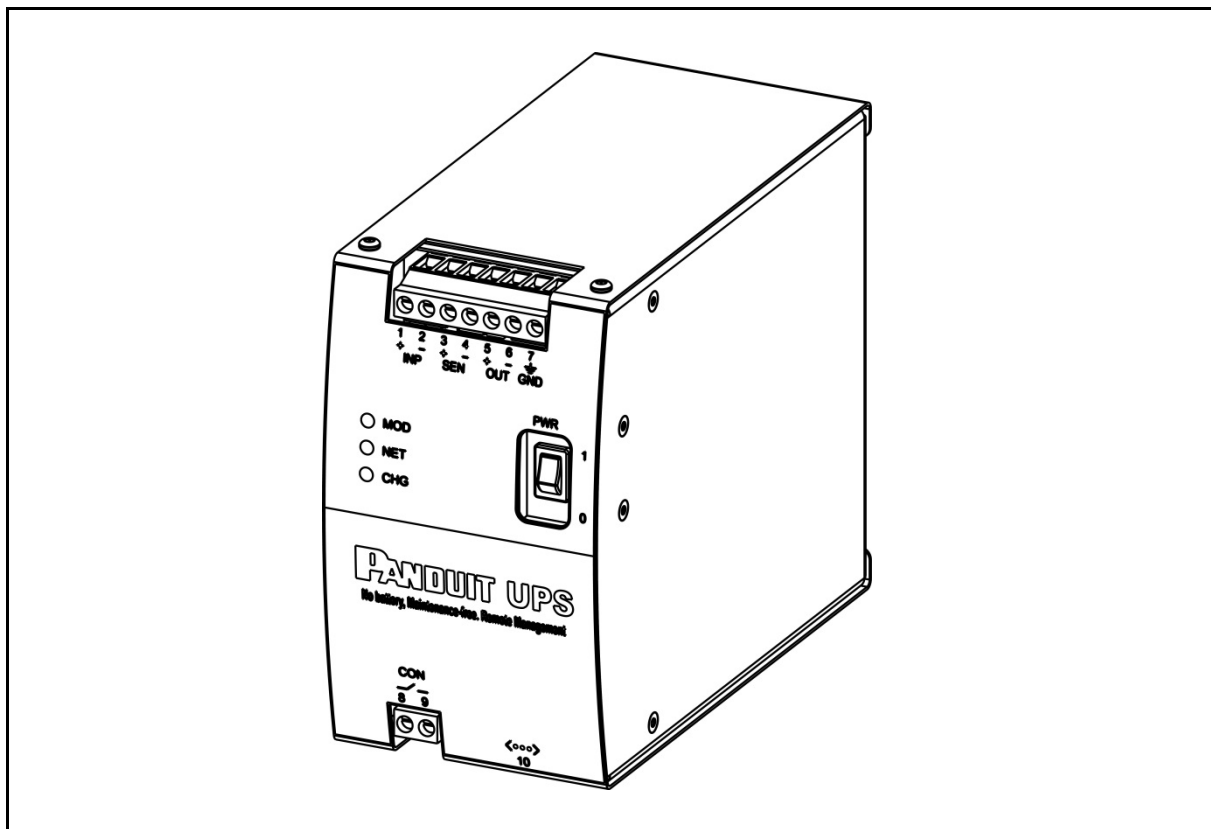


## UNINTERRUPTIBLE POWER SUPPLY (UPS) OPERATION MANUAL

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Original Instructions



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

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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.*

## ACCESSORIES

Load Sense Module Panduit part number UPS003LSM

## UPS GENERAL SPECIFICATIONS

### Model Number

UPS003024024015

### Input Power

Voltage: 24.0 to 28.0 VDC

Power Minimum: 20 W with no load, charging on slow charge setting per section 4.7.2

Power Maximum: 88 W with 35 W load, charging on fast charge setting per 4.7.2

Protection: Over-voltage shut down at 32VDC. Maximum overvoltage is +60VDC at 25°C ambient. Reverse voltage maximum is -60VDC at 25°C ambient.

### Output Power

Voltage: Input present: 500 mV drop at 35 W load

Input not present: 21.0 to 23.0 VDC

Current: 1.6 A maximum

Short circuit rating: 3.6 to 4.6 A

### 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)

### 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, 2<sup>nd</sup> ed, 2011-12-19, CSA C22.2 No. 60950-1-07, 2<sup>nd</sup> ed, 2011-12  
"Information Technology Equipment - Safety - Part 1: General Requirements"
- (Low-Voltage Directive\*) IEC 60950-1:2005+AM 2009, EN 60950-1:2006+A1:2010+A11:2009+A12:2011  
"Information Technology Equipment - Safety - Part 1: General Requirements"
- 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 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations"
- RoHS All materials and components used must meet the material restrictions of European Directive 2002/95/EC on the Restriction of Hazardous Substances
- IP20 per IEC 60529
- IEC Ex (*pending*)



Model No. / Manufacture Date

Input / Output / Temp Ratings

Conformances

Warnings

Approvals

## 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

The device shall have control wiring 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)



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 and rated IP54 in accordance with IEC 60529. The enclosure needs to only be accessible with the use of a tool. Provision shall be made to prevent the rated voltage being exceeded by transient disturbances of more than 140% at the power supply terminals of the device. This device is to be installed within an area of not more than pollution degree 2, as defined in IEC 60664-1.



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.**

## Performance

Hold Time: 5 minutes, minimum at 35 W 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 which Output is &lt; 18VDC at 35W 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 Time, 22.5 to 27.5 minutes at nominal 17W Input Power

## 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

## User Interface

IP Address: dynamic, requires DHCP server on the same subnet

Content: Module

Network

Charge

Settings

## Network Interface

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

Certification: ODVA

## 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)



**NOTE:** *Throughout this document the UPS003024024015 (Uninterruptible Power Supply) may also be referred to as “UPS”.*

# 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 for prevention of accidents.



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.





## Safety Warnings

	<div data-bbox="427 309 507 376"></div> <div data-bbox="531 324 703 365"><b>WARNING</b></div> <ul style="list-style-type: none"> <li>• Read all safety warning and all instructions. Failure to follow the warnings and instructions may result in electric shock, fire and/or serious injury.</li> <li>• Save all warnings and instructions for future reference.</li> </ul>
	<p>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.</p> <ul style="list-style-type: none"> <li>• <b>FOR INSTALLATION AND USE BY TRAINED PERSONNEL ONLY.</b></li> <li>• <b>IF ANY DAMAGE TO THE PRODUCT IS APPARENT OR SUSPECTED, DO NOT USE THE PRODUCT. REFER PRODUCT TO QUALIFIED SERVICE PERSONNEL.</b></li> </ul>
	<ul style="list-style-type: none"> <li>• <b>FCC WARNING: CHANGES OR MODIFICATIONS TO THE PRODUCT COULD VOID THE USER'S AUTHORITY TO OPERATE THE PRODUCT.</b></li> <li>• <b>USE RECOMMENDED ACCESSORIES. CONSULT THE OWNER'S MANUAL FOR RECOMMENDED ACCESSORIES. THE USE OF IMPROPER ACCESSORIES MAY CAUSE RISK OF INJURY TO PERSONS.</b></li> </ul>



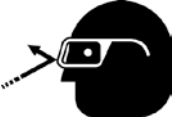

## Electrical Safety Practices

	<p><b><u>GROUNDING:</u></b> 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.</p> <p><b>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.</b></p> <p><b>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.</b></p> <p><b>Avoid body contact with earthed or grounded surfaces, such as pipes, radiators, ranges and refrigerators.</b> <i>There is an increased risk of electric shock if your body is earthed or grounded.</i></p>
-------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

	<p> <b>WARNING</b></p> <p><b>ONLY OPERATE THE UPS IN A CLEAN, DRY, INDOOR ENVIRONMENT.</b></p> <p><b>DO NOT EXPOSE THE UPS TO RAIN OR WET CONDITIONS.</b>  <i>Water entering a UPS will increase the risk of electric shock.</i></p>
	<p> <b>KEEP AWAY FROM LIVE CIRCUITS:</b></p> <ul style="list-style-type: none"> <li>• Operating personnel must not remove covers.</li> <li>• Replacement of components and internal adjustments must be made by qualified maintenance personnel.</li> <li>• Disconnect power when replacing components.</li> <li>• Dangerous voltages may exist even with the power removed.</li> <li>• To avoid injuries, always disconnect power and turn power switch to OFF.</li> <li>• Input connection to the product must remain accessible as a disconnect device.</li> <li>• DO NOT work on the product; connect or disconnect cables during periods of lightning.</li> <li>• Provide wiring per national and local electrical codes.</li> </ul>



## Personal Safety

	<p> <b>WARNING</b></p> <p><b>Use personal protective equipment. Safety glasses must be worn at all times by all persons installing the UPS.</b></p>
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## Service

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

**Contact Panduit Tool Service at the following locations:**

<p><b>Panduit Tool Solutions Division (USA)</b>          16530 W. 163<sup>rd</sup> Street          Lockport, IL 60441  <b>Tel.: 1-888-506-5400, ext. 83255</b></p>	<p><b>Panduit EMEA Service Center (EUR)</b>          EMEA Tool Service Center          Bedrijvenpark Twente 360          7602 KL Almelo  <b>tel + 31 546 580 451</b></p>
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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.



# 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 35W. The bank of twelve 350F EDLCs provide energy storage of approximately 15kJ which can supply a 35W load for a minimum run time of 5 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 in order 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 project the operating lifetime of the unit.

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

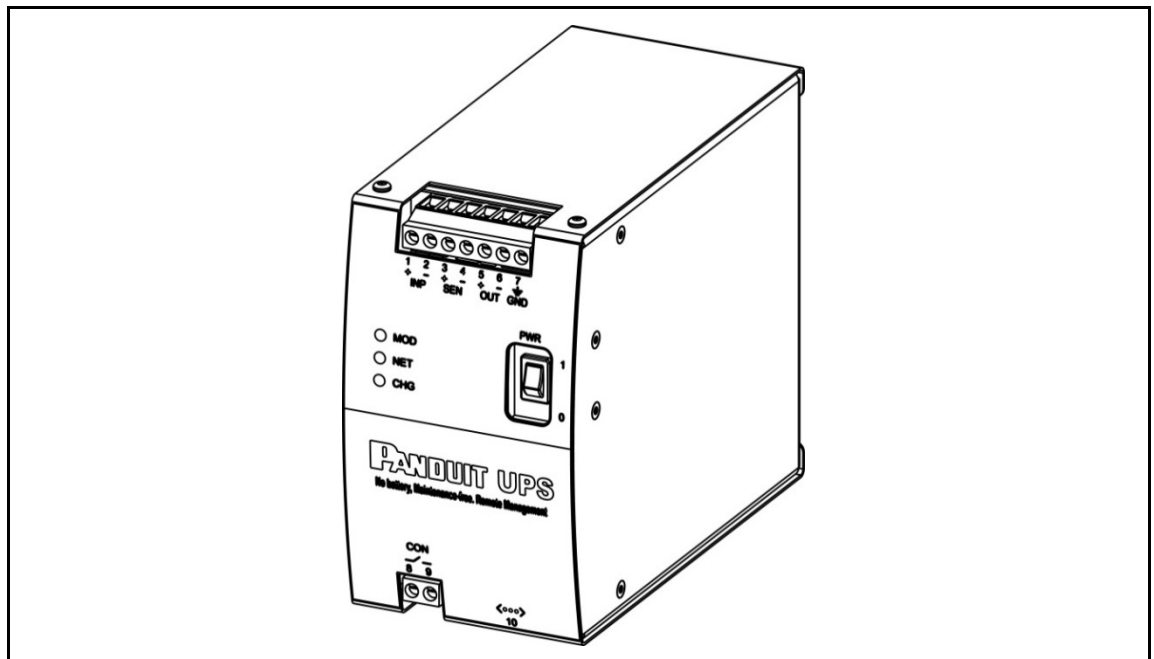


Figure 1: UPS

## 1.2. PURPOSE

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

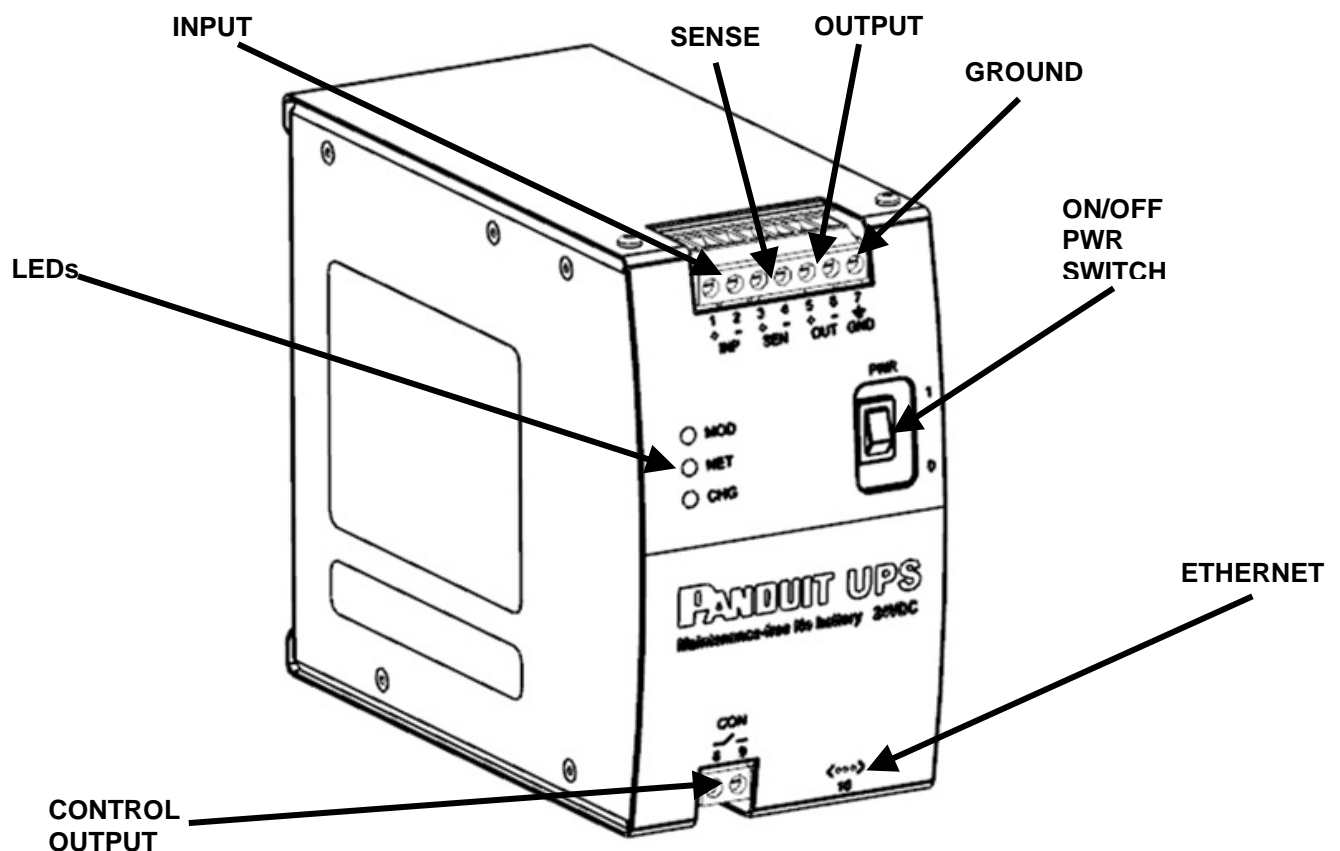
### 1.3. TERMS AND ABBREVIATIONS

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. INTERFACES

### 2.1. 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 bottom edge of the front panel includes connections for a control output relay and Ethernet port. The front panel also contains an ON/OFF switch and three indicator LEDs. The front panel is shown in Figure 2.

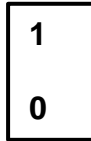


**Figure 2: UPS Front Panel**

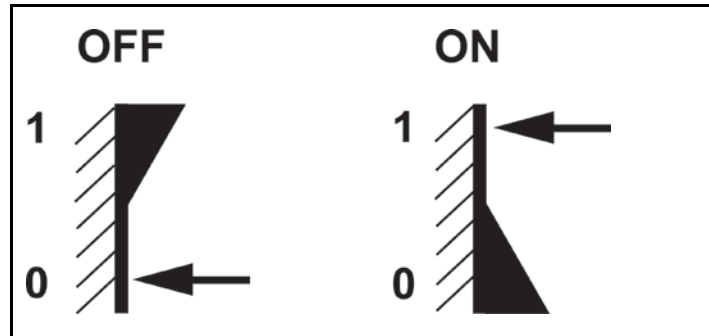
*The remainder of this section describes each of these interfaces in more detail.*

## 2.2. FRONT PANEL DESCRIPTION

### 2.2.1. 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.

### 2.2.2. 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 combined current draw of the UPS and the load shall not be any greater than 3.7A. 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 wire.

### 2.2.3. 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 3.2 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 wire.

### 2.2.4. DC POWER OUTPUT

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 1.6A. The operating output voltage range is 21 to 28VDC. The terminals are designed to accept 12 to 30 AWG wire.

### 2.2.5. GROUND

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

### 2.2.6. CON-Control Relay

The two terminals below the legend “CON” provide a normally open, single pole-single throw (Form A) relay contact. 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

### 2.2.7. ETHERNET

The Ethernet port marked below the legend <...> is a standard RJ-45 type receptacle. This port should be connected to a router running a DHCP server. 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.

### 2.2.8. 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 power up testing, the module status indicator shall be flashing green/red.

**Table 1: Module Status Indicator**

### 2.2.9. 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	<p>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.</p> <p>Devices that support a single Exclusive Owner Connection shall transition to steady green when subsequent Exclusive Owner Connections are established</p> <p>Timeout of connections other than Exclusive Owner Connections shall not cause the indicator to flash red.</p> <p>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.</p>
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 2: Network Status Indicator**

### 2.2.10. CHG LED – Charge LED Status

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

### 2.2.11. 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.

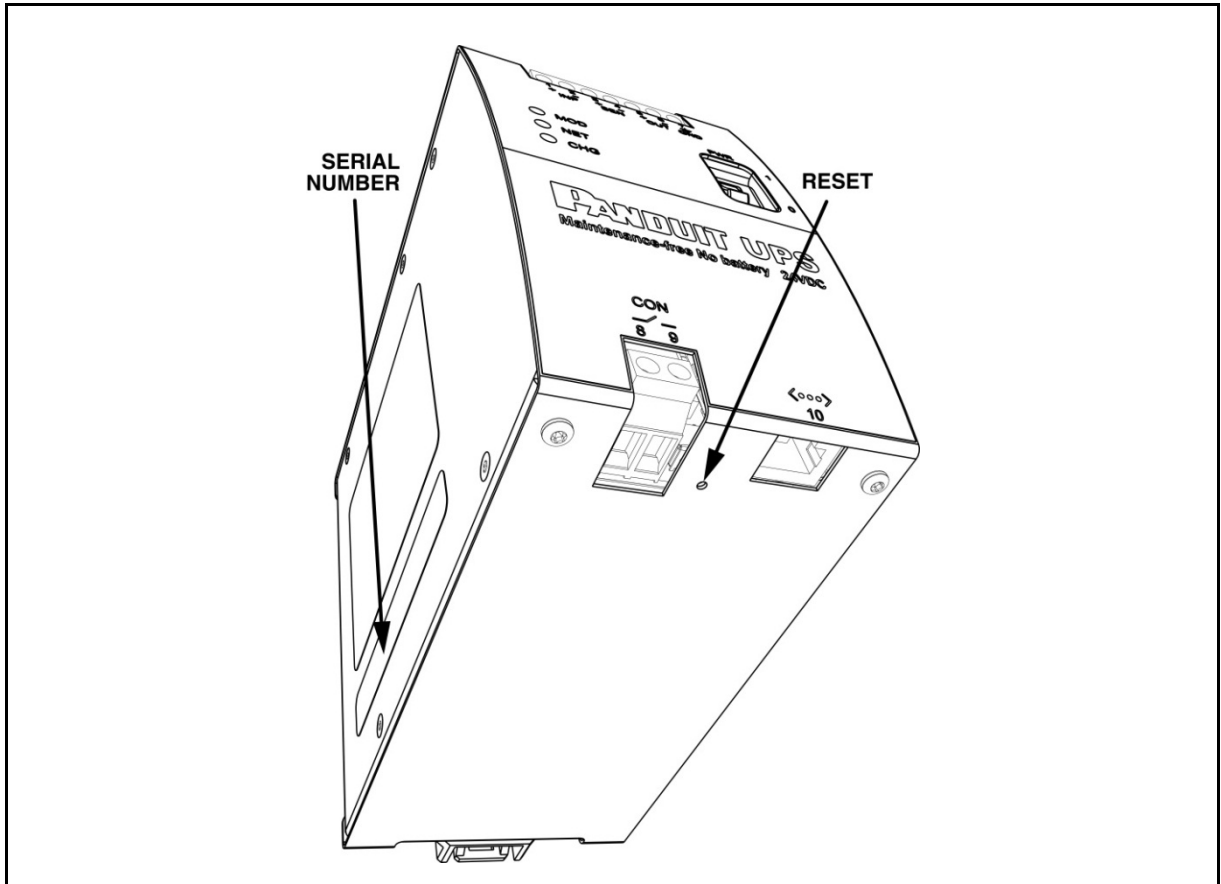


Figure 3: Reset Button Location

### 2.2.12. RESTORE 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

## 3. OPERATION

### 3.1. LOAD SUPPORT

The UPS is designed to support a maximum input current of 3.7A or 88 Watts at an input supply voltage of 24V. This power must support the load as well as the charging power for the energy storage elements.

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 2.2.8.

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.

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

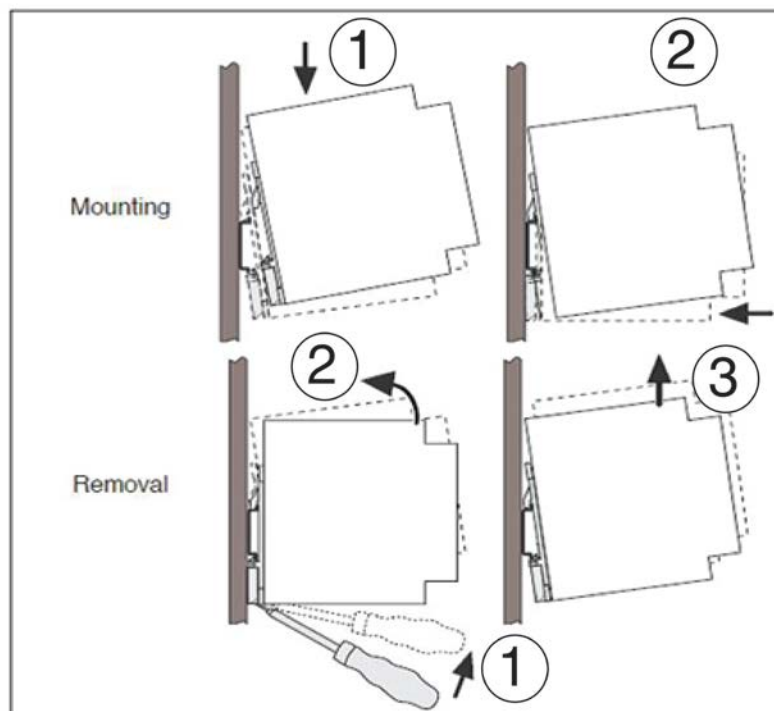
**Table 3: Estimated Capacitor Lifetime**

The estimated lifetime of the capacitors, based on the UPS internal temperature, are reported by the WBI as described in Temperature, Section 4.4.5 and Capacity, Years, Section 4.4.7.

### 3.2. INSTALLATION



Ensure that the ON/OFF switch is in the “OFF” position during installation. The UPS can store a significant amount of power for an extended period of time. DC voltage may be present at the DC output terminals even when the input terminals are disconnected from power.



**Figure 4: DIN Rail Installation**

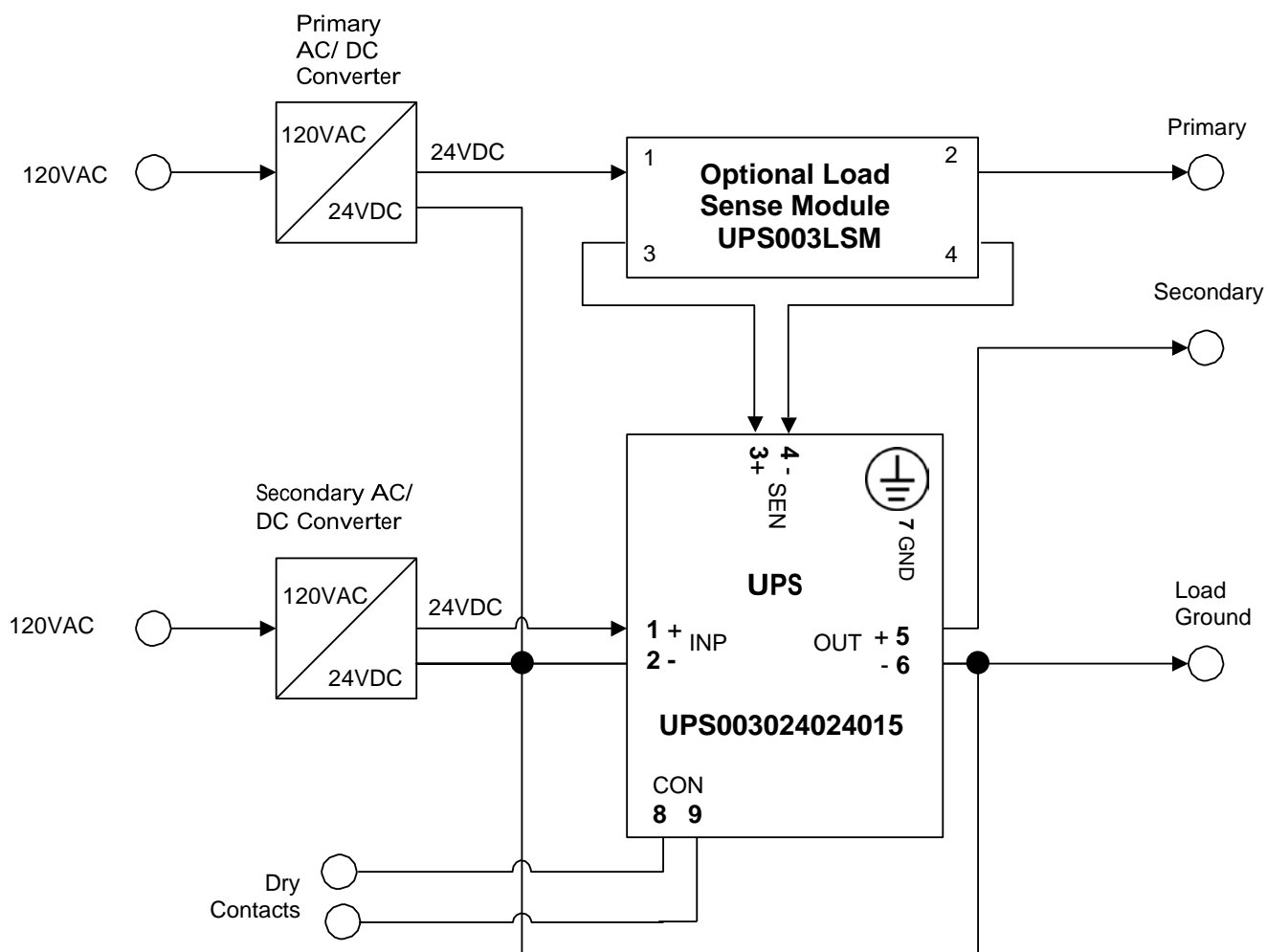
No minimum spacing to other modules is required for proper operation of the device.

To install the UPS, place the module with the DIN rail guide way on the top edge of the DIN rail and then snap it downwards and shown in Figure 4.

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 4.

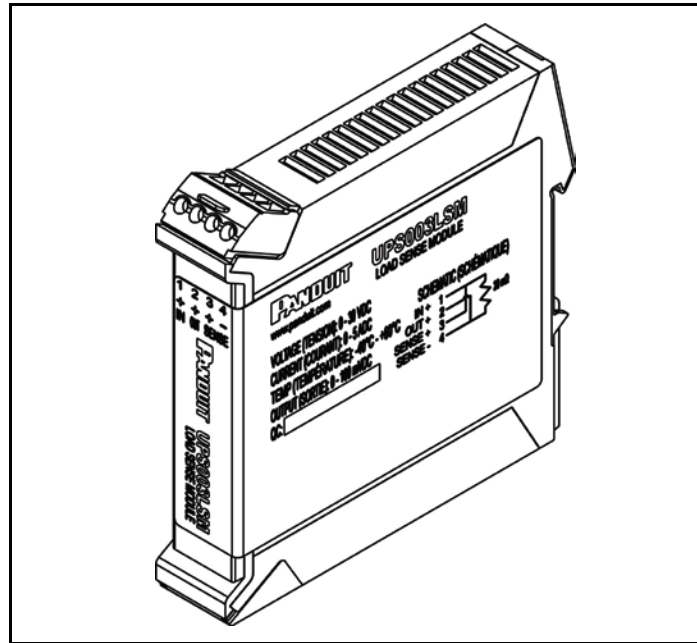


## Zone Enclosure Wiring Diagram



**Figure 5: System Block Diagram**

The UPS supports backup power for a load with redundant power supplies as shown in Figure 5. 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 5 shows the pin numbering of the current sense resistor.



**Figure 6: 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 5. 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. 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 3.3.

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.

### 3.3. GENERAL OPERATION

Once the UPS is installed per Section 3.2, 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.

### 3.4. 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 4 for more information on running the WBI.

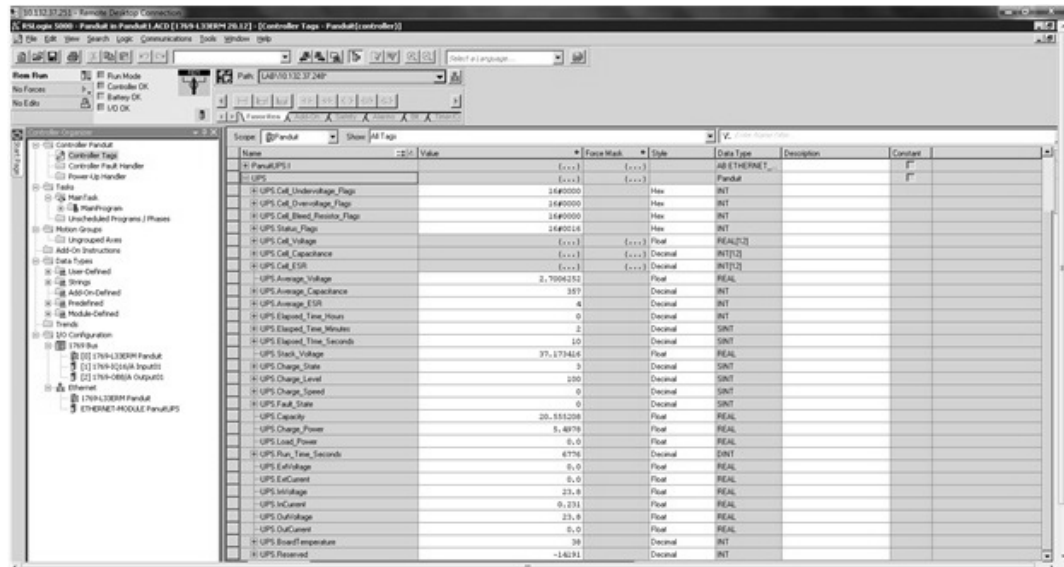
### 3.5. STATUS VIA PLC

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.



## 4. Web Browser Interface (WBI)

### 4.1. 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.

### 4.2. CONNECTING TO THE UPS

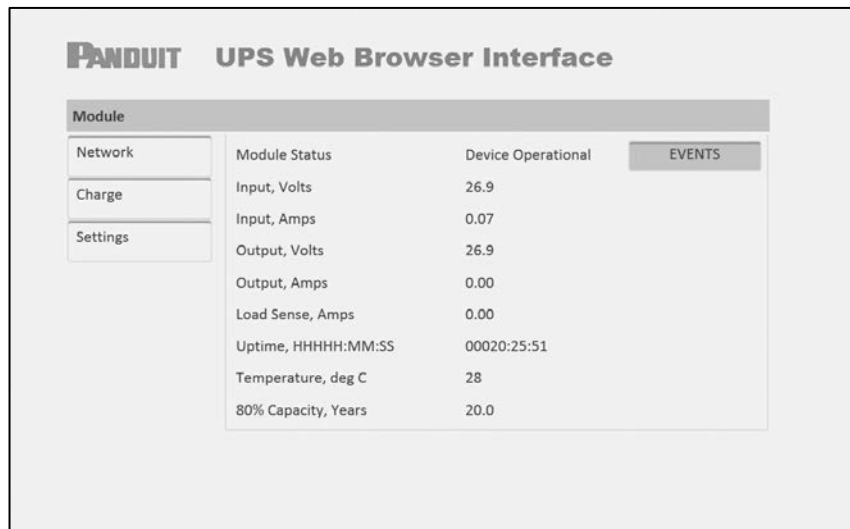
Within the web browser address bar type "<http://nnn.nnn.nnn.nnn>" where nnn.nnn.nnn.nnn is the IP address assigned to the UPS unit by the network.

### 4.3. 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 as described in RESTORE FACTORY DEFAULTS, Section 2.2.12.

## 4.4. MODULE



NOTE: No username and password authentication is required to view the Module page or Event log.

### 4.4.1. 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 below. Minor Faults may be corrected by a Reset (see RESET Section 2.2.11 or RESET Section 4.8.2). Major faults may be corrected by using the Restore Factory Defaults (See RESTORE FACTORY DEFAULTS, Section 2.2.12 or RESTORE, Section 4.8.8). 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 power up testing, the module status indicator shall be flashing green/red.

### 4.4.2. 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.

### 4.4.3. 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.

#### 4.4.4. 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.

#### 4.4.5. 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.

#### 4.4.6. 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).

#### 4.4.7. 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.

#### 4.4.8. EVENTS

Pressing the EVENTS button will access the Event Log.

### 4.5. EVENT LOG

PANDUIT UPS Web Browser Interface		
Event Log	Time	Event
	000:00:00	Reset button ready
	000:00:00	Serial communications started
	000:13:45	Cell Monitoring Enabled
	000:13:45	Cell Monitoring Disabled
	000:13:46	Cell Monitoring Enabled
	000:13:46	Cell Monitoring Disabled
	000:13:47	Cell Monitoring Enabled
REFRESH RETURN		

### 4.5.1. 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 and 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.

### 4.5.2. REFRESH

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

### 4.5.3. RETURN

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

## 4.6. NETWORK

The screenshot shows the 'Panduit UPS Web Browser Interface'. On the left is a navigation menu with buttons for 'Module', 'Network' (which is highlighted), 'Charge', and 'Settings'. The main content area displays network information. At the top, it says 'Network Status' followed by 'No Connections'. Below this, there is a table of network settings:

Device Name	Panduit UPS	CHANGE
Network Settings	DHCP	CHANGE
IP Address	192.168.1.16	
Network Mask	255.255.255.0	
Gateway IP	192.168.1.99	

See note 4.3 for username and password authentication.

### 4.6.1. NETWORK STATUS

The Network Status indicates the state of the EthernetIP connection, and closely follows the front panel NET indicator. A table of Network Status states is below.

Summary	Requirement
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).
No Connections	An IP address is configured, but no CIP connections are established,

	and an Exclusive Owner Connection has not timed out.
Standby	At least one CIP connection (any transport class) is established, and an Exclusive Owner Connection has not timed out.
Connection Timeout	<p>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.</p> <p>Devices that support a single Exclusive Owner Connection shall transition to steady green when subsequent Exclusive Owner Connections are established</p> <p>Timeout of connections other than Exclusive Owner Connections shall not cause the indicator to flash red.</p> <p>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.</p>
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.
Self-Test	The device is performing its power-on self-test (POST); During POST the network status indicator shall alternate flashing green and red.

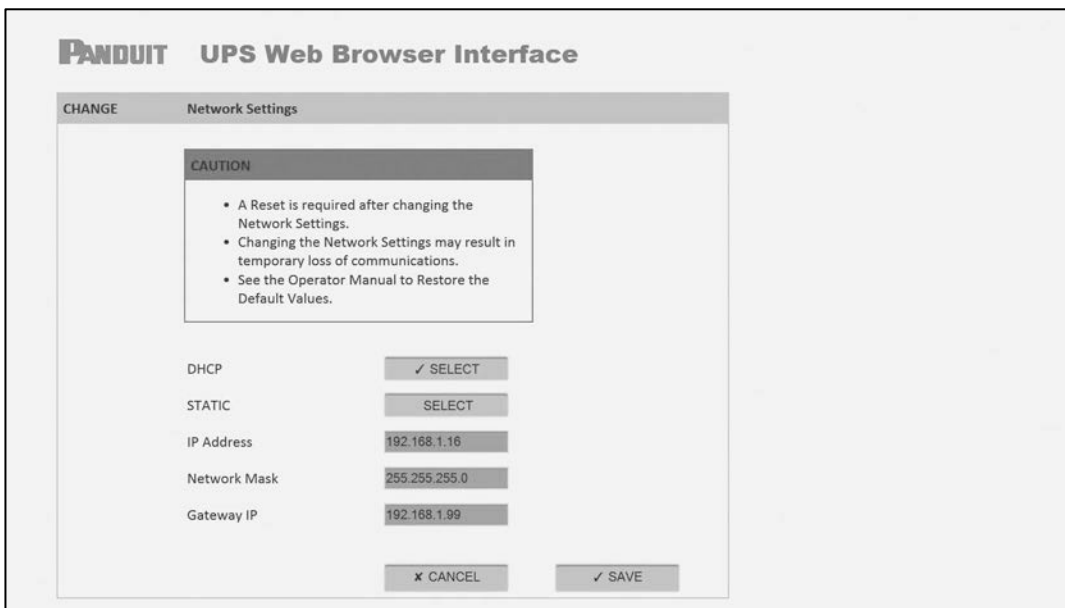
#### 4.6.2. DEVICE NAME

The Device Name parameter is used as the text in the WBI window. In addition to providing a convenient way to identify one device (e.g. "Plant 1 Line G"), having different Device Names allows multiple UPS windows to be displayed, each with a unique name in the Title Bar, allowing one screen to view multiple devices on a network. The Device Name can be edited by clicking on the "Change" button immediately to the right. The Device Name can be restored to the factory default value as described in RESTORE FACTORY DEFAULTS, Section 2.2.12 or RESTORE, Section 4.8.8.

#### 4.6.3. NETWORK SETTINGS

The Network Settings shows the current method the UPS uses to obtain an IP Address on the network, the current IP Address, the Network Mask and Gateway address values. In the default DHCP setting, the UPS will connect to the network and look for a DHCP server to issue an IP Address. The IP Address Mode can be changed to Static by clicking on the "Change" button immediately to the right.





**PANDUIT UPS Web Browser Interface**

**CHANGE Network Settings**

**CAUTION**

- 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.

DHCP ☒ SELECT

STATIC ☐ SELECT

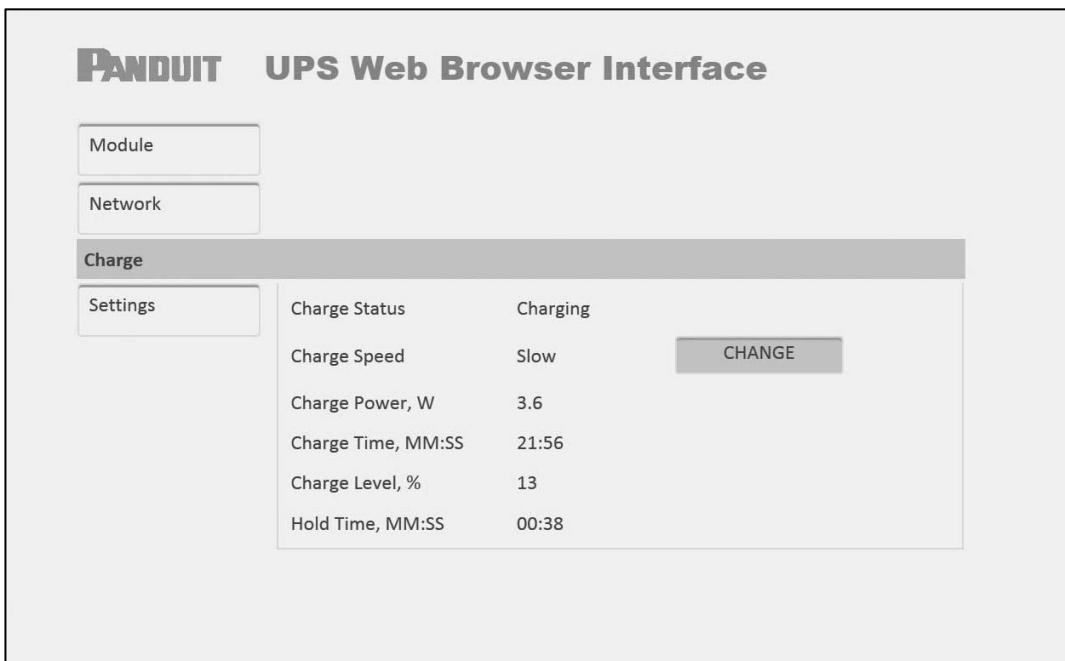
IP Address 192.168.1.16

Network Mask 255.255.255.0

Gateway IP 192.168.1.99

When the IP Address Mode is changed, an IP Address, an optional Network Subnet Mask and optional Gateway address can also be entered. The IP Address Mode can be restored to the factory default value as described in RESTORE FACTORY DEFAULTS, Section 2.2.12 or RESTORE, Section 4.8.8.

#### 4.7. CHARGE



**PANDUIT UPS Web Browser Interface**

Module

Network

**Charge**

Settings

Charge Status	Charging	
Charge Speed	Slow	<input type="button" value="CHANGE"/>
Charge Power, W	3.6	
Charge Time, MM:SS	21:56	
Charge Level, %	13	
Hold Time, MM:SS	00:38	

See note 4.3 for username and password authentication.

### 4.7.1. CHARGE STATUS

The Charge Status indicates the state of the internal energy storage of the UPS, and 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

### 4.7.2. CHARGE SPEED, CHARGE POWER

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.

The Charge Power indicates the maximum power being consumed internally by the UPS to charge the energy storage circuitry. The table below shows the trade-off between Charge Speed, Charge Power and Charge Time.

Charge Speed	Maximum Charge Power	Approximate Charging Time
Fast	53 Watts	10 minutes
Medium	37 Watts	12.5 minutes
Slow	20 Watts	20 minutes

The Charge Speed can be set by clicking on the Change button immediately to the right as shown below

The screenshot displays the 'PANDUIT UPS Web Browser Interface' with a 'CHANGE Charge Speed' dialog box. A 'CAUTION' message states: 'Ensure that the power supply is capable of providing enough power to the UPS and load simultaneously.' Below this, three options are listed: 'Fast' (with a checked 'SELECT' button), 'Medium' (with an 'SELECT' button), and 'Slow' (with an 'SELECT' button). At the bottom of the dialog are 'CANCEL' and 'SAVE' buttons.

### 4.7.3. 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 1.1. 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.

#### 4.7.4. 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.

#### 4.7.5. 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 as long as the stack voltage is greater than 5.5V. Note that if the load power consumption changes, the estimated hold time is updated to reflect the change in load power.

### 4.8. SETTINGS

The screenshot shows the 'Panduit UPS Web Browser Interface' with a sidebar menu containing 'Module', 'Network', 'Charge', and 'Settings'. The 'Settings' page displays a table of configuration items with corresponding action buttons:

Setting	Value	Action
Model	UPS003024024015	RESET
Serial Number	K13100000	PASSWORD
Username	Panduit UPS	CHANGE
Firmware Version	112.210	UPDATE
MAC ID	00:40:9D:43:35:97	RESTORE
Language	English	✓ SAVE

At the bottom of the settings table is a 'DIAGNOSTICS' button.

See note 4.3 for username and password authentication.

#### 4.8.1. MODEL

The Model displays the Model Number of this UPS device (UPS 003 024 024 015).

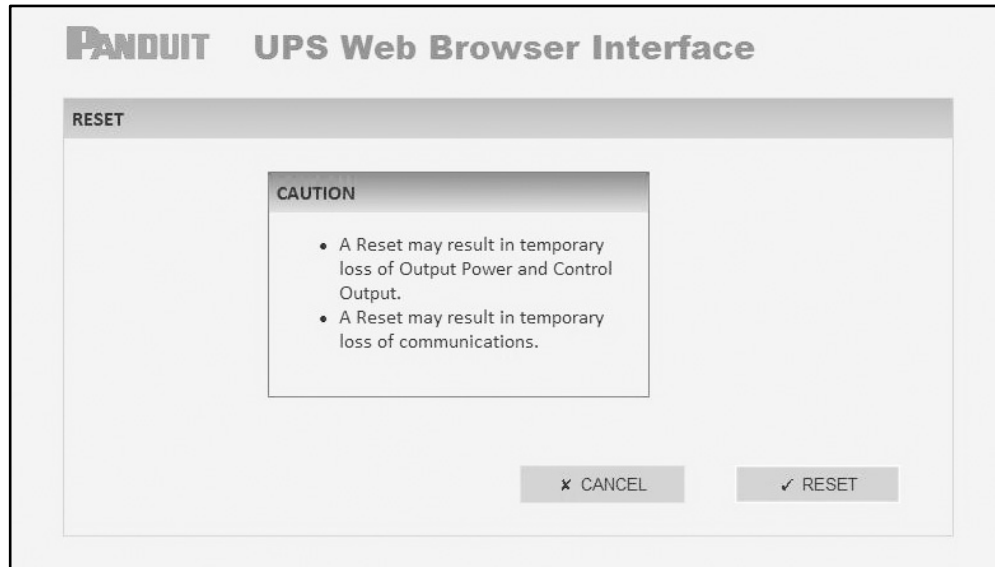
#### 4.8.2. RESET

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.



#### 4.8.3. 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.

#### 4.8.4. 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:

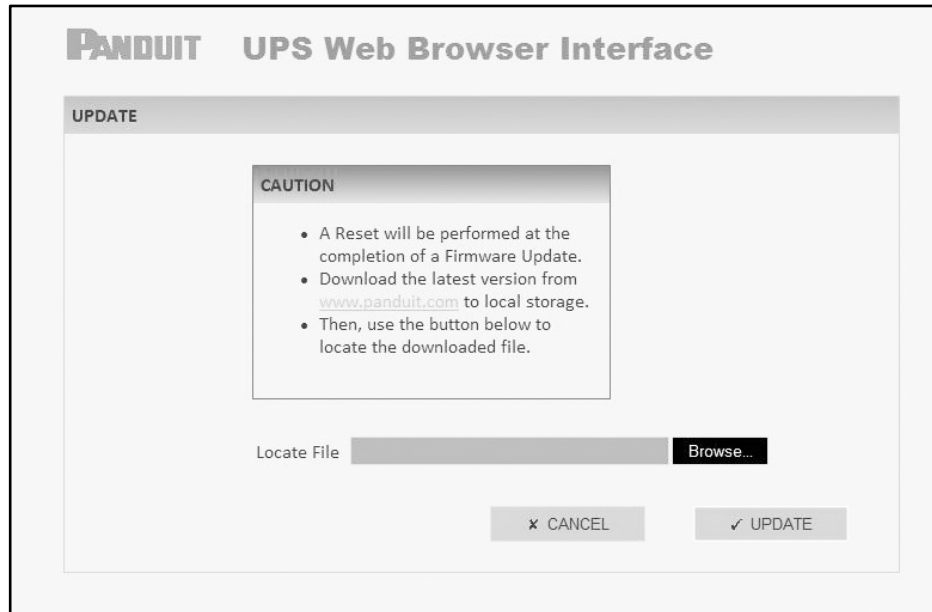


#### 4.8.5. FIRMWARE VERSION

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.

#### 4.8.6. 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.

#### 4.8.7. 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.

#### 4.8.8. 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 2.2.12. After a Restore Factory Defaults, the user should perform a RESET.



#### 4.8.9. 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.

Panduit UPS Web Browser Interface		
Module		
Network		
Charge		
<b>Settings</b>		
Model	3242415	RESET
Serial Number	PC12150001	PASSWORD
Firmware Version	1.0.5	UPDATE
MAC ID	00:40:9D:69:B4:82	RESTORE
Device Name	Panduit UPS 2	CHANGE
Select Language	English ▼	✓ SAVE
DIAGNOSTICS		