an EnerSys® company

FMPS FTTP

Multipurpose Power Supply

Installation & Operation Manual: 010-592-B2

Effective: 09/2020

SAFETY NOTES

SAVE THESE INSTRUCTIONS

Review the drawings and illustrations contained in this manual before proceeding. If there are any questions regarding the safe installation or operation of the system, contact Alpha Technologies or your nearest Alpha representative. Save this document for future reference.

To reduce the risk of injury or death, and to ensure the continued safe operation of this product, the following notations/symbols have been placed throughout this manual. Where these notations/symbols appear, use extra care and attention.

ATTENTION:
The use of ATTENTION indicates specific regulatory/code requirements that may affect the placement of equipment and installation procedures.

NOTE: *A* **NOTE** *provides additional information to help complete a specific task or procedure.*

CAUTION!
The use of CAUTION indicates safety information intended to PREVENT DAMAGE to material or equipment.

WARNING!
A WARNING presents safety information to PREVENT INJURY OR DEATH to the technician or user.

General Safety Precautions

To avoid injury:

- Read and follow all installation, equipment grounding, usage, and service instructions included in this manual.
- Disconnect power before servicing.
- This enclosure and its associated hardware must be serviced only by authorized personnel.
- Enclosure must remain locked at all times, except when authorized service personnel are present.
- Remove all conductive jewelry or personal equipment prior to servicing equipment, parts, connectors, wiring, or batteries.
- Use proper lifting techniques whenever handling enclosure, equipment, parts, or batteries.
- Batteries contain dangerous voltages, currents and corrosive material. Battery installation, maintenance, service and replacement must be performed by authorized personnel only.
- Never use uninsulated tools or other conductive materials when installing, maintaining, servicing or replacing batteries.
- Use special caution when connecting or adjusting battery cabling. An improperly connected battery cable or an unconnected battery cable can result in arcing, a fire, or possible explosion.
- A battery that shows signs of cracking, leaking or swelling must be replaced immediately by authorized personnel using a battery of identical type and rating.
- Avoid any contact with gelled or liquid emissions from a valve-regulated lead-acid (VRLA) battery. Emissions contain dilute sulfuric acid which is harmful to the skin and eyes. Emissions are electrolytic, which are electrically conductive and are corrosive. Follow the Chemical Hazards notes if contact occurs.
- Do not smoke or introduce sparks in the vicinity of a battery.
- Under certain overcharging conditions, lead-acid batteries can vent a mixture of hydrogen gas that is explosive. Proper venting of the enclosure is required.
- Follow the battery manufacturer's approved transportation and storage instructions.

CAUTION!

Enclosure, equipment, or parts may be damaged (or cause damage) if installed or used improperly.

To avoid damage:

- Prior to installation, verify that the AC input voltage to the enclosure and its equipment match with respect to voltage and frequency.
- Prior to installation, verify that the output voltage from the enclosure or its equipment match the voltage requirements of the connected equipment (load).
- Prior to installation, verify that the enclosure's utility service panel is equipped with a properly rated circuit breaker for use with the equipment inside. Refer to manufacturer's recommendations.
- Review and upgrade utility service panel circuit breaker requirements whenever the equipment within the enclosure is changed.
- Prior to installation, contact local utilities, local building maintenance departments, and cable/piping locator services to ensure that installation does not interfere with existing utility or building cables/piping.
- Do not exceed the output rating of equipment. Verify load requirements prior and during connection process.
- Prior to handling the batteries, touch a grounded metal object to dissipate any static charge that may have developed in your body.
- For continued protection against risk of fire, replace only with same type and rating of fuse.

Battery Safety Notes

WARNING!
Lead-acid batteries contain dangerous voltages, currents and corrosive material. Battery installation, maintenance, service and replacement must be performed only by authorized personnel.

Chemical Hazards

Any gelled or liquid emissions from a valve-regulated lead-acid (VRLA) battery contain dilute sulfuric acid, which is harmful to the skin and eyes. Emissions are electrolytic, and are electrically conductive and corrosive.

To avoid injury:

- Servicing and connection of batteries shall be performed by, or under the direct supervision of, personnel knowledgeable of batteries and the required safety precautions.
- Always wear eye protection, rubber gloves, and a protective vest when working near batteries. Remove all metallic objects from hands and neck.
- Batteries produce explosive gases. Keep all open flames and sparks away from batteries.
- Use tools with insulated handles; do not rest any tools on top of batteries.
- Batteries contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Battery post terminals and related accessories contain lead and lead compounds. Wash hands after handling (California Proposition 65).
- Wear protective clothing (insulated gloves, eye protection, etc.) whenever installing, maintaining, servicing, or replacing batteries.
- If any battery emission contacts the skin, wash immediately and thoroughly with water. Follow your company's approved chemical exposure procedures.
- Neutralize any spilled battery emission with the special solution contained in an approved spill kit or with a solution of 2.2 kg (one pound) bicarbonate of soda to 3.8 liters (one gallon) of water. Report chemical spill using your company's spill reporting structure and seek medical attention if necessary.
- Never use uninsulated tools or other conductive materials when installing, maintaining, servicing or replacing batteries.
- Use special caution when connecting or adjusting battery cabling. An improperly connected battery cable or an unconnected battery cable can make contact with an unintended surface that can result in arcing, fire, or possible explosion.
- A battery showing signs of cracking, leaking, or swelling should be replaced immediately by authorized personnel using a battery of identical type and rating.

Battery Maintenance Guidelines

The battery maintenance instructions listed below are for reference only. Battery manufacturer's instructions for transportation, installation, storage or maintenance take precedence over these instructions.

- To prevent damage, inspect batteries every three months for:

  Signs of battery cracking, leaking or swelling. The battery should be replaced immediately by authorized personnel using a battery of the identical type and rating.

  Signs of battery cable damage. Battery cable should be replaced immediately by authorized personnel using replacement parts specified by vendor.

  Loose battery connection hardware. Refer to battery manufacturer's documentation for the correct torque and connection hardware for the application.
- Apply battery manufacturer's specified antioxidant compound on all exposed connections.
- Verify battery terminals or exposed connection hardware is not within close proximity of a conductive surface. Reposition batteries as necessary to maintain adequate clearance.
- Clean up any electrolyte (battery emission) in accordance with all federal, provincial (or state), and local regulations or codes.
- Proper venting of the enclosure is recommended. Follow the battery manufacturer's approved transportation and storage instructions.
- Always replace batteries with those of an identical type and rating. Never install old or untested batteries.
- Do not charge batteries in a sealed container. Each individual battery should have at least 12.7mm (0.5") of space between it and all surrounding surfaces to allow for convection cooling.
- All battery compartments must have adequate ventilation to prevent an accumulation of potentially dangerous gas.

Recycling and Disposal Instructions

Spent or damaged batteries are considered environmentally unsafe. Always recycle used batteries or dispose of the batteries in accordance with all federal, provincial (or state) and local regulations.

Electrical Safety

- Lethal voltages are present within the power system. Never assume that an electrical connection or conductor is not energized. Check the circuit with a voltmeter with respect to the grounded portion of the enclosure (both AC and DC) prior to any installation or removal procedure.
- Always use the buddy system when working under hazardous conditions.
- A licensed electrician is required to install permanently wired equipment.
- Ensure no liquids or wet clothes contact internal components.
- Hazardous electrically live parts inside this unit are energized from batteries even when the AC input power is disconnected.
- For cord connected model, the plug is the disconnect device. A socket outlet shall be installed near the equipment. For hardwired model, a breaker shall be used for a disconnect device. For IEC line cord option, the inlet on the cord is the disconnect device for such systems.

CAUTION!

DOUBLE POLE/NEUTRAL FUSING:

For continued protection against risk of fire, replace only with the same type and rating of fuse.

Grounding Connection Notes

In order to provide a ready, reliable source of backup power it is necessary to establish a grounding system that not only provides for the safety of the service personnel responsible for its operation and maintenance, but also facilitates the proper operation and protection of the equipment within the network. Such a grounding system will provide protection with respect to operator safety, system communication, and equipment protection.

Safety Ground

The safety ground is a two-part system. The first part is a return path for stray current back to the input breaker, and the second is a return path from the enclosure to a second ground rod.

Typically, the safety, or utility ground, provides a return path to the input breaker or fuse panel by means of a connection to an appropriate driven ground rod at the base of the power pole. This path must meet National Electrical Code (NEC) as well as local codes to ensure the breaker will open, preventing unwanted current flow from posing a hazard to service personnel.

Strike (Lightning) Ground

Lightning strikes, grid switching, or other aberrations on the power line all have the potential to cause “fast rise-time currents” which can cause damage to the powering system. Without a low-impedance path to ground, the current, while travelling through wires of varying impedance, can produce high voltages that will damage the powering equipment. The most viable method available to protect the system from damage is to divert these unwanted “fast rise-time currents” along a low-impedance path to ground. A low-impedance path to ground will prevent these currents from reaching high voltage levels and posing a threat to equipment. The single-point grounding system provides a low-impedance path to ground, and the key to its success is the proper bonding of the ground rods, so the components of the grounding system appear as a single point of uniform impedance.

NOTE: *Alpha shall not be held liable for any damage or injury involving its enclosures, power supplies, generators, batteries, or other hardware if used or operated in any manner or subject to any condition not consistent with its intended purpose, or is installed or operated in an unapproved manner, or improperly maintained.*

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FIGURE **PAGE**

1 Introduction

1.1 Scope of the Manual

This instruction manual explains the features, installation, startup and maintenance of the FMPS FTTP Multipurpose Power Supply.

NOTE: *Images contained in this document are for illustrative purposes only and may not exactly match your installation.*

1.2 Product Overview

The FMPS, model number FMPS-150W, is an intelligent microprocessor-controlled 48Vdc UPS system.

The input is powered by either a customer-owned 120 to 240Vac power outlet or a hardwired AC connection.

The system includes two parallel outputs with alarm connections.

The FMPS supports distances of up to 100-feet using unshielded cable between the FMPS and ONT, allowing the FMPS to be located close to existing power outlets.

Individually monitored 48Vdc strings of standard 7.2 AH maintenance free, sealed lead-acid batteries provide standby power.

Model FMPS-150CWK features a factory installed cold weather kit that includes a battery heater, and supports extended runtimes at –40°C.

LED indicators and audible alarm provide local status indication, and PacketCable-compliant telemetry connections to the ONT provide remote status reporting.

System includes:

- Local and remote status indicators
- Universal AC input
- Two DC outputs and alarm connections
- Microprocessor controlled battery management
- Low voltage battery disconnect
- LED status indicators for each battery string
- Indoor or outdoor installation
- Up to two FMPS units may be installed on a single dedicated 15A circuit

Figure 1–Front perspective view of FMPS-150W

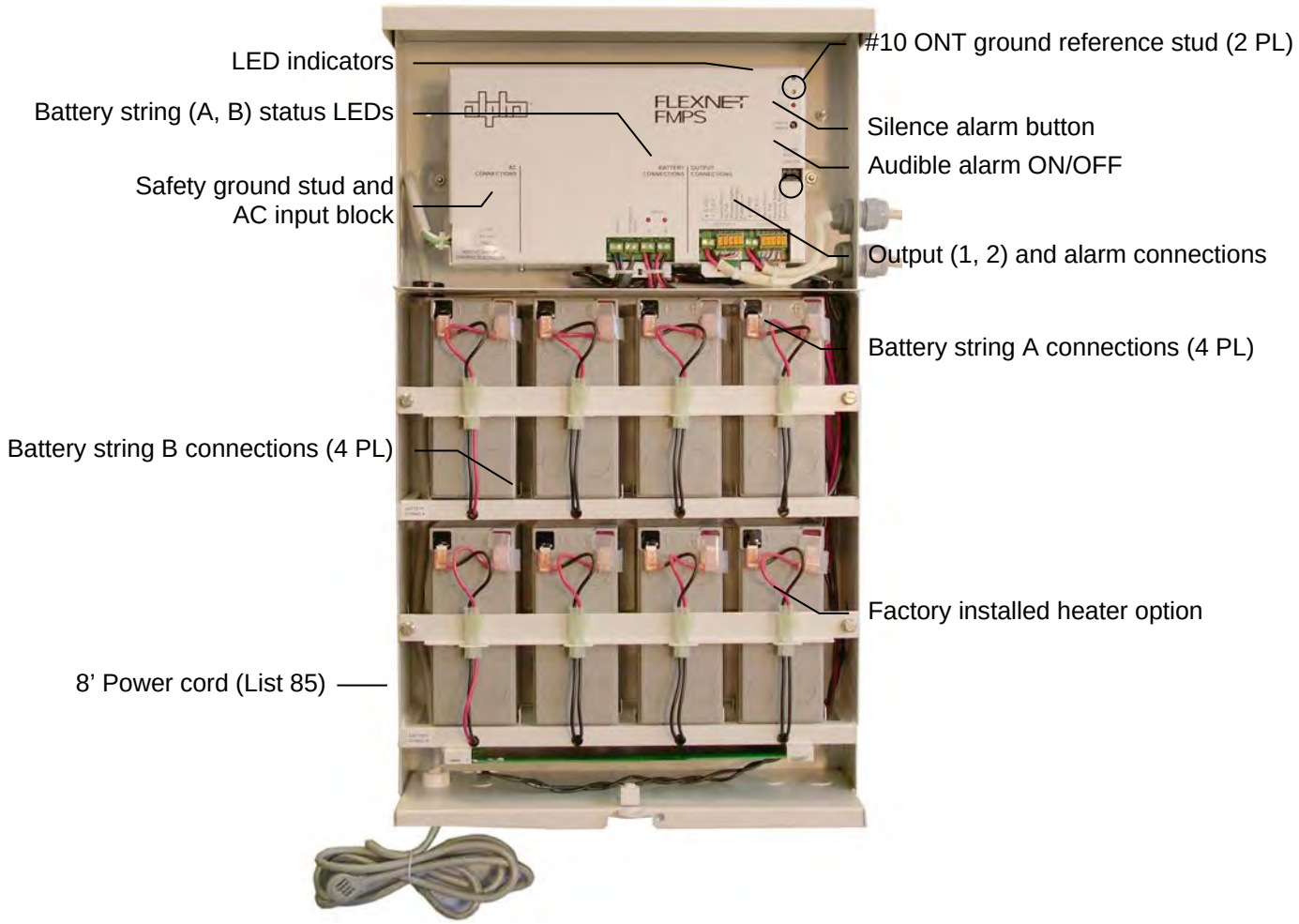


Figure 2–FMPS features overview with cover removed

2 Theory of Operation

2.1 Operating States

The FMPS has two operating states, Normal Operation and Battery Backup.

2.1.1 Normal Operation

The FMPS supplies power to the ONT, while being powered by the AC mains outlet. It may also be charging the batteries or performing a battery test. While in the Normal Operation state, the FMPS operates in one of three sub-modes and switches between these sub-modes as necessary. The sub-modes are:

2.1.1.1 Battery Standby

The Battery Standby mode is the normal mode of operation. The battery in the UPS is fully charged and in good condition.

2.1.1.2 Battery Charging

The Battery Charging mode is initiated by a drop in battery voltage, due either to battery self-discharge or powering the ONT(s) after an AC outage. In either case, the FMPS initiates battery charging. Temperature compensated charging is used to maintain battery capacity at the suitable voltage for the temperature range.

2.1.1.3 Battery Self-test

In order to determine when a battery needs replacement, a battery test program is initiated by the microprocessor. Battery testing occurs only when AC power is present. See Section 6.10 for a battery test overview.

From the Normal Operation state, the FMPS can switch to the Battery Backup state. This occurs without DC interruption when AC power fails.

2.1.2 Battery Backup

The FMPS supplies power to the ONT via the backup batteries. The FMPS backup batteries consist of one or two strings of 7.2 AH batteries. Each battery string consists of four batteries wired in series (Figure 10). Projected battery run times are listed in the Specifications (010-592-B1). While in the Battery Backup state, there are two sub-modes:

2.1.2.1 Battery Low

The FMPS sends a “Low Battery” alarm to the ONT(s) when either battery string has discharged to 46.8Vdc. The FMPS also sounds an audible alarm once a Low Battery condition has been detected (unless the alarm has been disabled).

2.1.2.2 Low Voltage Disconnect

If AC power is not restored after an extended time, and both battery strings have discharged to 42.0Vdc, the FMPS disconnects the batteries to protect them from over-discharge.

If the depleted batteries are removed from the FMPS, and other (charged) batteries are installed before restoration of AC power, the LVD circuit automatically resets and provides battery backup power to the ONT(s).

The FMPS switches from the Battery Backup state to the Normal Operation state on resumption of reliable AC power. The FMPS initiates the Battery Charging sub-mode until battery capacity is fully restored.

2.2 Exception States

While in Normal Operation or Battery Backup, there are three exception states that may occur.

2.2.1 Replace Battery

The FMPS enters the Replace Battery state when the charge control circuit determines the battery is not holding a charge, or is incapable of being charged. The Replace Battery alarm initiates when the battery capacity is less than 70% of the battery capacity stated by the battery manufacturer. The battery replacement criteria are based on the battery test results described in Section 6.10.

2.2.2 Battery Missing

The Battery Missing condition is a critical condition because the FMPS is unable to supply the expected amount of backup power should AC power fail. A Battery Missing alarm is sent to the ONT if one or more batteries are missing from the FMPS; i.e., there are less than eight batteries in the unit.

2.2.3 Over-current

Over-current is a serious condition that could damage the FMPS. The state becomes active if the FMPS detects the external load current draw exceeds the FMPS capacity; e.g., this condition could be caused by an inadvertent short across the power leads.

The FMPS automatically determines the proper operating state and resumes operation when the Battery Missing or Over-current conditions are removed. Replacing the battery (batteries) clears the Replace Battery alarm.

2.3 Status Signals

The status connections communicate FMPS status to the ONT(s). Status signals sent to the ONT are assertive high; i.e., when active, the signal line is disconnected from float with respect to the “Telemetry Return” pin. Status signals are open collector (open circuit = alarm, and low impedance = no alarm).

3 Transportation and Storage

3.1.1 Packaging

The enclosure and components are shipped on individual pallets and shrink wrapped. The pallet is approximately 0.15m H x 1.22m W x 1.52m D (6” H x 48” W x 60” D) and the overall height including pallet and enclosure is approximately 0.46m (18”). The enclosures and components cannot be stacked.

Batteries may or may not be installed; if they are not, they will be on a separate pallet and packaged per the manufacturers guidelines.

NOTE: *Packaging assemblies and methods are tested to International Safe Transit Association standards.*

3.1.2 Storage

The weight of the enclosure is listed in the specifications. The equipment pallet can be moved using a forklift.

Do not hoist/lift enclosure with batteries installed.

If the batteries are installed, the warehouse facility may have to be certified for handling such goods. Typically, the batteries will be on a separate pallet; the same requirements for certification will apply.

3.1.3 Site Considerations

It is assumed that the site will be ready for enclosure installation upon arrival.

The supporting structure must be designed to support a fully configured enclosure. In addition, the mounting site must be designed and installed in accordance with local building practices and codes.

Site considerations should include the following:

- Areas that may receive hot air exhaust from neighboring buildings or structures should be avoided.
- Any areas with architectural controls or environmental restrictions should be known.
- Areas prone to flooding should be avoided.
- A proper grounding system.

3.1.4 Inspection

Prior to unpacking the equipment, perform a visual inspection and note any damage. Unpack the equipment and inspect the exterior for damage. If any damage is observed contact the carrier immediately.

Continue the inspection for any internal damage. In the unlikely event of internal damage, please inform the carrier and contact Alpha Technologies for advice on the consequence of any damage.

Verify that you have all the necessary parts per your order for proper assembly.

Call Alpha Technologies if you have any questions before you proceed: 1 (888) 462-7487

4 Installation

The information in this section is intended as a guideline only; there may be site-specific requirements and other factors that will require individual attention, such as jurisdictional codes and construction covenants.

The FMPS can be installed by one technician during a single visit to the customer premises. The FMPS can be mounted on an internal or external customer premises wall, or it can be recessed into a newly framed wall during new construction.

Generous placement of 1/2" electrical metallic tubing (EMT) knockouts can accommodate flexible placement of ONT(s) and AC service. Watertight fittings are supplied for strain relief, and to seal the ONT(s) cable transition into the FMPS housing.

NOTE: *The FMPS is factory equipped with an eight-foot power cord and safety ground stud. Placement of the FMPS adjacent to a customer-owned AC outlet can minimize installation time.*

When mounting the FMPS on an external wall, route the AC power lines to the FMPS in conduit. The FMPS power cord is removable to allow installation of 1/2" EMT conduit to the FMPS using the same hole.

For “built-in” FMPS installations, a six-inch to eight-inch space below the FMPS should be provided. This will allow access to EMT conduit and output fittings, in the event the FMPS requires service or replacement. This opening should be free from drywall or other wall coverings.

ATTENTION:
The max/peak current draw for the FMPS power supply is 5.8A_{pk}. Based on max/peak inrush current, two FMPS units may be installed on a dedicated 15A, 120Vac circuit, and three FMPS units may be installed on a dedicated 20A, 120Vac circuit.

4.1 Enclosure Preparation

Remove the protective covering from the enclosure.

NOTE: *Inspect the packing slip to verify that all equipment is there.*

If batteries are on a separate pallet, they should not be installed until after the enclosure has been secured. If the batteries are going to be placed within the enclosure, the inter-unit connectors must be installed.

Inspect moving parts, hardware, connectors, and installed equipment.

NOTE: *In case of damage, report it according to procedure.*

Remove and properly dispose of all packaging.

4.2 Lifting Preparation

ATTENTION:

All local safety practices and guidelines must be followed while lifting the enclosure.

Do not lift enclosure with batteries installed.

All personnel involved with lifting and placing the enclosure should wear head and eye protection and gloves when required.

4.3 Removing the FMPS Cover

1. Remove the Phillips screw securing the cover.
2. Grasp the cover by the sides and lift up slightly (see Figure 3).
3. Swing the bottom of the cover out and away from the unit (see Figure 4).

Figure 3–Lifting the FMPS cover

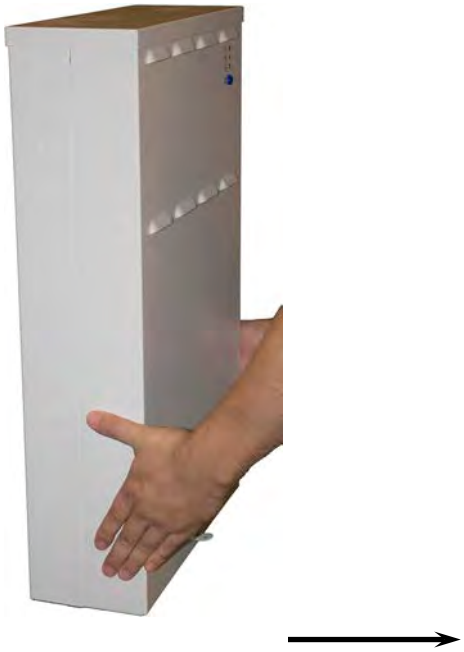


Figure 4–Sliding the FMPS cover out

4.4 Wall-mounting the FMPS

1. Select a suitable location for mounting the FMPS (within 8 feet of a power outlet if using the line cord: L85).
2. Install a 3/4" plywood backing plate measuring 18” wide by 36” long on stud centers using four customer-supplied 5/16” x 4” lag bolts. Use one customer-supplied 5/16” flat washer and one 5/16” spring lock washer per lag bolt.
3. Attach the FMPS to the backing plate using four customer-supplied 5/16” x 1” lag bolts, with one 5/16” flat washer and one 5/16” spring lock washer per lag bolt. See Figure 5.

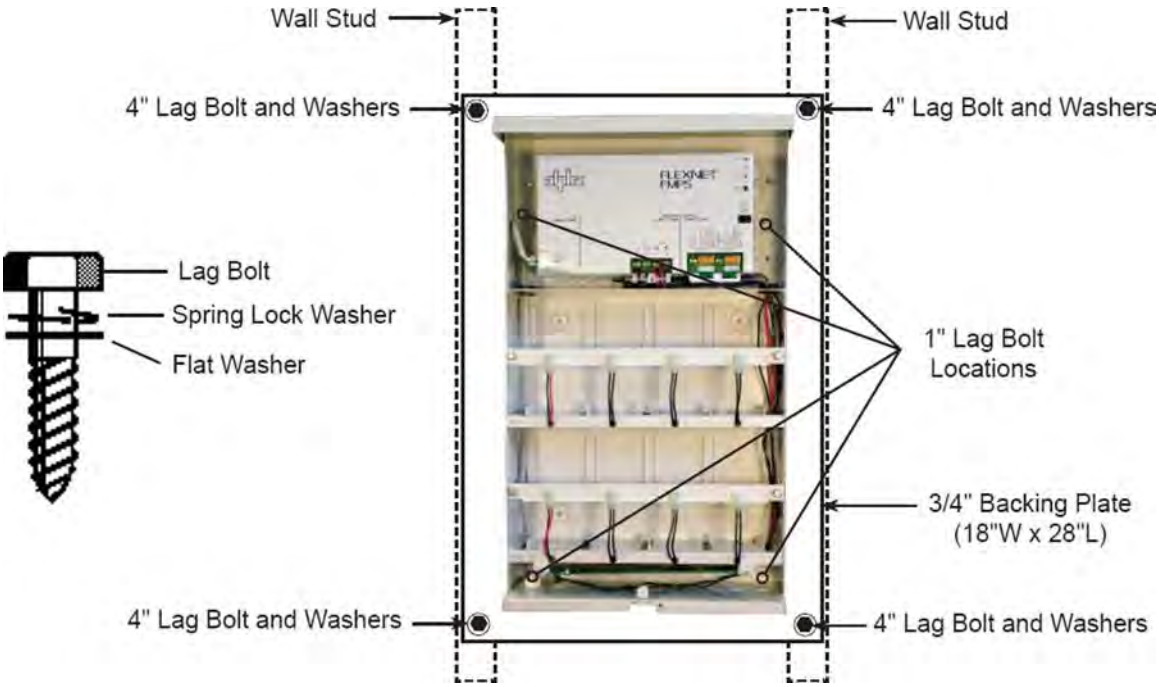


Figure 5–FMPS wall-mounting

4.5 Recessed/Stud-mounting the FMPS

1. Select a suitable location for mounting the FMPS.
2. After removing the cover, unscrew the battery retaining brackets.
3. Drill four 3/8” holes in the side of the enclosure using the pressed dimples in the side of the enclosure as a guide. See Figure 6. Clean any shavings from the enclosure.
4. Using a hammer and punch, knock out the DC wiring knockout on the bottom of the enclosure. See Figure 6.
5. Mount one side of the FMPS to a stud using two user-supplied 5/16” x 1” lag bolts.
6. Insert a 1/2" (typical) plywood spacer on the other side of the FMPS and secure it using two more 5/16” x 1” lag bolts.

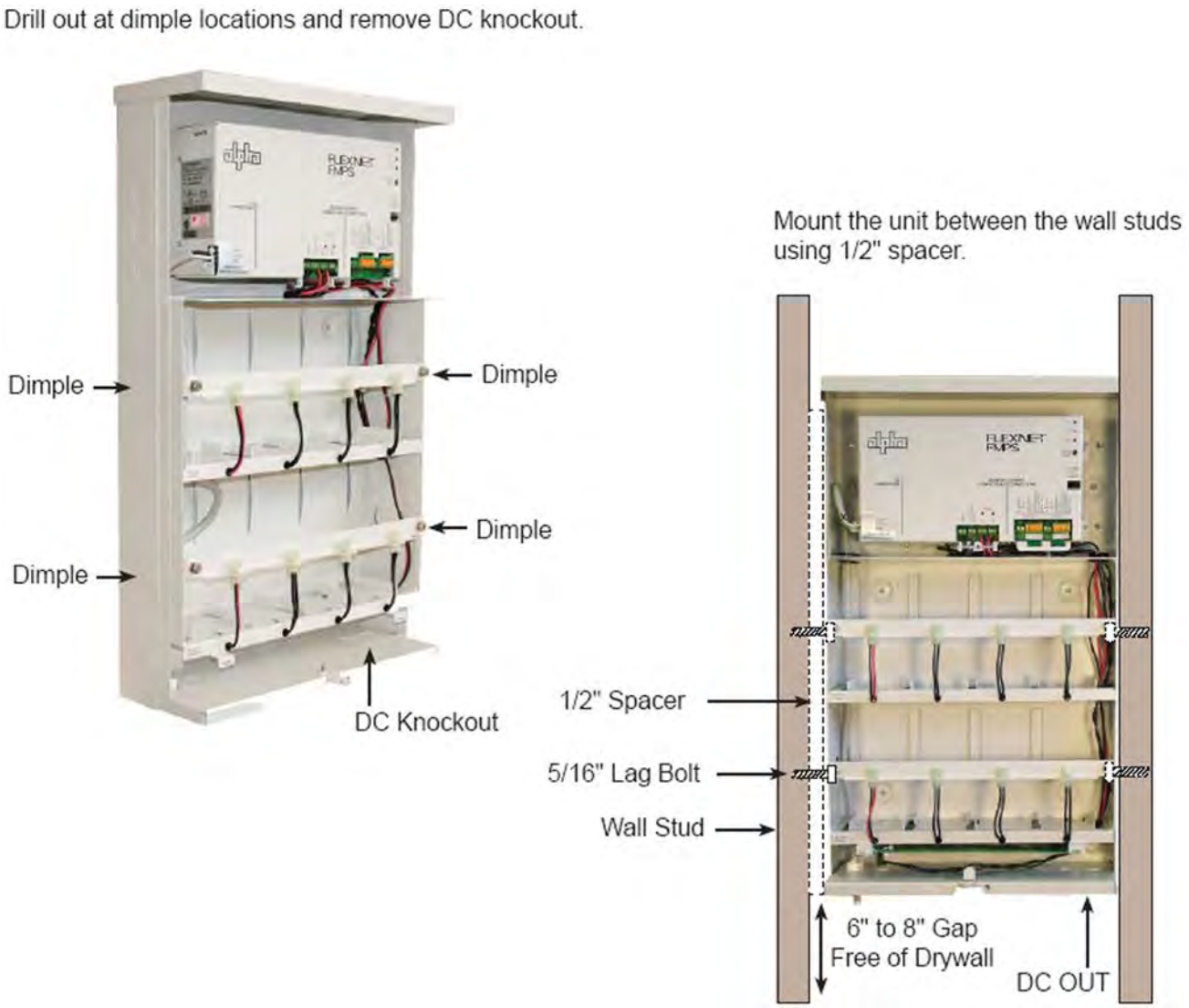


Figure 6–Stud-mounting the FMPS

4.6 Grounding Connection Notes

In order to provide a ready, reliable source of backup power it is necessary to establish a grounding system that not only provides for the safety of the service personnel responsible for its operation and maintenance, but also facilitates the proper operation and protection of the equipment within the network. Such a grounding system will provide protection with respect to operator safety, system communication, and equipment protection.

4.7 Safety Ground

The safety ground is a two-part system. The first part is a return path for stray current back to the input breaker, and the second is a return path from the enclosure to a second ground rod.

Typically, the safety, or utility ground, provides a return path to the input breaker or fuse panel by means of a connection to an appropriate driven ground rod at the base of the power pole. This path must meet National Electrical Code (NEC) as well as local codes to ensure the breaker will open, preventing unwanted current flow from posing a hazard to service personnel.

4.8 Strike (Lightning) Ground

Lightning strikes, grid switching, or other aberrations on the power line all have the potential to cause “fast rise-time currents” which can cause damage to the powering system. Without a low-impedance path to ground, the current, while travelling through wires of varying impedance, can produce high voltages that will damage the powering equipment. The most viable method available to protect the system from damage is to divert these unwanted “fast rise-time currents” along a low-impedance path to ground. A low-impedance path to ground will prevent these currents from reaching high voltage levels and posing a threat to equipment. The single-point grounding system provides a low-impedance path to ground, and the key to its success is the proper bonding of the ground rods, so the components of the grounding system appear as a single point of uniform impedance.

4.9 AC Wiring, Optional Power Cords

1. The FMPS may be supplied with an optional power cord, up to eight feet in length, equipped with a 5-15P-type plug (as shown in Figure 2 or List 85 below).
2. If hardwiring the FMPS, discard the AC line cord by removing it from the AC input terminal block.
3. The inlet on the line cord shown here (Figure 7, List 84) is the disconnect device for systems provided with this option:

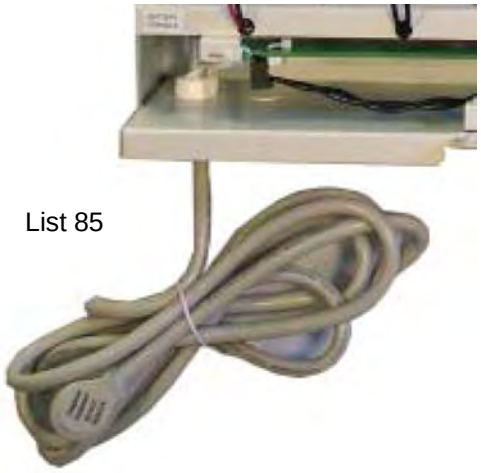


Figure 7–Power cord options

NOTE: *For use with external line cords compatible with IEC 60320 type female connections. Verify local electrical codes and installation requirements before connection.*

4. The FMPS must be permanently connected, or provided with a IEC 60309 compliant power cord set, when installed in the following countries: Austria, Belgium, Denmark, Finland, Germany, Norway, Sweden, UK.

4.10 AC Wiring, Permanent Connection

1. Run the AC wiring through the 1/2" EMT along the same path as the original AC line cord.
2. Connect the AC wiring as follows:
   - Black wire = Line
   - White wire = Neutral
3. Connect the ground wire (min. #14 AWG) to the safety ground stud on the chassis, and then to the AC input block. The stud uses a 7mm nut.
4. Secure the EMT connector.

CAUTION!

Do not apply power at this time. Connection to the building utility may only be performed by a licensed electrician in accordance with the NEC and all applicable local codes and regulations.

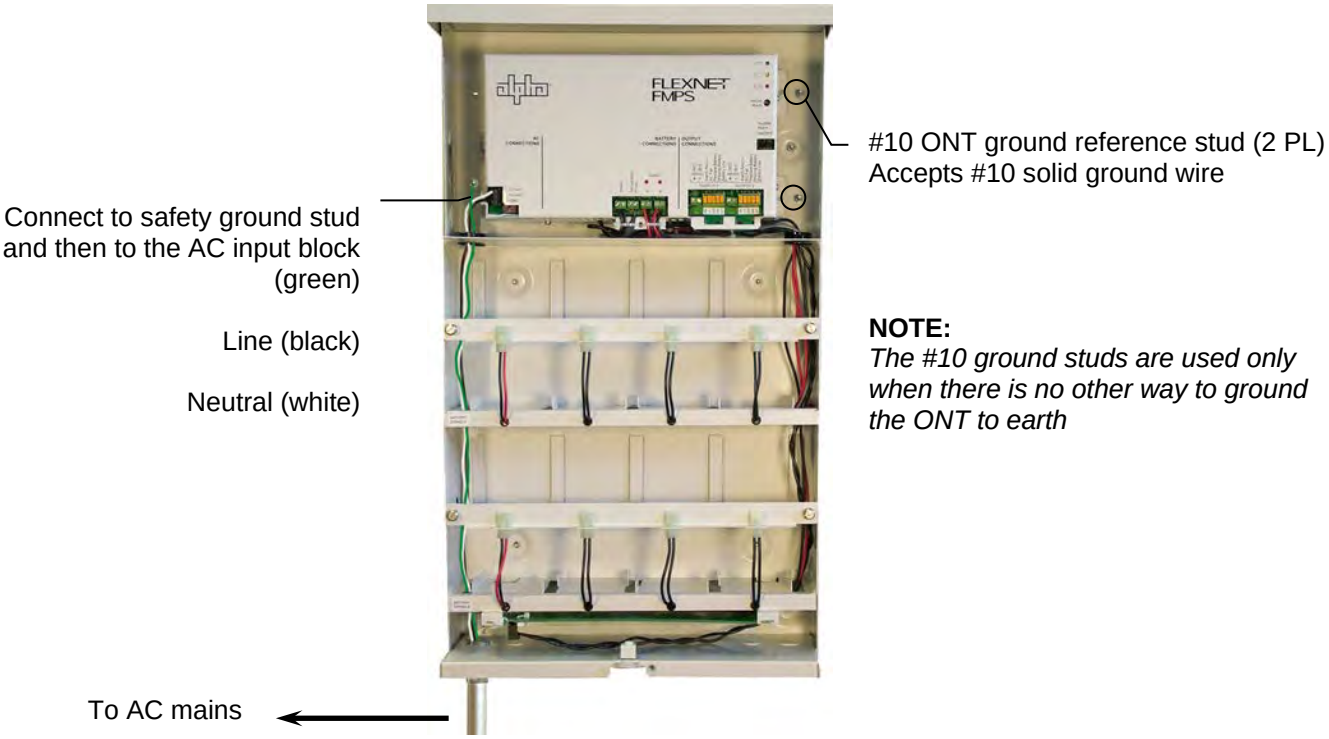


Figure 8–AC mains connection

4.11 DC Output And Alarm Wiring

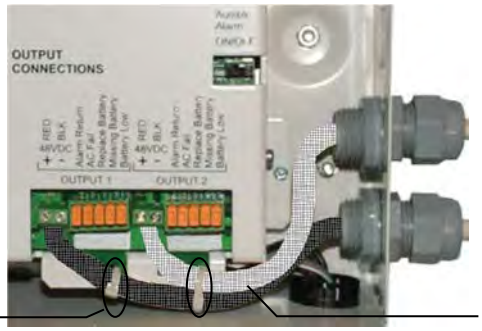
Recommended wire size:

- DC output: 2 x #16 AWG
- Alarm wiring: 5 x #24 AWG
- Ground: #16 AWG

1. If wall-mounting the FMPS, select a knockout to the right of the DC output block and remove it using a hammer and punch.
2. Insert the terminal end of the customer-supplied DC and alarm wiring through the sealing nut of the Heyco fitting (provided), and through the selected knockout.
3. Connect the ground wire to #10 ground stud, M4 thread (optional ground reference wire to ONT).
4. Run the #16 AWG DC wiring and #24 AWG alarm wiring through the threaded end of the Heyco fitting and mate the fitting halves. Tighten snug.

NOTE: *Recommended hybrid wire for use is Belden P/N YR53034 or equivalent.*

5. Create a drip loop (Figure 9) and use tie-wraps to secure the wiring.



Pin for pin the two outputs are common

FMPS output is floating with respect to ground

Either side of the output may be grounded

Tie-wraps (2 PL)

Drip loop

Figure 9–DC output connections

6. Connect the terminal end of the DC wiring to the DC output block as follows:
   - Red wire = positive (RED) (48Vdc with respect to Black –)
   - Black wire = negative return (BLACK)

NOTE: *Do not over-tighten the output connections. Excessive torque can break the connectors.*

7. Open (pull out) the alarm IDC connectors (small orange connectors) and insert the #24 AWG alarm wires into the connectors. Press the connectors shut to complete the connections. See inside cover for alarm wiring details.

NOTE: *The FMPS complies with PacketCable™ alarm monitoring standards. Alarm monitoring parameters are configured HI Active.*

5 Battery Installation

WARNING!

Follow battery manufacturer's safety recommendations when working around battery systems and review the safety instructions provided in this manual.

Batteries must be rated at the same capacity, and must be equal in age and quality.

5.1 Preparation/Mounting

The Enclosure must be mounted (Section 4) before installation of the bottom tray of batteries may be completed.

Batteries should be located in a temperature-controlled environment. The temperature should be regulated at approx. 25°C (77°F). Significantly lower temperatures reduce performance and higher temperatures decrease life expectancy.

Before assembly, clean cells (where applicable) as per the battery manufacturer's recommendations. First neutralize any acid with a baking soda and water solution. Then wipe the cells with clean water.

5.2 Installation of Batteries in Alpha Power Systems

CAUTION!

Verify that all battery breakers, DC circuit breakers, and fuses on the distribution panels are either in the OFF position or removed. For each of the following steps, verify that the rubber terminal caps / plastic covers are on and are completely covering the positive and negative terminal connections.

Note: *FMPS installed with two strings of Battery and if one is removed there is need of Field kit Part# 037-270-20 (2 to 1 "Y" battery bridging harness kit). For installation instructions refer to 075-212-10 document.*

Use a corrosion-inhibiting agent, such as NO-OX-ID "A"™, on all battery terminal connections.

1. Check the battery block voltage (typically >12.6V).
2. Remove the battery pigtails from their plastic bag and connect them to the battery terminals as shown below:

The pigtails are manufactured to prevent misconnection.

Figure 10–Connecting the battery pigtails

NOTE: *The FMPS can be initially equipped with one string of batteries. If a second string of batteries is added later, the FMPS software will qualify the new battery string and begin periodic testing.*

3. Verify polarity and voltage at connectors.
4. Loosen the battery retaining bracket thumbscrews and let the brackets fall clear of the battery shelves.

NOTE: *The FMPS passes GR63 flame testing using HB rated flame retardant 7.2AH batteries. Greater levels of fire resistance can be achieved using 94V0 rated batteries.*

5. Slide the battery blocks onto the battery trays starting at the bottom (four per tray).

NOTE: *When only one string of batteries is installed, thermal performance will be better on the bottom tray.*

6. Secure the battery bracket thumbscrews. See Figure 11.
7. Connect the battery pigtails to the battery bracket connectors.
8. Check all battery connections and verify the yellow Battery LED is on steady.

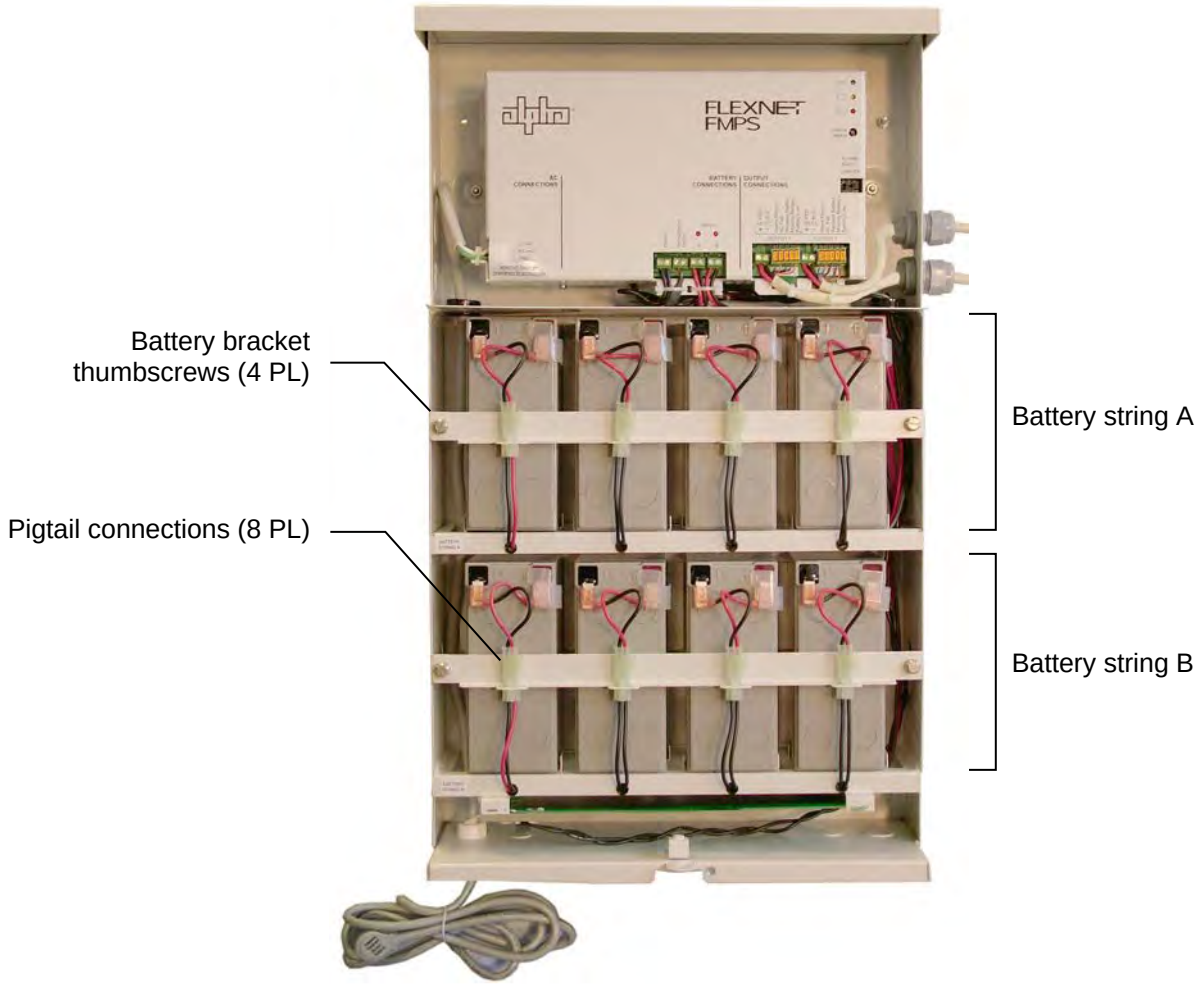


Figure 11–Installing the batteries

NOTE: *See system startup procedure before connecting batteries online.*

After assembly, batteries should be numbered and “as received” readings should be taken, such as, battery voltage and temperature. ***Refer to manufacturer's literature for guidelines.***

See following table for typical maintenance report.

Company: _____ Date: _____
Address:_____
Battery location and/or number:_____
No. of cells: _____ Type: _____ Date new: _____
Date installed: _____ Float voltage: _____ Ambient temp.: _____

Battery Readings

Battery #	Serial #	Voltage	Specific Gravity	Ohms	Mhos	Observations
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						

Remarks and recommendations:_____
_____
_____

Readings taken by: _____

Table A–Typical VRLA battery maintenance report

6 Operation

6.1 Start-up

1. Apply AC power by a) plugging the unit into AC power outlet, b) turning on the AC feeder breaker, or c) connecting the IEC (option) to specified source.
2. Verify no alarms are active and the green power indicator is lit.
3. Connect the DC load.
4. Secure the FMPS cover with a padlock or a wire utility tie.

6.2 Normal Operation

Under normal operating conditions, the FMPS delivers 55Vdc (nominal) power for up to two loads. The green System LED remains lit.

6.3 Status LEDs

The FMPS is equipped with three status LEDs. Refer to the following table:

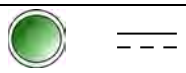
	**System (GREEN):** Indicates normal mode of operation.
	**Battery (YELLOW):** Indicates power supply is operating from the battery pack.
	**Replace Battery (RED):** Battery replacement required.
 Silence Alarm	**Silence Alarm:** Press and hold button one time for 1/2 second to silence the audible alarm for 24 hours.

Table B–LED and alarm indications

6.4 Battery String LEDs

The FMPS is equipped with two battery string LEDs. The LEDs light when a battery test has failed, suggesting that battery capacity has fallen below 70 percent.

NOTE: *If a single string of batteries is used, the FMPS will report a Battery Missing alarm. This is a normal condition when using a single battery string.*

6.5 AC Fail Alarm

The FMPS sets an AC Fail alarm during an AC line outage or brownout when the AC supply voltage is insufficient to maintain battery charge. To prevent nuisance alarms and consequent service disruptions, the FMPS monitors the battery status and sets the alarm when the battery is discharging. Depending on load conditions, it may take several minutes. The alarm is cleared when the battery receives a consistent charge.

The FMPS also indicates the AC Fail alarm when AC is present, but the system is overloaded to the point that batteries are required to supplement the power supply in meeting load requirements. If an AC Fail Alarm is indicated despite a solid AC line voltage, then verify the load is within specification and lead lengths and wire sizes are accordant with the installation instructions.

6.6 Audible Alarm

The Audible Alarm switch is located inside the unit below the status LEDs. Its default position is OFF. If enabled, the audible alarm gives a low battery warning of four short beeps once an hour when the battery string voltage reaches 46.8V. When the voltage is between 40 and 46.80V, it takes 10 seconds to activate. When voltage is less than 40V, it takes 30 seconds to activate. Silence the alarm for 24 hours by pressing the blue Silence Alarm button on the front panel of the FMPS.

The audible alarm can be disabled by setting the Audible Alarm switch back to the OFF position.

6.7 Battery Backup Mode

In the event of an AC power outage, the FMPS switches to Battery Backup mode and the Battery LED lights. The FMPS runs in Battery Backup mode until AC power is restored, or until the battery strings reach a low-voltage shutdown level of 42V. On resumption of AC power, the FMPS will recharge the batteries at a maximum current of 1.8A per string.

6.8 Charging Mode

Under normal conditions a float charge maintains the batteries at 100% capacity. If the unit operates in Battery Backup mode, battery charging resumes when primary power is restored. Charging continues until one of the following occurs:

- Battery has reached 100% of capacity.
- Another power failure occurs requiring battery support. Charging ceases until primary power is restored.
- Additional power is required by the ONT, in which case power is diverted from the battery charger and sent to the ONT. When demand for additional power ceases, normal battery charging resumes.
- The battery is depleted. No special actions are required to restore normal operation once primary power has been restored.

CAUTION!

Never connect batteries, or any other power source, to the output of the FMPS.

6.9 Battery Management

Batteries have limited shelf life and must be put into service in a timely manner. The chart below provides general storage guidelines and illustrates the relationship between capacity retention and storage temperature over time. Consult battery documentation for product specific information.

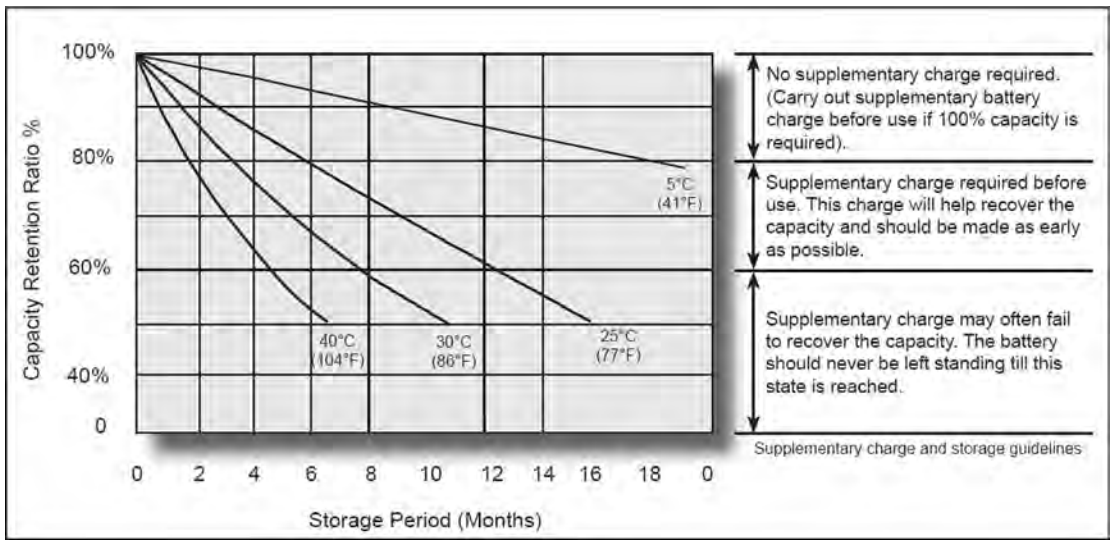


Figure 12–Battery capacity characteristics

NOTE: *Should the batteries freeze during periods of cold weather power failure, a "battery missing" alarm will become active until the batteries thaw.*

6.10 Battery Self-test

The FMPS performs an automatic Battery Self-test on a cycle of one string every 22.5 days.

The battery self-test operates as follows:

1. The microprocessor verifies that AC power is on.
2. If AC is present the microprocessor initiates the self-test.
3. The load is supported by Battery String A or B, but not both. Should AC power fail during the test, the test is terminated.
4. The microprocessor monitors energy taken from the battery string and compares it with the energy required to recharge the batteries. It determines if the battery string capacity is greater than 70 percent of the 7.2AH rating. If capacity fails, a replace battery alarm is generated.

NOTE: *The battery test begins with String A, and alternates between battery strings each time a test starts.*

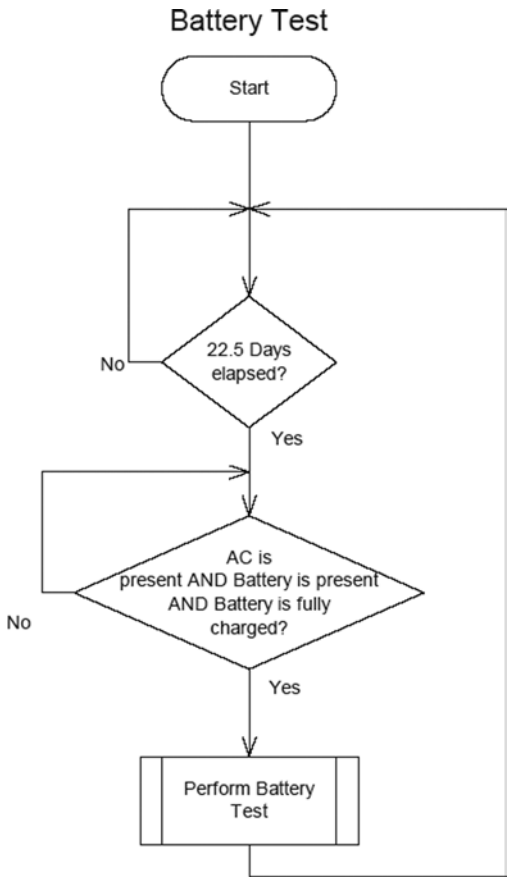


Figure 13–Battery self-test

NOTE: *To trigger a manual battery test, toggle the Silence Alarm switch On, Off, On.*

7 Test and Commissioning (Overview)

7.1 System

All Alpha power system components undergo thorough factory testing. All levels/alarms are set to predetermined values as detailed in their individual component manuals except where custom levels are specified. Good installation practice is to check the operation of all features and alarms and to set the power system levels in accordance with the specific requirements of your system.

NOTE: *The individual system component manuals detail the methodology for testing and calibration of all components.*

7.2 Battery

After installation of batteries it is usually necessary to “initial charge” the batteries to ensure proper operation and to eliminate plate sulfation. Follow guidelines supplied with the battery and record initial charge readings; i.e. specific gravity, cell voltage, charge current and temperature.

NOTE: *Battery warranty may be void if batteries are not initially charged following the manufacture's guidelines – with proper records maintained.*

Some VRLA batteries do not require initial charging if placed on charge within 3-6 months of manufacture, check with the manufacturer.

After the equalization period battery voltage should be reduced to the recommended float level.

Once the batteries have been initial charged it is suggested to perform a short duration high rate discharge test on the batteries to verify the connections on the batteries and also to verify that there are no open or failed cells. Cell voltages should be monitored during this process:

- Discharge for 15 minutes at the C/8 rate.
- Record cell voltages every 5 minutes.
- Check for overheating connections.

7.3 Documentation

Complete all necessary documentation; i.e., battery reports (Table D), DC wiring lists, AC distribution tables, floor plans, etc. Tag wires, fill out identification strips, and identify circuit breakers.

8 Maintenance

Although very little maintenance is required with Alpha systems, routine checks and adjustments are recommended to ensure optimum system performance. Qualified service personnel should do repairs.

The following table lists a few maintenance procedures for this system. These procedures should be performed at least once a year.

WARNING! HIGH VOLTAGE AND SHOCK HAZARD.

Use extreme care when working inside the enclosure/shelf while the system is energized. Do not make contact with live components or parts.

Circuit cards, including RAM chips, can be damaged by static electricity. Always wear a grounded wrist strap when handling or installing circuit cards.

Procedure	Date Completed
Clean ventilation openings	
Inspect all system connections (re-torque as necessary)	
Verify alarm/control settings	
Verify alarm relay operation	

Table C–Sample maintenance log

8.1 Using the Enclosure Security Bypass

The FMPS provides a security bypass, allowing a technician to access a locked FMPS enclosure. Using a 0.540 Can Wrench (available through Harris Communications Products Division, Camarillo, CA, 800 437 2266, P/N 44007-000), loosen the security nut located on the bottom of the enclosure and slide the security hasp out of the enclosure. Replace in reverse order.

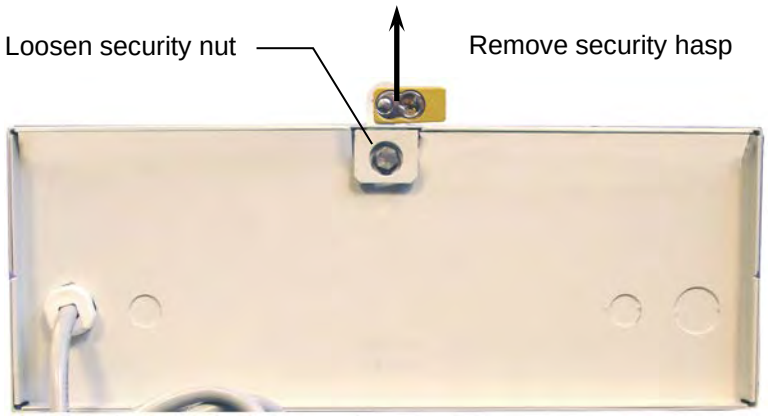


Figure 14–Security bypass

8.2 Replacing the FMPS

The FMPS contains no serviceable parts. Should a unit fail, contact Alpha Technical Support at 1-800-836-3364. Use the following procedure for replacing the FMPS unit.

8.2.1 Removal Procedure

1. Remove the housing cover by grasping it from the sides, lifting it up slightly, and swinging the bottom out away from the unit.
2. If the unit's power is hardwired, turn OFF, tag, and lock the power breaker. Disconnect the wiring and move it out of the way.
3. If using a line cord, unplug the unit.
4. If using the IEC option, disconnect from the source. Alternatively, disconnect at the IEC inlet closest to the FMPS.
5. Disconnect the battery pigtails and loosen the battery bracket(s). Remove the batteries.
6. Make a note of alarm and output connections, and disconnect.
7. Remove the output and alarm wiring, and the Heyco liquid-tight fittings.
8. Uninstall the FMPS from its mounting and remove the unit. Return the damaged unit according to the Return Merchandise Authorization (RMA) instructions.

8.2.2 Replacement Procedure

1. Remove the appropriate knockouts on the replacement enclosure.
2. Mount the replacement enclosure (see Section 4 for details).
3. Connect the alarm and output connections.

NOTE: *Do not over-tighten the output connections. Excessive torque can break the connectors.*

4. Reinstall the liquid-tight fittings.
5. Reconnect the output and alarm connections.
6. Verify connections and reinstall line power wiring. Turn on power breaker (if applicable).
7. Reinstall the batteries, and secure the battery brackets.
8. Check operation and secure the front panel.

9 Appendix A

9.1 Installing the FMPS Power Module as a Stand-alone Unit

The following instructions are for installation of the FMPS power module in an independent application.

9.1.1 Installing the FMPS Power Module

1. Unpack and inspect the FMPS power module for damage. For technical support, contact Alpha Technologies at 800 863 3364.
2. Select a suitable location for mounting the FMPS power module. Allow at least one inch clearance above and below the power module for proper cooling. The FMPS power module can be wall-mounted or mounted in a 19” or 23” equipment rack. See Section 4 for details.
3. Connect the AC wiring. The FMPS power module can be hardwired or powered using one of the AC power cord options. Connect AC service to the AC input block as follows: (**120Vac**) Line (black), Neutral (white), and Safety Ground (green); (**240Vac**) Line 1 (black), Line 2 (red), and Ground (green). Leave a 6” to 8” space under the FMPS power module for servicing.
4. Connect the DC load and alarm wiring. Use of #16 AWG wire for DC wiring is recommended. Connect the DC load blocks (red=positive, black=negative). **Tighten snug; do not over-tighten.** Pull open the alarm IDC connectors (small orange connectors) and insert #24 AWG alarm wires into the connectors. Do not attempt to remove the IDC connectors. Press the connectors shut to complete the connections.
5. Install one or two strings of batteries, if applicable.
6. Install the battery temperature probe wiring. The wiring is not polarity sensitive. Tape the end of the sensor to the centermost battery.
7. Check all connections.
8. To verify that the unit is operational, apply AC power by a) plugging the unit into AC power outlet, b) by turning on the AC feeder breaker, or c) by connecting the IEC (option) to specified source.

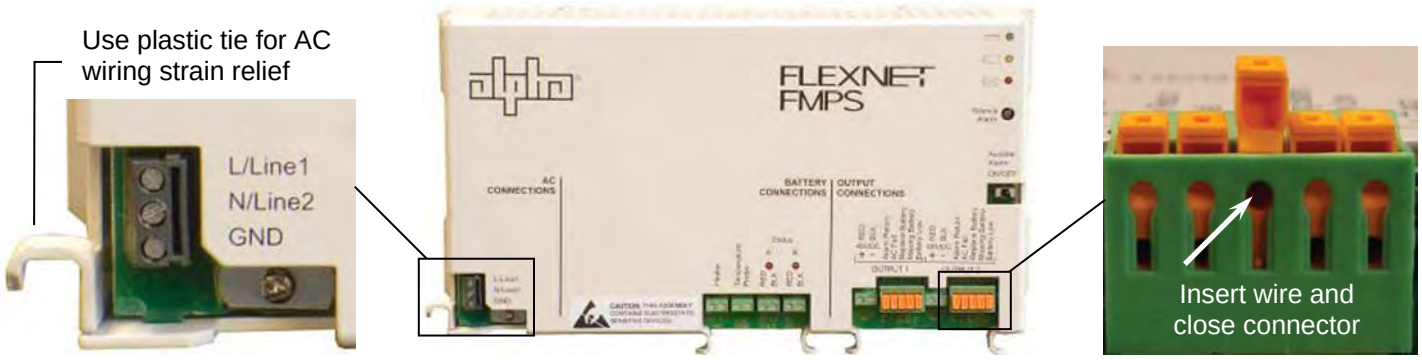


Figure 15–FMPS power module connection details

9.1.2 FMPS Operation

1. Verify no alarms are active and the green power indicator is lit (Table E).
2. Connect the DC load.
3. Secure the FMPS cover with a padlock or a wire utility tie.

10 Appendix B

10.1 Installing the FMPS Power Module in a 19” or 23” Rack Mount Chassis

A 19” or 23” rack mount chassis accomodates up to six FMPS power modules for FiOS high-density indoor applications.

10.1.1 Installation Procedure

1. Unpack and inspect the FMPS power modules and mounting brackets for shipping damage. Contact Alpha to report issues.
2. Mount the power module to the mounting bracket using the provided screws (3 PL):

Figure 16–Location of FMPS mounting bracket screws

3. Slide the mounting bracket into the 23” rack mount, and secure the captive screw:

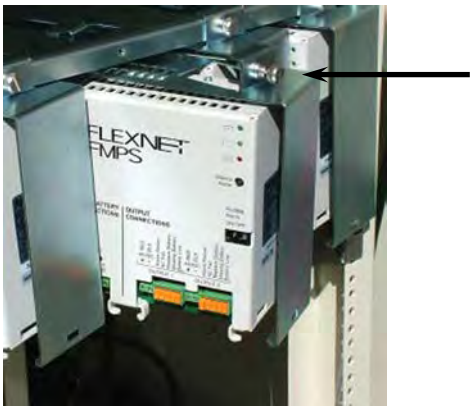


Figure 17–Location of mounting bracket captive screw

4. Repeat this procedure for up to six power modules:

Figure 18–Six rack mounted FMPS power modules

11 Warranty

11.1 Technical Support

In Canada and the USA, call toll free 1-888-462-7487.

Customers outside Canada and the USA, call +1-604-436-5547.

11.2 Warranty Statement

For full information details review Alpha's online Warranty Statement at www.alpha.ca/support.

11.3 Product Warranty

Alpha warrants that for a period of two (2) years from the date of shipment its products shall be free from defects under normal authorized use consistent with the product specifications and Alpha's instructions, the terms of the manual will take precedence. Alpha authorized Commissioning is mandatory for warranty coverage and shall be conducted by Alpha-trained personnel. Completed commissioning reports shall be submitted for Alpha's record keeping at support@alpha.ca.

The warranty provides for repairing, replacing or issuing credit (at Alpha's discretion) for any equipment manufactured by it and returned by the customer to the factory or other authorized location during the warranty period.

There are limitations to this warranty coverage. The warranty does not provide to the customer or other parties any remedies other than the above. It does not provide coverage for any loss of profits, loss of use, costs for removal or installation of defective equipment, damages or consequential damages based upon equipment failure during or after the warranty period. No other obligations are expressed or implied. Warranty also does not cover damage or equipment failure due to cause(s) external to the unit including, but not limited to, environmental conditions, water damage, power surges or any other external influence.

The customer is responsible for all shipping and handling charges. Where products are covered under warranty Alpha will pay the cost of shipping the repaired or replacement unit back to the customer.

11.4 Battery Warranty

Note that battery warranty terms and conditions vary by battery and by intended use. Contact your Alpha sales representative or the Technical Support team at the above number to understand your entitlements under Battery Warranty.

11.5 Warranty Claims

Any claim under this Limited Warranty must be made in writing to Alpha BEFORE sending material back. Alpha will provide Product return instructions upon approval of return request. A Service Repair Order (SRO) and / or Return Authorization (RA) number will be issued ensuring that your service needs are handled promptly and efficiently.

Claims must be made online at: www.alpha.ca/support.

11.6 Service Information

For a list of international service centers, refer to the Alpha website: www.alpha.ca/support

12 Acronyms and Definitions

AC	Alternating current
AH	Ampere hour
ANSI	American National Standards Institute
AWG	American Wire Gauge
CEC	Canadian Electrical Code
CSA	Canadian Standards Association
DC	Direct current
EMT	Electrical metallic tubing
FCC	Federal Communications Commission (for the USA)
FTTP	Fiber to the premises
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
LED	Light emitting diode
LVD	Low voltage disconnect
NEC	National Electrical Code (for the USA)
OEM	Original equipment manufacturer
ONT	Optical network terminal
OSHA	Occupational Safety & Health Administration
UL	Underwriters Laboratories
UPS	Uninterruptible power supply
VRLA	Valve regulated lead acid

Specifications for Alpha Technologies FMPS

Input

Voltage (nominal):	120Vac @ 2.5A; 240Vac @ 1.25A
Frequency:	50/60Hz
Current (maximum):	2.5A @120Vac (maximum DC output + charger + heater)
Inrush Current:	4.1A maximum (peak value)
Surge Protection:	ANSI/IEEE Std. C62.41 to Category A, B, or C requirements, using a “Ring Wave” or “Combination” waveform, at a level of 6kV

Output

Power:	150W continuous; 170W, 10 second maximum
Voltage (nominal):	55Vdc
Current:	3.1A typical (crowbar limited beyond 4A DC)
Short Circuit:	5A
Loading:	Following GR-909 telephone lines in various states; e.g., ringing, off-hook, on-hook, data, and video operation requirements
Ripple:	< $30mV_{RMS}$
Noise:	< $100mV_{p-p}$

In accordance with FCC requirements, we provide the following statement as specified in the FCC guidelines for conformance to Part 15, Class B:

> **NOTE:** *This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:*
>
> - Reorient or relocate the receiving antenna.
> - Increase the separation between the equipment and receiver.
> - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
> - Consult the dealer or an experienced radio/TV technician for help.

Any changes or modifications to this equipment not expressly described in this manual could void the FCC compliance.

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Local Alarms

System LED:	Green steady = system output normal, DC output/off = no AC or battery power
Battery LED:	Yellow steady = system on battery/off = normal mode
Replace Battery:	Red steady = replace one or two battery strings/off = batteries within parameters
Replace Battery A&B (internal):	Red steady = replace one or both battery strings/off = batteries within parameters
Audible Indicator (Alarm On):	Alarm enable/disable toggle switch located on FMPS, batteries below voltage parameters

Remote Alarms

SEE ALSO CONNECTIONS

Pin 1 Alarm Return:	Open collector return reference
Pin 2 AC Fail:	On battery
Pin 3 Replace Battery:	One or both battery strings failed periodic self-test
Pin 4 Missing Battery:	< 8 batteries
Pin 5 Battery Low:	Battery string voltage < 46.8Vdc

Connections

Output:	2x terminal blocks accepting #16 AWG (1.5mm²), parallel connections
Remote Alarms:	2x 5-position IDC #24 AWG (0.25mm²), parallel connections

Mechanical

Dimensions

FMPS:	603mm H x 356mm W x 140mm D (23.75” H x 14” W x 5.5” D)
FMPS + Shipping Carton:	724mm H x 432mm W x 298mm D (28.5” H x 17” W x 11.75” D)

Weight

FMPS:	11.3 kg (25 lb.)
FMPS + Shipping Carton:	13.6 kg (30 lb.)

Battery

Type:	4 or 8 7.2AH valve regulated lead acid (VRLA)
Model:	GS Battery Inc., OEM P/N: PX12072F2-HG CSB, OEM P/N: GP1272F2

For compatibility with other battery models, please consult Alpha factory.

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Environmental

Operating Temperature:	-10 to 46.1°C plus solar loading (14 to 115°F) [-40° with cold weather kit (includes heater)]
Storage Temperature:	-15 to 85°C (5 to 185°F)
Humidity:	0 to 95% non-condensing
Elevation:	0 to 3048m operating, 15240m storage (0 to 10000 ft operating, 50000 ft storage)

Compliance

CSA/UL:	60950
EN:	60950 55022 Class B
FCC:	Part 15 Class B
Telcordia:	GR-63-CORE GR-1089-CORE

System Configurations

This product is available to order under the following system configurations:

Description	Part Number/List Option
FMPS with Verizon silkscreen, heater option, 120Vac line cord	010-592-20-050
FMPS with Alpha silkscreen, heater option, 120Vac line cord	010-592-20-053
FMPS with Alpha silkscreen, heater option, universal IEC line cord	010-592-20-058

Part Numbers and List Options

This product is available to order with the following options and accessories:

Description	Part Number/List Option
FMPS UPS 150W	010-592-20
Basic power module assembly	*List 0
Cool gray with Alpha logo	List 53
Cool gray with Verizon logo	List 58
Cool gray with Motorola logo	List 59
Cold weather option	List 80
Line cord, receptacle, 250Vac, IEC 60320	List 84
Line cord, 120Vac, 5-15P	List 85
Fittings, liquid tight	List 86

*** Default options**

Kit, battery cables, 100 sets, FMPS 150W	037-116-20
Kit, fittings, 50 sets, FMPS 150W	037-117-20

The above information is valid at the time of publication. Consult factory for up-to-date ordering information.
Specifications are subject to change without notice.

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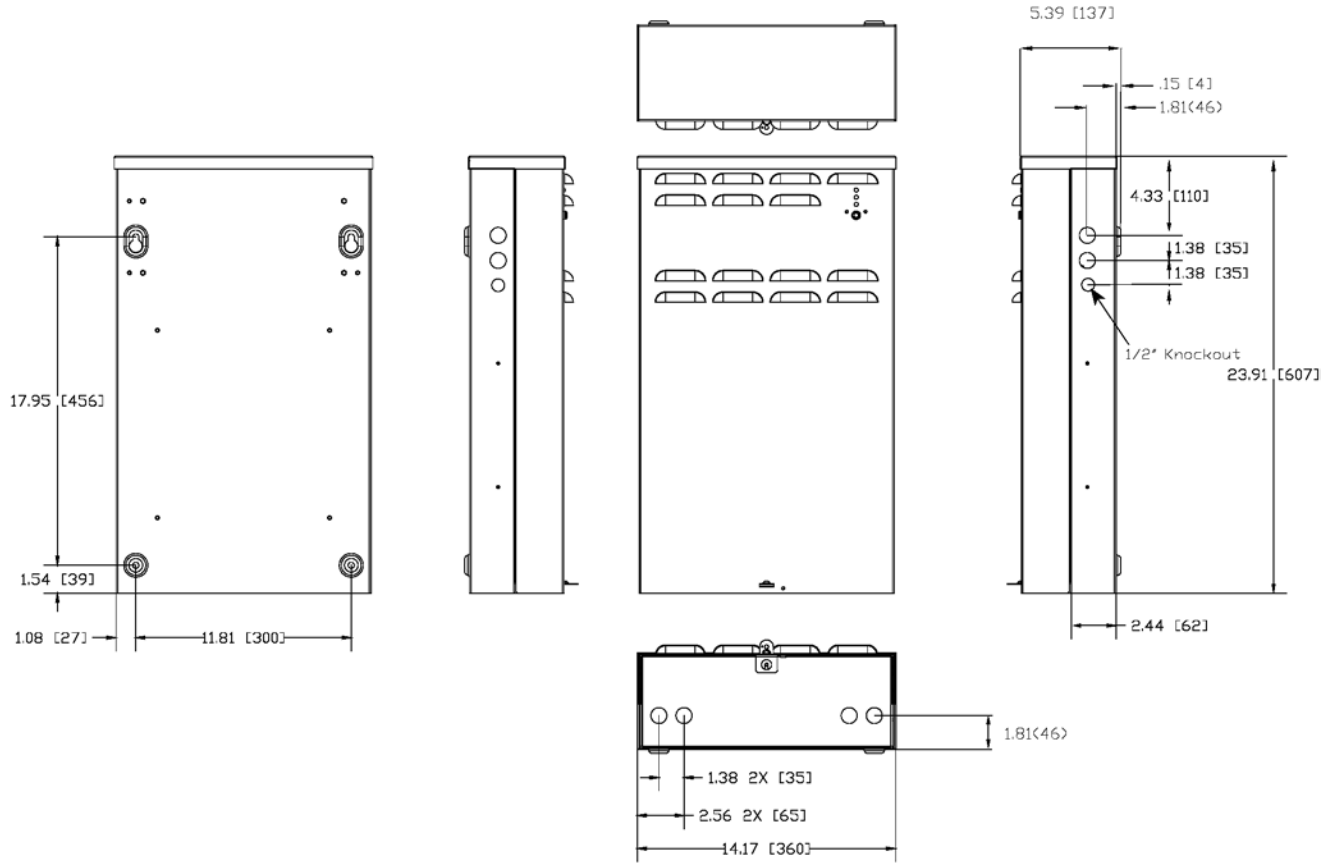
Dimensions



Battery Run Times

ONE STRING Run Time (hours) vs. Temperature				
Watts	**-10°C**	**0°C**	**25°C**	**40°C**
20	14.4	15.6	18.7	20.0
40	7.0	7.4	8.9	10.0
60	3.9	4.8	6.6	7.2
80	2.7	3.1	4.3	5.5
100	2.2	2.5	3.2	3.7
120	1.8	1.9	2.6	2.9
150	1.5	1.7	2.0	2.3

TWO STRINGS Run Time (hours) vs. Temperature				
Watts	**-10°C**	**0°C**	**25°C**	**40°C**
20	21.7	22.5	24.4	25.0
40	14.1	15.6	18.7	20.0
60	9.0	9.6	13.1	15.5
80	6.7	7.4	8.9	10.0
100	5.9	6.3	7.5	7.9
120	3.7	4.8	6.7	7.2
150	3.0	3.3	5.0	6.2

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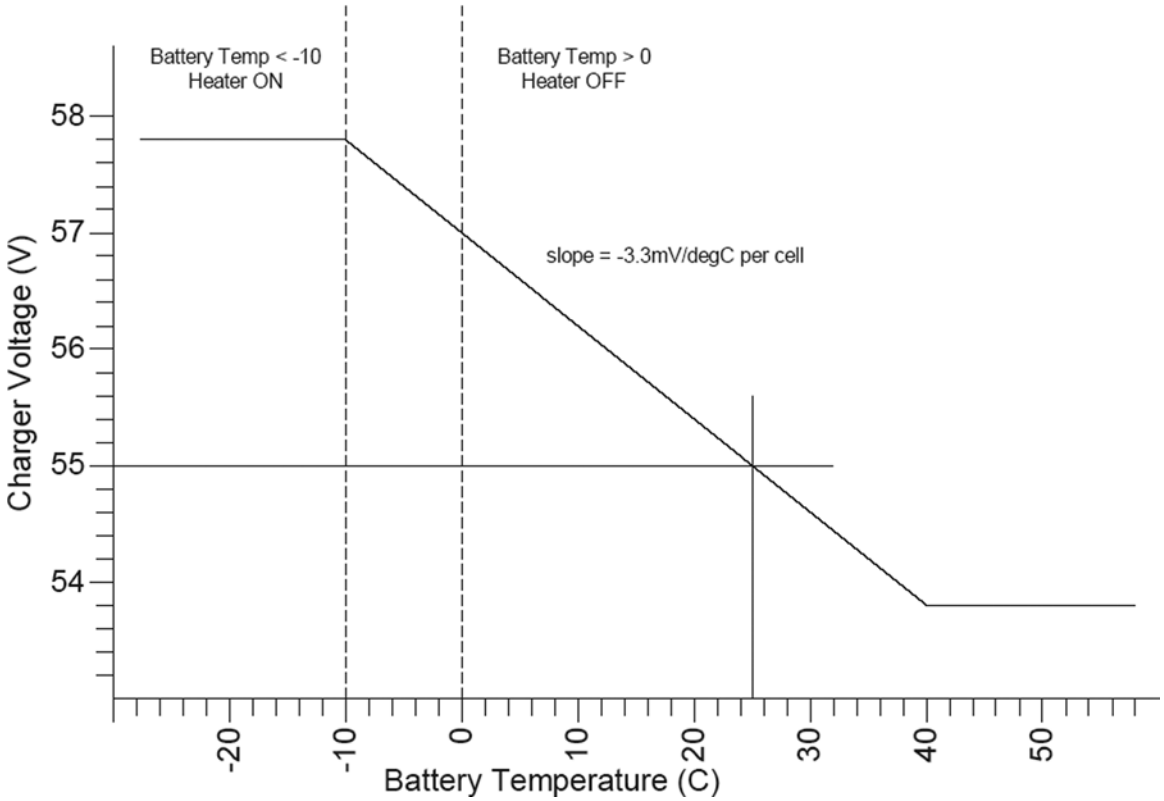
Temperature Compensation



Battery temperature compensation (charge voltage vs. temperature)

Battery Recharge Times

Battery Recharge vs. Load Power, Single String 90% Recharge Efficiency	
Load (W)	**Hours**
5	3.5
10	3.5
15	3.5
20	3.5
25	3.5
30	3.5
40	3.5
50	3.5
75	5.4
100	8.3
125	17.1
150	No recharge

Battery Recharge vs. Load Power, Two Strings 90% Recharge Efficiency	
Load (W)	**Hours**
5	10.8
10	11.1
15	12.0
20	12.7
25	13.6
30	14.2
40	15.8
50	17.4
75	21.4
100	25.2
125	29.3
150	No recharge

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