



## **XM2-300HP CableUPS**

XM2-300HP, XM2-300HP-CE  
Technical Manual  
Effective: October 2017

## Safety Notes

This manual contains important safety information that must be followed during the installation and maintenance of the equipment and batteries. If there are any questions regarding the safe installation or operation of the system, contact Alpha Technologies or the 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 warnings and notifications symbols have been placed throughout this manual. Where these symbols appear, use extra care and attention.



### **WARNING! ELECTRICAL HAZARD**

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ELECTRICAL HAZARD WARNING provides electrical safety information to PREVENT INJURY OR DEATH to the technician or user.



### **WARNING! FUMES HAZARD**

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FUMES HAZARD WARNING provides fumes safety information to PREVENT INJURY OR DEATH to the technician or user.



### **WARNING! FIRE HAZARD**

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FIRE HAZARD WARNING provides flammability safety information to PREVENT INJURY OR DEATH to the technician or user.

There may be multiple warnings associated with the call out. Example:



### **WARNING! FIRE & ELECTRICAL HAZARD**

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This WARNING provides safety information for both Electrical AND Fire Hazards



### **CAUTION!**

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CAUTION provides safety information intended to PREVENT DAMAGE to material or equipment.



### **NOTICE:**

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NOTICE provides additional information to help complete a specific task or procedure.

### **ATTENTION:**

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ATTENTION provides specific regulatory/code requirements that may affect the placement of equipment and/or installation procedures.

# XM2-300HP CableUPS

XM2-300HP, XM2-300HP-CE

Technical Manual

Effective: October 2017

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## Supporting Documentation

Refer to the following documents for comprehensive installation instructions and safety information.

Available via [www.alpha.com](http://www.alpha.com).

**APP9015S, APP9022S Service Power Supply:** Installation and Operation Manual (*Alpha p/n 016-537-B0*).

**DPM Communications Module:** AlphaNet DSM Series 3 Technical Manual (*Alpha p/n 745-814-B8*).

**DM3 Communications Module:** DM3.0 Series DOCSIS® Status Monitor Technical Manual (*Alpha p/n 704-939-B0*).

## Disclaimer

Images contained in this manual are for illustrative purposes only. These images may not match every installation.

Operator is cautioned to review the drawings and illustrations contained in this manual before proceeding. If there are questions regarding the safe operation of this powering system, please contact Alpha Technologies or the nearest Alpha representative.

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.

## Contact Information

Sales information and customer service in USA

(7AM to 5PM, Pacific Time):

1 800 322 5742

Complete technical support in USA

(7AM to 5PM, Pacific Time or 24/7 emergency support):

1 800 863 3364

Sales information and technical support in Canada:

1 800 667 8743

Website:

[www.alpha.com](http://www.alpha.com)

## Notice of FCC Compliance

Per FCC 47 CFR 15.21:

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

Per FCC 47 CFR 15.105:

This equipment when installed in an Alpha enclosure 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 the 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.

For further information visit: <https://www.fcc.gov/guides/interference-defining-source>

Changes and Modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission rules.

# Table of Contents

XM2-300HP Power Supply Safety Notes .....	7
Safety Precautions .....	7
Grounding and Earth Connection Notes.....	9
Utility Power Connection Notes .....	10
<b>1.0 Introduction.....</b>	<b>12</b>
1.1 Theory of Operation.....	13
AC (Line) Operation.....	13
Standby Operation.....	13
Charger Operation.....	15
1.2 XM2-300HP Layout .....	16
Transformer Module Overview .....	16
Inverter Module Overview.....	17
Optional Status Monitoring Module .....	18
1.3 Recommended Enclosure System Options.....	19
Local and Remote Indicator (LRI).....	19
AC Indicator (ACI) .....	19
AC Surge Protector / Lightning Arrester .....	19
Coaxial surge protector .....	19
APP90S /APP9022S (Service Power Supply).....	19
<b>2.0 Pre-Commissioning.....</b>	<b>20</b>
2.1 Initial Inspection .....	20
2.2 Pre-Commissioning Checklist.....	21
2.3 About the Smart Display .....	22
2.4 Using the Smart Display .....	23
2.5 Smart Display Glossary .....	24
<b>3.0 Commissioning.....</b>	<b>26</b>
3.1 Turn-up and Test.....	26
AC Line Operation .....	26
Self Test Operation .....	27
Standby Operation .....	27

## Table of Contents, continued

<b>4.0</b>	<b>Operation</b> .....	<b>28</b>
4.1	Smart Display modes for XM2-300HP .....	28
	Operation Normal .....	28
	Comms Information Display (with DPM or DM3) .....	29
	Setup Menu .....	30
	Menu Structure and Navigation (from Operation Normal screen) .....	33
	Menu Structure and Navigation (from Active Alarms screen) .....	34
4.2	Alarm Indications .....	35
4.3	Control Panel LEDs .....	37
4.4	Automatic Performance Test.....	38
4.5	Providing Power via Portable Generator or Inverter.....	39
	AC Powering.....	39
	Using a Truck-mounted Inverter or Generator .....	40
4.6	Resumption of Utility Power .....	40
<b>5.0</b>	<b>XM2-300HP Maintenance</b> .....	<b>41</b>
5.1	System Information.....	41
5.2	Battery Charger Voltage .....	42
5.3	Battery Terminals and Connecting Wires.....	42
5.4	Output Voltage .....	42
5.5	Output Current.....	42
5.6	Check Output Connections.....	43
	Visual Inspection.....	43
5.7	Inverter Module Maintenance .....	43
5.8	Maintenance Log .....	44
<b>6.0</b>	<b>Return and Repair Information</b> .....	<b>45</b>
<b>7.0</b>	<b>Specifications</b> .....	<b>46</b>
7.1	Safety and EMC Compliance .....	47
<b>8.0</b>	<b>Emergency Shutdown</b> .....	<b>48</b>
<b>9.0</b>	<b>Appendix</b> .....	<b>49</b>
9.1	Inverter Module Removal and Reinstallation.....	49
9.2	AC Output Voltage Reconfiguration.....	50
9.3	Protective Interface Module.....	51
9.4	Programming the PIM.....	52
9.5	Grounding Wire Connection .....	53
9.6	Verification of DM3 Jumper Setting .....	53

# Figures

Fig. 1-1, XM2-300HP .....	12
Fig. 1-2, Simplified Block Diagram .....	14
Fig. 1-3, Charger Modes.....	15
Fig. 1-4, Transformer Module Connections .....	16
Fig. 1-5, AC Input Connections and Product Label .....	16
Fig. 1-6, Smart Display .....	17
Fig. 1-7, Inverter Module Connections .....	17
Fig. 1-8, Temperature Probe Locations .....	17
Fig. 1-9, DPM (L) and DM3 (R) .....	18
Fig. 2-1, Smart Display Navigation.....	22
Fig. 2-2, Smart Display Panel.....	23
Fig. 3-1, Sample Configuration Screen .....	26
Fig. 4-1, Operation Normal Display .....	28
Fig. 4-2, Comms Info Display .....	29
Fig. 4-3, Setup Menu Display .....	32
Fig. 4-4, Smart Display LEDs .....	37
Fig. 8-1 Emergency Shutdown .....	48
Fig. 9-1, Removing the Inverter Module .....	50
Fig. 9-2, Inside of XM2-300HP .....	50
Fig. 9-3, Output Voltage Terminal Block Detail .....	50
Fig. 9-4, Power Supply Ground Wire Connection.....	53
Fig. 9-5, Location of Reset Timing Jumper, DM3 .....	53

# Tables

Table 3-1, AC Output .....	26
Table 4-1, Major Alarms.....	36
Table 4-2, Minor Alarms.....	36
Table 7-1, XM2-300HP Power Supply Specifications.....	46

# XM2-300HP Power Supply Safety Notes

## Safety Precautions



### CAUTION!

- Only qualified personnel may service the XM2-300HP CableUPS®.
- Verify the voltage requirements of the equipment to be protected (load), the AC input voltage to the power supply (line), and the output voltage of the system prior to installation.
- Equip the utility service panel with a properly rated circuit breaker for use with this power supply.
- When connecting the load, DO NOT exceed the output rating of the power supply.
- Always use proper lifting techniques whenever handling units, modules or batteries.



### WARNING! ELECTRICAL HAZARD

- The XM2-300HP Power Supply contains more than one live circuit! Even though AC voltage is not present at the input, voltage may still be present at the output.
- The battery string, which provides backup power, contains dangerous voltages. Only qualified personnel should inspect or replace batteries.
- In the event of a short-circuit, batteries present a risk of electrical shock and burns from high current. Observe proper safety precautions.

### ATTENTION:

This power supply has been approved by regulatory authorities which require its use with Alpha enclosures. Visit [www.alpha.com](http://www.alpha.com) to download copies of the LPE Enclosure Installation and Operation Manual (*Alpha p/n 031-302-B0*) or the XM2-300HP Wall-Mount Rack Installation instructions (*Alpha p/n 746-221-C0*).



### WARNING! ELECTRICAL & FIRE HAZARD

- Do not allow live battery wires to contact the enclosure chassis. Shorting battery wires can result in a fire or possible explosion.
- If replacing the internal auto style fuses, use only the same type and rating of fuse.



### WARNING! GENERAL HAZARD

- Any gelled or liquid emissions from a valve-regulated lead-acid (VRLA) battery contains diluted sulfuric acid, which is harmful to the skin and eyes. Emissions are electrolytic and are electrically conductive and corrosive.
- 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 one pound bicarbonate of soda to one gallon of water. Report a chemical spill using your company's spill reporting structure and seek medical attention if necessary.
- A battery showing signs of cracking, leaking, or swelling should be replaced immediately by authorized personnel using a battery of identical type and rating.



### WARNING! ELECTRICAL HAZARD

- Always wear eye protection, rubber gloves and a protective vest when working near batteries. To avoid electrical shock, remove all metallic objects (such as rings or watches) from your person.
- Use tools with insulated handles. Do not rest any tools on top of batteries.
- Prior to handling the batteries, touch a grounded metal object to dissipate any static charge that may have developed on your body.
- Use special caution when connecting or adjusting battery cabling. An improperly or unconnected battery cable can make contact with an unintended surface that can result in arcing, fire, or a possible explosion.

# Safety Precautions



## **WARNING! FIRE HAZARD**

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Batteries produce explosive gases. Keep all open flames and sparks away from batteries.



## **CAUTION!**

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- During maintenance visits, inspect batteries for the following:
- 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 documentation for the correct torque and connection hardware for the application.
- Always replace batteries with those of an identical type and rating. Match conductance, voltage and date codes. Never install untested batteries.
- Do not attempt to remove the vents (valves) from the AlphaCell broadband battery or add water. This is a safety hazard and voids the warranty.
- Apply electrical contact grease on all exposed connections.
- Follow approved storage instructions.
- Each individual battery should have at least 13mm (1/2") 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. Never place batteries in a sealed enclosure. Extreme caution should be used when maintaining and collecting data on the battery system. Ensure all enclosure vents and filters are clean and free of debris.
- Always refer to the battery manufacturer's recommendation for selecting correct "FLOAT" and "ACCEPT" charge voltages. Failure to do so can damage the batteries.
- Verify the Power Supply's battery charger "FLOAT" and "ACCEPT" charger voltage settings.
- Batteries are temperature sensitive. During extremely cold conditions, a battery's charge acceptance is reduced and requires a higher charge voltage; during extremely hot conditions, a battery's charge acceptance is increased and requires a lower charge voltage. To compensate for changes in temperature, the battery charger used in the power supply is temperature compensating.
- If the batteries appear to be overcharged or undercharged, first check for defective batteries and then verify the correct charger voltage settings.
- To ensure optimum performance, inspect batteries every three to six months for signs of cracking, leaking or unusual swelling (note that some swelling is normal).
- Check battery terminals and connecting wires. Clean battery terminal connectors periodically and retighten to approximately 110 inch-pounds (or to manufacturer's specifications if not AlphaCell). Spray the terminals with an approved battery terminal coating such as NCP-2.
- Check battery voltages UNDER LOAD. Use a load tester if available.
- Refer to the battery manufacturer's recommendation for correct charger voltages and the power supply operation manual for corresponding charger settings.
- Establish and maintain a battery maintenance log.

## **ATTENTION:**

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- Clean up any spilled electrolyte in accordance with all federal, state, and local regulations or codes.
- Spent or damaged batteries are environmentally unsafe. Always recycle used batteries. Refer to local codes for proper disposal of batteries.

# Grounding and Earth Connection Notes



## **WARNING! ELECTRICAL HAZARD**

Low impedance grounding is **mandatory for personnel safety** and critical for the proper operation of the cable system.

In order to provide a ready, reliable source of backup power it is necessary to connect the power supply to an effective grounding and Earthing 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 provides protection with respect to operator safety, system communication and equipment protection.

Lightning strikes, grid switching or other aberrations on the power line and/or communications cable have the potential to cause high-energy transients that can damage the powering or communications systems. The most viable method available to protect the system from damage is to divert these unwanted high-energy transients along a low-impedance path to Earth. A low-impedance path to Earth prevents these currents from reaching high voltage levels and posing a threat to equipment.

The key to the success of lightning protection is single-point grounding so the components of the grounding system appear as a single point of uniform impedance. Two places recommended by Alpha for single-point grounding are connections in the enclosure and connections to Earth. Single-point grounding in the enclosure is achieved by bonding all electrical connections to the enclosure, including the connection to Earth, as close together on the enclosure as possible. Single-point grounding for the connection to Earth is achieved, for example, by the proper bonding of the ground rods.

## **Safety Ground and Earth Connection**

The safety ground and Earth is a two-part system, comprised of the utility service and the Alpha system.

### 1. The utility service:

As a minimum requirement for the protection of Alpha equipment, the local utility service must provide a low-impedance path for fault current return. In addition, there must be a low impedance bonded path between the Alpha Power Supply power plug Ground Pin and the Enclosure.

### 2. The Alpha grounding system:

The Alpha grounding system consists of a low-impedance connection between the enclosure and an Earth Ground (located at least 6' away from the Utility Earth connection).

This impedance between the enclosure and Earth must be 25 Ohms or less at 60 Hertz as measured by AMPROBE Model DGC-1000 or equivalent. The measurement should be made on the wire or ground rod after it exits the enclosure.

Local soil conditions will determine the complexity of the grounding system required to meet the 25 Ohm (maximum) resistance specified above. For example, a single 8' ground rod may be sufficient to meet the requirement. In some cases, a more elaborate system may be required such as multiple ground rods connected by a #6AWG solid copper cable buried 8-12" below the surface. Where this is not possible, contact a local grounding system expert for alternate methods that will meet the 25 Ohm (maximum) specification.

**All ground rod connections must be made by means of a listed grounding clamp suitable for direct burial or exothermic welding.**

## **Power Output Return**

For proper operation, the Service Power Inserter (SPI) must be securely bonded to the enclosure.

## **Communications Grounding**

For an external status monitoring transponder, the transponder chassis is typically bonded via a separate ground wire to the enclosure. For systems using an embedded transponder, the grounding connection is typically made either through a separate chassis ground block bonded to the enclosure, or by means of the internal mounting hardware which bonds the transponder through the XM2-300HP. Please refer to the appropriate Communications product manual for installation procedures.

Alpha strongly recommends on communication cables the use of a surge arresting device electrically bonded to the Alpha Enclosure.

# Utility Power Connection Notes

## ATTENTION:

Connecting to the utility should be performed only by qualified service personnel and in compliance with local electrical codes. Connection to utility power must be approved by the local utility before installing the power supply.

UL and NEC require that a service disconnect switch (UL listed) be provided by the installer and be connected between the power source and the ALPHA power supply. Connection to the power supply must include an appropriate service entrance weather head.



## NOTICE:

In order to accommodate the high-inrush currents normally associated with the start-up of active load transformers (400 Amp, no-trip, first-half cycle), either a “high-magnetic” or an HACR (Heating, Air Conditioning, Refrigeration) trip breaker must be used. Either a 15A (minimum required) or 20A rated circuit breaker is acceptable. Do not replace these breakers with a conventional service entrance breaker. Alpha recommends ONLY Square D breakers because of the increased reliability required in this powering application. High-magnetic Square D circuit breakers and a BBX option (UL Listed service entrance) are available from Alpha Technologies.

Description	Alpha Part Number	Square D Part Number
120V Installation - High-magnetic (20A)	470-017-10	QO120HM
120V Installation - High-magnetic (15A)	470-013-10	QO115HM
BBX - External Service Disconnect	020-085-10	QO2 -4L70RB
BBX - External Service Disconnect	020-141-10	QO8-16L100RB

## ATTENTION:

In most cases, the following configurations qualify for service entrance use when wiring a duplex receptacle to a service disconnect. Other codes may also apply. Always contact your local utility to verify that the wiring conforms to applicable codes.

## XM2-300HP Connections

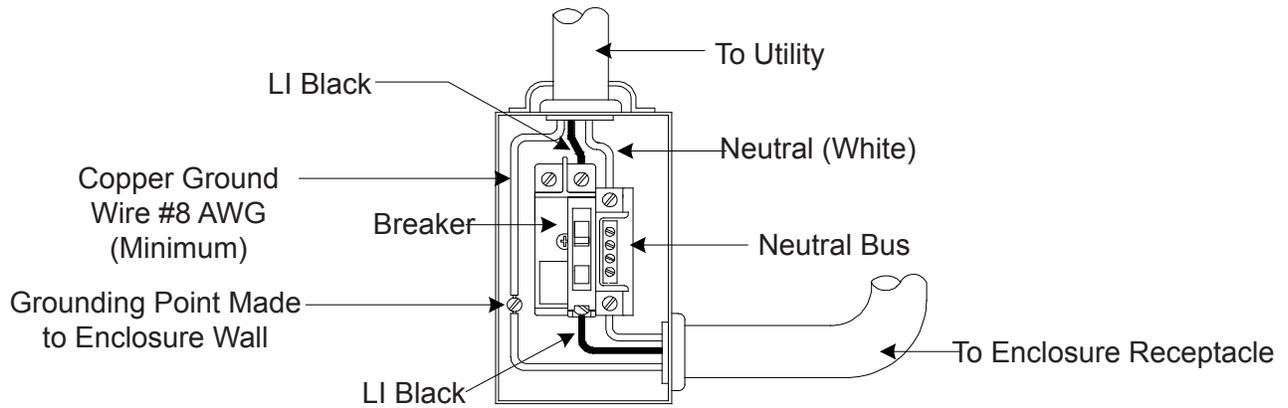
Proper 120Vac 15A or 20A service requires the installation site be equipped with a 120Vac duplex receptacle which provides power to the power supply and peripheral equipment.

### Verify the following:

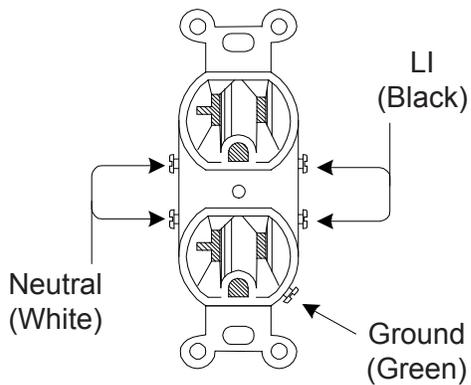
- For 20A service: Have a NEMA 5-20R receptacle that is protected by a single-pole, 20 Amp High Magnetic (HM) circuit breaker inside the service entrance.
- For 15A service: Have a NEMA 5-15R receptacle that is protected by a single-pole, 15 Amp High Magnetic (HM) circuit breaker inside the service entrance.
- That, in accordance with NEC CODE, the proper wire AWG (suggested wire gauge is 12AWG) is used.
- The system is equipped with a grounding clamp on the enclosure to facilitate dedicated grounding.
- The system is equipped with a plug-in or hardwired AC Surge Protector/Lightning Arrester for any outdoor installations. Plug-in Model: LA-P+ 120V or LA-P-120T. Hardwired Model: ISA 120/240 Surge Arrester Kit.

**Utility Connection Notes, continued**

Typical 120Vac Service Entrance Wiring

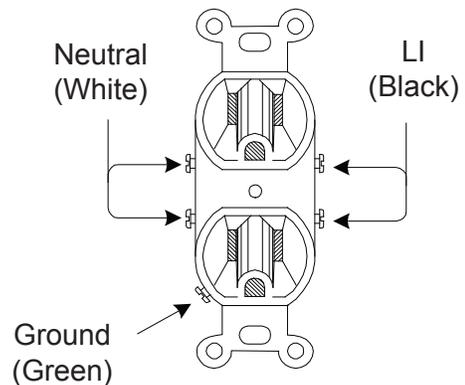


Typical 120Vac 20A Receptacle Wiring, 5-20R



(P/N 531-006-19)

Typical 120Vac 15A Receptacle Wiring, 5-15R



(P/N 531-003-10)



**NOTICE:**

When bonding the box to a neutral plate is required, use the long green bonding screw provided (Alpha p/n 523-011-10, Square D p/n 40283-371-50).

# 1.0 Introduction

Standard features of the XM2-300HP include:

- Smart Display
- Built-in Self Test (with inverter diagnostics)
- Battery test (advanced battery diagnostics)
- A high-efficiency transformer
- Improved Status menus
- Communications menu with DOCSIS® parameters

Via the Smart Display, the operator can view all of the power supply's operating parameters. Automatic scrolling (AUTO-SCROLL) is always active — eliminating the need to press any buttons to view the power supply's status or system parameters. In addition to operating parameters, active alarms are automatically displayed on the Smart Display, so that the operator can immediately see what fault is being detected. Troubleshooting tips automatically display on the Alarm menu screen.

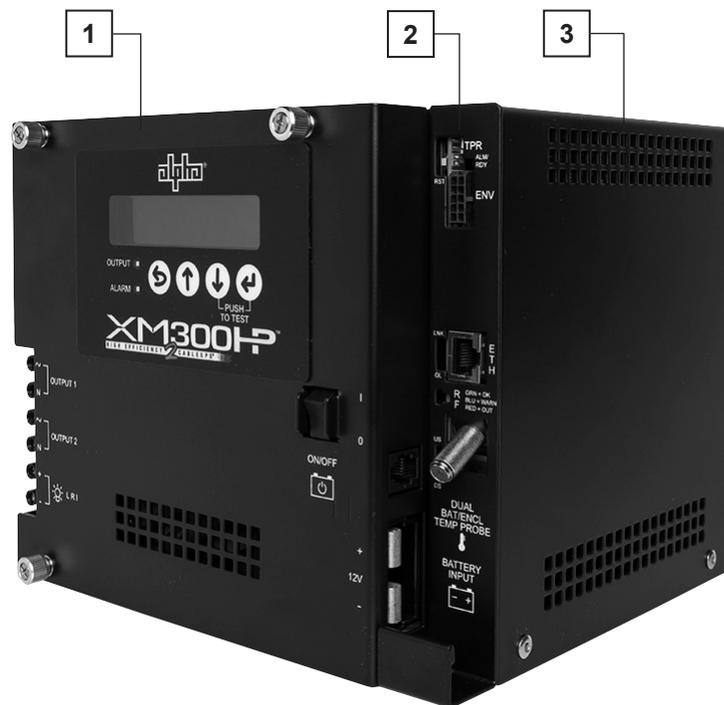


Fig. 1-1, XM2-300HP

The modular XM2-300HP is comprised of the:

- 1** Inverter module, which is required for standby operations and contains circuitry needed for the three-stage temperature-compensated battery charger, DC to AC converter (inverter), AC line detectors and Smart Display.
- 2** Optional DOCSIS® communications module (DPM or DM3), used to provide external status monitoring and communications.
- 3** Chassis, which contains a transformer and transfer isolation relay.

## 1.1 Theory of Operation

The XM2-300HP powers signal processing equipment in cable television and broadband LAN distribution systems. The XM2-300HP provides a critical load with current-limited, regulated AC power that is free of spikes, surges, sags and noise.

During AC line operation, AC power entering the power supply is regulated by a multi-tap transformer at the required output voltage. The regulated voltage is connected to the load via the output connectors, and some power is directed to the battery charger to maintain a float charge on the batteries.

When the incoming AC line voltage significantly deviates from normal, the XM2-300HP inverter module automatically switches to standby operation and maintains power to the load. In standby mode, the XM2-300HP powers the load until the battery voltage reaches a low-battery cutoff point.

When utility power returns, the XM2-300HP transformer module waits for a short time (approximately 20 to 40 seconds) for the utility voltage and frequency to stabilize and then initiates a smooth, in-phase transfer back to AC line power. Once the transfer is complete, the battery charger recharges the batteries in preparation for the next event.

### AC (Line) Operation

During AC Line operation, utility power is routed into the primary winding of the transformer through the contacts of the line isolation relay and voltage selection relays. Simultaneously, in the inverter, power is directed to the rectifier circuitry providing power for the control circuitry. The bidirectional inverter also serves as a battery charger during line operation. The transformer and automatic tap relays provide output voltage regulation.



#### **NOTICE:**

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The duration of battery-backed standby operation depends upon the type and number of batteries and the load on the power supply.

### Standby Operation

When the incoming AC line voltage drops or rises significantly, or a complete power outage occurs, the control logic's line monitor activates standby operation. During the transfer from AC line to standby operation, the battery powered inverter comes online as the isolation relay switches to prevent AC power from back-feeding to the utility. The following changes also occur within the XM2-300HP:

- The isolation relay opens to disconnect the AC line from the primary winding of the transformer.
- The control logic drives the inverter FETs on and off at line frequency. This switching action converts DC from the battery to AC in the transformer winding to provide a regulated power for the load.
- The control logic, which includes a microprocessor and other circuits to protect the inverter FETs from overcurrent damage, monitors the condition of the battery and the inverter during standby operation. Since a prolonged AC line outage would severely discharge the battery, resulting in permanent damage, the control logic disables the inverter when the battery cell voltage drops to 1.75Vdc per cell (10.5Vdc per individual battery).

When acceptable AC line voltage returns, the power supply returns to AC line operation after a 20 to 40 second lag. This delay allows the AC line voltage and frequency to stabilize before the control logic phase-locks the inverter's output to the utility input. The control logic then de-energizes the isolation relay, reconnects the AC line to the primary of the transformer and disables (turns off) the inverter. This results in a smooth, in-phase transfer back to utility power without interruption of service to the load. The battery charging circuit then activates to recharge the battery in preparation for the next power outage.

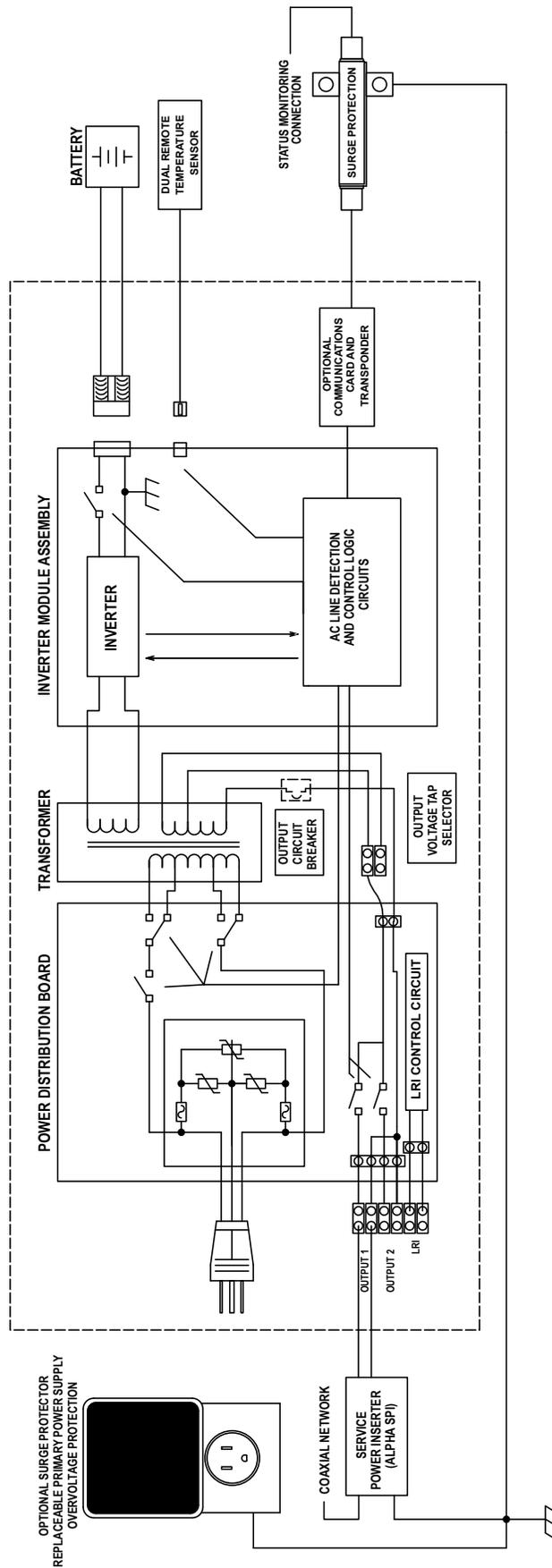


Fig. 1-2, Simplified Block Diagram

## Charger Operation

The XM2-300HP uses a three-stage, temperature-compensated battery charger. During AC line operation, the inverter winding on the transformer feeds the charger circuit which provides BULK, ACCEPT and FLOAT charge voltages to the battery.

### Charger Modes

#### BULK

This is a “Constant Current” charge with a maximum current of 10A. As the charge is returned to the batteries, their voltage increases to a specific threshold (2.27Vdc per cell). The charger then switches to ACCEPT mode. The BULK charger mode generally returns the battery charge state to 80 percent of rated battery capacity.

#### ACCEPT

This charge is a “Constant Voltage” charge. The voltage, 2.40Vdc (adjustable) per cell, is temperature-compensated to ensure longer battery life and proper completion of the charge cycle. This cycle is complete when the charging current into the battery becomes less than 0.5A, or approximately six hours elapses from the time ACCEPT mode was entered. When the batteries are fully recharged the charger switches to the FLOAT mode of operation.

#### FLOAT

This mode is a temperature-compensated “pulsed voltage” charge, averaging about 2.27Vdc (adjustable) per cell. During FLOAT mode, the battery is fully charged and ready to provide backup power. The charger provides a small maintenance charge to overcome the battery self-discharge characteristics and other minor DC loads within the power supply. As the battery voltage reaches the “full charge” level the time delay between pulses increases.

During ACCEPT and FLOAT modes, the cell voltage is temperature-compensated at -0.005Vdc per cell per degree C (adjustable) to ensure a safe battery cell voltage and to maximize battery life.

 **NOTICE:**

When AlphaCell is the selected battery type, ACCEPT and FLOAT are pre-set and are not manually selectable.

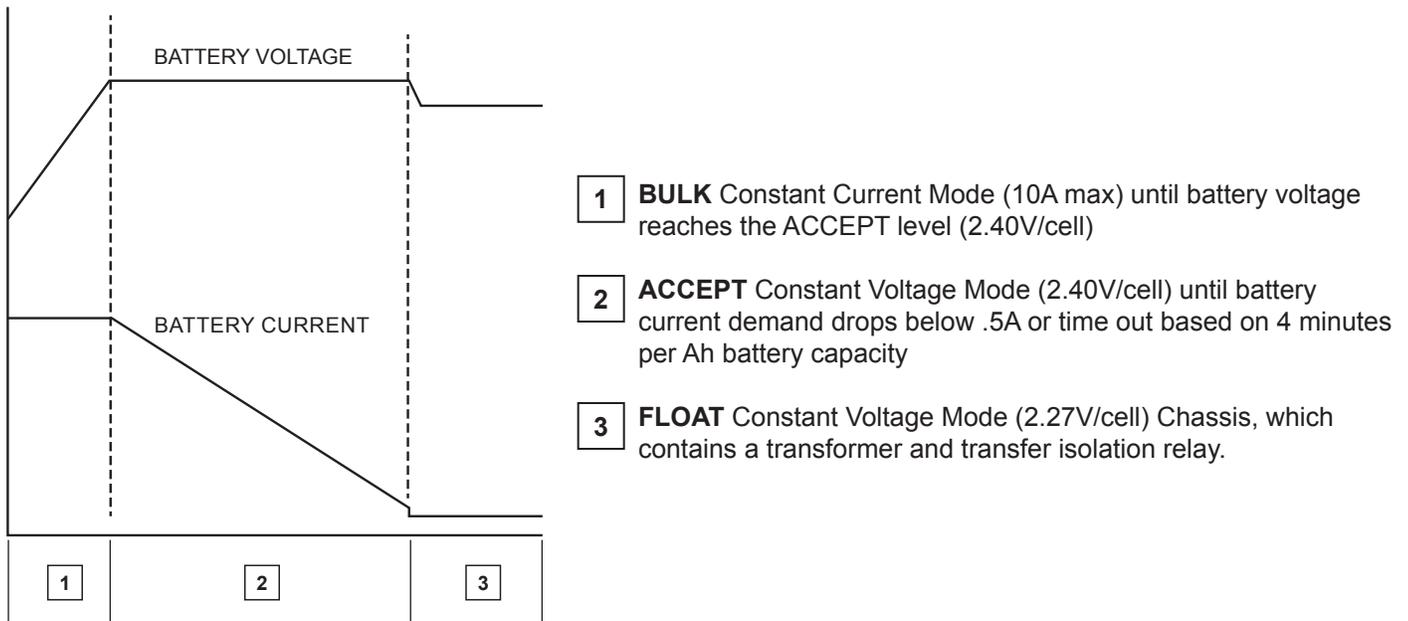


Fig. 1-3, Charger Modes

## 1.2 XM2-300HP Layout

### Transformer Module Overview

#### AC Output Circuit Protection:

XM2-300HP power supplies use an 8A circuit breaker. To provide increased durability, an integrated sheet metal guard protects the line cord and circuit breaker.

#### Output 1 (White = Neutral, Black = Line):

The AC output connector is clearly marked for easy identification. The service power inserter (SPI) connects directly into the Output 1 connector.

#### Output 2 (Optional) [White = Neutral, Black = Line]:

The AC output connector is clearly marked for easy identification. The SPI, which couples power to the load, connects directly into the Output 2 connector. This feature is part of the factory-installed PIM.

#### LRI (Local/Remote Indicator):

The LRI lamp option is used in conjunction with the automatic performance feature and plugs directly into the LRI connector. The LRI circuit is rated at 12Vdc, 250mA, and duplicates the function of the red ALARM LED by illuminating an externally mounted red lamp for standby operation.



Fig. 1-4, AC Input Connections and Product Label

- 1** Line Cord / Circuit Breaker Protective Tab
- 2** 8A Circuit breaker
- 3** Product Label

- 4** Output 1
- 5** Output 2
- 6** Local/Remote Indicator (LRI) Connector

## Inverter Module Overview

The removable inverter module provides uninterrupted power to the transformer (via the batteries) during line failures. During line operation, the inverter charges the battery using a three-stage (BULK, ACCEPT, and FLOAT) charger. The Inverter Module houses the following:

### Smart Display:

All operational functions, system testing, setup items, and alarms are available via the Smart Display panel on the front of the XM2-300HP (the Smart Display is covered in detail in Section 2.3). Display functions are accessible by pressing any of the four keys: ESCAPE, UP, DOWN or ENTER. Backlighting is activated when any of the four keys are pressed, and stays lit for a period of one hour. There are four levels of menu items: Operation Normal, Communication Information, Setup and Alarms. Pressing ENTER will sequence the display one level lower, and pressing ESCAPE will sequence the display one level higher. Additionally, built-in metering circuits measure and indicate voltage and current, without the need for external test equipment.

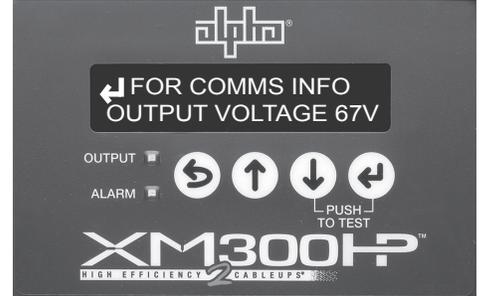


Fig. 1-5, Smart Display

### Battery Switch:

The battery switch disconnects the battery from the inverter module's DC circuit. With the battery switch turned off, the XM2-300HP power supply does not transfer to standby mode, the inverter is disabled, and the battery charger cannot charge the battery.

### Battery Input Connector

The battery cable connector is polarized and plugs directly into the inverter module's battery connector.

### Temp Probe Connector:

The Dual Remote Temperature Sensor (DRTS) plugs directly into the temperature probe (RJ-11C type) connector. One sensor clips onto the front edge of the power supply shelf and monitors the ambient air temperature within the enclosure. The second sensor attaches to the negative terminal of the battery and monitors battery temperature. To install, connect the ring terminal onto the negative battery terminal as shown below.

### NOTICE:

Always verify proper polarity of cables before connecting the battery to the power module. Polarity is clearly marked for easy identification. Reversing the polarity prevents the battery from being active in the system.

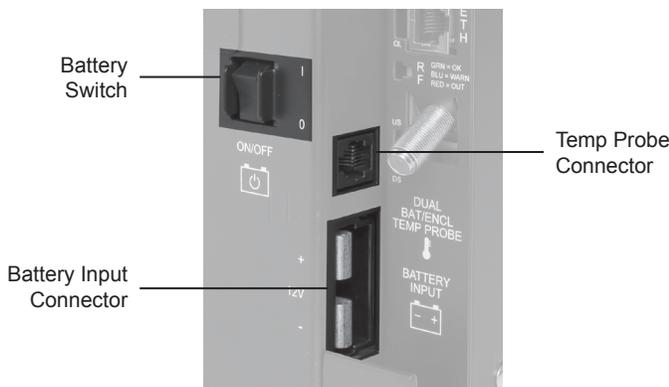


Fig. 1-6, Inverter Module Connections

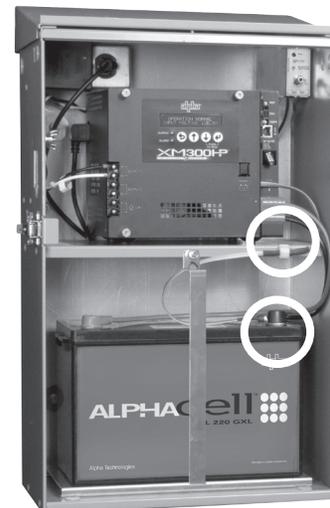


Fig. 1-7, Temperature Probe Locations

### Optional Status Monitoring Module

The XM2-300HP supports the Alpha Technologies DPM (DOCSIS 2.0) or DM3 (DOCSIS 3.0) communication module. The module may be ordered factory-installed or as a user-installed field upgrade.

**NOTICE:**

If communications options are installed, Alpha recommends adding a coaxial surge arrestor for the transponder. Tighten the RF cable connector and the cables attached to the Grounded Surge Protector to a Torque setting of 10in-lb ± 1in-lb. (See Section 1.3, *Optional Features*).

**CAUTION!**

Handle these modules with extreme care. Circuit boards and logic upgrades are static-sensitive and susceptible to damage.

### DOCSIS® Communication Module

Network-enable your power supply and access powerful diagnostic tools using the DPM or DM3 embedded WEB interface and standard SNMP. Poll power supply and battery data in real-time, and receive alerts when power system alarms indicate noteworthy events. The DPM or DM3 is completely configurable from the standard cable modem configuration file and can be provisioned using default cable modem settings. Customize your monitored information with configurable CM settings that are used to set alarm thresholds and power supply operating parameters.

Visit [www.alpha.com](http://www.alpha.com) to download a copy of the technical manual for the installed communications module. Information regarding the DPM is found in the AlphaNet DSM Series 3 Technical Manual (*Alpha p/n 745-814-B8*). Information regarding the DM3 is found in the DM3.0 Series DOCSIS® Status Monitor Technical Manual (*Alpha p/n 704-939-B0*).

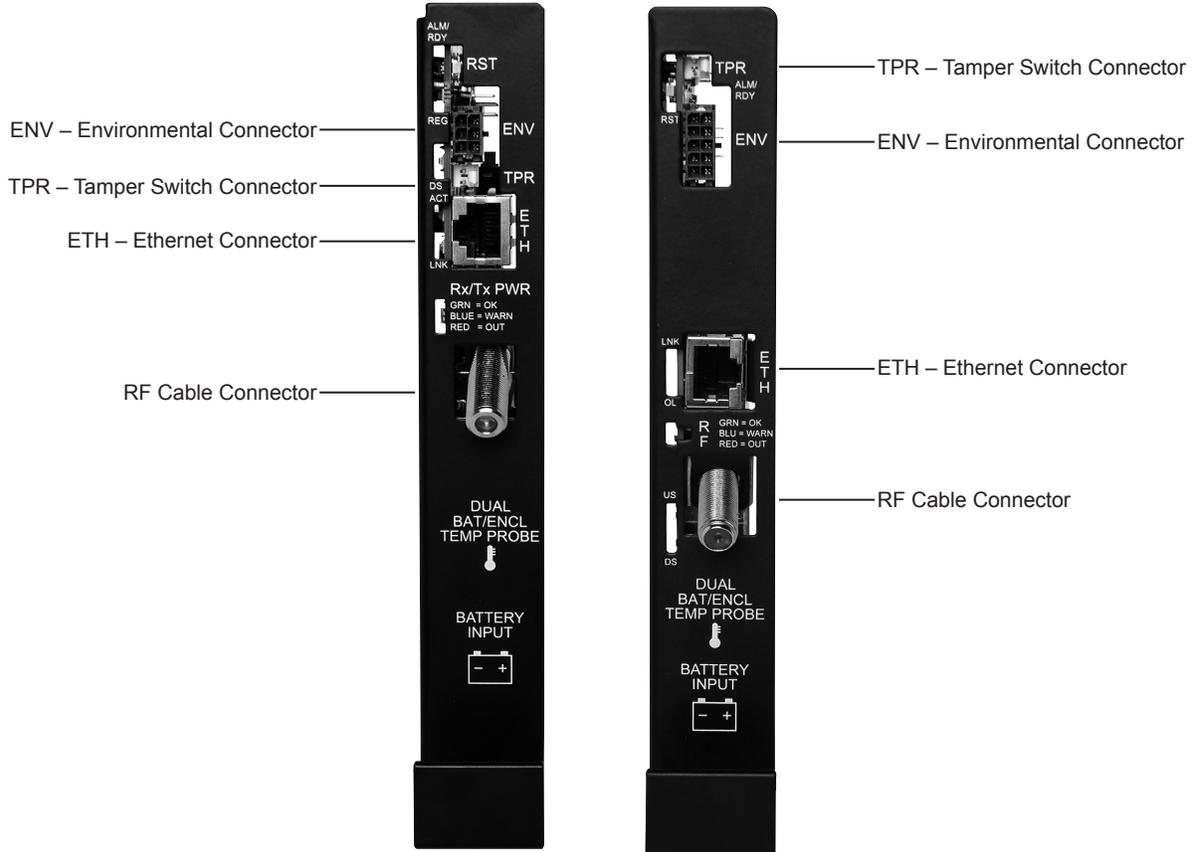


Fig. 1-9, DPM (L) and DM3 (R)

## 1.3 Recommended Enclosure System Options

These options can be factory installed or upgraded in the field by the user:

### Local and Remote Indicator (LRI)

The LRI (red) lamp is located on the outside of pole-mount enclosures. Using this simple form of status monitoring operators can check the operational status of the power supply without having to climb the pole and open the enclosure. During normal AC line operation, the LRI remains off. The LRI comes on only when the power supply is running in standby mode. Whenever a fault is detected during Self Test, the LRI flashes to indicate that service is required.

### AC Indicator (ACI)

The AC Indicator (green lamp) is located next to the LRI on the outside of pole-mount enclosures and also acts as a simple form of status monitoring so cable technicians can check the output status of the power supply without having to climb the pole and open the enclosure. As long as there is voltage present at the output, the ACI remains on. To provide much longer life than the original light bulb design, use the ACI-LL (long life LED). Models for 60V and 90V are available. Do not use ACIs for ground mount enclosures.

### AC Surge Protector / Lightning Arrester

AC surge protectors may be plugged directly into the AC outlet or hardwired into the utility power feed depending on the model. For outdoor installations of the XM2-300HP, the AC surge protector is required to meet agency compliance.

### Coaxial Surge Protector

Alpha recommends using coaxial surge suppression for enclosure protection. The Coax Surge Protector (*Alpha p/n 162-028-10*) includes 75 ohm surge protector and mounting hardware.

### APP9015S / APP9022S (Service Power Supply)

The APP9015S / APP9022S is a portable, non-standby power supply that provides conditioned AC power to the load when the main power module is out of service. An internal tap lets the APP9015S / APP9022S be set for 90/75/60Vac applications. Use a 15A or 25A SPI (Service Power Inserter) to transfer power from the APP9015S / APP9022S to the load.

## 2.0 Pre-Commissioning

### 2.1 Initial Inspection



#### **CAUTION!**

---

Read the Safety Precautions, Utility Power Connection Notes, and Grounding Connection Notes (*pages 8-11*) before you install the power supply.

#### **Pre-installation Inspection**

1. Remove the XM2-300HP from the shipping container. Confirm that the power supply, including the Remote Temperature Sensor, and all other ordered options are included.
2. During shipping, components might shift. Carefully inspect the power supply and other contents for possible shipping-related failures, such as loosened or damaged connectors. If any items are damaged or missing, contact Alpha Technologies or the shipping company immediately. Most shipping companies have a short claim period.
3. Do not attempt to install a damaged power supply without first passing a complete pre-installation inspection and start-up test.



#### **NOTICE:**

---

See the “CableUPS Quick Start Guide” (*Alpha p/n 017-877-B0*) that accompanies each power supply. **SAVE THE ORIGINAL SHIPPING CONTAINER.**

Use the original shipping container if the XM2-300HP needs to be returned for service. If the original container is not available, make sure the unit is well packed with at least three inches of shock-absorbing material to prevent shipping damage.



#### **CAUTION!**

---

Do not use popcorn-type material. Alpha Technologies is not responsible for damage caused by improper packaging of returned units.

#### **ATTENTION:**

---

***Output voltage reconfiguration is only to be performed by authorized personnel.***

## 2.2 Pre-Commissioning Checklist

The XM2-300HP can be shelf-mounted in a variety of Alpha enclosures. Complete the checklist below before system commissioning.

 **NOTICE:**

---

Alpha enclosures are engineered to properly vent the XM2-300HP. The XM2-300HP series has been investigated by regulatory authorities for use in various Alpha enclosures. If the product is being installed in a non-Alpha enclosure, verify the combination conforms to local regulatory requirements, and that the XM2-300HP remains within its environmental specifications.

 **NOTICE:**

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Verify XM2-300HP output voltage tap is set appropriately for load equipment to be powered. See Appendix subsection 9.2 for details and AC output voltage reconfiguration procedure on the XM2-300HP.

 **NOTICE:**

---

At the beginning of the installation, take the initial readings of the batteries and record them in the event maintenance needs to be performed. These initial readings can be found and recorded in Section 5.8 Maintenance Logs.

 **CAUTION!**

---

Whether the system is comprised of one 12V battery or 2 to 3 batteries connected in parallel, the measured voltage at the battery connector should be 12Vdc. Properly install and test all batteries, battery connections and battery cables prior to connection to the power supply.

1. Place the XM2-300HP on the top shelf of the enclosure.
2. Verify the Inverter Module's battery switch is OFF.
3. Connect battery cables to battery input connector.
4. Insert temperature probe cable
5. Insert Local/Remote Indicator (LRI) cable. (Optional)
6. Connect status monitoring connectors, including tamper switch (if installed).
7. Verify SPI switch is in "ALT" position.
8. Connect the SPI (network load) to the Output 1 connector.
9. Connect an auxiliary load to the Output 2 connector.
10. For outdoor installations, plug the LA-P+ AC surge protector into the convenience outlet or verify the hardwired ISA 120/240 kit has been installed.

Refer to Section 3.1, Turn-Up and Test, for the complete system commissioning procedure to place the unit into service.

### 2.3 About the Smart Display

All operational functions, system testing, setup menus, and alarms are available via the illuminated display panel on the front of the XM2-300HP. Display functions are accessible by pressing any of the four keys: **ESCAPE**, **UP**, **DOWN**, and **ENTER**.

Descriptions of the key functions are:

KEY	ACTION
<b>ESCAPE</b> 	Move up one level in the menu tree. Leave the EDIT mode without saving the changes made to the selected menu item.
<b>UP</b> 	Scroll up in a branch of the menu tree. Increase a parameter (or value) while in the EDIT mode.
<b>DOWN</b> 	Scroll down in a branch of the menu tree. Decrease a parameter (or value) while in the EDIT mode.
<b>ENTER</b> 	Displays the next lower level in the menu tree. In the EDIT mode, ENTER accepts the new value into memory. Depressing ENTER for two seconds or longer initiates Display Test mode. Display Test mode switches all LED and LCD pixels (dots) on for several seconds.
<b>Self Test</b> 	Press DOWN and ENTER simultaneously to manually enter a Self Test mode. A Self Test will be initiated and run between 5-180 minutes (set in the setup menu). To cancel a Self Test in progress, simultaneously press DOWN and ENTER.

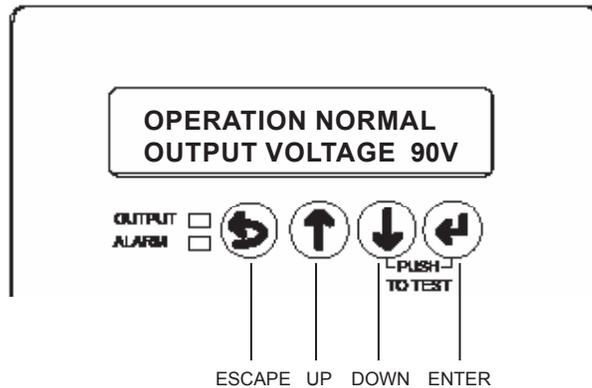


Fig. 2-1, Smart Display Navigation

## 2.4 Using the Smart Display

### Display Backlighting

The display is normally unlit. Press any key once to activate backlighting and illuminate the display without deactivating Auto Scroll.

### Auto Scroll

The display is normally in Auto Scroll mode, continually cycling through the sub-menu items at a two-second interval. In Auto Scroll mode you can quickly view menu items without the need to press any keys.

### Single Step

Pressing either arrow key (Up key or Down key) activates the Single Step mode in which you can step through individual menu items one at a time. Each press of the arrow key steps up or down through the sub-menu items. Press ESC to return to Auto Scroll mode.

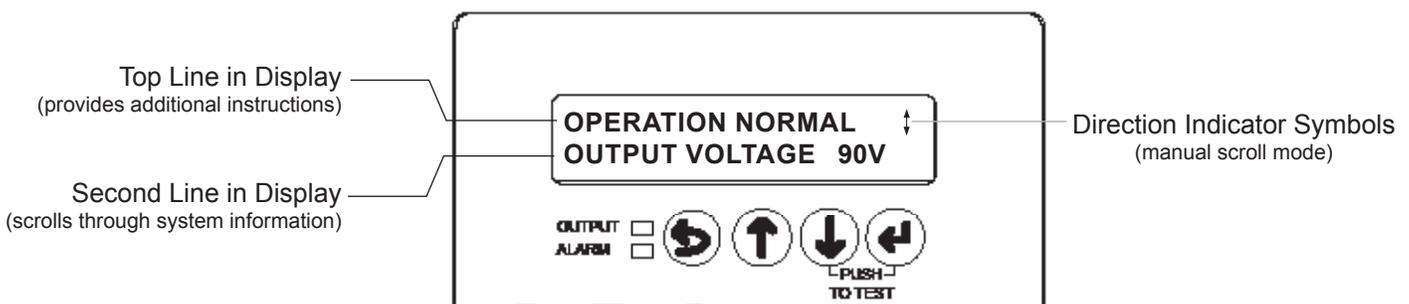


Fig. 2-2, Smart Display Panel

### Direction Indicator Symbols

The rightmost character of the display (may appear on either line) indicates the proper key function when manually scrolling. Where more than one choice is available multiple characters display. Possible characters or text are:

#### KEY(S) ACTION

- |   |   |
|---|---|
|  | Access more menu items by pressing either <b>UP</b> or <b>DOWN</b> .  |
|  | Press <b>ENTER</b> to select (or accept) a function.  |
|  | Press <b>UP</b> or <b>DOWN</b> to change a display value or mode. Press <b>ENTER</b> to save the change into memory. <i>(This type of multiple display choice is normally available in the programming mode.)</i> |
|  | Press <b>ESCAPE</b> to leave the selected function without altering any values or return to the previous menu in the display.   |

## 2.5 Smart Display Glossary

**Battery Capacity:** The capacity of the batteries installed with a particular XM2-300HP. When batteries are not installed, the setting must be programmed to “0”. This disables standby operations, including test mode and disables the No Batteries Alarm.

 **NOTICE:**

---

If non-Alpha batteries are installed, Battery Capacity should be set per manufacturer’s rating.

**Battery Conductance (MHOs) Reading:** The battery conductance is measured in Siemens and can be determined using a battery analyzer. This measurement is related to the internal resistance of the battery and is useful in evaluating and maintaining the battery.

**Battery Date Code:** This is the battery’s date of manufacture and is used to determine the age of the battery.

**Battery Life Expectancy:** The Manufacturer’s expected service life of the battery.

**Battery Type:** The AlphaCell battery type can be specified via the smart display (if not AlphaCell, leave as default battery type, Other). If AlphaCell is selected, values for Accept, Float, Temperature Compensation, and Battery Capacity are automatically selected. If Other, these parameters will need to be manually set to the manufacturer’s recommended rating.

**Charger Accept Voltage:** Battery Accept charge voltage control in volts per cell. This voltage, 2.40Vdc (adjustable) per cell, is temperature compensated to ensure longer battery life. It properly completes the charge cycle and is factory set for AlphaCell batteries. If another manufacturer’s batteries are used, consult the battery manufacturer for Accept voltage levels.

**Charger Float Voltage:** Battery Float charge voltage control in volts per cell. This is set to 2.27Vdc per cell for AlphaCell batteries. The value is temperature compensated, and is adjustable for OTHER battery type. If another manufacturer’s batteries are used, consult the battery manufacturer for Float voltage levels.

**Charger Temperature Compensation:** Battery charger temperature compensation control. Programming this parameter to “0.0” disables temperature compensation. It is factory set for AlphaCell batteries (5mV/cell). If another manufacturer’s batteries are used, consult the battery manufacturer for Charger Temperature compensation ranges.

**Date of Last Conductance (MHO’s) Reading:** The date the last conductance test was performed on the battery.

**End of Discharge (EOD):** The point at which the battery is fully discharged (default 1.75V/C \* 6 cells) and the power supply shuts off, preventing permanent damage to the batteries.

**Frequency Range Limit:** AC input voltage frequency range limit. This limit establishes the acceptable input frequency range outside of which standby operation is initiated.

**Major Conductance Alarm:** The alarm issued when the battery conductance is below the critical level. This is an indication the battery is near the end of its useful life.

**Minor Conductance Alarm:** The alert issued when the conductance of the battery has dropped below the preset minor limit. This is an indication the battery is aging and may require close observation.

**Output 1 Overcurrent Trip level:** *Primary leg:* Value of RMS current that causes an overcurrent trip on the Output 1 + Output 2 protection relay after a specified delay. This limit is linked to the parameter Overcurrent Tolerance Period.

**Output 2 Overcurrent Trip level:** *Secondary leg:* Value of RMS current that causes an overcurrent trip on the Output 2 protection relay after a specified delay. This limit is linked to parameter Overcurrent Tolerances Period.

## 2.0 Pre-Commissioning, continued

**Overcurrent Tolerance Period:** An output overcurrent condition is tolerated on either of the PIM outputs for this amount of time. When this delay expires, the output protection relay disables the output.

**Power Supply Priority:** The Power Supply Priority is set by the service provider and identifies the priority level of the unit at time of service if multiple service calls are issued simultaneously.

**Reset Output 1, Reset Output 2:** Programming this feature resets the corresponding output in the event one or both outputs are tripped. Upon clearing the alarm, either manually or via an automatic retry, the output(s) remain on.

**Retry Delay:** PIM option output fault retry interval timer. This is the period of time between each attempt to restart an output connection. While automatic retry can't be disabled, the value of retry delay can be changed to shorten the length between retries. The default value is 300 seconds with maximum of 600 seconds and minimum of 60 seconds.

**Retry Limit:** PIM fault retry count limit. This is the number of times the XM2-300HP attempts to restart an output connection at the frequency specified by Retry Delay. Once the retry limit is exceeded, attempts to restart the feeder occur indefinitely, once every 30 minutes.

**Set Defaults:** When programmed to YES, all the programmable data levels (except STANDBY TIME, STANDBY EVENTS, DEVICE ADDRESS, TOTAL RUN TIME and LANGUAGE will not change by setting defaults.) are reset to the original factory settings.

**Self Test:** When programmed to YES, the XM2-300HP automatically starts a 10 minute Self Test.

**Standby Events:** XM2-300HP standby events counter. This does not include Self Test events. Use the Setup Menu to reset Standby Events to zero.

**Standby Time:** The total amount of time the XM2-300HP has operated in standby mode. This does not include Self Test time and represents the sum total number of minutes of AC line failure since the last time the counter was reset. Use the Setup Menu to reset Standby Time to zero.



### **NOTICE:**

---

Resetting factory defaults does not clear Standby Events or Standby Time.

**Technician ID number:** The Technician ID number is determined by the service provider and is entered to record the service history of the unit.

**Test Countdown:** The number of days remaining before the next scheduled automatic Self Test initiates. This variable is programmable and you can select the day that the autotest sequence will begin. This counter has no effect if test interval is set to 0.

**Test Duration:** Automatic Self Test duration timer. This sets the number of minutes the XM2-300HP performs a battery maintenance cycle test. This timer applies to automatically or manually initiated tests.

**Test Discharge percentage:** The depth of discharge allowed during a battery/inverter test and is based on battery capacitance and power supply load.

**Test Inhibit:** Becomes active when programmed by the operator (or when the unit runs in inverter mode for more than 5 minutes). The XM2-300HP delays the start of a scheduled Self Test for seven days if the test countdown is less than seven days (See Section 4.4, Automatic Performance Test for complete details).

**Test Interval:** Automatic Self Test control timer. The number of days between battery maintenance cycle tests. Set this value to zero to disable automatic Self Test.

**Total Run Time:** The amount of time (in days) the power supply has functioned in any mode of operation. This is not a resettable value.

## 3.0 Commissioning

### 3.1 Turn-up and Test

As part of the commissioning procedure, the operator will perform tests to verify utility AC voltage and battery DC voltage as well as perform tests of the power supply (Self Test and Standby Operation) before placing the unit into service.

#### AC Line Operation

1. Before making power supply connections, verify the correct voltage, polarity and frequency are available from both the AC utility power source and the DC battery system.
2. Verify the AC circuit breaker (on the customer supplied service disconnect) and the battery switch on the XM2-300HP are off.
3. Plug the XM2-300HP power cord into the convenience outlet and make the battery cable connection. Plug the DRTS into the temp probe connection and attach it to the negative terminal of the battery (see Fig. 1-7). Plug the LRI cables into the front panel, if applicable.
4. Switch the AC (service disconnect) circuit breaker on to start initial power up. During this stage, the power supply performs a “display test” and verifies configuration for the power supply. After the initial display test, a “No Batteries” alarm message appears on the Smart Display because the battery switch is off. The green output LED remains off and the red alarm LED continues to flash while in this alarm state (see Section 4.2).

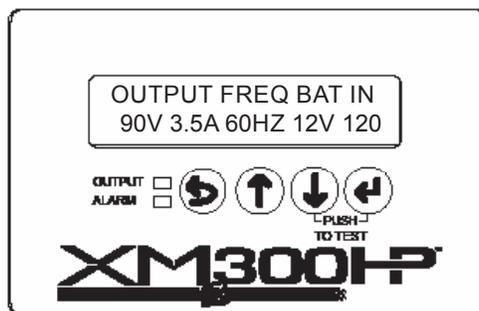


Fig. 3-1, Sample Configuration Screen

#### **NOTICE:**

Access the configuration screen any time by simultaneously pressing UP and ENTER.

5. Use the Smart Display to verify XM2-300HP operations. If desired, the No Battery alarm can be disabled by changing Battery Capacity to “0” in the setup menu.
6. Use the Smart Display to verify AC output ( $\pm 5\%$ ).

Setting	Low (-5%)	High (+5%)
87Vac (Domestic models)	82.65Vac	91.35Vac
60Vac (Domestic models)	57.0Vac	63.0Vac
63Vac (CE models)	59.85Vac	66.15Vac

Table 3-1, AC Output

7. Switch on the battery switch. Within one minute, the flashing red alarm LED turns off, the green output LED turns on, the No Battery alarm clears and the power supply displays Operations Normal. Use the Smart Display to verify operations and setup as needed.

### 3.0 Commissioning, continued

#### Self Test Operation

1. The XM2-300HP should be operating correctly with no alarms present. Use the Smart Display to verify Normal and/or Additional Information (Communication Information available only when communication module is installed). Verify test duration in the Setup Menu as needed.
2. Press and hold DOWN and ENTER simultaneously to start Self Test. The test will run for a preset time (5-180 minutes, set in the Setup Menu). Self Test can also be entered by setting Self Test to ON in the Setup Menu.
3. While in Self Test mode, use the Smart Display or a true RMS voltmeter to verify output at the module's AC Output. Output voltages should appear within  $\pm 5\%$  of: 87Vac for 90V units, 63Vac for CE units, and 60Vac for 60V units at nominal line input voltage.
4. To cancel a Self Test in progress, push and hold DOWN and ENTER a second time, or change Self Test to OFF in the Setup Menu.

#### Standby Operation

Perform the following procedure after successful completion of a Self Test with the XM2-300HP operating normally in AC line mode.

1. Momentarily fail the AC utility input power by switching the AC (service disconnect) circuit breaker to OFF.
2. The XM2-300HP starts operating in the inverter mode. Use the Smart Display or a true RMS voltmeter to verify output. Output voltages should appear within  $\pm 5\%$  of: 87Vac for 90V units, 63Vac for CE units, and 60Vac for 60V units at nominal line input voltage.
3. Return the XM2-300HP to AC Line mode by switching the AC (service disconnect) circuit breaker to ON. The transfer back to utility power may take 10 to 50 seconds for the utility voltage and frequency to stabilize, and the module's phase-lock circuitry to activate. The module then synchronizes the inverter waveform and inverter before initiating a smooth, in-phase transfer back to utility power. Once the transfer is complete, the Smart Display reports:  
OPER MODE = LINE.

The XM2-300HP is now fully operational.

## 4.0 Operation

### 4.1 Smart Display modes for XM2-300HP

#### Operation Normal

If no alarms are present, the XM2-300HP power supply operates in Operation Normal display mode. In this mode you can view the primary operating parameters of the power supply while the display auto scrolls through the available menu items at two-second intervals. In Operation Normal mode the displayed items are all “metered” items and are for informational purposes only (not programmable) with respect to the operational status of the power supply.

The Operation Normal menu contains the following items:

<b>OPERATION NORMAL</b>	↕	← Top line
<b>OPER MODE =</b>	<b>LINE</b>	← Second line
<b>BATT STATUS</b>	<b>OK</b>	
<b>INV STATUS</b>	<b>OK</b>	
<b>DPM STATUS</b>	<b>OK</b>	
<b>INPUT VOLTAGE</b>	<b>120</b>	
<b>INPUT FREQ</b>	<b>60HZ</b>	*
<b>INPUT CURRENT</b>	<b>23.0A</b>	
<b>INPUT WATTS</b>	<b>140</b>	
<b>OUTPUT VOLTAGE</b>	<b>60</b>	
<b>OUTPUT 1 CURR</b>	<b>1.0A</b>	
<b>OUTPUT 2 CURR</b>	<b>1.0A</b>	
<b>OUTPUT CURRENT</b>	<b>2.0A</b>	
<b>OUTPUT WATTS</b>	<b>120 W</b>	*
<b>OUTPUT VA</b>	<b>120 VA</b>	
<b>PERCENT LOAD</b>	<b>33%</b>	
<b>CHARGER MODE =</b>	<b>ACCEPT</b>	
<b>BATT VOLTAGE</b>	<b>14.4V</b>	
<b>BATTERY TEMP</b>	<b>26.5C</b>	
<b>ENCLOSURE TEMP</b>	<b>26.5C</b>	*
<b>CHARGER CURR</b>	<b>5.0A</b>	
<b>1 EVENTS</b>	<b>84 MIN</b>	

\*Only visible in single-step mode

Fig. 4-1, Operation Normal Display  
(Examples are given for values in the display)

The top line indicates the current screen and provides additional instructions. Use the arrows to manually scroll. When scrolling, the parameters shown above will cycle through the second line.

## 4.0 Operation, continued

### Comms Information Display (with DPM or DM3)

Pressing ENTER while in the Operation Normal screen will open the Comms Information display (only displayed when paired with DPM or DM3, otherwise display will read "NO DATA"). This mode operates in a similar fashion as the Operation Normal display. When you first access the information display, information displays in Auto Scroll mode. Press UP or DOWN to access information one step at a time. Press ENTER to access the Setup Menu (discussed on page 30). Press ESCAPE to reactivate Auto Scroll mode. Press ESCAPE a second time to reactivate Operation Normal mode (up one level).

The Comms Information display contains the following items:

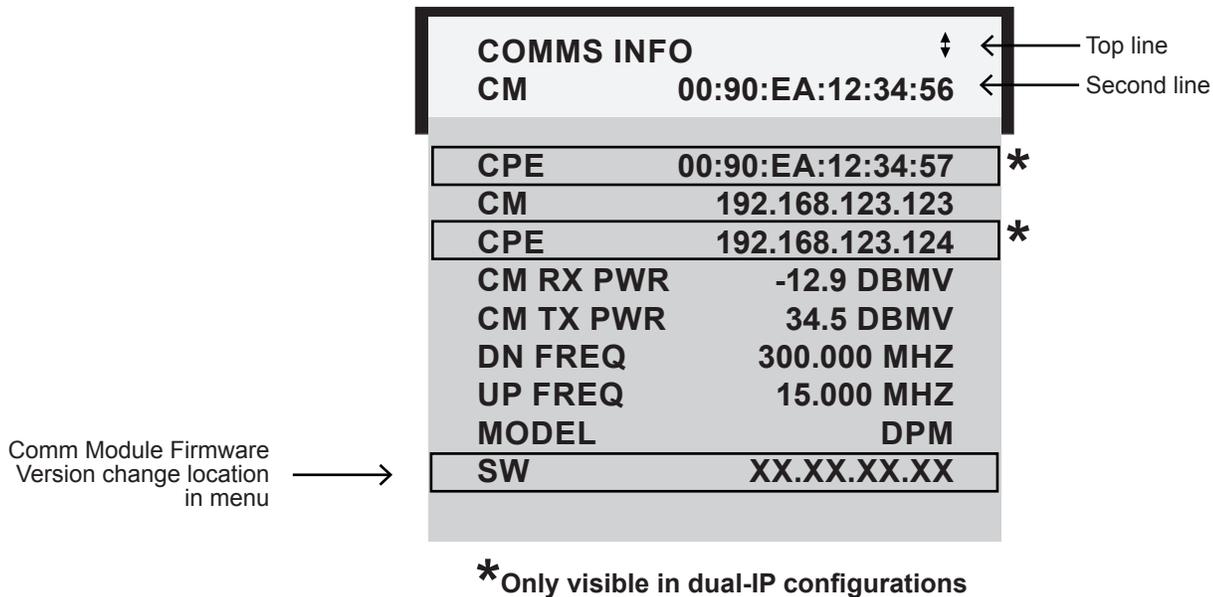


Fig. 4-2, Comms Info Display  
(Examples are given for values in the display)

The top line provides additional instructions. Use the arrows to manually scroll. When scrolling, the parameters shown above will cycle through the second line.

### Setup Menu

Pressing ENTER while in the Comms Status display opens the Setup Menu, one level below the Comms Status display. Using the Setup menu you can view and change the programmable operating parameters of the power supply or the PIM. Setup Menu navigation is similar to the Operation Normal menu. Press UP or DOWN to access the Single Step mode where sub-menu items are individually selected.

To select and change a value in the Setup Menu:

1. Press either UP or DOWN to put the display in the Manual Scroll mode.
2. Continue to press UP or DOWN until the desired item is displayed.
3. Press ENTER to select the item for editing.
4. Use UP to increase the displayed value, or DOWN to decrease the value. To change the displayed value more rapidly, press and hold either UP or DOWN for more than two seconds while in edit mode.

#### **NOTICE:**

---

When in EDIT mode, press the ENTER key twice for the change in the parameter to take effect.

5. Press ENTER when the desired value displays. This accesses an additional display where you can either ESCAPE from programming mode and not save the new value, or press ENTER to accept and save the new value.
6. After the value is saved, the display returns to the Setup Menu. You may now check and view the new value or select additional parameters to modify.

If an incorrect value is entered, repeat the above process and enter the proper value; or select the Set Defaults menu selection on the Setup Menu and press ENTER twice to reset all parameters to their factory default values.

In addition to using UP and DOWN to increase or decrease numerical values, you can select ON or OFF and YES or NO in the same manner as described. The CODE VER, XM\_CLASS VER, and Total Run Time selections are for informational display only and cannot be edited. To return to the "Operation Normal" menu from the Setup Menu, press ESCAPE three times.

#### **NOTICE:**

---

The Set Defaults menu selection does not reset Standby Time, Standby Events or Device Address; these settings must be manually reset.

## 4.0 Operation, continued

The Setup Menu contains the following items:

Top Line (provides additional information)

- SET UP MENU
- ↓↑ TO MANUAL SCROLL
- <ESC> TO COMMS INFO

Second Line (cycles through the following parameters):

	Default	Minimum	Maximum
Other Battery Types	Other	If AlphaCell™ is selected then user selects between a range of Alpha cells	
Device Address	1	0	7
Battery 1 Life	5	0	10
MHO's Minor Level	80%	10	80
MHO's Major Level	60%	20	80
Float V/C	2.27 V/C	2.10 V/C	2.35 V/C
Accept V/C	2.40 V/C	2.20 V/C	2.45 V/C
Temp Comp	5.0 mV	0.0 mV	5.0 mV
Batt. Capacity*	100 AH	0	1000 AH
Battery 1** Date	01/10	01/00	12/30
Battery 1 MHOS	1050 S	150 S	2500 S
MHO 1 Date	01/10	01/00	12/30
Battery 1 Life	5 Y	0 Y	10 Y
Battery 1 Age	0	0 (Read Only)	10 (Read Only)
MHO's Minor Level	80%	20%	80%
MHO's Major Level	60%	20%	80%
Standby Time	0	0	65335
Standby Events	0	0	65335
Total Runtime	0	0	65335
Self Test	Off	5 minutes (300 s)	180 minutes (10,800 s)
Test Interval	30 Days	0 Days	360 Days
Test Inhibit	—	7 Days	7 Days
Discharge %	00%	00%	50%
Test Duration	10 Min	5 Min	180 Min
Test Countdown	30 Days	0 Days	360 Days
Freq. Range	3.0Hz	1.0Hz	6.0Hz
PIM Option	Yes	No (Read Only)	Yes (Read Only)
Reset Output 1	—	No	Yes
Reset Output 2	—	No	Yes
Over Curr1	5.0 A	3.0 A	6.0 A
Over Curr2	5.0 A	3.0 A	6.0 A
Retry Delay	300 Sec	60 Sec	600 Sec
Retry Limit	10	0	10
Over Curr Tol	60s	0s	255s
System Fan	No	No	Yes
PS Priority	High	Normal	Critical
Technician ID	123	000	999
Input I Limit	6.0 A	1.0 A	6.0 A
Set Defaults	—	No	Yes
Language	English	Spanish/French/Portuguese/German	

These items appear in the setup menu only if battery type **Other** is selected. They are preset (but not displayed) if AlphaCell™ is selected.

These items appear in the setup menu only if the optional PIM is installed.

\* Per battery

\*\* Battery Data will change as a function of changes to the number of battery strings in the system.

SETUP MENU	↕
CODE VER	7.01.0
DEVICE ADDRESS	1
ALPHACELL	OTHER
FLOAT V/C	2.27
ACCEPT V/C	2.40
TEMP COMP	5mV
BATT CAPACITY	100Ah
# BATT STRINGS*	1
BATT 1 DATE M/Y*	01/10
BATT 2 DATE M/Y**	01/10
BATT 1 MHOS*	1050
BATT 2 MHOS**	1050
MHO 1 DATE M/Y*	01/10
MHO 2 DATE M/Y**	01/10
BATTERY 1 LIFE*	5Y
BATTERY 1 AGE*	5Y
BATTERY 2 LIFE**	0 MO
BATTERY 2 AGE**	0 MO
MHOS MIN LEVEL*	80%
MHOS MAJ LVL*	60%
STANDBY TIME	65 M
STANDBY EVENTS	12
TOTAL RUN TIME	365D
SELF TEST	OFF
TEST INTERVAL	30D
TEST INHIBIT	—
% DISCHARGE	00%
TEST DURATION	10 M
TEST COUNTDOWN	30D
FREQ RANGE	3.0HZ
PIM OPTION	YES
RESET OUTPUT 1	—
RESET OUTPUT 2	—
OVER CURR 1	15.0A
OVER CURR 2	15.0A
RETRY DELAY	60S
RETRY LIMIT	20
OVER CURR TOL	3000ms
SYSTEM FAN	NO
HEATER MAT	NO
PS PRIORITY	NORMAL
TECHNICIAN ID	123
INPUT LIMIT	6.0
SET DEFAULTS	NO
SELECT LANGUAGE	ENGLISH

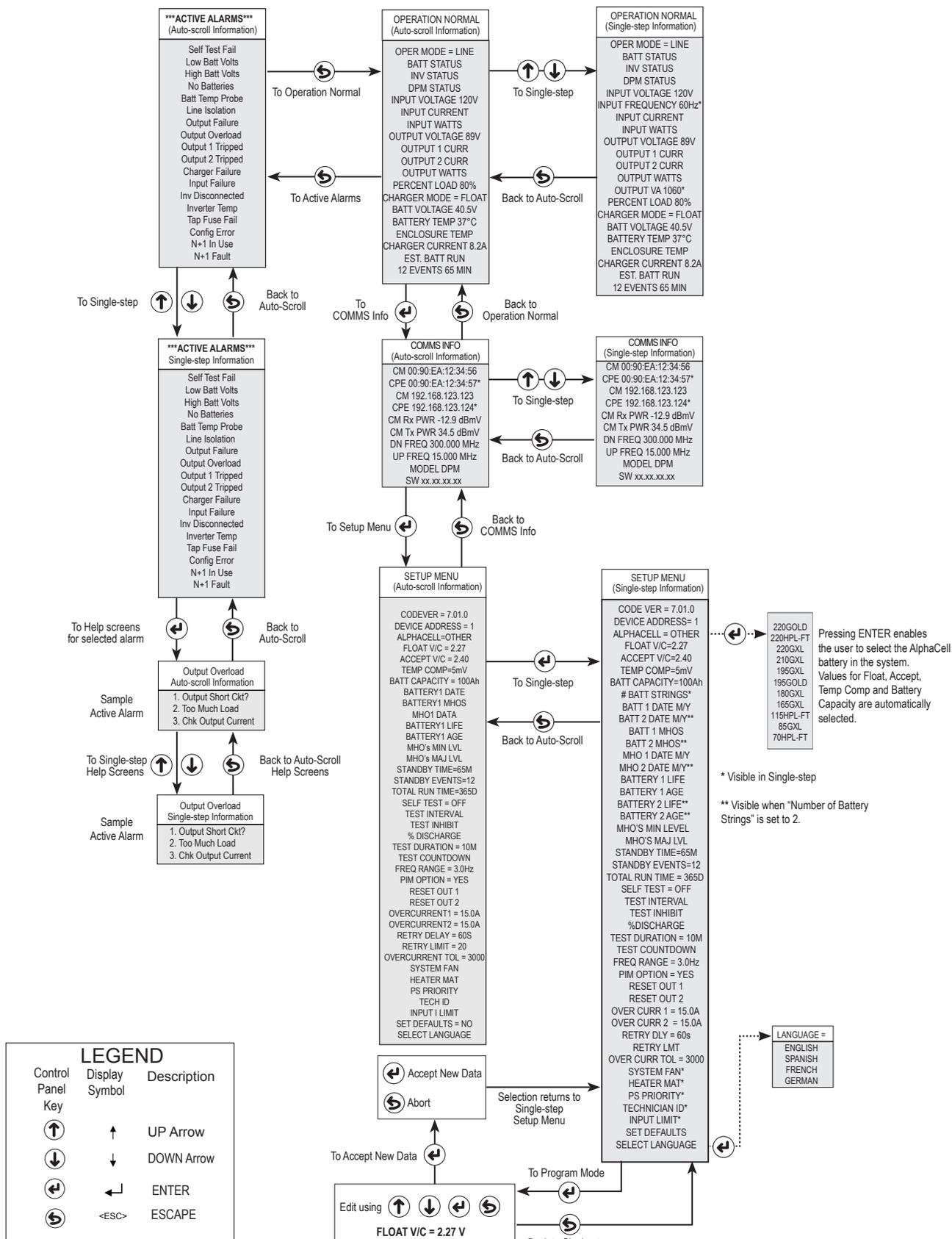
\*Visible in Single Step Mode

\*\*Visible when “Number of Battery Strings” is set to 2.

Fig. 4-3, Setup Menu Display  
(Examples are given for values in the display)



### Menu Structure and Navigation (from Active Alarms screen)



### 4.2 Alarm Indications

In the event of a failure, the Active Alarm displays which alarms are active and how to correct the alarm condition. Major alarms cause the red LED to flash.

- Press UP or DOWN to stop Auto Scroll. Arrows on the right-hand side of the display text indicate which keys to press to display the next menu item.
- Press UP or DOWN to select the alarm of interest.
- Press ENTER to select the alarm and display diagnostic information. Press ESCAPE to return to the alarm list.



#### **NOTICE:**

---

If only one alarm is active, the alarm list is bypassed and diagnostic information for the single active alarm displays.

A Help sub-menu provides possible remedies relating to the active alarm. To access the Active Alarm Help sub-menu, scroll to the alarm of interest and press ENTER. The diagnostic information initially auto scrolls. To enter manual scroll mode, press either UP or DOWN. Press DOWN to scroll through the list of remedies.

Alarms are classified in two categories:

**MAJOR Alarms** are indications of a serious failure within the XM2-300HP , such as a loss of output voltage or a failed battery charger. Any situation that causes output failure is considered a Major Alarm. Major alarms require immediate action to correct the failure. To correct major alarms, follow the Smart Display on-screen instructions.

**MINOR Alarms** indicate a less serious failure, such as defective dual RTS or loss of utility power. Corrective action can be delayed for a short time. To correct, follow the Smart Display on-screen instructions.

The alarm matrices on the following pages indicate the MAJOR/MINOR active alarms, the probable cause, and troubleshooting items to check to correct the alarm condition.

## 4.0 Operation, continued

Major Alarms		
Active Alarm	Probable Cause of Alarm	Corrective Action
Self Test STATUS	Output voltage failed or batteries less than 1.85V/cell during Self Test.	1. CHECK BATTERIES 2. CHECK INVERTER ( <i>Refer to Note1</i> )
INVERTER STATUS	Predicted overall health of the inverter calculated by the power supply's proprietary algorithm.	1. CHECK INVERTER 2. REPLACE INVERTER
OUTPUT OVERLOAD	The output is overloaded or shorted.	1. REMOVE SHORT CIRCUIT 2. REDUCE OUTPUT LOAD 3. REPLACE POWR SUPPLY ( <i>Refer to Note2</i> )
OUTPUT 1 TRIPPED	Output 1 PIM hardware protection mode engaged and is overloaded.	1. REDUCE OUTPUT LOAD 2. CHECK PIM SETTINGS
CHARGER FAILURE	Charger has failed or shutdown, possible battery over-temperature.	1. RESEAT INVERTER 2. PERFORM Self Test 3. REPLACE INVERTER
INVERTER TEMP	Inverter heat sink has exceeded set temperature (Stand-by operations suspended until temp drops to safe level).	1. CHECK VENTILATION 2. REPLACE INVERTER
CONFIG ERROR	The power supply is improperly configured and operation is suspended until error is corrected.	1. CHECK INVERTER MODULE
BATTERY STATUS	Predicted overall health of the batteries calculated by the power supply's proprietary algorithm.	1. CHECK BATTERIES 2. REPLACE BATTERIES
LOW BATT WARNING	Batteries dropped below 1.85 V/cell.	1. SHUTDOWN IMMINENT 2. CHECK AC INPUT 3. CONNECT GENERATOR
HIGH BATT WARNING	Batteries raised above 2.50 V/cell.	1. CHECK CHARGER SETTINGS 2. REPLACE INVERTER
BATT DELTA MHO'S VERY LOW	Conductance delta major alarm threshold has been exceeded.	1. CHECK ALARM THRESHOLD 2. REPLACE BATTERY
OUTPUT FAIL	Power Supply output has failed.	1. CHECK OUTPUT TYPE 2. OUTPUT OVERLOADED? 3. CHECK INVERTER
LINE ISOLATION	AC plug is connected to the inverter. The potential for backfeed exists.	1. REPLACE POWER SUPPLY ( <i>Refer to Note2</i> )

Note 1: To clear a Latched Self Test Fail Alarm, initiate and complete a successful Self Test.

Note 2: Remove and replace XM2-300HP.

Table 4-1, Major Alarms

Minor Alarms		
Active Alarm	Probable Cause of Alarm	Corrective Action
INPUT FAILURE	Utility AC Input has failed	1. CHECK AC INPUT 2. RESTORE AC INPUT 3. CONNECT GENERATOR
INPUT CURRENT LIMIT	AC Input current exceeds threshold setting.	1. REDUCE OUTPUT LOAD 2. CHECK INPUT CURRENT LIMIT SETTING
BATT DELTA MHO'S LOW	Conductance delta minor alarm threshold has been exceeded.	1. CHECK ALARM THRESHOLD 2. REPLACE BATTERY
BATT TEMP PROBE	Remote Temp Sensor (RTS) failed or is not connected.	1. CHECK CONNECTION 2. REPLACE SENSOR
BATTERY AGING ALARM	The battery is nearing the expected end of life.	1. VERIFY BATTERY DATE 2. CHECK DATE/TIME

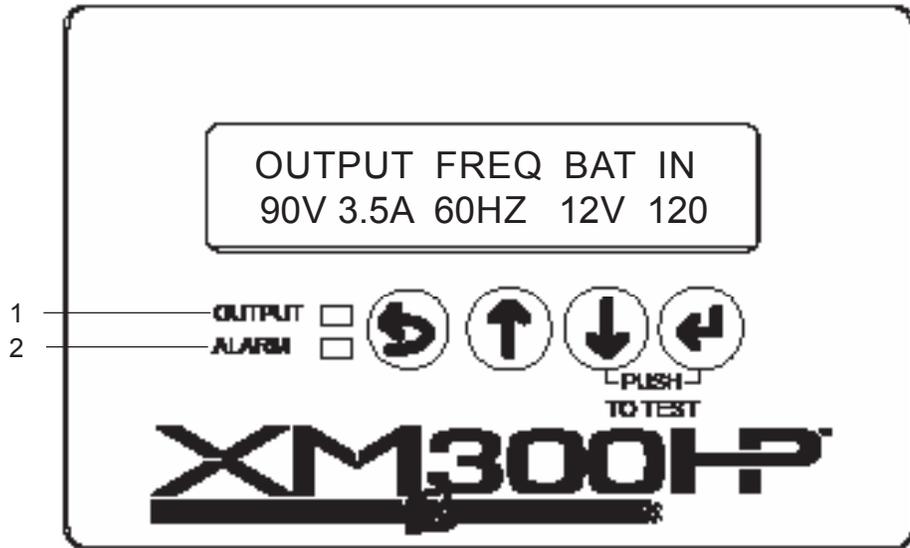
Table 4-2, Minor Alarms

### 4.3 Control Panel LEDs

Two front panel LEDs indicate the condition and status of the unit.

The green Output LED, when lit, indicates the power supply is functioning normally and supplying output AC to the load. A flashing output LED indicates a minor alarm has been detected. If the Output LED is off, a major alarm has been detected.

The red Alarm LED flashes to indicate a major alarm has been detected. This state clears when the alarm is no longer present. Under typical operating situations, the red Alarm LED is off. This indicates normal power supply operation.



<b>1</b>	<b>OUTPUT LED (Green)</b> SOLID = Operation Normal / FLASHING = Minor Alarm / OFF = Major Alarm
<b>2</b>	<b>ALARM LED (Red)</b> FLASHING = Major Alarm / OFF = Minor Alarm / OFF = Operation Normal

Fig. 4-4, Smart Display LEDs

### 4.4 Automatic Performance Test

**Automatic Self Test:** The XM2-300HP can periodically perform an automatic Self Test to verify the state of the battery and the inverter circuitry. The automatic test feature has several programmable parameters that determine the frequency and duration of automatic tests. In addition to automatic testing, you can manually put the XM2-300HP into test mode by pressing ENTER and DOWN simultaneously. A running test may be halted manually by pressing ENTER and DOWN a second time.

The test sequence process:

- Begins with a check to verify that battery is attached and the battery switch is OFF. If the battery is discharged or not connected, the XM2-300HP does not attempt to operate in inverter mode, preventing a drop of the load.
- Next, the XM2-300HP switches to standby mode for a pre-programmed period. Successful completion of a test sequence indicates the XM2-300HP is operating normally in standby mode, the battery voltage did not drop below a preset threshold, and the output was stable throughout the test. Failure of test is indicated by a Self Test Fail alarm, which can be cleared by subsequently running a successful test for at least one minute.

**Test Control:** A manual test can be initiated (or a running test may be halted) at any time by pressing ENTER and DOWN simultaneously or by initiating or stopping the Self Test via the front panel interface or status communications. A Self Test may also be controlled via the status monitoring card.

To prevent an automatic test scheduled to occur in the next week, issue a Test Inhibit command. This command is useful if periodic maintenance of the power supply is scheduled close to the next scheduled automatic test.

This control feature may also be used when inclement weather is expected that might cause a utility failure. The Test Inhibit command only affects an automatic test scheduled to run in the next seven days. Multiple issues of the Test Inhibit command result in the deferral of the next automatic test until at least seven days after the last request. This command has no effect if an automatic test is not scheduled to take place in the next week. Starting a test manually overrides the Test Inhibit command.

The automatic test feature is on by default. To turn auto-test off, change Test Interval to 0 days in the Setup Menu. Auto-test may be enabled at any time by changing the test interval to any numerical value (excluding "0"). The default test interval is 30 days.

**Test Countdown:** Indicates a pending automatic test.

**Test Duration:** The Test Duration is adjustable to meet customer requirements. Use caution when increasing the parameter because long Self Tests compromise the standby capability during, and shortly after, the test.

**Standby Time and Standby Events:** Counters that are not incremented during XM2-300HP Self Tests.

### 4.5 Providing Power via Portable Generator or Inverter

In the event of an extended utility failure, an external AC power supply can provide backup power to the system. This backup power enables the power supply to continue charging the batteries ensuring interrupted service to the network. Follow the documentation and connection procedures listed below.

#### AC Powering

Should it become necessary to power the CATV system with a portable AC generator, truck-mounted AC generator or truck-mounted inverter, follow the procedures below for the protection of service personnel and powering system equipment.

#### Connection Procedure:

1. Read the Smart Display to determine if there is output power to the system. If there is still power to the system, check the battery voltage on the Smart Display:
  - If the battery voltage is greater than 11.5Vdc then approximately one hour remains to complete the changeover to generator power before the cable system loses power to its customers.
  - If the battery voltage is less than the previous numbers, move rapidly as there is not much time until the system fails. However, exercise caution as there are dangerous voltages in the system that can shock you or damage the cable amplifiers.
2. Verify the AC Input breaker from the utility powering system is in the OFF position. This ensures that if power returns suddenly, you will not experience a surge in power. This also ensures when you connect the generator it will not put AC voltage back onto the power lines.
3. Properly ground the generator by connecting a #6 AWG wire from the grounding lug on the output panel of the generator to either a driven ground rod or the strand ground on the pole to which the power supply is mounted. If working with a ground-mounted power supply, locate the grounding point inside the enclosure and clamp on to that point.



#### CAUTION!

---

Grounding the generator is *mandatory* for safety and for proper operation of the power supply.

4. After the generator is properly grounded, unplug the power supply from the convenience outlet inside the enclosure and plug the power supply input cable into the generator output. Use an NEC or UL approved extension cord.
5. Start and operate the generator according to the generator operation manual.
6. If the generator kilowatt rating is twice the Watts used by the power supply indicated on the Smart Display, leave the battery breaker on and the generator will charge the batteries. If the generator fails, the power supply will continue to provide battery backup. If the generator output is not approximately twice the Watt rating indicated on the Smart Display, switch the battery switch off to reduce the load on the generator if battery backup of the system is unavailable.
7. In either case, after the power from the generator is applied to the power supply, use the Smart Display to increase the Frequency Input Tolerance to  $\pm 6\text{Hz}$  from the normal  $\pm 3\text{Hz}$ , inhibiting the power supply from switching to battery backup if the generator occasionally does not operate on the proper frequency. It is not uncommon for smaller (4 kilowatt or less) sized generators to get "off frequency" due to the step loading of the power supply.

## Using a Truck-mounted Inverter

To use a truck-mounted inverter follow the steps listed in Section 4.5 with the additional step of grounding the truck. Run the ground wire from an unpainted point on the truck chassis to either a driven ground rod or strand ground to complete the grounding circuit. The rubber tires on the truck insulate it from being grounded in all but the most exceptional circumstances.



### WARNING!

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Ground the vehicle before operating a truck inverter. Failure to do so places service personnel at risk for electric shock.

## 4.6 Resumption of Utility Power



### WARNING!

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Use caution when disconnecting and reconnecting a generator to utility power. Dangerous voltages are present.



### CAUTION!

---

Exercise care to ensure that both powering systems are **not** connected at the same time, or damage to the power supply and the generator may result.

1. Before turning on the AC voltage input breaker, use a voltmeter to verify the input voltage is within specifications.
2. When the proper voltage is present, verify the battery voltage indicated on the Smart Display is greater than 10.5Vdc. Disconnect the power supply from the generator output and plug the power supply input cord into the convenience outlet within the enclosure. The power supply operates on battery backup for this short period of time, but exercise caution during this changeover as the grounding circuit to the power supply is broken.

If the battery is at or below the low voltage cutoff, then the power supply will NOT transfer to battery back up and there will be a momentary power outage to the cable system while you make this changeover.

3. Turn on the AC input power.
4. Shut down the generator and remove the grounding system.

## 5.0 XM2-300HP Maintenance

A routine maintenance program, performed every three to six months, ensures the XM2-300HP will provide years of trouble-free operation.

Good battery care is the first step in any power supply maintenance program. In addition to voltage checks, visually inspect the batteries for signs of cracking, leaking or swelling.

To aid in quick identification and tracking of voltages in the maintenance log, number the batteries inside the enclosure using labels or masking tape. Batteries are temperature sensitive and susceptible to overcharging and undercharging. Since batteries behave differently in the winter than in the summer, Alpha's battery chargers automatically compensate for changes in temperature by adjusting float and accept charge voltages.



### CAUTION!

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- The XM2-300HP must be serviced by qualified personnel.
- Use heavy gloves when handling an XM2-300HP that has recently been taken out of service. The transformer generates heat that may cause burns if handled with bare hands.
- Alpha Technologies is not responsible for battery damage due to improper charger voltage settings. Consult the battery manufacturer for correct charger voltage requirements.
- When removing batteries, ALWAYS switch the battery switch off before unplugging the battery connector.
- Always wear safety glasses when working with batteries.

## 5.1 System Information

Observe and record the following system information from the Operation Normal and Additional Information menus in the maintenance log in Section 5.8.

### Operation Normal

---

Input Voltage	Output 2 Voltage
Output 1 Voltage	Output 2 Current
Output 1 Current	Standby Events
Battery Voltage	Charger Mode
Standby Time	Operation Mode
Battery Temperature	Charger Current
Input Frequency	Output Watts
Output VA	Percent Load

### Comms Status / Menu

---

CM	CPE
CM MAC	CPE MAC
CM Version	DSM Version
CMTX	CMRX

## 5.2 Battery Charger Voltage

The advanced three-stage charging features of the XM2-300HP are completely self-monitoring. During normal power supply operations, the power supply continuously verifies the operating condition of the battery charger. If, for any reason, the battery charger fails, a Charger Fail alarm displays on the Smart Display. No operator voltage checks are required.

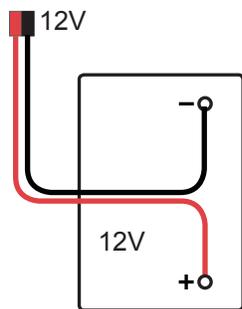
## 5.3 Battery Terminals and Connecting Wires

- Check each battery terminal and connection.
- Verify hardware is clean and the crimped connectors are tight. Terminal connectors should be torqued and re-torqued to the battery manufacturer's recommended specifications.
- If there is an "in-line" fuse in the battery cable, check the fuse holder and fuse.
- Verify the terminals are properly protected with an approved battery terminal corrosion inhibitor such as NCP-2.
- Record date of maintenance in the maintenance log.

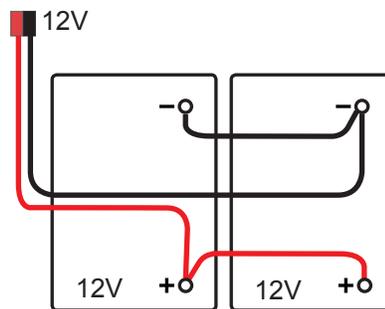
### ✓ **NOTICE:**

Whenever the battery breaker is turned off, or the batteries are not connected, the XM2-300HP automatically reports a No Batteries alarm. This is a built in safety feature. The unit does not attempt inverter operations, either standby or test, during a No Battery alarm.

Specific battery arrangements are dependant upon the shelf, rack, or enclosure used in the particular XM2-300HP system. Sample connections are shown below.



A single 12Vdc battery



Two 12Vdc batteries wired in parallel provide 12Vdc output with double the Ah capacity of each individual battery

## 5.4 Output Voltage

Observe Output voltages using the Smart Display. Record the voltages in the maintenance log.

## 5.5 Output Current

With the XM2-300HP in normal operating mode observe the Smart Display Output Current. The value of output current is dependent on the total amount of load connected to the power supply. Record the current in the maintenance log.

## 5.6 Check Output Connections

Perform a thorough visual inspection of the XM2-300HP output connectors to prevent problems that may be caused by improper connector engagements.

 **NOTICE:**

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A Service Power Supply is required to provide power to support the load for this procedure. Visit [www.alpha.com](http://www.alpha.com) and download a copy of the Technical Manual (*Alpha p/n 016-537-B0*).

### Visual Inspection

1. Connect the Service Power Supply and provide auxiliary power to the load per the instructions in the APP 9015S, APP9022S Service Power Supply Installation and Operation Manual (*Alpha p/n 016-537-B0*).
2. Once the load is supported, remove the AC and DC power sources from the power supply.
3. Carefully inspect the separated halves of each connector for signs of abnormal heating, such as a deformed housing or other damage (e.g., signs of arcing).

## 5.7 Inverter Module Maintenance

1. Carefully remove the inverter module assembly (see Section 9.1, Inverter Module Removal and Installation).
2. Inspect the inverter module for signs of dust or corrosion.



**CAUTION!**

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Circuit boards are static-sensitive and must be handled with care.

3. Inspect ventilation holes to verify they are clear of obstruction from debris or other equipment.
4. Reinstall the inverter module and test the XM2-300HP for proper operation (see Section 3.1, Turn-up and Test).



**CAUTION!**

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If the XM2-300HP fails the following test, there will be a loss of power to the load without the use of a Service Power Supply. Do not perform the next test step if the power supply or battery is suspect, or the load is at a critical stage.

5. If the XM2-300HP passes all previous tests (e.g. Battery Load Test, Self Test):
6. Turn off the utility input breaker to remove input power. The XM2-300HP will go into standby operation.
7. Verify there is no interruption to the output.
8. Observe the battery voltage reported on the Smart Display. If battery voltage drops below 11.5Vdc, reapply utility power immediately. After five minutes reapply utility power. The power supply then transfers back to Operation Normal, clears any alarms and starts the battery charger (BULK mode, if needed). This test adds standby events and time to the event counter.

5.0 Maintenance, continued

5.8 Maintenance Log

<b>Battery Maintenance</b>		
	Battery 1	Battery 2
Battery Manufacturer		
Date Code/Lot Number		
Terminal Check		
Voltage (Unloaded)		
Voltage (Loaded)		
Mhos level (Date / Date)	/	/
<b>XM2-300HP Maintenance</b>		
Model Number		
Serial Number		
<b>Operation Normal</b>		
Input Voltage		
Output (1) Voltage		
Output (2) Voltage		
Output (1) Current		
Output (2) Current		
Battery Voltage		
Standby Events		
Standby Time		
Charger Mode		
Operation Mode		
Battery Temperature		
Charger Current		
Input Frequency		
Output Watts		
Output VA		
Percent Load		
<b>Communications Status</b>		
CM		
CM MAC		
CM Version		
CMTX		
CPE		
CPE MAC		
DSM Version		
CMRX		
<b>Commissioning</b>		
Service Technician		
Date Serviced		

## 6.0 Return and Repair Information

In the event the power supply needs to be returned to Alpha Technologies for service, a Return Material Authorization (RMA) form must accompany the unit. The form can be found at Alpha's Web site (<http://rma.alpha.com>). Follow the instructions contained in the form to obtain an RMA. Once an RMA number has been issued, pack the unit per instructions and return to the service center assigned by Alpha Technologies. Or, if preferred, contact Alpha Technologies at (800) 322-5742 for assistance.

 **NOTICE:**

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Any information pertaining to the nature of the power supply failure or problem, along with a copy of the power supply's maintenance log, should be included with the returned XM2-300HP.

## 7.0 Specifications

The following tables show the electrical, mechanical, and physical specifications for the various models of the XM2-300HP power supply.

Models	XM2-300HP	XM2-300CE-HP
<b>ELECTRICAL INPUT</b>		
Input Voltage (Vac)	120	230
Input Voltage Window	+10%/-15% of nominal	+10%/-15% of nominal
Input Frequency	60Hz	50Hz
Input Frequency Window	± 3%	± 3%
Input Power Factor at Nominal	0.9	0.9
Input Line Voltage	120	230
Low Line Voltage	102	195
High Line Voltage	132	253
Input Current (max)	6	4
<b>OUTPUT</b>		
Output Power	300W	300W
Output Voltage	60 / 87V	63Vac
Output Current	5/3.5	5
Output Voltage Regulation	±5%	±5%
Inverter Output Frequency	±0.1%	±0.1%
Output Current Limit	150% of max. output rating	150% of max. output rating
Inverter Transfer Time	<4ms	<4ms
Efficiency	93% Line Mode 86% Inverter Mode	93% Line Mode 86% Inverter Mode
PIM	2 outputs @ 3.5-5A	2 outputs @ 1-5A
Smart Display	Std 2x20 backlit LCD	Std 2x20 backlit LCD
<b>BATTERY</b>		
Battery Voltage	12Vdc	12Vdc
Low Voltage Cutout	10.5Vdc	10.5Vdc
Float Voltage	13.6Vdc nominal	13.6Vdc nominal
Equalize Voltage	14.4Vdc nominal	14.4Vdc nominal
Temp Compensation	0.0 to 0.005Vdc/C/°	0.0 to 0.005Vdc/C/°
Current Charger (max)	10A	10A
Typical Recharge Time	12Hr w/100Ah battery	12Hr w/100Ah battery
<b>MECHANICAL</b>		
Chassis Dimensions W x H x D(in/mm)	8.5 x 9.75 x 8.0 / 216 x 248 x 203	8.5 x 9.75 x 8.0 / 216 x 248 x 203
Shipping Weight (lb/Kg)	23/10.4	25/11.3
Inverter & Connections	Front panel access	Front panel access
<b>ENVIRONMENT</b>		
Operating Temperature	-40°C to +55°C	-40°C to +55°C
Humidity	0 to 90% Non-condensing	0 to 90% Non-condensing
<b>ADVANCED DIAGNOSTICS</b>		
Advanced Analytics	Onboard battery algorithm for predictive service required	
User Inputs	Power supply install and battery manufacturing dates, Power supply priority level, Siemens values during battery preventive maintenance cycles, Battery out-of-date period, Battery heater mat installed (Yes/No), Technician code/ID	

Table 7-1, XM2-300HP Power Supply Specifications

## 7.0 Specifications, continued

### 7.1 Safety and EMC Compliance

North American Product Compliance	
Safety (NRTL/C)	UL / CSA 60950-1, UL1778/CSA 22.2 No. 107.3
Electromagnetic Compatibility (EMC):	FCC Part 15 / ICES-003 Class A (Class B when installed in an Alpha enclosure)
European Union Product Compliance	
Low Voltage Directive	CE Marked IEC/EN 60950-1, IEC/EN 62040-1, IEC/EN 60728-11
EMC Directive	IEC/EN 55032 Class B, IEC/EN 55024, IEC/EN 62040-2 Category 2, EN 50083-2, EN 300 386 v1.5.1 (when installed in an Alpha enclosure)
RoHS Directive	RoHS compliant

#### **ATTENTION:**

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A separate product specification document can be supplied for models not covered in this manual.

## 8.0 Emergency Shutdown

The XM2-300HP contains more than one live circuit. During an emergency, utility power can be disconnected at the service entrance or main electrical panel to protect emergency personnel. However, power is still present at the output. To prevent the possibility of injury to service or emergency personnel, always follow this procedure to safely shutdown the power supply.

EMERGENCY SHUTDOWN PROCEDURE:	
<b>1</b>	Unplug the Battery Input Cable (1).
<b>2</b>	Unplug the AC Input Line Cord from the service entrance (2).
<b>3</b>	Disconnect both the Output 1 and Output 2 connections (3).



Fig. 8-1 Emergency Shutdown

# 9.0 Appendix

## 9.1 Inverter Module Removal and Reinstallation

The XM2-300HP power module comes with a field-replaceable inverter module assembly containing the inverter and control logic. The inverter module accepts optional communications modules to facilitate remote status monitoring. The removable module is located on the front of the XM2-300HP power supply.



### CAUTION!

- ALWAYS switch the battery switch off before removing or installing the inverter module assembly.
- Handle the inverter module with extreme care. Circuit boards and logic upgrades are static-sensitive and susceptible to damage.



### NOTICE:

The inverter module assembly is “hot-swappable” and may be removed and replaced while the power supply is running on line power. While the inverter module is removed, the power supply will continue to operate as a non-voltage regulated, standby power supply.

#### Removal Procedure:

1. Turn the battery switch OFF.
2. Disconnect the battery input and temperature probe cables from the inverter module, as well as the tamper, environmental and coax cables from the communication module.
3. Loosen the thumbscrews.
4. Grasp the handle on the lower right corner of the inverter module. Pull firmly to release the module from the inverter connector. Gently slide the module assembly straight out until the inverter module is clear of the chassis.



#### Reinstallation Procedure:

1. Verify that the battery switch is OFF.
2. To re-seat the inverter module assembly, align the inverter board in the card guides and slide the inverter module back onto the connector. It is important that the inverter circuit board is properly seated in the card guides and the module is fully inserted into the housing.
3. Tighten the thumbscrews.
4. Reconnect the battery input, temperature probe cables, tamper, environmental and coax cables.
5. Turn the battery switch ON.



## 9.2 AC Output Voltage Reconfiguration

**✓ NOTICE:**

The XM2-300HP is often utilized as a dedicated power source at the point of load. In this arrangement, voltage drop between the power supply and the load equipment is a minimum compared to more distributed network powering arrangements. The XM2-300HP output voltage is specified with a steady state crest factor of <1.5. DC breakover voltage rating on input voltage, transient surge suppressors incorporated in network load equipment should be reviewed (including tolerances) to assure there is no risk of XM2-300HP peak output voltage triggering these devices under normal steady state operation. Most network load equipment has a wide input rms voltage operating range. If a potential for triggering transient suppressors exists, lower the XM2-300HP output tap (e.g. 87V to 60V).

The output voltage of the XM2-300HP can be reconfigured by moving the Output Tap jumper per the procedure below.

**Tools Required:** Small flat-blade screwdriver

**Output Voltage Reconfiguration Procedure:**

1. Shut down the XM2-300HP, verify all power is removed, utility power is off and battery power is safely secured (or not installed) in the enclosure assembly. Remove all connections and cables from the XM2-300HP.
2. Loosen the three captive fasteners and pull the inverter module from the power supply chassis. Completely remove and set aside.
3. Locate the transformer output terminal block (Fig. 9-2) between the transformer and front of chassis. Move the single black wire to the desired output voltage connector (Fig. 9-3). Connectors are labeled for easy identification: 87 or 60Vac.
4. Replace the inverter module.
5. Reinstall the unit into the enclosure and complete the Pre-commissioning Checklist as outlined in Section 2.2.
6. Upon successful completion of the Pre-commissioning Checklist, refer to Section 3.0, Commissioning and return the unit to service.



Fig. 9-1, Removing the Inverter Module



Fig. 9-2, Location of Terminal Block

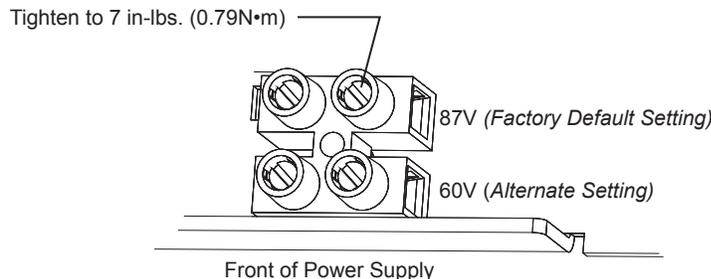


Fig. 9-3, Output Voltage Terminal Block Detail

### 9.3 Protective Interface Module

The factory-installed Protective Interface Module (PIM) adds a second independent output. It provides programmable current limits for two output channels and protects system components by shutting down the load during overcurrent and short circuit conditions. The PIM has a programmable overcurrent threshold (3-6A) and overcurrent tolerance period that specifies the time (1-10 secs) an overcurrent condition is permitted before shutting down.

The programmable retry limit enables the operator to select how many times (0-10) after a programmable delay (60-600 seconds) the PIM will attempt to reconnect an output once it has been shut down. When the limit is reached, the XM2-300HP power supply automatically retries once every 30 minutes until the fault clears.

Advantages provided by the PIM to the XM2-300HP:

- **A second protected output:** The main purpose of the PIM is to limit the impact of a fault condition in one output channel. If a fault condition occurs in an XM2-300HP (without the optional PIM installed) the entire customer network can be affected. The PIM option affords protection to one output should a fault condition exist on the other. This gives you flexibility to isolate Output 1 from Output 2.
- **A current for critical loads:** With the PIM, one output may be designated as the primary connection, and the other output as the secondary connection. Commonly, critical loads are connected to Output 1 as the primary feeder. Using the overcurrent limit settings, you can ensure that the primary output always provides the necessary power. For example, on a 60 volt unit, if a customer needs 3 Amps available on Output 1, the overcurrent limit for Output 2 is set at 2 Amps, so regardless of Output 2, 3 Amps will remain available for the primary Output 1.
- **Additional current protection:** The standard XM2-300HP current limit protection is provided by the output circuit breaker. The 160% current limit may exceed the ratings of active devices in the cable network and cause failures. You can lower the maximum current provided at each output by lowering the overcurrent limit of each respective output. Therefore, to minimize failures due to excess current supply, set the overcurrent limit to a value below the maximum current the active components can tolerate.

XM2-300HP Load	Permitted Duration of Load
>150%	10 seconds
125% to 150%	10 minutes
115% to 125%	30 minutes
<115%	Indefinitely

For example, on a 5A power supply, where both outputs are programmed to 4A maximum, and both outputs are supplying 3A, neither output is “in violation” but the total system at 6A is operating at 120% of its rated output. In this example, after 30 minutes, the power supply will begin a “load shedding” algorithm. The first action is to disconnect Output 2. If this does not correct the system overload, the next action is to disconnect Output 1.

## 9.4 Programming the PIM

Programmable parameters are:

**Channel 1 Overcurrent Limit:** The RMS current level that causes the Output 1 protection relay to trip after a specified delay (overcurrent tolerance period).

**Channel 2 Overcurrent Limit:** The RMS current level that causes the Output 2 protection relay to trip after a specified delay (overcurrent tolerance period).

**Retry Delay:** The time between each attempt to restart an output in the event of an overcurrent event.

**Retry Limit:** The number of times the XM2-300HP will attempt to restart an output connection. Once the RETRY LIMIT is exceeded, the XM2-300HP will attempt to restart the output connection every 30 minutes. Set this parameter to “zero” to disable the “automatic retry” function.

**Overcurrent Tolerance Period (1-10 seconds):** In the event of an overcurrent episode, the amount of time an output overcurrent condition is permitted on either output connection. Once this time expires, the output protection relay disables its output feeder.

**Reset Output 1/Reset Output 2:** Once fault condition has been corrected, this manually resets tripped output.

 **NOTICE:**

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Programming any of the above parameters will reset the “trip/retry” counters.

 **NOTICE:**

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If the PIM is not installed, the values shown on the “PIM PARAMETERS” line of the Smart Display are “read only”.

### The Setup Menu

On the Smart Display, press the Enter key to access the Setup Menu.

Use the Setup menu to view or change the programmable operating parameters of the power supply or the optional PIM. Navigation is similar to the Operation Normal menu. Press UP or DOWN to access the Single Step mode where you can individually select sub-menu items.

To select and change a value in the Setup Menu:

1. Press either UP or DOWN to put the display in the Manual Scroll Mode.
2. Continue pressing UP or DOWN until the desired item is displayed.
3. Press ENTER to select the item to edit.
4. Press UP to increase the displayed value, or DOWN to decrease the value. To change the displayed values more rapidly, in Edit mode, press either UP or DOWN and hold for more than two seconds.
5. Press ENTER when the desired value is displayed. Press ENTER again to accept and save the new value. To leave programming mode without saving the new value, press ESCAPE. If an incorrect value is accidentally entered, repeat the above process and enter the proper value, or select the SET DEFAULTS menu selection of the Setup Menu and press ENTER twice to reset all parameters to their factory default values.
6. To return to the Operation Normal menu, press ESCAPE three times.

ON, OFF, YES and NO selections may be accessed as described above. The CODE VER, and Total Run Time selections are for informational display only and cannot be edited.

 **NOTICE:**

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The SET DEFAULTS menu selection does not reset STANDBY TIME, STANDBY EVENTS, or DEVICE ADDRESS. Manually reset these options.

## 9.5 Grounding Wire Connection

**NOTICE:**

This procedure is only necessary for power supplies installed outside of an enclosure.

In instances where the power supply is not installed in an enclosure, connect the grounding wire to the ground lug on the power supply chassis as shown below. Connect the grounding wire to the rack or shelf grounding location.

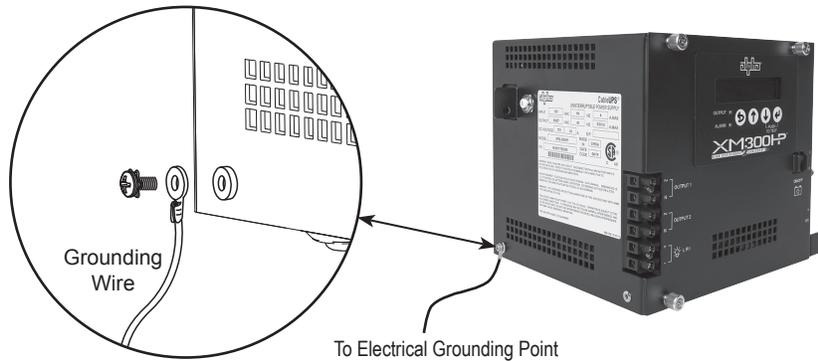
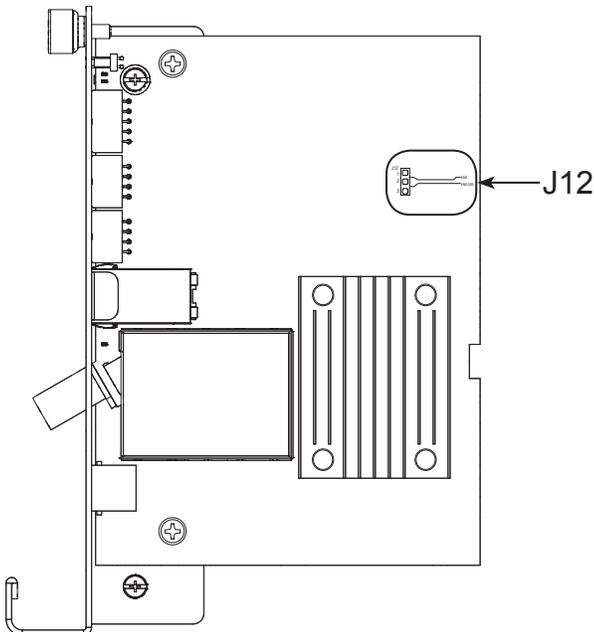


Fig. 9-4, Power Supply Ground Wire Connection

## 9.6 Verification of DM3 Jumper Setting

To confirm the correct DM3 Comm Module configuration for the XM2-300HP Power Supply, locate the Reset Timing Jumper [J12]; verify pin shorting connector is set as indicated below.



### Reset Timing [J12]

Verify the jumper is in position 2 and 3 when using the DM3 Comm Module in an XM2-300HP Power Supply.



Fig. 9-5, Location of Reset Timing Jumper, DM3



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