IntelliShield 3kW
Rugged
Uninterruptible Power Supply (UPS)
User Manual

Cal Power

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AMETEK IntelliPower Inc., a Business Unit of AMETEK, Inc., is a global leader in the design and manufacture of Rugged Uninterruptable Power Supplies, Power Conditioners and Power Distribution Units across diverse military and industrial segments. From rack-mounted rugged UPS installed abord ship to case mounted mobile backup, IntelliPower is the proud manufacturer of mission critical equipment used in military and commercial applications where failure is not an option.

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Important Safeguards

Read all information and instructions in this manual.

- The equipment is heavy. Use proper lifting techniques and seek assistance or use lifting aids to avoid injury.
- Do not operate unit if it has been damaged, including chassis, internal components, connectors, and power cords. In the event of damage, return the equipment to IntelliPower for service.
- The use of attachments not recommended by IntelliPower or those not requested and approved in a defined customer specification may cause injury.
- To protect against electrical shock, do not place any part of the unit in water or other liquid.
- Do not allow power cords to hang over edges, reside near hot surfaces, or be exposed to other conditions where power cord insulation could be damaged.
- Do not insert any materials, objects, or connectors other than proper mating connectors into unit connectors.
- Unless otherwise specified, this product is intended for use in an environment which is relatively free of conductive and non-conductive contaminates such as carbon or metal dust. Placement in high dust areas may cause damage.
- Do not touch hot surfaces. Before removal, allow the equipment to cool.
- Do not expose batteries to fire.
- Do not disconnect or connect the wall socket or source power connector to turn the unit OFF or ON. Doing so causes arcing of the input connector and source power connector(s). Always turn OFF the unit before connecting to, or disconnecting from, power source.
- Do not attempt to change individual batteries.
- This publication may have been updated since this copy was released. Note the manual number. Contact support to request the latest version.

⚠ WARNING

LETHAL VOLTAGES CAN EXIST INSIDE THE UNIT ENCLOSURE EVEN IF THE UNIT IS OFF. TO REDUCE THE RISK OF FIRE OR ELECTRICAL SHOCK, REPAIR SHOULD BE DONE ONLY BY AUTHORIZED PERSONNEL.

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WARRANTY TERMS

Product Family: IntelliShield 3kW Rugged UPS

Warranty Period: Two Years

IntelliPower provides this written warranty covering the Product stated above, and if the Buyer discovers and notifies IntelliPower in writing of any defect in material or workmanship within the applicable warranty period stated above, then IntelliPower may, at its option: repair or replace the Product; or issue a credit note for the defective Product; or provide the Buyer with replacement parts for the Product.

The Buyer will, at its expense, return the defective Product or parts thereof to IntelliPower in accordance with the return procedure specified below. IntelliPower will, at its expense, deliver the repaired or replaced Product or parts to the Buyer.

Any warranty of IntelliPower will not apply if the Buyer is in default under the Purchase Order Agreement or where the Product or any part thereof:

- is damaged by misuse, accident, negligence or failure to maintain the same as specified or required by IntelliPower;
- is damaged by modifications, alterations or attachments thereto which are not authorized by IntelliPower;
- is installed or operated contrary to the instructions of IntelliPower;
- is opened, modified or disassembled in any way without IntelliPower 's consent; or,
- is used in combination with items, articles or materials not authorized by IntelliPower.

The Buyer may not assert any claim that the Products are not in conformity with any warranty until the Buyer has made all payments to IntelliPower provided for in the Purchase Order Agreement.

When an alarmed failure suggests that the IntelliPower equipment may be faulty, whether in or out of the warranty period, IntelliPower Customer Service should be notified at the phone number or email below. An RMA request may also be initiated on the AMETEK IntelliPower, Inc. website. Upon receipt of this notification, the Customer Service Department will provide the assistance required to obtain repair or replacement of the equipment.

The customer MUST obtain a return/replacement authorization with RMA number from IntelliPower Customer Service Department before returning a product for warranty service. The return authorization number MUST be placed on the outside of the shipping box and the equipment must be packaged securely to avoid shipping damage. Use original packaging as supplied by IntelliPower or call for new shipping boxes to protect the product during

shipment. If the product is heavy (greater than 95 lbs.), it must be secured to a pallet for shipment. If questions arise, call IntelliPower for details in addition to using IntelliPower's engineered packaging materials.

The warranty is expressly in lieu of all other warranties, expressed or implied, including, without limitation, any implied warranty or merchantability or fitness for a particular purpose, and/or any other obligation or liability on the part of IntelliPower Inc. The sole exclusive remedy for breach of any warranty, expressed or implied, concerning IntelliPower's products and the only obligation of IntelliPower hereunder, shall be the repair or replacement of defective equipment, components, or parts, or, at IntelliPower's option, the refund of the purchase price or substitution with a new replacement product. IntelliPower shall in no way be responsible for any consequential damages, of any kind, or nature whatsoever, resulting from the breach of any warranty.

If the unit is damaged upon receipt, file a claim with the shipping carrier within 15 days after receipt of the package. Request an RMA form from support; complete the form and return it. Further instructions will be provided.

Use the original box & foam packaging to avoid shipping damage. If the original packaging is damaged or not available, contact support for new packaging.

Battery Warranty

Lead-Acid Battery: 1-Year Warranty

Lithium Iron Phosphate Battery: 2-Year Warranty

Warranty Period: This warranty extends for a period of one (1) year for Lead-Acid batteries or two (2) years for Lithium Iron Phosphate batteries from the date of purchase, as evidenced by the original sales receipt.

Coverage: This warranty covers defects in materials or workmanship under normal use and service.

Exclusions: This warranty does not cover:

- Batteries that have been subjected to misuse, abuse, neglect, alteration, or accident.
- Batteries that have been opened, repaired, or modified by anyone other than an authorized service representative.
- Batteries that have been used in applications for which they were not designed or intended.
- Batteries that have been damaged due to acts of God, such as fire, flood, or lightning.

Maintenance Requirements: To ensure optimal battery performance and warranty coverage, the end user must:

- Maintain accurate and up-to-date records of battery storage conditions, including temperature, humidity, and duration of storage.

- Follow recommended storage practices, such as storing batteries in a cool, dry place and disconnecting them from power sources when not in use.

Warranty Claims: To obtain an RMA and make a warranty claim, the end user must:

1. Provide proof of purchase, including the original sales PO and date of purchase.
2. Submit the completed maintenance records for the battery.
3. Return the defective battery to AMETEK IntelliPower

Remedies: If a covered defect is found, the manufacturer will, at its option, repair or replace the defective battery at no charge.

Disclaimer: This warranty is the sole and exclusive warranty applicable to the battery and is in lieu of all other warranties, express or implied, including, but not limited to, warranties of merchantability and fitness for a particular purpose. The manufacturer shall not be liable for any incidental or consequential damages, including, but not limited to, loss of profits, loss of use, or damage to property.

Shipping

- Assure that the system is completely shut down.
- Keep system in original packing materials and shipping carton.
- Protect the system from moisture and weather.

Business Hours
Monday thru Friday
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1.0 General Description

1.1. Introduction

The IntelliShield 3kW is a 3kW Rugged Uninterruptable Power Supply (RUPS) that provides regulated voltage at up to 25 Amps RMS load current. The IntelliShield 3kW RUPS accepts input voltages from 108 Volts to 264 Volts at frequencies from 47 to 440 Hz. A battery backup of up to 6.7 minutes at 3000 Watts is also provided by a removeable battery pack drawer. Output power is continuous when transferring from AC to battery or battery to AC.

1.2. General Description

The IntelliShield 3kW is contained in a 3.45” (87.6mm) high by 19” (482.6) wide by 27” (685.8 mm) deep rack-mount enclosure. All input and output connections are made at the rear panel. Cooling air is drawn in through a filter on the front panel and exhausted out the rear panel. Operational status is indicated by front panel LEDs. A master power switch and control panel are also provided on the front panel. There are no operator adjustments.

1.3. Specifications

INPUT RATINGS	
Input AC Voltage	108VAC to 264VAC.
Input Max Current (Amps):	34.4
Input Frequency (Hz, Tolerance):	47- 440Hz
Efficiency	85%
Breaker & Switch Input (Rating, Type, Location):	2P,40A, Magnetic Hydraulic CB Power Toggle Switch, Front Panel
Power Factor	0.99 typical

OUTPUT RATINGS	
Output Power Rating	3000 VA, 3000 W
Output AC Voltage	120VAC, 220VAC, 230VAC, or 240VAC (+/- 1%)
Frequency	50 or 60 Hz, (±1 %), Follows input frequency, Frequency change (optional)
Isolation	Galvanic Isolation
Neutral Bonded to Ground (Bonded/Un-bonded/Switch)	Switch. Factory default switch position is Bonded.
If Switch, Factory Default Is:	Bonded
Output AC Breaker & Switch	1P30A, Push to Reset, Magnetic Hydraulic Circuit Breaker, Rear Panel
Output DC Breaker & Switch	N/A
Output Overload - Shutdown or Bypass	Shutdown at 10% overload. 1 Min operation 5% - 10% overload. Continuous operation below 5% overload. Bypass feature available when voltage and frequency are synchronized between input and output.
MECHANICAL	
Enclosure Type & Size	Rack mountable 2U, 3.45”H x 19”W x 27"D (87.6mm x 482.6mm x 685.8mm) w/ front panel 1” (25.4mm) rack ears.
Enclosure Material & Finish	Aluminum, chem. coated, charcoal gray powder coat.
Nominal Weight +/- lbs:	73.3lbs (33.2kg)
Shipping Dimensions	32.75" x 22.125" x 6.625" (832mm x 562mm x 168mm)
Shipping Weight +/- lbs	77 lbs (35 kg)
Enclosure Airflow	Front-to-Rear

Fan Filters (EMI/Dust/Combination/Grill):	EMI Metal Honeycomb Grid, Dust Filter
Mounting Ears	Yes
Rack Slides	JES slides for Defense applications, GD slides for other applications. Use GD hole pattern for both.
INTERFACE COMMUNICATIONS	
Serial Data Stream (SNMP2/SNMP3/RS232, type):	SNMP, Ver 3
Discrete (Relay/Opto, Description):	EPO (Optional)
ADDITIONAL ELECTRICAL FEATURES and CONTROLS/INTERFACE	
Bar Graph LED Indicators	Output Power Loading %; Battery Charge Level %;
LED Status Indicators	Inverter Output On; Bypass On; UPS Fault; Service Battery; Option 1, Option 2
Panel Controls	AC Input On-Off Breaker, AC Output push-to-reset Breaker AC Output On (via F1 Button); Alarm Fault Silence (via F3 Button); LED Test (via F4 Button); Bypass (via F1 and F2 Buttons); UPS Shutdown (via F2 and F3 Buttons)
Audible Alarms	Input AC Interrupt; Inverter Failure; Overload; Low Battery; Self-Test
Auto Start (Manual Start/Auto Start):	Auto Start: AC Output is Present when AC is Applied (Default Setting) Manual Start: Available by Customer Selection Thru Settings - See User Manual
Battle Short Switch (Yes/No):	Optional by Special Request
EPO Emergency Power off (EPO)	Standard
Controls – Cold Start	Standard

CONNECTORS	
Connector(s) AC Input	MS3452L20-19P (Pin A = High, Pin B = Neutral, Pin C = GND)
Connector(s) DC Input	N/A
Connector(s) AC Output	MS3452L20-19S (Pin A = High, Pin B = Neutral, Pin C = GND)
Connector(s) DC Output	N/A
Connector(s) EBP/Charger	2x2 Anderson, Rear Panel
SNMP/Ethernet	SNMP
RS-232	DE-9F (Factory Use Only)
External Control, Remote EPO	Optional
Chassis Ground:	¼ -28 Stainless Steel HEX Screw with appropriate, Flat Washer and Lock washer Hardware.
EMI AND ENVIRONMENTAL MIL-STD's	
Temperature, Operating	MIL-STD-810, -20C to 50C
Temperature, Storage:	MIL-STD-810, -40 to 70C
Humidity:	5% to 95% (non-condensing), MIL-STD-810
Shock:	MIL-DTL-901
Vibration:	MIL-STD-167-1
EMI and Power Quality MIL-STD's (MIL-STD 461, MIL-STD-1399)	MIL-STD-461, MIL-STD-1399-300 Part B
EMC and Safety	CE Mark : EN62040-2 EN62040-1, EN62477-1 UL 1778

LEAD ACID BATTERY	
Battery Rating	12V 8AH
Battery String Voltage:	168VDC(Nominal)
Battery Minimum Run Time	2 minutes at 3000Watt (See External Battery Module Section)
Battery Mounting (Hot Swap/Fixed):	Internal Hot Swap Drawer
Hot Swap Drawer PN	FB00093

LITHIUM IRON PHOSPHATE BATTERY	
Battery Cell Rating	3.2V 2.5A
Battery String Voltage:	172.8VDC(Nominal)
Battery Minimum Run Time	6.8 minutes at 3000Watt (See External Battery Module Section for additional run times)
Battery Mounting (Hot Swap/Fixed):	Internal Hot Swap Drawer
Hot Swap Drawer PN	FB00095

External Battery Pack (EBP) – Lead Acid	
Battery Rating	12VDC 8AH
Battery Total Quantity:	14
Battery String Voltage:	168VDC(Nominal)
Battery Minimum Run Time (UPS Internal Battery + 1 EBM)	5 minutes at 3000W
Battery Minimum Run Time (UPS Internal Battery + 2 EBM)	10 minutes at 3000W
MECHANICAL	
Enclosure Type & Size	Rack Mountable, 2U, 3.5"H, 17"W, 18.195"D; w/front panel 1” rack ears
Nominal Weight +/- lbs:	54 lbs. (24.5 kg)
Drawer Slides	Available separately
CONNECTORS	
Connector(s)	2x2 Anderson, Rear Panel
Chassis Ground:	¼ -28 Stainless Steel HEX Screw with appropriate, Flat Washer and Lock washer Hardware.
Cables	IntelliPower PN: CA02746-48, UPS to EBP Interconnect Battery Cable with 1 each 2 x 2 Anderson Connector

External Battery Pack (EBP) - LFP	
Battery Rating	2.5Ah
Battery String Voltage:	172.8VDC(Nominal)
Battery Minimum Run Time (UPS Internal Battery + 1 EBM)	13.6 minutes at 3000W
Battery Minimum Run Time (UPS Internal Battery + 2 EBM)	20.4minutes at 3000W
MECHANICAL	
Enclosure Type & Size	Rack Mountable, 2U, 3.5"H, 17"W, 18.195"D; w/front panel 1” rack ears
Nominal Weight +/- lbs.:	32 lbs. (14.5 kg)
CONNECTORS	
Connector(s)	2x2 Anderson, Rear Panel
Chassis Ground:	¼ -28 Stainless Steel HEX Screw with appropriate, Flat Washer and Lock washer Hardware.
Cables	IntelliPower PN: CA02746-48, UPS to EBP Internconnect Battery Cable with 1 each 2 x 2 Anderson Connector

Specifications are subject to change without notice.

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2.0 Installation

2.1. Introduction

The IntelliShield 3kW rugged UPS has been aligned, calibrated, and tested prior to shipment. Therefore, the RUPS is ready for immediate use upon receipt. However, the following checks should be made to ensure that the rugged Uninterruptable Power Supply was not damaged during shipment.

CAUTION!
The IntelliShield 3kW rugged UPS weighs 73.3 pounds (33.2 kg) with the battery pack installed. A minimum two-person lift is required.

WARNING!
Hazardous voltages are present when operating this equipment. Read and understand all safety notifications prior to performing installation, operation, or maintenance.

2.2. Unpacking

Perform a visual inspection of the shipping container prior to accepting the package from the carrier. If extensive damage to the shipping container is evident, a description of the damage should be noted on the carrier's receipt and signed by the driver of the carrier agent.

If damage is not apparent until the rugged UPS is unpacked, a claim for concealed damage should be placed with the carrier. In addition, the shipping container and filler material should be saved for inspection. Forward a report of damage to the IntelliPower Repair Department. IntelliPower will provide instructions for repair or replacement of the rugged UPS.

When returning the rugged UPS to IntelliPower, suitable shipping containers and packing materials should be used. If the rugged UPS needs to be shipped and proper packing material is not available, contact IntelliPower to obtain shipping material and instructions.

2.3. Pre-Installation Inspection

Upon unpacking the rugged UPS, carefully inspect the unit for any visible signs of damage that may have occurred during shipping. Check all exterior surfaces, including the casing,

connectors, and displays, for dents, cracks, or deformities. Ensure that all MIL-DTL 5015 connectors are securely attached and free of dust or debris. Verify that the LED indicators and control buttons are intact and functional. Additionally, confirm that the unit's model and serial number labels are legible. If any damage or discrepancies are found, contact IntelliPower before proceeding with installation.

2.4. Installation

The Model IntelliShield 3kW is 2U high and designed to fit in a standard 19I ((483 mm) wide cabinet enclosure or transit case

CAUTION!

Avoid blocking the rugged UPS air intakes and exhaust.

2.5. Air Intake and Exhaust

The air intake is located on the front panel of the RUPS and the exhaust is through the rear panel. Care must be taken not to block the air intake and exhaust. No special vertical separation is required when stacking rugged UPS. However, a 1U spacer above and below the rugged UPS may improve cooling.

2.6. Rack Mounting

Do not use hardware greater than 3/8" length for rack attachment.

Unless otherwise specified, IntelliPower enclosure mounting screws are #10-32 thread.

Screws should be installed with a locking adhesive to prevent them from becoming loose or falling out.

2.7. Connecting System Cables and Line Power

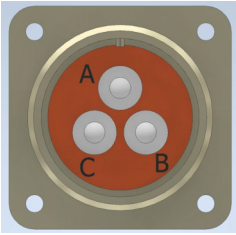
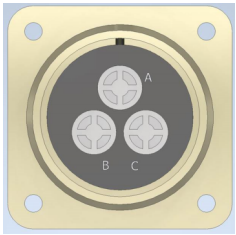
1. Make sure the Input Power Switch is OFF.
2. If possible, make sure load devices are OFF.
3. Connect ground stud to ground with 12 Gauge or better wire.
4. Connect External Battery Pack (EBP) shielded, interconnect cable.
5. Connect communications cables.
6. Connect Output cables. Do not connect load greater than unit power rating.

7. Connect Input cables. It is recommended to use shielded input and output cables
8. Double check all connections.

2.8. Input/Output Connectors

Table 2-1 provides details of the IntelliShield 3kW input and output connectors.

Table 2-1 IntelliShield AC Input Connector Details

AC Input Connector		
Panel Connector	MS3452L20-19P	
Mating Connector	MS3452L20-19S	
Pin	**Function**	**Drawing**
A	Line	
B	Neutral	
C	Ground	
AC Output Connector		
Panel Connector	MS3452L20-19S	
Mating Connector	MS3452L20-19P	
Pin	**Function**	**Drawing**
A	Line	
B	Neutral	
C	Ground	

2.9. Wire Gauge Selection

The following guidelines assist in determining the optimum wire and cable specifications for the user's power applications. These guidelines are applicable to low frequency AC (up to 450 Hz) power cabling. The same engineering rules apply whether going into or out of an electrical device. Thus, this guide applies equally to the input cable and output cable for this IntelliPower rugged UPS and application loads.

Power cables must be able to safely carry maximum load current without overheating or causing insulation damage. It is important to everyday performance to minimize IR (voltage drop) loss within the cable. These losses have a direct effect on the quality of power delivered to and from the rugged UPS and corresponding loads.

When specifying wire gauge, the operating temperature must be considered. Wire gauge current capability and insulation performance drops with the increased temperature developed within a cable bundle and with increased environmental temperature. Thus, short cables with generously derated gauge and insulation properties are recommended for power source applications.

It is recommended to avoid using published commercial utility wiring codes. These codes are designed for internal wiring of homes and buildings and accommodate the safety factors of wiring loss, heat, breakdown insulation, aging, etc. However, these codes consider that up to 5% voltage drop is acceptable.

Such a loss directly detracts from the quality performance of this IntelliPower rugged UPS. Frequently, these codes to not consider bundles of wire within a cable arrangement.

In high performance applications, as in motor start-up and associated inrush/transient currents, additional considerations are required. The cable wire gauge must consider peak voltages and currents which may be up to ten times the average values. An underrated wire gauge adds losses which alter the inrush characteristics of the application and thus the expected performance.

Table 2-2 Recommended Wire Gauge Selection Guide

Column 1	Column 2	Column 3	Column 4
Size (AWG)	**Amperes (Maximum)**	**Ohms/100 Feet (One Way)**	**IR Drop/100 Feet (Col 2 X Col. 3)**
14	15	0.257	3.85
12	20	0.162	3.24
10	30	0.102	3.06
8	40	0.064	2.56
6	55	0.043	2.36
4	70	0.025	1.75
2	95	0.015	1.42
1/0	125	0.010	1.25
3/0	165	0.003	1.04

The following notes apply to table 2-1 and to the power cable definition:

1. The above figures are based on insulated copper conductors at 25°C (77°F), two current carrying conductors in the cable plus a safety (chassis) ground.

Columns 3 and 4 refer to “one way” ohms and IR drop of current carrying conductors (e.g., a 50-foot cable contains 100 feet of current carrying conductor).

2. Determine which wire gauge for the application by knowing the expected peak loa current (I_{peak}), the maximum tolerated voltage loss (V_{loss}) within the cable, and the one way cable length. The formula below determines which ohms/100 feet entry is required from Column 3. Read the corresponding wire gauge from Column 1.

$$Column\ 3\ value = \frac{V_{loss}}{I_{peak} \times\ 0.02 \times cable\ length}$$

Where:

Column 3 value = Entry of the table above.

Cable Length = One way calbe length in feet.

Vloss = Maximum loss, in volts, permitted within the cable

<u>Special Case</u>: Should the V_{loss} requirement be very loose, I_{peak} may exceed the maximum amperes (Column 2). In this case, the correct wire gauge is selected directly from the first two columns of the table.

Example:

A 20 ampere (I_{peak}) circuit which may have a maximum 0.5 volt drop (V_{loss} along its 15-foot cable (one way cable length) requires (by formula)a Column resistance value of 0.083. This corresponds to wire gauge size of 8 AWG.

If the cable length was 10 feet, the Column 3 value would be 0.125 and the corresponding wire gauge would be 10 AWG.

3. Aluminum wire is not recommended due to soft metal migration at the terminals, which may cause long term (on the order of years) poor connections and oxidation. If used, increase the wire gauge by two sizes (e.g. specify 10 gauge aluminum instead of 14 gauge aluminum).
4. Derate the wire gauge (use heavier gauge) for higher environmental temperatures since conductor resistance increases with temperature.
5. Derate the wire gauge (use a heavier gauge) for an increased number of current carrying conductors. This offsets the thermal rise of bundled conductors.
6. The preferred insulation material is application dependent. IntelliPower recommends any flame retardant, heat resistant, moisture resistant thermoplastic insulation rated to a nominal 75°C (167°F). Voltage breakdown must exceed the combined effects of:

The rated output voltage;

Transient voltages induced on the conductors from any source;

The differential voltage to other nearby conductors; and,

Safety margins to accommodate degradations due to age, mechanical abrasion, and insulation migration caused by bending and temperature.

7. As frequency increases, the magnetic field of the current carrying conductors becomes more significant in terms of adverse coupling to adjacent electrical circuits. Use twisted pairs to help cancel these effects. Shielded twisted pairs are even better. Avoid lose coupling with nearby cables by using separate cable runs for high power and low power cables.
8. The general values and recommendations in this manual should be reviewed, and may be modified, and amended as necessary for each application. Cables should be marked with appropriate safety WARNING decals as hazardous voltages may be present.

2.10. Load Devices

Note the unit power rating. Do not connect load greater than the unit power rating. For multiple load devices, plug in the critical load into the unit outlets one at a time after unit startup – turn each load ON, one at a time. As you do so check the Output Load LED Meter (OUT LOAD) on the local panel. If the last LED in the meter turns ON or begins to flash, you have overloaded the unit.

2.11. Material Identification

Prior to permanent installation, it is recommended that the user locate the model number, serial number, date of receipt, and dealer's name of the rugged UPS and record them in the table below. This information will be useful for future reference, especially for warranty claims, service requests, and technical support. Be sure to keep this manual in a safe location for easy access.

Model Number	
Serial Number	
Purchase Date	
Dealer Name	

3.0 Operation

3.1. Introduction

The controls and display for the IntelliShield 3kW rugged UPS are easily understood after a brief overview.

3.2. Control and Indicator Panel

Refer to figure 3-1 for the location of the indicators and controls described in this section. All controls and indicators for the IntelliShield 3kW rugged UPS are located on the Control and Indicator Panel. There are no operator adjustments inside the unit.

The local control interface features two LED-segmented displays: the load meter and the battery capacity meter, both designed for quick and easy monitoring. The load meter consists of five LED segments, with the first four green LEDs indicating 25% load increments. The fifth, a red LED, alerts users to an overload condition. This design allows for real-time visibility, enabling operators to assess the UPS's load status at a glance. This is especially valuable in mission-critical environments where system performance needs to be closely monitored.

The interface is equipped with four additional LED indicators: Bypass, On, Fault, and Service Battery. These provide immediate feedback on the UPS's operational state, helping users quickly diagnose issues or check status. To further enhance usability, the interface includes four push buttons labeled F1 through F4, with F1 as the Function button, F2 as the On button, F3 as the Silence button, and F4 as the Test button. Pressing the F1 button in combination with any of the other buttons triggers programmed functions, allowing operators to execute advanced system commands with ease.

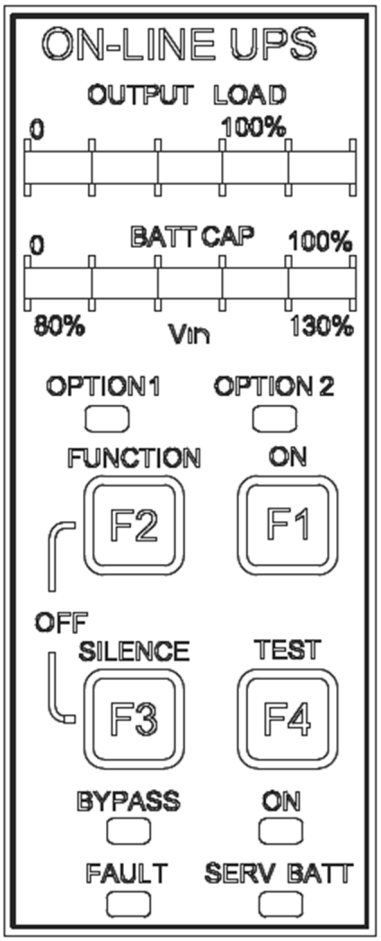


Figure 3-1 IntelliShield Local Control and Indicator Panel

The function buttons have been designed with a safety feature against inadvertent operation and require a firm sustained pressure for up to 1 second to initiate a function.

BATT CAP 0 to 100% – Battery Capacity LED Meter Each of the five positions on the LED meter indicates a different level of battery capacity. If the LED is flashing, the unit is on battery.			
Position	**LED Status**	**Other Condition**	**Indication**
1 (0%+)	ON		Unit is on line power, batteries are charging. Battery capacity is critical, between 0 and 20%. LED is red.
	OFF		
	FLASHING	ON LED is ON	Unit is on battery power, batteries are discharging. Battery capacity is critical, between 0 and 20%. LED is red.
	FLASHING	ON LED is OFF	Unit is shutting down.
2, 3, 4	ON		Unit is on line power, batteries are charging. Capacity is less than 100% and greater than 20%.
	OFF		
	FLASHING		Unit is on battery power, batteries are discharging. Capacity is less than 100% and greater than 20%.
	FLASHING	ON LED is OFF	Unit is shutting down.
5 (100%)	ON		Unit is on line power, batteries fully charged.
	OFF		
	FLASHING	ON LED is ON	Unit is on battery power, batteries are discharging. Capacity is 100%.
	FLASHING	ON LED is OFF	Unit is shutting down.

BYPASS – LED This LED is always in use. If overcurrent, the system will enter bypass automatically.		
LED Status	**Other Condition**	**Indication**
ON		On bypass
OFF		Not on bypass
FLASHING		

FAULT – LED Units with an auto bypass will go into bypass to power the load and allow time for graceful shutdown.		
LED Status	**Other Condition**	**Indication**
ON		The inverter has malfunctioned due to an internal fault.
OFF		Normal mode.
FLASHING		

ON – LED Indicates inverter output status.		
LED Status	**Other Condition**	**Indication**
ON		Inverter output is ON.
OFF		Inverter output is OFF.
FLASHING		
FLASHING		

OPTION 1 – LED Reserved		
LED Status	**Other Condition**	**Indication**
ON		
OFF		
FLASHING		

OPTION 2 – LED Reserved		
LED Status	**Other Condition**	**Indication**
ON		
OFF		
FLASHING		

OUT LOAD 0 to 100% – Output Load LED Meter

Each of the 4 green LEDs within the bar represents approximately 25% of rated output power in terms of RMS VA or Watts, whichever is greater. Positions 1 through 4 each represents 25% of load. LED positions may occasionally move back and forth due to variable loading.

Position	LED Status	Other Condition	Indication
1 (0%+)	ON		0 to 25% load
	OFF		0% load
	FLASHING		
2, 3, 4 (100%)	ON		25% to 100% load
	OFF		
	FLASHING		
5	ON		Load is >= 100% and < 101 to 105%. Critical load. LED is red.
	OFF		
	FLASHING		
	FLASHING	Bypass Enabled	

All 5 LEDs blinking: 100%<load≤overload level 1 (default 105%, can be changed in factory setting)

ONLY LED 5 blinking, LED 1..4 OFF, with audible alarm: overload level 1<load≤over load level 2 (default 110%, can be changed in factory setting). Overload timeout in 1 minute.

SERVICE BATTERY – LED

Indicates battery conditions. The system will light up the "service battery" LED if one of the situations is detected, the voltage is out of range, there is over current at the battery, or if it stays in fast charge for over 12 hours.

LED Status	Other Condition	Indication
ON		Bad battery or service battery.
OFF		
FLASHING		

F1 ON – BUTTON

Push this button once to turn the output inverter ON.

F2 FUNCTION – BUTTON

This button is utilized in conjunction with the F3 button to turn off the inverter output. And conjunction with F1 button to toggling bypass manually.

F3 SILENCE – BUTTON

Press this button to loop through buzzer modes.

F4 TEST - BUTTON

Push this button once to run a local panel LED test. This will help to pinpoint any faulty LEDs. This test can be performed while the unit is in normal operation without effecting power to the load devices.

OFF F2 AND F3 – BUTTON

Press F2 and F3 simultaneously to turn OFF the inverter output.

F2 AND F4 – BUTTON – *Advanced Users Only* - Overview

Warning! Do not access this mode without proper training, documentation, and instructions. In this mode unit functionality can be changed to follow parameters and rules outside of specifications. If this mode is entered accidentally, wait 5 minutes without operating any controls and the unit will return to normal mode.

The FLASH memory is accessed via 3 switch banks composed of 10 switches each.
Press F2 and F4 simultaneously to enter bank configuration mode; press F2 before F4 to avoid entering LED test.
After entering configuration mode:
BYPASS – LED indicates Switch Bank 1 is selected.
SERVICE BATTERY – LED indicates Switch Bank 2 is selected.
FAULT – LED indicates Switch Bank 3 is selected.
Flashing positions on the OUT LOAD & BATT CAP meters can assist in recognizing switch positions.
Press F2 to change switch banks.
Each switch bank begins with Switch 1.
Press F4 to ascend upwards through switches 1 to 10 of each bank
Pressing F4 while positioned at switch 10 will initiate navigation to switch 1 of the next bank.
Press F3 to descend downwards through switches 10 to 1 of each bank.
Pressing F3 while positioned at switch 1 will initiate navigation to switch 10 of the previous bank.
If the ON – LED is ON, the selected switch is ON. If the ON – LED is OFF, the selected switch is OFF.
Press F1 to change a switch from OFF to ON or ON to OFF.
Press F2 and F4 again to apply and save changes and return to normal mode.
If no button is pressed for 5 minutes, system will exit advanced programming mode and discard all changes.

CONTACT INTELLIPOWER TECHNICAL SUPPORT FOR INFORMATION ABOUT OTHER FRONT PANEL PROGRAMMABLE SETTINGS AVAILABLE.

F2 AND F4 – BUTTON – *Advanced Users Only* – Auto/Manual Start

This section outlines steps to enable Auto Start or Manual Start.
See also “F2 AND F4 – BUTTON – *Advanced Users Only* – Overview”.

Warning! Do not access this mode without proper training, documentation, and instructions. In this mode unit functionality can be changed to follow parameters and rules outside of specifications. If this mode is entered accidentally, wait 5 minutes without operating any controls and the unit will return to normal mode.

Press F2 and F4 simultaneously to enter bank configuration mode; press F2 before F4 to avoid entering LED test.
Check that the BYPASS – LED is ON.
Press F3 or F4 until the fourth LED of BATT CAP LED bar is ON..
You are now in Switch Bank 1, Switch 2.
If the ON – LED is ON, Auto Start is enabled. If the ON – LED is OFF, Manual Start is enabled.
Press F1 to change the switch from ON to OFF or OFF to ON.
Press F2 and F4 again to save changes and return to normal mode.

CONTACT INTELLIPOWER TECHNICAL SUPPORT FOR INFORMATION ABOUT OTHER FRONT PANEL PROGRAMMABLE SETTINGS AVAILABLE.

F2 AND F4 – BUTTON – *Advanced Users Only* – Default Settings

This section outlines steps to return unit to default settings.
See also “F2 AND F4 – BUTTON – *Advanced Users Only* – Overview”.

Warning! Do not access this mode without proper training, documentation, and instructions. In this mode unit functionality can be changed to follow parameters and rules outside of specifications. If this mode is entered accidentally, wait 30 seconds without operating any controls and the unit will return to normal mode.

Press F2 and F4 simultaneously to enter bank configuration mode; press F2 before F4 to avoid entering LED test.
Press F2 until FAULT LED is ON. Press F3 or F4 until the first LED of OUTPUT LOAD LED bar is ON.
You are now in Switch Bank 3, Switch 10.
If the ON – LED is ON, return to default is enabled. If the ON – LED is OFF, return to default is disabled.
Press F1 to change the switch from ON to OFF or OFF to ON.
Set the switch to ON.
Check that the ON – LED is ON.
Press F2 and F4 again to save changes and return to normal mode.
Completely shut down and restart the unit.

CONTACT INTELLIPOWER TECHNICAL SUPPORT FOR INFORMATION ABOUT OTHER FRONT PANEL PROGRAMMABLE SETTINGS AVAILABLE.

3.3. Normal Start

3.3.1. Unit Startup

1. Turn ON the unit Input Circuit Breaker.
2. Local Panel LEDs will turn ON for approximately 5 seconds before running LED startup test. If the unit is set to Auto start, the inverter will begin to output power in 5-10 seconds; otherwise use the front panel F1 ON button to turn ON the inverter output. When the ON LED stops flashing and remains ON the inverter output is operational.

3.3.2. Unit Output Control

1. To turn OFF the Output Inverter press F2 and F3 simultaneously.
2. To turn ON the Output Inverter press F1.

3.3.3. Unit Shutdown

1. Hot Swap Battery (if applicable): Do not shut down the Unit with the battery drawer removed.
2. If the ON – LED is ON (output inverter is operational), press F2 and F3 simultaneously.
3. Turn OFF Input Circuit Breaker. Allow the unit to exercise the shutdown procedure.

3.3.4. Hot Swap (If applicable)

The front panel BATT CAP LED meter will not show accurate capacity until configuration and 10 hours of charge time.

3.3.4.1. Removal

1. Remove the six (6) screws that secure the battery drawer to the chassis.
2. Using both hands while maintaining the batteries in their normal, horizontal orientation, gently remove the drawer.

3.3.4.2. Insertion

1. Using both hands while maintaining the batteries in their normal, horizontal orientation, gently insert the drawer.
2. Inspect the drawer mating surfaces to assure it is completely inserted.
3. Fasten designated screws.

3.3.4.3. Configuration

1. Press F3 and F4 at the same time. To initiate, press F3 briefly before pressing F4. Before releasing both F3 and F4 should be pressed at the same time. Allow UPS to charge for 10 hours.

3.4. Cold Start

When AC power is not available, the rugged UPS can be started from the internal battery by performing the Cold Start procedure. Cold Start will allow the battery to be connected to the unit in a power on sequence and inverter operation will follow with the AC voltage present at the output. The Battery Capacity Meter on the Control and Indicator panel will monitor the battery discharge, providing real-time battery charge levels to the user. When the batteries are nearly discharged, the battery alarm will sound.

1. Press the Cold Start button. The unit will enter idle mode.
2. Press the ON button on the Local Panel.

3.5. Unit Shutdown

Switch the breaker off. Press and hold F2. Then simultaneously press F3 for 1 second.

3.6. Battery Operation

Whenever the input voltage falls outside of the specified range, the IntelliShield UPS will automatically switch to the battery operation. The UPS will maintain the output voltage and load current as the battery discharges.

When the battery charge falls below 20%, the audible battery alarm will sound. This alarm can be silenced with the F3 button. When the battery charge is too low to operate, the rugged UPS will automatically shut off. When the AC power returns, the battery charger will resume operation, and the battery (or batteries) will begin to recharge. Operating the inverter on the battery will result in reduced backup time unless the battery has been able to fully recharge.

CAUTION!

The rugged UPS will not operate if the battery has been removed.

4.0 Battery Care and Handling

Your rugged UPS is designed to support two different battery configurations: VRLA (Valve-Regulated Lead-Acid) and LFP (Lithium Iron Phosphate). Both configurations offer reliable backup power, but each has distinct characteristics and care requirements. Proper handling and maintenance of your UPS batteries are essential for ensuring optimal performance and extending battery life.

VRLA batteries are a proven technology, offering reliable energy storage. However, they require specific charging and maintenance protocols to prevent sulfation (the buildup of lead sulfate on the plates), which can degrade performance over time. Regular monitoring and proper charging practices are critical for maximizing the lifespan of VRLA batteries.

LFP batteries, on the other hand, offer several advantages, including longer cycle life, better tolerance to deep discharges, and faster recharge times. LFP batteries are also more resistant to common issues like sulfation, making them a low-maintenance option. Despite their resilience, following best practices for care and handling will ensure their optimal performance in rugged environments.

The following sections provide detailed guidance on the care, maintenance, and handling of both VRLA and LFP battery configurations, ensuring the long-term reliability of your UPS system.

CAUTION!
Lithium Iron Phosphate batteries should be charged at 40 to 60% during long term storage conditions greater than 3 months for longest life. Sealed Lead Acid batteries should be kept charged at 100% capacity under all conditions.

4.1. Battery Maintenance During UPS Storage

4.1.1. General Procedure to Place UPS into Storage

1. Apply AC power by switching on the input circuit breaker and then switching off. The UPS will continue to operate in battery run mode.
2. Alternately, the cold start switch in the front panel can be pressed to place UPS into battery run mode.
3. Operate the UPS until the batteries are fully discharged.
4. For Lithium Iron Phosphate batteries, use the charging options as outlined in section 4.1.2.2. Use 100% full charging for either removal from storage or short-term storage (less than 3 months). Use 40-60% partial charging for long-term storage (greater than 3 months).

5. To avoid full battery discharge after 40-60% partial or 100% full charging, the UPS can be completely shut down. First remove input power. Then press F2 and F3 in the front control panel and hold for at least 1 second. This will initiate UPS shut down in battery mode. The front panel LED lights will sequentially energize and then shut-off in sequence, after which the UPS will completely shut off. If lights and fans do not completely shut-off, press F2 and F3 a second time for at least one second.
6. When placing / returning to storage, keep UPS unit in the original packing materials and shipping carton.
7. Protect the stored UPS unit from moisture and weather.
8. During storage, refer to Table 3-1 or 3-2 for battery charging intervals.

Table 4-1 Recommended Battery Charging Interval, Sealed Lead Acid

Sealed Lead Acid	
Storage Temperature	Battery Charging Interval (Months)
Less than 20C	9
21 to 30C	6
31 to 40C	3
41 to 50C	1.5
51 to 60C	1

Table 4-2 Recommended Battery Charging Interval, Sealed Lead Acid

Lithium Iron Phosphate	
Storage Temperature	Charging Frequency (Months)
Less than 20C	18
21 to 30C	12
31 to 40C	8
41 to 50C	6
51 to 60C	5

4.1.2. Charging Procedure Options During and After Storage

4.1.2.1. Lead Acid: Removal from Storage; Short-Term and Long-Term Storage

1. Perform a battery runtime test described in section 3.1.3.1.
2. Follow this with at least 12 hours of normal AC line powered operation to restore the battery charge level from a complete discharge to 100% charge. Preferably, have the UPS output at no load while recharging.

4.1.2.2. Lithium Iron Phosphate: Removal from Storage; Short-Term Storage - Less than 3 months

1. Perform a battery runtime test described in section 3.1.3.1.
2. Follow this with at least 12 hours of normal AC line powered operation to restore the battery charge level from a complete discharge to 100% charge. Preferably, have the UPS output at no load while recharging.
3. After recharging, perform a complete shut-down of UPS as outlined in section 3.1.1.1.
4. Either return the UPS to storage or place unit into service.

4.1.2.3. Lithium Iron Phosphate Only: Long-Term Storage, Greater Than 3 months

1. For long term storage greater than 3 months, battery life will be maximized by keeping Lithium Iron Phosphate batteries at a 40-60% state-of-charge rather than at 100%.
2. At the intervals specified in the table above, operate UPS at full load and remove AC power.
3. Operate the UPS in battery run mode until shut-off occurs.
4. Apply AC power and switch on the UPS. Allow charging to continue until the 3rd LED or 40-60% charge point is reached.
5. Perform complete shut-down of UPS as outlined in section 3.1.1.1.
6. Return UPS to storage with batteries at 40-60% state-of-charge.

4.1.3. Battery Maintenance During UPS Service

CAUTION!
It is highly recommended to perform a battery runtime test upon receipt of the unit and at least every 3 months thereafter. Use the battery maintenance worksheet at the end of this chapter.

WARNING!
Do NOT begin a battery recharge if ambient temperature is above 50°C (122°F)..

4.2. Battery Run-time Test

Proper battery maintenance requires a battery runtime test, every three months. This test should be done upon receiving the unit. Results should be retained for comparison with the results of future tests.

1. Allow the UPS to continue to run at least 6 additional hours after the battery capacity meter on the front panel has reached 100%. Upon battery capacity LED meter reaching

100%, the unit has transitioned from fast-charge mode to float charge mode. The UPS is now top charging batteries the last few percent at a slower, safer rate.

2. With AC power applied, apply a 3KW load for battery runtime testing.
3. Place the unit in battery runtime mode by removing input AC power. The front panel battery capacity meter will start flashing and the UPS will sound a beeping alarm. The beeping alarm may be silenced by pressing the F3 Silence button.
4. With AC input power removed, simultaneously start a timer to measure the battery runtime.
5. Once approximately 90% of battery capacity has been exhausted, the unit will sound a continuous tone alarm (The F3 Silence button is now over-ridden). Allow the UPS to continue to operate in battery run mode until complete battery exhaustion occurs. The UPS will shut down automatically when this point is reached.
6. Record the unit serial number and the measured battery run time. Use the data as a battery runtime benchmark for future tests.
7. Allow the unit to cool down, un-powered (off) for at least 2 hours - but not more than 12 hours - following a battery runtime test. This allows the batteries to return to ambient temperature before attempting a full recharge. Full battery recharge requires a minimum of 12 hours.

4.3. Battery Charging Modes

4.3.1. Fast Charging Mode

Fast charging occurs when the battery LED display indicates 80% or less state of charge (SOC).

4.3.2. Float/Final Charging Mode

The Float/Final Charging occurs when the battery LED display first indicates 80%After the battery capacity LED meter reaches 80%, an additional 6 hours is required to finish charging the batteries.

Lead Acid batteries are continuously float charged after reaching 100% charge.

Lithium Iron Phosphate batteries receive a limited time final charge to avoid damage from continuous float charging.

4.4. Battery Fault Modes

4.4.1. Shorted Cell Damage:

The most common and potentially damaging failure mode is for a single cell to partially short. When this happens, the series battery pack will never reach float charge level because

of the missing voltage from the shorted cell. The UPS will thus remain in “Fast Charge” mode.

If battery charging continues with a shorted cell, the remaining cells in series may eventually be damaged from overcharging, resulting in swelling, outgassing or venting of the battery. To help prevent this, the UPS microprocessor monitors the battery charger operating mode. If the UPS remains in fast charge mode for more than 12 hours, the Service Battery LED will turn ON. However, depending on the severity of the cell short, the remaining batteries may still overcharge and be permanently damaged before the 12-hour period is complete. This is especially true if more than one cell shorts at about the same time.

4.4.2. Open Cell Damage:

A second mode of battery failure is for a cell to partially open rather than short. If this happens, the UPS microcontroller senses that the batteries are simply at the float charge level. Thus, the front-panel battery capacity meter indicates 100%, even though the batteries are not properly charged.

This 100% indication is misleading if there is an open cell because the entire series battery pack voltage will rise. This gives the charging hardware the impression that all cells are already near full charge. In turn, this causes the charger to prematurely transition from fast-charge mode to float-charge mode.

Under these conditions the battery runtime under load is severely reduced or crippled. Marginally reduced runtime may or may not be detectable unless a user periodically performs a battery runtime test. In cases of one or more completely open cells, the UPS will refuse to operate on batteries under load but will operate normally with AC power applied.

4.5. Battery Recycling

Batteries must always be recycled in accordance with local laws and regulations.

For the local recycling facility in your area, consult the website: earth911.com or the battery vendor as shown on the battery.

4.6. Hot Swap Battery Tray Replacement

1. It is not necessary to turn the UPS off while changing the Hot Swap Drawer. However, should you lose input power during this procedure the UPS will shut down and the protected equipment will experience a hard shut down.
2. Replacing the drawer should not take more than 15 minutes.
3. Identify and remove all stainless-steel screws used to secure the battery tray. The number of fastener screws, screw head type, and screw thread size will vary, depending on the battery tray configuration. Some tray configurations will also use captive fasteners rather than loose screws.

4. Do not remove any screws used to hold the tray assembly together.
5. The power connection is internal to the UPS and uses self-aligning dagger pins that do not require any tools or actions from the operator to disconnect the battery drawer.
6. Using the handle, carefully pull the drawer out slightly and supporting the bottom of the drawer with the other hand, completely remove the drawer and set it aside (the drawer can heavier than it looks, especially if sealed lead acid batteries are used).
7. Replace it with the new drawer by sliding it into the chassis as far as it will go. The mating pins on the rear of the drawer will automatically connect, and at this time the UPS is fully operational.
8. Replace fasteners screws and torque to the appropriate levels:
9. 4-40 Screws: 4 in-lbs.
10. 6-32 Screws: 9 in-lbs.
11. 8-32 Screws: 14 in-lbs.
12. 10-32 Screws: 18 in-lbs.
13. The UPS display should show the battery capacity at 50% or 100%, depending on the battery state-of-charge.
14. It is recommended to run a test of the batteries by turning off the main circuit breaker. This will cause the UPS to run on batteries for a few seconds just to make sure the unit is fully operational.

4.7. Battery Runtime Specification

_____of runtime at _____Watts

4.8. Battery Runtime Test Results Log

Receiving/ Initial Test – Battery Runtime Results		
Date	Runtime	Wattage
Quarterly Test – Battery Runtime Results		
Date	Runtime	Wattage

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5.0 Maintenance

5.1. Introduction

This section includes information on maintaining the IntelliShield 3kW rugged UPS. There are no adjustments accessible to the user. This section will deal with mechanical or general operational details only.

WARNING!

Hazardous voltages are present when operating this equipment. Read the Important Safeguards on page vi prior to performing installation, operation, or maintenance.

5.2. Service Information

Questions concerning the operation, repair, or service of this rugged UPS should be directed to the IntelliPower Repair Department. Include the model number and serial number in any correspondence concerning this rugged UPS. DO NOT return the unit to the factory without prior authorization.

5.3. Spare and Repair Parts

When ordering spare and repair parts, please specify the part name, part number, component value, and rating, and the IntelliPower part number, if available.

If complete assemblies are required, please contact the IntelliPower Repair Department. Specify the assembly part number as marked on the assembly and the unit model number, IntelliShield 3kW, when ordering.

5.4. Periodic Maintenance

5.4.1. Fan Filter and Exhaust Grill Maintenance

Fan filters and exhaust grills may become obstructed by dust and debris accumulation. Blocked fans can cause unit overheating and damage, due to compromised airflow rate. Periodically check the condition of each fan/grill filter. Clean fan/grill filters as required.

1. Check the fan/grill intake and exhaust periodically to establish an appropriate cleaning frequency. Environments with high amounts of debris will require more frequent fan/grill filter cleanings.
2. Before each cleaning, shut down the UPS completely (input breaker off, followed by F2/F3 shutdown) so that fan blades are not turning during this operation.
3. Filter/grill cleaning:

a) Metal Honeycomb EMI or Plastic Type Filter Grills: Gently vacuum fan intake and exhaust to clear dust and debris.
b) Foam Type Filters: Remove plastic fan grills and wash the foam elements with soapy water.

5.5. Troubleshooting

This section is designed to help you quickly identify and resolve issues that may arise during the operation of your rugged UPS. By recognizing common observable events, understanding their potential causes, and following the recommended actions, you can minimize downtime and ensure the continued performance of your UPS system.

Each event listed below corresponds to a specific set of symptoms, ranging from indicator light changes to performance irregularities. The likely causes are outlined for easy diagnosis, along with step-by-step recommended actions to restore normal operation. Whether the issue is related to power input, battery performance, or communication, this guide will assist you in identifying and correcting problems efficiently.

For any issues that cannot be resolved using this guide, or if more complex troubleshooting is needed, please contact customer support for further assistance.

1	**BATT CAP 0 to 100% – Battery Capacity LED Meter**	
	Observation	Flashing
	Cause	Input power lost. Unit is on battery power.
	Action	Check to make sure the unit plug is still in the power receptacle. Check to make sure the Input Circuit Breaker is still in the ON position.

2	**BATT CAP 0 to 100% – Battery Capacity LED Meter**	
	Observation	Position 1 (bottom) flashing red.
	Cause	Low battery. 20% or less capacity remaining.
	Action	If safe-shutdown software is running, no action is required. Safely shut down load devices.

3	**BATT CAP 0 to 100% – Battery Capacity LED Meter**	
	Observation	Position 1 (bottom) is flashing red. Continuous tone audible alarm.
	Cause	Low battery. Shutdown imminent. The unit has been without input power and has reached the end of its battery run time.
	Action	If safe-shutdown software is running, no action is required. Immediately execute safe shut down of load devices. Equipment may be disconnected from power at this point, depending on battery health and runtime specifications.

4	**OUT LOAD 0 to 100% – Output Load LED Meter**	
	Observation	Red top position on the Output Load LED meter is flashing. Periodic beep audible alarm.
	Cause	The system is overloaded. Approaching shutdown load.
	Action	Immediately reduce load devices.

5	**BYPASS – LED, Momentary Dynamic Bypass** (if configured)	
	Observation	BYPASS – LED flashes for approximately 2 seconds. Momentary beep audible alarm.
	Cause	The unit is overloaded by the load or the start-up requirement of the load.
	Action	The load on the unit has a high starting current requirement that is overloading the unit. It may be severely overloaded; some of the load devices must be removed.

6	**SERVICE BATTERY – LED**	
	Observation	SERVICE BATTERY – LED is flashing. MODEL C Units Only
	Cause	Failing batteries.
	Action	Safely shut download devices. Completely shut down and restart the system. If a problem returns batteries may need to be replaced soon. Utilize only IntelliPower authorized batteries. Contact IntelliPower customer support to order batteries.

7	**SERVICE BATTERY – LED**	
	Observation	SERVICE BATTERY – LED is ON. Continuous tone audible alarm.
	Cause	The battery system of the UPS has failed.
	Action	Safely shut download devices. Completely shut down and restart the system. If a problem returns batteries may need to be replaced. Utilize only IntelliPower authorized batteries. Contact IntelliPower customer support to order batteries.

8	**FAULT – LED**	
	Observation	FAULT – LED is ON. Continuous tone audible alarm. ON – LED is OFF.
	Cause	The unit inverter may have failed.
	Action	Check that load is OFF. Completely shut down and restart the system. In order to not overwrite system error log, do not attempt more than one restart. If problem returns, contact IntelliPower customer support.

9	**Continuous Tone Audible Alarm**	
	Observation	Continuous audible alarm. If configured, BYPASS-LED is ON. If enabled, red top position on the Output Load LED meter is ON.
	Cause	Unit may have been overloaded.
	Action	Reduce load. If enabled (new models), push ON – Button to return to normal mode. Alternatively, safely turn off the load and then completely shut down and restart the system.

10	**Periodic Beep Audible Alarm**	
	Observation	No LEDs are flashing. Periodic beep audible alarm.
	Cause	Over-voltage warning or over-temperature warning. a. May be an over-voltage condition on the input. b. May be an over-temperature condition.
	Action	a. Confirm that the input voltage is within specified tolerance. b. Check and see if anything is blocking the fan inlet in the rear panel of the unit. Check and see if the fan is turning. Move the unit to an area with cooler temperatures or reduce the temperature of the environment.

11	**Unit Does Not Provide Battery Backup**	
	Observation	Input power is turned OFF. Unit shuts down rather than supporting load for specified battery run time.
	Action	If enabled, check that hot swap drawer is fully inserted and fastened. If enabled, check that the BYPASS – LED is OFF. Batteries may not be fully charged. Run the unit on Input power to charge the batteries.

Audible Alarm and LED Event Summary		
Event	**Audible Alarm**	**LED**
Over Temperature – Ambient	Periodic beep	
Over Temperature – Heat Sink	Periodic beep	
Over Voltage	Periodic beep	EXT DC (if configured), FLASHING
Overload – Warning	Periodic beep	OUT LOAD 0 to 100%, FLASHING
Overload – Shutdown or Bypass	Continuous tone	OUT LOAD 0 to 100%, FLASHING
On Battery, Input AC Failure	Periodic beep	BATT CAP 0 to 100%, FLASHING
Low Battery, Input AC Failure	Continuous tone	BATT CAP 0 to 100%, FLASHING
Inverter Failure	Continuous tone	FAULT, ON
Battery Failure	Continuous tone	SERVICE BATTERY, ON

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6.0 Glossary of Terms

This glossary provides definitions for key terms and concepts related to the operation and maintenance of all rugged UPS products offered by IntelliPower. Some terms may not apply specifically to the product described in this user manual but are included to offer a broader understanding of our product line and technologies. Whether you are a first-time user or an experienced technician, this glossary will serve as a helpful reference for navigating the technical language associated with UPS systems, battery configurations, communication protocols, and other important features.

For terms that are specific to your current product, refer to the relevant sections of this manual for additional context and usage.

Altitude: Distance to an arbitrary point above mean sea level. Pressure decreases as altitude increases. Internal components may expand and fail in low pressure environments. IntelliPower systems are designed to operate in elevations up to 10,000 ft or 69.7 kPa.

Anderson Connector(s): Typically utilized for connecting DC power between an external battery pack (EBP) and an uninterruptible power supply (UPS).

Application: The grounding characteristics of a unit depend on the type of vessel it is installed on. Shipboard applications represent water borne vessels such as boats, submarines, and floating rigs. Airborne applications represent planes, airships, and UAVs. Ground applications represent all vessels with a connection to earth such as buildings, cars, trains, etc. Shipboard applications often require that the neutral wire is floating. IntelliPower offers a switch that allows the user to toggle between bonding neutral to ground and un-bonding neutral to ground.

Auto Start: If auto start is enabled, the unit will turn ON the output from the inverter automatically after the input breaker is switched ON and the system powers up. See also Manual Start.

Batteries – Lead Acid: Lead-acid batteries offered by IntelliPower are maintenance-free and sealed. Lead-acid batteries typically have lower upfront costs compared to other battery types. Stored batteries should be recharged once every 3 months when they are stored between 31° to 40° C. If the storage temperature exceeds 40° C, the recharge frequency should be increased. See also Storage & Maintenance.

Batteries – Lithium Iron Phosphate: Lithium iron phosphate batteries offered by IntelliPower are maintenance-free and sealed. Although the initial cost of lithium iron phosphate batteries is higher than lead-acid, lithium iron phosphate batteries have approximately 2 to 2.5X the runtime, 50% the weight, and 10X the life. Although battery performance degrades as the temperature increases, these batteries can operate in much higher temperatures than lead-acid. Lithium iron phosphate batteries do not outgas H^2.

Battery Drawer Alarm: The system reports if the battery drawer is removed or ajar.

Battery Minimum Run Time: Under specified operating conditions the battery array will support a given output power level for a specified minimum amount of time.

Battery Safety Disconnect Switch: Disconnects power to the battery cables to prevent arcing when the cables are removed.

Battery String: Batteries connected in series.

Battle Short: If the unit is in battle short mode, it will ignore alarms that would normally initiate shutdown. The unit will continue to operate until the hardware fails. Battle short functionality is important for systems that need to provide continuous protection in critical situations, where overall system survival trumps the conservation of individual components.

Briefcase UPS: A lightweight, easily portable UPS designed for power protection and backup. The case is resistant to water, weather, shock, and vibration.

Blackout Protection: When input line voltage drops to zero. Here, the system will transfer to battery power. The unit responds the same to a blackout as it will to severe brownouts that breach input voltage tolerance ratings.

Brownout Protection: In many cases input line voltages are not consistent. Voltage will dip below and rise above designated ratings. IntelliPower systems will operate utilizing line power so long as it remains within input tolerances. The breadth of these tolerances depends on the configuration of the unit. Depending on system specifications, IntelliPower supports wide range/ global input ranges as well as discrete and standard tolerances. If input voltages breach tolerance levels the system will transfer to battery power and continue to output power until battery run time expires.

Bulkhead Mount: An enclosure designed for mounting on a vertical surface in the hull of a maritime vessel. See also wall mount.

Bypass: If the system has the bypass feature configured, it may transfer the load over to a direct line from the input if certain conditions are met. The unit may enter three different bypass modes – manual, momentary, and permanent.

Manual Bypass: The user can force the unit into manual bypass by pressing F1 and F2 simultaneously. To return press F1 and F2 again simultaneously.

Momentary/ Dynamic Bypass: The inverter is temporarily overloaded; thus, the system will transfer the load to the bypass circuit momentarily.

Permanent Bypass: The inverter encounters a sustained overload; thus, the system will transfer the load to the bypass circuit until further operator action is taken.

External Bypass Switch: For units with an external bypass switch, the unit must be put into manual bypass locally before engaging the external switch.

Cabinet: Large external batteries and system components are all mounted together inside one enclosure. This enclosure will typically have lifting eyes or skids. Circuit Breaker – Input Power Switch: Provides protection against faults, functions as an ON/OFF switch for the input power, and as a total system shutdown switch. The input switch or circuit breaker controls the input of electrical power to the unit. If this switch is accidentally turned off when the inverter is operating, the unit will act as if there has been a power outage.

The front panel Input Power Switch or Circuit Breaker should only be turned off when the unit is unplugged or is not going to be used for an extended period.

Circuit Breaker – Output Push to Reset: In the event of a fault on the output, this breaker will isolate the circuit. Upon a fault event, a small pin is partially released from the breaker casing. Correct the output fault. To reconnect – or reset – the circuit, push the pin back in to the breaker casing.

Circular Mil Connector(s): Plug and receptacle configurations built to military detail specifications (MIL-DTL) such as MIL-DTL-5015. Use a Circular Mil nomenclature table for referencing more information on connector types.

Cold Start: Allows the user to start the unit without AC input power present. Upon pushing the cold start button, the unit will begin to support a load on batteries until battery run time expires without the normal start up procedure, so long as the batteries are sufficiently charged. In older models, cold start may be turned off by pressing 'OFF' (F2 and F3 together) twice. In newer models pressing 'OFF' (F2 and F3 together) once is sufficient.

Cold Start – Remote: This function allows the user to start the unit without AC input power present from a remote source. Upon pushing the cold start button, the unit will begin to support a load on batteries until battery run time expires without the normal start up procedure, so long as the batteries are sufficiently charged. The unit may be turned off again via the remote-control source.

Common Industrial Protocol (CIP): IntelliPower systems support common industrial protocol for industrial process automation, alarm monitoring systems and control applications. Use common industrial protocol to interface multiple IntelliPower systems with supported PLC, operator stations, and other industrial network devices. CIP is a trademark of the Open DeviceNet Vendors Association (ODVA).

Conformal Coating: Material that is applied to printed circuit board assemblies (PCBAs) to protect against moisture, dust, chemicals, and extreme temperatures.

D-subminiature Connector(s) – DE-9, DA-15, DB-25: DE-9 connectors are typically utilized for RS-232 serial communications interface and dry contacts; other configurations such as DA-15 and DB-25 which may support serial communications or dry contacts are found on some models.

Discrete Contacts: A set of metal contacts that communicate a single command or indication to an electrical component. If the contact is normally open, closing it will signal a device to perform a function such as turning on an output or signaling an alarm.

Dry Contacts: See discrete contacts.

Emergency Power Off (EPO): Upon operating this control, the unit will turn OFF the output and commence shutdown. This feature is incorporated remotely or through a control component mounted on the unit front or rear panel.

EMI Filter: Reduces conducted and radiated electromagnetic interference (EMI).

Ethernet/IP: See Common Industrial Protocol. Ethernet/IP is a trademark of the Open DeviceNet Vendors Association (ODVA).

External Battery Charger (EBC): External enclosure that houses a large battery charger. These modules are typically utilized for fast charging of large battery banks.

External Battery Module (EBM): External enclosure containing a battery array. These modules are used to increase system runtime.

External Battery Pack (EBP): External enclosure containing a battery array. These modules are used to increase system runtime.

Fans: Fans are essential in maintaining appropriate internal temperatures. Care must be taken in ensuring that fans are not obstructed. Loose objects (paper, etc.) must not be placed near fan intakes.

Fan Filters – Dust: Protects internal equipment from most dry airborne particles. Pore density is given in pores per inch (PPI). Higher PPI protects against finer particles but requires greater pressure to push or pull air through the media.

Fan Filters – EMI: Where electromagnetic interference (EMI) standards must be met, EMI fan filters reduce electromagnetic radiation emanating from electrical components within a unit enclosure.

Fixed Batteries: Batteries are housed within the UPS enclosure. Unlike hot swap batteries, fixed batteries are not accessible without completely shutting down the UPS. Opening the enclosure will void the warranty.

Galvanic Isolation: The input circuitry is physically disconnected or 'isolated' from the unit's internal circuitry and the output load. Isolation prevents unwanted current flow and reduces common mode noise.

Ground Stud: Exposed metal parts are connected to ground to prevent user contact with dangerous voltage in the event of a fault. This hardware is for grounding of conductive unit enclosures.

Hot Swap Battery Drawer: To inspect or replace system batteries, this drawer may be removed while the unit is operating and supporting a load. If the battery drawer is removed, the system cannot provide battery power in the event of blackouts, overloads, etc. Do not use batteries that are not authorized by IntelliPower. It is not recommended to shut down the unit without the drawer completely inserted and fastened.

Humidity: Given that there is no condensation, the system will operate within specifications in environmental conditions measured at the given relative humidity range.

IEC Connector(s): Plug and receptacle configurations built to standards set by the International Electrotechnical Commission (IEC). For example, an IEC 60320 C13 connector, commonly referred to as IEC-320 C13, is a grounded receptacle rated for 10 Amps. Use an IEC nomenclature table for referencing more information on connector types.

Input Power Fuse: Legacy systems: protects the unit from extremely high current conditions or short circuits.

Input Frequency and Tolerance: Oscillations in electric charge flow of alternating current (AC) are measured in Hz. Units tolerate a range of input frequency in Hz based upon unit specifications.

Input Voltage AC and Tolerance: The unit will operate without batteries while input alternating current (AC) remains within this range. In many cases input line voltages are not constant. Voltage will dip below and rise above designated ratings. IntelliPower systems will operate utilizing line power so long as it remains within input tolerances. The breadth of these tolerances depends on the configuration of the unit. IntelliPower supports wide range/ global input ranges depending on the unit specifications.

Input Voltage DC and Tolerance: The unit will operate without batteries while input direct current (DC) remains within this range. In many cases input line voltages are not constant. Voltage will dip below and rise above designated ratings. IntelliPower systems will operate utilizing line power so long as it remains within input tolerances. The breadth of these tolerances depends on specifications of the unit.

Load Shedding: Individual loads are disconnected when their draw increases and creates a total load amount which requires greater current than the unit power rating.

Local Panel: Displays output load, battery capacity, and some status indications such as ON or OFF, Bypass, Fault, and Service Battery. Control functionality includes program settings, output inverter ON or OFF, alarm Silence, Manual Bypass, and more.

Management Information Base (MIB): The MIB is an ASCII text file which describes SNMP network elements as a list of data objects. It is used to translate the OID numbers to a human readable format where a programmer can modify or verify protocol functionality.

Manual Start: If manual start is enabled, the unit will not turn ON the output from the inverter automatically after the input breaker is switched ON and the system powers up. The inverter output can be turned ON by pressing F1 ON. See also Auto Start.

NEMA Connector(s): Plug and receptacle configurations built to standards set by the National Electrical Manufacturers Association (NEMA). For example, a NEMA 5-15P is a grounded plug rated for 125VAC and 15 Amps. Use a NEMA nomenclature table for referencing more information on connector types.

Object Identifier (OID): Each data object called out in the MIB is represented by a string of numbers called an OID. Each digit in the OID string represents a junction point in a network path to find information on a SNMP network node.

On-Line Double Conversion: Provides superior output power quality when compared to other approaches such as Off-Line or Line Interactive. Input voltage is converted to DC at a rectifier. Output voltage is converted back to AC at an inverter. Batteries support a DC bus before the inverter. The load sees a clean, sine wave signal with input sags, surges, and noise reduced to tolerable levels on the unit output. Because the battery is connected directly with the rectifier and inverter, no switching is necessary in the event of a blackout. Supported equipment is assured superior protection from line power hazards. Battery life is greatly extended when compared to conventional approaches.

Output Circuit Breaker – Push to Reset: Will respond during a sustained overload or unit fault and interrupt the power to the output receptacles. In the event of an overload, a plastic pin will partially pop out of the breaker housing. Correct any overload. To reset the breaker, push the plastic pin back in.

Output Neutral Bonding Switch: In one position the switch will bond the output neutral to ground for land-based applications or land-based lab testing. The other position switches the output to an un-bonded configuration for shipboard based applications. This switch can be locked in either position.

Output Voltage AC and Tolerance: The unit will output this range of alternating current (AC) voltage in normal operating conditions.

Output Voltage DC and Tolerance: The unit will output this range of direct current (DC) voltage in normal operating conditions.

Output Frequency Follower: The unit will output the frequency encountered at the input given that it is within a specified tolerance.

Output Frequency Changer: The unit will output a specified frequency within a specified tolerance.

Overtemp: If the ambient temperature within the unit enclosure increases past a set threshold, the unit will shut down to protect itself from the possibility of damage.

Pole or Pad Mounted: An enclosure designed for mounting outdoors on a concrete pad or elevated on a pole in an external enclosure such as a NEMA 3R cabinet.

Power Conditioner: Depending on the configuration, can provide protection against sags, surges, spikes, voltage transients, frequency transients, harmonics, etc. Does not protect against blackouts and sustained overvoltages or brownouts above or below unit rated input tolerances.

Power Converter: Depending on unit configuration, will change input to output characteristics such as frequency, voltage, and current such as AC to DC.

Power Distribution Unit (PDU): Modules used to increase the quantity of output receptacles.

Power Factor Correction (PFC): The power factor is the ratio of real power to apparent power. A higher factor equates to more efficient energy transmission. When the power factor is 1, all energy supplied by the source is consumed by the load. Loads where current leads voltage are capacitive or leading. Loads where voltage leads current are inductive or lagging. Power factor correction mimics a resistive load, increasing the power factor. Units providing PFC corrects input current harmonics. Input current sine waves are matched to input voltage sine waves thus increasing the power factor. For example, MIL-STD 1399 300B requires shipboard electric power systems are designed to operate with a power factor of 0.8 lagging to 0.95 leading for Type I 60 Hz power systems. Maximum total harmonic distortion (THD) cannot be greater than 5% and maximum single harmonic distortion cannot be greater than 3% aside from the first harmonic.

Power Inverter: Changes direct current (DC) to alternating current (AC).

Power Rating: Specifies the amount of load the system is designed to accommodate.

Rack Ears: Mounting brackets that connect the front, rear, or both sides of the unit to the rack.

Rack Mount: An enclosure designed for mounting on an electronics rack within a cabinet.

Rack Unit: A fundamental unit of height regarding rack mountable equipment. 1U is equal to 1.75”.

Remote Power Management and Communications Protocol: Power management, alarm monitoring, automation, and control of multiple IntelliPower Inc. devices are available through IntelliPower communications. Supported protocols include SNMPv1, SNMPv2, SNMPv3, RS-232 and common industrial protocol (CIP) – Ethernet/IP. Dry Contact configurations are also available. CIP and Ethernet/IP are trademarks of the Open DeviceNet Vendors Association (ODVA). The following bullet list briefly summarizes the alarm reporting, status monitoring and control functionality supported. More options and functionality are available and listed in included and purchasable management software manuals.

•Input and Output Volts	•Battery Status	•Over-Temperature Alarm	•Estimated Time Remaining
•Input and Output Frequency	•Battery Current	•Input Fail Alarm	•Output OFF and ON
•Input and Output Status	•Battery Volts	•Output Fail Alarm	•Shutdown after Delay
•Unit Temperature	•Battery Capacity	•Over Load Alarm	•Startup after Delay
•Event History	•Battery Runtime	•Battery Fail Alarm	•System Configuration

RS-232: A serial communications protocol, RS-232 stands for recommended standard 232. IntelliPower units typically interface RS-232 signals through a DE-9 D-subminiature connector. The protocol enables users several monitoring and control features and functions. System status such as load, input voltage, and temperature may be reported to remote managing computers. Managing software can periodically query unit conditions to build logs, reports, and charts. Managing software can initiate safe operating system shutdown in the event of a power failure or other event. Remote operators can shut down and restart unit inverter output.

Safe Shutdown: IntelliPower provides solutions that support the safe shutdown of computers available on a network based upon selectable events such as input power failure or based upon a schedule.

Safe Shutdown and Virtualization: IntelliPower provides solutions that support the safe shutdown of virtual machines and hosts on platforms such as VMWare ESX, VMWare ESXi, and Microsoft HyperV. ESX and ESXi are trademarks of VMWare. HyperV is a trademark of Microsoft.

Sleep Mode: The system will shut down given that it is on battery and has no load for a set period. This prevents unnecessary discharging of the batteries.

SNMP: An Ethernet network protocol that makes each connected unit available on a wide area or local area network as a network node. SNMP stands for simple network management protocol. IntelliPower units interface SNMP data through an 8P8C, RJ-45 Ethernet port mounted on the SNMP Agent Module. The protocol enables users several monitoring and control features and functions. System status such as load, input voltage, and temperature may be reported to remote managing computers. Managing software can periodically query

unit conditions to build logs, reports, and charts. Managing software can initiate safe operating system shutdown in the event of a power failure or other event. Remote operators can shut down and restart unit inverter output.

SNMP Agent Module: Hardware that facilitates translation of the unit's RS-232 protocol to SNMP for availability on an SNMP compatible network and facilitates the translation of management device queries to the node. The interface panel of the module contains six indicating LEDs and one Ethernet port for 8P8C, RJ-45 modular connectors. Under normal operating conditions, the network LED will flash, the power LED will be ON, and the hourglass LED will be ON. Depending on network speed, the 100M or the 10M LED will flash.

SNMP 2: CPU is an ARM 50MHz 32Bit. Flash memory is 1 MB. Network speed is 10M/100M UTP. Supported internet protocols are TCP/IP, HTTP, SMTP, DHCP, Telnet, BOOTP, DNS, DDNS, PPPoE and IPv4. Supported MIB are RFC1628. SNMP 1 and SNMP 2 are supported. Hardware for this version is labeled DP527.

SNMP 3: CPU is an ARM9 180MHz 32Bit. Flash memory is 8 MB. Network speed is 10M/100M UTP. Supported internet protocols are TCP/IP, HTTP, SMTP, DHCP, Telnet, BOOTP, DNS, DDNS, PPPoE, IPv4, IPv6, HTTPS RADIUS, SSL, SSH, and SNTP. Supported MIB are RFC1628. SNMP 1, SNMP 2, SNMP 3, and PPC are supported. Information security cryptographic hash functions MD5 and SHA are supported. DES and AES encryption is supported. Web user interface is updated with additional functionality. Hardware for this version is labeled DX527.

Temperature: The system will operate as specified given that the ambient temperature is within the specified range.

Temperature Compensated Battery Charging: Protects and extends battery life. In high temperature environments, the charging current is limited to inhibit thermal runaway. In low temperature environments the charging current is increased to maintain performance.

Terminal(s) – terminal block, spring terminal, screw terminal: Connector types that enable inputs, outputs, communication wires, and power distribution to be hard wired directly to the unit. Each wire must be attached to the specific terminal on the block for which it is designated.

Three Phase Power: Line cables in this configuration incorporate 3 hot wires in order to generate, transmit, and distribute power to large loads more efficiently. Each wire carries an alternating current at a phase 120 degrees from each other. Therefore, the voltage on any conductor reaches its peak at 1/3 of a cycle.

Transit Case: A deployable weather, vibration, and shock resistant container which contains a rack for mounting electrical equipment such as a UPSs, EBMs, computers or other.

Uninterruptible Power Supply (UPS): An electrical device that protects equipment from variable input line power conditions whether they are derived from the grid, solar, generators, or other. These conditions include blackouts, brownouts, sags, surges, noise, voltage transients, frequency transients, spikes, and more. There are many approaches to power protection. All IntelliPower UPS are On-Line Double Conversion; proven to be best method for producing the highest quality output from the most variable input.

Vertical Mount. An enclosure designed for mounting on a horizontal surface.

Wall Mount. An enclosure designed for mounting on a vertical surface. See also bulkhead mount.

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