pin 4 is connected to the load. Figure 6 shows the pin numbering of the current sense resistor.

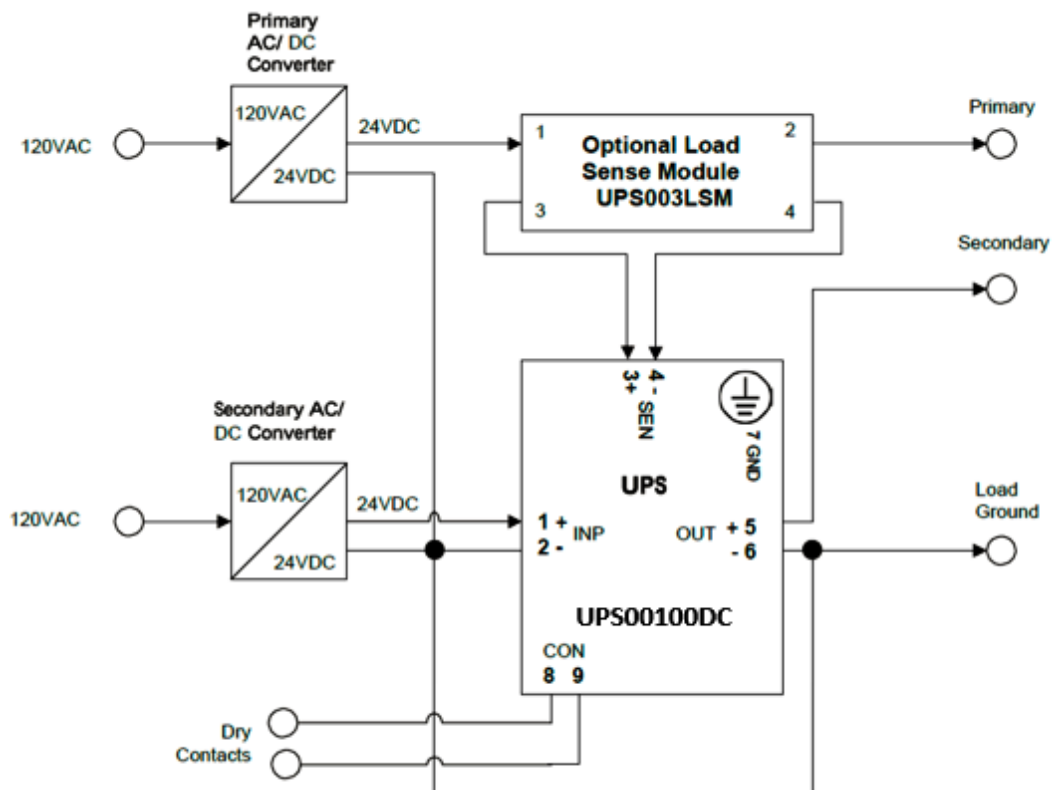
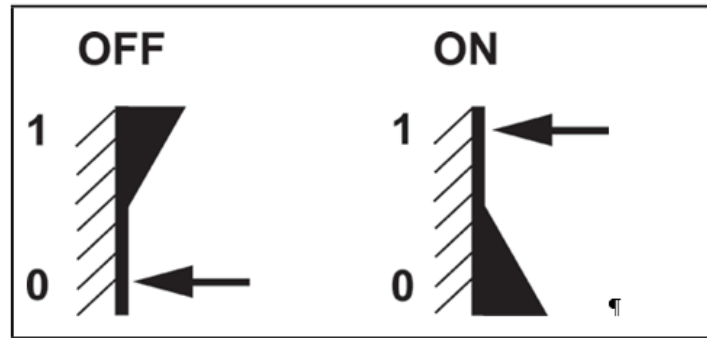


Figure 6: System Block Diagram

4.5.1. ON/OFF POWER SWITCH



This two-position toggle switch enables operation of the UPS when it is set to the “ON” position. When set to the “OFF” position, the LEDs will be OFF and there will be no voltage present on any of the connector terminals, making the UPS safe for installation or transport.



Note that when the toggle switch is in the “ON” position, voltage may still be present at the DC output terminals even when the input terminals are disconnected from power. Do not transport or attempt to make connections to the terminals when the toggle switch is in the “ON” position.



Warning: A disconnect switch shall be provided by others for DC input circuit and shall be in accordance with the National Electric Code, ANSI/NFPA 70.

Connect the conductors according to the wiring diagram on Figure 6. Consult the Load Sense Module Instruction Manual before installing the Load Sense Module. Omit connections to the optional Load Sense Module if not using a Load Sense Module.

4.6. DC POWER INPUT

The two screw terminals above the legend marked “INP” are to be connected to an external DC power supply. The terminal marked “+” is to be connected to the positive supply line and the terminal marked “-” is to be connected to the system ground. The input maximum shall not be greater than 6.5A, 100W + 56W fast charge. The operating input voltage range is 24 to 28VDC. The input is protected with an internal fuse. The terminals are designed to accept 12 to 30 AWG (3.34 mm² to 0.049 mm²) wire. Torque terminal screws to 7 in-lbs. (0.7909 Nm).

4.7. SENSE INPUT

The two terminals above the legend marked “SEN” are to be connected to the optional load sense module, Panduit part number UPS0030LSM. Please see Section 7.3 for a detailed description of the external current sensor connections. The input voltage range for these two connections is 21 to 28VDC. The terminals are designed to accept 12 to 30 AWG (3.34 mm² to 0.049 mm²) wire. Torque terminal screws to 7 in-lbs. (0.7909 Nm).

4.8. DC POWER OUTLET

The two terminals above the legend marked “OUT” are to be connected to the load. The terminal marked “+” is to be connected to the positive supply line to the load and the terminal marked “-” is to be connected to the system ground. Note that the “-” terminal for the power input and power output are connected together internal to the UPS. The current draw of the UPS load shall not be any greater than 4.5 A. The operating output voltage range is 21 to 28VDC. The terminals are designed to accept 12 to 30 AWG (3.34 mm² to 0.049 mm²) wire. Torque terminal screws to 7 in-lbs. (0.7909 Nm). Insure the proper regulations are followed when selecting wiring components with regards to your system.

4.9. GROUND

The terminal above the legend GND should be connected to the equipment ground.

4.10. CON-CONTROL RELAY

The two terminals below the legend “CON” provide a normally open, single pole- single throw (Form A) relay contact. Basically, it is on if power is present and off in not. This device can offer added visibility through a

separate communication channel (PLC, light stack, etc.). The status of the relay follows the charge status indicator as shown in table below.

Input	Output	Charge Status	Control Output
0 VDC	0 VDC	N/A	Off
24 VDC	24 VDC pass through	Charging	On
24 VDC	24 VDC pass through	Charged	On
0 VDC	18-22 VDC backup	Discharging	On
0 VDC	0 VDC	Discharged	Off

4.11. NETWORK LED – Network Status Indicator

See Table 1.

Indicator State	Summary	Requirement
Steady Off	No Power, No IP address	The device is powered off, or is powered on but with no IP address configured (Interface Configuration attribute of the TCP/IP Interface Object).
Flashing Green	No Connections	An IP address is configured, but no CIP connections are established, and an Exclusive Owner Connection has not timed out.
Steady Green	Connected	At least one CIP connection (any transport class) is established, and an Exclusive Owner Connection has not timed out.
Flashing Red	Connection Timeout	An Exclusive Owner Connection for which this device is the target has timed out. The network status indicator shall return to steady green only when all timed out Exclusive Owner connections are reestablished. Devices that support a single Exclusive Owner Connection shall transition to steady green when subsequent Exclusive Owner Connections are established. Timeout of connections other than Exclusive Owner Connections shall not cause the indicator to flash red. The Flashing Red state applies to target connections only. Originators and CIP Routers shall not enter this state when an originated or routed CIP connection times out.
Steady Red	Duplicate IP	For devices that support duplicate IP address detection, the device has detected that (at least one of) its IP addresses are already in use.

Table 1: Network Status Indicator

4.12. CHG LED – Charge LED Status

Green	Charged
Flashing Green	Charging
Flashing Red	Discharging
Red	Discharged/Disconnected

5. NETWORK INSTALLATION

5.1. ETHERNET

The Ethernet port marked below the legend <...> is a standard RJ-45 type receptacle shown in Figure 3. This port should be connected to a router running a DHCP server. By Factory Default, the UPS will obtain an IP address from the DHCP server which will make it available to provide status via a web browser on a PC running on the same network. This connection is optional as the UPS can be operated without a connection to a PC. The Factory Default Values are shown in the following table:

Description	Factory Default Values
Charge Speed	Slow
Device Name	Panduit UPS
Network Settings	DHCP
Password	Serial Number
Username	Panduit UPS
Language	English

These values can be changed by accessing through the web browser interface.

5.2. WEB BROWSER INTERFACE (WBI)

Requirements

The UPS web server has been tested with Microsoft Internet Explorer 9, 10, and 11 running on Windows 7 operating system. Other web browsers and operating systems may work as well, but proper operation is not guaranteed. The appearance of the WBI can be adjusted through the web browser settings.

5.3. CONNECTING TO THE UPS

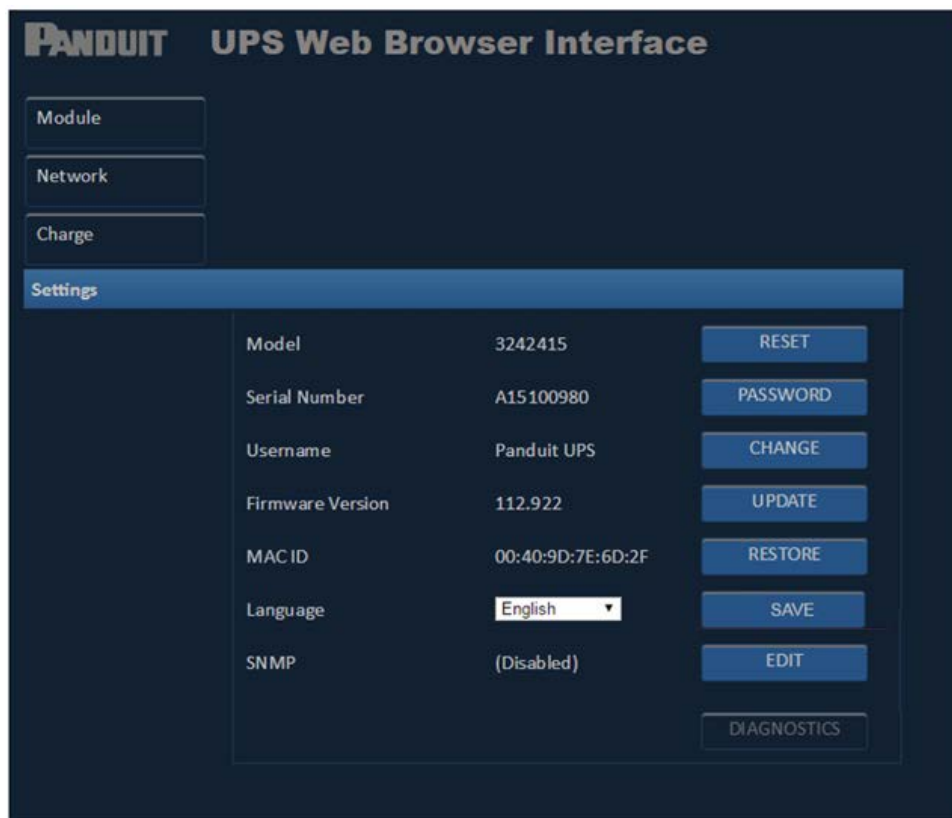
Within the web browser address bar type “http://nnn.nnn.nnn.nnn” where nnn.nnn.nnn.nnn is the IP address assigned to the UPS unit by the network.

5.4. USERNAME AND PASSWORD



When first accessing the Network, Charge and Setting pages on the UPS; or after approximately 30 minutes of inactivity, entry of a Username and Password is required. The default Username is "Panduit UPS" and the default password is the devices' serial number. It is strongly recommended that the Username and Password be changed from the factory default values after installation and first use. If the Username and/or Password is lost or forgotten, it can be restored to the factory default values using the reset switch as described in RESTORE FACTORY DEFAULTS section.

5.5. MODULE



This is the home screen of the web browser interface. NOTE: No username and password authentication is required to view the Module page or Event log.

5.5.1. MODULE STATUS

The Module Status indicates the general state of the UPS, and closely follows the front panel MOD indicator. A table of Module Status states is shown below. Minor Faults may be corrected by a Reset (see RESET Section 5.6.2 or 6.2). Major faults may be corrected by using the Restore Factory Defaults (See RESTORE FACTORY DEFAULTS, Section 6.3 or RESTORE, Section 5.6.8). If normal operation does not follow after a Restore Factory Defaults, please contact Panduit for technical support or service.

Status	Description
No Power	If no power is supplied to the device, the module status indicator shall be steady off.
Device Operational	If the device is operating correctly, the module status indicator shall be steady green.
Standby	If the device has not been configured, the module status indicator shall be flashing green.
Minor Fault	If the device has detected a recoverable minor fault, the module status indicator shall be flashing red. NOTE: An incorrect or Inconsistent configuration would be considered a minor fault.
Major Fault	If the device has detected a non-recoverable major fault, the module status indicator shall be steady red.
Self-Test	While the device is performing its power up testing, the module status indicator shall be flashing green/red.

5.5.2. Input, Volts and Input, Amps

Input, Volts displays the DC Voltage present on the Input + and - terminals.

Input, Amps display the total DC Current being used by the UPS, which is a combination of Charge Power plus Output (load) Power.

5.5.3. Output, Volts and Output, Amps

Output, Volts displays the DC Voltage present on the Output + and – terminals. When Input Power is present, this may be a slightly lower value than Input Volts due to small losses within the UPS circuitry. When Input Power is not present, this value will be the nominal Output Voltage supplied by the UPS from its internal stored energy and output conversion circuitry.

5.5.4. Load Sense, Amps

Load Sense, Amps display the approximate current draw through the optional accessory Load Sense Module (LSM), when connected in series with the power supply and the load. If the LSM is not being used, this value will typically be near zero.

5.5.5. Uptime, HHHHH:MM:SS

Uptime displays elapsed time since the UPS has started operating, in hours, minutes and seconds format, up to a maximum of 99999 hours.

5.5.6. Temperature, deg C.

Temperature displays the result of measuring the temperature sensor located inside the UPS enclosure. For normal operating conditions, the Temperature displayed will be about 5 degrees higher than the UPS ambient temperature (outside its enclosure).

5.5.7. 80% Capacity, Years

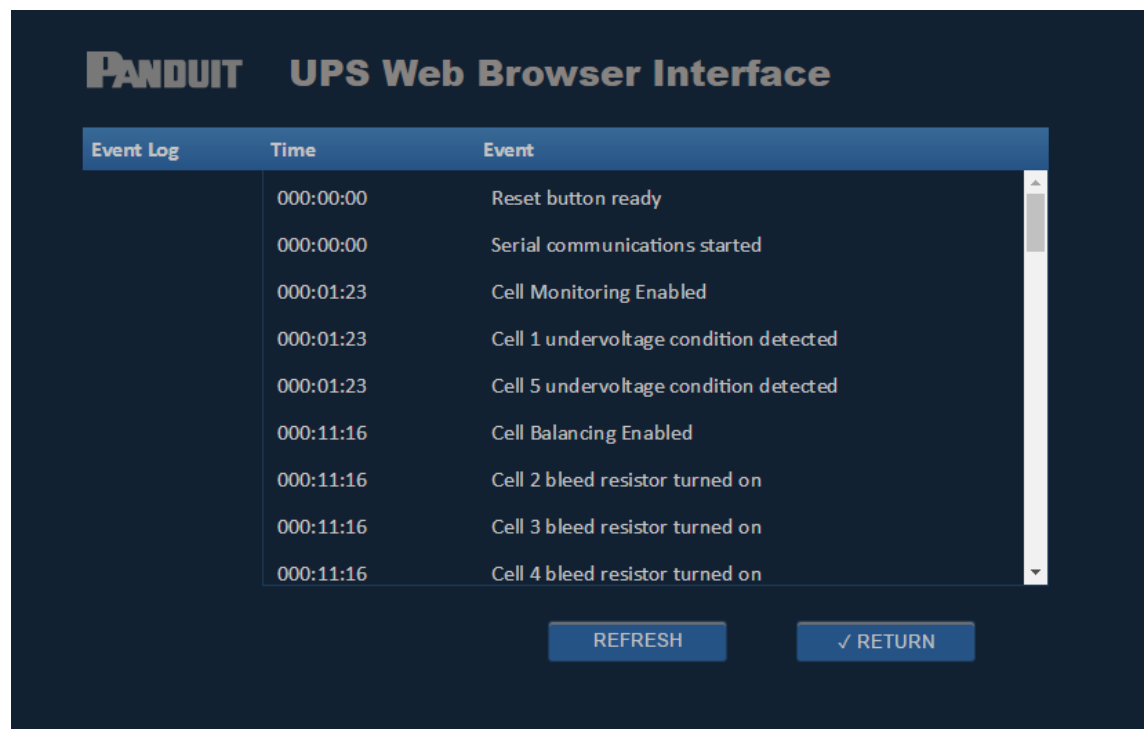
The estimated lifetime for the ELDC capacitors is 20 years for an operating temperature of 25 degrees Celsius or below. The 80% Capacity parameter is initialized with an expected lifetime of 20 years. As time elapses, this parameter is reduced. For internal temperatures of 25 deg C and below, time is reduced equal to elapsed time (e.g. 1 hour of elapsed time reduces this parameter by 1 hour). For internal temperatures above 25 deg C, a calculation is performed to reduce the parameter by a larger value, which accurately predicts the effect of temperature on capacitance. This parameter shows the estimated time before the ELDC capacitance is reduced by 20%, or 80% of its original capacity. It is important to note that this reduction in capacity only impacts the Hold Time provided by the UPS.

5.5.8. EVENTS

Pressing the EVENTS button will access the Event Log.

5.5.8.1. EVENT LOG

The event log records events pertaining to the automatic cell-balancing routine running on the internal microcontroller. Since the time between cell-balancing events may occur over relatively long time periods lasting days or even weeks, this allows the WBI to record these events so that they may be reviewed at a later time. The event log records when the automatic cell-balancing routine is activated or de-activated, when an under or overvoltage condition is detected, as well as when any of the bleed resistors are turned on or off. The stack voltage is recorded when the cell-balancing routine is activated or de-activated. The cell voltage is recorded when an under or overvoltage condition is detected, as well as when any of the bleed resistors are turned on or off. A time stamp of the Elapsed Time is recorded with each of these events. The Event Log can store a maximum of 1,000 events, which are stored in sequence. Older events are deleted when the Event Log reaches its maximum capacity.



The screenshot shows the 'PANDUIT UPS Web Browser Interface' with a table titled 'Event Log'. The table has three columns: 'Event Log', 'Time', and 'Event'. The table contains eight rows of data. Below the table are two buttons: 'REFRESH' and '✓ RETURN'.

Event Log	Time	Event
	000:00:00	Reset button ready
	000:00:00	Serial communications started
	000:01:23	Cell Monitoring Enabled
	000:01:23	Cell 1 undervoltage condition detected
	000:01:23	Cell 5 undervoltage condition detected
	000:11:16	Cell Balancing Enabled
	000:11:16	Cell 2 bleed resistor turned on
	000:11:16	Cell 3 bleed resistor turned on
	000:11:16	Cell 4 bleed resistor turned on

5.5.8.2. REFRESH

Pressing the Refresh button provides an explicit command to retrieve the latest updates from the event log.

5.5.8.3. RETURN

Pressing the RETURN button will return the WBI to the Module page.

5.6. SETTINGS

The screenshot shows the 'Panduit UPS Web Browser Interface' settings page. On the left, there is a sidebar with buttons for 'Module', 'Network', 'Charge', and 'Settings' (which is highlighted). The main content area displays various system settings in a table-like format with corresponding action buttons.

Setting	Value	Action
Model	ABC123	RESET
Serial Number	A15100788	PASSWORD
Username	UPS	CHANGE
Firmware Version	112.922	UPDATE
MAC ID	00:40:9D:79:1D:75	RESTORE
Language	English	✓ SAVE
SNMP	(Enabled)	EDIT

At the bottom right of the settings area is a button labeled 'DIAGNOSTICS'.

See Section 5.4 for username and password authentication.

Set a user name and password by clicking the PASSWORD button and following the wizard.

5.6.1. MODEL

The Model displays the Model Number of this UPS device (UPS00100DC).

5.6.2. RESET

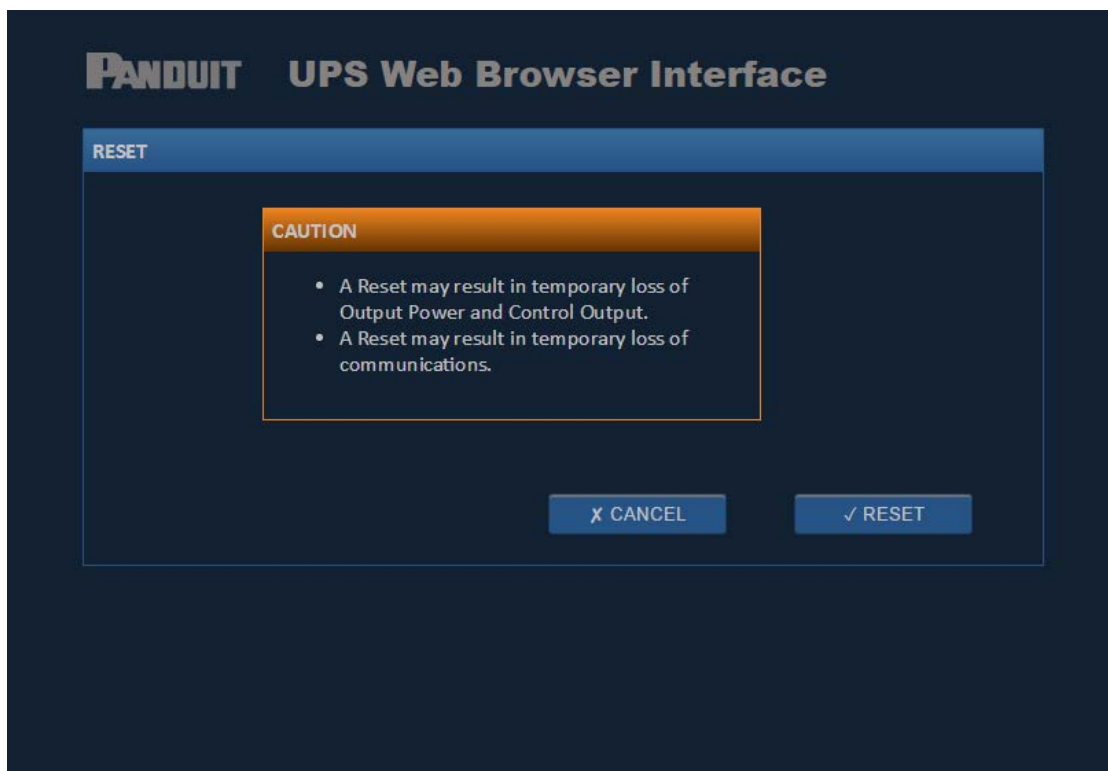
The Reset button can be used to restart the UPS in the event of a Minor or Major Fault, or after a change to Network Settings, or performing a Restore Factory Defaults or Firmware Update.

A Reset will also impact the following items and must be confirmed using the screen shown below:

The Elapsed Time will be reset to zero

The Event Log will be cleared.

Refer to Section 6.2 for Reset procedure.

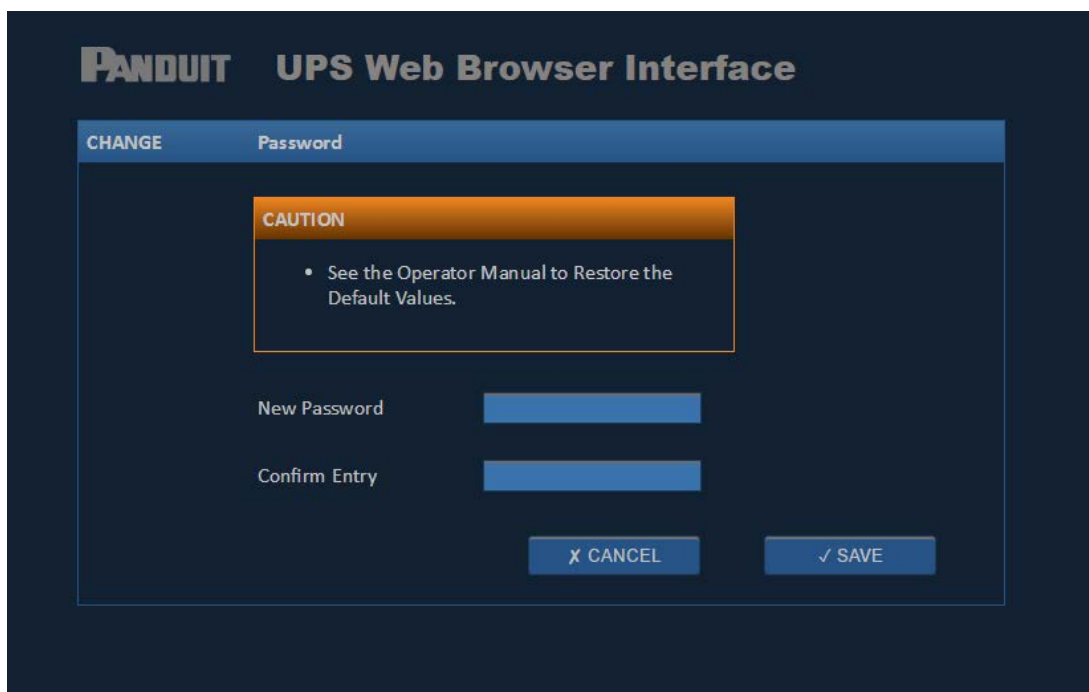


5.6.3. SERIAL NUMBER

The Serial Number displays the Serial Number of this UPS device, which is also printed onto a label on the side of the unit. The Serial Number is also used as the factory default value for the Password.

5.6.4. PASSWORD

Clicking on the PASSWORD button allows the user access to change the default Password. The new Password must be confirmed with a matching entry as shown below:

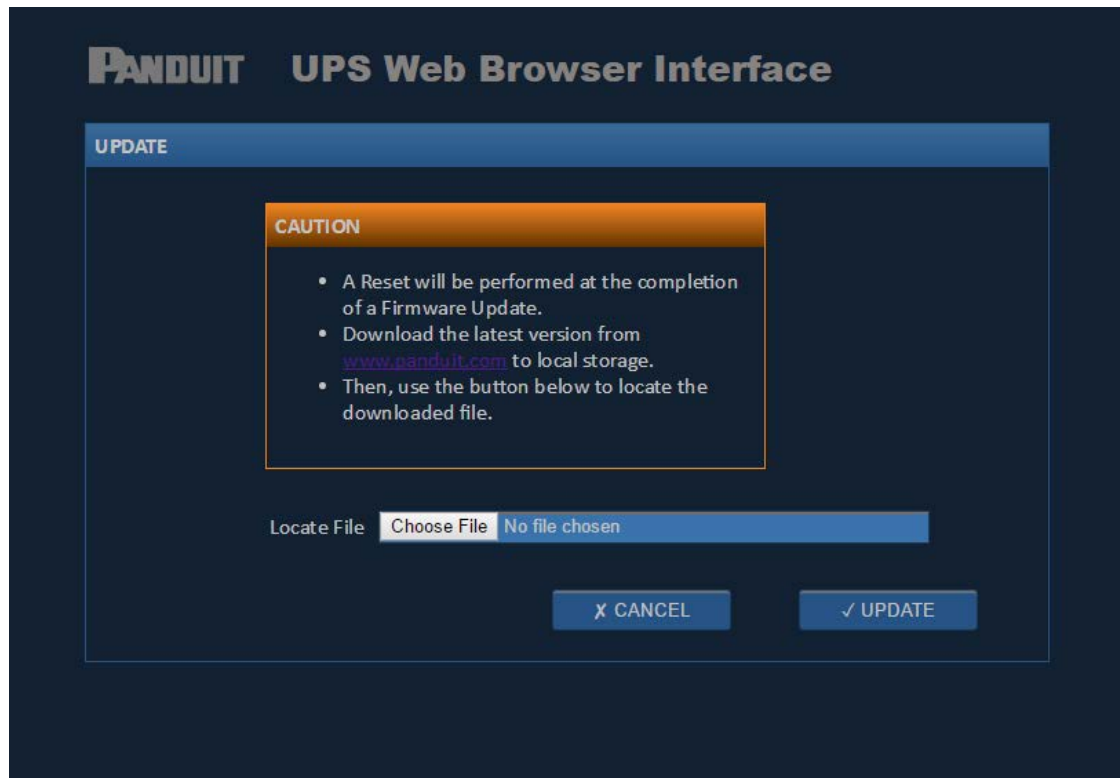


5.6.5. FIRMWARE VERSION

The firmware version is displayed. To check for firmware updated, please visit Panduit.com and click on Support and follow the links to the UPS Firmware Update page.

5.6.6. UPDATE

Clicking on the UPDATE button will prompt the user to locate an image file for uploading, as shown below.



The image file should be downloaded and placed on an accessible network drive. After the image file is located and the UPDATE button is clicked, the UPS will import and update its software using the new image.

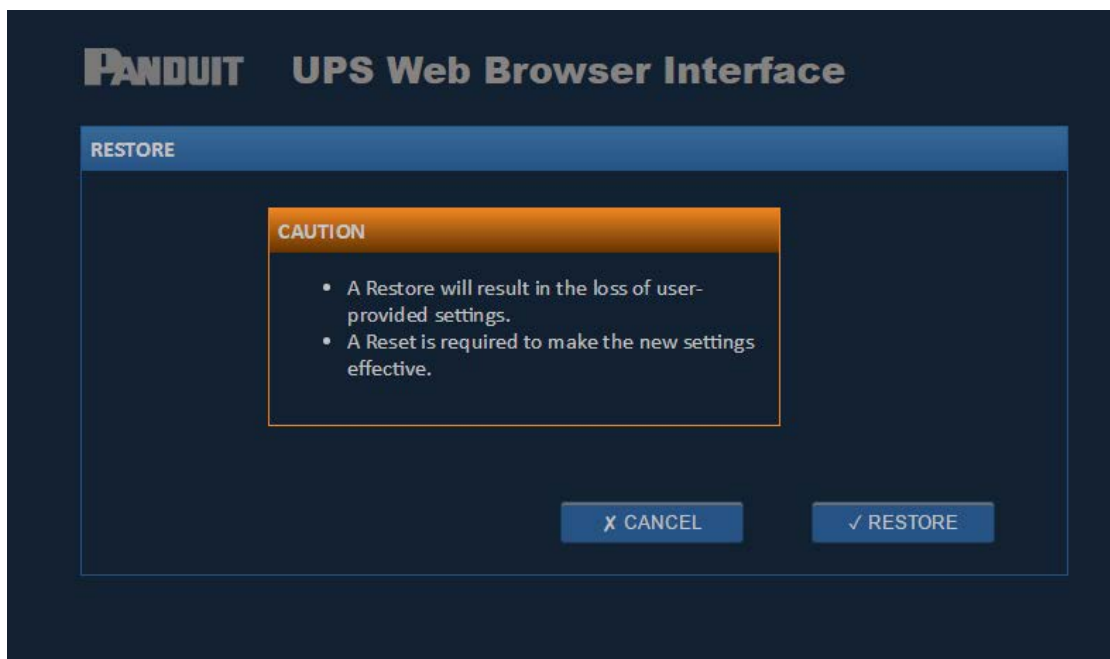
After performing a firmware updated, the user should immediately perform a RESET.

5.6.7. MAC ID

The MAC ID (Ethernet adapter device identifier) is displayed. The MAC ID is also printed on a label affixed to the side of the UPS.

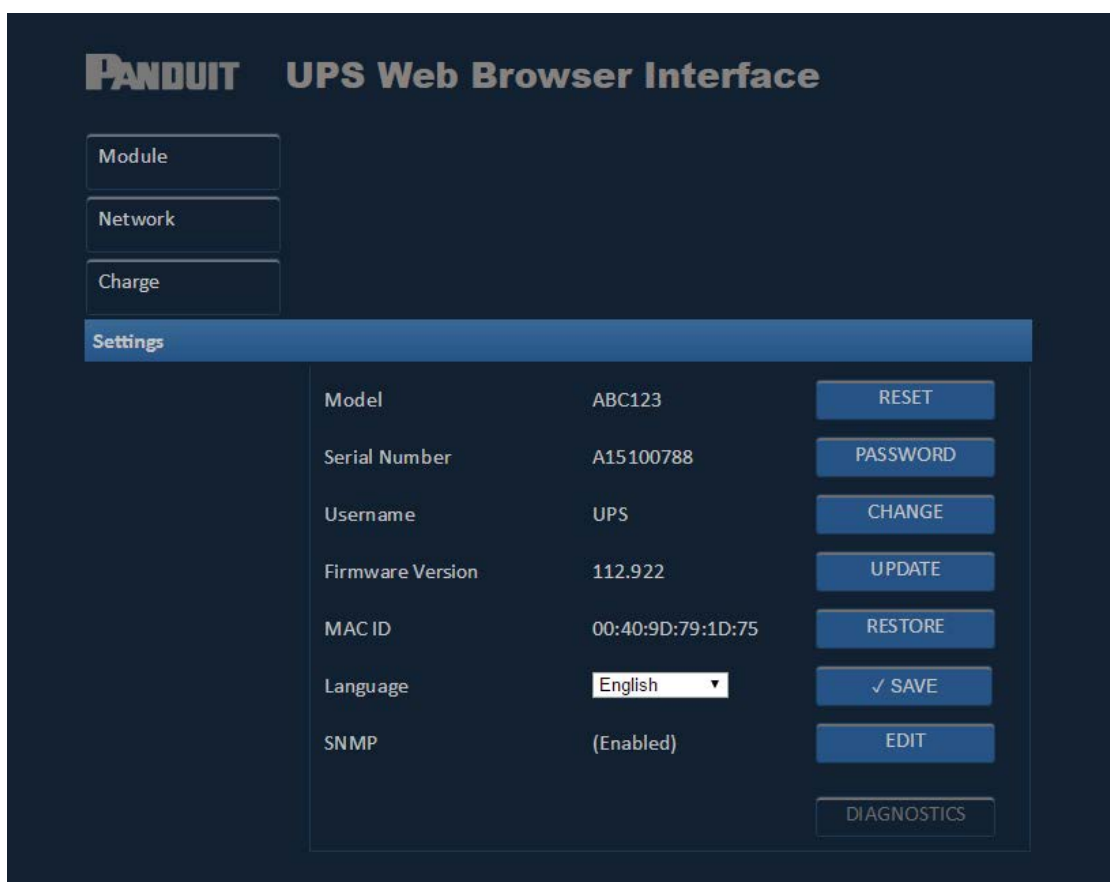
5.6.8. RESTORE

Clicking on the RESTORE button will prompt the user to confirm before setting parameters back to their factory default values, as shown in RESTORE FACTORY DEFAULTS, Section 6.3. After a Restore Factory Defaults, the user should perform a RESET.



5.6.9. LANGUAGE

The current Language for the WBI is displayed. Clicking on the arrow displays a menu of available Languages. Clicking on a different language followed by clicking on the SAVE button, immediately to the right, will change the Language setting. After changing the Language, the user should perform a RESET for the new Language to take effect.



5.7. NETWORK

The screenshot shows the 'Panduit UPS Web Browser Interface'. On the left, there is a sidebar with buttons for 'Module', 'Network' (highlighted), 'Charge', and 'Settings'. The main content area displays network information:

Network Status	No Connections	
Device Name	Panduit UPS	<button>CHANGE</button>
Network Settings	DHCP	<button>CHANGE</button>
IP Address	10.68.168.145	
Network Mask	255.255.255.0	
Gateway IP	10.68.168.1	

The network tab allows the Device Name and Network settings to be changed. For security, tab is Password protected. Use the network settings CHANGE button to set the DHCP or Static IP settings, IP Address, Network Mask, and Gateway IP.

The screenshot shows the 'Panduit UPS Web Browser Interface' with the 'Network Settings' dialog box open. The dialog has a 'CHANGE' button in the top left and a 'Network Settings' title. A 'CAUTION' box contains the following text:

- A Reset is required after changing the Network Settings.
- Changing the Network Settings may result in temporary loss of communications.
- See the Operator Manual to Restore the Default Values.

Below the caution box, there are input fields for network settings:

DHCP	<button>✓ SELECT</button>
STATIC	<button>SELECT</button>
IP Address	10.68.168.145
Network Mask	255.255.255.0
Gateway IP	10.68.168.1

At the bottom of the dialog, there are two buttons: ✗ CANCEL and ✓ SAVE.

5.8. CHARGE

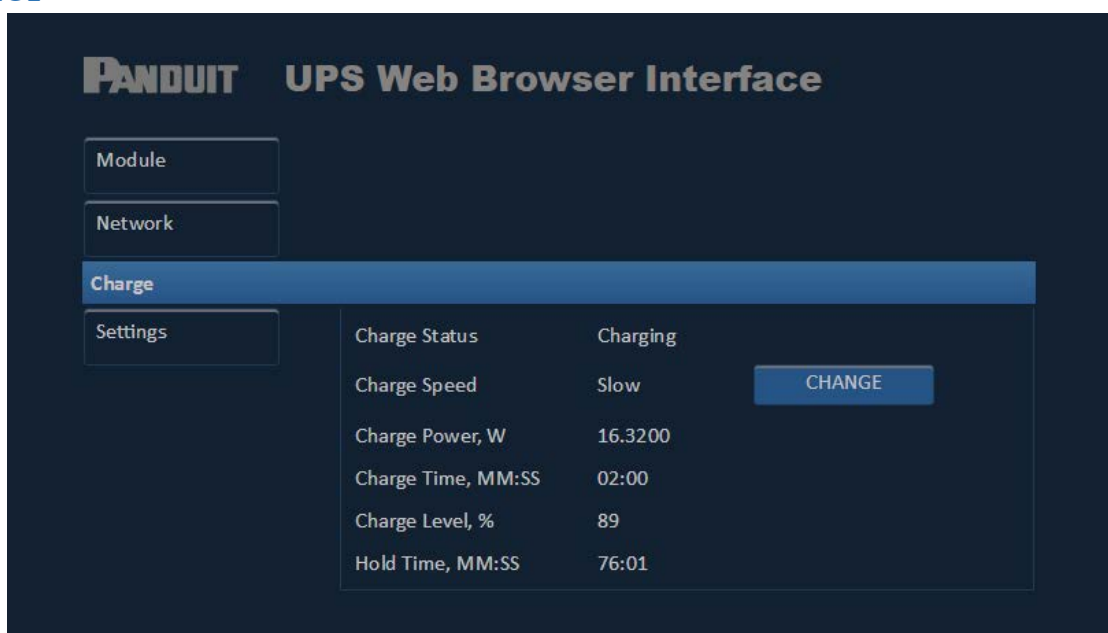


Figure 7: UPS Web Browser Interface - Charge

See Section 5.4 for username and password authentication.

5.8.1. CHARGE STATUS

The Charge Status indicates the state of the internal energy storage of the UPS, closely follows the front panel CHG indicator. A table of Charge Status states is below.

Input	Output	Charge Status
0 VDC	0 VDC	N/A
24 VDC	24 VDC pass through	Charging
24 VDC	24 VDC pass through	Charged
0 VDC	18-22 VDC backup	Discharging
0 VDC	0 VDC	Discharged

5.8.2. CHARGE SPEED

The Charge Speed indicates the current charge speed setting (“Slow”, “Medium” or “Fast”). The “Fast” charge speed results in the fastest charge time but also uses the most charging power which reduces the maximum load power.

Charge Speed	Maximum Charge Power	Approximate Charging Time
Fast	56 Watts	12 minutes
Medium	35 Watts	14 minutes
Slow	24 Watts	19 minutes

The Charge Speed can be set by clicking on the Change button immediately to the right as shown above in Figure 7.



Figure 8: UPS Web Browser Interface - Charge Speed

5.8.3. CHARGE TIME

The Charge Time estimates the time to charge the UPS to a full charge given the current Charge Level and the Charge Speed setting. The UPS implements cell balancing as described in BACKGROUND, Section 4.1. As a result, when the voltage on one of the twelve cells is too high, a resistor is placed across the cell to bleed the voltage down to the average cell voltage. This will dissipate energy and increase the charging time. However, the estimated charging time is updated continuously such that a new charge time will be calculated based on the energy used for cell-balancing. NOTE: Charge time is only updated during charge mode.

5.8.4. CHARGE LEVEL

The Charge Level represents the percentage charge of the energy storage capacitors rounded to the nearest percent. This value should be near 100% when fully charged and near 0% when fully discharged.

5.8.5. HOLD TIME

The Hold Time is estimated based on the energy stored in the capacitors, in the efficiency of energy conversion, and the current load power consumption. The estimated hold time is calculated whether the UPS is in the charging or discharging state and is updated continuously. Note that if the load power consumption changes, the estimated hold time is updated to reflect the change in load power.

6. OPERATION

6.1. LOAD SUPPORT

The UPS is designed to support a maximum input current of 156 Watts (100W plus 56 Watts additional for fast charge. (The power must support the load as well as the charging power for the energy storage elements.)

Examples of input loads:

- 5.57 A at an input voltage of 28 VDC (156W)
- 6.5 A at an input voltage 24 VDC (156W)
- 3.57 A at an input voltage of 28 VDC (100W)
- 4.17 A at an input voltage 24 VDC (100W)

The charging time may be longer for the first charge cycle after the unit has been sitting unpowered for a long period of time, due to the extra power consumed by the cell balancing operation. If the maximum load power listed is exceeded, the output of the UPS will go into current limit and the module status (MOD) LED will flash as described in MOD LED, Section 8.1.1.

Note that the UPS run time will be reduced as the capacitors age, however the minimum run time will be supported throughout the lifetime of the capacitors. The estimated capacitor lifetime is based on the operating temperature of the capacitors. See Table 2

Temperature (°C)	Estimated Capacitor Lifetime (years)
Less than 25	20 years
30	12 years, 4 months
35	7 years, 4 months
40	4 years, 6 months
45	2 years, 9 months
50	1 year, 8 months
55	1 year
60	7 months

Table 2: Estimated Capacitor Lifetime

6.2. RESET

The UPS can be reset by using a standard #1 sized paper clip to depress the recessed Reset Button accessible from the bottom of the unit. With the power “ON”, depress and hold the Reset Button. Release the button after the LEDs turn “OFF” and the LED initialization sequence begins. See Figure 9.

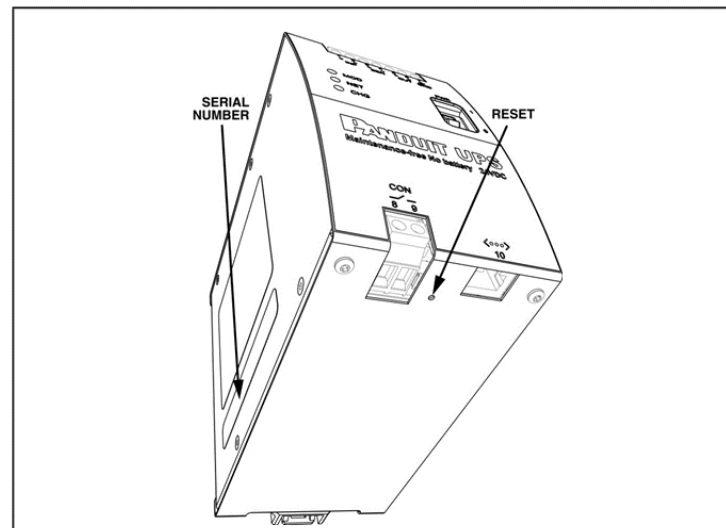


Figure 9: Reset Button Location

6.3. RESTORING FACTORY DEFAULTS

The user settable parameters can be restored to factory default values by using a standard #1 sized paper clip to depress and hold the recessed reset button accessible from the bottom of the unit. Turn unit off. Depress the button and hold while switching the power on. Release the button after the LED turns off and the LED initialization sequence starts. A list of the parameters and their factory default values are listed below.

Item	Description	Default Values
4.2.1.9	Charge Speed	Slow
	Device Name	Panduit UPS
	Network Settings	DHCP
	Password	Serial number
	Username	Panduit UPS
	Language	English

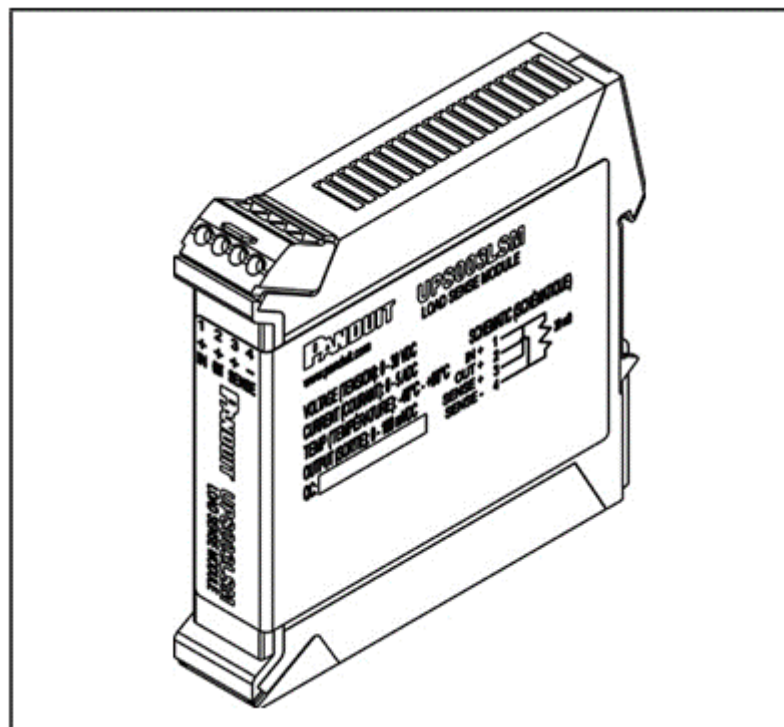


Figure 10: Load Sense Module

Pins 3 and 4 of the load sense module are connected to the sense input terminals of the UPS. Note that pin 3 of the current sense resistor must be connected to the “+” sense terminal and pin 4 of the current sense resistor must be connected to the “-” sense terminal. Note that these connections may not be reversed. These connections allow the UPS to measure the current flow to the load under normal operation so that it can predict the run time when backup power is being provided by the UPS.

The secondary AC/DC converter provides to the input terminals of the UPS while the output terminals of the UPS provides the secondary power supply to the load. Ensure that the orientation of the “+” and “-” terminals are connected as shown in Figure 6. Note that there is a common ground connecting the two AC/DC converters, the UPS, and the load. The UPS will connect the “-” terminal of the input and the “-” terminal of the output together internally. The ground connection between these two terminals should be connected as

shown so that if the UPS is removed from the system, the common ground connection between the AC/DC converters and the load is retained.

The sense, input and output terminals of the UPS are designed to accept UL/CUL 12 to 30 AWG wire. The 12 gauge wires are recommended to reduce resistive losses and minimize error of the external current sensing function.

The described installation provides redundant power to the load in the case of a failure of either AC/DC converter. In the case of a failure of both AC/DC converters, or the input AC power, the UPS will provide backup power to the load as described in Section 6.4.

The UPS may also be used in a non-redundant power supply application. In this case the primary AC/DC converter and load sense module are omitted. The UPS will provide backup power to the load in the event of a failure of the incoming AC power.

6.4. GENERAL OPERATION

Once the UPS is installed per Section 5, power may be applied to the secondary AC/DC converter as well as the primary AC/DC converter if present. The UPS can then be switched to the “ON” position. If the input voltage is too high the MOD LED flashes red. Switch the unit to the “OFF” position, remove AC power from the system and recheck the connections.

After the unit is switched on, the “Charge Status - CHG” LED should flash green indicating that the unit is charging. Once the unit is fully charged, the “Charge Status - CHG” LED will illuminate solid green. The unit is now ready to provide backup power to the load in the event of an AC power failure. If the output of the UPS is overloaded the MOD status LED will flash red. Switch the unit to the “OFF” position and check that the load does not exceed to the maximum load power.

If AC power fails, the UPS will provide DC power to the load. The “Charge Status - CHG” LED will flash red indicating the unit is being discharged. When the unit is fully discharged, the “Charge Status - CHG” LED will illuminate solid red. DC voltage will then be disconnected from the load when it is no longer able to provide +24VDC. The unit will be accessible through the WBI as described in Section 4 for approximately three minutes after it is no longer supplying power to the load. When AC power is applied, the UPS will begin charging again with the “Charge Status” LED blinking green.

6.5. STATUS VIA PC

Status information and control of the UPS may be accessed by running a web browser on a PC that is connected to the same network to which the UPS is connected. The UPS will be assigned an IP address by the DHCP server running on the network. The network can be configured to assign either a static or dynamic IP address to the UPS unit. Consult with the network administrator as to how to determine the assigned IP address. See Section 5 for more information on running the WBI.

6.6. STATUS VIA PLC

Status information and control of the UPS may be accomplished through EthernetIP communications.

EtherNet/IP™, better known as the Common Industrial Protocol (CIP™), was designed for use in process control and industrial automation applications. CIP was designed to provide consistent device access to eliminate the need for vendor specific software for configuration and monitoring of individual devices. EDS files are installed using the “EDS Hardware Installation Tool”.

If you are using RSLinx version 2.41.00, there are several EDS files that you must install before programming the controller through RSLogix 5000 programming software. With newer versions of RSLinx, this is not necessary. See the next page for the EDS files appropriate for each CompactLogix controller. To install the EDS files:

1. Locate the appropriate EDS files. EDS files are available at either of the following locations:
RSLogix 5000 software CD
<http://www.panduit.com/support/ups> - Each EDS file has a specific location on the web.
2. Copy all the files to a temporary subdirectory on your hard drive.
3. Use the EDS Hardware Installation tool to install the EDS files. This tool is installed with RSLinx software under the RSLinxTools directory. It is also installed with RSLogix 5000 software under the Utils directory.
 - a. Shutdown all applications that use RSLinx.
 - b. Shutdown RSLinx.
 - c. Start the EDS Hardware Installation Tool by selecting:
Start->Programs->Rockwell Software->Tools->EDS Hardware Installation Tool.
 - d. Follow the on-screen instructions. Make sure to select Register a directory of EDS files and point to the directory you saved all the above EDS files.

7. SNMP CONFIGURATIONS

7.1. SNMP

By default, the SNMP agent is disabled. In order to enable the SNMP agent, locate and select the EDIT button for SNMP under the Web interface.



To enable the SNMP agent, click the EDIT button next to the version of SNMP you want to support.

IP Port	161	EDIT
System		EDIT
sysDescription	Panduit UltraCAP UPS, Model 3242415, Serial Number	
sysContact	Robert Wilcox Sr	
sysLocation	BEW Cube	
SNMP v1/v2C	(Enabled)	EDIT
SNMPv3	(Enabled)	EDIT
Notifications	(Enabled)	EDIT
✓ OK		

7.2. SNMPv1 and SNMPv2C

Enter a Community Name, then set the read/write/trap access appropriately. If more than one user is needed, you can click add. See the image below for an example creating a public and private community string for the UPS.

Community	Read Access	Write Access	Notify Access	
public	all ▼	none ▼	all ▼	REMOVE
private	all ▼	all ▼	none ▼	REMOVE
ADD X CANCEL SAVE				

7.3. SNMPv3

PANDUIT UPS Web Browser Interface

SNMP User

Name:

Read: Write: Notify:

Authorization:

Password:

Privacy:

Secret:

7.4. SNMP TRAPS

Setup the IP Address of the SNMP manager that will be receiving the trap notifications, the port (default SNMP Trap port is 162), then whether the SNMP trap should be sent as SNMP v1, v2c, or v3. And finally the user the trap should be sent as. Default is to send the trap as public. See below for an example setup that will send SNMPv2c traps. Once completed, click the SAVE button.

PANDUIT UPS Web Browser Interface

SNMP Notify

upsTrapOnBattery will be sent to the following IP addresses:

IP Address	IP Port	Processing Model	User	Enabled
192.168.1.1	162	SNMPv2c	public	Enabled
0.0.0.0	0	SNMPv3	Tester	Disabled
0.0.0.0	0	SNMPv3	Tester	Disabled

7.5. SNMP AGENT PORT

To change the SNMP Agent port from the default 162, click Edit

The screenshot shows the 'SNMP EDIT' page in the Panduit UPS Web Browser Interface. The page has a dark blue header with the Panduit logo and 'UPS Web Browser Interface'. Below the header is a blue bar labeled 'SNMP EDIT'. The main content area is a table with the following rows:

IP Port	161	EDIT
System		EDIT
sysDescription	Panduit UltraCAP UPS, Model 3242415, Serial Number	
sysContact	Robert Wilcox	
sysLocation	BEW Cube	
SNMP v1/v2C	(Disabled)	EDIT
SNMPv3	(Disabled)	EDIT
Notifications	(Disabled)	EDIT
X CANCEL		✓ SAVE

Enter the new port number of the agent and then click save.

The screenshot shows the 'SNMP IP Port' page in the Panduit UPS Web Browser Interface. The page has a dark blue header with the Panduit logo and 'UPS Web Browser Interface'. Below the header is a blue bar labeled 'SNMP IP Port'. The main content area is a form with the following fields:

IP Port	161
X CANCEL ✓ SAVE	

After clicking save, the user is notified that a restart of the UPS is required in order to change the SNMP agent port.

Click save in order to restart the agent. The Web UI will update once the restart is complete.

PANDUIT **UPS Web Browser Interface**

SNMP EDIT

NOTICE

- A Reset is required after changing the SNMP Port.
- If you Save now, the system will be reset.

IP Port	21161	EDIT
System		EDIT
sysDescription	Panduit UltraCAP UPS, Model 3242415, Serial Number	
sysContact	Robert Wilcox	
sysLocation	BEW Cube	
SNMP v1/v2C	(Enabled)	EDIT
SNMPv3	(Enabled)	EDIT
Notifications	(Enabled)	EDIT
X CANCEL		✓ SAVE

7.6. SYSCONTACT or SYSLOCATION

To change the syscontact or syslocation, click the edit button right of System:

PANDUIT UPS Web Browser Interface

SNMP EDIT

IP Port	161	EDIT
System		EDIT
sysDescription	Panduit UltraCAP UPS, Model 3242415, Serial Number	
sysContact	Robert Wilcox	
sysLocation	BEW Cube	
SNMP v1/v2C	(Disabled)	EDIT
SNMPv3	(Disabled)	EDIT
Notifications	(Disabled)	EDIT
X CANCEL		✓ SAVE

Enter a new name for the sysLocation and sysContact and press save. sysLocation and sysContact are used by network managers to indicate where the device is and who is responsible for managing it.

PANDUIT UPS Web Browser Interface

SNMP System

sysDescription	Panduit UltraCAP UPS, Model 3242415, Serial Number A15100980, Firmware Version 112.922	
sysContact	Robert Wilcox	
sysLocation	BEW Cube	
X CANCEL		✓ SAVE

8. TROUBLESHOOTING

8.1. LED STATUS INDICATORS

8.1.1. MOD LED – Module Status Indicator

Indicator State	Summary	Requirement
Steady Off	No Power	If no power is supplied to the device, the module status indicator shall be steady off.
Steady Green	Device Operational	If the device is operating correctly, the module status indicator shall be steady green.
Flashing Green	Standby	If the device has not been configured, the module status indicator shall be flashing green.
Flashing Red	Minor Fault	If the device has detected a recoverable minor fault, the module status indicator shall be flashing red. NOTE: An incorrect or Inconsistent configuration would be considered a minor fault.
Steady Red	Major Fault	If the device has detected a non-recoverable major fault, the module status indicator shall be steady red.
Flashing Green/Red	Self-Test	While the device is performing is power up testing, the module status indicator shall be flashing green/red.

Table 3: Module Status Indicator

8.1.2. NET LED – Network Status Indicator

Indicator State	Summary	Requirement
Steady Off	No Power, No IP address	The device is powered off, or is powered on but with no IP address configured (Interface Configuration attribute of the TCP/IP Interface Object).
Flashing Green	No Connections	An IP address is configured, but no CIP connections are established, and an Exclusive Owner Connection has not timed out.
Steady Green	Connected	At least one CIP connection (any transport class) is established, and an Exclusive Owner Connection has not timed out.

Flashing Red	Connection Timeout	An Exclusive Owner Connection for which this device is the target has timed out, the network status indicator shall return to steady green only when all timed out Exclusive Owner connections are reestablished. Devices that support a single Exclusive Owner Connection shall transition to steady green when subsequent Exclusive Owner Connections are established Timeout of connections other than Exclusive Owner Connections shall not cause the indicator to flash red. The Flashing Red state applies to target connections only. Originators and CIP Routers shall not enter this state when an originated or routed CIP connection times out.
Steady Red	Duplicate IP	For devices that support duplicate IP address detection, the device has detected that (at least one of) its IP addresses are already in use.
Flashing Green/Red	Self-Test	The device is performing its power-on self-test (POST); During POST the network status indicator shall alternate flashing green and red.

Table 4: Network Status Indicator

8.1.3. CHG LED – Charge Led Indicator

Green	Charged
Flashing Green	Charging
Flashing Red	Discharging
Red	Discharged/Disconnected