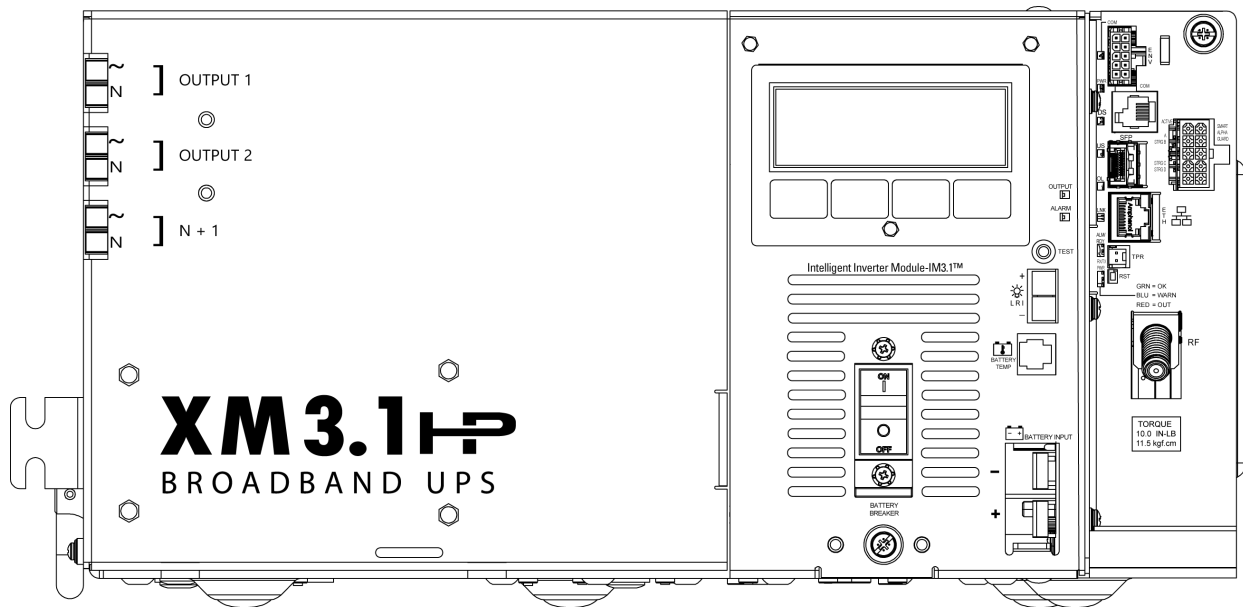


an EnerSys® company

Alpha® XM3.1-HP™ Power Supply Technical Manual

Effective: June 2024



Alpha® XM3.1-HP™ Power Supply

Technical Manual

017-950-B0-001, Rev. C

Effective Date: June 2024

© 2024 by Alpha Technologies Services, Inc., an EnerSys company. All rights reserved.

Disclaimer

Images contained in this manual are for illustrative purposes only. These images may not match your 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 Services, Inc. or your nearest Alpha® product sales 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.

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 has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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:

+1 888-462-7487

Website:

www.alpha.com

Table of Contents

XM3.1-HP™ Power Supply Safety & Compliance Notes	8
1.0 Introduction	16
1.1 Alpha® XM3.1-HP™ Power Supply	16
1.2 Theory of Operation	17
1.2.1 AC (Line) Operation	17
1.2.2 Standby Operation	17
1.2.3 Charger Modes of Operation	18
1.2.4 Output Voltage Modes of Operation	23
1.3 Alpha® XM3.1-HP™ Power Supply Layout	24
1.3.1 Front and Side Panel Connectors	25
1.3.2 Smart AlphaGuard™ Card	26
1.3.3 Alpha® Dual Output Controller (AlphaDOC)	27
1.3.4 Inverter Module Overview	29
1.3.5 Communications Module	30
1.4 Alpha® Extended Runtime (XRT) Power System Applications	31
2.0 Installation	32
2.1 Installation Procedure	32
2.1.1 Pre-installation Inspection	32
2.1.2 Internal Security Screw Kit Installation	32
2.2 XM3.1-HP™ Power Supply Start-Up Procedure	34
2.2.1 Parts and Connections	34
2.2.2 Battery Installation Options and Wiring Diagram	35
2.2.3 63/89VAC Output Voltage Reconfiguration Procedure	39
2.2.4 Optional Smart AlphaGuard™ Card	40
2.2.5 Optional N+1 Configurations	41
2.2.6 DOCSIS® Communications Module	43
2.2.7 SFP Optical Connection	45
2.2.8 Tamper Interface	46
2.2.9 Environmental Connector	47
2.2.10 Power Module Configuration and Installation Procedure	48
2.2.11 Local Verification of DOCSIS® Transponder	51
2.3 Web Interface	52
2.3.1 Local Web Server Access	52
2.3.2 Remote Web Server Access	54
2.3.3 Web Interface Security Levels	55
2.3.4 Navigating the Web Pages	57
2.3.5 Web Page Features	59
3.0 Operation	60
3.1 Start-Up and Test	60
3.1.1 Self Test Operation	60
3.2 Using the Smart Display	61
3.3 Smart Display Menus	62
3.3.1 Power Information and Configuration	63
3.3.2 Battery Information and Configuration	64
3.3.3 Communication Information and Configuration	65
3.3.4 Alpha® Applications Information and Configuration	69
3.4 AlphaApps Overview	70
3.4.1 Display Structure	70
3.4.2 Applications	72
3.5 Active Alarms	81
3.5.1 Menu Structure/Navigation (from Active Alarms Screen)	82
3.5.2 PWR Alarms	83
3.5.3 BATT Alarms	84
3.5.4 COMM Alarms	85
3.5.5 APP Alarms	85

Table of Contents

3.5.6	AlphaDOC Card Alarms	85
3.6	Smart Display Glossary	87
3.7	Automatic Performance Test	91
3.8	Providing Power via Portable Generator or Inverter	92
3.8.1	DC Powering	92
3.8.2	AC Powering	92
3.8.3	Using a Truck-mounted Inverter or Generator	93
3.9	Resumption of Utility Power	94
4.0	Maintenance	95
4.1	Safety Precautions	95
4.2	Required Tools and Equipment	95
4.3	Power Supply System Maintenance	96
4.3.1	Preparing for Maintenance	96
4.3.2	Periodic Maintenance Tasks	96
4.3.3	MOV Board Replacement	99
4.4	PM Certification Report	100
5.0	Firmware Update	102
5.1	Core Modem Firmware Update	102
5.2	Component Firmware Update Using TFTP	103
5.3	Component Firmware Update Using HTTP	103
5.4	Bundled Firmware.	104
6.0	Shut Down	105
6.1	Emergency Shutdown Procedure.	105
7.0	Specifications	106
7.1	North American Models.	106
7.2	International Models	108
7.3	Safety and EMC Compliance	109
7.4	System Options	109
7.5	Return and Repair Information	110
7.6	Common Parts for XM3.1-HP™ Power Supply	110
7.7	XM3.1-HP™ Power Supply Block Diagram	111
8.0	Safety & Compliance Notes (Translations).	112
8.1	Safety Notes (German)	112
8.2	Safety Notes (Spanish)	120
8.3	Safety Notes (Portuguese)	128
8.4	Safety Notes (French)	136

Figures

Fig. 0-1, Typical 120VAC Service Entrance Wiring.....	12
Fig. 0-2, Typical 120VAC 20A Receptacle Wiring, 5-20R (p/n 531-006-19).....	12
Fig. 0-3, Typical 240VAC 15A Receptacle Wiring, 6-15R (p/n 531-004-19).....	12
Fig. 0-4, Typical 240VAC 60 Hz Service Entrance Wiring	13
Fig. 0-5, Typical 230VAC 50 Hz Service Entrance Wiring	13
Fig. 0-6, SPI Location.....	14
Fig. 0-7, Communications Grounding.....	15
Fig. 1-1, Alpha® XM3.1-HP™ Power Supply	16
Fig. 1-2, 3-Stage Charger Modes.....	19
Fig. 1-3, 4-Stage Charger Modes.....	20
Fig. 1-4, 4-Stage Charger Modes for AlphaCell® XTV Batteries	21
Fig. 1-5, 5-Stage Charger Modes.....	22
Fig. 1-6, Front Panel, XM3.1-HP™ Power Supply.....	24
Fig. 1-7, Side Panel, XM3.1-HP™ Power Supply.....	25
Fig. 1-8, Detail View, Front Panel Connections and Indicators	25
Fig. 1-9, Smart AlphaGuard Front Panel.....	26
Fig. 1-10, Inverter Module Connections.....	29
Fig. 1-11, Communications Module	30
Fig. 2-1, Required Materials.....	33
Fig. 2-2, Security Screw Mounting Location.....	33
Fig. 2-3, Power Supply/Enclosure Shelf Security Screw Stack Up	33
Fig. 2-4, Installation of XM3.1-HP™ Power Supply	34
Fig. 2-5, Placement of Battery Spacer Clips (for domestic and international 36V battery strings).....	35
Fig. 2-6, Battery Wiring Diagram (w/ embedded Smart AlphaGuard™ option depicted)	35
Fig. 2-7, Precision Temperature Sensor (PTS), p/n 746-331-20	35
Fig. 2-8, Dual Battery String Wiring Diagram (w/ embedded Smart AlphaGuard™ Harness depicted)	36
Fig. 2-9, Multiple Battery String Wiring Diagram (w/ embedded Smart AlphaGuard™ Harness depicted).....	37
Fig. 2-10, Wiring diagram, 8-battery Parallel Configuration	38
Fig. 2-11, Battery Terminal Bolt Stack-up.....	39
Fig. 2-12, Fuse Bolt Stack-up	39
Fig. 2-13, Voltage Terminal Location and Wire Position	39
Fig. 2-14, Inverter Module Screw Locations	40
Fig. 2-15, Installing the SAG Card	40
Fig. 2-16, SPI, Output and Smart AlphaGuard Harness Connections	41
Fig. 2-17, N+1 Configuration	41
Fig. 2-18, Dual Redundancy N+1 Configuration.....	42
Fig. 2-19, Active Alarm Screen.....	42
Fig. 2-20, N+1 In Use Alarm Screen.....	42
Fig. 2-21, DOCSIS® Communications Module Front Panel Connections	43
Fig. 2-22, Installing SFP and Fiber Connection	45
Fig. 2-23, Active Alarm Screen	49
Fig. 2-24, Enter Battery Date Code.....	49
Fig. 2-25, Enter Battery MHOs Reading	49
Fig. 2-26, Select Language in PWR CNFG Menu	50
Fig. 2-27, COMM Menu Options	51
Fig. 2-28, XM3.1-HP™ Power Supply Overview Web Page.....	52
Fig. 2-29, Local Area Connection Properties Screen, Windows® 10.....	53
Fig. 2-30, Internet Protocol (TCP/IP) Properties Screen, Windows® 10	53
Fig. 2-31, Web Server Home Page	54
Fig. 2-32, Power Supply Web Page.....	59
Fig. 3-1, Operation Normal Display Screen.....	61
Fig. 3-2, Navigating Through Menu Screens.....	61
Fig. 3-3, Smart Display Menus	62
Fig. 3-4, Power Information and Configuration Menu Options	63
Fig. 3-5, Battery Information and Configuration Menu Options.....	64
Fig. 3-6, Communication Information and Configuration Menu Options	65
Fig. 3-7, COMM - FAULT Menu Screen.....	65

Figures

Fig. 3-8, RF - GENERAL Menu Options	65
Fig. 3-9, RF - DIAGNOSTICS Menu Screen	66
Fig. 3-10, RF - DIAGNOSTICS Menu Options	66
Fig. 3-11, SFP - GENERAL Menu Options	67
Fig. 3-12, SFP - DIAGNOSTICS Menu Options	67
Fig. 3-13, TRANSPONDER Menu Screen	68
Fig. 3-14, TRANSPONDER Menu Options	68
Fig. 3-15, AlphaApps Menu Options	69
Fig. 3-16, Technician ID Screen	70
Fig. 3-17, Technician ID Log Screen	70
Fig. 3-18, AlphaApps Main Menu Screen	70
Fig. 3-19, AlphaApps Menu Options	71
Fig. 3-20, Configuration History	72
Fig. 3-21, Event Log Screen	73
Fig. 3-22, Battery Manufacture Date Screen	74
Fig. 3-23, Battery Mhos Screen	75
Fig. 3-24, Logged Battery Mhos Screen	75
Fig. 3-25, Battery History	76
Fig. 3-26, Utility Performance Menu Options	77
Fig. 3-27, Outage History	78
Fig. 3-28, Battery Health	79
Fig. 3-29, Battery Run Time	79
Fig. 3-30, Active Drop	80
Fig. 3-31, Active Alarm Table	81
Fig. 3-32, Sample Active Alarm Display, PWR Menu	82
Fig. 3-33, Sample Active Alarm Display, BATT Menu	82
Fig. 3-34, Sample Active Alarm Display, COMM Menu	82
Fig. 4-1, XM3.1-HP™ Power Supply System Components	97
Fig. 4-2, Removing the Transformer Module Cover	99
Fig. 4-3, MOV Board Location	99
Fig. 4-4, MOV Board Model	99
Fig. 4-5, PM Certification Report, Page 1	100
Fig. 4-6, PM Certification Report, Page 2	101
Fig. 5-1, TFTP Firmware Update	103
Fig. 5-2, Direct Firmware Update	103
Fig. 5-3, Bundled Firmware	104
Fig. 6-1, Emergency Shutdown	105
Fig. 7-1, XM3.1-HP™ Power Supply Block Diagram	111
Fig. 8-1, Typische Netzanschlussverdrahtung für 120 V Wechselstrom	116
Fig. 8-2, Typische Steckdosenverdrahtung für 120 V/20 A Wechselstrom, 5-20R (Teile-Nr. 531-006-19)	116
Fig. 8-3, Typische Steckdosenverdrahtung für 240 V/15 A Wechselstrom, 6-15R (Teile-Nr. 531-004-19)	116
Fig. 8-4, Typische Netzanschlussverdrahtung für 240 V/60 Hz Wechselstrom	117
Fig. 8-5, Typische Netzanschlussverdrahtung für 230 V/50 Hz Wechselstrom	117
Fig. 8-6, SPI-Standort	118
Fig. 8-7, Kommunikationserdung	119
Fig. 8-8, Cableado típico de entrada de servicio de 120 VCA	124
Fig. 8-9, Cableado típico de receptáculo de 120 VCA 20A, 5-20R (p/n 531-006-19)	124
Fig. 8-10, Cableado típico de receptáculo de 240 VCA 15A, 6-15R (p/n 531-004-19)	124
Fig. 8-11, Cableado típico de entrada de servicio de 240 VCA 60 Hz	125
Fig. 8-12, Cableado típico de entrada de servicio de 230 VCA 50 Hz	125
Fig. 8-13, Ubicación del SPI	126
Fig. 8-14, Comunicaciones a tierra	127
Fig. 8-15, Fiação Típica da Entrada de Serviço 120 VAC	132
Fig. 8-16, Fiação Típica do Receptáculo 120 VCA 20A, 5-20R (p/n 531-006-19)	132
Fig. 8-17, Fiação Típica do Receptáculo 240 VCA 15A, 6-15R (p/n 531-004-19)	132
Fig. 8-18, Fiação Típica da Entrada de Serviço 240 VCA 60 Hz	133
Fig. 8-19, Fiação Típica da Entrada de Serviço 230 VCA 50 Hz	133

Figures

Fig. 8-20, Local do SPI.....	134
Fig. 8-21, Aterramento das Comunicações	135
Fig. 8-22, Câblage typique d'un branchement de 120 VCA.....	140
Fig. 8-23, Câblage typique d'une prise de courant de 120 VCA 20 A, 5-20R (No de pièce 531-006-19)	140
Fig. 8-24, Câblage typique d'une prise de courant de 240 VCA 15 A, 6-15R (No de pièce 531-004-19)	140
Fig. 8-25, Câblage typique d'un branchement de 240 VCA 60 Hz	141
Fig. 8-26, Câblage typique d'un branchement de 230 VCA 50 Hz	141
Fig. 8-27, Emplacement du SPI.....	142
Fig. 8-28, Mise à la terre des lignes de transmission	143

Tables

Table 0-1, Circuit Breakers and Service Disconnects	11
Table 1-1, Low Battery Cutoff (EOD).....	18
Table 1-2, Charger Modes of Operation.....	18
Table 1-3, RMODE Levels	23
Table 1-4, Smart AlphaGuard LEDs Behavior	26
Table 1-5, Duration of Load	27
Table 2-1, Rx/Tx LEDs Behavior.....	44
Table 2-2, ENV Connector and Pin Descriptions	47
Table 2-3, OIDs for Usernames and Passwords	55
Table 2-3, OIDs for Usernames and Passwords, continued	56
Table 3-1, AC Output.....	60
Table 3-2, Main Menu Functions	61
Table 3-3, Logged Events and Alarms.....	73
Table 3-4, PWR Alarms: Classifications, Causes and Corrections	83
Table 3-5, BATT Alarms: Classifications, Causes and Corrections	84
Table 3-6, COMM Alarms: Classifications, Causes and Corrections	85
Table 3-7, APP Alarms: Classifications, Causes and Corrections.....	85
Table 3-8, AlphaDOC Card Alarms: Classifications, Causes and Corrections	86
Table 5-1, Alpha® Firmware Update Settings	102
Table 5-2, Bundled Firmware Settings	104
Table 7-1, Specifications for North American Models.....	106
Table 7-1, Specifications for North American Models, continued	107
Table 7-2, Specifications for International Models	108
Table 7-3, Product Certifications Regarding Safety, EMC Compliance	109
Table 7-4, Common Parts for XM3.1-HP™ Power Supply.....	110
Table 8-1, Leistungsschalter und Service-Trennschalter	115
Table 8-2, Disyuntores de circuito y desconexiones de servicio	123
Table 8-3, Disjuntor e Desconectores de Serviço.....	131
Table 8-4, Disjoncteurs et sectionneurs.....	139

XM3.1-HP™ Power Supply Safety & Compliance Notes

Review the drawings and illustrations contained in this manual before proceeding. If there are any questions regarding the safe installation or operation of the system, contact Alpha Technologies Services, Inc. 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 symbols have been placed throughout this manual. Where these symbols appear, use extra care and attention.

Refer to **Section 8.0 Safety & Compliance Notes (Translations)** for German, Spanish, Portuguese and French safety notes.

Sicherheitshinweise in Englisch, Spanisch, Portugiesisch und Französisch finden Sie in **Abschnitt 8.0, Hinweise zur Einhaltung der Sicherheit**.

Consulte la **Sección 8.0, Notas sobre Seguridad y Cumplimiento (traducciones)** para ver notas sobre seguridad en alemán, español, portugués y francés.

Consulte a **Seção 8.0, Notas de Segurança e Conformidade (Traduções)** para ver as notas de segurança em alemão, espanhol, português e francês.

Veuillez vous reporter à la **section 8.0, Remarques sur la sécurité et la conformité (traductions)**, pour lire les remarques sur la sécurité en allemand, en espagnol, en portugais et en français.



WARNING! GENERAL HAZARD

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



WARNING! ELECTRICAL HAZARD

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



WARNING! FUMES HAZARD

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



WARNING! FIRE HAZARD

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! ELECTRICAL & FIRE HAZARD

This WARNING provides safety information for both Electrical AND Fire Hazards



CAUTION!

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



NOTICE:

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

ATTENTION:

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

The following sections contain important safety information that must be followed during the installation and maintenance of the equipment and batteries. Read all of the instructions before installing or operating the equipment, and save this manual for future reference.

Safety Precautions



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.



WARNING! ELECTRICAL HAZARD

- In the event of a short-circuit, batteries present a risk of electrical shock and burns from high current. Observe proper safety precautions.
- The battery string, which provides backup power, contains dangerous energy. Only qualified personnel should inspect or replace batteries.
- The 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.



CAUTION!

- This equipment shall be installed by qualified service personnel only, according to the installation instructions provided with each unit.
- This equipment is not provided with a suitable fire enclosure. Intended to be installed in a suitable fire enclosure in the end installation.
- This equipment is not intended for direct outdoor installation. A suitable outdoor enclosure shall be provided in the end installation.
- Power supply output is considered Hazardous Voltage Secondary (CATV).
- This equipment is intended for use in a national two wire CATV system. Line-neutral/ground is functional and relies upon multipoint grounding of the end-use enclosure for safety. Acceptability of this equipment in the end-use CATV system is to be determined by the authority having jurisdiction (AHJ).
- External circuits on the Battery, communications card and "Temp Probe" are considered ES1.
- Battery testing was conducted with the manufacturer's recommended batteries.
- The product was tested in a branch circuit protected by a 20A circuit breaker. Additional evaluation shall be conducted if a higher protector is to be used in the end system.
- Evaluated for use at max 60°C ambient temperature (derating applicable), Pollution Degree 3 environment, overvoltage category III.
- The equipment contains VDRs and gas tubes bridging insulation. Acceptability shall be determined by the accepting AHJ.
- Evaluated for connection to a cable distribution system with a maximum external transient overvoltage rating of 4000Vpk.
- 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.
- Always use proper lifting techniques whenever handling units, modules or batteries.
- If adding an external battery pack fuse, select a value whose opening characteristics are higher than the DC circuit breaker provided in your unit.

ATTENTION:

This power supply has been investigated by regulatory authorities for use in various Alpha® enclosures. If a non-Alpha® enclosure is being used, it is the operator or installer's responsibility to ensure the combination conforms to your local regulatory requirements and the power supply remains within its environmental specifications.

Battery Safety Notes



WARNING! ELECTRICAL HAZARD

- Always wear eye protection, rubber gloves, and a protective vest when working near batteries. To avoid battery contact, remove all metallic objects, (such as rings or watches).
- Prior to handling the batteries, touch a grounded metal object to dissipate any static charge that may have developed on your body.
- Use tools with insulated handles, do not rest any tools on top of batteries.
- 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.



WARNING! FIRE HAZARD

- Batteries produce explosive gases. Keep all open flames and sparks away from batteries.
- Do not charge batteries in a sealed container. Each battery should have at least 1/2 inch (13 mm) 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. Ensure all enclosure vents and filters are clean and free of debris.



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.

Battery Maintenance Guidelines



CAUTION!

- Inspect each battery during every maintenance check. Replace or repair batteries if any of the following is found:
 - **Signs of battery cracking, leaking or swelling.**
 - **Signs of battery cable damage.**
 - **Loose battery connection hardware.**
- 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.
- A battery showing signs of cracking, leaking, or swelling should be replaced immediately by authorized personnel.
- Always replace batteries with those of an identical type and rating. Match conductance, voltage and date codes. Never install untested batteries.
- Always follow battery manufacturer's storage instructions.
- Apply electrical contact lubricant or grease such as NO-OX® grease on all exposed connections.

ATTENTION:

- 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.

Utility Power Connection Notes

NOTICE:

Alpha® enclosures are engineered to properly vent the power supply. The power supplies have been investigated by regulatory authorities for use in various Alpha® enclosures. If a non-Alpha enclosure is being used, it is the operator or installer's responsibility to ensure the combination conforms to your local regulatory requirements and the power supply remains within its environmental specifications.

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.

Local regulatory authorities may require the use of an approved service entrance and/or service disconnect switch when the power supply is installed in an outdoor enclosure. Alpha® enclosures have switch options. The installer may need to provide these if using a non-Alpha enclosure.

NOTICE:

In order to accommodate the high-inrush currents normally associated with the start-up of ferroresonant transformers (400 amp, no-trip, first-half cycle), either a “high-magnetic” or a heating, air conditioning, refrigeration (HACR) trip breaker must be used. 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 Services, Inc.

Description	Alpha Part Number	Square D Part Number
240V Installation - HACR (15A)	470-224-10	QO215
120V Installation - High-magnetic (20A)	470-017-10	QO120HM
2-space BBX - External Service Disconnect	020-085-10	QO2-4L70RB
8-space BBX - External Service Disconnect	020-141-10	QO8-16L100RB

Table 0-1, Circuit Breakers and Service Disconnects

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 the wiring conforms to applicable codes.

XM3.1-HP™ Power Supply Connections

Proper 120VAC 20A service requires the installation site to be:

- Equipped with a 120VAC duplex receptacle which provides power to the power supply and peripheral equipment.
- Equipped with a NEMA® 5-20R receptacle protected by a single-pole, 20 amp high magnetic (HM) circuit breaker inside the service entrance.
- Checked to NEC®/CEC® code or with your local regulatory authority to verify proper wire AWG (suggested wire gauge is #12 AWG).
- Equipped with a grounding clamp on the enclosure to facilitate dedicated grounding.

NOTICE:

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

Utility Power Connection Notes, continued

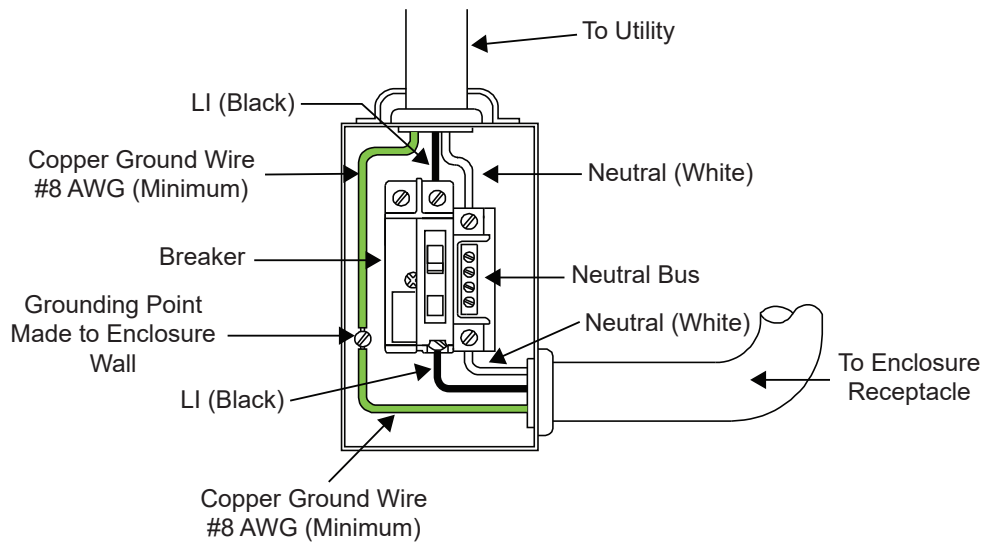


Fig. 0-1, Typical 120VAC Service Entrance Wiring

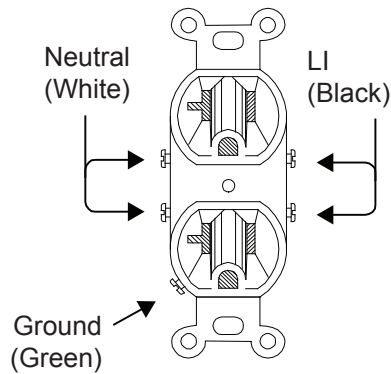


Fig. 0-2, Typical 120VAC 20A Receptacle Wiring, 5-20R (p/n 531-006-19)

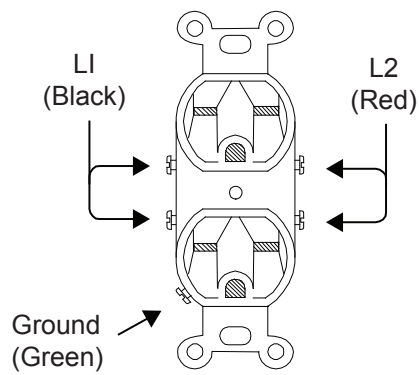


Fig. 0-3, Typical 240VAC 15A Receptacle Wiring, 6-15R (p/n 531-004-19)

Utility Power Connection Notes, continued

Proper 240VAC 15A service requires the installation site be:

- Equipped with a 240VAC duplex receptacle to provide power to the power supply and peripheral equipment.
- Have a NEMA® 6-15R receptacle that is protected by a single, 2-pole, common trip 15A circuit breaker inside the service entrance.
- Checked to NEC®/CEC code or with your local regulatory authority to verify proper wire AWG (suggested wire gauge is #14 AWG).
- Equipped with a grounding clamp on the enclosure to facilitate dedicated grounding.

✓ **NOTICE:**

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

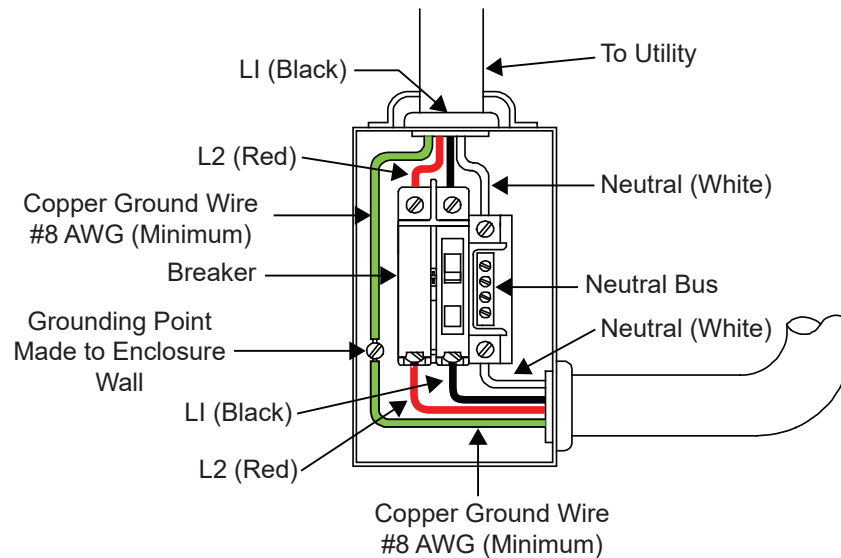


Fig. 0-4, Typical 240VAC 60 Hz Service Entrance Wiring

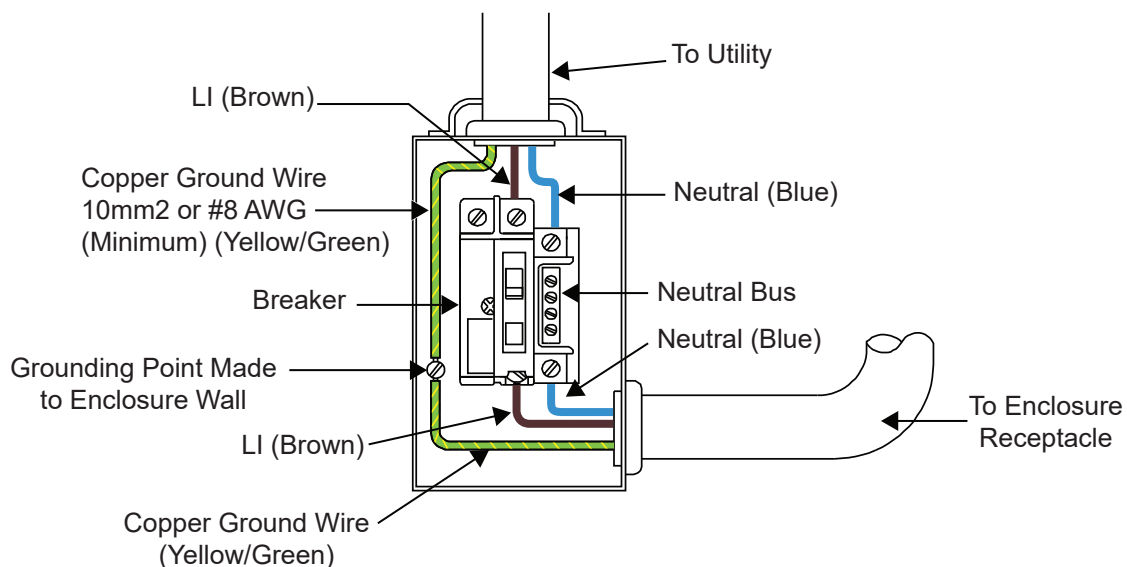


Fig. 0-5, Typical 230VAC 50 Hz Service Entrance Wiring

Grounding & Earth Connection Notes

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. This 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 & Earth Connection

The safety ground and earth is a two-part system, comprised of the utility service and the Alpha® grounding 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 power supply 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. Consult your local code or NEC® 250.53.

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 #6 AWG 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) (*Alpha p/n 020-019-31, 15A model; Alpha p/n 021-029-21, 25A model*) must be securely bonded to the enclosure.

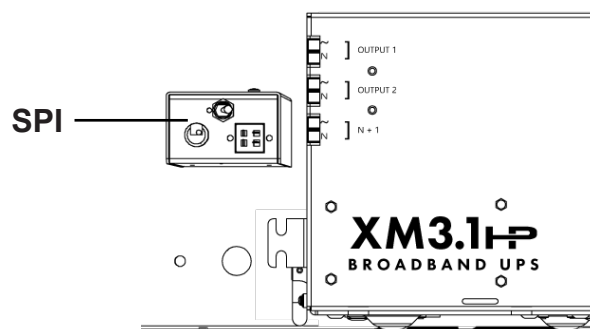


Fig. 0-6, SPI Location

Communications Grounding

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 Broadband UPS power supply. Please refer to the appropriate communications product manual for installation procedures.

For communication cables, Alpha® strongly recommends the use of a surge arresting device electrically bonded to the Alpha® enclosure.

WARNING! ELECTRICAL HAZARD

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

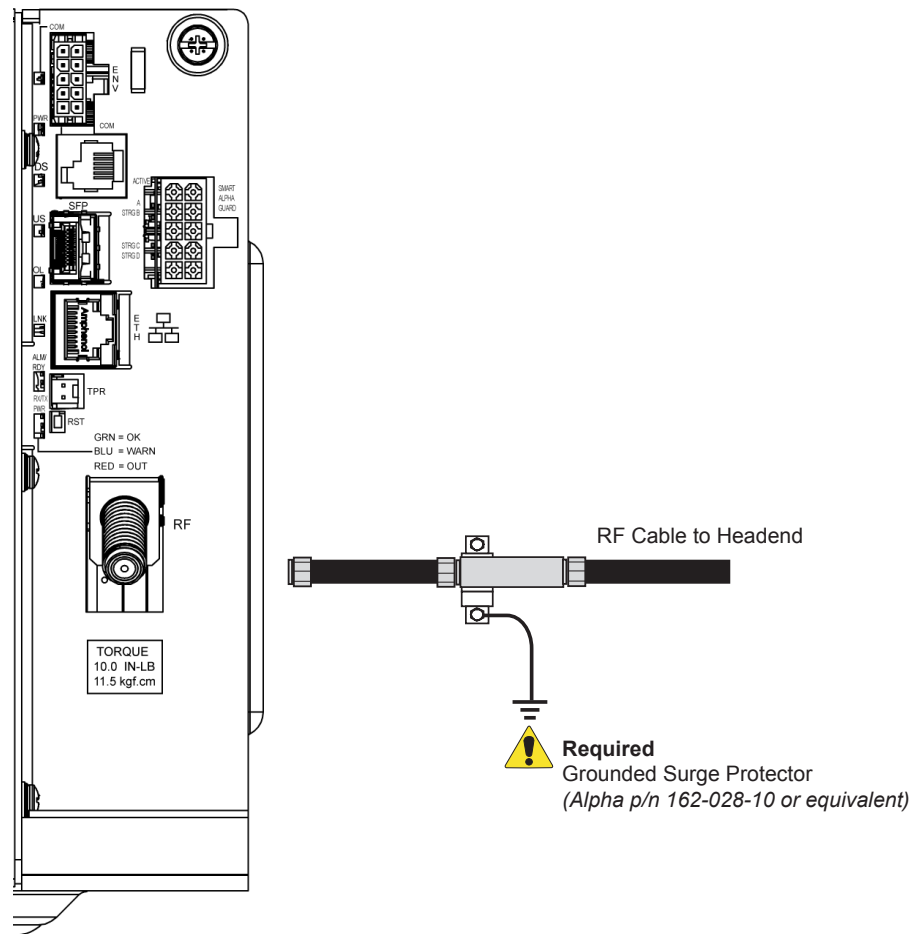


Fig. 0-7, Communications Grounding

1.0 Introduction

1.1 Alpha® XM3.1-HP™ Power Supply

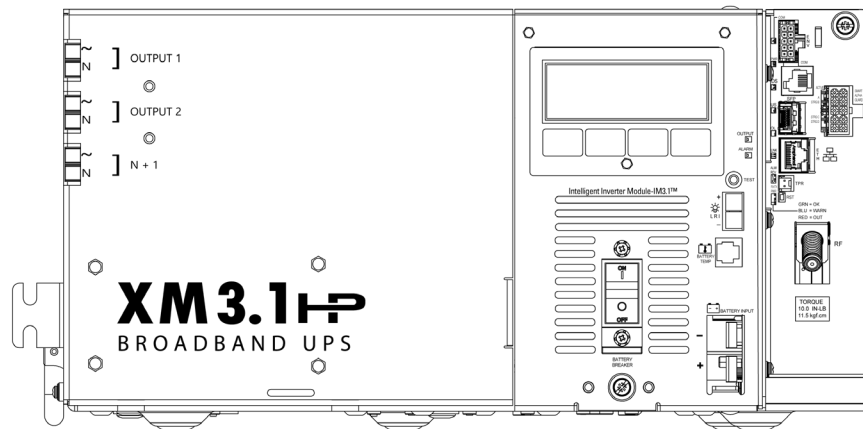


Fig. 1-1, Alpha® XM3.1-HP™ Power Supply

The Alpha® XM3.1-HP™ power supply powers signal processing equipment in cable television and broadband LAN distribution systems. The transformer module 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 converted into a quasi square wave and is regulated by a ferroresonant 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 inverter module automatically switches to standby operation and maintains power to the load. During the switch to standby operation, energy in the module's ferroresonant transformer continues to supply power to the load. In standby mode, the power supply powers the load until the battery voltage reaches a low-battery cutoff point.

When utility power returns, the transformer module waits a short time (approximately 10 to 20 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.

✓ **NOTICE:**

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

The Alpha® XM3.1-HP™ power supply contains the following:

- Smart Display
- Hot-swappable inverter module
- Built-in Self Test
- Wide input voltage range
- High efficiency transformer
- Communications menu with DOCSIS® parameters
- Optional Smart AlphaGuard™ card
- Optional factory-installed Alpha® Dual Output Controller (AlphaDOC) allows the XM3.1-HP™ power supply to provide programmable current limits for two output channels.
- Optional AlphaAPPs (APPS) functionality
- Via the Smart Display, the operator can view all of the power supply's operating parameters.
- Troubleshooting tips automatically display in the Alarm menu screen.
- Built-in metering circuits measure voltage and current, without the need for external test equipment.

✓ **NOTICE:**

During a no-load start-up, the power supply may reduce output voltage to 75-80% of rated output voltage until a load of greater than 1.5A is applied.

1.2 Theory of Operation

1.2.1 AC (Line) Operation

During AC line operation, utility power is routed into the primary winding of the ferroresonant transformer through the contacts of the line isolation relay. 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 ferroresonant transformer and an AC capacitor form the resonant tank circuit, which provides excellent noise and spike attenuation, output short-circuit current-limiting, and output voltage regulation. The ferroresonant transformer produces a quasi square wave output which resembles a rounded square wave.

NOTICE:

When measuring the output voltage of ferroresonant transformers, use only a true RMS AC voltmeter.

Non-RMS reading meters are calibrated to respond to pure sine waves and do not provide an accurate reading when measuring quasi-square wave output.

1.2.2 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 power supply:

- The isolation relay opens to disconnect the AC line from the primary winding of the ferroresonant transformer.
- The control logic switches the inverter FETs (field-effect transistor) on and off. This switching action converts the DC battery current into AC current in the inverter windings of the ferroresonant transformer, providing regulated power to 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 batteries and the inverter during standby operation. Since a prolonged AC line outage could severely discharge the batteries, resulting in permanent damage, the control logic disables the inverter when the batteries drop to a predetermined cutoff voltage.
- The XM3.1-HP™ power supply offers two user-selectable end of discharge (EOD) options based on either overall string voltage or individual battery voltage. See **Table 1-1, Low Battery Cutoff (EOD)** for battery specific EOD settings. Operation is defined as follows:
 - Battery String Voltage Mode which shuts off the inverter when the 36V bus voltage reaches Low Battery Cutoff Voltage as seen at the inverter.
 - Individual Battery Voltage Mode which shuts off the inverter when any battery in any string (1-4) reaches Low Battery Cutoff Voltage.
 - All units will factory default to Battery String Voltage Mode.
 - Individual battery EOD will only be available (user-selectable) if individual battery voltages are being sensed and present at logic card via the Smart AlphaGuard™ board.
 - When set to Battery String Voltage Mode the "Low Battery Cutoff" (EOD) is not user adjustable from the default. See **Table 1-1, Low Battery Cutoff (EOD)** for more information.
 - When set to individual Battery Voltage Mode the "Low Battery Cutoff" (EOD) will automatically set to default values based on battery type (see **Table 1-1, Low Battery Cutoff (EOD)**). A secondary option is then offered to the user for manually programming the "Low Battery Cutoff" (EOD), regardless of battery type, within the range 1.65 to 1.80 V/C.

1.0 Introduction, continued

- When set to Individual Battery Voltage Mode, if individual battery voltage is lost, the unit automatically reverts back to Battery String Voltage Mode and "Low Battery Cutoff" (EOD) will revert back to default value based on battery type.

	HP Batteries	GXL Batteries	XTV Batteries	OTHER Batteries
	Fixed	Fixed	Fixed	Fixed
String Low Battery Cutoff (EOD)	30.6 VDC (1.70 V/C)	31.5 VDC (1.75 V/C)	31.5 VDC (1.75 V/C)	31.5 VDC (1.75 V/C)

Individual Low Battery Cutoff (EOD)	Default	Minimum	Maximum
HP Batteries	10.2 VDC (1.70 V/C)	9.9 VDC (1.65 V/C)	10.8 VDC (1.80 V/C)
GXL Batteries	10.5 VDC (1.75 V/C)		
XTV Batteries	10.5 VDC (1.75 V/C)		
OTHER Batteries	10.5 VDC (1.75 V/C)		

Table 1-1, Low Battery Cutoff (EOD)

- When acceptable AC line voltage returns, the power supply returns to AC line operation after a 10 to 20 second lag. This delay lets the AC line voltage and frequency 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 ferroresonant 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 batteries in preparation for the next power outage.

1.2.3 Charger Modes of Operation

Battery charger temperature compensation control will occur between -20°C and 40°C. The default values listed in the Charger Modes of Operation table are at 25°C. Programming the temperature compensation 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.

	AlphaCell® Batteries			OTHER Batteries		
	HP	GXL	XTV	Default	Minimum	Maximum
Float V/C	2.25	2.27	2.25	2.27	2.10	2.35
Accept V/C	2.35	2.40	2.35	2.40	2.20	2.45
Automatic 30-Minute Refresh On/Off	ON	ON	OFF	OFF	OFF	OFF
Manual 24-Hour Refresh On/Off	OFF (Programmable)	OFF (Programmable)	OFF (Programmable)	OFF (Programmable)	OFF	ON
Refresh V/C	2.45	2.45	2.45	2.45	2.40	2.50
Rest On/Off	ON	OFF	ON	OFF (Programmable)	OFF	ON
Temperature Compensation	-4mV/°C/cell	-5mV/°C/cell	-3.3mV/°C/cell	-5mV/°C/cell (Programmable)	0 mV/ °C/cell	-5mV/ °C/cell

Table 1-2, Charger Modes of Operation

1.0 Introduction, continued

The Alpha® XM3.1-HP™ power supply uses a three-stage (OTHER battery type), four-stage (AlphaCell® GXL and XTV batteries), or five-stage (AlphaCell® HP batteries) temperature compensated battery charger as determined by the type of battery used in the system. During AC line operation, the inverter winding on the ferroresonant transformer feeds the charger circuit which provides the appropriate charge voltages to the batteries.

3-Stage Charger Modes (BULK/ACCEPT/FLOAT):

The 3-stage charger is applied when the battery type of OTHER is selected in the Smart Display menu.

BULK charge is a “Constant Current” charge. The maximum current is 10A. As the charge is returned to the batteries, their voltage increases to a specific threshold (2.40VDC 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 charge is a “Constant Voltage” charge. This voltage, default 2.40VDC (programmable 2.20-2.45VDC) 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 batteries becomes less than 0.5A or approximately six hours elapses from the time ACCEPT mode was entered, at which time the charger switches to the FLOAT mode of operation.

FLOAT charge is a temperature-compensated charge, default 2.27VDC (programmable 2.10-2.35VDC) per cell. During FLOAT mode, the batteries are fully charged and ready to provide backup power. The charger provides a small maintenance charge to overcome the batteries' self-discharge characteristics and other minor DC loads within the power supply.

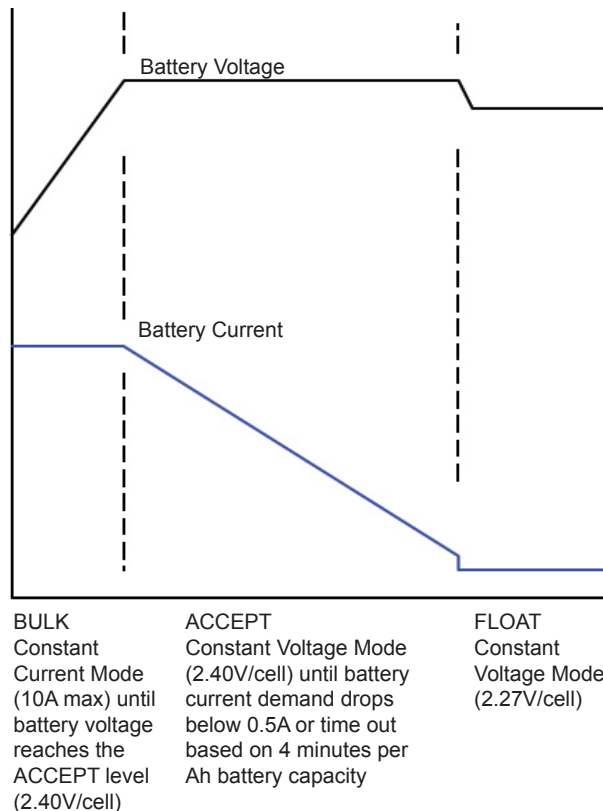


Fig. 1-2, 3-Stage Charger Modes

1.0 Introduction, continued

4-Stage Battery Charger (BULK/ACCEPT/REFRESH/FLOAT):

This preset value is applied to AlphaCell® GXL batteries when selected in the Smart Display Menu.

A 30-minute REFRESH charge is added, after BULK and ACCEPT states, before dropping down to FLOAT state, when the batteries are discharged more than 30% and it has been more than 30 days since the last REFRESH charge.

A manual REFRESH charge mode is recommended to be applied to all new batteries upon installation. This mode “boosts” the individual cell voltage of batteries that may have been in storage before they were placed on permanent FLOAT. Refresh can be initiated manually via menu selection or automatically when the battery date code is updated (See **Section 3.3.2 Battery Information and Configuration** for further instructions). The REFRESH charge is a one-time, 24-hour charge to raise individual cell voltage to 2.45VDC, and may bypass the BULK and ACCEPT states if the batteries are fully charged. The batteries are temperature-compensated at -0.005VDC per cell per degree C to ensure safe battery cell voltage and maximize battery life.

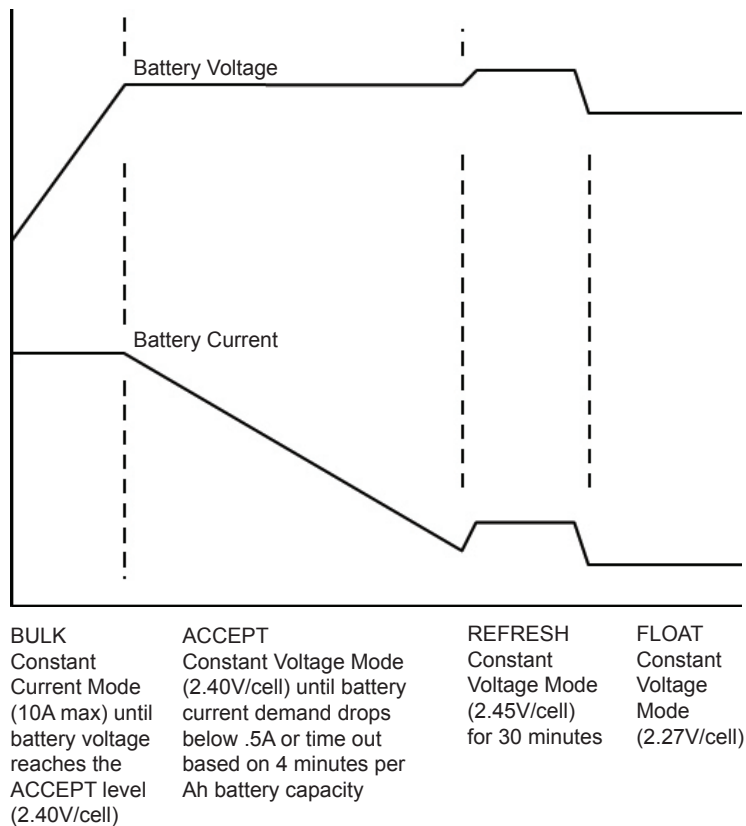


Fig. 1-3, 4-Stage Charger Modes

1.0 Introduction, continued

4-Stage Battery Charger (BULK/ACCEPT/FLOAT/REST):

This preset value is applied to AlphaCell® XTV batteries when selected in the Smart Display Menu.

A REST stage is added, after BULK, ACCEPT and FLOAT states.

A manual REFRESH charge mode is recommended to be applied to all new batteries upon installation. This mode “boosts” the individual cell voltage of batteries that may have been in storage before they were placed on permanent FLOAT. The REFRESH charge is a one-time, 24-hour charge to raise individual cell voltage to 2.45VDC, and may bypass the BULK and ACCEPT states if the batteries are fully charged. The batteries are temperature-compensated at -0.005VDC per cell per degree C to ensure safe battery cell voltage and maximize battery life.

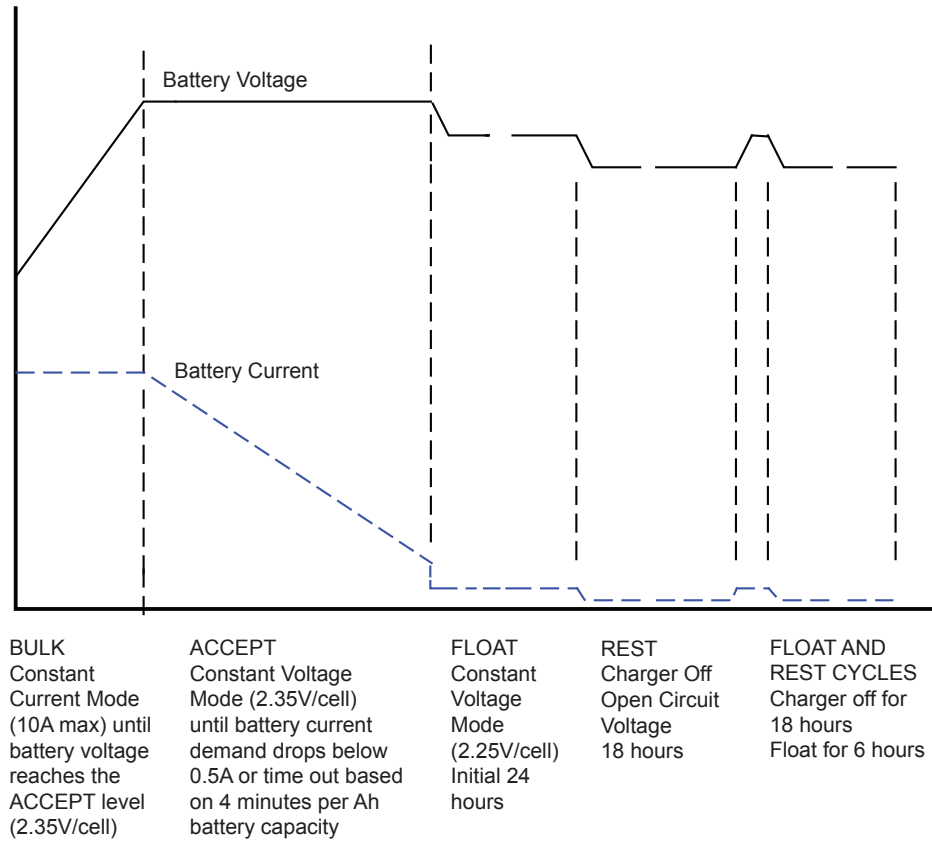


Fig. 1-4, 4-Stage Charger Modes for AlphaCell® XTV Batteries

1.0 Introduction, continued

5-Stage Battery Charger (BULK/ACCEPT/REFRESH/FLOAT/REST):

This preset value is applied to AlphaCell® HP batteries when selected in the Smart Display Menu.

REST: Charger is turned off (if ENABLED) and leaves the batteries without external voltage applied on the battery. Removing charged voltage and allowing the battery to sit in an open circuit environment maximizes the battery life by eliminating the chance of overcharging individual cells inside the 12V battery.

If the Smart AlphaGuard™ card is installed and the battery harness is connected, the unit will not go into REST mode until the Smart AlphaGuard card indicates that any batteries are less than or equal to 0.3V out of balance, or until 4 days per string has elapsed, whichever comes first after the 6 hour float period.

After any discharge/recharge cycle, once the charger reaches FLOAT mode, it will wait 24 hours in FLOAT mode before going to REST mode. On a daily basis, without any discharge cycle, the batteries will be in FLOAT for 25% and REST (charger off) for 75% (6 hours float, 18 hours rest).

REST mode is terminated if voltage drops to less than 2.12VDC. Upon exiting REST mode due to a voltage below 2.12VDC, a BULK/ACCEPT cycle will be initiated.

The battery charger voltage is temperature-compensated at -0.004VDC per cell per degree C to ensure a safe battery cell voltage and to maximize battery life.

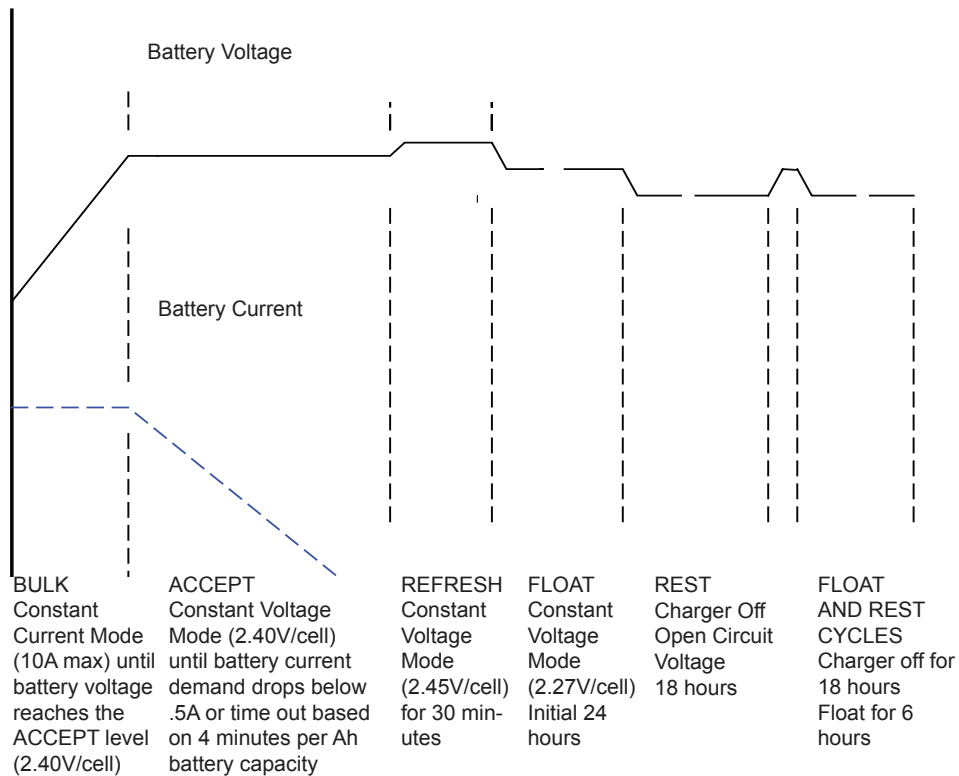


Fig. 1-5, 5-Stage Charger Modes

1.0 Introduction, continued

1.2.4 Output Voltage Modes of Operation

The XM3.1-HP™ power supply can be configured to Fine or Coarse Mode of operation for Output Voltage Regulation via the Power Configuration Menu (see **Section 3.3.1 Power Information and Configuration**).

Fine Mode:

In Fine Mode the power supply will maintain the tightest output voltage regulation possible, +1/-2.5% for 89V or +1.5/-3.5% for 63V. It will automatically adjust to and from Coarse Override Mode temporarily if:

- a) The unit switches to inverter more than 2 times in a 60-day period;
- b) the unit switches tap relays more than 60 times in a 60-day period.

The power supply will automatically adjust back to Fine Mode if there are less than 2 inverter transfers and less than 15 output tap switches in a 60-day period.

Coarse Mode:

In Coarse Mode the XM3.1-HP™ power supply will maintain a wider output voltage regulation window, +1/-5% for 89V or +1.5/-6% for 63V. In this mode the power supply switches taps as few times as possible. It will never automatically adjust to Fine Mode once Coarse Mode is selected.

Reduced Peak Mode (RMODE) Inverter Regulation:

Reduced Peak Mode is intended for power HFC devices that are sensitive to peak voltage. Reduced Peak Mode will lower the inverter mode output peak voltage by approximately 20%. RMODE can be enabled locally via the Smart Display or remotely via the Alpha® cable modem web page. When RMODE is activated the power supply inverter efficiency will decrease by approximately 2 to 3%.

Background: Legacy CATV HFC equipment may be more susceptible to the peak voltage of the XM3.1-HP™ power supply Output waveform than newer HFC equipment due to circuit design, surge protection, electronic component aging, and distance from the power supply. When the XM3.1-HP™ power supply switches to standby inverter mode or a Self-test is performed, the equipment load may not power up or cause an output failure on the XM3.1-HP™ power supply.

Three levels of RMODE are available:

RMODE Levels			
Vout Setting	Vout Peak Limit (Level 1)	Vout Peak Limit (Level 2)	Vout Peak Limit (Level 3)
89V	115V	109.25V (95%)	103.5V (90%)
63V	87V	85.65V (95%)	78.3V (90%)
60V	85V	80.75V (95%)	76.5V (90%)

Table 1-3, RMODE Levels

1.3 Alpha® XM3.1-HP™ Power Supply Layout

The Alpha® XM3.1-HP™ power supply is comprised of the following:

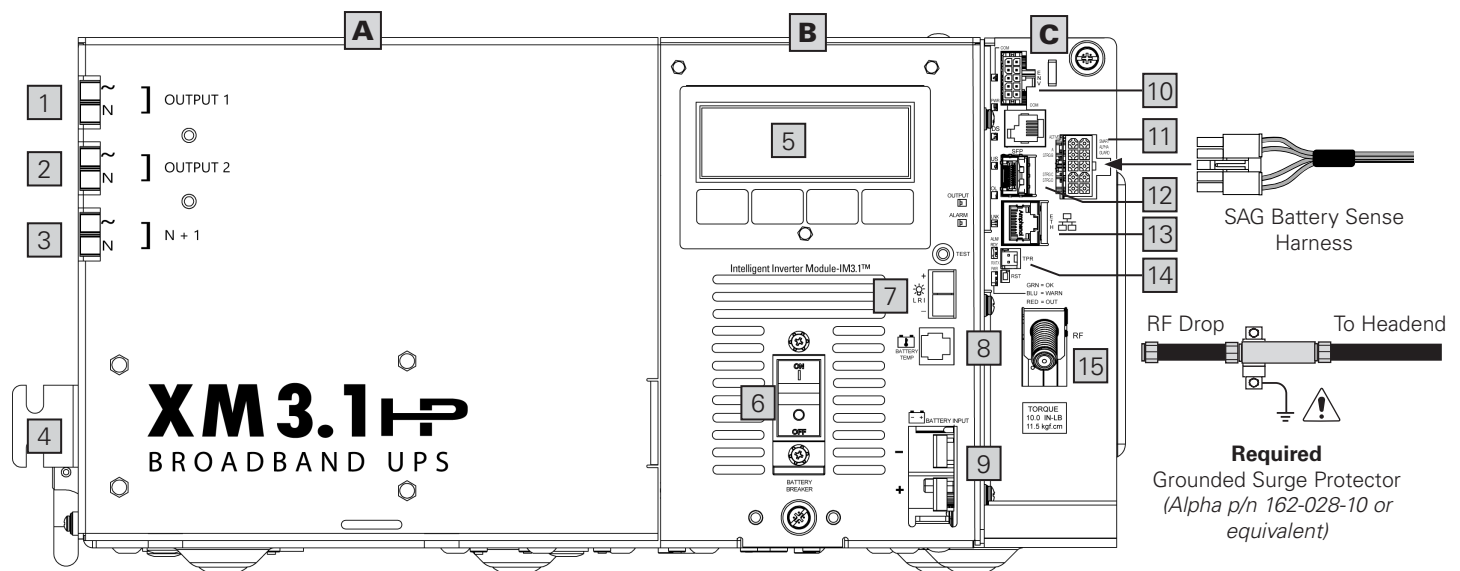
A Transformer Module — Acts as a stand-alone line conditioner. The transformer module contains a ferroresonant transformer, AC capacitor, line isolation relay, power distribution module, EMC filter board, and the optional AlphaDOC card.

NOTICE:

The option cards require an inverter module installed in order to be functional.

B Intelligent Inverter Module — Required for standby operations and contains circuitry needed for the three-to-five-stage temperature-compensated battery charger, DC to AC inverter, AC line detectors and Smart Display.

C Communications Module — The communications module is populated with the Smart AlphaGuard™ card mounted to the element monitoring module (EMM). The module also contains an embedded cable modem module (CMM) which enables status monitoring and communications.



- | | |
|--|--|
| 1 Output 1 (Primary) | 9 Battery Input |
| 2 Output 2 | 10 Environmental (ENV) Control Connector |
| 3 N + 1 Port (AlphaDOC) | 11 Smart AlphaGuard (SAG) Connector |
| 4 AC Power Input | 12 SFP Optical Status Monitoring Port |
| 5 Smart Display | 13 Ethernet (ETH) Connector |
| 6 Battery Breaker | 14 Tamper (TPR) Switch Connector |
| 7 Local/Remote Indicator (LRI) Connector | 15 RF Connector |
| 8 Precision Temperature Sensor (PTS) Connector | |

NOTICE:

Alpha® recommends tightening the RF cable connector and the cables attached to the grounded surge protector to a torque setting of 10in-lb ± 1in-lb.

Fig. 1-6, Front Panel, XM3.1-HP™ Power Supply

1.3.1 Front and Side Panel Connectors

- 1 Output 1 (White = Neutral, Black = Line): The AC output connector is clearly marked and color-coded for easy identification. The Service Power Inserter (SPI) connects directly into the Output 1 connector.
- 2 Output 2 (White = Neutral, Black = Line): When no AlphaDOC card is installed, this output is wired in parallel to Output 1 and is often used for auxiliary loads. If the AlphaDOC card is installed, programmable current limits are available for both Output 1 and Output 2.
- 3 N + 1 port (only if AlphaDOC card is installed)
- 4 AC power input

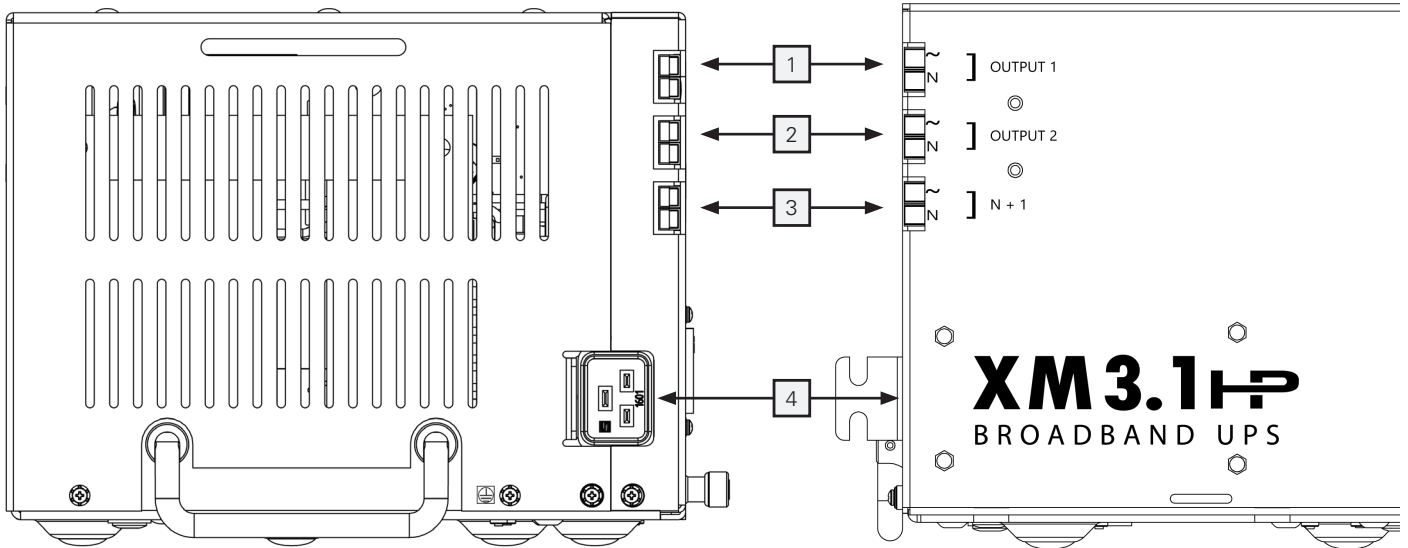


Fig. 1-7, Side Panel, XM3.1-HP™ Power Supply

Fig. 1-8, Detail View, Front Panel Connections and Indicators

1.3.2 Smart AlphaGuard™ Card

The Smart AlphaGuard™ card is an optional device that maximizes battery life.

The Smart AlphaGuard card enables the XM3.1-HP™ power supply system to gather individual battery voltages and balance the batteries. A description of the Smart AlphaGuard card's operation and features follows.

Theory of Operation

The Smart AlphaGuard card is a battery balancer with multiple string capability and integrated intelligent functions. It minimizes differences in individual battery voltages during the charging of the batteries (all modes except REST) by transferring charge from a battery with a higher voltage to the batteries with lower voltages within a string. The Smart AlphaGuard's balancer circuit switches between strings enabling a single Smart AlphaGuard card to service up to four strings of batteries.

To accomplish this the Smart AlphaGuard card periodically measures all the battery voltages. Voltage measurements are used to determine the level of balance of the batteries and determine if there is one or more batteries that need to be balanced. The level of balance will determine which string the Smart AlphaGuard card will focus on. The Smart AlphaGuard card selects the string with the highest delta mean ($V_{bat}-V_{mean}$) to balance first.

Smart AlphaGuard™ LEDs

The LEDs provide visual indications of the current state of the Smart AlphaGuard card and any alarms that are present. Verify the Smart AlphaGuard LEDs behavior is as follows:

Smart AlphaGuard™ LED State and Indications			
LED Name	Color	State	Indication
Active	Green	Off	No power to Smart AlphaGuard card
		Solid	Unit is on and communicating with power supply or in Rest mode
		Flash (50% on / 50% off)	Actively balancing
		Flash (10% on / 90% off)	PowerSave mode - relays powered off and balancer disabled
STRG A STRG B STRG C STRG D (ALARMS)	Red	Off	Normal operation
		Flash (50% on / 50% off (Minor Alarm)	Battery imbalance (high delta mean)
		Solid (Major Alarm)	Check battery alarm
		All flash (10% on / 90% off)	String X miswired
		All solid (Minor Alarm)	Stuck relay detected
		All solid (Minor Alarm)	Smart AlphaGuard harness not connected

Table 1-4, Smart AlphaGuard LEDs Behavior

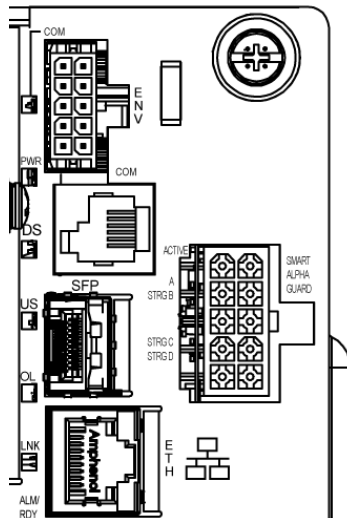


Fig. 1-9, Smart AlphaGuard Front Panel

1.3.3 Alpha® Dual Output Controller (AlphaDOC)

The optional AlphaDOC card adds a second programmable output to the power supply. 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 AlphaDOC card has a programmable overcurrent threshold (3A-25A) and overcurrent tolerance period that specifies the time (20-9900ms) an overcurrent condition is permitted before shutting down.

The retry limit can be programmed to select how many times (0-40) after a programmable delay (5-301 seconds) the AlphaDOC card will attempt to reconnect an output once it has been shut down. When the limit is reached, the XM3.1-HP™ power supply automatically retries once every 30 minutes until the fault clears.

Adding the AlphaDOC card to the power supply provides these advantages:

- **A second programmable output:** The main purpose of the AlphaDOC card is to limit the impact of a fault condition in one output channel. If a fault condition occurs in a power supply (without the optional AlphaDOC card installed) the entire customer network can be affected. The AlphaDOC card option affords protection to one output should a fault condition exist on the other. This gives the operator flexibility to program limits for both Output 1 and Output 2.
- **A protected current for critical loads:** With the AlphaDOC card option, the operator can designate one output 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, the operator can ensure the primary output always provides the necessary power. For example, on a 15 amp power supply, if a customer needs 10 amps available on Output 1, the overcurrent limit for Output 2 is set at 5 amps, so regardless of Output 2, 10 amps will remain available for the primary Output 1.
- **Additional current protection:** The standard power supply current limit protection is provided by the fold-back characteristics of the transformer (150% of rated output). The 150% current limit may exceed the ratings of active devices in the cable network and cause failures. The operator 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.
- **Short Circuit Trip:** A short circuit on the broadband network with a line impedance of 1.5 to 2Ω will be detected and disconnected within 2 cycles or less.
- **Output Transient Suppression:** Some active devices on the broadband power network are sensitive to the peak voltages of a ferroresonant power supply due to initial start-up, low load or near proximity situations. The XM3.1-HP™ power supply AlphaDOC card option provides a 150V peak clamped output that may help to reduce the risk of premature failure of sensitive power modules in the broadband equipment.

 **NOTICE:**

The table below depicts a condition in which no AlphaDOC card is installed, or no individual output is above its trip setting.

Power Supply Load		Duration
918 and 918P	All Other Models	Permitted Duration of Load
>125%	>150%	30 seconds
113% to 125%	125% to 150%	10 minutes
108% to 113%	115% to 125%	30 minutes
<108%	<115%	Several months
Short Circuit		10 seconds

Table 1-5, Duration of Load

1.0 Introduction, continued

For example, on an 18A power supply, where both outputs are programmed to 10A maximum and both outputs are supplying 10A, neither output is “in violation” but the total system at 18A is operating at 111% 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.

Programming the AlphaDOC Card

Programmable parameters (with AlphaDOC card installed) 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 power supply attempts to restart an output connection. Once the RETRY LIMIT is exceeded, standard models attempt to restart the output connection every 30 minutes. Set this parameter to “zero” to disable the “automatic retry” function.

Overcurrent Tolerance Period (20-9900ms): 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.

NOTICE:

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

Output 1 Reset/Output 2 Reset: This manually resets corresponding tripped output. These are not displayed if the corresponding output is not tripped.

Read Only AlphaDOC Menu Items

- AlphaDOC Option: Automatically senses and indicates whether the AlphaDOC card is installed.
- AlphaDOC FW: Firmware version installed in the AlphaDOC card.
- DOC #####: Serial number of the AlphaDOC card.

NOTICE:

If the optional AlphaDOC card is not installed, the values shown under the “AlphaDOC OPTION” line of the Smart Display are hidden.

1.3.4 Inverter Module Overview

The removable inverter module provides uninterrupted power to the ferroresonant transformer (via the batteries) during utility failures. During normal operation, the inverter charges the batteries using a three-, four- or five-stage (Bulk, Accept, Refresh, Rest and Float) charging protocol determined by the charger setting and battery type.

- 1 Smart Display:** All operational functions, system testing, programmable items and alarms are available via the Smart Display panel on the front of the power supply.
- 2 Softkeys:** Provide access to the various menus and submenus within the Alpha® XM3.1-HP™ power supply.
- 3 Output LED:** Indicates output state of the Alpha® XM3.1-HP™ power supply.
- 4 Alarm LED:** Indicates alarm condition.
- 5 Self-test button:** Initiates self-test.
- 6 Local/Remote Indicator Connector:** Indicates alarm condition to exterior lamp.
- 7 The Precision Temperature Sensor (PTS):** Plugs directly into the temperature probe (RJ-11C type) connector.
- 8 Battery Circuit Breaker:** Controls battery DC power to the inverter.
- 9 Battery Cable Input Connector:** The battery cable connector plugs directly into the inverter module's battery input connector. The connector is polarized and fits in one direction only.

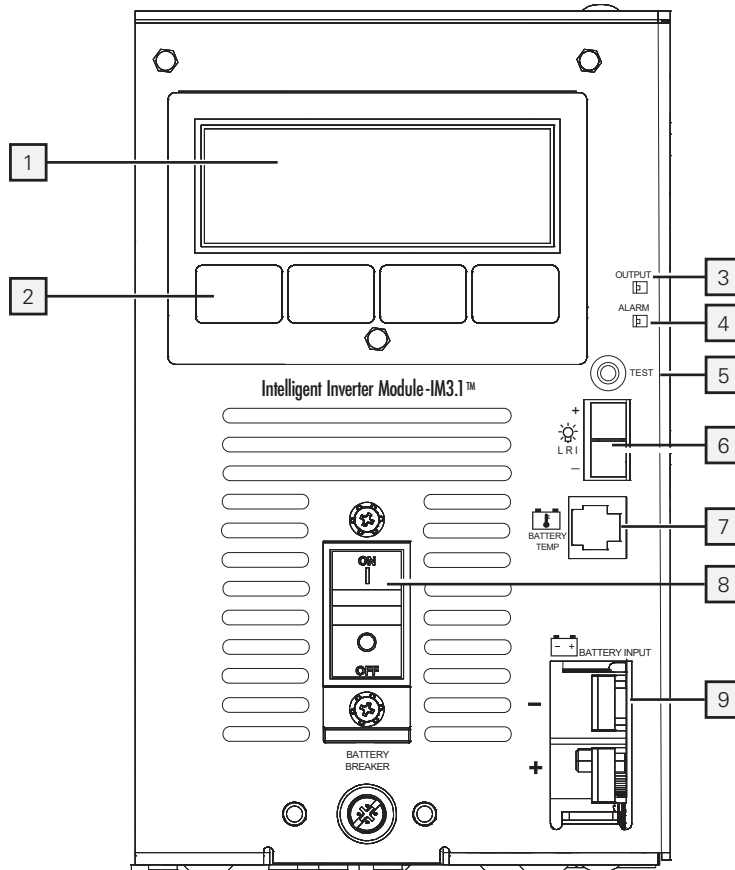


Fig. 1-10, Inverter Module Connections

1.3.5 Communications Module

The Communications Module is attached via five mounting screws (see below) and is populated with the Smart AlphaGuard™ card mounted to the Element Monitoring Module (EMM). The module also contains an embedded Cable Modem Module (CMM) which enables status monitoring and communications. The CMM Embedded DOCSIS® Status Monitoring enables monitoring of Alpha power supplies through existing cable network infrastructure. Advanced networking services provide quick reporting and access to critical powering information.

The CMM utilizes Simple Network Management Protocol (SNMP) and standard SCTE-HMS and Alpha Management Information Bases (MIBs) to provide network status monitoring and diagnostics. A web interface enables authorized personnel direct access to advanced diagnostics using a common web browser.

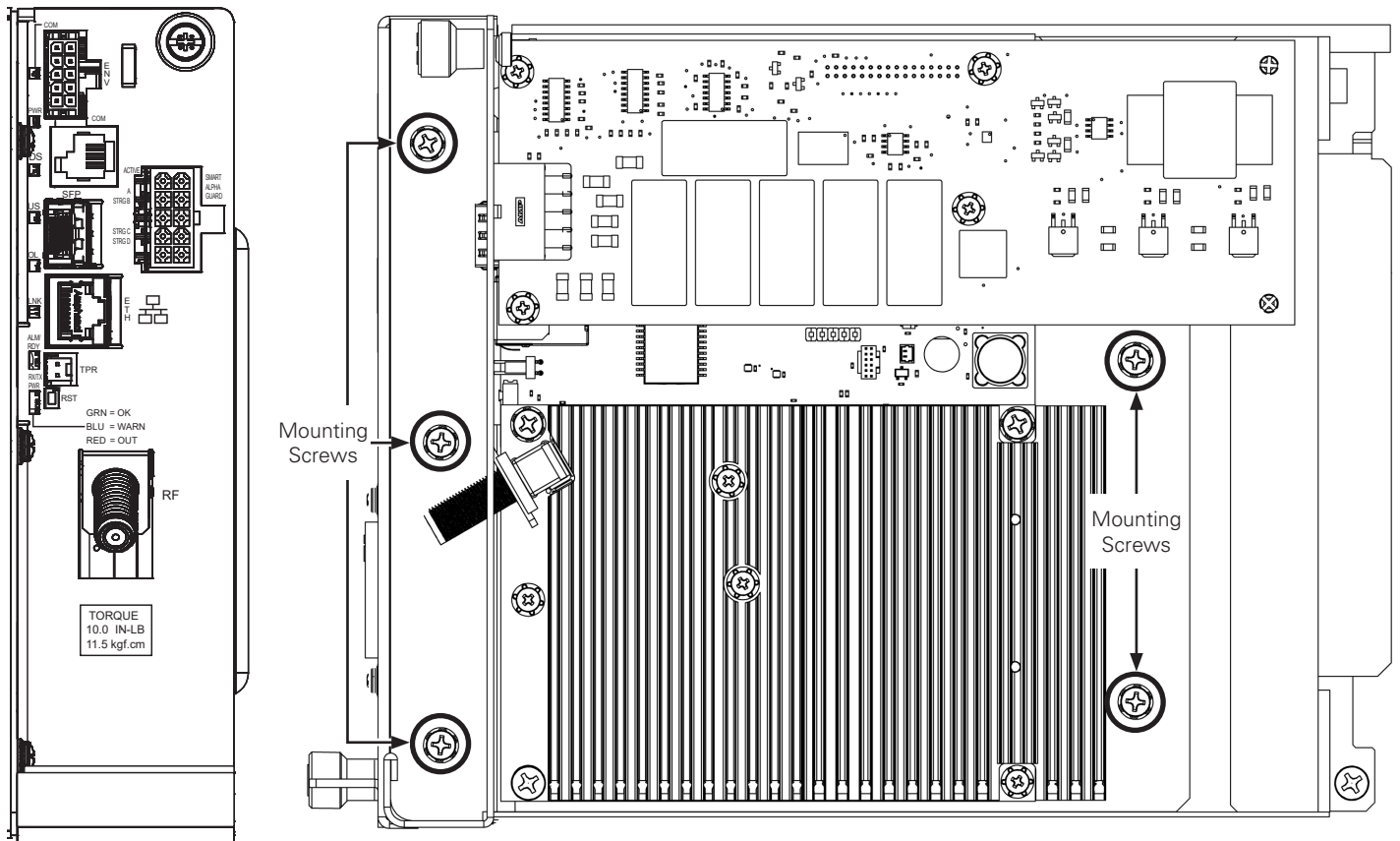


Fig. 1-11, Communications Module

1.4 Alpha® Extended Runtime (XRT) Power System Applications

The Alpha® XRT-Li and XRT-TPPL extended runtime power systems offer a solution for a longer backup time for the XM3.1-HP™ power supply and cable TV powering applications. For more information, refer to the following documents:

- Alpha® XRT-Li Extended Runtime Power System Technical Manual (*p/n 031-00019-B0-001*)
- Alpha® XRT-TPPL Extended Runtime Power System Technical Manual (*p/n 031-00014-B0-001*)
- Alpha® XRT-TPPL Extended Runtime Power System Quick Start Guide (*p/n 031-00014-B1-001*)

2.0 Installation

2.1 Installation Procedure

The Alpha® XM3.1-HP™ power supply can be shelf-mounted within a variety of Alpha enclosures and secured with an internal tamper-resistant security screw kit. The installer must read and follow all safety instructions and the preliminary inspection below prior to installation of the power supply.



CAUTION!

Read the Safety Precautions, Utility Power Connection Notes, and Grounding Connection Notes before installing the power supply.

2.1.1 Pre-installation Inspection

1. Remove the power supply from the shipping container. Confirm the power supply, including the precision temperature sensor (PTS) 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 Services, Inc. or the shipping company immediately. Most shipping companies have a short claim period.
3. Do not attempt to install a power supply without first passing a complete pre-installation inspection.



NOTICE:

Use the original shipping container if the power supply 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. Use single shipment packaging (*Alpha p/n 966-639-10 or 966-640-10*) to return ship a damaged power supply. If necessary, palletize shipment to protect power supply.



CAUTION!

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

2.1.2 Internal Security Screw Kit Installation

The XM3.1-HP™ power supply security screw kit provides the hardware for securing the power supply to its enclosure. The security key for the included security screw is NOT in the installation kit and must be purchased separately from Alpha®. The customer may supply their own tamper resistant/security fastener if desired.



WARNING! ELECTRICAL HAZARD

- Only qualified service personnel should perform this procedure.
- Use EXTREME CAUTION when drilling into the enclosure. Clear all equipment, wiring, and batteries from the area into which you are drilling.
- Lead-acid batteries contain dangerous voltages, currents and corrosive material.



NOTICE:

Enclosure and power supply unit may differ slightly from the figures. Use as reference only.

Required Materials:

- Security screw kit, *p/n 746-316-20*
- Alpha-01 security key, *p/n 647-188-10*
- 3/8" hand drill
- 13/32" (#Y) drill bit
- Center punch
- 3/8" Socket and torque wrench

2.0 Installation, continued

Kit Includes:

- A. 3/4" × 1/4" Aluminum spacer (p/n 640-174-10)
- B. 1-1/2" SS flat washer (p/n 633-015-12)
- C. 5/16-18 × 1" SS security screw (p/n 647-189-12)

Note – Customer may supply their own tamper resistant/security fastener. If so, do not use kit supplied screw.

Not Included (w/ Internal Security Screw Kit):

- D. Alpha 01 security screw key (p/n 647-188-10)

Installation Procedure:

1. Locate the security screw mounting location on the XM3.1-HP™ power supply (see Fig. 2-2).
2. Mark the location of the XM3.1-HP power supply security screw hole on the enclosure shelf.
3. Using the 13/32" drill bit, drill the hole for the security screw. Remove all metal shavings from the enclosure.
4. Position the 1/4" aluminum spacer over the hole (use the center punch to locate the spacer directly over the hole).
5. Position the XM3.1-HP power supply with the security hole over the drilled hole and spacer (use the center punch to hold the spacer in place while positioning the power supply) (see Fig. 2-3).
6. Install the 5/16-18 × 1" SS security screw and 1-1/2" SS flat washer from the underside of the shelf. If installing the supplied 5/16-18 × 1" SS security screw, torque to 26 ft-lb (35.2 Nm). If installing a different security screw, follow the manufacturer's recommendations for torque.

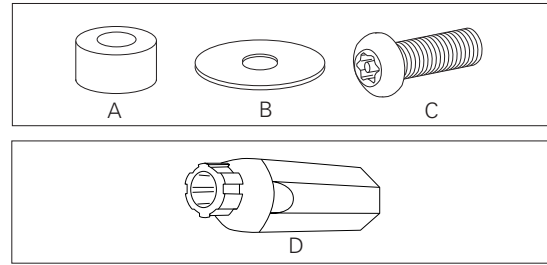


Fig. 2-1, Required Materials

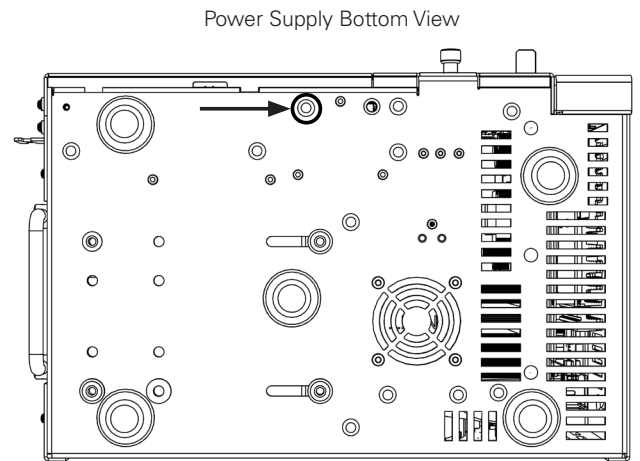


Fig. 2-2, Security Screw Mounting Location

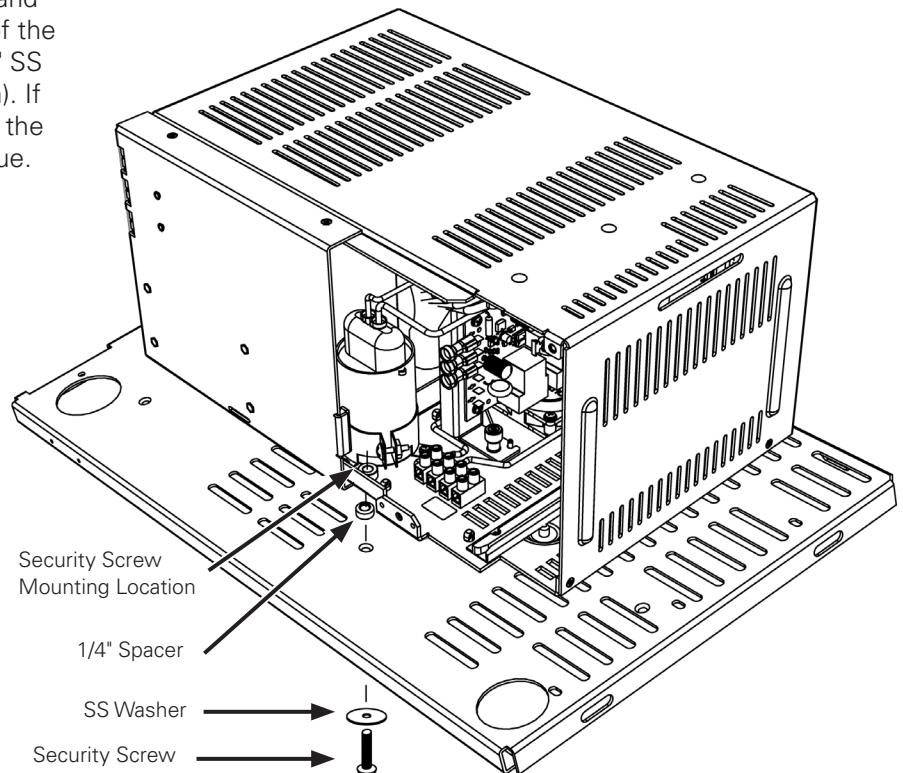


Fig. 2-3, Power Supply/Enclosure Shelf Security Screw Stack Up

2.2 XM3.1-HP™ Power Supply Start-Up Procedure

2.2.1 Parts and Connections

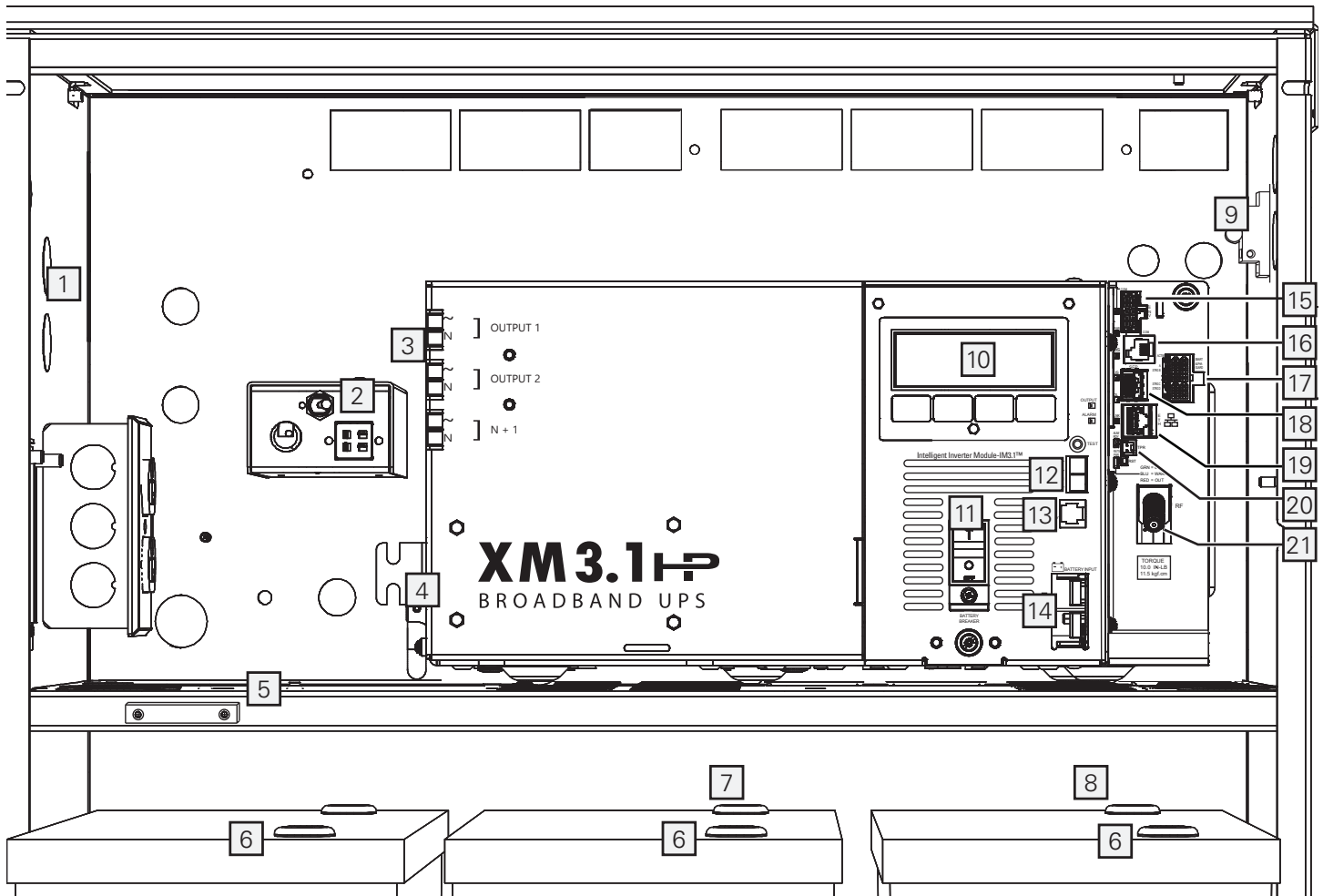


Fig. 2-4, Installation of XM3.1-HP™ Power Supply

- | | | |
|--|--|------------------------|
| 1 Local Remote Indicator (LRI) Mounting Location | 11 Battery Breaker | 21 RF Connector |
| 2 Service Power Inserter (SPI) | 12 Local/Remote Indicator (LRI) Connector | |
| 3 Output Ports | 13 Precision Temperature Sensor (PTS) Connector | |
| 4 AC Power Input | 14 Battery Input | |
| 5 Alarm Intrusion Tamper Switch | 15 Environmental (ENV) Control Connector | |
| 6 Positive Battery Terminals to Smart AlphaGuard (3, Red) | 16 Communications (COM) Port | |
| 7 Negative Battery Terminal to Center Battery and PTS | 17 Smart AlphaGuard™ Connector | |
| 8 Negative Battery Terminal (1, Black) | 18 SFP Optical Status Monitoring Port | |
| 9 Grounded Surge Protector | 19 Ethernet (ETH) Connector | |
| 10 Smart Display | 20 Tamper (TPR) Switch Connector | |



WARNING! ELECTRICAL HAZARD

Verify battery voltage, cable color, connection and polarity are correct before proceeding.

2.2.2 Battery Installation Options and Wiring Diagram

Convection airflow battery cooling relies on proper spacing of batteries installed in the enclosure. Consistent spacing is achieved by the use of Alpha's battery spacer clips. These easy-to-install clips snap over the tops of AlphaCell® batteries allowing for optimal airflow. For domestic applications, use one battery clip per 36V battery string for optimal spacing. For international applications, use two clips per 36V battery string (See Fig. 2-5).

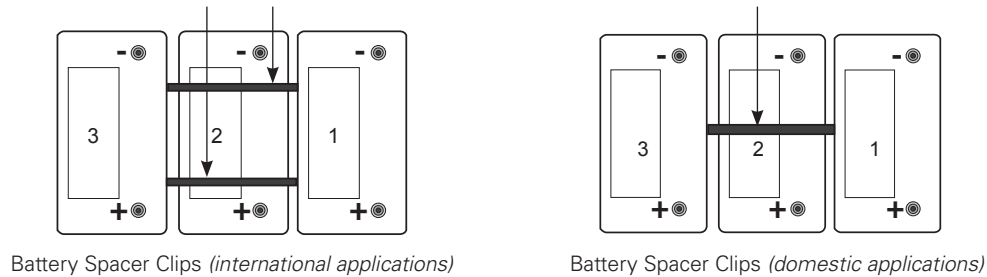


Fig. 2-5, Placement of Battery Spacer Clips (for domestic and international 36V battery strings)

Load batteries into cabinet with the positive terminals (+) facing forward. Battery strings are lettered A through D; batteries are numbered 1 through 3, from right to left.

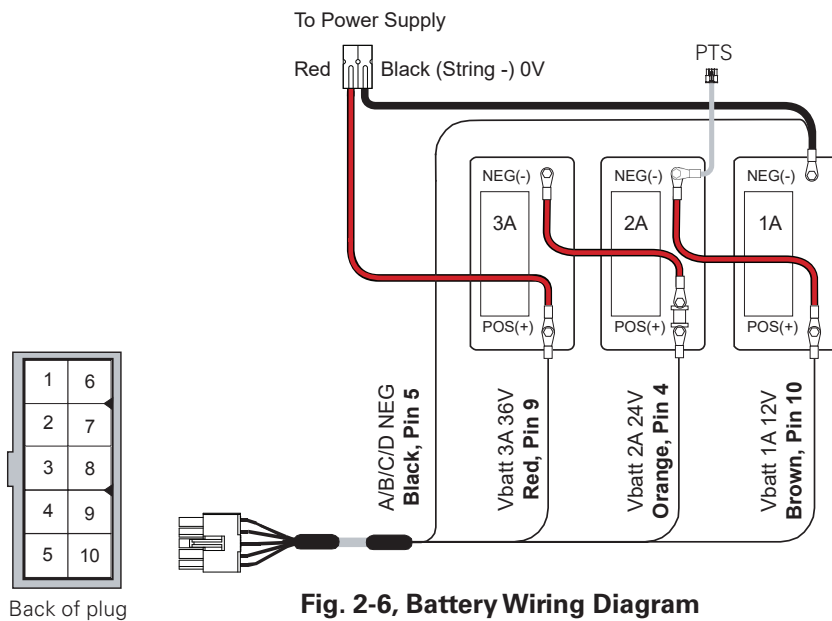


Fig. 2-6, Battery Wiring Diagram (w/ embedded Smart AlphaGuard™ option depicted)



Fig. 2-7, Precision Temperature Sensor (PTS), p/n 746-331-20

The connection from the embedded Smart AlphaGuard™ card to the battery strings are made with one of the available to order wire kits. Kits for one, two, three, or four strings are available. Kits are also available that mate to the external AlphaGuard wire kit. The Smart AlphaGuard wire kit consists of a string 36V positive and a string negative that are common for all strings. For each string (A, B, C and D), there are two additional wires that must be connected.

Smart AlphaGuard™ (Embedded) Use Battery Harness, p/n:

- 1 string battery harness, p/n 875-848-20
- 2 string battery harness, p/n 875-848-21
- 3 string battery harness, p/n 875-848-22
- 4 string battery harness, p/n 875-848-23

Single battery string

- A single string system must use String A on the wire harness.

2.0 Installation, continued

Dual battery string

A dual string system must use String A as the first string and String B as the second.

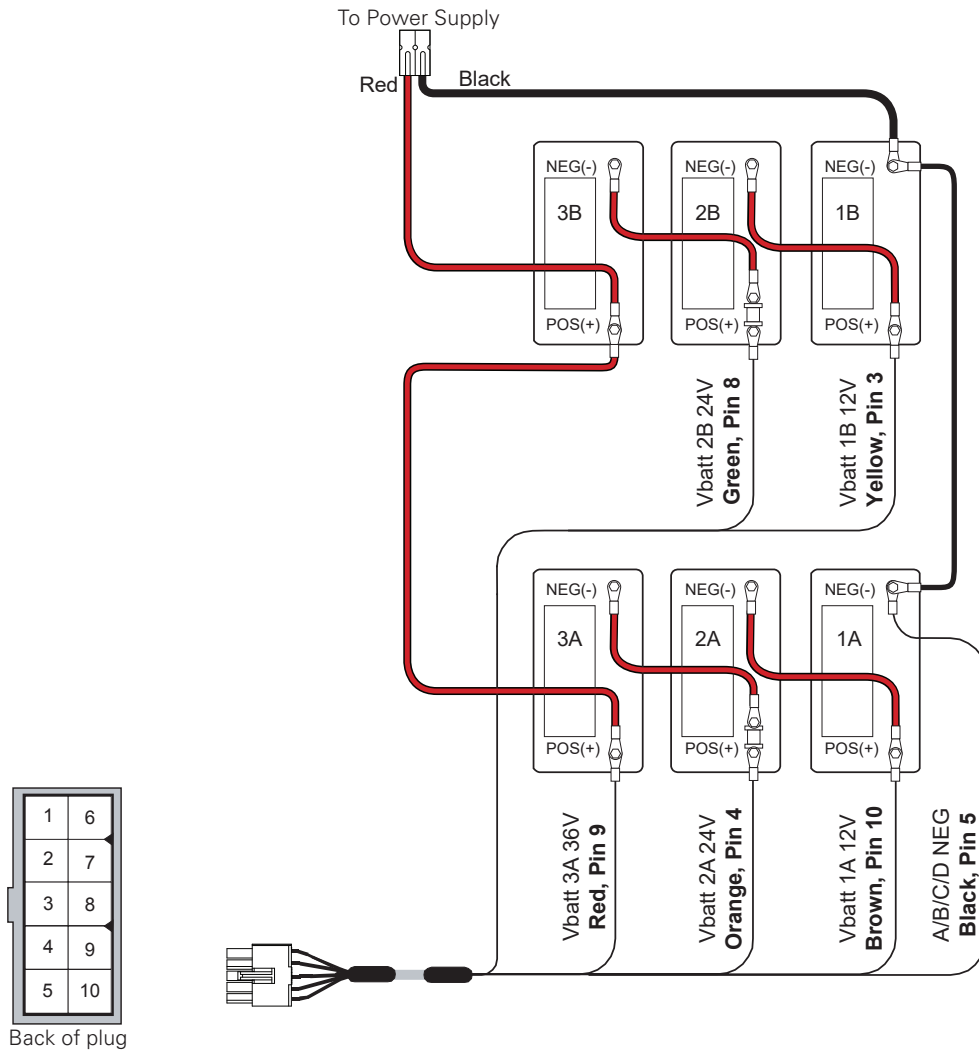


Fig. 2-8, Dual Battery String Wiring Diagram (w/ embedded Smart AlphaGuard™ Harness depicted)

2.0 Installation, continued

Multiple battery strings

A system with multiple strings must use String A as the first string, B as the second, C as the third and D as the fourth.

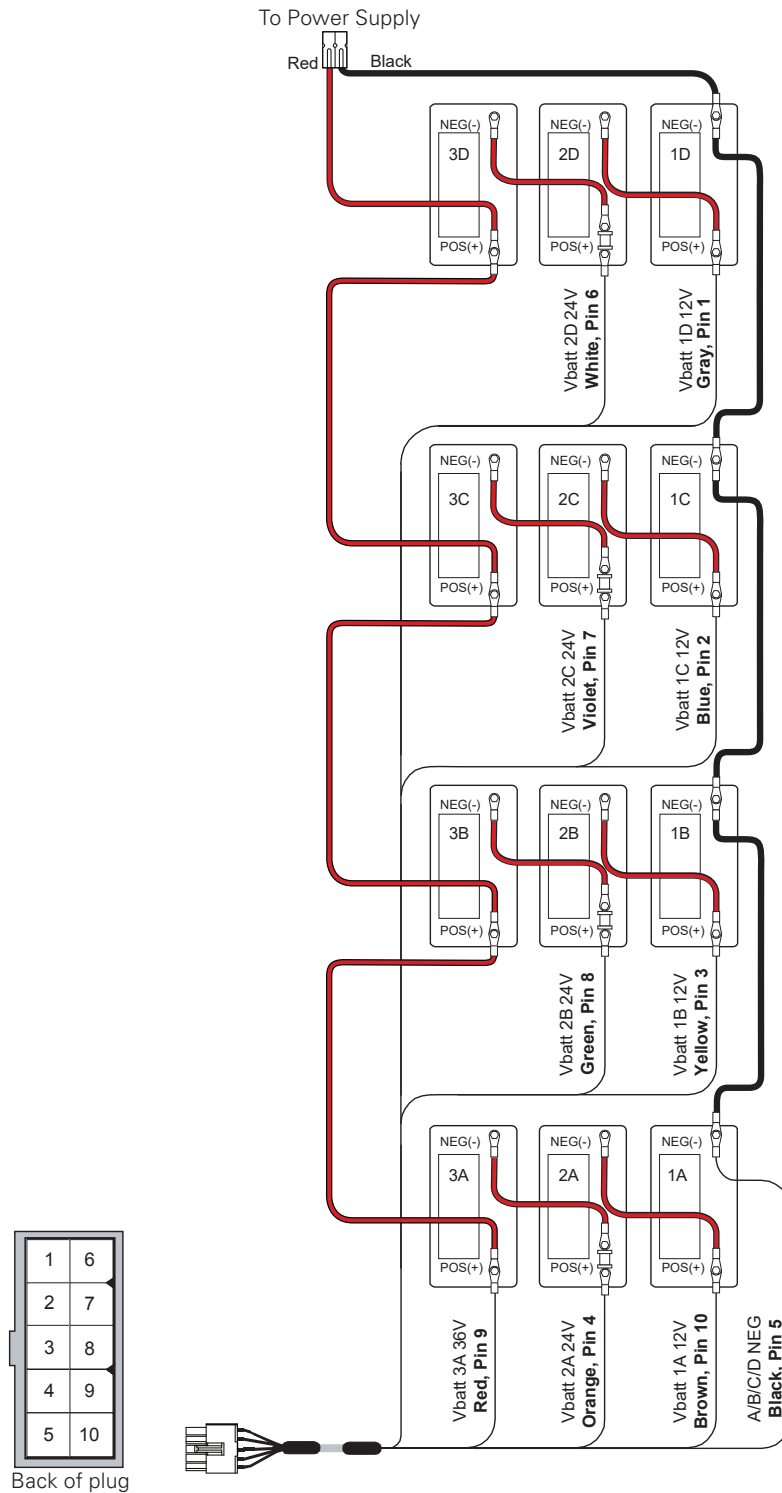


Fig. 2-9, Multiple Battery String Wiring Diagram (w/ embedded Smart AlphaGuard™ Harness depicted)

2.0 Installation, continued

✓ **NOTICE:**

The following battery diagram uses AlphaCell® XTV 18V4 batteries. This set up does not apply to 12V batteries used in the previous diagrams such as Fig. 2-8 and Fig. 2-9.

There are two battery harnesses available for AlphaCell® XTV 18V4 batteries:

- 1 string kit: p/n 876-00014-20
- 2 string kit: p/n 876-00014-21

✓ **NOTICE:**

Support for 6V and 12V battery strings are available with the use of an individual battery voltage monitor (IBVM) (p/n 746-00014-22) and harness (p/n 876-00050-20). These items are for monitoring only and not for battery balancing. If battery balancing is needed for a 12V string, a normal Smart AlphaGuard™ harness may be used.

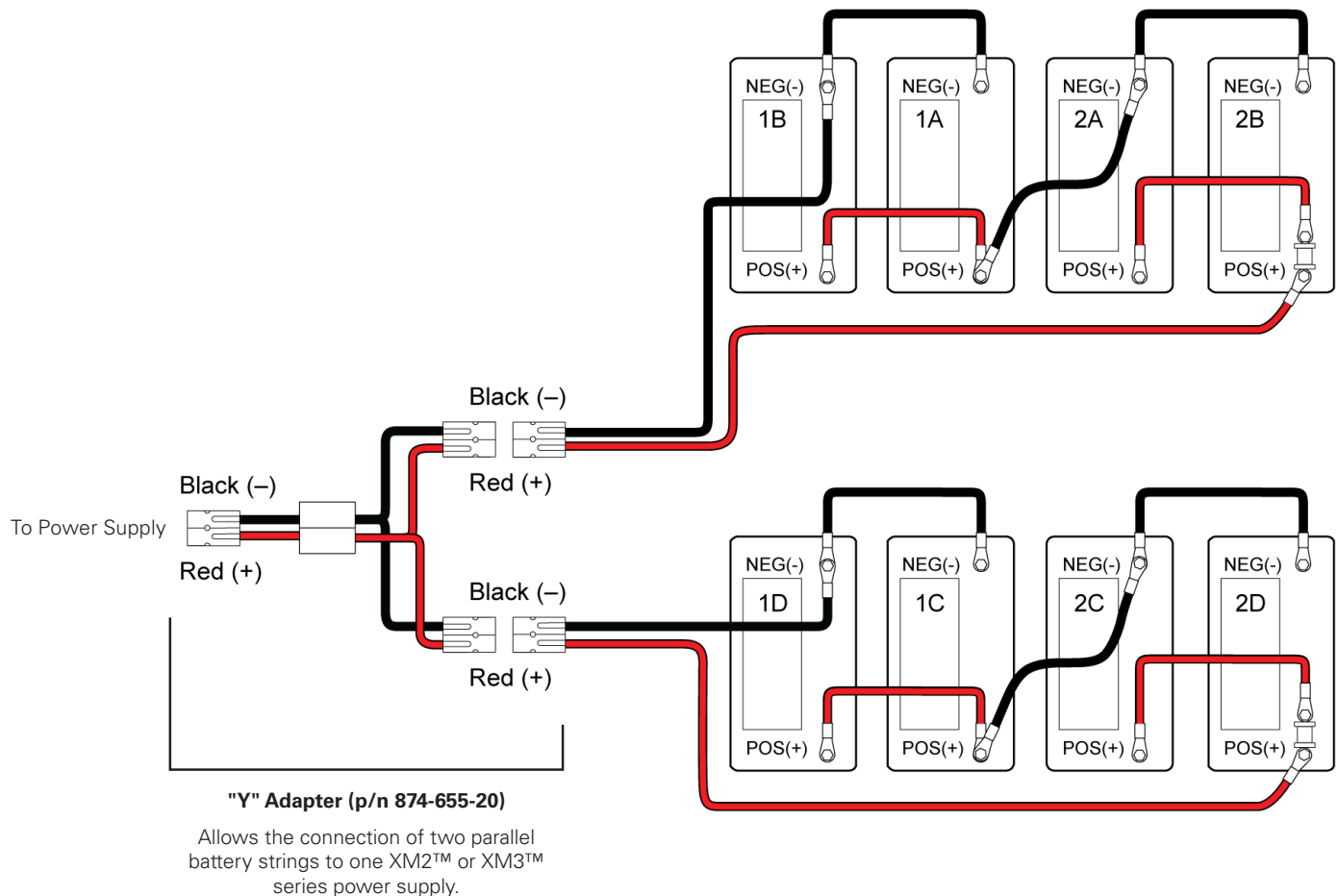


Fig. 2-10, Wiring diagram, 8-battery Parallel Configuration

2.0 Installation, continued

Threaded Insert Terminals



CAUTION!

Threaded insert terminals require the use of 3/4" (19 mm) bolts with the exception of 18V4 batteries which require the use of M6 × 12 mm bolts. The use of 1" (25.4 mm) bolts will seriously damage the battery. The only exception is the terminal with the large spacer for the in-line fuse link. Apply NO-OX® grease on all exposed connections.

Torque all nuts and bolts to 110 in-lb (12.43 Nm).

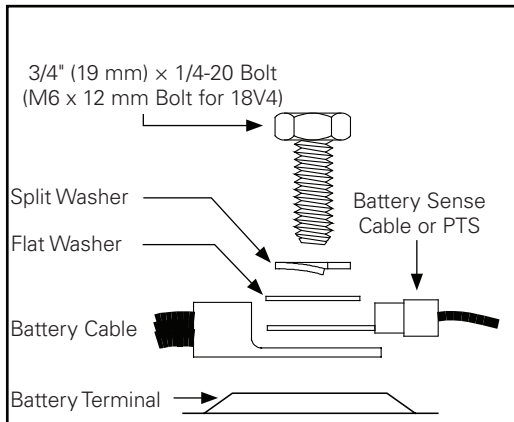


Fig. 2-11, Battery Terminal Bolt Stack-up

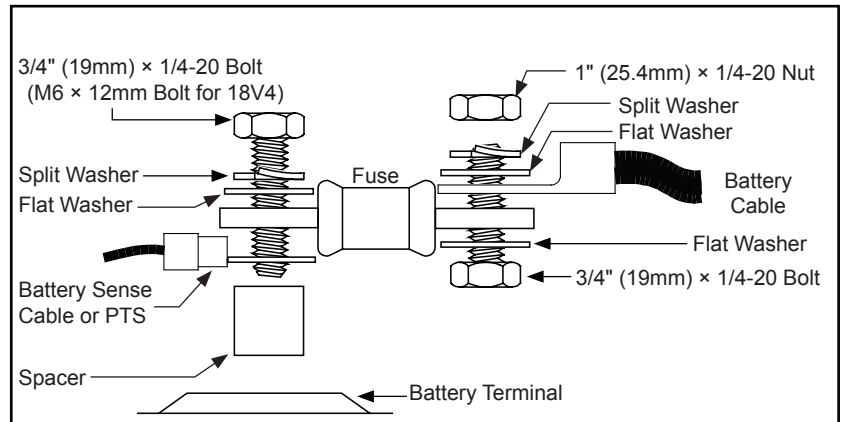


Fig. 2-12, Fuse Bolt Stack-up

2.2.3 63/89VAC Output Voltage Reconfiguration Procedure



WARNING! ELECTRICAL HAZARD

Remove all sources of power to unit before performing the following procedure.

Tools Required:

Small flat-blade screwdriver

Procedure:

1. To access the output voltage terminal, remove the inverter module by removing the screw securing the module (see Fig. 2-14, next page).
2. Loosen the terminal screw and move the output voltage wire to the desired output voltage position on the output voltage terminal (see Fig. 2-13).
3. Torque the terminal screw to 7 in-lb (0.79 Nm) to secure the output voltage wire.
4. Reinstall the inverter module.

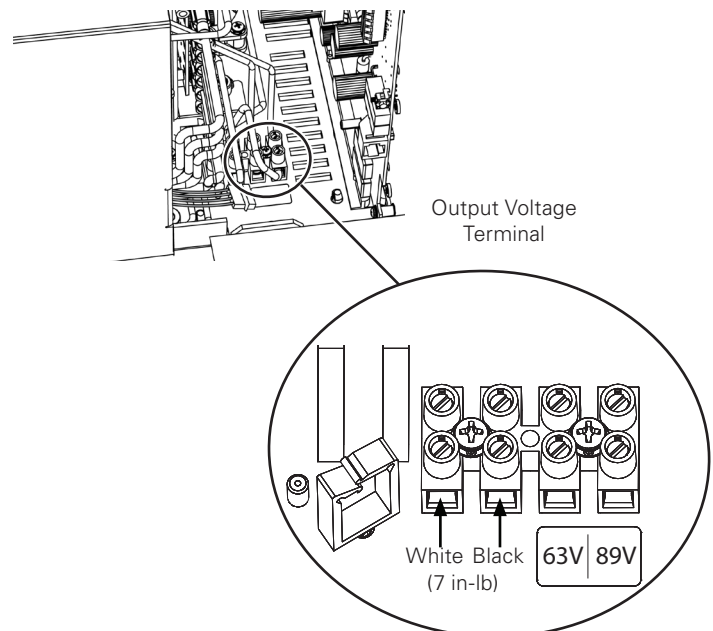


Fig. 2-13, Voltage Terminal Location and Wire Position

2.2.4 Optional Smart AlphaGuard™ Card



WARNING! ELECTRICAL HAZARD

Remove all sources of power to unit before performing the following procedure.

Tools required:

- #2 Phillips screwdriver

Procedure:

1. Loosen the thumb screws securing the inverter module and communications module (see Fig. 2-14). Pull out the inverter module.



NOTICE:

The communications module is attached to the inverter module and will come out as one unit.

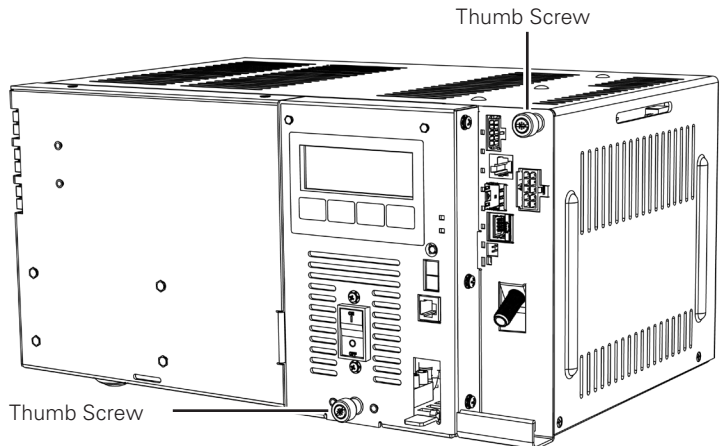


Fig. 2-14, Inverter Module Screw Locations

2. In the communications module, install the Smart AlphaGuard™ card by firmly pressing the holes through the two standoffs on the right side (see Fig. 2-15). Ensure the Smart AlphaGuard connector lines up with the Smart AlphaGuard port opening on the module.
3. Secure the Smart AlphaGuard board in place with four #6-32 screws.

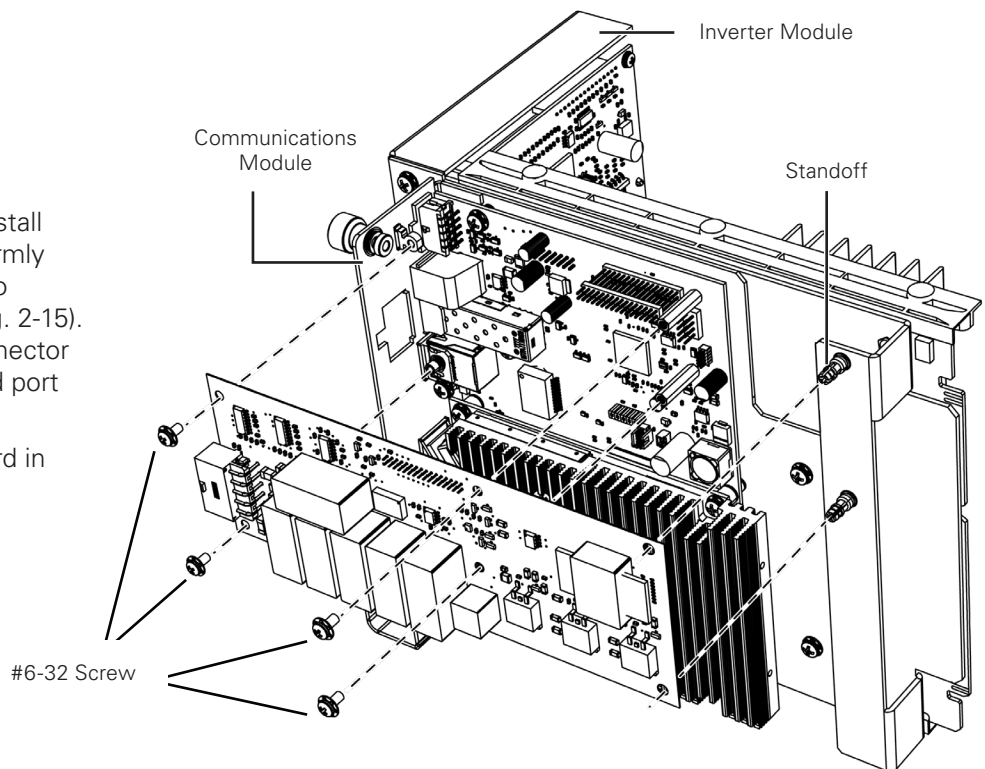


Fig. 2-15, Installing the SAG Card

2.0 Installation, continued

Procedure, continued:

4. Install the inverter module in the power supply and tighten the thumb screws.
5. Connect the Smart AlphaGuard battery sense harness to the Smart AlphaGuard connection (see Fig. 2-16).
6. Connect the SPI to the desired Output 1 or 2.

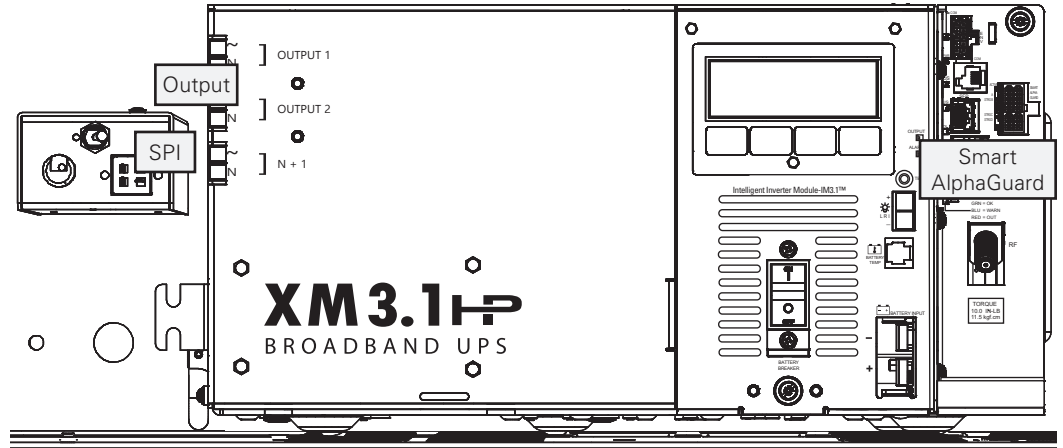
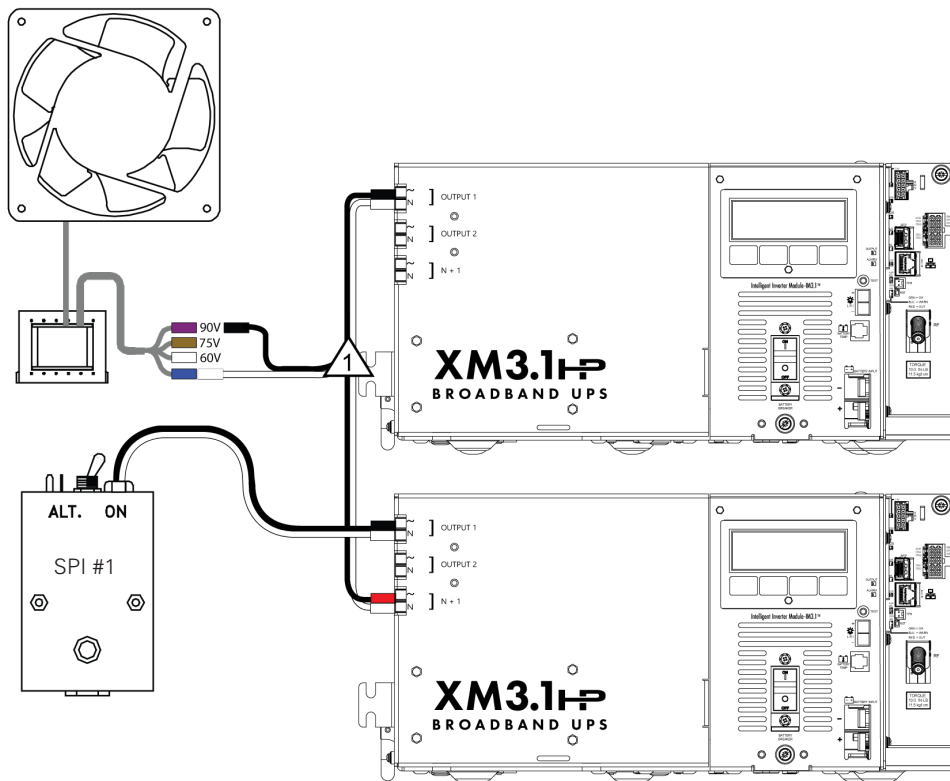


Fig. 2-16, SPI, Output and Smart AlphaGuard Harness Connections

2.2.5 Optional N+1 Configurations

The N+1 option (AlphaDOC card) provides the additional capability of allowing a dual redundancy to protect its critical loads via a second power supply. The unit with the N+1 option should have the critical loads connected to its two output channels (with their associated programmable current limits). In case the N+1 unit experiences an operational issue, its loads will be supported via the second power supply.



1 Wire Kit (Alpha p/n: 875-994-20)

Fig. 2-17, N+1 Configuration

2.0 Installation, continued

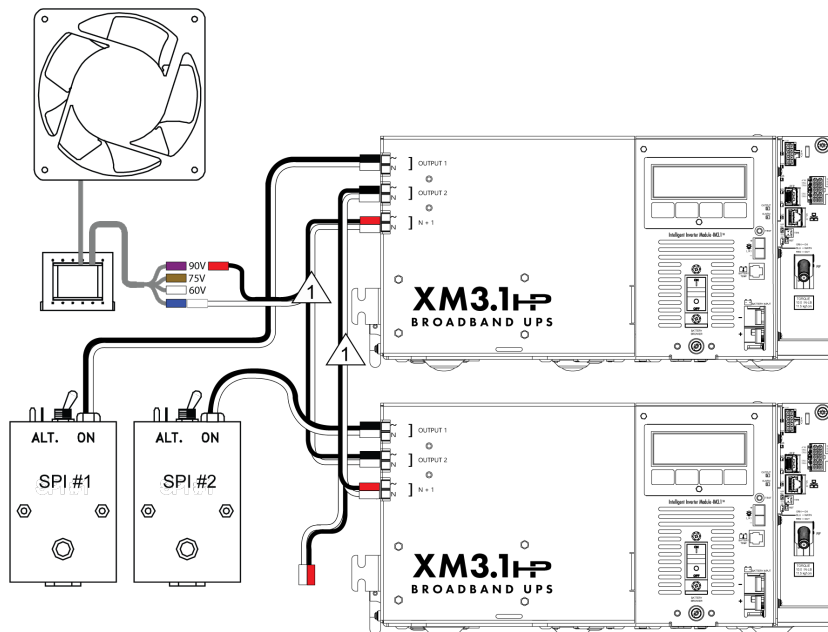
The N+1 ports are used in redundant system configurations where multiple power supplies are housed in a single enclosure. In the event of a power supply failure, a redundant power supply (with an optional AlphaDOC card with N+1 board installed) is automatically switched into service with approximately a 8ms delay. This feature is part of the AlphaDOC card with N+1 option.

This provision also protects system components by shutting down the load during overcurrent and short circuit conditions. Adding an AlphaDOC card with N+1 in the secondary power supply enables both power supplies to be connected in a “dual redundant” configuration so the system can protect two critical loads (see Fig. 2-18).

✓ NOTICE:

The N+1 unit and the primary unit cannot be loaded over 50% of rated capacity when configured as shown below.

When the power supply is in N+1 operation, the active alarm menu screen will display (see Fig. 2-19). Additionally, the Output Voltage and Output Current display in the upper right hand corner of the Smart Display will show 0 volts and a value for the Output Current Amperage (e.g. 0V/10.8A). This Output Current Amperage is the sum of output terminals. By pressing the softkey below the PWR menu the Active Alarms menu will display (see Fig. 2-20).



1 Wire Kit (Alpha p/n: 875-994-20)

Fig. 2-18, Dual Redundancy N+1 Configuration

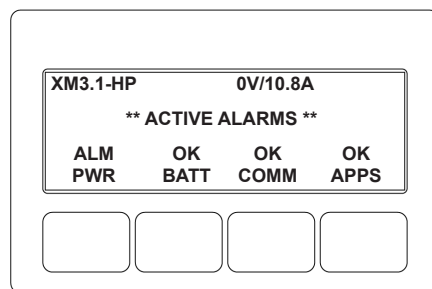


Fig. 2-19, Active Alarm Screen

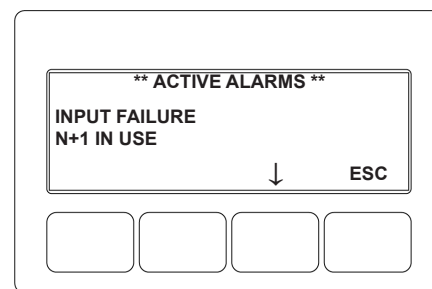


Fig. 2-20, N+1 In Use Alarm Screen

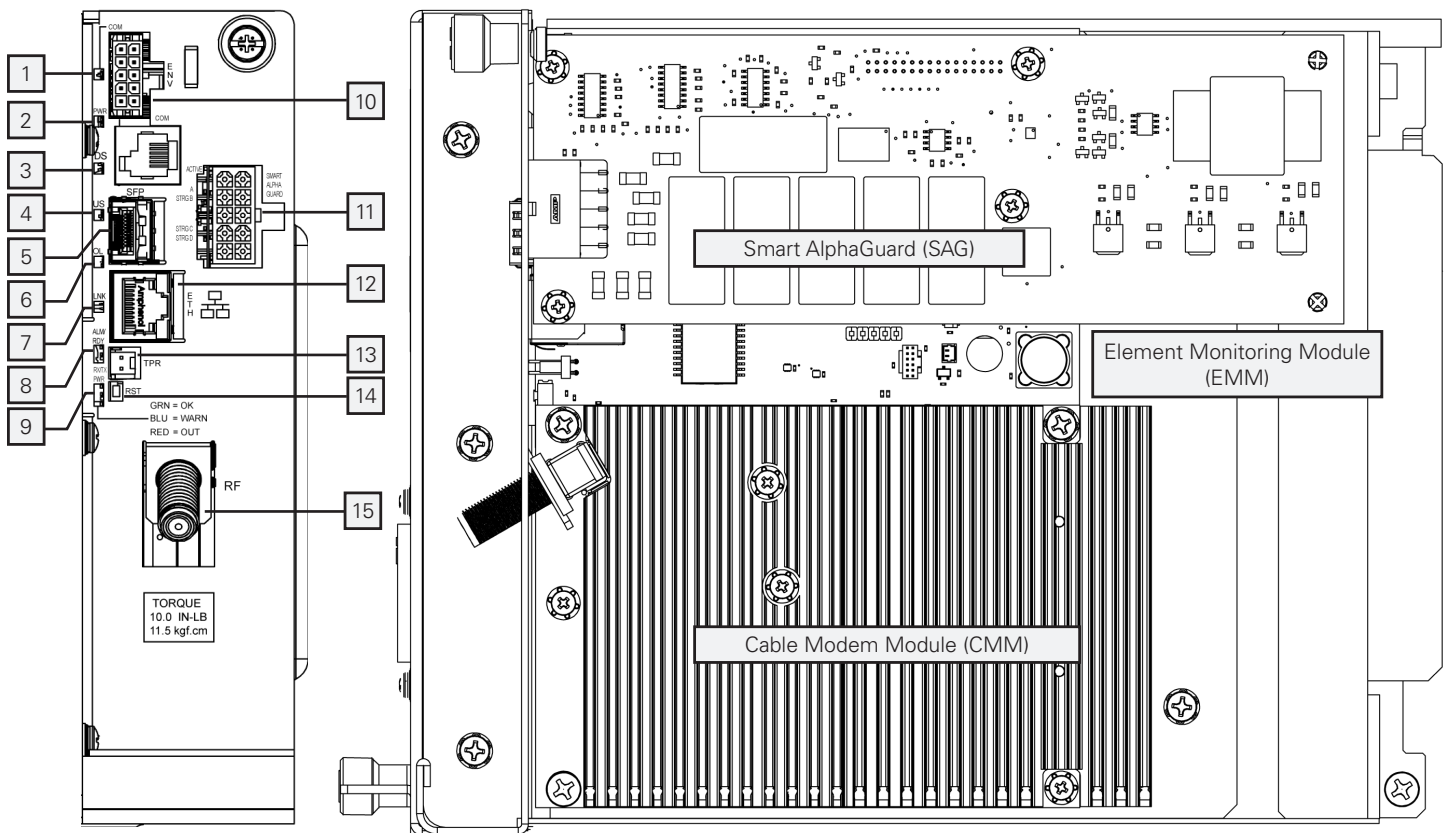
✓ NOTICE:

When N+1 is in use, the displayed Output Current will show both on the remote status monitoring web page and Smart Display as 0 volts for Output Voltage and 0 amps for the Output Current Output Current.

2.2.6 DOCSIS® Communications Module

DOCSIS® Communications Module Front Panel Connections

1. For XM3.1-HP™ units with the Smart AlphaGuard™ card option, connect the battery harness to the Smart AlphaGuard connector (see **11** below).
2. Connect tamper switch wire harness to the TPR connector **13**.
3. Connect the RF drop **15** or SFP **5** connections as shown below. The DOCSIS® specification for downstream power level is ±15 dBmV. However, for optimal performance, set the level as close to 0 dBmV as possible.



1 COM Indicator LED	6 Online LED	11 Smart AlphaGuard (SAG) Connector
2 Cable Modem Power (PWR) Indicator	7 Ethernet Status LED	12 Ethernet (ETH) Connector
3 Downstream LED	8 Alarm / Ready LED	13 Tamper (TPR) Switch Connector
4 Upstream LED	9 Rx/Tx Power LED	14 Reset Button
5 SFP Optical Status Monitoring Port	10 Environmental (ENV) Control Connector	15 RF Connector

Fig. 2-21, DOCSIS® Communications Module Front Panel Connections

2.0 Installation, continued

LED Status Verification

Verify the CMM LEDs behavior is as follows:

CMM Rx and Tx LED Indications					
Step	Communications State	Downstream (DS)	Upstream (US)	Online (OL)	Rx/Tx Power
1	Transponder initializing/searching for downstream DOCSIS® channel(s)	Flashing	OFF	OFF	OFF
2	Downstream channel(s) locked, searching for upstream channel(s)	ON	Flashing	OFF	ON (Green)
3	Upstream channel(s) locked, registering with CMTS	ON	ON	Flashing	ON (Green)
4	CMM fully functional, registration complete	ON	ON	ON	ON (Green)

When the CMM is fully functional (step 4 in the table above), the Rx/Tx Power LEDs indicate the RF power levels as follows:

Green RF LED indicates Rx/Tx Power at acceptable level.

* Blue RF LED indicates Rx/Tx Power at a warning level. Make the necessary RF level adjustments.

* Red RF LED indicates Rx/Tx Power at an alert level. Make the necessary RF level adjustments.

LED Color	Default Rx Range (dBmV)	Default Tx Range (dBmV)
Green	+10 to -10	0 to +50
* Blue	+15 to +10 and -10 to -15	+50 to +55
* Red	>+15 and <-15	>+55



Table 2-1, Rx/Tx LEDs Behavior

NOTICE:

The Rx and Tx LED color boundaries can be changed by modifying the alarm properties associated with the readings.

2.2.7 SFP Optical Connection



NOTICE:

For more detail on the SFP optical connection, refer to the XM3.1-HP™ Series Intelligent Broadband UPS Optical Status Monitoring User Guide, *Alpha p/n 017-950-C0-001*.

The CMM can use an optical link instead of a DOCSIS® RF cable for communicating status monitor information. The DOCSIS® 3.1 CMOA is still required to be installed for optical monitoring. A connection to the RF port is not required.

Install a small form-factor pluggable (SFP) optical module into the SFP socket on the CMM, making sure the module latches into place (see **Fig. 2-22, Installing SFP and Fiber Connection**). Insert the associated fiber(s) into the opening on the protruding end of the module. (An Ethernet passive optical network (EPON) SFP module uses a single fiber connection; most point-to-point SFP modules use a dual fiber connection.) Avoid excessive bends and tight turns in optical fibers as these add optical attenuation.

SFP module recommendations:

- SFP form factor modules with communication standards to 1 Gbps.
- Utilize SFP optical modules rated for industrial operating temperatures.
- The SFP port supports the following SFP module power ratings:
 - EMM with blue or green colored PCBA (*p/n 704-00302-20-001* or *704-983-20-001*) supports SFP modules drawing up to 1.0W.
 - EMM with red colored PCBA (*p/n 704-00302-20-002*) supports SFP modules drawing up to 3.3W
- Areas with hotter climates may require enclosure fan kits and/or SFP extension cables to meet the SFP thermal ratings.
- An RJ45 copper SFP module should only be used for a short connection to another communications device within the same cabinet.



WARNING! GENERAL HAZARD

Do not look into the open end of an SFP module when the fiber is not installed. The built-in laser may cause serious eye damage.

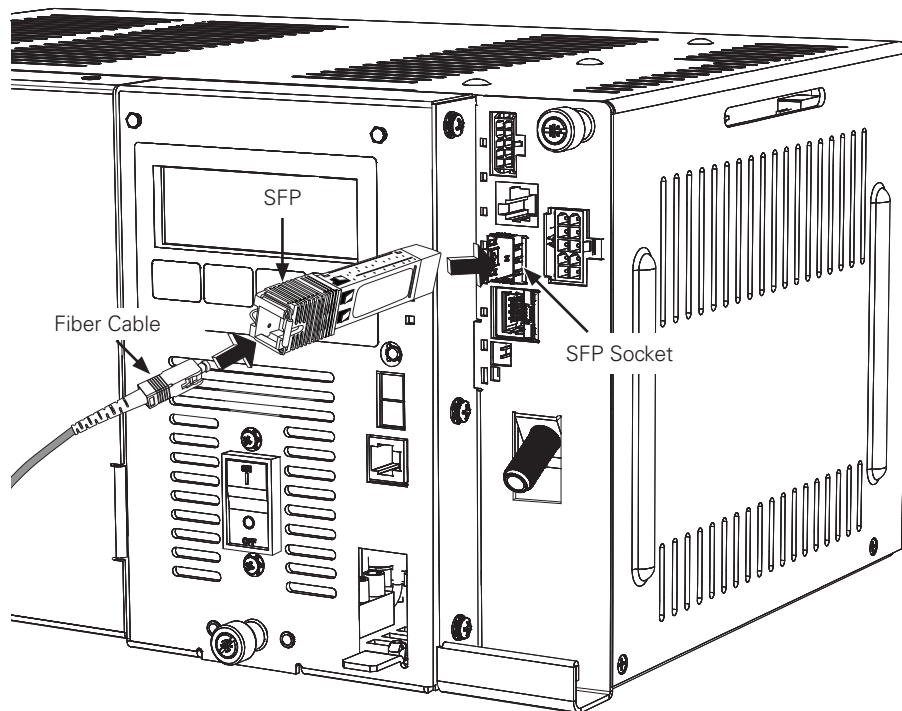


Fig. 2-22, Installing SFP and Fiber Connection

2.0 Installation, continued

The status of the SFP link is indicated on the online (OL) LED as follows:

- **OFF:** No SFP module or there is no signal from the other end of the fiber.
- **FLASHING:** The CMM is registering with the network.

ON: The optical link is ready for use. Many SFP modules include digital diagnostics monitoring (DDM) capabilities, which monitor key parameters of the module in real time. For any module that reports status warnings and alarms, wherever there is an optical link, the Rx/Tx PWR LEDs indicate the status of the receiver optical power as follows:

- **GREEN:** The receiver power levels are acceptable (or the SFP module doesn't report power status).
- **BLUE:** There is a WARNING for the receiver power level.
- **RED:** There is an ALARM for the receiver power level.

When the Rx/Tx PWR LEDs indicate SFP receive power (and not DOCSIS® RF power levels), the indicated LED briefly blinks off once per second. If there is an SFP module installed, but there is not an optical link, the Rx/Tx PWR LEDs briefly blink red once per second.

The particular ranges for warnings and alarms are specific to the SFP module. The Rx/Tx PWR LEDs only indicate the receiver optical power status, not the transmit optical power, because warnings or alarms for the transmit optical power represent a problem with the SFP module rather than with the optical link.

For more detail on the status of the SFP module, refer to the LCD menus (**Section 2.2.11 Local Verification of DOCSIS® Transponder**), (**Section 3.3.3 Communication Information and Configuration**) or the SFP web page (**Section 2.3.4 Navigating the Web Pages**).

2.2.8 Tamper Interface

The Alpha® cable modem module (CMM) is populated with a tamper interface to report the status of the power supply enclosure door when equipped with the optional tamper switch. The tamper switch interface is designed to report and alarm the status of the power supply enclosure door. The tamper polarity may need to be adjusted via the web page interface or the SNMP OID `SNMP tamper polarity OID (1.3.6.1.4.1.926.1.3.2.6.1)` to be compatible with the tamper switches (normally open or normally closed) that may be installed on the enclosure/cabinet door. The circuit created by the tamper switch is a contact relay, so other contact relay devices can be designed to be monitored through this interface. For example, the Alpha® utility line sensor (*Alpha p/n 746-399-2X*) uses the tamper interface to monitor the utility outlet to report the presence of line voltage.

2.2.9 Environmental Connector

The Alpha® cable modem module is populated with the environmental connector and I/O controller interface which can be used to monitor and control a variety of contact relay devices such as battery heater mats, PoE controller, enclosure moisture sensors and emergency generators.

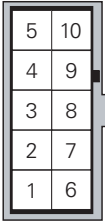
ENV Connector and Pin Descriptions		
ENV Connector	Pin	Description
 <p>Back of ENV Connector</p>	1	Ground
	2	5V
	3	Digital I/O (3)
	4	Digital I/O (4)
	5	Digital I/O (5)
	6	Digital I/O (6)
	7	Digital I/O (7)
	8	Digital I/O (8)
	9	Not Connected
	10	Not Connected

Table 2-2, ENV Connector and Pin Descriptions

2.2.10 Power Module Configuration and Installation Procedure



NOTICE:

Before applying power, verify power supply rating is matched to AC input utility. Verify a low-resistance ground is installed in accordance with your local electrical regulatory authority.



CAUTION!

Batteries are an important part of the power supply. Properly install and test all batteries, battery connections and battery cables before you connect them to the power supply.

1. Route the local/remote indicator (LRI) cable down through the opening in the left side of the shelf and back up through the opening in the right side of the shelf and connect.



NOTICE:

For existing LRI installations, use LRI adapter kit, *p/n 875-952-20*.



NOTICE:

The LCD will turn on if the batteries are plugged in and the breaker is off. The LCD will flash "TURN ON AC", "TURN OFF BREAKER", "DISCONNECT BATTERY" in this condition to alert the user to take some action.

2. After wiring battery cable kit, battery sense cables and PTS as shown in **Section 2.2.2 Battery Installation Options and Wiring Diagram**, verify DC breaker is OFF, then connect battery cable to inverter module.
3. Connect the Smart AlphaGuard wire harness to Smart AlphaGuard port.
4. Connect precision temperature sensor (PTS) to inverter module.
5. Connect transponder, RF Input cable, and the tamper switch (if installed). Refer to **Fig. 2-21, DOCSIS® Communications Module Front Panel Connections** for communication module connections.
6. For new installations, skip to step 10.
7. For upgrading existing sites, install a service power supply (see service power supply documents) and remove existing power supply.
8. Thoroughly inspect output connectors for abnormal heating or damaged housing; replace if necessary.
9. Verify SPI switch is in "ALT" position.
10. Connect the SPI (network load) to the Output 1 connector.
11. Connect the second load / auxiliary load (i.e., fan) to the Output 2 connector.
12. Turn on AC breaker (located on enclosure) and verify correct (per unit's nameplate voltage) utility voltage at outlet; if correct, plug in line cord to the utility outlet.
13. Turn battery breaker ON.
14. Toggle SPI switch to ON.
15. Verify no alarms are present after power up initiation (it may take up to 60 seconds for alarms to clear; APPs alarms may take longer). Alarms may be verified on the LCD display or alarm LED.

2.0 Installation, continued

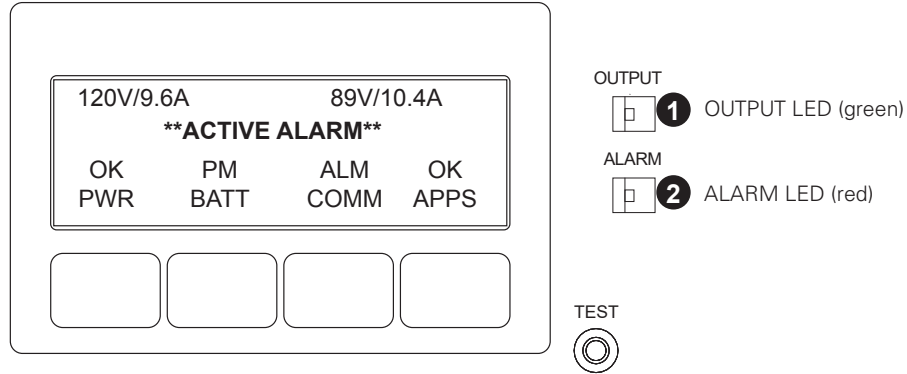


Fig. 2-23, Active Alarm Screen

16. If alarms do not clear after 60 seconds, press the menu key with **ALM** indicated above it to see the ACTIVE ALARM list for the selected key.
17. Press **UP** or **DOWN** to select the alarm of interest.
18. Press **ENTR** to select the alarm and display diagnostic information. Press **ESC** to return to the alarm list. Press **ESC** again to return to the home screen.

✓ **NOTICE:**

For more detailed information on alarms, see **Section 3.5, Active Alarms**.

19. To configure battery information, press **BATT** to access the BATTERY INFO/BATTERY CONFIG menu. Enter Battery Type (or parameters) and number of battery strings. Battery type entries can be made on the LCD.
20. Enter the battery DATE code and the MHOs (conductance) readings. Battery date and MHOs entries can be made on the LCD (see Figs. **Fig. 2-24, Enter Battery Date Code** and **Fig. 2-25, Enter Battery MHOs Reading**).
21. Once the unit is running on line voltage, perform a Self Test by pressing and holding the test button for 1-2 seconds with a pen (or similar object). Wait for Self Test completion before proceeding (see **Section 3.1.1 Self Test Operation**).
22. Perform standby test by shutting off utility breaker and verifying unit goes into standby and supports the load.

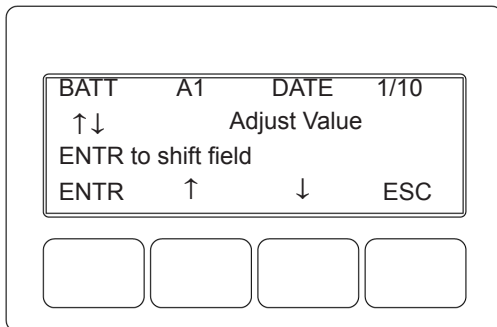


Fig. 2-24, Enter Battery Date Code

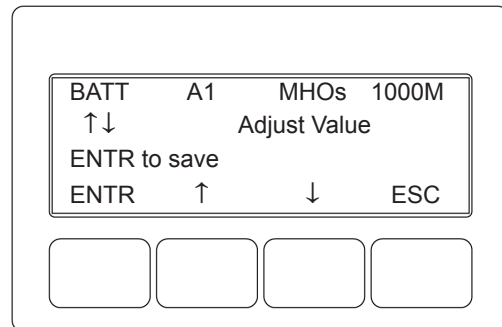


Fig. 2-25, Enter Battery MHOs Reading

✓ **NOTICE:**

Battery MHOs and Date Code can only be set after DOCSIS® transponder has registered with CMTS. Please wait 3 minutes after power up to enter battery MHOs measurements.

2.0 Installation, continued

23. Re-apply AC power and verify unit goes to Line Mode.

✓ **NOTICE:**

If the unit is operating from batteries, the Self Test will not initiate. Check input breaker and input line cord.

✓ **NOTICE:**

Two output connectors will be present on the side of the front panel whether or not the optional AlphaDOC card is installed. If an AlphaDOC card is not installed, the output voltage (Output 1) will be present on both connectors as the connectors are wired in parallel by means of an internal split ("Y") wiring harness. If an optional AlphaDOC card is installed, the split wiring harness is replaced with individual wiring for Output 1 and Output 2 (**secondary loads to be connected to Output 2**).

✓ **NOTICE:**

The default language is set to English, unless the XM3.1-HP™ power supply is ordered preset to another language. The language can be changed through the PWR CNFG (Power Configuration) menu. Pressing the **PWR** (Power) softkey while in the OPERATION NORMAL screen opens the Power Info Menu display (the first letter of the top line will blink indicating it is the active line; shown in orange). Pressing **ENTR** from this screen opens the PWR CNFG Menu. Scroll down to the SELECT LANGUAGE menu to set to the desired language, see **Fig. 2-26, Select Language in PWR CNFG Menu**.

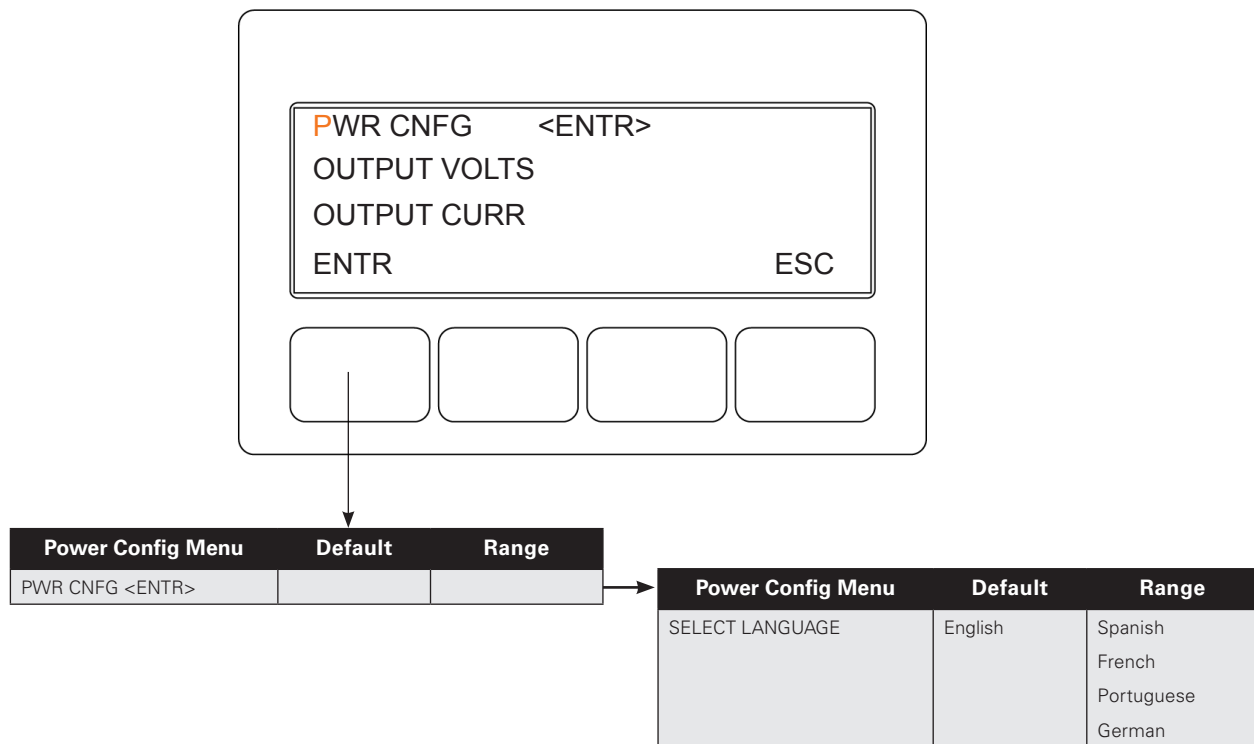


Fig. 2-26, Select Language in PWR CNFG Menu

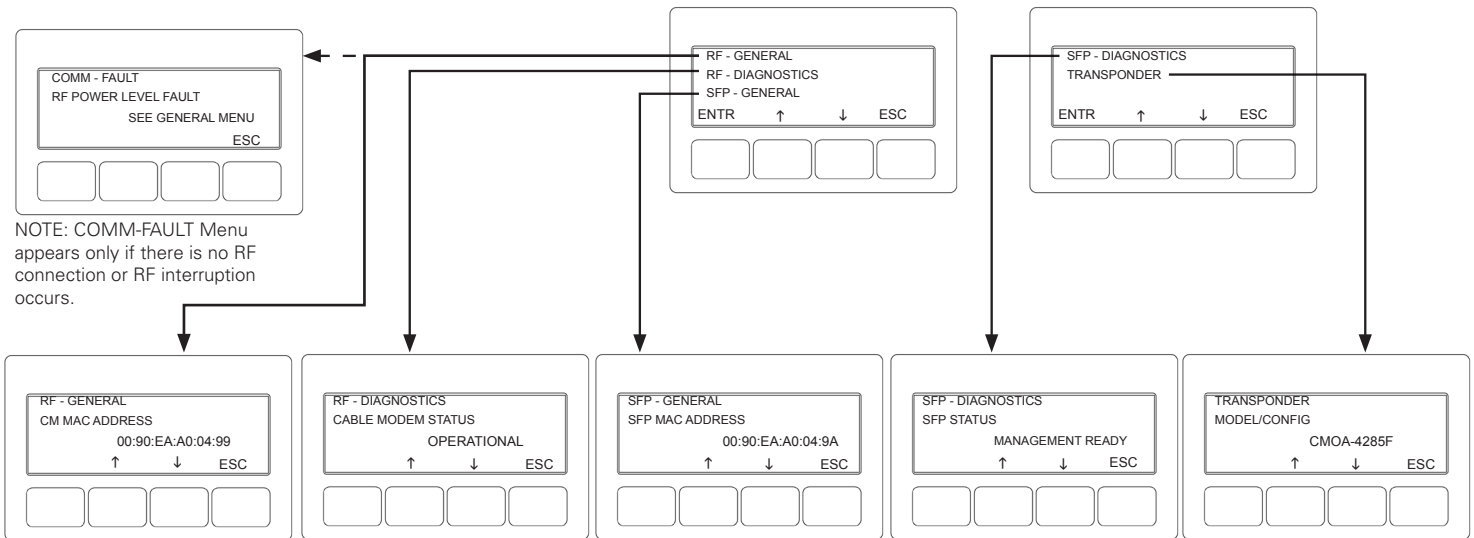
2.0 Installation, continued

2.2.11 Local Verification of DOCSIS® Transponder

To confirm successful hardware installation before leaving the installation site, verify network connectivity and correct hardware interconnection.

The DS, US, and OL LEDs on the front of the CMM should be ON solid green. This indicates successful registration with the CMTS via the RF link. In addition, the RF LED should also be ON solid green indicating proper RF power levels and the ALM/RDY LED should be blinking green for normal operation.

With the DOCSIS® 3.1 CMOA transponder used in conjunction with the XM3.1-HP™ power supply, network connectivity can be verified via the COMM menu on the XM3.1-HP™ Smart Display. The figure below provides a list of parameters available on the XM3.1-HP™ Smart Display populated with sample values.



NOTE: COMM-FAULT Menu appears only if there is no RF connection or RF interruption occurs.

RF - GENERAL	
CM MAC ADDRESS	00:90:EA:A0:04:99
CM IPV6 ADDRESS ¹	2601:544:c100:d1f1:290:eaff:fea0:49a ²
CM IP ADDRESS	192.168.1.121
CPE IP ADDRESS ³	192.168.1.122
CM RECEIVE POWER	-2.1dBmV
RX INTERNAL ATTEN ⁴	10 dB
CM TRANSMIT POWER	48.5dBmV
DOWNSTREAM SNR	40.5dB

RF - DIAGNOSTICS	
CABLE MODEM STATUS	OPERATIONAL
CM LINK UPTIME ¹	3d 05h:17m
DOWNSTREAM FREQUENCY	300.000 MHz
DOWN MODULATION TYPE	QAM 256
UPSTREAM FREQUENCY	33.000 MHz
UP MODULATION TYPE	ATDMA
T3 TIMEOUTS	80360
T4 TIMEOUTS	51
CODEWORD ERROR RATIO	0.0%
MICROREFLECTIONS	-5 DBC
CM RESETS	10
CM LOST SYNCs	5
DOCSIS CONFIG FILE	AlphaXM31.cfg

SFP - GENERAL ¹	
SFP MAC ADDRESS	00:90:EA:A0:04:9A
SFP IPV6 ADDRESS ²	2601:544:c100:d1f1:290:eaff:fea0:49a ³
SFP IP ADDRESS	192.168.2.132
SFP RECEIVE POWER	-6.73 dBm
SFP TRANSMIT POWER	-5.58 dBm

¹ This menu is only displayed if the SFP is installed.
² Displayed only if the SFP has an IPv6 address.
³ Information that is longer than the 20-character display will automatically scroll horizontally.

SFP - DIAGNOSTICS ¹	
SFP STATUS	MANAGEMENT READY
SFP LINK UPTIME ²	3d 05h:17m
SFPTYPE	1000base-LX +DDM
SFP TX WAVELENGTH ³	1310 NM
SFP TEMPERATURE ³	47.3°C
SFP SUPPLY VOLTAGE ³	3.275 VDC
LASER BIAS CURRENT ³	32.15 mA
SFP CONFIG FILE ⁴	AlphaXM31fiber.txt

¹ This menu is only displayed if the SFP is installed.
² Displayed only when the SFP has a valid connection.
³ Displayed only for an SFP that reports this information.
⁴ Displayed only if a configuration file was loaded over SFP.

TRANSPONDER	
MODEL/CONFIG	CMOA-4285F
FIRMWARE VERSION	XM3.1-0.31.00.1912011841.JENKINS ¹
SYSTEM NAME ²	ABC123 CABLE
SYSTEM CONTACT ²	JOHN DOE
SYSTEM LOCATION ²	123 BAKERVIEW
COMMON LOGICAL ID	XM3.1-HP
SERIAL NUMBER	1904F6700067
SYSTEM UPTIME	3d 05h:18m
LAST SNMP QUERY	XM3-1 APP-1 BTQ-1

¹ Information that is longer than the 20-character display will automatically scroll horizontally.
² User Input values are examples only.

Fig. 2-27, COMM Menu Options

2.3 Web Interface


Overview

The DOCSIS® 3.1 CMOA provides an embedded web server interface to allow operations personnel the ability to connect locally or remotely via TCP/IP over Ethernet with a laptop/computer to verify the status of common data points and to configure various operating parameters.

2.3.1 Local Web Server Access

The transponder's Ethernet port (comparable to the **Craft** port on some transponder models) will typically be used as a local connection point allowing the user to connect directly to the Cable Modem Module web server interface to verify/configure common communication parameters and view power supply status and battery values. The Ethernet port on the power supply is a fully functional standard Ethernet port, capable of providing all the functionality of any standard Ethernet connection.

To access the DOCSIS® 3.1 CMOA web server locally utilizing a web browser, use the following procedure:

 **NOTICE:**

The following web browser settings should be 'enabled' for proper rendering/download of the web pages:

- JavaScript
- Cookies
- Downloads
- Show Pictures

These settings are typically enabled in the web browser by default.

1. Connect a standard Ethernet cable (CAT 5e or better) between the power supply Ethernet port (ETH) and a laptop or computer's network interface port.
2. Launch a web browser.
3. Enter the transponder's default IP address (192.168.100.1) into the web browser's address field.
4. The transponder's web server home page will appear (Fig. 2-28). **Note: This may take up to a minute when the transponder is initially powered up.**
5. Click the **Language** menu to select a desired language for the text information on the web page. The language choices are English (default), Spanish, Portuguese, French and German.
6. Many modifications can be made via the web pages. The operator can log in as Alpha or Admin (case sensitive) or not log in at all for read-only information.
 - **No log in** = Everything is read-only.
 - **Login: Alpha / Password: AlphaGet** = Allows some items to be changed.
 - **Login: Admin / Password: AlphaSet** = All changeable items can be changed via the GUI.

For login details, refer to **Section 2.3.3 Web Interface Security Levels**.

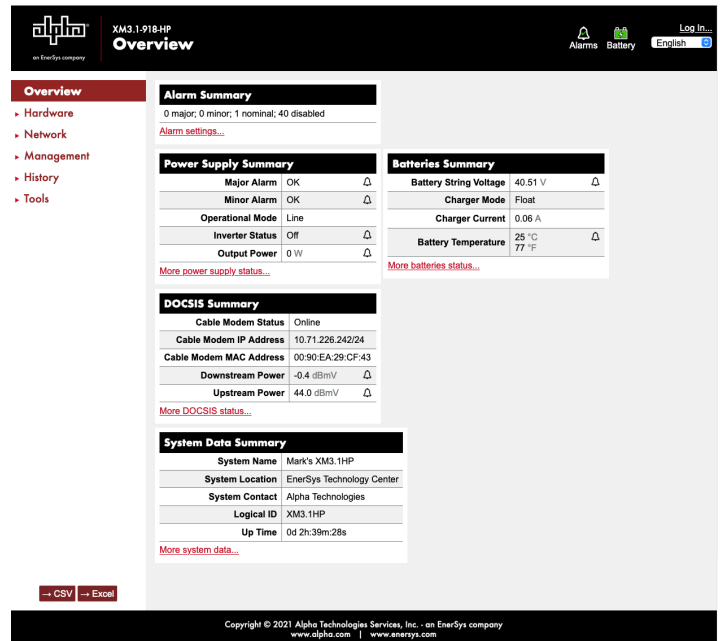


Fig. 2-28, XM3.1-HP™ Power Supply Overview Web Page
(Data values shown for illustration purposes only.)

2.0 Installation, continued

✓ **NOTICE:**

If the home page of the CMOA using IP address 192.168.100.1 is not viewable, the network configuration on the computer that is being used to connect to the transponder may require a temporary static IP address to be configured.

Use the following procedure to configure a static IP address on a laptop or computer with the Windows® 8 or Windows® 10 operating system:

1. Right click the **Start** button (lower left button on most Windows computers).
2. For Windows® 10, click **Network Connections**. Alternatively, left click on the **Start** button and click **Settings**. Then click on **Network & Internet**. **Note:** For Windows® 8 when the window pops up, click **Control Panel** (usually about half the way down the second column).
3. Click **Network and Sharing Center**.
4. Click **Ethernet**.
5. Click the **Properties** button.
6. A dialog box much like **Fig. 2-29** will pop up. Click **Internet Protocol (TCP/IPv4)** and then click the **Properties** button.
7. The Internet Protocol (TCP/IP) Properties dialog box will open (**Fig. 2-30**). Select "Use the following IP address". Enter the values as shown (i.e. IP address 192.168.100.2 and Subnet mask 255.255.255.0). Record the existing IP address and Subnet mask in order to later return the computer to its original state.
8. Click the **OK** button and try to connect to the transponder once again using 192.168.100.1 in the web browser.

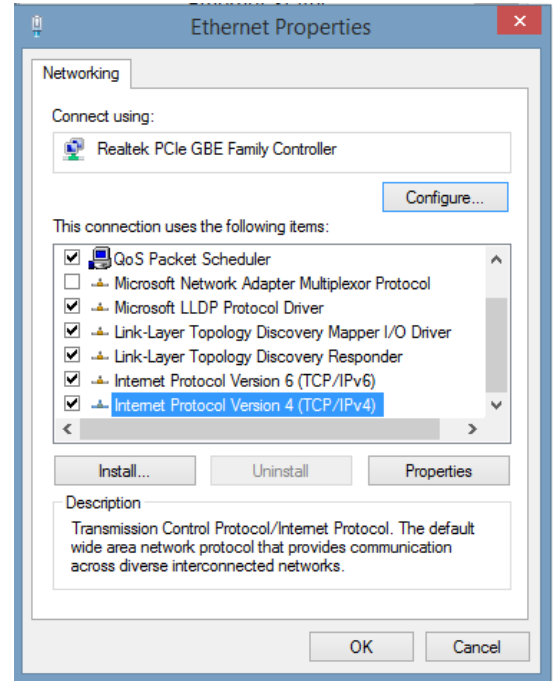


Fig. 2-29, Local Area Connection Properties Screen, Windows® 10

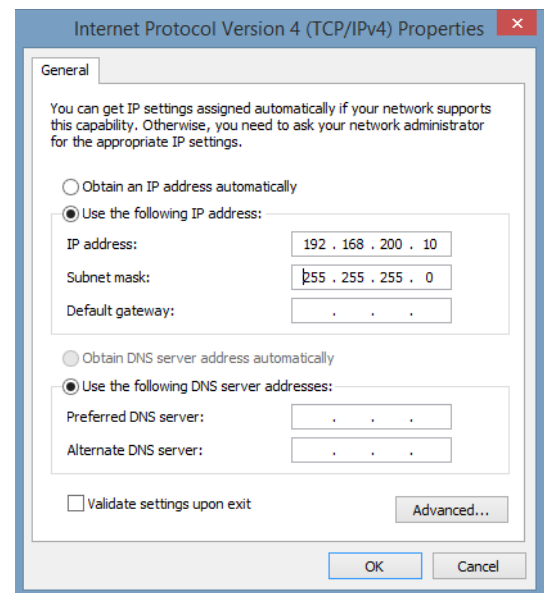


Fig. 2-30, Internet Protocol (TCP/IP) Properties Screen, Windows® 10

To remotely access the transponder web server via a web browser, use the following procedure:

2.0 Installation, continued

2.3.2 Remote Web Server Access

To remotely access the transponder web server via a web browser, use the following procedure:

✓ **NOTICE:**

For web server (HTTP) access, port 80 must not be blocked.

1. Connect the laptop or computer's network interface port to the company's Ethernet network.
2. Open a web browser.
3. Enter the CMOA Series' DHCP designated IP address (e.g., 192.168.1.124) into the web browser's address field. Use square brackets when entering IPV6 IP addresses (e.g. [FC00:168:40::124]) into the web browser's address field.
4. The transponder's web server home page will appear (**Fig. 2-32**).
5. The web page language will default to the language set on the XM3.1-HP™ power supply. To change the language, click on the **Language** menu to select a desired language for the text information on the web page. English, Spanish, Portuguese, French and German are available.
6. Many modifications can be made via the web pages. To log in, click **Log In** located in the upper right corner of the web page. The operator can log in as Alpha or Admin, or not log in at all for read-only information. Usernames and passwords are case sensitive.
 - **No log in** = Everything is read-only.
 - **Login:** Alpha / **Password:** AlphaGet = Allows some items to be changed.
 - **Login:** Admin / **Password:** AlphaSet = All changeable items can be changed via the GUI.

For login details, refer to **Section 2.3.3 Web Interface Security Levels**.

The screenshot shows the 'Overview' page for an XM3.1-HP power supply. The page is organized into several summary sections:

- Alarm Summary:** 0 major, 0 minor, 1 nominal, 40 disabled. Includes a link for 'Alarm settings...'
- Power Supply Summary:** Major Alarm: OK, Minor Alarm: OK, Operational Mode: Line, Inverter Status: Off, Output Power: 0 W.
- Batteries Summary:** Battery String Voltage: 40.51 V, Charger Mode: Float, Charger Current: 0.06 A, Battery Temperature: 25 °C / 77 °F.
- DOCSIS Summary:** Cable Modem Status: Online, Cable Modem IP Address: 10.71.226.242/24, Cable Modem MAC Address: 00:90:EA:29:CF:43, Downstream Power: -0.4 dBmV, Upstream Power: 44.0 dBmV.
- System Data Summary:** System Name: Mark's XM3.1HP, System Location: EnerSys Technology Center, System Contact: Alpha Technologies, Logical ID: XM3.1HP, Up Time: 0d 2h:39m:28s.

On the right side, there is a 'Languages' dropdown menu with the following options: English, Español, Français, Português, and Deutsch. The current language is set to English. At the bottom of the page, there are links for 'CSV' and 'Excel' exports, and a copyright notice for 2021 Alpha Technologies Services, Inc. - an EnerSys company.

Fig. 2-31, Web Server Home Page

(Data values shown for illustration purposes only.)

2.3.3 Web Interface Security Levels

There are two levels of function-specific security. General operations are set at Level 1 and configuration-related functions are set at Level 2. Default username and security passwords are shown in **Table 2-3**.

ATI-MGMT-SYS-HTTP-LOGINS-MIB			
OIDs for Usernames and Passwords for Web Interface Access (atiHttpLoginCredentials)			
Component	Description	Default	Values
atiHttpLoginCredUserName 1.3.6.1.4.1.926.1.3.2.2.4.5.11.1.0	The login username for 'basic user' access to the web interface. atiHttpLoginCredUserAccess determines the level of access for this login.	Alpha	Can be changed to a customized string.
atiHttpLoginCredUserPassword 1.3.6.1.4.1.926.1.3.2.2.4.5.11.2.0	The login password for 'basic user' access to the web interface.	AlphaGet	Can be changed to a customized string.
atiHttpLoginCredAdminName 1.3.6.1.4.1.926.1.3.2.2.4.5.11.3.0	The login username for 'administrator' access to the web interface. atiHttpLoginCredAdminAccess determines the level of access for this login.	Admin	Can be changed to a customized string.
atiHttpLoginCredAdminPassword 1.3.6.1.4.1.926.1.3.2.2.4.5.11.4.0	The login password for 'administrator' access to the web interface.	AlphaSet	Can be changed to a customized string.
atiHttpLoginCredNoneAccess 1.3.6.1.4.1.926.1.3.2.2.4.5.11.5.0	This setting determines the level of web page interaction available without logging in to the web page.	viewAll(2)	noAccess(0) view(1) viewAll(2) edit(3) editAll(4)
atiHttpLoginCredUserAccess 1.3.6.1.4.1.926.1.3.2.2.4.5.11.6.0	This setting determines the level of web page interaction available with the 'basic user' login.	edit(3)	noAccess(0) view(1) viewAll(2) edit(3) editAll(4)
atiHttpLoginCredAdminAccess 1.3.6.1.4.1.926.1.3.2.2.4.5.11.7.0	This setting determines the level of web page interaction available with the 'administrator' login.	editAll(4)	noAccess(0) view(1) viewAll(2) edit(3) editAll(4)

Table 2-3, OIDs for Usernames and Passwords

2.0 Installation, continued

OIDs for Login Configuration and Information (atiMgmtSysHttpWriteEnabled, atiMgmtSysHttpLogins, and atiHttpLoginSessionTable)			
Component	Description	Default	Values
atiMgmtSysHttpWriteEnabled 1.3.6.1.4.1.926.1.3.2.2.4.4	Controls which interface connection write access is allowed.	localAndCmAndCpe(7)	disabled(0) cmOnly(1) cpeOnly(2) cmAndCpe(3) localOnly(4) localAndCm(5) localAndCpe(6) localAndCmAndCpe(7)
atiHttpLoginLocalAccess 1.3.6.1.4.1.926.1.3.2.2.4.5.1.0	Controls whether the device will accept web interface logins from the local Ethernet port.	access(2)	noAccess(1) access(2)
atiHttpLoginRemoteAccess 1.3.6.1.4.1.926.1.3.2.2.4.5.2.0	Controls whether the device will accept web interface logins from the network.	access(2)	"noAccess(1) access(2)"
atiHttpLoginEditsLevel 1.3.6.1.4.1.926.1.3.2.2.4.5.3.0	This is a read-only object that indicates the highest level of edit capability currently held by any web login session. This object has an associated entry in the Discrete Property Table.		noEdits(1) someEdits(2) allEdits(3)
atiHttpLoginTimeout 1.3.6.1.4.1.926.1.3.2.2.4.5.6.0	This is the time, in minutes, that a web login session may be inactive (time between page loads) before the session automatically ends. A setting of 0 means that no timeout is applied to a login session.	10 Minutes	
atiHttpLoginSessionUser 1.3.6.1.4.1.926.1.3.2.2.4.5.12.1.2.x	The user name(s) of a current or recent login session.		
atiHttpLoginSessionLevel 1.3.6.1.4.1.926.1.3.2.2.4.5.12.1.3.x	The access level(s) assigned at login for a current or recent login session. Reading a value of loggedOut(0) indicates a session no longer active. Writing a value of loggedOut(0) to an active session forces a logout of that session.		loggedOut(0) view(1) viewAll(2) edit(3) editAll(4)
atiHttpLoginSessionAddress 1.3.6.1.4.1.926.1.3.2.2.4.5.12.1.4.x	The IP address(es) of a client for a current or recent login session.		
atiHttpLoginSessionStart 1.3.6.1.4.1.926.1.3.2.2.4.5.12.1.5.x	The time(s) when a current or recent session started. If the returned time does not include a time zone, it is expressed in terms of local time on the device.		
atiHttpLoginSessionEnd 1.3.6.1.4.1.926.1.3.2.2.4.5.12.1.6.x	For a recent login session, this is the time(s) when that session ended. This object is not returned for a session that is still active. If the returned time does not include a time zone, it is expressed in terms of local time on the device.		

Table 2-3, OIDs for Usernames and Passwords, continued

2.0 Installation, continued

2.3.4 Navigating the Web Pages

Once the web page has been successfully accessed, the operator is able to select a link in the navigation panel and the page specific to the topic will open, enabling real-time data to be observed.

Overview: Provides a summary of information on alarms, the power supply, batteries, DOCSIS®, SFP and system data.

Hardware

Power Supply: Displays power supply information as well as input, output and inverter information. Self-tests may also be performed from this page.

Batteries: Displays battery information and configuration, as well as the charger system status.

Environmental I/O: Status and configuration of tamper polarity and external devices connected to the ENV port.

Components: Displays information on major components of the power supply system (EMM, transformer, etc.) and temperature readings.

Network

DOCSIS: Provides real-time DOCSIS® information such as upstream and downstream channels and network configuration.

RF Attenuation: Displays internal downstream power level adjustments. Log in to control the attenuation level.

SFP: Displays SFP network communications, configuration, module status and information. (Only visible when an SFP is installed.)

Ethernet: Displays configuration information for the ETH port, and lists devices connected to it.

Advanced

Interfaces: Displays a summary of network interface status and addresses, and communications health monitoring controls.

Network Services: Manages which network service are permitted on the transponder.

Diagnostics: Log in to perform a "ping" connectivity test or trace route test.

Management

System Data: Configure and view the transponder's system status. The power supply system may be reset or restored to factory settings from this page, and system diagnostic information can be downloaded.

SNMP: Display Simple Network Management Protocol (SNMP) settings and trap destinations. Log in to change settings.

Alarms: View and configure all of the power supply system alarms.

Utility Power: View utility power status and past events.

History

Power Supply Events: View recorded power supply system events.

Power Supply Configuration: View recorded changes to the power supply's configurations.

Battery Events: View recorded battery events.

Standby Events: View recorded events when the power supply was running from battery backup.

Modem Log: View recorded DOCSIS modem events.

Network System Log: Lists a record of login and logout events to the network.

Network Event Log: Lists a record of network related events such as provisioning.

Firewall Log: Lists recorded events pertaining to potential breaches in the firewall or changes to firewall settings.

Alarm Log: Displays recorded alarm events.

2.0 Installation, continued

Tools

Spectrum: Display and analyze a detailed, full-band capture analysis of the DOCSIS® channels as seen by the transponder. This tool assists in identifying and troubleshooting common impairments throughout the range of DOCSIS channels.

Microreflections: Displays details about impairments on the DOCSIS® network and the approximate distance(s) of the impairment(s). This tool requires the Adaptive Equalization function to be enabled on the CMTS.

Firmware Update: The power supply's firmware can be remotely updated by directly uploading the latest firmware, or update via TFTP. (Only visible when logged in with administrative privilege.) This should generally only be used as directed by Alpha® technical support.

2.3.5 Web Page Features

Each web page has its own set of unique features that give the operator the ability to adjust parameters and settings. The following features are some of the most common or most notable features on the web pages.

- **Navigation Panel:** Located at the left side of the web page is a menu of pages. Click on a category (indicated by a triangle on the left) to expand that set of pages. Click on a page name to go to that page.
- **Status Indicators:** Located at the top of the web page, icons show a quick visual status of the alarms and the power supply batteries.
- **Alarm Configuration:** Many fields in the web pages include a “bell” symbol indicating that the item is alarmable. A solid bell indicates that alarms are enabled for that field, while a hollow bell indicates that the field CAN be configured to alarm, but is not presently. Click on the bell to view or (if logged in) adjust alarm settings.
- **CSV / Excel Buttons:** Located on the bottom left of the web page are the CSV and Excel buttons. The operator may download the web page data as either an Excel® spreadsheet or Comma-separated Values (CSV) file.
- **Command Buttons:** When you are logged in, some web pages include command buttons to perform immediate tasks. (Refer to **Section 2.3.3 Web Interface Security Levels**, for username and security password.) For example, on the Power Supply page (below), there is a command button to perform a power supply self test.
 - To launch a remote Self Test, click on the **Start Test** button.
 - To stop a remote Self Test before the predefined test duration, click on the **Stop Test** button.
- Other command buttons include a “Reset Now” button on the System Data page to restart the power supply system. The "Reset to Defaults" button below will set all configurations to their default settings.

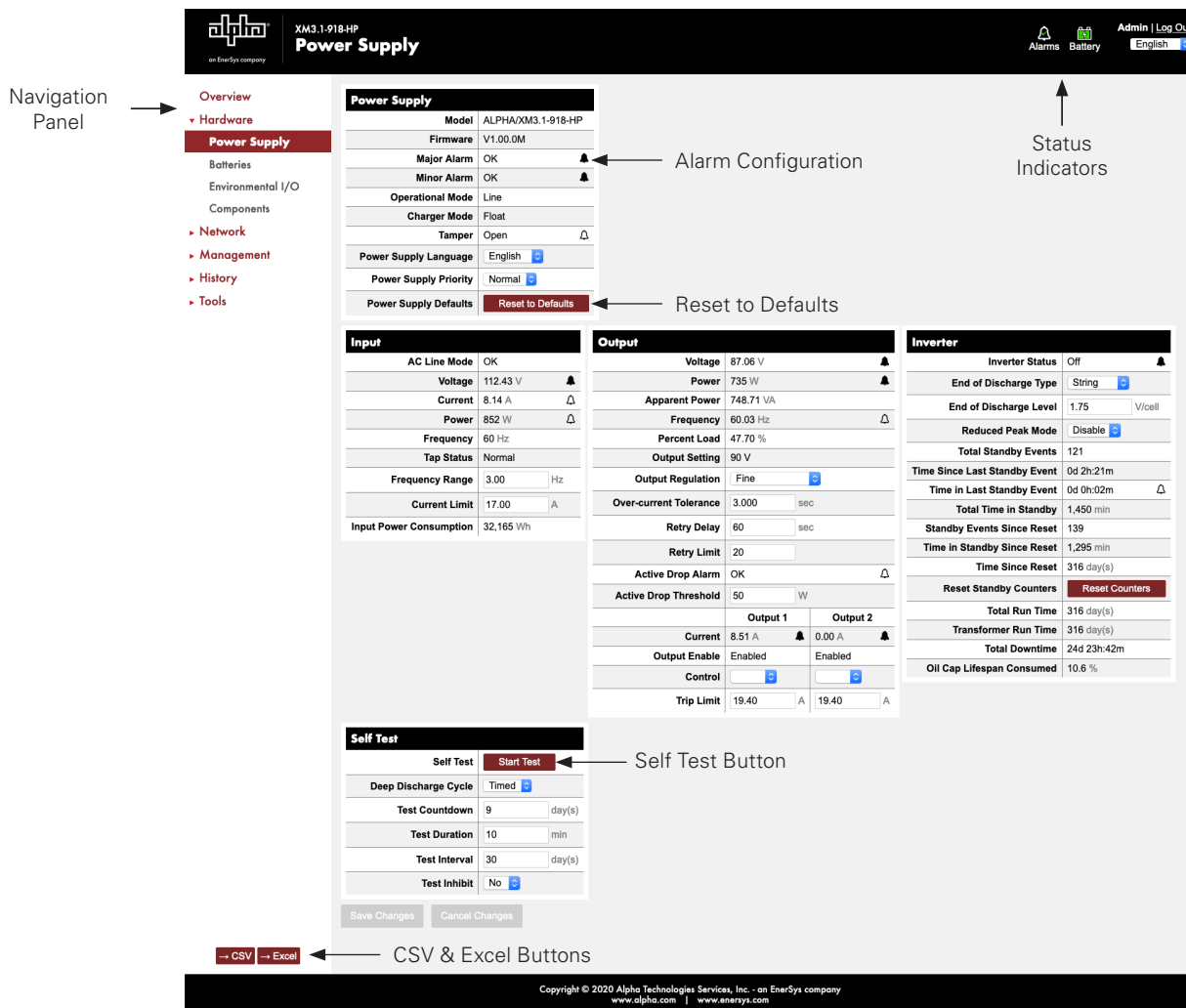


Fig. 2-32, Power Supply Web Page

3.0 Operation

3.1 Start-Up and Test

3.1.1 Self Test Operation

1. The power supply should be operating correctly with no alarms present. Use the Smart Display to verify Normal and Communication Information. Verify Test Duration setting in the Power Config menu screen.
2. Press the Self Test button on the inverter module to start Self Test. The test will run for a preset time (5-180 minutes, set in the Power Config Menu). Self Test can also be entered by setting Self Test to ON in the Power Config Menu. Additionally, the Self Test can be configured to perform a deep-discharge of 10%, 20%, 30%, 40% and 50% of battery capacity. When the deep discharge is complete, it will revert back to the Timed Test.
3. While in Self Test mode, use the Smart Display or a true RMS voltmeter to verify output. Output voltages should appear within the ranges listed in **Table 3-1, AC Output**. To cancel a Self Test in progress, press the Self Test button a second time or change Self Test to OFF in the Power Config Menu.



NOTICE:

Possible measurement points for output voltage are an unused output connector or the SPI coaxial seizure screw.

Voltage Regulation (% Range)		
Voltage Setting	Fine (-2.5%/+1%)	Coarse (-5%/+1%)
89VAC	86.77VAC / 89.89VAC	84.6VAC / 89.89VAC
63VAC	61.43VAC / 63.63VAC	59.85VAC / 63.63VAC

Table 3-1, AC Output



NOTICE:

For power supply installations that may not have utility power available due to new construction or extended service interruptions, it is recommended to disconnect the batteries from the power supply until the site is fully functional. It is not recommended to have the power supply battery circuit breaker in the off position with batteries connected and no utility power connected for extended periods of time. A warning will display on the Smart Display when this condition is detected.

3.2 Using the Smart Display

All operational functions, system testing, menus and alarms are available via the illuminated Smart Display. Display functions are accessible by following the indicated prompts above the four softkeys. Descriptions of the menu functions are as follows:

Menu	Function (from Operation Normal Screen)
PWR (Power)	Pressing the softkey below PWR once opens the Power Information and Configuration Menu. From this menu, the operator can view the current power supply configuration or access the PWR CONFIG menu to adjust parameters.
BATT (Battery)	Pressing the softkey below BATT once opens the Battery Information and Configuration Menu. From this menu, the operator can view the current battery information or type and adjust battery parameters as necessary.
COMM (Communications)	Pressing the softkey below COMM once opens the Communication Information and Configuration Menu. From this menu, the operator can access additional menus (General/Extended/Diagnostics) to view and/or modify COMM parameters.
APPS (Applications)	Pressing the softkey below APPS once opens the Application Information and Configuration Menu. From this menu, the operator can view or modify parameters for the installed APP card.

Table 3-2, Main Menu Functions

Display Text & Backlighting: During inactivity, both the text and backlighting will be turned off. Press any softkey once to activate the text and backlighting on the display. When the Alarm LED has been activated, press any softkey to activate the display for alarm details.

Moving up and down the menu: Press the **UP** or **DOWN** arrow softkey to access menu items in the active screen (see Fig. 3-2). Each press of the softkeys steps up or down through the sub-menu items. Press the softkey beneath **ENTR** to access the next menu option. Press the softkey beneath **ESC** to return to the previous screen.

Model Name: To access the Model, press the two left buttons.

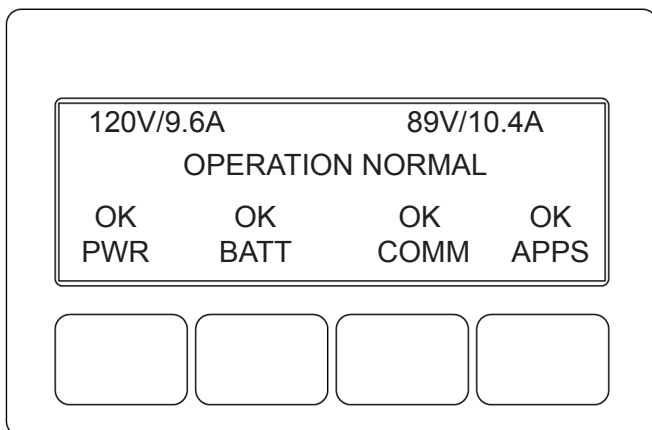


Fig. 3-1, Operation Normal Display Screen

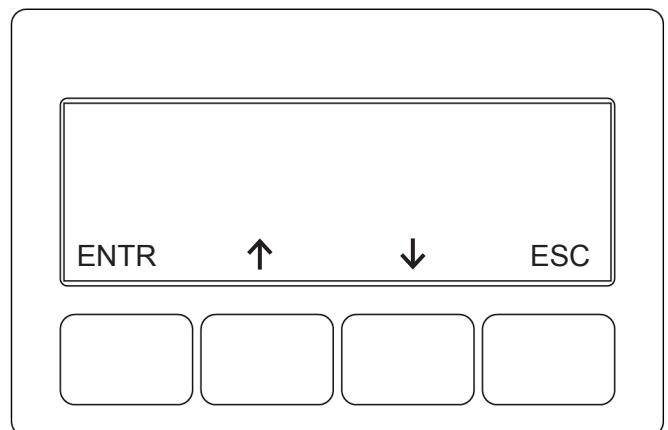


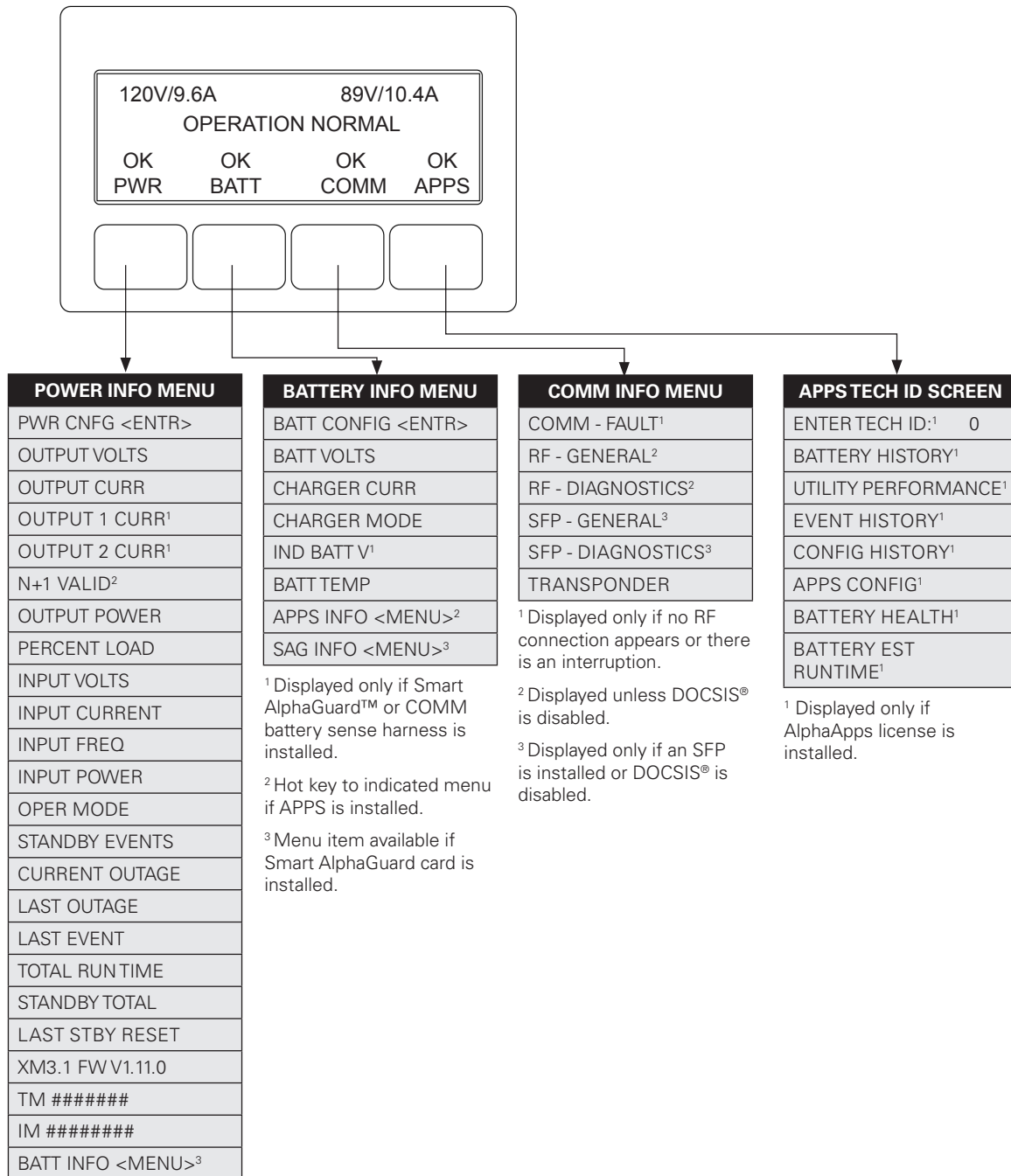
Fig. 3-2, Navigating Through Menu Screens

3.3 Smart Display Menus

While in the OPERATION NORMAL display, the following menu prompts are displayed when the respective softkey is pressed.

 **NOTICE:**

"SAG" references Smart AlphaGuard™ card items on the display menus.



¹ Displayed only if AlphaDOC card is installed.

² Displayed only if AlphaDOC card with N+1 option is installed.

³ Hot key to indicated menu.

Fig. 3-3, Smart Display Menus

3.0 Operation, continued

3.3.1 Power Information and Configuration

Pressing the **PWR** (Power) softkey while in the OPERATION NORMAL screen opens the Power Info Menu display (the first letter of the top line will blink indicating it is the active line; shown in orange). Pressing **ENTR** from this screen opens the PWR CNFG (Power Config) Menu. Cycling through each menu item and following the prompts on the lower line will enable the user to configure the parameters shown in the menu.

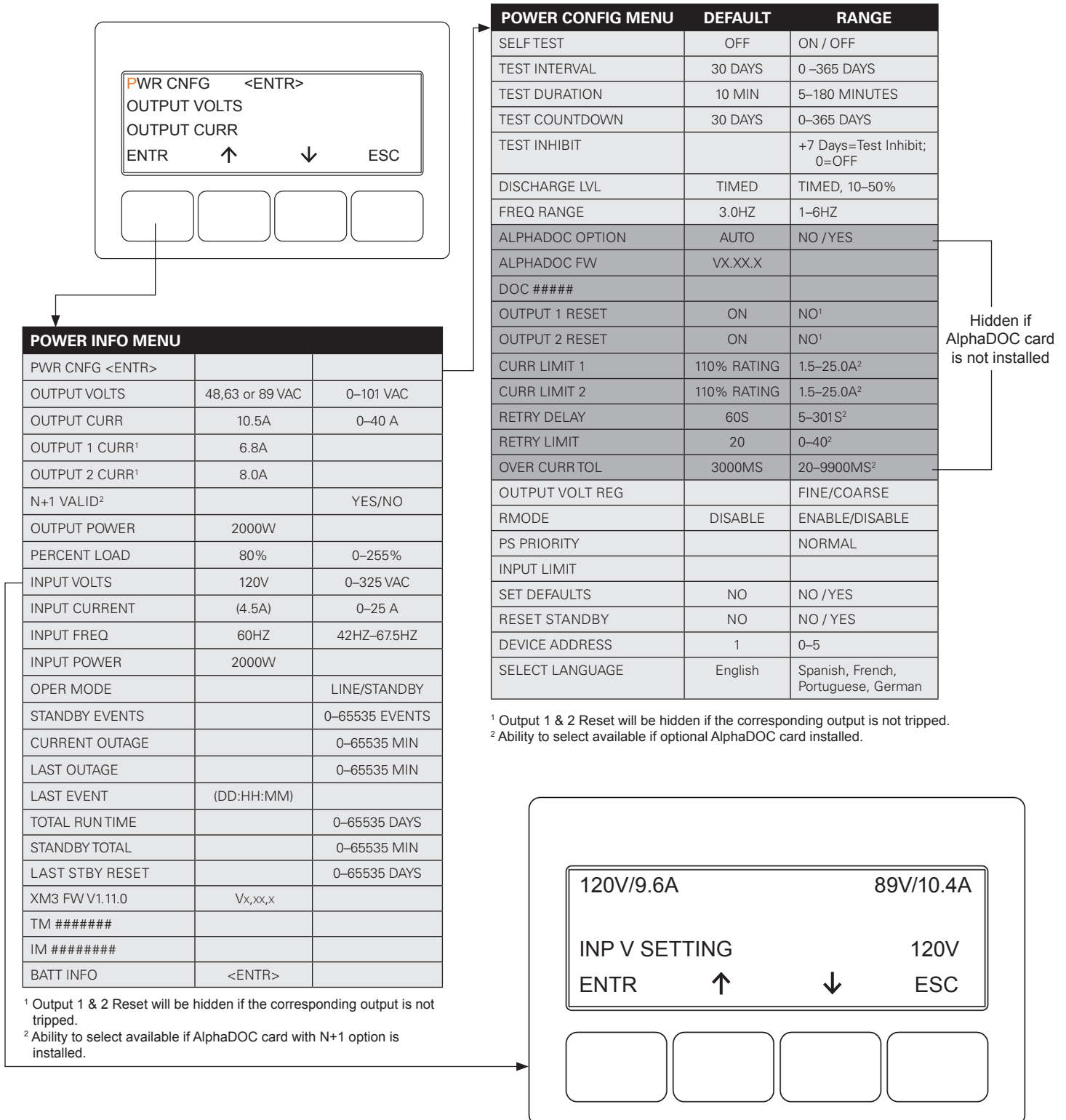


Fig. 3-4, Power Information and Configuration Menu Options

3.3.2 Battery Information and Configuration

The top line of the display is affected by pressing a softkey. In this case, pressing **ENTR** will open the BATTERY INFO/ BATTERY CONFIG Menu enabling the operator to set values for the following parameters.

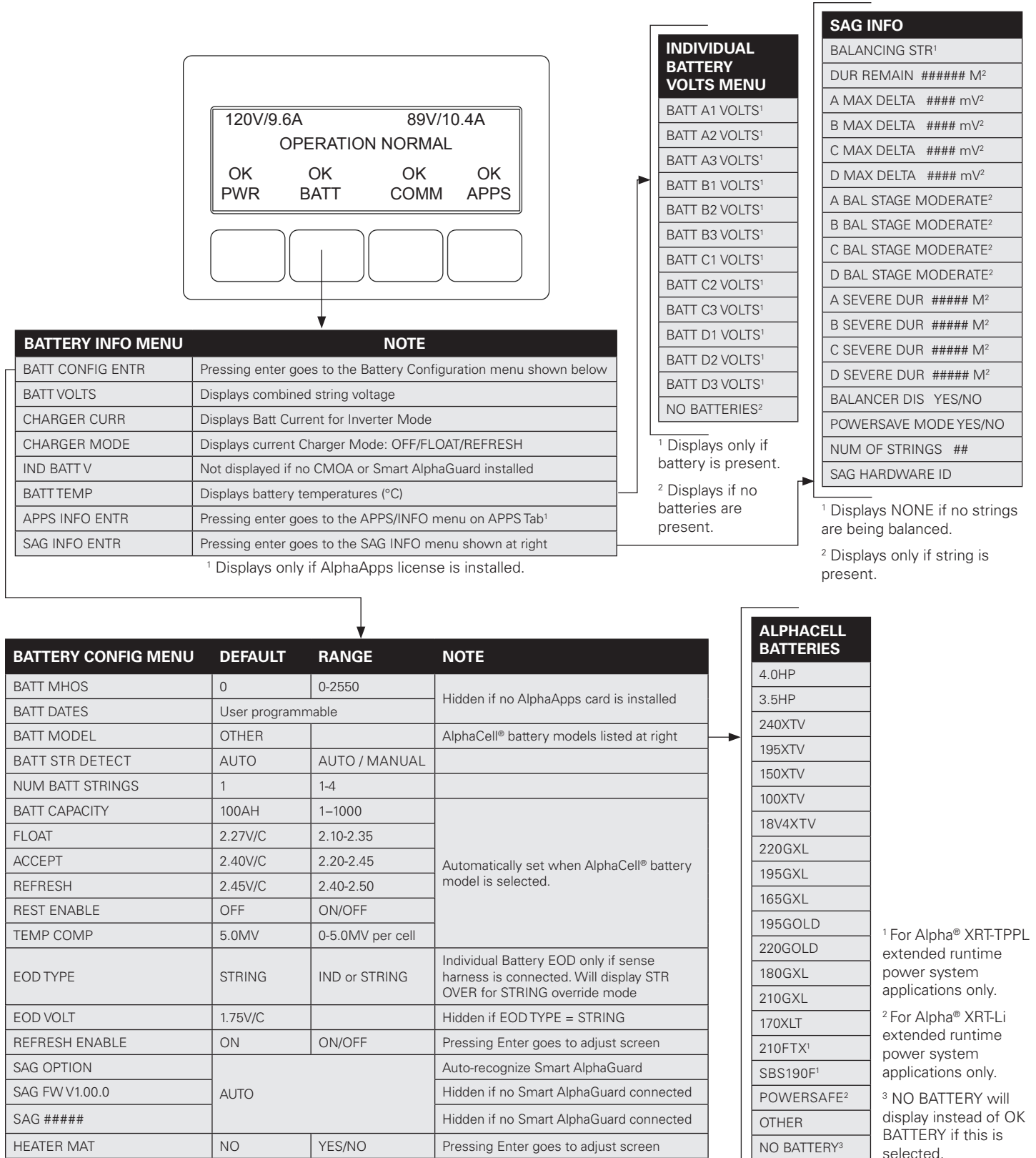


Fig. 3-5, Battery Information and Configuration Menu Options

3.3.3 Communication Information and Configuration

Pressing the **COMM** softkey while in the OPERATION NORMAL screen opens the following display (the first letter of the top line will blink indicating it is the active line).

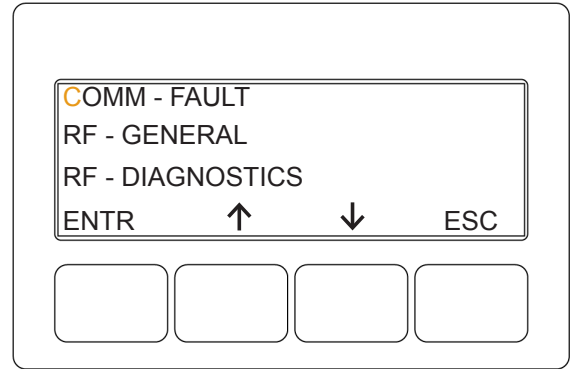


Fig. 3-6, Communication Information and Configuration Menu Options

COMM - FAULT

The top line of the display is affected by pressing a softkey. Pressing **ENTR** will open the COMM - FAULT Menu. The COMM - FAULT Menu will appear if there is no RF connection or the RF connection is interrupted.

If there are multiple errors, use the softkey arrows to move up or down through the list.

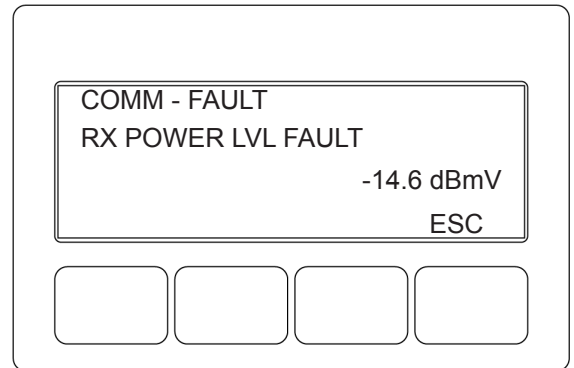
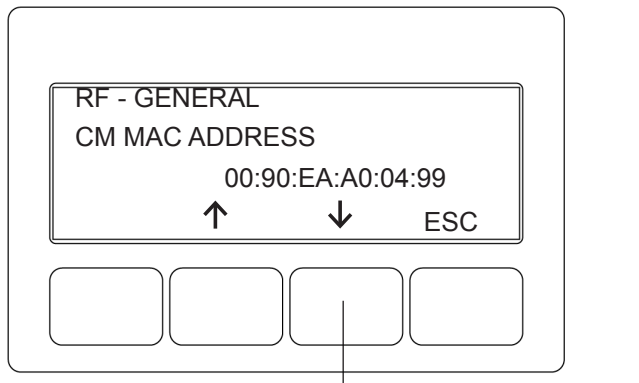


Fig. 3-7, COMM - FAULT Menu Screen

RF - GENERAL

In this case, pressing **ENTR** will open the RF - GENERAL Menu enabling the operator to view values for the following parameters. Pressing the **UP** or **DOWN** arrow softkeys will show two lines of information for each submenu item.



Press **DOWN** arrow softkey to view next item(s) in menu.

RF - GENERAL	
CM MAC ADDRESS	00:90:EA:A0:04:99
CM IPV6 ADDRESS ¹	2601:544:c100:d1f1:290:eaff:fea0:49a ²
CM IP ADDRESS	192.168.1.121
CPE IP ADDRESS ³	192.168.1.122
CM RECEIVE POWER	-2.1d BmV
RX INTERNAL ATTEN ⁴	10 dB
CM TRANSMIT POWER	48.5 dBmV
DOWNSTREAM SNR	40.5 dB

¹ Displayed only if the cable modem has an IPv6 address.

² Information that is longer than the 20-character display will automatically scroll horizontally.

³ Displayed only if the power supply is configured for "dual IP" operation.

⁴ Displayed only if an internal attenuator has been set.

Fig. 3-8, RF - GENERAL Menu Options

3.0 Operation, continued

Pressing the **DOWN** arrow softkey to move RF - DIAGNOSTICS (the first letter of the top line will blink indicating it is the active line) to the top line and press **ENTR** to open the RF - DIAGNOSTICS menu.

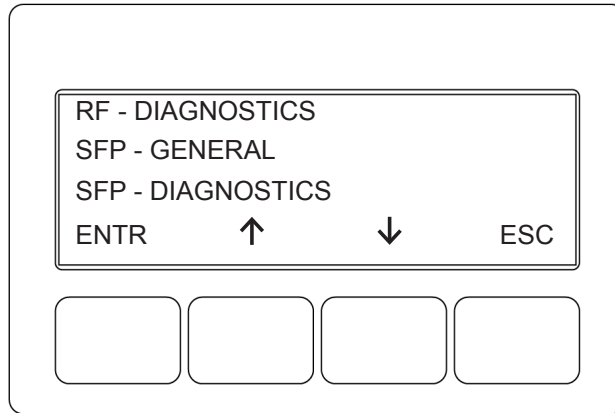
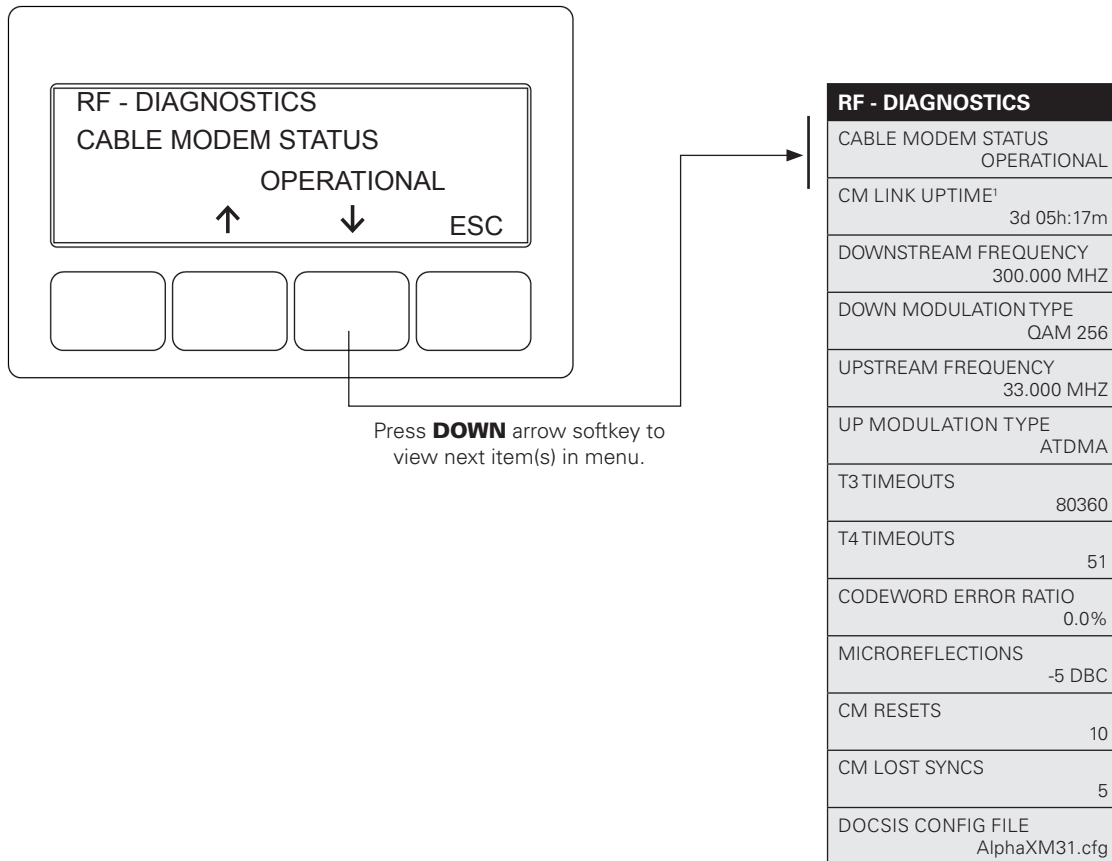


Fig. 3-9, RF - DIAGNOSTICS Menu Screen

RF - DIAGNOSTICS

Pressing **ENTR** opens the RF - DIAGNOSTICS menu enabling the operator to view values for the following parameters. Pressing the **UP** or **DOWN** arrow softkeys will show two lines of information for each submenu item.



¹ Only displayed when the modem is online.

Fig. 3-10, RF - DIAGNOSTICS Menu Options

3.0 Operation, continued

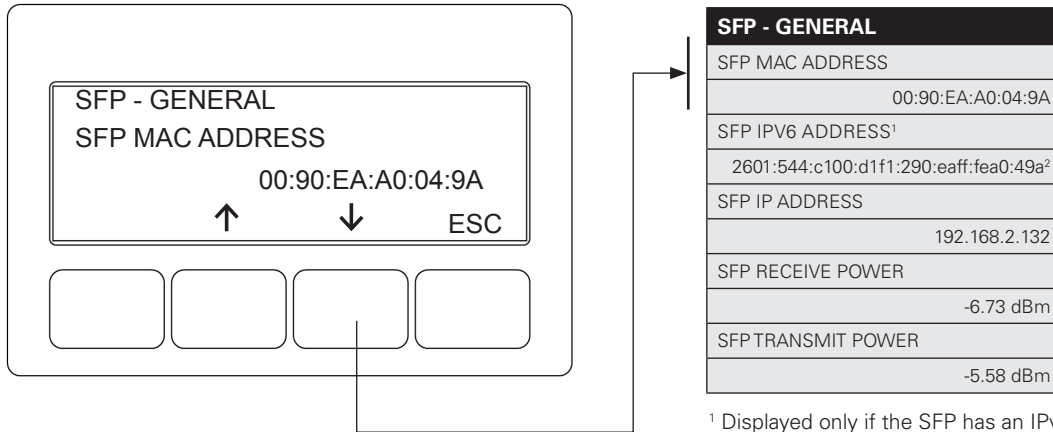
SFP - GENERAL



NOTICE:

SFP - GENERAL displays only when an SFP is installed in the power supply or if DOCSIS® is disabled.

Pressing **ENTR** opens the SFP - GENERAL menu enabling the operator to view values for the following parameters. Pressing the **UP** or **DOWN** arrow softkeys will show two lines of information for each submenu item.



¹ Displayed only if the SFP has an IPv6 address.
² Information that is longer than the 20-character display will automatically scroll horizontally.

Fig. 3-11, SFP - GENERAL Menu Options

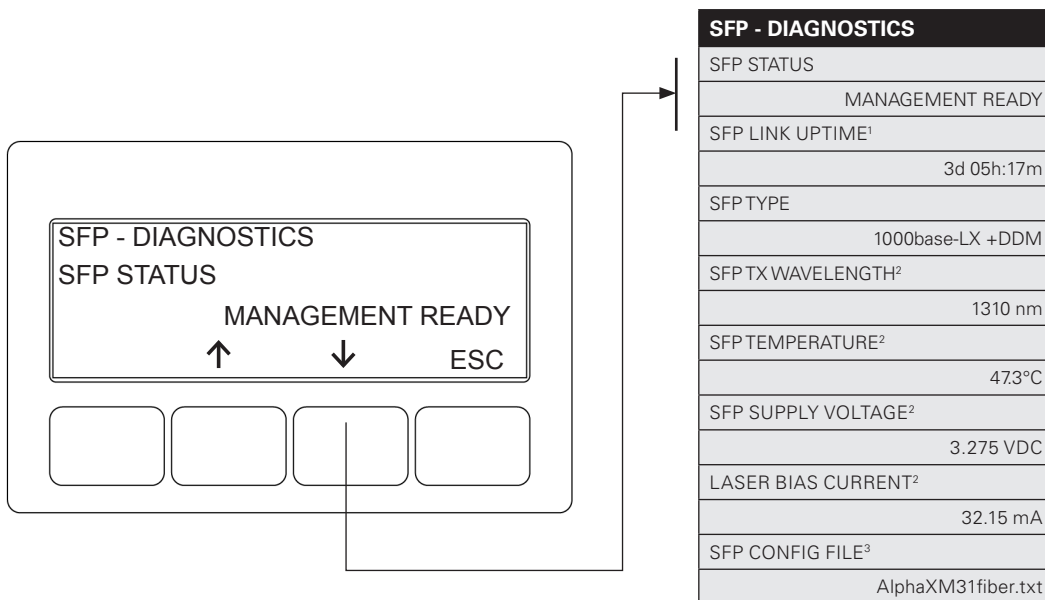
SFP - DIAGNOSTICS



NOTICE:

SFP - DIAGNOSTICS displays only when an SFP is installed in the power supply or if DOCSIS® is disabled.

Pressing **ENTR** opens the RF - DIAGNOSTICS menu enabling the operator to view values for the following parameters. Pressing the **UP** or **DOWN** arrow softkeys will show two lines of information for each submenu item.



¹ Displayed only when the SFP has a valid connection.
² Displayed only for an SFP that reports this information.
³ Displayed only if a configuration file was loaded over SFP.

Fig. 3-12, SFP - DIAGNOSTICS Menu Options

3.0 Operation, continued

Pressing the **DOWN** arrow softkey to move TRANSPONDER (the first letter of the top line will blink indicating it is the active line) to the top line and press **ENTR** to open the TRANSPONDER menu.

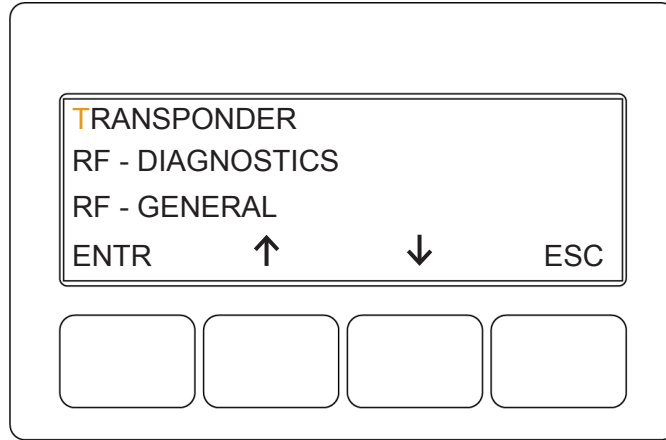
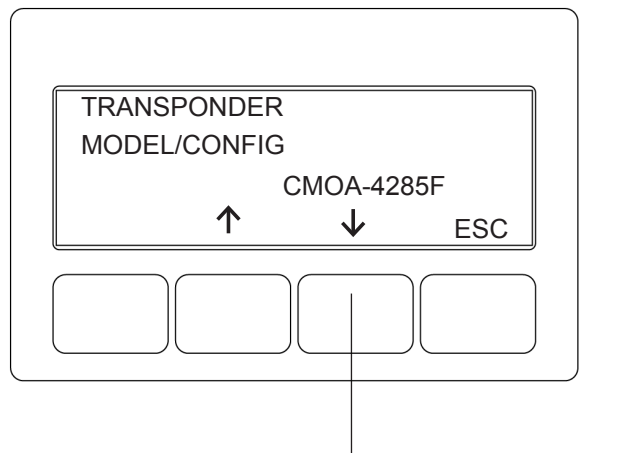


Fig. 3-13, TRANSPONDER Menu Screen

TRANSPONDER

Pressing **ENTR** opens the TRANSPONDER menu enabling the operator to view values for the following parameters. Pressing the **UP** or **DOWN** arrow softkeys will show two lines of information for each submenu item.



Press **DOWN** arrow softkey to view next item(s) in menu.

TRANSPONDER	
Model/Config	CMOA-4285F ¹
Firmware Version	XM3.1-0.31.00.1912011841.JENKINS ²
SYSTEM NAME ¹	ABC123 Cable
SYSTEM CONTACT ¹	John Doe
SYSTEM LOCATION ¹	123 Bakerview
Common Logical ID	XM3.1-HP
Serial Number	1904F6700067
SYSTEM UPTIME	3d 05h:18m
LAST SNMP QUERY	XM3-1 APP-1 BTQ-1

¹ Model number may change based upon the installed transponder. Example: CMOA-xxxxx.

² User Input values are examples only.

Fig. 3-14, TRANSPONDER Menu Options

3.3.4 Alpha® Applications Information and Configuration



NOTICE:

If the optional AlphaApps functionality is not enabled, NO APPS will appear on the Smart Display, and the values shown under the “APPS OPTION” line of the Smart Display are hidden.

Pressing the **OK APPS** softkey while in OPERATION NORMAL screen opens the APPS TECH ID screen. The technician may bypass this screen by pressing **ENTR** with a number 0 on the display, or the technician may enter a number using the **UP** and **DOWN** arrow keys and then pressing **ENTR**. If a technician ID is entered, a confirmation screen will appear. Press **ENTR** again to commit the value and the APPS menu list will appear.

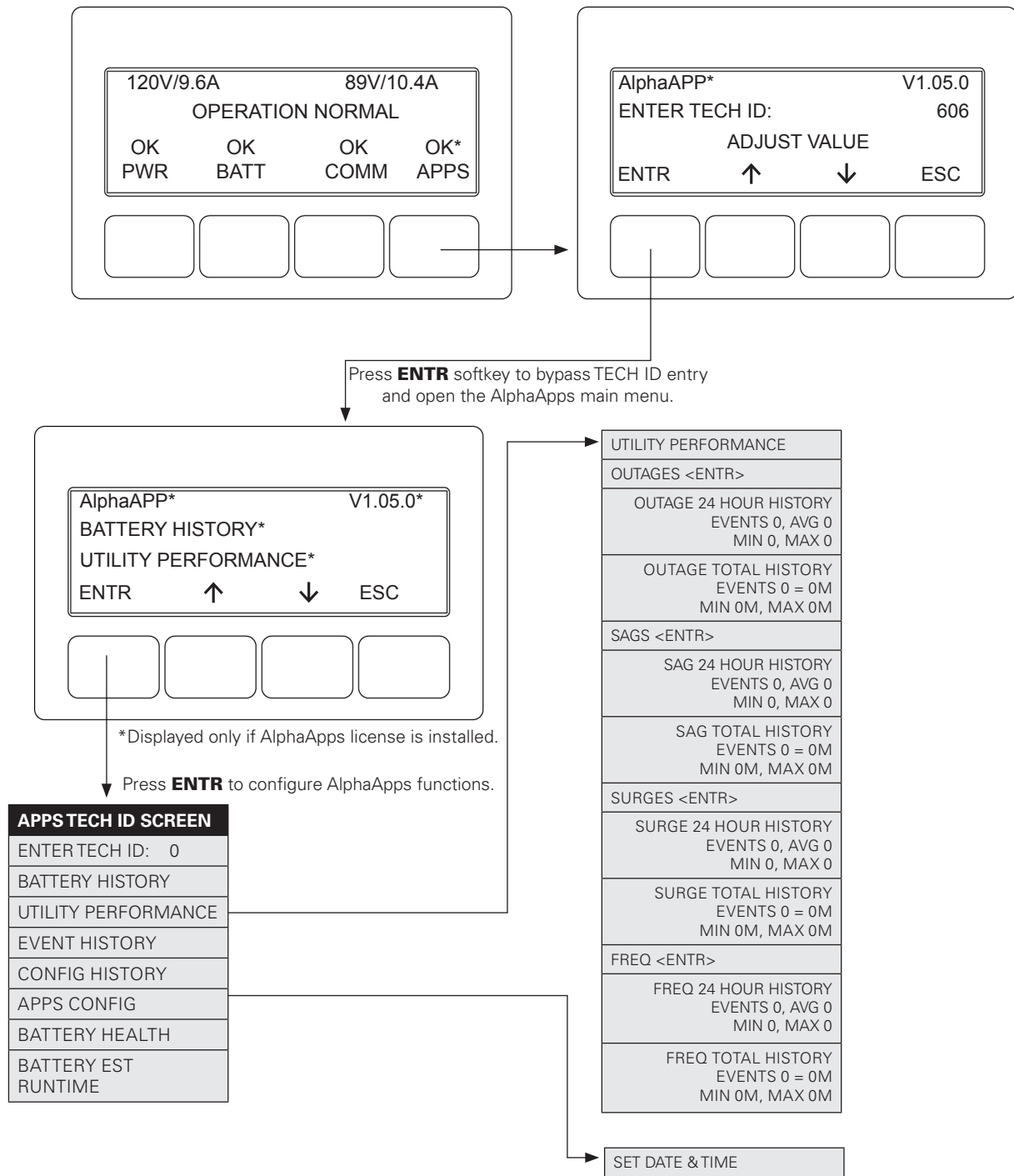


Fig. 3-15, AlphaApps Menu Options

3.4 AlphaApps Overview

The AlphaApps (applications) provides optional applications for the XM3.1-HP™ power supply. It operates as a computing system gathering telemetry from the power supply, batteries and the environment. The embedded AlphaApps operating system and flash file system provides the operator with an expandable platform for future software applications. As new applications are developed, they can be downloaded over the power supply cable modem interface. The AlphaApps details may be viewed on the power supply display, the Alpha® transponder web AlphaApps pages, and some are supported on the Continuity™ and Alpha XD™ status monitoring systems.

3.4.1 Display Structure

Technician ID Screen:

To access the APPS screens press the **APPS** softkey on the main XM3.1-HP™ power supply menu. The first APP screen displayed will be the Technician ID screen (orange denotes a flashing character in this document).

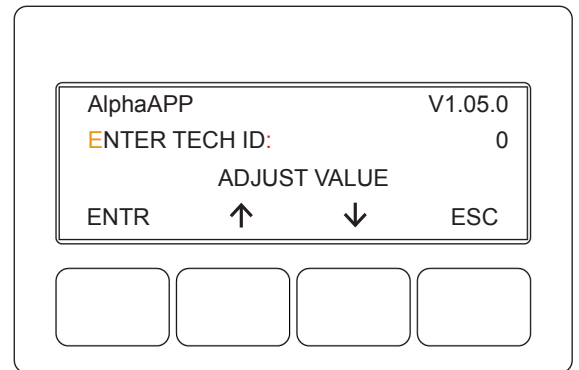


Fig. 3-16, Technician ID Screen

If the technician wishes to have their visit logged, they may enter their ID number (up to 999) by pressing the **UP** and **DOWN** arrow softkeys and then pressing the **ENTR** softkey. The technician ID may be bypassed by pressing the **ENTR** softkey with an ID of zero.

If a non-zero ID is entered, a confirmation screen will appear. It shows the ID and the time stamp.

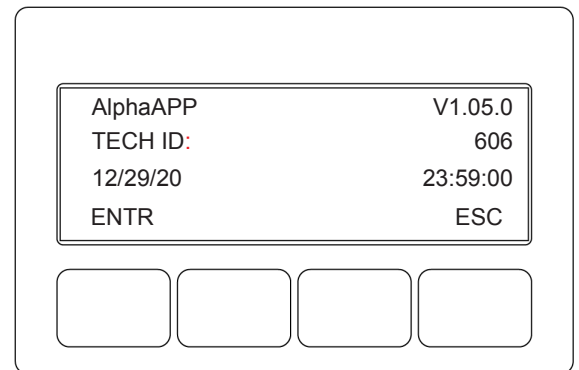


Fig. 3-17, Technician ID Log Screen

Press **ENTR** once again to confirm the entry. The AlphaApps main menu screen will appear.

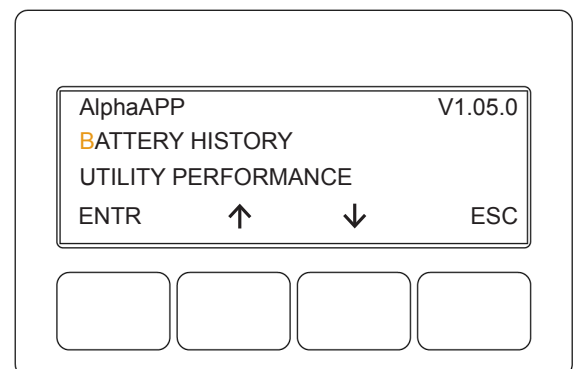


Fig. 3-18, AlphaApps Main Menu Screen

3.0 Operation, continued

Main APP Menu Screen:

The main menu screen can scroll **UP** or **DOWN** using the arrow softkeys. The flashing character (shown in orange) denotes which sub-menu will be selected when **ENTR** is pressed.

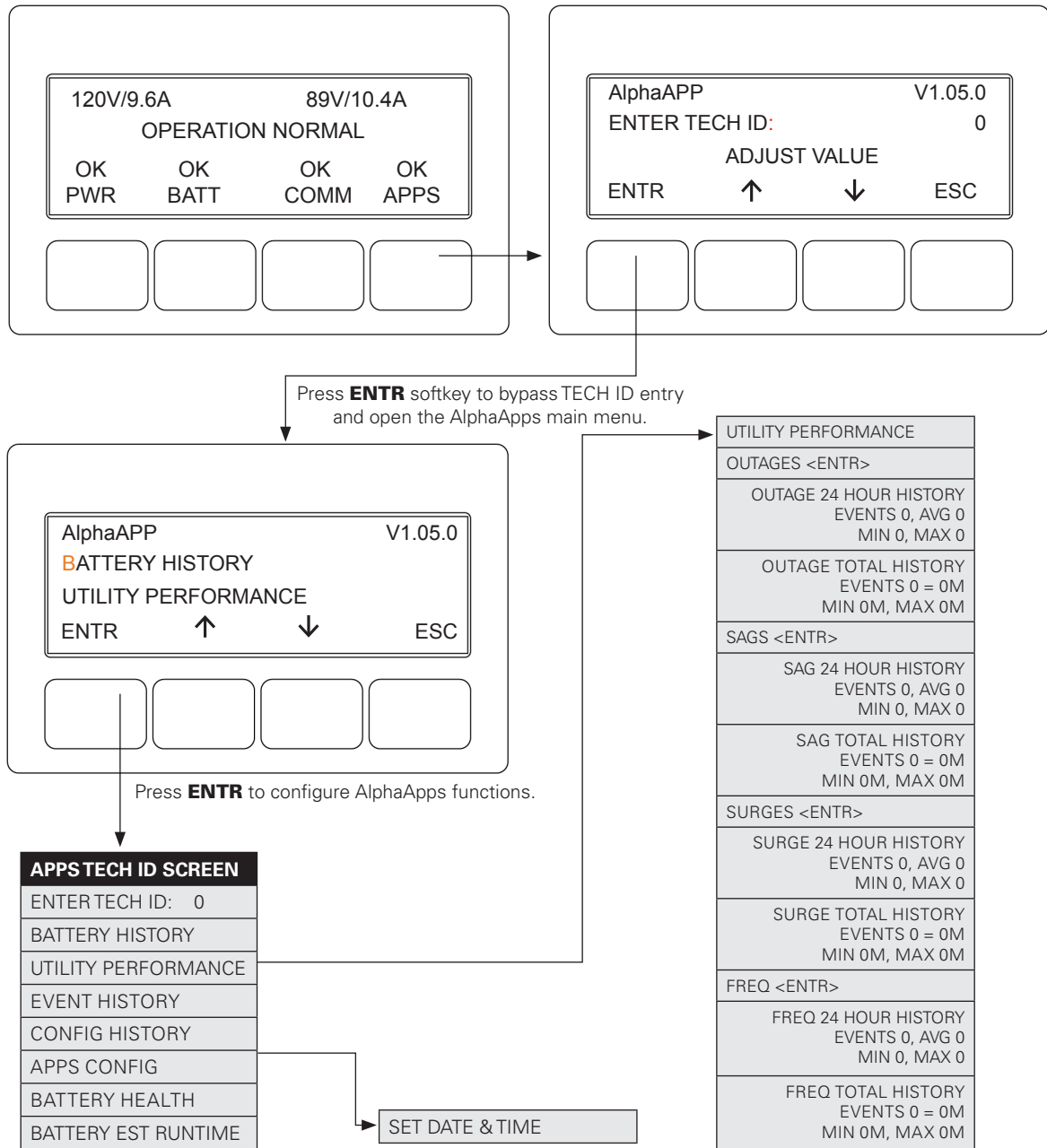


Fig. 3-19, AlphaApps Menu Options

The date and time can be set in the APPS CONFIG menu. The date and time are normally set by a time server at the headend. In the event no time server is present, the APPS option will find the last event log time stamp and use that date and time as clock initial value.

If the date and time needs to be manually entered, use the arrow softkeys to select the digit and use the **ENTR** to shift fields.

When the "OK" is flashing, press **ENTR** one more time to save the value. Press **ESC** if no changes to the date or time are desired.

3.0 Operation, continued

3.4.2 Applications

There are currently eight applications:

1. Configuration Logging
2. Alarm Event Logging
3. Battery Information Logging
4. Utility Performance
5. Battery Health
6. Battery Run Time
7. Active Drop
8. Power Supply Downtime

Configuration Log Screen:

To enter the Configuration History screen, scroll **UP** or **DOWN** until the CONFIG HISTORY is at the top of the scroll area.

Press **ENTR** to access the CONFIG HISTORY screen. The "CL" indicates that this is a Configuration Log record, and the time stamp shows when the record was created. Lines two and three on the display contain the record contents. In this example, the APP firmware version record is shown.

The screen will begin with the most recent record created. Press the **DOWN** softkey to view earlier records, or press the **UP** softkey to view more recent records.

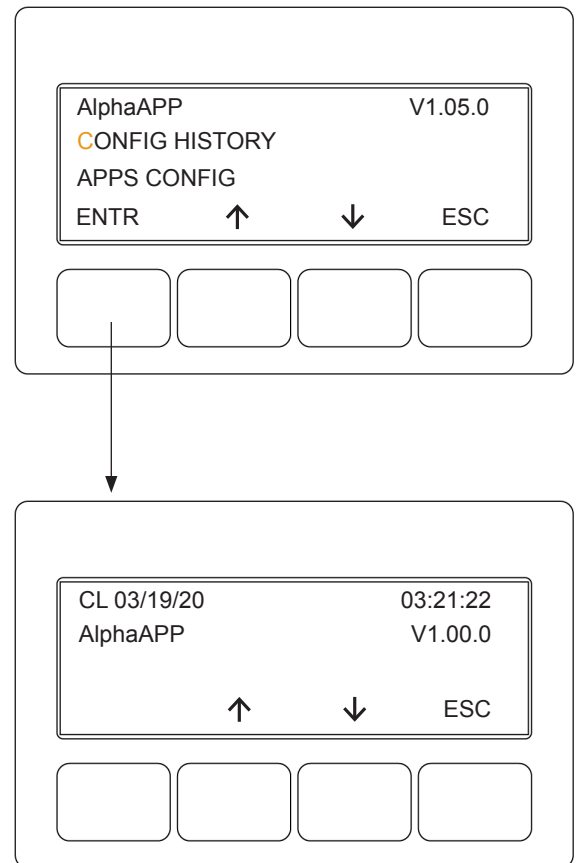


Fig. 3-20, Configuration History

3.0 Operation, continued

Event Logging App:

The APP card can log 768 events. This log does roll-over when the maximum size has been reached. When the roll-over occurs, the oldest 64 records are erased to make room for new records. Once a roll-over has occurred, the number of records available will be between 704 and 768. See **Table 3-3, Logged Events and Alarms** for a list of events and alarms that are logged.

Table of Events/Alarms Logged		
ALPHADOC OPTION	CPE IP ADDRESS	OUTPUT FAILURE
APP CARD CODE DOWNLOADED	CPE MAC ADDRESS	OUTPUT OVERLOAD
APP CARD HARDWARE STATUS	DNSTRM POWER FAULT	OUTPUT OVERLOAD ALARM
APP CARD REAL TIME CLOCK SET	HIGH BATT VOLTS	PDM EEPROM ERROR
APP CARD RESET CAUSE	HIGH BATTERY ALARM	POWER SUPPLY INPUT CURRENT LIMIT ALARM
APP CARD TECHNICIAN CODE ENTERED	HW COMPATIBILITY	REFRESH
APP OPTION	INPUT FAILURE	SAG COMPATIBILITY
BATT TEMP PROBE	INPUT FAILURE ALARM	BATTERY VOLTAGE IMBALANCE
BATTERY EOD	INPUT OVER CURR	SAG NO HARNESS
BATTERY FAIL	PPM EEPROM ERROR	SAG NOT CALIBRATED
BATTERY LOG CLEARED	INVERTER ALARM	SAG OPTION
BATT. TEMPERATURE PROBE STATUS ALARM	INVERTER ENABLE	SAG RELAY STUCK
CHARGER ENABLE	INVERTER TEMP	SELF TEST ALARM
CHARGER FAIL ALARM	LINE ISOLATION	SELF TEST FAIL
CHARGER FAILURE	LINE ISOLATION ALARM	SELF TEST FAIL ALARM
CLOCK NOT SET	LOW BATT VOLTS	STR X MISWIRED
CM IP ADDRESS	LOW BATTERY SHUTDOWN ALARM	SURGE MOV FAIL
CM MAC ADDRESS	MAJOR APPLICATION ALARM	TM COMPATIBILITY
CONFIG ERROR	MINOR APPLICATION ALARM	X BAL STAGE
CONFIGURATION LOG CLEARED	NO BATTERIES	

Table 3-3, Logged Events and Alarms

This is an example event log screen shot. The “EL” denotes the Event Log, and the record was time stamped on February 6, 2020 at 8:38:33 in the morning.

The **UP** and **DOWN** arrow keys step through the log records forward and backward in time.

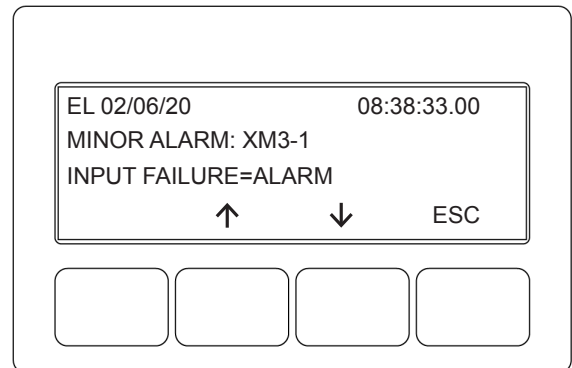


Fig. 3-21, Event Log Screen

3.0 Operation, continued

Battery Logging App:

This application allows the operator to manually enter the battery manufacture dates and their conductance (mhos) values.

1. To enter the battery manufacture dates, press the **BATT** softkey on the XM3.1-HP™ power supply main menu.
2. Next select the BATT CONFIG sub-menu.
3. Scroll the screen using the arrow keys until BATT DATES appears at the top of the screen.
4. Press the **ENTR** softkey. The APP option will now take over control of the display and show a list of installed batteries.
5. If the dates have never been entered, they will appear blank as shown. Use the arrow softkeys to select the appropriate battery.
6. To enter the manufacture date, press the **ENTR** softkey. The following screen will appear.
7. Use the **UP** and **DOWN** arrow softkeys to set the month.
8. Press the **ENTR** softkey to select the year adjustment.
9. Press the **ENTR** softkey when finished.

Note: The APP card will not allow a manufactured date set to a time after the current APP option date.

As a time saving feature, if battery dates have never been entered into the APP option, it will copy the entry for battery A1 to all batteries if A1 is done first.

When a battery date has been saved, the APP option will create a battery log record recording the date and time of the entry and the battery manufactured date for this battery.

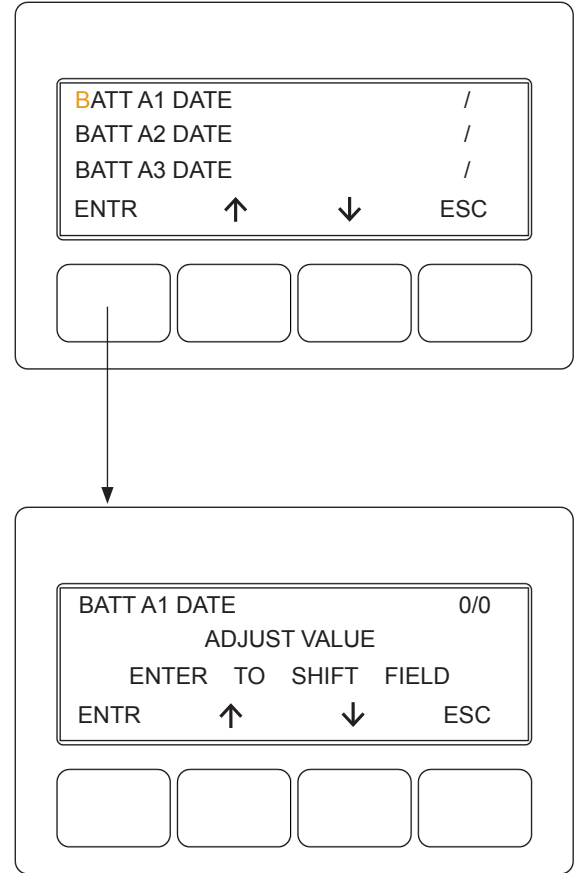


Fig. 3-22, Battery Manufacture Date Screen

3.0 Operation, continued

Entering Battery Mhos (Conductance):

To enter the battery conductance reading in mhos, press the **BATT** softkey on the XM3.1-HP™ power supply main menu. Next select the BATT CONFIG sub-menu. Scroll the screen using the arrow keys until BATT MHOS appears at the top of the screen. Press the **ENTR** softkey. The APP card will now take over control of the display and show a list of installed batteries.

Use the softkeys to select the appropriate battery.

To enter the MHOS value, press the **ENTR** softkey. The following screen will appear.

Use the arrow keys to select the flashing digit value. Press the **ENTR** softkey to move to the next digit, and so on. When all digits have been entered, the units will flash. The display will show the entered mhos value and the temperature compensated value. The PTS probe temperature is used for temperature compensation.

Press the **ENTR** softkey one more time to save the value.

Only the temperature compensated value will be logged or displayed from this point forward.

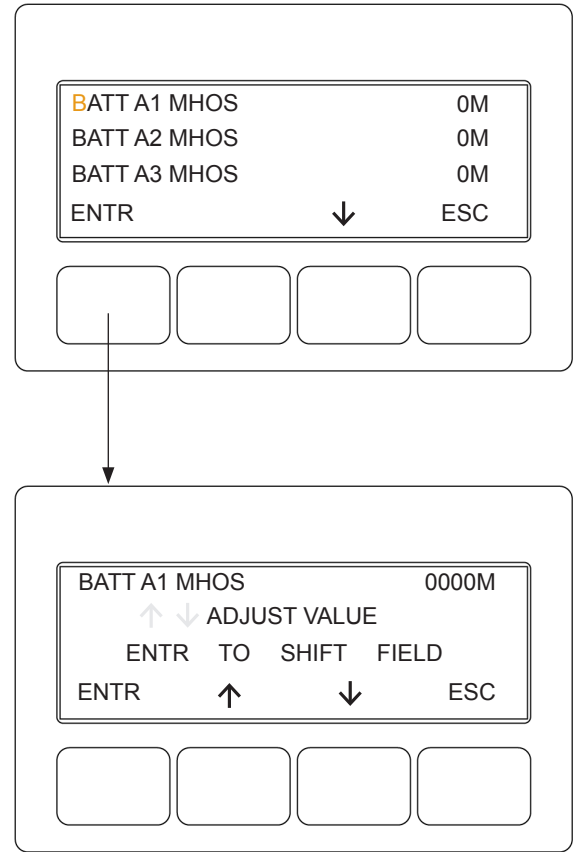


Fig. 3-23, Battery Mhos Screen

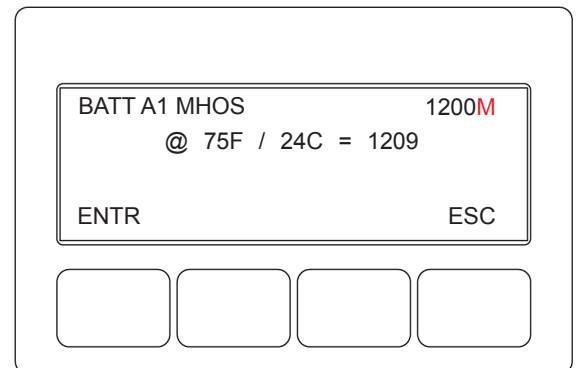


Fig. 3-24, Logged Battery Mhos Screen

3.0 Operation, continued

Battery Log Screen:

To enter the Battery History screen, select the APPS menu from the main XM3.1-HP™ power supply screen. Bypass the Technician ID screen if needed and scroll up or down until BATTERY HISTORY is at the top of the scroll area.

Press **ENTR** to access the BATTERY HISTORY screen:

The top three lines of the display scroll up and down using the arrow softkeys.

The “BL” in line one indicates the Battery Log. Also in line one is the date and time the record was created.

Line two has the battery name and the manufactured date stored.

There are also battery MHOS records stored in the battery log.

The format of the record matches the battery dates record.

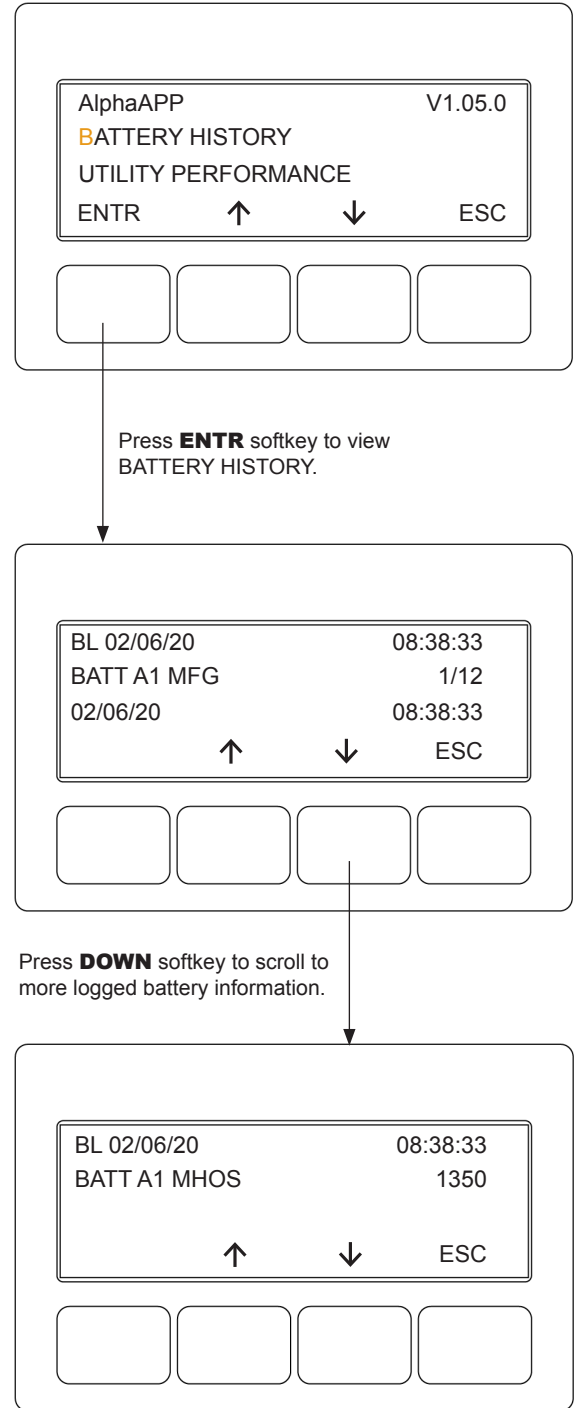


Fig. 3-25, Battery History

3.0 Operation, continued

Utility Performance App:

This application monitors the AC line input to the XM3.1-HP™ power supply. It detects, displays and logs four types of AC fault conditions:

1. Line Outage – If the AC input is below a factory set threshold, an outage condition is recorded.
2. Line Sag – If the AC input exists but is below a factory set threshold, a line sag condition is recorded.
3. Line Surge – If the AC input exceeds a factory set threshold, a line overvoltage or surge condition is recorded.
4. Line Frequency – If the AC line frequency exceeds the normally defined operating range, a frequency event is recorded.

Each condition is measured with one second resolution and will not be permanently logged until the event has ended.

To enter the Utility Performance sub-menu, scroll up or down until UTILITY PERFORMANCE is at the top of the Smart Display and press the **ENTR** softkey to access the sub-menu. Scroll **DOWN** to OUTAGES and hit the **ENTR** softkey to view outage history logs.

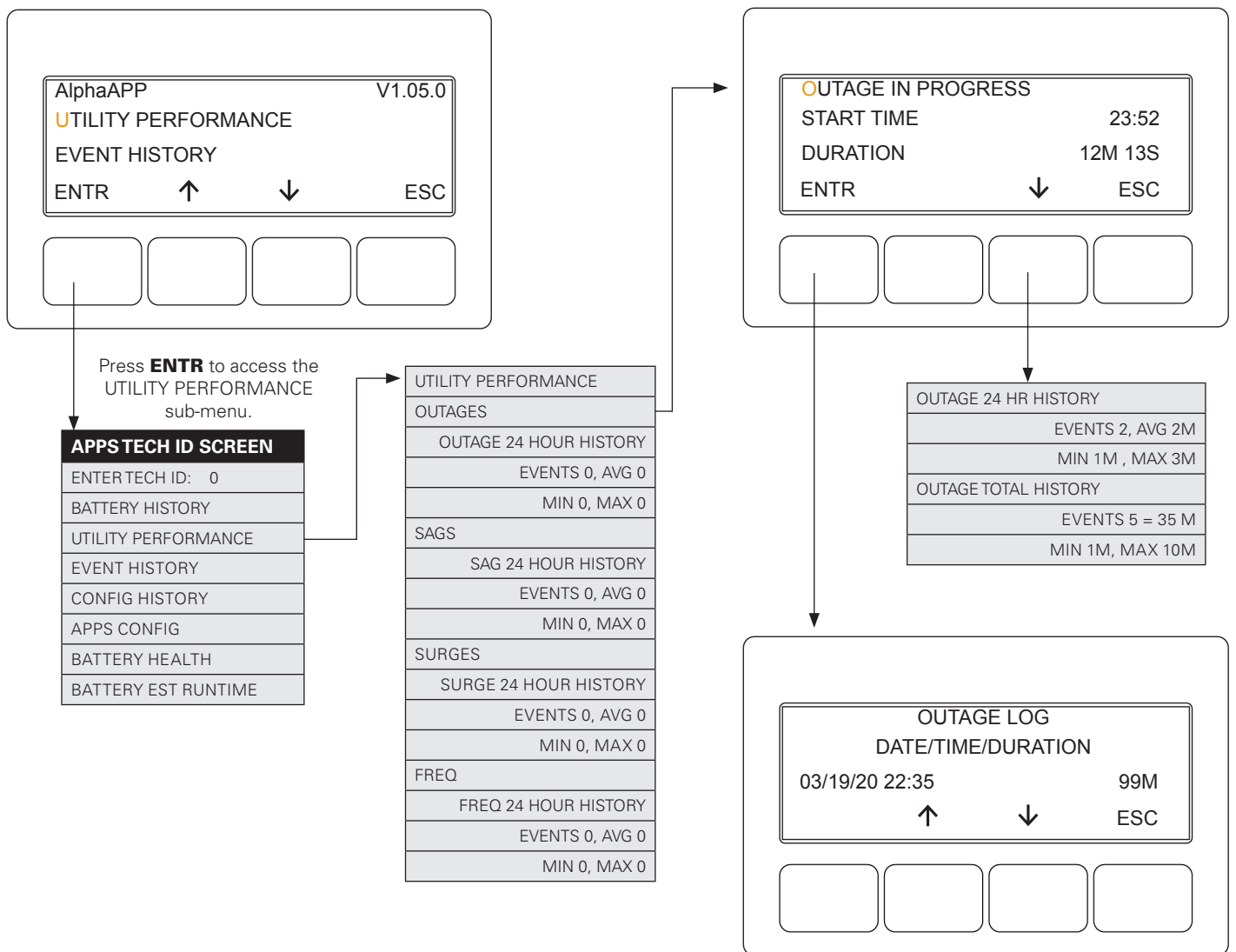


Fig. 3-26, Utility Performance Menu Options

3.0 Operation, continued

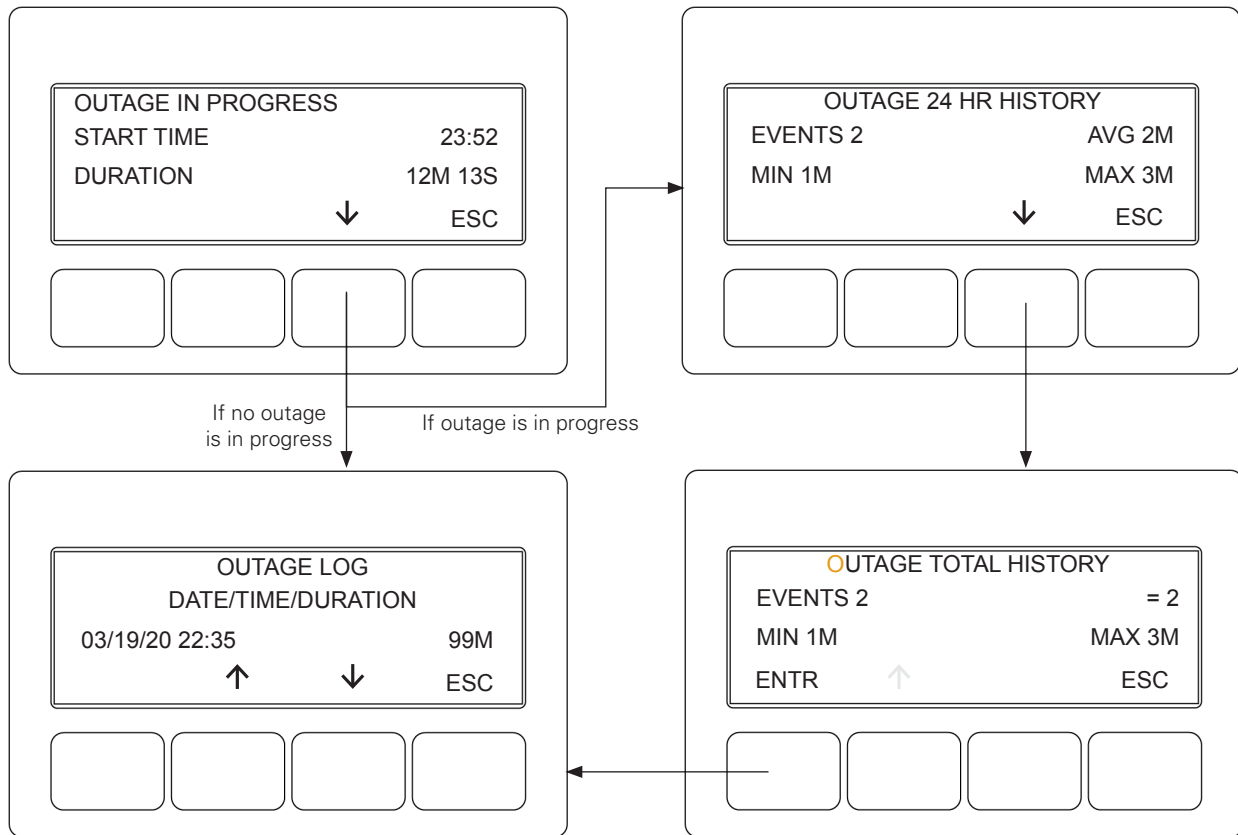


Fig. 3-27, Outage History

The top line of the Utility Performance sub-menu does not scroll. It indicates "OK" if there are no utility events active or "EVT" if there are.

Pressing the **DOWN** arrow scrolls the sub-menu to show SAGS, SURGES and FREQUENCY sub-menu selections. Each of these sub-menus has the same structure as the OUTAGES sub-menu, so only OUTAGES will be shown here.

Press **ENTR** to select OUTAGES sub-menu (top left). This screen will appear if an Outage is in progress (top right), otherwise the screen below it will appear.

If any previous outages have been logged, the **ENTR** key will appear and the first character in OUTAGE will flash. Pressing **ENTR** displays the Outage Log.

Pressing the **UP** and **DOWN** arrows displays the various log entries. The last complete Outage logged will be displayed first. Press the **DOWN** arrow to review earlier log entries.

3.0 Operation, continued

Battery Health App:

The Battery Health App uses several factors in determining the remaining life of the batteries. Battery Manufacture date, install date, battery model, and other environmental conditions are key inputs to this algorithm.

To enter the Battery Health sub-menu, scroll up or down until BATTERY HEALTH is at the top of the scroll area.

Press **ENTR** to access the BATTERY HEALTH sub-menu.

The top line of the BATTERY HEALTH sub-menu does not scroll. It indicates the remaining expected life of the battery set.

The second and third lines scroll together using the **UP** and **DOWN** arrow keys.

Line two contains the battery number (String A, B, C) and number (1, 2, 3). Battery A1 is the 12V battery on string A. Line two also contains the battery manufactured date and the calendar age of the battery.

Line three contains the temperature compensated MHOS value. The temperature compensated value is computed using the PTS.

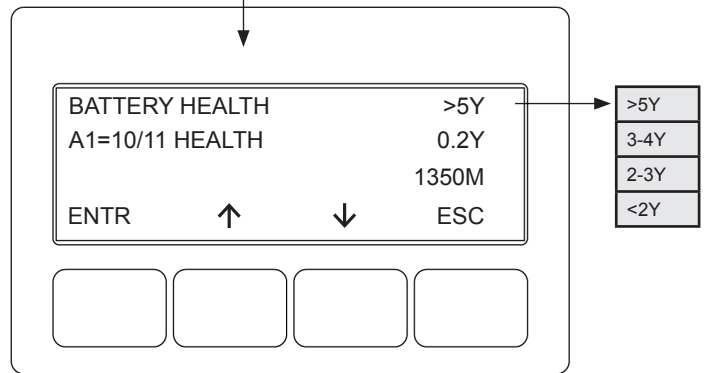
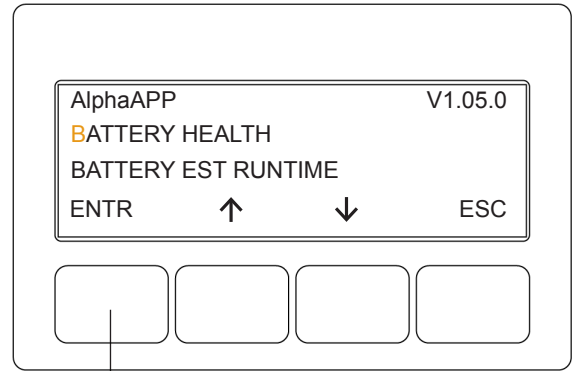


Fig. 3-28, Battery Health

Battery Run Time App:

The Battery Run Time App dynamically computes the amount of standby time remaining in the batteries. It uses the existing capacity of the batteries, the AC load, the power factor and other environmental parameters.

The computed value is displayed on the power supply display, transponder web page, and Alpha status monitoring systems. When a power supply is first installed, the display will indicate calculating to the transponder web page and Alpha® status monitoring systems until the first self-test is run.

To enter the Battery Runtime sub-menu, scroll up or down until BATTERY EST RUNTIME is at the top of the scroll area.

Press **ENTR** to access the BATTERY RUNTIME sub-menu.

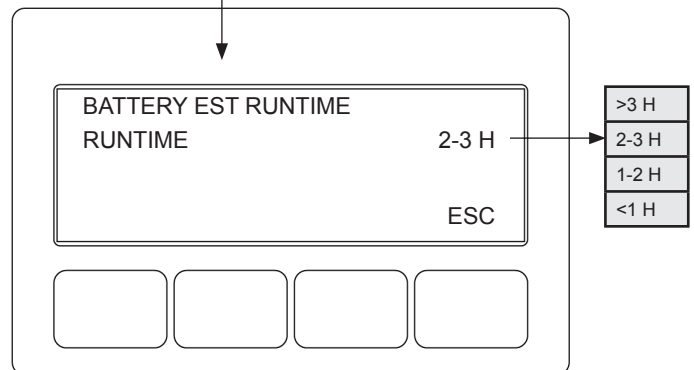
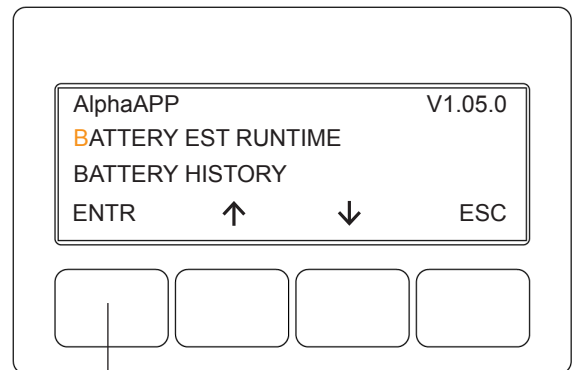


Fig. 3-29, Battery Run Time

3.0 Operation, continued

Active Drop App:

Some networks have issues on hot summer days where the resistance of the cable network increases when the cable gets hot. The added resistance causes active devices on the network to go offline.

Active drop detection application monitors the power supply's output power after an initial stabilization time of 5 minutes. Whenever the output power drops 50W or more an alarm is triggered indicating that an active device may have dropped from the network. This alarm is part of the HMS alarming and if configured will send a HMS alarm trap the Element Monitoring System. The alarm will self-clear after 6 hours of steady output power.

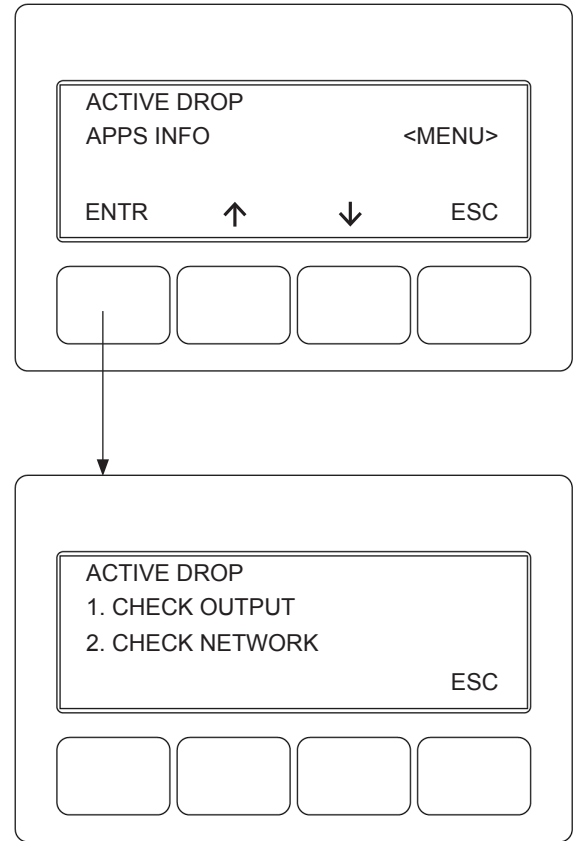


Fig. 3-30, Active Drop

Power Supply Downtime App:

This application keeps track of power supply downtime. A counter is accumulated every second that an output failed alarm is present. However, depending on the length of an outage and the battery health it is possible that the power supply is completely powered off. When this occurs the downtime is based on the cable modem setting the EMM's time of day.

The EMM records the current time of day every 2 minutes. When power is restored and the cable modem starts up it will send the current time of day to the EMM. This is compared to the stored value and a downtime calculation is determined.

3.0 Operation, continued

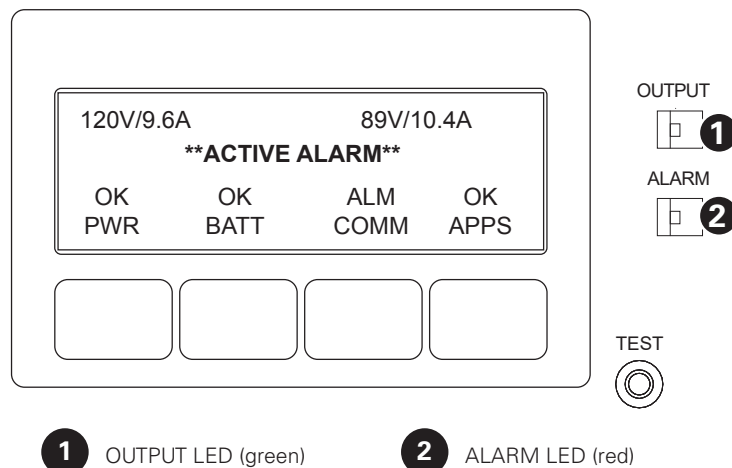
3.5 Active Alarms

Two LEDs on the inverter module indicate the condition and status of the XM3.1-HP™ power supply.

- 1 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 that a minor alarm has been detected. If there is an output failure, the Output LED will be turned off.
- 2 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 no major alarms have been detected.

In the event of a failure, the Active Alarm displays which alarms are active and how to correct the alarm condition. If the display is not illuminated, press a softkey to activate the display to view the alarm details.

- Press the menu key with **ALM** indicated above it to see the ACTIVE ALARM list for the selected key.
- Press **UP** or **DOWN** to select the alarm of interest.
- Press **ENTR** to select the alarm and display diagnostic information. Press **ESC** to return to the alarm list.



1 OUTPUT LED (green) 2 ALARM LED (red)

Condition	Output	Alarm
Normal	On	Off
Minor	Flash	Off
Major	Flash	Flash
Output Off	Off	Flash

Fig. 3-31, Active Alarm Table

(Alarm Conditions exist in the Battery and Communications subsystems)

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 **ENTR**. Press either **UP** or **DOWN** to scroll through the list of remedies.

Alarms are classified in two categories:

MAJOR Alarms are indications of a serious failure within the power supply, 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 PTS 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, troubleshooting items to check to correct the alarm condition, and whether or not Standby is disabled for that alarm type.

3.5.1 Menu Structure/Navigation (from Active Alarms Screen)

Sample alarm screens are shown for PWR, BATT, and COMM menus. Pressing the **ENTR** softkey in any of these screens will open the diagnostics screen for the alarm condition shown on the 3rd line of the screen.

The alarm condition will advance to the top of the screen and the second line will scroll through a listing of probable causes. Pressing **ENTR** will open a diagnostic screen of the suggested fixes.

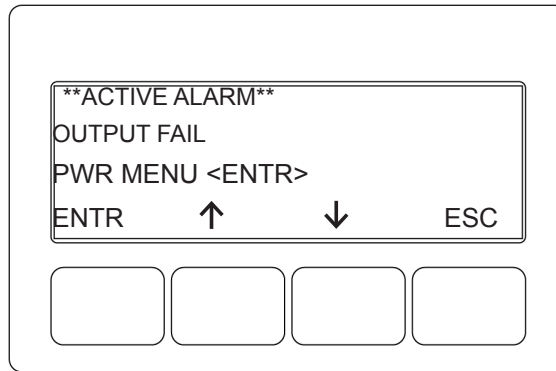


Fig. 3-32, Sample Active Alarm Display, PWR Menu

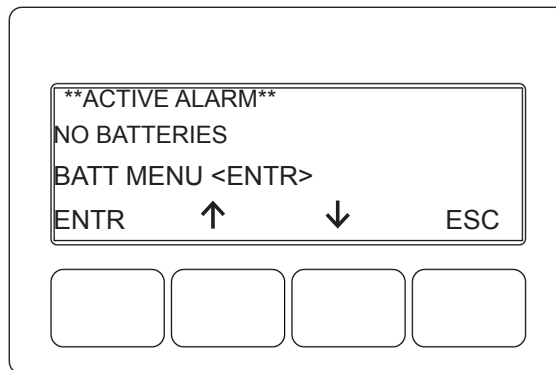


Fig. 3-33, Sample Active Alarm Display, BATT Menu

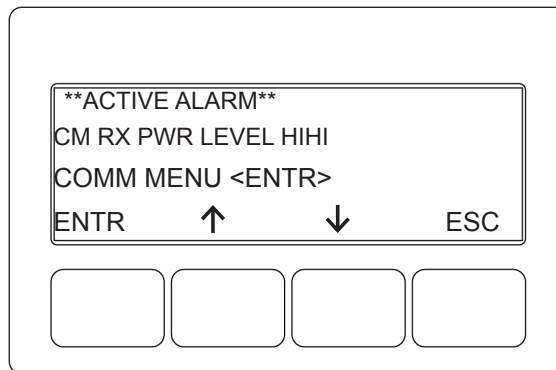


Fig. 3-34, Sample Active Alarm Display, COMM Menu

3.0 Operation, continued

3.5.2 PWR Alarms

The Alpha® XM3.1-HP™ power supply detects alarms and displays the type of active alarm in the Smart Display screen and the severity of alarm (e.g., Major/Minor) by means of the inverter module LEDs.

Active Alarm	Alarm Type	Alarm Category	Probable Cause	Corrective Action	Standby Disabled
SELF-TEST FAIL	Major	PWR	Output voltage failed or batteries less than 1.85V/C during self-test.	1. Check batteries	NO
LINE ISOLATION	Major	PWR	Line isolation has failed and Inverter operations are suspended.	1. Replace power supply as soon as possible	YES
OUTPUT FAILURE	Major	PWR	The AC output has failed due to a bad inverter or transformer, or an unstable transformer.	1. Apply load > 1.50A 2. Output overloaded 3. Check battery string 4. Replace power supply	YES
OUTPUT OVERLOAD	Major	PWR	The output is overloaded or shorted.	1. Output short circuit 2. Check output current	NO
CHARGER FAILURE	Major	PWR	Charger has failed to shut down; possible battery over temperature condition exists.	1. Perform self-test	NO
INVERTER TEMP	Major	PWR	Inverter heat sink has exceeded set temperature. (Stand-by operations suspended until temperature drops to a safe level.)	1. Check enclosure ventilation	NO
CONFIG ERROR	Major	PWR	The power supply is improperly configured and operation is suspended until error is corrected.	1. Wrong input voltage or frequency 2. Wrong battery string, requires 12VDC	YES
INVERTER ALARM/ INVERTER FAILED	Major	PWR	No output detected with good batteries for 30 seconds OR inverter is disconnected from PDM.	1. Replace power supply	YES
INPUT FAILURE	Minor	PWR	Utility AC input has failed.	1. Utility failure 2. Check input breaker 3. Input connections	NO
INPUT OVER CURRENT / INPUT CURRENT LIMIT	Minor	PWR	AC Input current exceeds threshold setting.	1. Reduce output load 2. Check input current limit setting	NO
SURGE MOV FAIL	Minor	PWR	The MOV board surge protection has failed and needs to be replaced.	1. Replace power supply (MOV board to be replaced by qualified personnel.)	NO
INVERTER ENABLE	Minor	PWR	System controller has disabled the Inverter	1. Check inverter	YES
CHARGER ENABLE	Minor	PWR	System controller has disabled the charger	1. Check inverter	NO
PPM EEPROM ERROR	Minor	PWR	There has been an error reading the EEPROM on the PPM.	1. Replace inverter	NO
HW COMPATIBILITY	Minor	PWR	There is a hardware incompatibility between the Main micro board and the PPM.	1. Check micro board	NO
PDM EEPROM ERROR	Minor	PWR	There has been an error reading the EEPROM on the PDM.	1. Replace power supply	NO

Table 3-4, PWR Alarms: Classifications, Causes and Corrections

3.0 Operation, continued

3.5.3 BATT Alarms

The Alpha® XM3.1-HP™ power supply detects battery alarms and displays the type of active alarm in the Smart Display screen and the severity of alarm (e.g., Major/Minor) by means of the inverter module LEDs.

Active Alarm	Alarm Type	Alarm Category	Probable Cause of Alarm	Corrective Action	Standby Disabled
NO BATTERIES	Major	BATT	Detected the absence of batteries (alarm inactive when battery model is set to "NO BATT").	1. Check battery breaker 2. Check connections 3. Check battery fuse	YES
LOW BATT VOLTS	Major	BATT	Battery voltages below 1.833V/cell.	1. Check AC input 2. Restore AC input 3. Connect generator 4. Check battery string	NO
HIGH BATT VOLTS	Major	BATT	Battery voltages above 4.5V over target charger voltage.	1. Check batteries 2. Replace inverter	NO
BATTERY EOD	Major	BATT	Batteries dropped below the low voltage shutdown level.	1. Low battery disconnect	YES
BATTERY FAIL	Major	BATT	Charge current > 5.0A for 7 days while in float mode.	1. Check batteries 2. Replace batteries	NO
BATT TEMP PROBE	Minor	BATT	Precision Temperature Sensor (PTS) failed or is not installed.	1. Check connection 2. Replace sensor	NO
REFRESH/BATT REFRESH ALARM	Minor	BATT	Battery Temperature exceeded 60°C.	1. Check charger settings 2. Check batteries 3. Check battery temperature	NO
SAG OPTION	Minor	BATT	I2C has failed between the XM3.1-HP™ power supply and Smart AlphaGuard™ card.	1. Replace Smart AlphaGuard card	NO
BATTERY VOLTAGE IMBALANCE	Minor	BATT	Battery voltage is 500mV too high or low from mean.	1. Check batteries 2. Replace batteries	NO
SAG RELAY STUCK	Minor	BATT	Stuck relay has been detected on the Smart AlphaGuard card.	1. Check Smart AlphaGuard wires battery 2. Check Smart AlphaGuard wires unit 3. Replace Smart AlphaGuard card	NO
STR X MISWIRED	Minor	BATT	Battery wires are not connected properly or battery voltage is outside valid range of 9.9V to 15.7V.	1. Check Smart AlphaGuard wires battery 2. Check Smart AlphaGuard wires unit 3. Replace Smart AlphaGuard wires	NO
X BAL STAGE	Minor	BATT	Stage 0 and 1 are normal. Stage 2 shows that the batteries are not of similar capacity. Stage 3-5 trigger check battery alarm when a battery shows a major capacity imbalance continuously for 3 weeks.	1. Check batteries 2. Replace batteries	NO
SAG NO HARNESS	Minor	BATT	Battery wires are not connected properly.	1. Check Smart AlphaGuard wires battery 2. Check Smart AlphaGuard wires unit 3. Replace Smart AlphaGuard wires	NO

Table 3-5, BATT Alarms: Classifications, Causes and Corrections

If desired, the No Battery alarm can be disabled by changing the battery model to "NO BATT" in the BATT CONFIG menu.

3.0 Operation, continued

NOTICE:

Setting the battery model to "NO BATT" will disable the inverter, and the unit will no longer have backup capability. When installing batteries, set the number of batteries and the battery type or battery capacity to enable battery charger and allow the XM3.1-HP™ power supply to go into Self Test and Standby.

3.5.4 COMM Alarms

The Alpha® XM3.1-HP™ power supply detects communication alarms and displays the type of active alarm in the Smart Display screen and the severity of alarm (e.g., major/minor) by means of the inverter module LEDs.

Active Alarm	Alarm Type	Alarm Category	Probable Cause	Corrective Action	Standby Disabled
RX POWER LEVEL	Minor	COMM	RF receiver power level is outside optimal thresholds.	1. Check attenuation / RF padding 2. Check alarm level settings	NO
TX POWER LEVEL	Minor	COMM	RF transmitter power level is outside optimal thresholds.	1. Check attenuation / RF padding 2. Check alarm level settings	NO
SFP RECEIVE POWER	Minor	COMM	Optical receiver power level is outside optimal thresholds.	1. Check fiber integrity 2. Check optical attenuation	NO
SFP TRANSMIT POWER	Minor	COMM	Optical transmitter power level is outside optimal thresholds.	1. Ensure SFP is enabled 2. Replace SFP module	NO
SFP TEMPERATURE	Minor	COMM	Module temperature is outside optimal thresholds.	1. Check enclosure ventilation	NO
SFP SUPPLY VOLTAGE	Minor	COMM	Power to the SFP module is outside optimal thresholds.	1. Replace SFP module 2. Replace power supply	NO
LASER BIAS CURRENT	Minor	COMM	SFP module laser bias current is outside optimal thresholds.	1. Ensure SFP is enabled 2. Replace SFP module	NO

Table 3-6, COMM Alarms: Classifications, Causes and Corrections

3.5.5 APP Alarms

The Alpha® XM3.1-HP™ power supply detects and initiates an alarm if certain parameters for applications are not met.

Active Alarm	Alarm Type	Alarm Category	Probable Cause	Corrective Action	Standby Disabled
CLOCK NOT SET	Minor	APP	Real time clock not set.	1. Set real time clock	NO

Table 3-7, APP Alarms: Classifications, Causes and Corrections

3.5.6 AlphaDOC Card Alarms

The following alarms will display only if the AlphaDOC card is installed.

3.0 Operation, continued

Active Alarm	Alarm Type	Alarm Category	Probable Cause	Corrective Action	Standby Disabled
OUTPUT 1 TRIPPED	Major	PWR	Output 1 AlphaDOC hardware protection mode engaged and is overloaded.	1. Over current 2. Check settings	NO
OUTPUT 2 TRIPPED	Major	PWR	Output 2 AlphaDOC hardware protection mode engaged and is overloaded.	1. Over current 2. Check settings	NO
N+1 IN USE	Major	PWR	The power supply output has failed and it is providing output from the redundant N+1 power supply.	1. Check output 2. Check connections	NO
DOC OPTION	Minor	PWR	AlphaDOC communication status. I2C has failed between the power supply and AlphaDOC card.	1. Check AlphaDOC connection 2. Replace AlphaDOC card	NO
ALPHADOC FLASH ERROR	Minor	PWR	Indicates there is a problem with reading the external SPI flash memory located on the AlphaDOC card. Alarm will clear once the external SPI flash memory can be successfully accessed.	1. Re-seat inverter 2. Replace AlphaDOC card	NO
DOC TRANSIENT SUPPRESSION	Minor	PWR	This reports the failure of the AlphaDOC card output transient suppression device.	1. Replace AlphaDOC card	NO

Table 3-8, AlphaDOC Card Alarms: Classifications, Causes and Corrections

3.6 Smart Display Glossary

Battery Capacity	The capacity of the battery strings attached to a particular intelligent broadband UPS. When batteries are not attached, the setting must be programmed to "NO BATT." This disables standby operations, including test mode, and disables the No Batteries Alarm. If batteries are attached, then this setting should be programmed to the rating of each battery. If the power supply is used in a non-standby application, the Battery Capacity variable must be programmed to "NO BATT" to disable the battery maintenance cycle portion of a self-test.
Battery Dates	The month and year the batteries were manufactured can be entered here. This value is hidden if the APPs card is not installed.
Battery MHOs	The conductance measurement of the batteries. The date of each entry is also recorded. This value is hidden if the APPs license is not installed.
Battery Model	The AlphaCell® battery type can be specified in the Smart Display (if not an AlphaCell® battery, leave as default battery type, Other). If an AlphaCell® battery is selected, parameters for Accept, Float, Temp, Comp and Battery Capacity are automatically selected. If Other, these parameters will need to be manually set to the manufacturer's recommended rating.
Battery Strings Detection Type	Select AUTO to have the power supply automatically detect the number of battery strings connected (via SAG or DSM harness). Set to MANUAL to manually override the sensed value or if no harness is connected.
Battery Temperature	The temperature of the batteries sensed from the PTS connected to the front of the inverter.
Battery Voltage	The total battery string voltage.
Charger Accept Voltage	Battery Accept charge voltage control in volts per cell. This voltage, 2.40VDC (adjustable for OTHER battery types) 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 Current	The battery charger current in amps. When running in Standby mode, this value will display "Batt Current" which is the battery discharge current in amps.
Charger Float Voltage	Battery Float charge voltage control in volts per cell. The average is approximately 2.27VDC (adjustable for OTHER battery types) per cell. It is factory set for AlphaCell® batteries. If another manufacturer's batteries are used, consult the battery manufacturer for Float voltage levels.
Charger Mode	The mode of the battery charger which may be one of the following: OFF, TEST, BULK, ACCEPT, REFRESH, FLOAT, REST.
Charger Temperature Compensation	Battery charger temperature compensation control will occur between -20°C and 40°C. The default values listed in Table 1-2, Charger Modes of Operation are at 25°C. Programming the temperature compensation 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.
CM IP Address	The IPV4 IP address assigned to the cable modem of the DOCSIS® transponder.
CM IPV6 ADR Postfix	The last 4 sections of the IPV6 address of the cable modem when deployed on an IPV6 network. Refer to the previous menu item for the first 4 sections of the address.
CM IPV6 ADR Prefix	The first 4 sections of the IPV6 address of the cable modem when deployed on an IPV6 network. Refer to the next menu item for the last 4 sections of the address.
CM MAC Address	Media Access Control (MAC) address assigned to the cable modem. A MAC label is provided on the DOCSIS® transponder. This item may also be labeled as the "RF MAC Address" on some DOCSIS® transponders.
CM Receive Power	The RF receive (downstream) power at the cable modem. The acceptable range is between +15 to -15 dBmV. The ideal operating receive power is 0 dBmV.
CM Transmit Power	The RF transmit (upstream) power from the cable modem. The acceptable range is less than +55dBmV. The ideal operating transmit power is less than +50 dBmV
CMM Firmware Version	The firmware version loaded on the cable modem microprocessor chip.
CMM Model/Config	The model and configuration (options) of the DOCSIS® cable modem module.
CMM Serial Number	The serial number of the cable modem module. A label is provided on the DOCSIS® transponder.
Common Logical ID	Specifies the logical ID for the managed power supply used by network management systems. Some network management systems require this item to be blank. This item can be entered via the transponder web page or status monitoring firmware.

3.0 Operation, continued

CPE IP Address	The IPV4 IP address assigned to the CPE side of the DOCSIS® transponder when used in Dual IP configuration
CPE MAC Address	MAC (Media Access Control) address assigned to the CPE side of the transponder. The CPE MAC is utilized in Dual IP configurations.
Current Outage	When the power supply is operating in standby mode, this is a counter (in minutes) of how long the power supply has been in standby mode. This is not used for self-test events.
Discharge Level	This is the setting for the amount of battery discharge to be performed during self-test, either manual or automatic. "TIMED" is the default and will use the time set in the Test Duration parameter. Deep discharge levels of 10%, 20%, 30%, 40% and 50% may be set. When set, the batteries will be discharged by the specified capacity percentage one time. Upon completion, the setting will revert back to Timed.
DOCSIS Config File	The file name of the cable modem configuration file the DOCSIS® transponder has downloaded.
Downstream SNR	The downstream signal-to-noise ratio. A value less than 28 dB usually indicates a noise issue on the forward RF plant and the DOCSIS® transponder may have issues communicating with the CMTS or status monitoring system.
End of Battery Discharge (EOD)	The point at which the batteries are fully discharged (default 1.75V/C — GXL series or "Other" batteries or 1.70V/C — HP series batteries; 18 cells for 36V inverter) and the power supply shuts off, preventing permanent damage to the batteries.
EOD Type	Determines whether the low battery voltage cutoff is based on the battery string voltage measurement or the lowest individual battery voltage measurement.
EOD Voltage	The low battery (End of Discharge) voltage at which the inverter will shut off the output. This value can be programmed if the EOD Type is Individual. This line is hidden if the EOD Type is String.
Frequency Range Limit	<i>(Setting may be increased when powering with AC Generator)</i> AC input voltage frequency range limit. This limit establishes the acceptable input frequency range outside of which standby operation is initiated.
Heater Mat Installed	If a battery heater mat is installed, this value can be programmed to Yes. The information is then available for the headend.
IM #####	The serial number of the XM3.1-HP™ power supply inverter module.
Individual Battery Voltages	List of the individual battery voltages measured from the battery sense harness from either the status monitor card or the Smart AlphaGuard™.
Input Current	The AC input current to the power supply.
Input Current Limit	The maximum allowable input current. When this limit is exceeded, the maximum battery charger current will be reduced to stay within this limit.
Input Frequency	The frequency of the AC input voltage.
Input Power	The total input power in watts.
Input Voltage	The AC input voltage to the power supply.
Last Event	How long in days, hours and minutes (DDDD:HH:MM) since the last standby event ended. This does not include self-test events.
Last Outage	The time the power supply was in standby mode during the most recent outage. This does not include self-test events.
Last Standby Reset	The number of days since the Total Standby Time and Events was reset.
N+1 Valid	Automatically sensed indication (Yes/No) whether a redundant voltage source has been connected to the N+1 connector on the AlphaDOC card with N+1 option.
Number of Battery Strings	Enter the number of battery strings installed here. This value is used with the Battery Capacity setting to set some of the battery charger parameters if the Battery Strings Detection type is set to Manual.
Operating Mode	The operating mode of the power supply will indicate Line when it is powering the output from the AC utility or Standby when it is powering the output from the batteries.
Output 1 Current	The AC output current from Output 1 of the AlphaDOC card. This value is hidden if the AlphaDOC card is not installed.
Output 1 Overcurrent Trip Level - Primary Leg	Value of RMS current that causes an overcurrent trip on the Output 1 protection relay after a specified delay. This limit is linked to counter data item Overcurrent Tolerance Period. This parameter is only visible when the AlphaDOC card is attached.
Output 2 Current	The AC output current from Output 2 of the AlphaDOC card. This value is hidden if the AlphaDOC card is not installed.
Output Power	The total output power in watts.

3.0 Operation, continued

Output Voltage	The AC voltage at the output of the power supply.
Output Voltage Regulation Mode	The XM3.1-HP™ power supply will be able to function in 2 modes of output voltage regulation: Fine and Coarse. When operating in Fine mode, the unit will maintain the tightest output voltage regulation possible. When set to Fine mode, the unit will automatically adjust to and from Coarse mode temporarily if a) The unit switches to inverter because of high/low line more than 2 times in a 60 day period or b) the unit switches tap relays more than 60 times in a 60 day period. The unit will then automatically adjust back to Fine mode if there are less than 2 inverter transfers for high/low line and less than 15 output tap switches in a 60 day period. When operating in Coarse regulation - Wider output voltage regulation window - Switches taps as few times as possible. Will never automatically adjust once it is selected. Both of these modes are user selectable in the PWR CNFG Menu.
Percent Load	The percentage of the output current versus the rated output current.
Power Supply Priority Level	The operator may select the power supply priority level in context of its deployed location in the cable network. This setting is a reference for the customers only and does not affect the power supply performance. The settings are Normal (default), High, or Critical.
PowerSave Mode	A mode of the SAG initiated by a "turn off" command from the power supply. In this mode the software disables the balancer including all relays, and it turns off all the LEDs. It only detects voltages on a query from the power supply.
Power Supply Priority Level	The operator may select the power supply priority level in context of its deployed location in the cable network. This setting is a reference for the customers only and does not affect the power supply performance. The settings are Normal (default), High, or Critical.
REFRESH Enable	This enables a 24-hour REFRESH charge of the batteries. This is recommended for batteries that have been in storage.
Reset Standby	This resets the Standby Total and Standby Events.
REST Enable	Enables the REST battery charger mode. The value is read-only when AlphaCell® battery models are selected, and is programmable when the battery model is Other.
RMODE	An inverter control that limits the peak output voltage. When R-Mode is enabled the XM3.1-HP™ power supply will reduce the inverter mode output peak voltage for powering HFC equipment with lower peak input voltage tolerances.
SAG FW Vx.xx.x	The Smart AlphaGuard™ firmware version that is installed. This is hidden if the SAG is not installed
SAG Option	Indication whether the Smart AlphaGuard™ is installed. This is automatically sensed.
SAG #####	The Smart AlphaGuard™ serial number. This is hidden if the SAG is not installed.
Self-test	When programmed to YES, the power supply automatically starts a self-test. If the power supply is used in a non-standby application, the Battery Capacity variable must be programmed to "0" to disable the battery maintenance cycle portion of a self-test.
Set Defaults	When programmed to YES, the programmable data levels (with the exception of Last Standby Time, Total Standby Time, Standby Events, Device Address, Total Run Time, Battery Type and Language) are reset to the original factory settings.
Set Language	The display text language can be set to English, Spanish, French, German, or Portuguese.
Small Form-factor Pluggable (SFP)	A module that enables an optical status monitoring interface for the communications module.
Standby Events	A standby events counter. This does not include self-test events. Resetting factory defaults does not clear Standby Events or Standby Total .
Last Standby Reset	The number of days since the Total Standby Time and Events was reset.
Standby Total	The total amount of time the power supply 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. Resetting factory defaults does not clear Standby Events or Standby Total .
System Contact	The textual identification of the contact person for the managed power supply, together with information on how to contact this person. This item can be entered via the transponder web page or status monitoring firmware.
System Location	The physical location of the power supply. This item can be entered via the transponder web page or status monitoring firmware.
System Name	An administratively assigned name for the managed power supply. This item can be entered via the transponder web page or status monitoring system.

3.0 Operation, continued

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 the auto-test 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 of a battery maintenance cycle test. This timer applies to automatically or manually initiated tests.
Test Inhibit	Becomes active when programmed by the operator (or when the unit runs in inverter mode for more than 5 minutes). The power supply delays the start of a scheduled self-test for seven days if the test countdown is less than seven days (See Section 3.7 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.
TM #####	Serial number of the transformer.
Total Run Time	The amount of time (in days) the power supply has functioned in any mode of operation. This value cannot be reset.
XM3.1-HP FW Vx.xx.x	The firmware version of the XM3.1-HP™ power supply micro board.

3.7 Automatic Performance Test

Automatic Self Test: An automatic Self Test is periodically performed to verify the state of the batteries and the inverter circuitry. The automatic test feature has several programmable parameters that determine the frequency and duration of automatic tests. A running test may be halted manually by pressing the **TEST** button a second time.

The automatic test feature is on by default. To turn auto-test off, change Test Interval to 0 days in the POWER CONFIG 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.

The test sequence process:

- Begins with a check to verify the batteries are attached and the battery circuit breaker is closed. If the batteries are discharged or not connected, the power supply does not attempt to operate in inverter mode, preventing a drop of the load.
- Next, the power supply switches to standby mode for a pre-programmed period. Successful completion of a test sequence indicates the unit 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.

In addition to automatic testing, the operator can manually initiate a Self Test. A running test may be halted at any time by pressing the Self Test switch on the front panel (below the OUTPUT and ALARM LEDS on the inverter module) or from the PWR CONFIG menu. The status monitoring card allows a Self Test to be initiated via the web page as well.

Test Inhibit: The Test Inhibit command prevents an automatic test scheduled to occur in the next week. This command is useful if periodic maintenance of the power supply is scheduled close to the next scheduled automatic test.

Use this feature when inclement weather might cause a utility failure. The Test Inhibit command 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.

3.8 Providing Power via Portable Generator or Inverter

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

3.8.1 DC Powering

The AlphaGen™ portable generator provides a convenient method of providing backup DC power. Upon the loss of commercial AC power, the existing battery strings immediately supply voltage to the inverter module. After some point of battery discharge, a portable generator can be deployed to the site to supply power to the DC bus. For complete connection and operation information of the AlphaGen portable generator, refer its operator's manual (*Alpha p/n 041-028-B0*).

3.8.2 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 34.5VDC, 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 the operator 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, the operator will not experience a surge in power. This also ensures when the generator is connected 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



CAUTION!

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

3.0 Operation, continued

point.

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 outdoor rated approved extension cord. Recommend min. #12 AWG for 120V, #14 AWG for 240V installations.
5. Start and operate the generator according to the generator operation manual.
6. If the generator kilowatt rating is twice the kilowatts 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 kilowatt rating indicated on the Smart Display, switch the battery breaker 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.



WARNING! ELECTRICAL HAZARD

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

3.8.3 Using a Truck-mounted Inverter or Generator

To use a truck-mounted inverter or generator, follow the steps listed in **Section 3.8.2, AC Powering** 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.

3.9 Resumption of Utility Power



WARNING! ELECTRICAL HAZARD

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



CAUTION!

Exercise care to ensure that both of the 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 31.5VDC. 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.



NOTICE:

If the batteries are at or below the low voltage cutoff, then the power supply will NOT transfer to battery backup 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. If necessary use the Smart Display to return the Frequency Input Tolerance back to the normal $\pm 3\text{Hz}$ range.



CAUTION!

- The power supply must be serviced by qualified personnel.
- Use heavy gloves when handling a unit that has recently been taken out of service. The ferroresonant transformer generates heat that may cause burns if handled with bare hands.
- Alpha Technologies Services, Inc. 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 breaker OFF before unplugging the battery connector.
- Always wear safety glasses when working with batteries.

4.0 Maintenance

4.1 Safety Precautions

- Only qualified personnel should service the power supply.
- 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.
- The 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.
- Do not allow live battery wires to contact the enclosure chassis. Shorting battery wires can result in a fire or possible explosion.
- This power supply has been investigated by regulatory authorities for use in various Alpha® enclosures. If the operator is using a non-Alpha enclosure, it is the operator's responsibility to ensure the combination conforms to your local regulatory requirements and the power supply remains within its environmental specifications.

4.2 Required Tools and Equipment

Prior to beginning maintenance, ensure that all required tools and equipment, including safety equipment, is available and functional.

The following is a list of the minimum equipment required to maintain and troubleshoot the XM3.1-HP™ power supply system and batteries:

- Socket wrenches, insulated
- Box end wrenches, insulated
- Torque wrench calibrated in in-lb
- Rubber gloves
- Full face shield
- Safety glasses
- Plastic apron
- Portable eyewash
- Spill kit, including sodium bicarbonate solution
- Fire extinguisher
- True RMS volt meter with DC amp clamp
- Midtronics® conductance meter
- Optional equipment, depending on the type of maintenance being performed, includes:
 - Service power supply
 - 100 amp momentary load test set
 - System load bank (DC if to be performed at the battery and AC if to be performed by loading a power supply output— contact your Alpha® representative for more information).
 - NO-OX® corrosion inhibitor
 - Paper towels and/or rags

4.3 Power Supply System Maintenance

4.3.1 Preparing for Maintenance

The power supply system should be remotely monitored and physically inspected periodically. If the system has an automatic monitoring system to gather the electrical and environmental data, the remote checks should consist of evaluating the recorded data and visiting any site that does not meet the specifications listed in the detailed procedures below.

Notify anyone affected by the intended maintenance or troubleshooting activity. This should include but not be limited to anyone responsible for the status monitoring equipment at the headend or NOC.

4.3.2 Periodic Maintenance Tasks

Remote Status Monitoring of Power Supply Monthly Self Test

The following maintenance procedure requires a fully functional status monitoring system capable of remotely measuring and recording the following data from a Self Test:

- **Self Test Result**
- **Percent Load**
- **Output Voltage**

Procedure:

1. If Self Test fails a site visit is required
2. If the power supply percentage load is above 100%, a site visit is required
3. If output voltage is below 84.5V for 89V units or 59V for 63V units, a site visit is required.

On-Site Power Supply Preventive Maintenance



WARNING! ELECTRICAL HAZARD

Ensure personal protective equipment (including rubber gloves, plastic apron, safety glasses, and face shield) is worn prior to proceeding.

Procedure:

1. Exterior site inspection

- a. Inspect power supply cabinet security and condition.
- b. Inspect cabinet for integrity (securely mounted, service meter and conduit integrity, etc).
- c. Check all locks and hinges for proper operation and lubricate if necessary.
- d. Inspect integrity of ground wire and ground rod. Ensure wire is of acceptable gauge and proper connections are tight at both ends, meeting the National Electrical Code® (NEC®) or local authority specs.

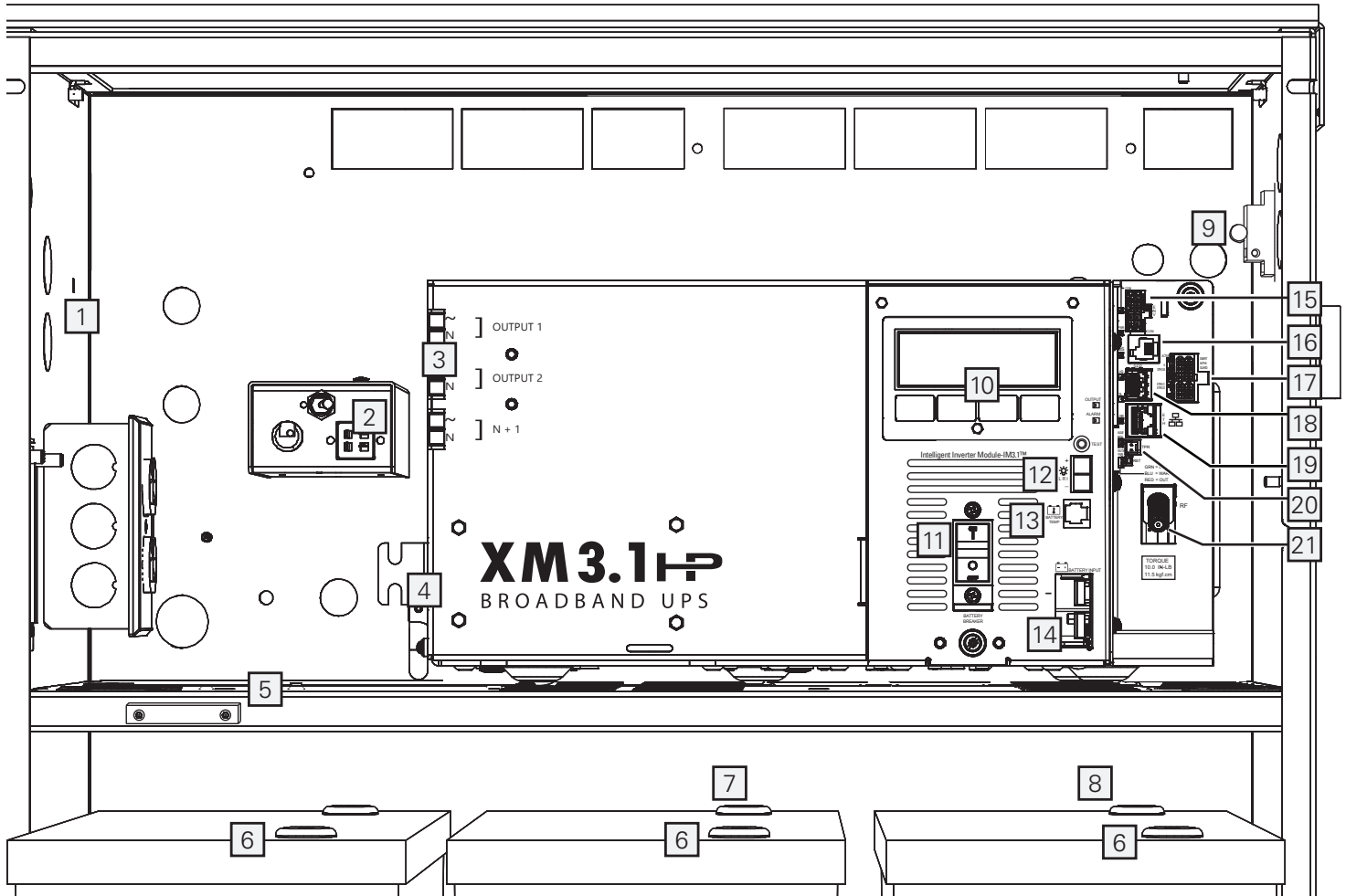
2. Interior Cabinet inspection

- a. Remove any dust, debris, or rodent signs from enclosure, louvers or vents. If enclosure has filters, clean with compressed air or leaf blower.
- b. Check all interior locks, hinges and battery slide trays for proper operation and lubricate if necessary.
- c. Verify that SPI (ALT Box) is tight along with coaxial connection, ensuring that power supply and sheath of coaxial is grounded.
- d. Verify that power supply has a surge arrestor that is in working condition. Replace the unit as needed.

4.0 Maintenance, continued

3. Power Supply Component Inspection

- Before physical inspection of the power supply, verify normal operation on the XM3.1-HP™ power supply Smart Display. Clear all Active Alarms before proceeding.
- Check physical condition of power supply; remove any dust or debris built up in or around openings.
- Inspect all cabling and connections of the power supply system (see Fig. 4-1). Verify that all cabling is intact and all connectors are properly seated; resolve as needed.



1	Local Remote Indicator (LRI) Mounting Location	11	Battery Breaker	21	RF Connector
2	Service Power Inserter (SPI)	12	Local/Remote Indicator (LRI) Connector		
3	Output Ports	13	Precision Temperature Sensor (PTS) Connector		
4	AC Power Input	14	Battery Input		
5	Alarm Intrusion Tamper Switch	15	Environmental (ENV) Control Connector		
6	Positive Battery Terminals to Smart AlphaGuard (3, Red)	16	Communications (COM) Port		
7	Negative Battery Terminal to Center Battery and PTS	17	Smart AlphaGuard Connector		
8	Negative Battery Terminal (1, Black)	18	SFP Optical Status Monitoring Port		
9	Grounded Surge Protector	19	Ethernet (ETH) Connector		
10	Smart Display	20	Tamper (TPR) Switch Connector		

Fig. 4-1, XM3.1-HP™ Power Supply System Components

4.0 Maintenance, continued

4. Inspect Inverter Module



CAUTION!

Always switch the battery breaker OFF before removing or installing the inverter module assembly.



NOTICE:

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



NOTICE:

You can remove the inverter module assembly while the power supply is running on line power. The power supply will continue to operate as a non-standby regulated power supply.

- a. Carefully remove the inverter module assembly.
 1. Shut off battery circuit breaker and disconnect the 36V battery cable from the inverter module.
 2. Disconnect the LRI and Temp Probe cables from the inverter module and the TMPR and XPDR cables from the communication module.
 3. Loosen the thumbscrews.
 4. Grasp tab at base of communications module sheet metal and pull inverter module from the power supply.
- b. Verify output voltage remains with volt meter.
- c. Inspect the inverter module for signs of dust or corrosion.
- d. Reinstall the inverter module (reverse removal procedure) and test the power supply for proper operation.
 1. Turn off the utility input breaker to remove input power. The power supply goes into standby operation.
 2. Verify on the Smart Display that there is no interruption to the output.
 3. After five minutes reapply utility power. The power supply then transfers back to Operation Normal, clears any alarms and starts the battery charger (BULK, if needed). This test adds standby events and time to the event counter.

5. Record the following data from the XM3.1-HP™ power supply Smart Display and record in the XM3.1-HP™ power supply system maintenance log:

Operational Data:

Output 1 Voltage

Input Voltage

Total Standby Time

Output Watts

Outside Ambient

Standby Events

Input Watts

PTS Reading

4.3.3 MOV Board Replacement



CAUTION!

Always switch the battery breaker OFF before removing or installing the inverter module assembly.



WARNING! ELECTRICAL HAZARD

To avoid exposing the operator to potentially lethal voltages, you must remove all power from the power supply; unplug the power supply from the AC power source, remove all front panel connections and disconnect the battery connector before proceeding.

Tools Required:

- 3mm slotted screwdriver
- #2 Phillips head screwdriver

Procedure:

1. Completely shut down the power supply; verify all power is removed. Ensure utility power is off and battery power is safely secured (or not installed) in the enclosure assembly. All connections and cables must be removed from the power supply. To maintain output to the load, consider using the APP9015S or APP9022S service power supply when installing the MOV board.
2. Remove the three screws securing the front cover of the Transformer Module and remove cover.
3. Locate the MOV board behind the cover and remove the damaged MOV board from the EMC by pulling it firmly away from the EMC board.



NOTICE:

Be sure that the new MOV board has the same part number as the damaged board (-20 for 120V and -21 for 240V is critical).



NOTICE:

Align quick connects correctly, and ensure the MOV board is completely seated.

4. Install the new MOV board onto the EMC board.
5. Replace the inverter module.
6. Turn the unit back on and verify the Surge MOV Fail alarm has cleared.

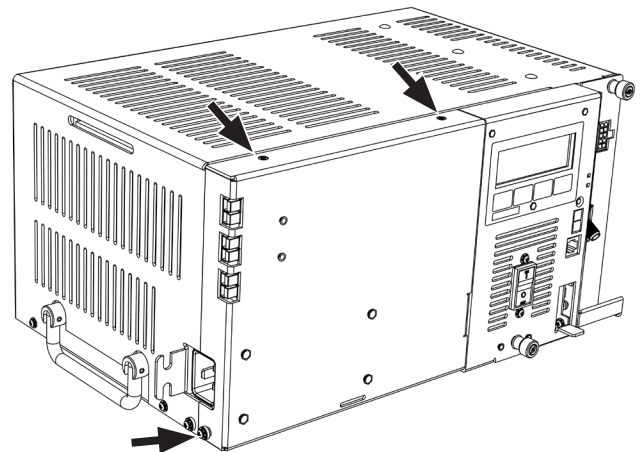


Fig. 4-2, Removing the Transformer Module Cover

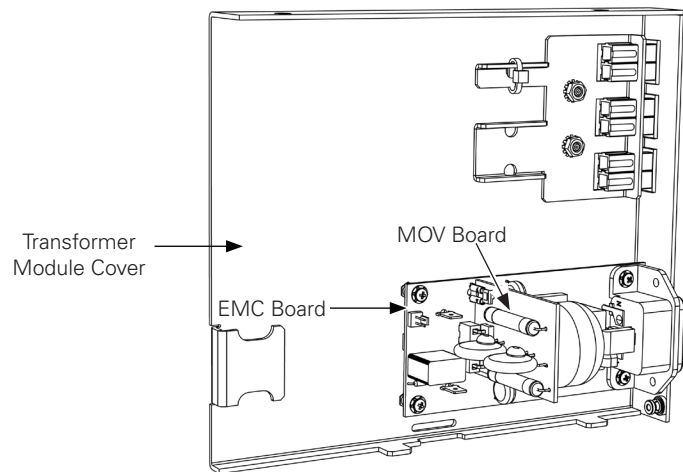


Fig. 4-3, MOV Board Location

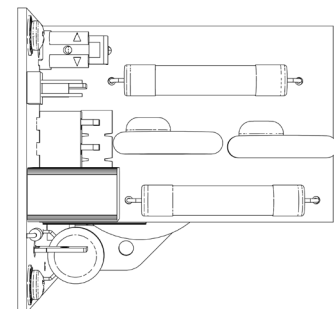


Fig. 4-4, MOV Board Model

4.0 Maintenance, continued

4.4 PM Certification Report

Follow this sample when filling out the maintenance log (following page).



Site Data				DEMO				Site ID: EXAMPLE PM CERT			
Latitude		Longitude		Date	Feb. 05, 2014	Time	02:53 PM	Transformer #			
Hub		City		State / Province		Zip Code					
Region		System		Node		Country	USA				
Project ID		Street(s)		Address Notes		Pole #					
Business Service		Output VAC		120V Or 240V?		Powering A Node					
Utility Company		Utility Account #		Utility Meter #							

Transponder Data											
CM Mac Address		SNR		CER		Logic Card		Transmit Power		Receive Power	
CM IP Address		Transponder Type		Firmware Version		T3 Timeouts		T4 Timeouts			
SNMP TRAPS											
Trap 1		Trap 2		Trap 3		Trap 4					
Alpha MIB 1		Alpha MIB 2		Alpha MIB 3		Alpha MIB 4					
UPSTREAM											
Frequency		Modulation		Lock		Channel ID		Symbol Rate			
DOWNSTREAM											
Frequency		Modulation		Lock		Channel ID		Symbol Rate			

Power Supply #1 Data							
Make-Model		Date Code (MMYY)		Refurb Date (MMYY)		PIM/DOC Installed	
Firmware Version		Total Run Days		Controller Card		Serial Number	
Self-Test Duration (min)		Self-Test Interval (days)		Retry Limit		Retry Delay (Seconds)	
Event Log Cleared		Number Of Events		Events Time		Inverter Test Performed	
AC Input Voltage (VAC)		Output Voltage (VAC)		Output Current 1 (A)		Output Current 2 (A)	

Battery Data							
Self-Test Verified		Self-Test Start Time		Self-Test Finish Time		Battery Temperature (°F / °C)	
Battery #	Battery Manufacturer	Date Code (MMYY)	ID #	Voltage No Load (VDC)	Voltage Under Load (VDC) After 9 Minute Self-Test	BS Conductance (mhos)	
						Meter Reading	Corrected 77°F
A1							
A2							
A3							
A4							
Battery Separator Present		String A Total				String A Fused	
B1							
B2							
B3							
B4							
Battery Separator Present		String B Total				String B Fused	
CHARGER INFO							
Charger Mode		Current (A)		Accept (V/C)		Current Limit (A)	
Float (V/C)		Temp Comp (mV/C°C)					

Fig. 4-5, PM Certification Report, Page 1



PM CERTIFICATION REPORT

INSTALL | MAINTAIN | REPAIR | VALIDATE



<i>As-Found Local Power Supply Alarms</i>			<i>Exceptions</i>
Alarm	Major/ Minor	Cleared On Site	Exceptions

<i>Inspection</i>					
Enclosure Exterior Maintenance Checklist					
Item To Check	Yes/No	Item To Check	Yes/No	Item To Check	Yes/No
Check For Pad Undermining		Clean Dust/Dirt From Enclosure Inside		Enclosure Hardware Tightened	
ACI Installed & Functioning		LRI Installed & Functioning		Enclosure Snow Shield	
Generator Accessibility		PS Co-Locate With Node		Control Switch Installed	
Co-Locate With Vault		U-Guard On Ground Wire		PS Metered	
Lock Present		Security Bar Present			
Enclosure Make-Model		Enclosure Condition		Enclosure Depth (cm)	
Internal Breaker		Service Entrance		Receptacle Type	
Dual Utility Switch Present		UG Or Aerial			
Interior Systems Maintenance Checklist					
Item To Check	Yes/No	Item To Check	Yes/No	Item To Check	Yes/No
Check Wire Harness And Connectors		Clean And NO-OX Batteries		Site Grounded Properly	
Tamper Installed And Functioning		AC TVSS Installed And Functioning		AlphaGuard Installed And Functioning	
Battery Hardware Properly Tightened		Coaxial TVSS Present		Battery Temperature Probe Present	
Pad Value		Cable Sim Value		Ground Current (mA)	
Tap Installed		Drop Installed		Generator Cord Present	
Battery Heater Mat Types & Quantities					
Mat Type	Quantity	Mat Type	Quantity		

<i>Work Items Performed On Site</i>		
Work Item	Quantity	Part Number(s)

<i>Technician Info</i>			
Open Items For Repeat Visit			
Initial X-Tractor & Form Time (minutes)	1	Additional Form Time (minutes)	
PM Service Technician			
Last Name	First Name	Contact #	Technician #

Fig. 4-6, PM Certification Report, Page 2

5.0 Firmware Update

The XM3.1-HP™ power supply supports firmware updates in the field. There are several types of firmware updates to consider.

The first is core modem firmware, which supports both DOCSIS® and optical communications, the SNMP and web support. DOCSIS defines a standard way to perform modem firmware updates using SNMP or the cable modem configuration file. Over an optical link, the same update is performed using a different, Alpha-specific SNMP operation.

There are component firmware updates for the power supply hardware. Alpha® provides an SNMP operation for this, which is the same as previous generations of Alpha power supplies, which works the same for DOCSIS or for optical.

And lastly, the core modem firmware includes component firmware files “bundled” within it. If the power supply hardware components need to be updated with the firmware released as well as the modem firmware at the same time, a simple SNMP operation can initiate the update.

5.1 Core Modem Firmware Update

To initiate a core modem firmware update, the firmware file must be stored on a TFTP server that is reachable from the optical network. Core modem firmware update files are identifiable by a “.img” file extension. Alpha provides files for DOCSIS 3.0 setups (filename ending in “-s30.img”) and for DOCSIS 3.1 setups (filename ending in “-s31.img”); ONLY the DOCSIS 3.0 files (“-s30.img”) can be used over an optical link.

The core modem firmware can be updated via the following methods:

- From SNMP, set atiMgmtSysDownloadTftpServerAddress to the address of the TFTP server, set atiMgmtSysDownloadFile to the name of the firmware file, and then set atiMgmtSysDownloadCtrl to systemReprogram(6) to initiate the transfer. (See **Table 5-1, Alpha® Firmware Update Settings.**)
- If using the web page, log in with administrative rights, go to the Firmware Update page (only visible if logged in), fill in the “TFTP Firmware Update” section, including choosing “System reprogram” for Download Control, and click “Save Changes.” (See **Fig. 5-1, TFTP Firmware Update.**)

If the transfer begins successfully, the download status (atiMgmtSysDownloadStatus in SNMP, also shown on the web page) will indicate downloading(10) during the lengthy update process. The system will restart, causing a network communications interruption for several minutes, and then show a status of idle(1). If the transfer DOES NOT succeed, the download status will report error(8) instead.

Alpha® Firmware Update Settings			
Component	Description	Default	Values
atiMgmtSysDownloadTftpAddress 1.3.6.1.4.1.926.1.3.2.1.1	Address of download TFTP server Use atiMgmtSysDownloadTftpServerAddress instead to support both IPv4 and IPv6 servers.	0.0.0.0	Any valid IPv4 address
atiMgmtSysDownloadCtrl 1.3.6.1.4.1.926.1.3.2.1.2	Download Control	idle(3)	idle(3) abort(4) reprogram(5) systemReprogram(6)
atiMgmtSysDownloadStatus 1.3.6.1.4.1.926.1.3.2.1.3	Current Download Status	idle(3)	idle(1) error(8) downloading(10) programming(11)
atiMgmtSysDownloadFile 1.3.6.1.4.1.926.1.3.2.1.4	Download File Name		File name
atiMgmtSysDownloadTftpServerAddressType 1.3.6.1.4.1.926.1.3.2.1.15	Address mode of atiMgmtSysDownloadTftpServerAddress	unknown(0)	unknown(0) ipv4(1) ipv6(2)
atiMgmtSysDownloadTftpServerAddress 1.3.6.1.4.1.926.1.3.2.1.16	Address of download TFTP server		Any valid IPv4 or IPv6 address, as an octet string

Table 5-1, Alpha® Firmware Update Settings

TFTP Firmware Update	
Server Address	192.168.1.51
File Name on Server	3670002505001A_W_afwu
Download Status	Idle
Download Control	Idle ▾

Fig. 5-1, TFTP Firmware Update

5.2 Component Firmware Update Using TFTP

There are two ways to perform a component firmware update. Component firmware files are identifiable with a “afwu” file extension (for “Alpha FirmWare Update”). The most common way is to install the file on a TFTP server, which is the same method for updating the core modem firmware.

- From SNMP, set `atiMgmtSysDownloadTftpServerAddress` to the address of the TFTP server, set `atiMgmtSysDownloadFile` to the name of the firmware file, and then set `atiMgmtSysDownloadCtrl` to `reprogram(5)` to initiate the transfer. (See **Table 5-1, Alpha® Firmware Update Settings**.)
- If using the web page, log in with administrative rights, go to the Firmware Update, fill in the “TFTP Firmware Update” section, including choosing “Reprogram” for Download Control, and click “Save Changes.” (See **Fig. 5-1, TFTP Firmware Update**.)

If the transfer begins successfully, the download status (`atiMgmtSysDownloadStatus` in SNMP, also shown on the web page) will indicate `downloading(10)` while the file transfers from the TFTP server, then indicate `programming(11)` while the firmware update is in progress. When the operation is completed, the download status will then show a status of `idle(1)`. If the transfer or the reprogramming DOES NOT succeed, the download status will report `error(8)` instead.

5.3 Component Firmware Update Using HTTP

If using the web page, there is an alternative method for updating component firmware.

✓ NOTICE:

This procedure does NOT work for the core modem firmware. Only the firmware file on your computer is needed, or a network location reachable from your computer (NOT necessarily reachable from the optical network).

1. Log in with administrative rights and go to the Firmware Update page (only visible when logged in).
2. In the “Direct Firmware Update” section at the top, click the “Browse” button to select the firmware file.
3. Click “Save Changes” to begin the transfer through a web browser. The page may take several seconds to respond, while sending the file, before indicating the update is occurring.

Direct Firmware Update	
File Name	<input type="button" value="Browse..."/> pcm_ra_v2.07.0.afwu

Fig. 5-2, Direct Firmware Update

5.0 Firmware Update, continued

5.4 Bundled Firmware

The core modem firmware files have the associated component firmware files bundled in, to provide a shortcut for bringing the components to the versions that were released at the same time as the core modem firmware. By default, these components are NOT automatically updated when the core modem firmware is updated. The power supply can be set to automatically apply the component firmware updates any time a core modem firmware update completes by setting `atiMgmtCfgFwBundleUpdates` to `autoUpdate(2)`.

The firmware components bundled with the core modem firmware, and the version number for each, are reported in SNMP in `atiMgmtCfgFwBundleContent`. The version numbers in that report are the versions that could be installed, not necessarily the current versions for those components. The bundled firmware and current running version can be viewed on the Firmware Update web page by logging in to the web page with administrative rights.

The power supply can be instructed to apply the bundled updates. In SNMP, set `atiMgmtCfgFwBundleControl` to `updateNow(1)`. From the Firmware Updates web page, click the “Apply Bundled Firmware” button. The power supply will apply any firmware updates where the versions are different. For any firmware where the reported version is the same as the bundled version, no update is performed.

Bundled Firmware Settings			
Component	Description	Default	Values
<code>atiMgmtCfgFwUpdateStatus</code> 1.3.6.1.4.1.926.1.3.3.4.1	This object indicates the status of the peripheral firmware update process.	<code>idle(1)</code>	<code>idle(1)</code> <code>updating(2)</code>
<code>atiMgmtCfgFwBundleContent</code> 1.3.6.1.4.1.926.1.3.3.4.2.1	This object displays information about the peripheral firmware that is bundled within the master firmware image.		Text
<code>atiMgmtCfgFwBundleUpdates</code> 1.3.6.1.4.1.926.1.3.3.4.2.2	This object indicates whether updating the master firmware image should also update all bundled peripheral firmware. Any future update of the master firmware image, while this object is set to <code>autoUpdate(2)</code> , also triggers peripheral firmware updates as needed.	<code>noAutoUpdate(1)</code>	<code>noAutoUpdate(1)</code> <code>autoUpdate(2)</code>
<code>atiMgmtCfgFwBundleControl</code> 1.3.6.1.4.1.926.1.3.3.4.2.3	This object allows control of the bundled firmware.	<code>noAction(0)</code>	<code>noAction(0)</code> <code>updateNow(1)</code>

Table 5-2, Bundled Firmware Settings

Bundled Firmware		
	Bundled Version	Current Version
DOC	v2.05.0	V2.04.0
PCM	v2.07.0	V2.06.0
EMM	v1.08.0	V1.06.0

Apply Bundled Firmware

Save Changes Cancel Changes

Fig. 5-3, Bundled Firmware

6.0 Shut Down

The Alpha® XM3.1-HP™ power supply 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.



WARNING! ELECTRICAL HAZARD

To prevent the possibility of injury to service or emergency personnel, always follow this procedure to safely shutdown the power supply.

6.1 Emergency Shutdown Procedure

- 1 Switch battery breaker OFF.
- 2 Unplug the AC input line cord from the service entrance.
- 3 Unplug both the Output 1 and Output 2 connections if applicable.
- 4 Unplug batteries. **Note:** If batteries are plugged in, the display will turn on regardless of circuit breaker position.

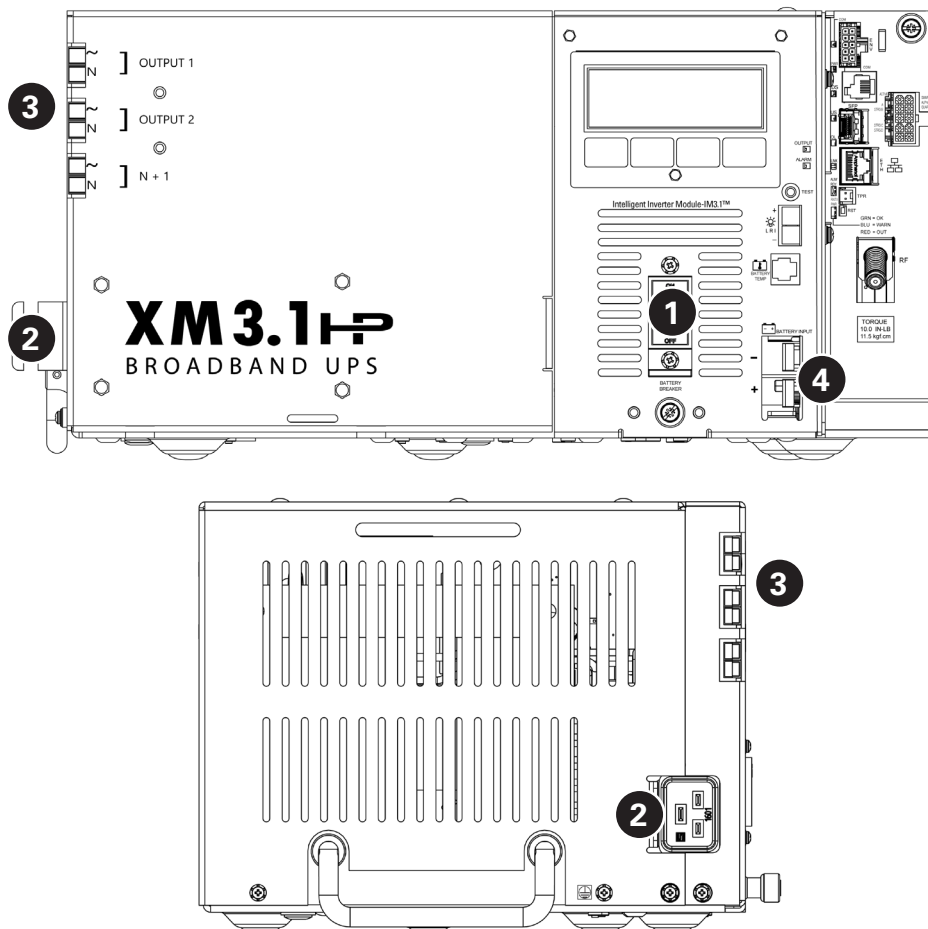


Fig. 6-1, Emergency Shutdown

7.0 Specifications

7.1 North American Models

North American Models	XM3.1-908-HP	XM3.1-910-HP	XM3.1-915-HP	XM3.1-918-HP
Fine Mode Parameters				
Nominal AC Input Voltage	120VAC	120VAC	120VAC, 240VAC (Factory Ordered)	120VAC, 240VAC (Factory Ordered)
Nominal Input Frequency	60Hz			
Input Frequency Tolerance	±3%			
Input Voltage Operating Range Tolerance	-25% / +15%			
Input Voltage Range	90-138VAC	90-138VAC	90-138VAC, 173-276VAC	90-138VAC, 173-276VAC
Output Voltage	63VAC / 89VAC			
Output Voltage Regulation	-2.5% / +1%			
Maximum Rated Output Current	8A	10A	15A	18A
Maximum Output Power	720VA	900VA	1350VA	1620VA
Line Mode Efficiency	Up to 91%			
Standby Efficiency	Up to 94%			
Output Waveform	Quasi-square wave			
Short Circuit Protection	<150% of maximum current rating			
Transfer Characteristics	Uninterrupted output			
Battery Voltage	36VDC			
Battery Charger				
Temperature Compensation	Programmable (0 to 5 mV/Cell/°C)			
Bulk Charger Current (amps @ 80% Load & Nomline)	10A			
5 Stages	Refresh, Bulk, Accept, Float, Rest			
Mechanical				
Inverter Module	Front plug in, hot swappable inverter module			
Dimensions H x W x D	7.8" x 15" (16.7" w/ handle) x 10" (10.7" w/ handle) 198.1 mm x 381 mm (424.18 mm w/ handle) x 254 mm (271.8 mm w/ handle)			
Weight	49 lb / 22.3 kg	49 lb / 22.3 kg	60 lb / 27.6 kg	60.5 lb / 27.6 kg
Input Power Connector (IEC 320/C20)	NEMA® 5-15P plug		NEMA® 5-20P/ NEMA® 6-15P Plug	
Battery Connector	Anderson™ style 75A			
Display	4 line by 20 character white LCD with softkey menu controls			
Indicators	LEDs for output status and major / minor alarm status			
Self Test Mode	Push-to-test switch to initiate local self-test mode			
Tamper Connector	2-position MTA-100 connector			
LRI Connector	2-position Anderson™ style connector			
Local Ethernet Port	1 port, auto-MDX, RJ-45, 10 / 100 / 1000 Mbps, data backhaul: complies with DOCSIS® 3.1 CPE interface operations			
SFP Optical Module Slot	SFP optical module (small form-factor pluggable) may be installed. Optional / supplied by customer for status monitoring purposes.			
Remote Temp Sensor	Ring lug fastens to negative terminal on center battery			
Lifting Handle	Foldable handle			

Table 7-1, Specifications for North American Models

7.0 Specifications, continued

North American Models	XM3.1-908-HP	XM3.1-910-HP	XM3.1-915-HP	XM3.1-918-HP	
Advanced Functions					
Advanced Analytics (AlphaApps)	Battery health, battery remaining runtime, utility event log, PS event log, active drop alarming, system downtime				
User Inputs	Battery model, battery manufacturing date, battery siemens values, technician code/ID				
Firmware	Local or remote power supply firmware upgrade capable				
Environment					
Operating Temperature	-40 to 140°F / -40 to 60°C (derate by 3.6°F / 2°C per 1000 feet above 3000 feet)				
Humidity	0 to 95% non-condensing (relative)				
Agency Compliance					
Safety	CSA® & UL® 62368-1:2019 3rd edition				
EMC	FCC Part 15 Class B (Precision Temperature Sensor with ferrite bead required for Class B installations.)				
Cable Modem Specifications					
Hardware					
CPU	Single chip Intel® Puma™ 7 CE2753i, industrial temperature rated				
Memory	Flash: 8 Gb (NAND) DRAM: 8 Gb (DDR3L)				
LAN Port	1 Gb/s (2.5 Gb/s optional) MDI/MDIX				
Diplexer Options*	Modem Model	Upstream Range 1	Downstream Range 2	Upstream Range 2	Downstream Range 2
	CMOA-4285	5-42 MHz	54-1002 MHz	5-85 MHz	108-1002 MHz**
	CMOA-45204	5-45 MHz	258-1218 MHz	5-204 MHz	258-1218 MHz
WAN Port	F connector, 75 Ohm (DOCSIS® 3.0, 3.1 compliant)				
LEDs	Upstream ranging and registration lock, downstream RF carrier detection and lock, CPE link, CPE activity				
Standards					
Regulatory / Standards (Verified w/ CMOA installed in application product)	<ul style="list-style-type: none"> • UL® 60950-1: Information Technology Equipment - Safety - Part 1 • UL®/CSA® 1778 (5th): Uninterruptable Power Systems as a guide for backfeed • IEC 60728-11 (4th): 2016 CATV Networks - Part 11 - Safety (applicable parts) • EN 50083 2:2006: EMC requirements for CATV equipment • EN 62040 2:2006: Uninterruptable Power Systems (UPS) - Electromagnetic Compatibility (EMC) Requirements - Category C2 • FCC Part 15 - Class B • CISPR24/EN55024: 10V/m radiated susceptibility • IEEE® 587 - Category B3: Surge, test method: 10 positive cycles/10 negative cycles, alternating • IEEE® C62.41: RF surge, 6,000V peak, combination wave., ten events, alternating positive and negative, using a 2 Ohm source impedance with "Outcome 1" per IEEE 62.45 • IEC/EN 61000-4-2: Direct electrostatic contact discharge at 8kV at the RF connector shield without data loss • RoHS® Compliant/Directive 2002/95/EC 				
Advanced Diagnostics					
RF Network	<ul style="list-style-type: none"> • Full band capture data available through CableLabs® MIB and internal web server • Microreflection diagram available via internal web server 				
Power Supply Display	Power supply display will show advanced network diagnostics including: Upstream and downstream frequencies and RF levels, IPv4 or IPv6 address assigned by network DHCP server, MAC address, DOCSIS® timeout error codes and firmware versions				
Utility Power Diagnostics	With XM3.1-HP™ power supply app card, utility performance status including outages, sags, surges and out-of-frequency events				
Battery Diagnostics	With XM3.1-HP™ power supply app card, power supply diagnostics report when batteries should be serviced including battery string runtime remaining and battery life remaining				
Event Logging	With XM3.1-HP™ power supply app card, logs include power supply events, power supply configurations and battery events				

* Dual hardware diplexers per model. Range 1 and Range 2 are software selectable within each model. (Factory default: Range 1)

** A downstream upper limit frequency of 1218 MHz available with firmware upgrade.

Table 7-1, Specifications for North American Models, continued

7.2 International Models

International Models	XM3.1-915M-HP	XM3.1-915-HP	XM3.1-918-HP
Parameters			
Nominal AC Input Voltage	127VAC	120VAC, 240VAC (factory ordered)	120VAC, 240VAC (factory ordered)
Nominal Input Frequency	60Hz	60Hz	60Hz
Input Frequency Tolerance	±3%	±3%	±3%
Input Voltage Operating Range Tolerance	-34% / +15%	-30% / +15%	-30% / +15%
Output Voltage	63VAC / 89VAC	63VAC / 89VAC	63VAC / 89VAC
Output Voltage Regulation	-5% / +1%	-5% / +1%	-5% / +1%
Maximum Rated Output Current	15A	15A	18A
Maximum Output Power	1350VA	1350VA	1620VA
Line Mode Efficiency	Up to 91%		
Standby Efficiency	Up to 94%		
Bulk Charger Current (amps @ 80% Load & Nom line)	10A	10A	10A
Battery Voltage (VDC)	36VDC	36VDC	36VDC
Mechanical			
Inverter Module	Front plug in, hot swappable inverter module		
Dimensions H × W × D	7.8" × 15" (16.7" w/ handle) × 10" (10.7" w/ handle) 198.1 mm × 381 mm (424.18 mm w/ handle) × 254 mm (271.8 mm w/ handle)		
Weight	60 lb / 27.2 kg	60 lb / 27.2 kg	60.5 lb/27.5 kg
Input Power Connector	IEC 320/C20		
Battery Connector	Anderson™ style 75A		
Remote Temp Sensor	Ring lug fastens to negative terminal on center battery		
Display	4 Line by 20 Character LCD with softkey menu controls		
LRI Connector	Anderson™ PP30		
Mounting	Shelf mounts inside suitably rated electrical enclosure		
Environment			
Operating Temperature	-40°F to +140°F (-40°C to +60°C) (derate by 2° to 3.6° per 1000 feet above 3000 feet)		
Storage Temperature	-40°F to +158°F (-40°C to +70°C)		
Humidity	0–95% non-condensing (relative)		
Conformal Coating	All printed circuit board assemblies (except CMOA) to prevent moisture related failure		
Safety Compliance			
UL®/CSA® 60950-1, UL® 1778, CSA® 107.3 (NRTL/C)	Y	Y	Y
IEC 60950-1 (CB)	Y	Y	Y
IEC/EN 62040-1			
Safety Mark	NRTL/C	NRTL/C BSMI (optional)	NRTL/C
EMC Compliance			
FCC Part 15 Class B* ICES 003	Y	Y	Y
IEC/EN 50083-2 (CATV)			
IEC/EN 62040-2 (UPS)			
CISPR22			

*Precision temperature sensor with ferrite bead required for Class B installations.

Table 7-2, Specifications for International Models

7.0 Specifications, continued

7.3 Safety and EMC Compliance

The Alpha® XM3.1-HP™ broadband UPS is certified over a wide range of North American and International safety and EMC specifications as indicated below.

Model	Input VAC	Safety Certification	EMI/EMC
XM3.1-908	120V, 60Hz	UL®/CSA® 60950-1 CB Report, IEC 60950-1	FCC CFR47 Part 15 Class B ICES-003
XM3.1-910	120V, 60Hz		
XM3.1-915	110-127V, 60Hz		
XM3.1-918	120V, 60Hz		
XM3.1-915M	127V, 60Hz		

Table 7-3, Product Certifications Regarding Safety, EMC Compliance

7.4 System Options

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

Local and Remote Indicator (LRI)

The red LRI 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 green ACI 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.

Coaxial Surge Arrestor

Alpha® recommends using coaxial surge suppression for enclosure protection. The coaxial surge protector (*Alpha p/n 162-028-10*) includes 75 ohm surge suppressor 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 service power inserter (SPI) to transfer power from the APP9015S/APP9022S to the load.

7.5 Return and Repair Information

In the event the power supply needs to be returned to Alpha Technologies Services, Inc. for service, a Return Material Authorization (RMA) form must accompany the unit. The form can be found at Alpha's website (www.alpha.com/rma). 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 Services, Inc. Or, if preferred, contact Alpha Technologies Services, Inc. at (800) 322 5742 for assistance.

NOTICE:

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 power supply.

7.6 Common Parts for XM3.1-HP™ Power Supply

Common Parts for XM3.1-HP™ Power Supply	
Part Number	Description
Smart AlphaGuard™ Cables	
875-848-20	SAG-BSC-3, 1x36V, 6'
875-848-30	AGI Batt HRNSS, 1x36V, 77'
875-848-39	AGI Batt HRNSS, 1x36V, 436"
875-848-21	SAG-BSC-6, 2x36V, 6'
875-848-25	SAG-BSC-6-25, 2x36V, 25'
875-848-28	SAG-BSC-6-35, 2x36V, 35'
875-848-31	AGI Batt HRNSS, 2x36V, 77'
875-848-22	SAG-BSC-9, 3x36V, 6'
875-848-23	SAG-BSC-12, 4x36V, 6'
Precision Temperature Sensor (PTS) w/ Ferrite Bead	
746-331-30	PTS, 61" w/FB
746-331-31	PTS, 125" w/FB
746-331-32	PTS, 420" w/FB

Table 7-4, Common Parts for XM3.1-HP™ Power Supply

7.7 XM3.1-HP™ Power Supply Block Diagram

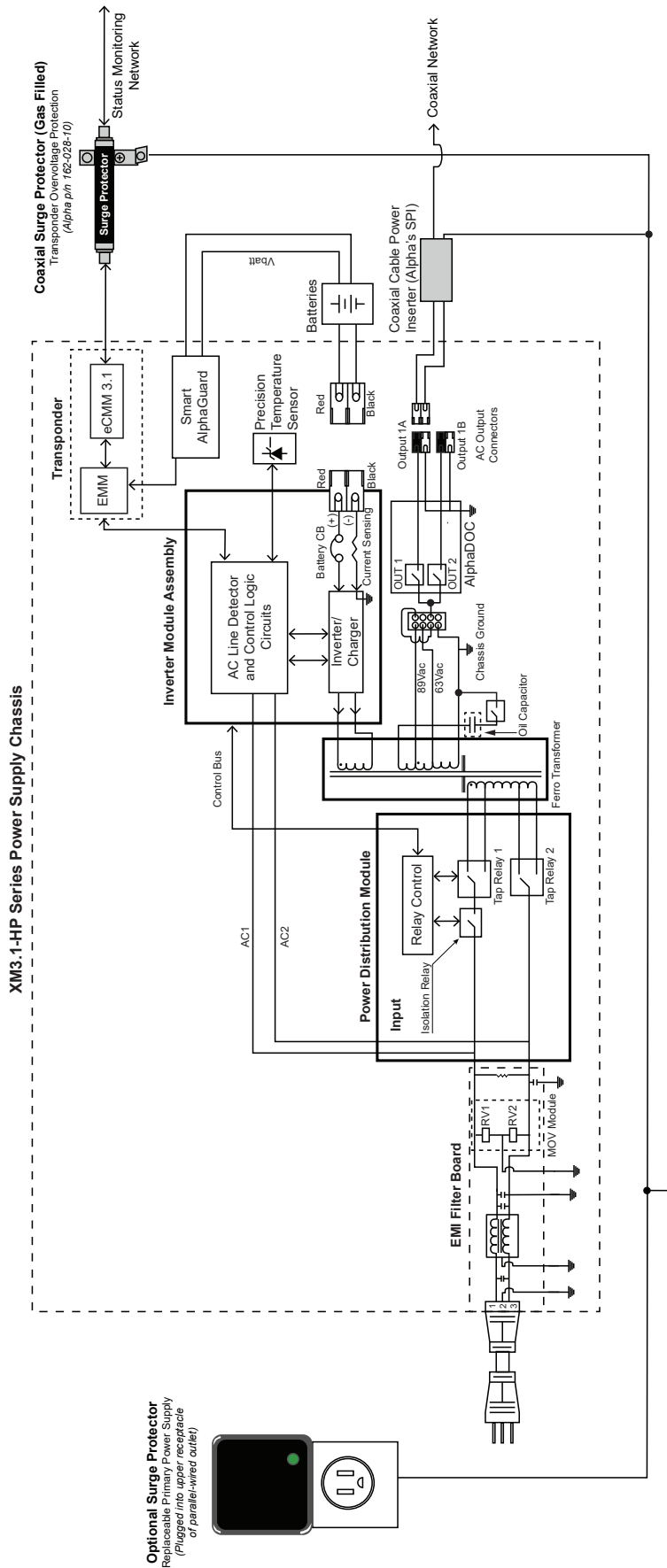


Fig. 7-1, XM3.1-HP™ Power Supply Block Diagram

8.0 Safety & Compliance Notes (Translations)

8.1 Safety Notes (German)

XM3.1-HP™ Hinweise zur Einhaltung der Sicherheit

Sehen Sie sich die Zeichnungen und Abbildungen in diesem Dokument an, bevor Sie fortfahren. Wenn Sie Fragen zur sicheren Installation oder zum sicheren Betrieb des Systems haben, wenden Sie sich an Alpha Technologies Services, Inc. oder an die nächstgelegene Vertretung von Alpha®. Behalten Sie dieses Dokument zur späteren Verwendung.

Um die Verletzungs- oder Todesgefahr zu verringern und den sicheren Betrieb dieses Produkts zu gewährleisten, wurden die folgenden Symbole in diesem Handbuch durchgehend angebracht. Wo diese Symbole erscheinen, ist besondere Vorsicht und Aufmerksamkeit geboten.



WARNUNG! ALLGEMEINE GEFAHR

ALLGEMEINE GEFAHR liefert dem Personal Sicherheitshinweise zur VERHÜTUNG VON VERLETZUNGEN ODER TOD.



WARNUNG! STROMSCHLAGGEFAHR

STROMSCHLAGGEFAHR liefert dem Personal Sicherheitshinweise zur elektrischen Sicherheit, um VERLETZUNGEN ODER TOD ZU VERHINDERN.



WARNUNG! GEFAHR DURCH DÄMPFE

GEFAHR DURCH DÄMPFE liefert dem Personal Sicherheitshinweise zur Gefahr durch DÄMPFE, um VERLETZUNGEN ODER TOD ZU VERHINDERN.



WARNUNG! BRANDGEFAHR

BRANDGEFAHR liefert dem Personal Sicherheitshinweise zur Entflammbarkeit, um VERLETZUNGEN ODER TOD ZU VERHINDERN.

Mit dem Aufruf können mehrere Warnungen verbunden sein. Beispiel:



WARNUNG! STROMSCHLAG- UND BRANDGEFAHR

Diese WARNUNG enthält Sicherheitshinweise für elektrische Gefahren UND für Brandgefahren



VORSICHT!

VORSICHT liefert Sicherheitshinweise zur VERMEIDUNG VON SCHÄDEN an Material oder Ausrüstung.



HINWEIS:

HINWEIS bietet zusätzliche Informationen, die bei der Erledigung einer bestimmten Aufgabe oder eines bestimmten Verfahrens helfen.

ACHTUNG:

ACHTUNG enthält spezifische regulatorische/rechtliche Anforderungen, die sich auf die Platzierung von Geräten bzw. auf Installationsverfahren auswirken können.

Die folgenden Abschnitte enthalten wichtige Sicherheitsinformationen, die bei der Installation und Wartung der Geräte und Batterien beachtet werden müssen. Lesen Sie alle Anweisungen, bevor Sie das Gerät installieren oder in Betrieb nehmen, und bewahren Sie dieses Handbuch zur späteren Anwendung auf.

Sicherheitsvorkehrungen



WARNUNG! STROMSCHLAG- UND BRANDGEFAHR

Lassen Sie nicht zu, dass stromführende Batteriedrähte das Gehäusechassis berühren. Das Kurzschließen von Batteriekabeln kann zu einem Brand oder einer Explosion führen.



WARNUNG! STROMSCHLAGGEFAHR

- Im Falle eines Kurzschlusses besteht bei Batterien die Gefahr von Stromschlägen und Verbrennungen durch hohe Stromstärken. Beachten Sie die ordnungsgemäßen Sicherheitsvorkehrungen.
- Der Batteriestrang der Notstromversorgung führt eine gefährliche Spannung. Nur qualifiziertes Personal darf die Batterien überprüfen oder austauschen.
- Das Netzgerät enthält mehrere spannungsführende Stromkreise! Auch wenn am Eingang keine Wechselspannung anliegt, kann am Ausgang immer noch Spannung anliegen.



VORSICHT!

- Diese Anlage darf nur von qualifiziertem Servicepersonal gemäß der Installationsanleitung, die mit jeder Einheit geliefert wird, installiert werden.
- Diese Anlage verfügt über kein genormtes Brandschutzgehäuse. Sie wird normalerweise bei der endgültigen Installation in einem geeigneten Brandschutzgehäuse eingebaut.
- Diese Anlage ist nicht für Freiluftbereiche vorgesehen. Für die endgültige Installation ist ein geeignetes Brandschutzgehäuse nötig.
- Der Spannungsversorgungsausgang führt eine gefährliche Sekundärspannung (CATV).
- Diese Anlage ist für ein CATV-System des öffentlichen Netzes vorgesehen. Phase-Neutral/Erde sind funktionell und erfordern aus Sicherheitsgründen eine Erdung an mehreren Stellen des Bedienergehäuses. Die Abnahme dieser Anlage innerhalb des CATV-Systems für den Endanwender obliegt der jeweils zuständigen Behörde.
- Die externen Leitungen für Batterie, Kommunikationskarte und Temperaturfühler („Temp Probe“) sind nach ES1 bemessen.
- Ein Batterietest wurde mit den vom Batteriehersteller empfohlenen Batterien durchgeführt.
- Das Produkt wurde in einem Zweigstromkreis getestet, der über einen 20-A-Schutzschalter abgesichert ist. Wenn ein höher bemessener Schutz im Endanwendersystem eingebaut werden soll, so ist dazu eine separate Beurteilung notwendig.
- Ausgelegt auf Umgebungen mit Temperaturen bis zu 60 °C (Leistungsreduzierung möglich), Verschmutzungsgrad 3, Überspannungskategorie III.
- Diese Anlage enthält VDRs sowie Betriebsisolierungen für Gasleitungen. Die Abnahme obliegt der jeweils zuständigen Behörde.
- Ausgelegt auf den Anschluss an ein KABELNETZWERK mit einem maximalen transienten Überspannungswert (extern) von 4000 Vpk.
- Überprüfen Sie vor der Installation die Spannungsanforderungen des zu schützenden Geräts (Last), die AC-Eingangsspannung des Netzgeräts (Leitung) und die Ausgangsspannung des Systems.
- Rüsten Sie die Verteilungstafel mit einem korrekt bemessenen Schutzschalter für dieses Netzgerät aus.
- Beim Anschließen der Last darf die Ausgangsnennleistung des Netzgeräts NICHT überschritten werden.
- Verwenden Sie bei der Handhabung der Einheiten, Module oder Batterien stets geeignete Hebetekniken.
- Wenn Sie, wie in Abb. 2-12 gezeigt, eine externe Batteriepaketsicherung hinzufügen, wählen Sie einen Wert, dessen Unterbrechungscharakteristik höher ist als die des DC-Trennschalters in Ihrem Gerät.

ACHTUNG:

Dieses Netzgerät wurde von den Aufsichtsbehörden für den Einsatz in verschiedenen Alpha-Gehäusen untersucht. Wenn ein Nicht-Alpha-Gehäuse verwendet wird, liegt es in der Verantwortung des Betreibers oder Installateurs, dafür zu sorgen, dass die Kombination den örtlichen gesetzlichen Bestimmungen entspricht und das Netzgerät den vorgegebenen Umweltspezifikationen entspricht.

Sicherheitshinweise zur Batterie



WARNUNG! STROMSCHLAGGEFAHR

- Tragen Sie immer Augenschutz, Gummihandschuhe und eine Schutzweste, wenn Sie in der Nähe von Batterien arbeiten. Um Batteriekontakt zu vermeiden, entfernen Sie alle metallischen Gegenstände (wie Ringe oder Uhren).
- Berühren Sie vor dem Umgang mit den Batterien einen geerdeten Metallgegenstand, um die statische Ladung, die sich möglicherweise an Ihrem Körper entwickelt hat, abzubauen.
- Verwenden Sie Werkzeuge mit isolierten Griffen, legen Sie keine Werkzeuge auf die Batterien.
- Beim Anschließen oder Anpassen der Batterieverdrahtung ist besondere Vorsicht geboten. Ein unsachgemäß bzw. nicht angeschlossenes Batteriekabel kann mit einer leitenden Oberfläche in Kontakt kommen, was zu einem Lichtbogen, Feuer oder einer Explosion führen kann.



WARNUNG! BRANDGEFAHR

- Batterien erzeugen explosive Gase. Halten Sie alle offenen Flammen und Funken von Batterien fern.
- Laden Sie Batterien nicht in einem verschlossenen Behälter auf. Jede Batterie muss einen Mindestabstand von 13 mm zu allen umgebenden Oberflächen haben, um eine Konvektionskühlung zu ermöglichen.
- Alle Batteriefächer müssen über eine ausreichende Belüftung verfügen, um eine Ansammlung von potenziell gefährlichen Gasen zu verhindern. Legen Sie Batterien niemals in ein verschlossenes Gehäuse. Stellen Sie sicher, dass alle Lüftungsöffnungen und Filter des Gehäuses sauber und frei von Ablagerungen sind.



WARNUNG! ALLGEMEINE GEFAHR

- Alle gelierten oder flüssigen Emissionen aus einer ventilgeregelten Bleisäurebatterie (VRLA) enthalten verdünnte Schwefelsäure, die schädlich für Haut und Augen ist. Die Emissionen sind elektrolytisch, elektrisch leitfähig und ätzend.
- Wenn der Inhaltsstoff einer Batterie mit der Haut in Berührung kommt, waschen Sie sie sofort und gründlich mit Wasser ab. Befolgen Sie die von Ihrem Unternehmen genehmigten Vorschriften bei Kontakt mit Chemikalien.
- Neutralisieren Sie verschüttete Batterieemissionen mit der Speziallösung eines zugelassenen Leckage-Notfallsets oder mit einer Lösung aus einem Pfund Natriumbikarbonat auf 3,8 l Wasser. Melden Sie einen Chemieunfall gemäß dem Meldeverfahren Ihres Unternehmens und suchen Sie gegebenenfalls medizinische Hilfe auf.

Richtlinien zur Batteriewartung



VORSICHT!

- Prüfen Sie jede Batterie bei jeder Wartungskontrolle. Ersetzen oder reparieren Sie Batterien, wenn einer der folgenden Punkte zutrifft:
 - **Anzeichen von Rissen, Auslaufen oder Aufblähen der Batterie.**
 - **Anzeichen einer Beschädigung der Batteriekabel.**
 - **Lose Batterieanschlüsse.**
- Versuchen Sie nicht, die Entlüftungsöffnungen (Ventile) von der AlphaCell® Breitbandbatterie zu entfernen oder Wasser hinzuzufügen. Dies stellt ein Sicherheitsrisiko dar und führt zum Erlöschen der Garantie.
- Eine Batterie, die Anzeichen von Rissen, Auslaufen oder Aufblähung zeigt, sollte sofort von autorisiertem Personal ersetzt werden.
- Ersetzen Sie die Batterien immer durch solche gleichen Typs und gleicher Leistung. Die Leitwert-, Spannungs- und Datumsangaben müssen übereinstimmen. Installieren Sie niemals ungeprüfte Batterien.
- Befolgen Sie stets die Lagerungshinweise des Batterieherstellers.
- Tragen Sie auf alle freiliegenden Verbindungen Polfett oder ähnliches auf, wie z. B. NO-OX®-Fett.

ACHTUNG:

- Beseitigen Sie verschüttetes Elektrolyt in Übereinstimmung mit allen Bundes-, Landes- und örtlichen Bestimmungen oder Vorschriften.
- Verbrauchte oder beschädigte Batterien sind umweltschädlich. Gebrauchte Batterien sind grundsätzlich zu recyceln. Beachten Sie die örtlichen Vorschriften für die ordnungsgemäße Entsorgung von Batterien.

Anmerkungen zum Netzanschluss



HINWEIS:

Alpha-Gehäuse sind so konstruiert, dass das Netzgerät ordnungsgemäß entlüftet wird. Dieses Netzgerät wurde von den Aufsichtsbehörden für den Einsatz in verschiedenen Alpha-Gehäusen untersucht. Wenn ein Nicht-Alpha-Gehäuse verwendet wird, liegt es in der Verantwortung des Betreibers oder Installateurs, dafür zu sorgen, dass die Kombination den örtlichen gesetzlichen Bestimmungen entspricht und das Netzgerät den vorgegebenen Umweltspezifikationen entspricht.

ACHTUNG:

Der Anschluss an das Versorgungsnetz darf nur von qualifiziertem Servicepersonal und unter Einhaltung der örtlichen Elektrovorschriften durchgeführt werden. Bei Verwendung eines Nicht-Alpha-Gehäuses muss der Installateur diese eventuell zur Verfügung stellen.

Lokale Regulierungsbehörden können die Verwendung eines zugelassenen Netzanschluss- bzw. Service-Trennschalters verlangen, wenn das Netzgerät in einem Gehäuse für den Außenbereich installiert ist. Alpha-Gehäuse werden mit Schalteroptionen geliefert. Bei Verwendung eines Nicht-Alpha-Gehäuses muss der Installateur diese eventuell zur Verfügung stellen.



HINWEIS:

Um den hohen Einschaltströmen gerecht zu werden, die normalerweise mit dem Einschalten von Ferroresonant-Transformatoren verbunden sind (400 A, ausfallfrei, erster Halbzyklus), muss entweder ein "hochmagnetischer" oder ein HACR-Trennschalter (Heizung, Klimaanlage, Kühlung) verwendet werden. Ersetzen Sie diese Trennschalter nicht durch einen herkömmlichen Netztrennschalter. Alpha empfiehlt NUR Square D-Trennschalter wegen der erhöhten Zuverlässigkeit, die bei dieser Versorgungsanwendung erforderlich ist. Hochmagnetische Square D-Trennschalter und eine BBX-Option (UL-gelisteter Netzanschluss) sind bei Alpha Technologies Services, Inc. erhältlich.

Beschreibung	Alpha-Teilenummer	Square D Teilenummer
240-V-Installation - HACR (15A)	470-224-10	QO215
120-V-Installation - Hochmagnetisch (20 A)	470-017-10	QO120HM
2-fach BBX - Externer Service-Trennschalter	020-085-10	QO2-4L70RB
8-fach BBX - Externer Service-Trennschalter	020-141-10	QO8-16L100RB

Table 8-1, Leistungsschalter und Service-Trennschalter

ACHTUNG:

In den meisten Fällen funktionieren die folgenden Konfigurationen für den Netzanschluss, wenn eine Duplex-Steckdose mit einem Service-Trennschalter verdrahtet wird. Andere Varianten sind möglich. Wenden Sie sich immer an Ihr örtliches Versorgungsunternehmen, um die Übereinstimmung der Verdrahtung mit den geltenden Vorschriften zu überprüfen.

XM3.1-HP-Verbindungen

Die ordnungsgemäße Stromversorgung mit 120V/20A setzt voraus, dass der Installationsort:

- mit einer 120-VAC-Duplex-Steckdose ausgestattet ist, die das Netzgerät und die Peripheriegeräte versorgt.
- mit einer NEMA 5-20R-Steckdose ausgestattet ist, die innerhalb des Stromeingangs durch einen einpoligen, 20 A starken HM-Schutzschalter (hochmagnetisch) geschützt ist.
- nach NEC/CEC-Code oder bei Ihrer örtlichen Regulierungsbehörde geprüft ist, um den ordnungsgemäßen Drahtquerschnitt zu gewährleisten (empfohlene Drahtstärke ist AWG-Nr. 12).
- mit einer Erdungsklemme am Gehäuse ausgestattet ist, um eine dedizierte Erdung zu erleichtern.



HINWEIS:

Wenn die Box auf einer neutralen Platte angebracht werden soll, verwenden Sie die mitgelieferte lange grüne Verbindungsschraube (Alpha Teile-Nr. 523-011-10, Square D Teile-Nr. 40283-371-50).

8.0 Safety & Compliance Notes (Translations), continued

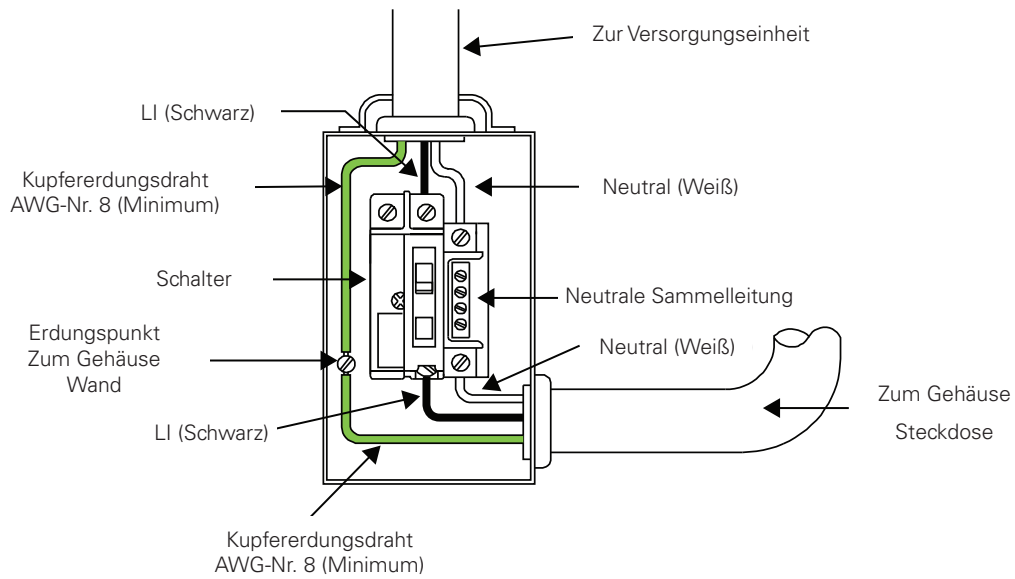


Fig. 8-1, Typische Netzanschlussverdrahtung für 120 V Wechselstrom

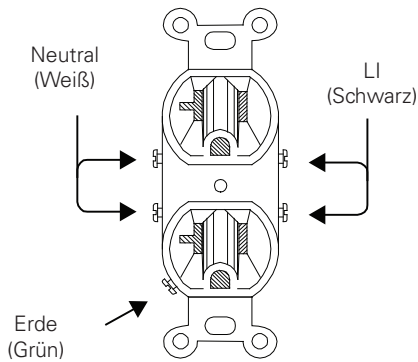


Fig. 8-2, Typische Steckdosenverdrahtung für 120 V/20 A Wechselstrom, 5-20R (Teile-Nr. 531-006-19)

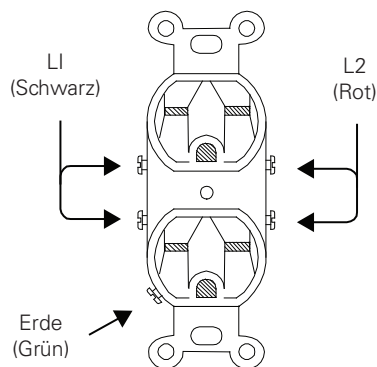


Fig. 8-3, Typische Steckdosenverdrahtung für 240 V/15 A Wechselstrom, 6-15R (Teile-Nr. 531-004-19)

8.0 Safety & Compliance Notes (Translations), continued

Die ordnungsgemäße Stromversorgung mit 240V/15A setzt voraus, dass der Installationsort:

- mit einer 240VAC-Duplex-Steckdose ausgestattet ist, die das Netzgerät und die Peripheriegeräte versorgt.
- über eine NEMA 6-15R-Steckdose verfügt, die innerhalb des Stromeingangs durch einen einzelnen, 2-poligen 15-A-Trennschalter mit gemeinsamer Auslösung geschützt ist.
- nach NEC/CEC-Code oder bei Ihrer örtlichen Regulierungsbehörde geprüft ist, um den ordnungsgemäßen Drahtquerschnitt zu gewährleisten (empfohlene Drahtstärke ist AWG-Nr. 14).
- mit einer Erdungsklemme am Gehäuse ausgestattet ist, um eine dedizierte Erdung zu erleichtern.

HINWEIS:

Wenn die Box auf einer neutralen Platte angebracht werden soll, verwenden Sie die mitgelieferte lange grüne Verbindungsschraube (Alpha Teile-Nr. 523-011-10, Square D Teile-Nr. 40283-371-50).

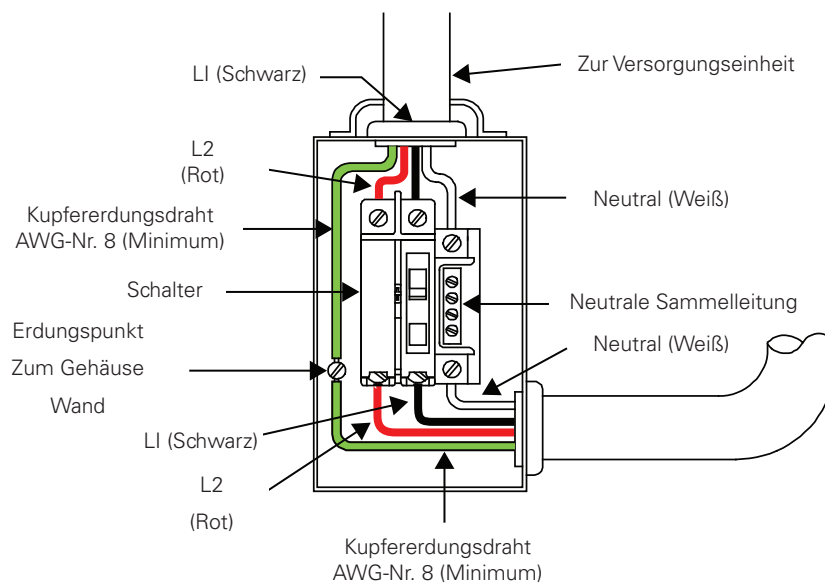


Fig. 8-4, Typische Netzanschlussverdrahtung für 240 V/60 Hz Wechselstrom

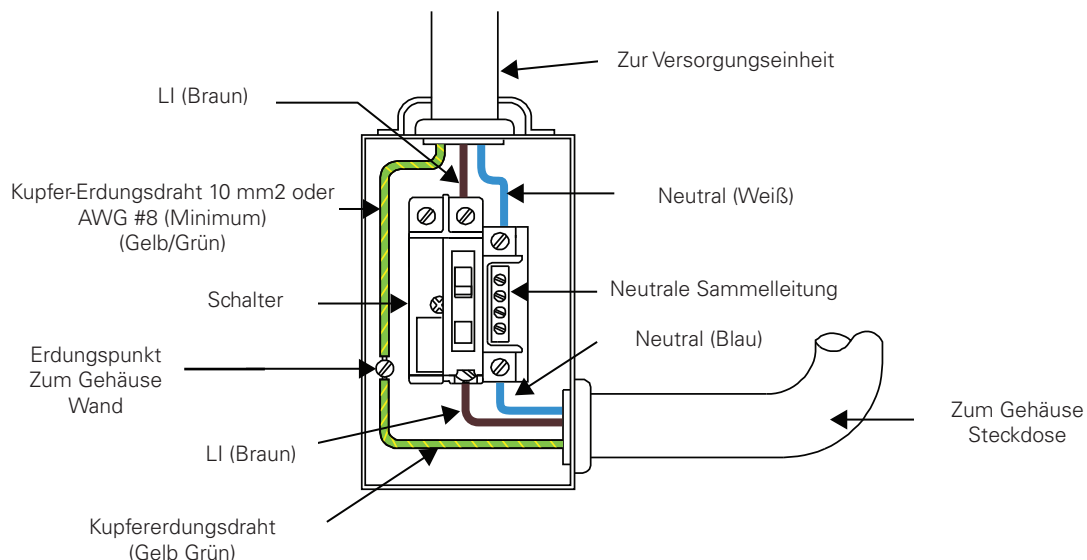


Fig. 8-5, Typische Netzanschlussverdrahtung für 230 V/50 Hz Wechselstrom

Hinweise zum Erdungsanschluss

Um eine einsatzbereite, zuverlässige Reservestromquelle bereitzustellen, ist es notwendig, das Netzgerät an ein wirksames Erdungssystem anzuschließen. Dies gewährleistet nicht nur die Sicherheit des für den Betrieb und die Wartung verantwortlichen Servicepersonals, sondern erleichtert auch den ordnungsgemäßen Betrieb und den Schutz der Geräte innerhalb des Netzwerks. Ein solches Erdungssystem bietet Schutz im Hinblick auf Bediener-sicherheit, Systemkommunikation und Geräteschutz.

Blitzeinschläge, Netzumschaltungen oder andere Aberrationen auf der Stromleitung bzw. dem Kommunikationskabel können zu hochenergetischen Transienten führen, die die Stromversorgungs- oder Kommunikationssysteme beschädigen können. Die praktikabelste verfügbare Methode, das System vor Schäden zu schützen, besteht darin, diese unerwünschten hochenergetischen Transienten über einen niederohmigen Pfad zur Erde umzuleiten. Ein niederohmiger Pfad zur Erde verhindert, dass diese Ströme hohe Spannungspegel erreichen und eine Gefahr für Geräte darstellen.

Der Schlüssel zum Erfolg des Blitzschutzes ist die Einzelpunktterdung, so dass die Komponenten des Erdungssystems als ein einziger Punkt mit einheitlicher Impedanz erscheinen. Zwei von Alpha empfohlene Stellen für die Einzelpunkt-Erdung sind Verbindungen im Gehäuse und Verbindungen zur Erde. Die Einzelpunkt-Erdung im Gehäuse wird erreicht, indem alle elektrischen Verbindungen am Gehäuse, einschließlich der Verbindung zur Erde, so dicht wie möglich am Gehäuse miteinander verbunden werden. Eine Einzelpunkt-Erdung für die Verbindung mit der Erde wird z. B. durch die ordnungsgemäße Verbindung der Erdstäbe erreicht.

Sicherheitserdung und Erdungsanschluss

Die Sicherheitserdung ist ein zweiteiliges System, das aus dem Stromnetz und dem Alpha-Erdungssystem besteht.

1. Das Stromnetz:

Als Mindestanforderung für den Schutz von Alpha-Geräten muss das örtliche Versorgungsunternehmen einen niederohmigen Pfad für die Fehlerstromrückführung bereitstellen. Darüber hinaus muss ein niederohmiger, festhaftender Pfad zwischen dem Erdungstift des Netzgeräts und dem Gehäuse vorhanden sein.

2. Das Alpha-Erdungssystem:

Das Alpha-Erdungssystem besteht aus einer niederohmigen Verbindung zwischen dem Gehäuse und einer Erdung (mindestens 15 cm von der Erdungsverbindung des Versorgungsunternehmens entfernt).

Diese Impedanz zwischen dem Gehäuse und der Erde muss 25 Ohm oder weniger bei 60 Hertz betragen, gemessen mit Amprobe® Modell DGC-1000 oder gleichwertig. Die Messung muss am Draht oder Erdstab hinter dem Austritt aus dem Gehäuse erfolgen. Erkundigen Sie sich nach Ihrer lokalen Codierung oder nach der NEC 250.53.

Die örtlichen Bodenverhältnisse bestimmen die Komplexität des Erdungssystems, das erforderlich ist, um den oben angegebenen Widerstand von (maximal) 25 Ohm zu erfüllen. Beispielsweise kann ein einziger 8-Zoll-Erdstab (20 cm) ausreichen, um die Anforderung zu erfüllen. In einigen Fällen kann ein aufwendigeres System erforderlich sein, wie z. B. mehrere Erdstäbe, die durch ein massives Kupferkabel AWG-Nr. 6 verbunden sind, das 20 bis 30 cm unter der Oberfläche vergraben wird. Wenn dies nicht möglich ist, wenden Sie sich an einen lokalen Experten für Erdungssysteme, um alternative Methoden zu finden, welche die Vorgabe von (maximal) 25 Ohm erfüllen.

Alle Erdstabverbindungen müssen mit Hilfe einer aufgeführten Erdungsschelle hergestellt werden, die für direktes Erdverlegen oder exothermes Schweißen geeignet ist.

Leistungsabgabe Rückleitung

Für einen ordnungsgemäßen Betrieb muss der SPI (Service Power Inserter) sicher mit dem Gehäuse verbunden werden.

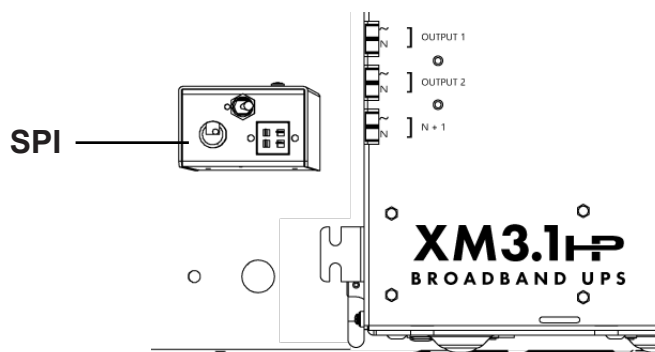


Fig. 8-6, SPI-Standort

Kommunikationserdung

Bei Systemen, die einen eingebetteten Transponder verwenden, erfolgt die Erdung in der Regel entweder über einen separaten, mit dem Gehäuse verbundenen Masseblock oder mithilfe der internen Montagehardware für den Anschluss des Transponders über die CableUPS-Stromversorgung. Hinweise zur Installation entnehmen Sie bitte dem entsprechenden Handbuch für Kommunikationsprodukte.

Für Kommunikationskabel empfiehlt Alpha ausdrücklich die Verwendung eines Überspannungsableiters, der mit dem Alpha-Gehäuse elektrisch verbunden ist.



WARNUNG! STROMSCHLAGGEFAHR

Eine niederohmige Erdung ist für die Sicherheit des Personals obligatorisch und für den ordnungsgemäßen Betrieb des Kabelsystems entscheidend.

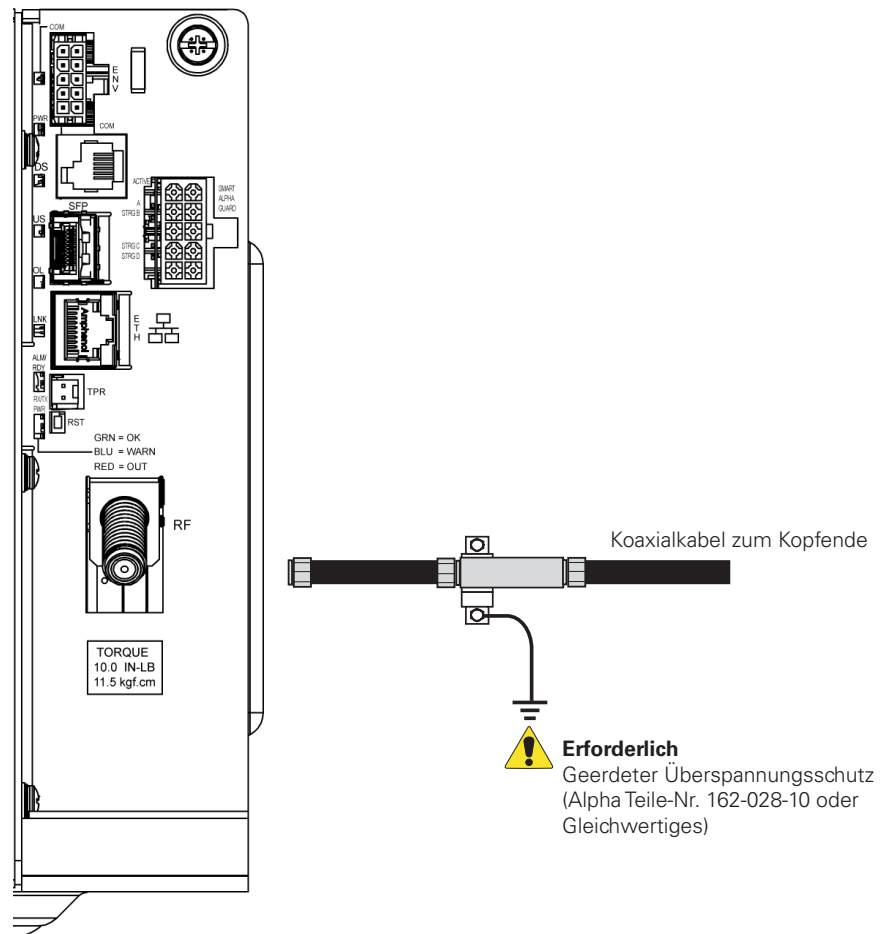


Fig. 8-7, Kommunikationserdung

8.2 Safety Notes (Spanish)

Notas de seguridad y el cumplimiento para XM3.1-HP

Revise los dibujos e ilustraciones que figuran en este manual antes de proceder. Si tiene alguna pregunta sobre la instalación o el funcionamiento seguro del sistema, póngase en contacto con Alpha Technologies Services, Inc. o con el representante más cercano de Alpha®. Guarde este documento para futuras referencias.

Para reducir el riesgo de lesiones o muerte y para garantizar el funcionamiento seguro y continuo de este producto, se han colocado los siguientes símbolos en este manual. Cuando aparezcan estos símbolos, tenga mucho cuidado y atención.



¡ADVERTENCIA! RIESGO GENERAL

ADVERTENCIA DE RIESGO GENERAL proporciona información de seguridad para PREVENIR LESIONES O LA MUERTE al técnico o usuario.



¡ADVERTENCIA! RIESGO ELÉCTRICO

ADVERTENCIA DE RIESGO ELÉCTRICO proporciona información de seguridad eléctrica para PREVENIR LESIONES O LA MUERTE al técnico o usuario.



¡ADVERTENCIA! RIESGO DE HUMOS

ADVERTENCIA DE RIESGO DE HUMOS proporciona información de seguridad de los humos para PREVENIR LESIONES O LA MUERTE al técnico o usuario.



¡ADVERTENCIA! RIESGO DE INCENDIO

ADVERTENCIA DE RIESGO DE INCENDIO proporciona información de seguridad de inflamabilidad para PREVENIR LESIONES O LA MUERTE al técnico o usuario.

Puede haber múltiples advertencias asociadas con la leyenda. Ejemplo:



¡ADVERTENCIA! RIESGO ELÉCTRICO Y DE INCENDIO

Esta ADVERTENCIA proporciona información de seguridad para Riesgos eléctricos Y de incendio.



¡PRECAUCIÓN!

PRECAUCIÓN proporciona información de seguridad con el fin de PREVENIR DAÑOS al material o equipo.



AVISO:

AVISO proporciona información adicional para ayudar a completar una tarea o procedimiento específico.

ATENCIÓN:

ATENCIÓN proporciona requisitos específicos de regulación/del código que pueden afectar a la ubicación de los equipos y/o a los procedimientos de instalación.

Las siguientes secciones contienen información de seguridad importante que debe seguirse durante la instalación y el mantenimiento del equipo y las baterías. Lea todas las instrucciones antes de instalar o hacer funcionar el equipo, y guarde este manual para futuras referencias.

Precauciones de seguridad



¡ADVERTENCIA! RIESGO ELÉCTRICO Y DE INCENDIO

No permita que los cables con corriente de la batería entren en contacto con el chasis del gabinete. El cortocircuito de los cables de la batería puede provocar un incendio o una posible explosión.



¡ADVERTENCIA! RIESGO ELÉCTRICO

- En caso de cortocircuito, las baterías presentan un riesgo de descarga eléctrica y quemaduras por la alta corriente. Observe las precauciones de seguridad adecuadas.
- La cadena de baterías, que proporciona energía de reserva, contiene energía peligrosa. Solo el personal cualificado debe inspeccionar o reemplazar las baterías.
- ¡La fuente de energía contiene más de un circuito con corriente! Aunque el voltaje de CA no esté presente en la entrada, el voltaje puede estar presente en la salida.



¡PRECAUCIÓN!

- Este equipo debe ser instalado únicamente por personal de servicio calificado, de conformidad con las instrucciones de instalación provistas con cada unidad.
- Este equipo no se entrega con un gabinete contra incendios adecuado. Para su instalación final debe proveerse un gabinete contra incendios adecuado.
- Este equipo no está diseñado para su instalación directa en exteriores. En su instalación final debe proveerse un gabinete adecuado para exteriores.
- La Salida de Suministro de Energía se considera Voltaje Peligroso Secundario (CATV).
- Este equipo está diseñado para usarse en un sistema de CATV nacional de dos cables. Línea-Neutral/Tierra es funcional y necesita la conexión a tierra multipunto del gabinete de uso final para seguridad. La aceptabilidad de este equipo en el sistema de CATV de uso final debe ser determinada por la autoridad competente (AHJ).
- Los circuitos externos de la batería, tarjeta de comunicaciones y "sonda de temperatura" se consideran ES1.
- La prueba de batería se realizó con las baterías recomendadas del fabricante.
- El producto se probó en un circuito secundario protegido por un disyuntor de 20A. Deberá realizarse una evaluación adicional si en el sistema final debiese usarse un protector más alto.
- Evaluado para usarse en una temperatura ambiente de 60° como máximo (reducción de potencia aplicable), entorno de grado de contaminación 3, categoría de sobrevoltage III.
- El equipo contiene VDR y aislamiento de puente térmico de tubos de gas. La aceptabilidad será determinada por la AHJ competente.
- Evaluado para conexión a un SISTEMA DE DISTRIBUCIÓN DE CABLES con una clasificación de sobrevoltaje transitorio externo máximo de 4000Vpk.
- Verifique los requisitos de voltaje del equipo a proteger (carga), el voltaje de entrada de CA a la fuente de energía (línea) y el voltaje de salida del sistema antes de la instalación.
- Equipe el panel de servicio de la red de energía pública con un disyuntor de circuito con la potencia nominal adecuada para su uso con esta fuente de energía.
- Cuando conecte la carga, NO exceda la potencia nominal de salida de la fuente de energía.
- Siempre utilice las técnicas de levantamiento adecuadas cuando manipule unidades, módulos o baterías.
- Si añade un fusible de batería externa como se muestra en la Fig. 2-12, seleccione un valor cuyas características de apertura sean superiores al disyuntor de circuito de CC suministrado en su unidad.

ATENCIÓN:

Esta fuente de energía ha sido investigada por las autoridades reguladoras para su uso en varios gabinetes Alpha. Si se utiliza un gabinete que no sea Alpha, es responsabilidad del operador o del instalador asegurarse de que la combinación cumpla con los requisitos normativos locales y que la fuente de energía se mantenga dentro de sus especificaciones ambientales.

Notas de seguridad de la batería



¡ADVERTENCIA! RIESGO ELÉCTRICO

- Siempre use protección ocular, guantes de goma y un chaleco protector cuando trabaje cerca de las baterías. Para evitar el contacto con la batería, retire todos los objetos metálicos, (como anillos o relojes).
- Antes de manipular las baterías, toque un objeto metálico conectado a tierra para disipar cualquier carga estática que pueda haberse desarrollado en su cuerpo.
- Use herramientas con mangos aislados, no apoye ninguna herramienta sobre las baterías.
- Tenga especial precaución al conectar o ajustar el cableado de la batería. Un cable de batería mal conectado o no conectado puede hacer contacto con una superficie no deseada que puede provocar un arco eléctrico, un incendio o una posible explosión.



¡ADVERTENCIA! RIESGO DE INCENDIO

- Las baterías producen gases explosivos. Mantenga todas las llamas y chispas abiertas lejos de las baterías.
- No cargue las baterías en un contenedor sellado. Cada batería debe tener al menos 1/2 pulgada (13 mm) de espacio entre ella y todas las superficies circundantes para permitir la refrigeración por convección.
- Todos los compartimentos de las baterías deben tener una ventilación adecuada para evitar una acumulación de gas potencialmente peligroso. Nunca coloque las baterías en un gabinete cerrado. Asegúrese de que todos los respiraderos y filtros del gabinete estén limpios y libres de residuos.



¡ADVERTENCIA! RIESGO GENERAL

- Cualquier emisión gelificada o líquida de una batería de plomo-ácido regulada por válvula (VRLA) contiene ácido sulfúrico diluido, que es perjudicial para la piel y los ojos. Las emisiones son electrolíticas y son eléctricamente conductoras y corrosivas.
- Si alguna emisión de la batería entra en contacto con la piel, lávese inmediata y minuciosamente con agua. Siga los procedimientos de exposición a químicos aprobados por su compañía.
- Neutralice cualquier emisión de batería derramada con la solución especial contenida en un kit para derrames aprobado o con una solución de una libra de bicarbonato de soda a un galón de agua. Informe un derrame químico usando la estructura de informes de derrames de su compañía y busque atención médica si es necesario.

Directrices para el mantenimiento de la batería



¡PRECAUCIÓN!

- Inspeccione cada batería durante cada revisión de mantenimiento. Reemplace o repare las baterías si se encuentra alguna de las siguientes:
 - **Señales de agrietamiento, fugas o hinchazón de la batería.**
 - **Señales de daños en el cable de la batería.**
 - **Accesorios de conexión de la batería sueltas.**
- No intente quitar los respiraderos (válvulas) de la batería de banda ancha AlphaCell® ni añadir agua. Esto supone un riesgo para la seguridad y anula la garantía.
- Una batería que muestre signos de agrietamiento, fugas o hinchazón debe ser reemplazada inmediatamente por personal autorizado.
- Siempre reemplace las baterías por otras de idéntico tipo y clasificación. Haga coincidir los códigos de fecha, voltaje y conductividad. Nunca instale baterías no probadas.
- Siempre siga las instrucciones de almacenamiento del fabricante de la batería.
- Aplique lubricante para contactos eléctricos o grasa como la grasa NO-OX® en todas las conexiones expuestas.

ATENCIÓN:

- Limpie cualquier electrolito derramado de acuerdo con todas las regulaciones o códigos federales, estatales y locales.
- Las baterías gastadas o dañadas no son seguras para el medio ambiente. Siempre recicle las baterías usadas. Consulte los códigos locales para la correcta eliminación de las baterías.

Notas sobre la conexión de la energía de la red pública

AVISO:

Los gabinetes Alpha están diseñados para ventilar adecuadamente la fuente de energía. Las fuentes de energía han sido investigadas por las autoridades reguladoras para su uso en varios gabinetes Alpha. Si se utiliza un gabinete que no sea Alpha, es responsabilidad del operador o del instalador asegurarse de que la combinación cumpla con los requisitos normativos locales y que la fuente de energía se mantenga dentro de sus especificaciones ambientales.

ATENCIÓN:

La conexión a la red de energía pública solo debe ser realizada por personal de servicio cualificado y en cumplimiento de los códigos eléctricos locales. La conexión a la energía de la red pública debe ser aprobada por la red local de energía pública antes de instalar la fuente de energía.

Las autoridades reguladoras locales pueden exigir el uso de un interruptor de entrada de servicio y/o de desconexión de servicio aprobado cuando la fuente de energía se instala en un gabinete para exteriores. Los gabinetes Alpha tienen opciones de interruptor. Es posible que el instalador deba proporcionarlos si utiliza un gabinete que no sea Alpha.

AVISO:

Para poder acomodar las altas corrientes de entrada normalmente asociadas con el arranque de los transformadores ferromagnéticos (400 amperios, sin disparo, primera mitad del ciclo), se debe utilizar un disyuntor de disparo de "alto magnetismo" (high-magnetic) o de HACR (Calefacción, Aire Acondicionado, Refrigeración). No reemplace estos disyuntores por un disyuntor de entrada de servicio convencional. Alpha recomienda SOLO los disyuntores Square D debido a la mayor fiabilidad requerida en esta aplicación de energía. Los disyuntores de circuito Square D de Alto Magnetismo y una opción BBX (entrada de servicio aprobada por UL) están disponibles en Alpha Technologies Services, Inc.

Descripción	Número de pieza Alpha	Número de pieza Square D
Instalación de 240V - HACR (15A)	470-224-10	QO215
Instalación de 120V - Alto magnetismo (20A)	470-017-10	QO120HM
BBX de 2 espacios - Desconexión de servicio externo	020-085-10	QO2-4L70RB
BBX de 8 espacios - Desconexión de servicio externo	020-141-10	QO8-16L100RB

Table 8-2, Disyuntores de circuito y desconexiones de servicio

ATENCIÓN:

En la mayoría de los casos, las siguientes configuraciones califican para el uso de entrada de servicio cuando se conecta un receptáculo doble a una desconexión de servicio. También pueden aplicarse otros códigos. Siempre contacte con su red local de energía pública para verificar que el cableado cumpla con los códigos aplicables.

Conexiones para XM3.1-HP

Un servicio adecuado de 120VCA 20A requiere que el lugar de instalación esté:

- Equipado con un receptáculo doble de 120VCA que proporcione energía a la fuente de energía y al equipo periférico.
- Equipado con un receptáculo NEMA 5-20R protegido por un disyuntor de circuito unipolar de 20 amperios de Alto Magnetismo (HM, High Magnetic) dentro de la entrada de servicio.
- Comprobado de acuerdo con el código NEC/CEC o con su autoridad reguladora local para verificar el AWG de cable adecuado (el calibre de cable sugerido es #12 AWG).
- Equipado con una abrazadera de puesta a tierra en el gabinete para facilitar la conexión a tierra dedicada.

AVISO:

Cuando se requiera unir la caja a una placa neutra, use el tornillo largo de unión verde que se proporciona (Alpha p/n 523-011-10, Square D p/n 40283-371-50).

8.0 Safety & Compliance Notes (Translations), continued

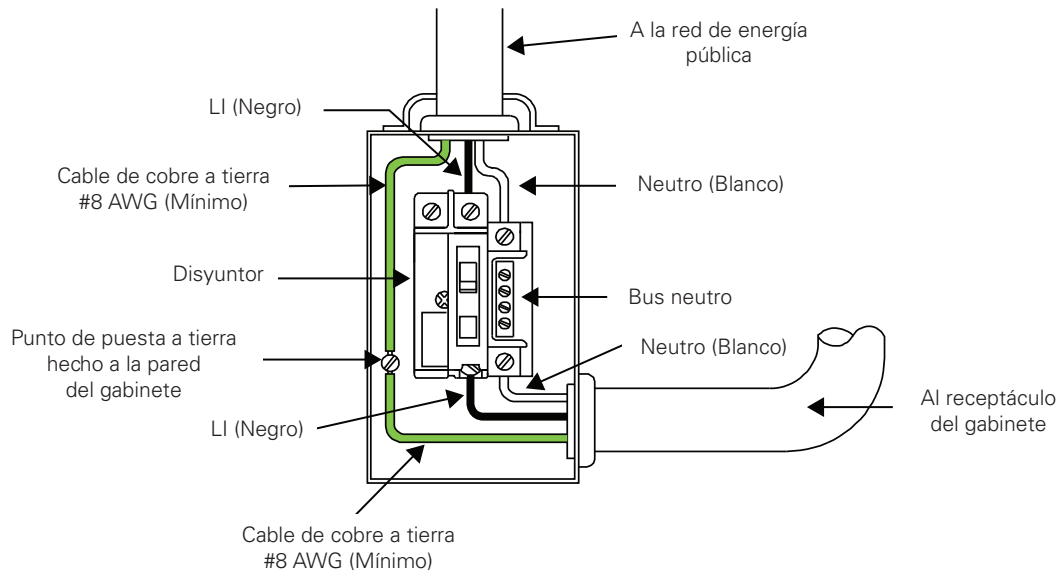


Fig. 8-8, Cableado típico de entrada de servicio de 120 VCA

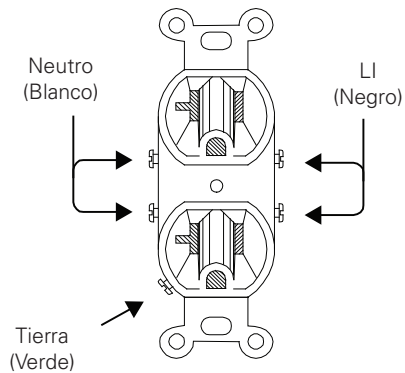


Fig. 8-9, Cableado típico de receptáculo de 120 VCA 20A, 5-20R (p/n 531-006-19)

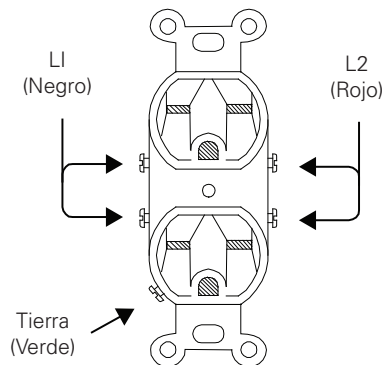


Fig. 8-10, Cableado típico de receptáculo de 240 VCA 15A, 6-15R (p/n 531-004-19)

8.0 Safety & Compliance Notes (Translations), continued

Un servicio adecuado de 240VCA 15A requiere que el lugar de instalación esté:

- Equipado con un receptáculo doble de 240VCA para proporcionar energía a la fuente de energía y al equipo periférico.
- Tenga un receptáculo NEMA 6-15R que está protegido por un disyuntor de circuito único de 2 polos de disparo común de 15A dentro de la entrada de servicio.
- Comprobado de acuerdo con el código NEC/CEC o con su autoridad reguladora local para verificar el AWG de cable adecuado (el calibre de cable sugerido es #14 AWG).
- Equipado con una abrazadera de puesta a tierra en el gabinete para facilitar la conexión a tierra dedicada.

✓ AVISO:

Cuando se requiera unir la caja a una placa neutra, use el tornillo largo de unión verde que se proporciona (Alpha p/n 523-011-10, Square D p/n 40283-371-50).

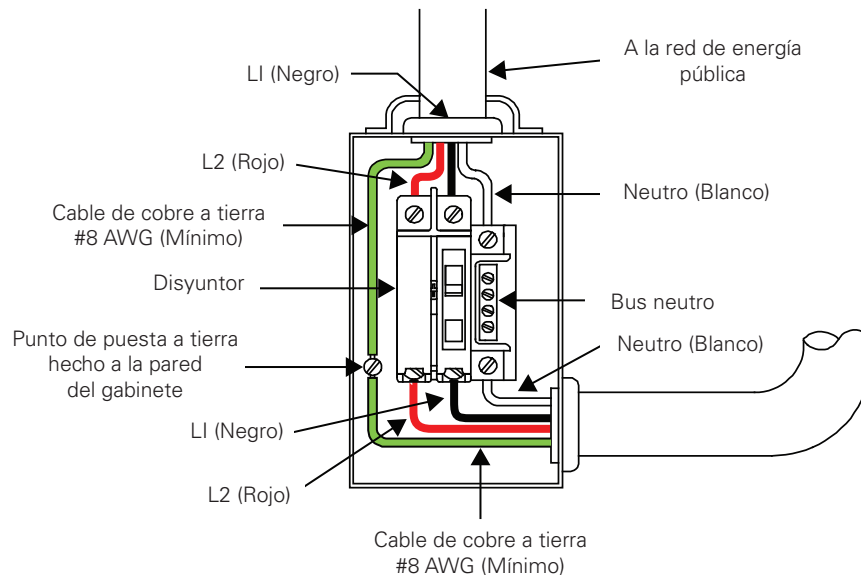


Fig. 8-11, Cableado típico de entrada de servicio de 240 VCA 60 Hz

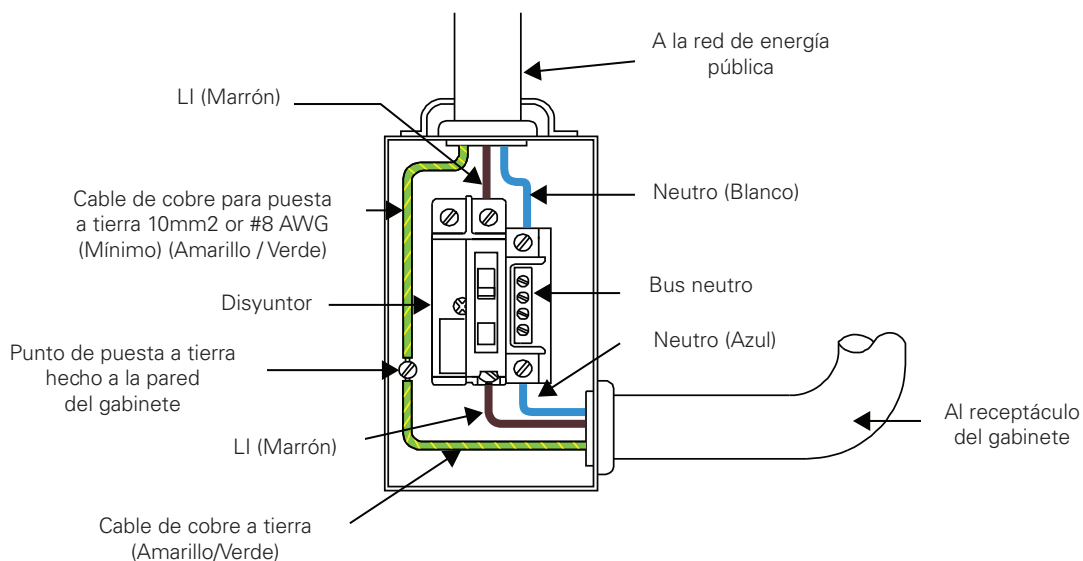


Fig. 8-12, Cableado típico de entrada de servicio de 230 VCA 50 Hz

Notas sobre la conexión de puesta a tierra

Para proporcionar una fuente de energía de reserva lista y fiable, es necesario conectar la fuente de energía a un sistema eficaz de puesta a tierra. Esto no solo garantiza la seguridad del personal de servicio responsable de su funcionamiento y mantenimiento, sino que también facilita el funcionamiento adecuado y la protección del equipo dentro de la red. Ese sistema de puesta a tierra proporciona protección con respecto a la seguridad del operador, la comunicación del sistema y la protección del equipo.

Las descargas de rayos, la conmutación de la red eléctrica u otras aberraciones en la línea de energía y/o el cable de comunicaciones tienen el potencial de causar transitorios de alta energía que pueden dañar los sistemas de energía o de comunicaciones. El método más viable disponible para proteger el sistema de daños es desviar estos transitorios de alta energía no deseados a lo largo de un camino de baja impedancia a tierra. Un camino de baja impedancia a tierra impide que estas corrientes alcancen niveles de alto voltaje y supongan una amenaza para los equipos.

La clave del éxito de la protección contra los rayos es la puesta a tierra de un solo punto, de modo que los componentes del sistema de puesta a tierra aparezcan como un solo punto de impedancia uniforme. Dos lugares recomendados por Alpha para la puesta a tierra de un solo punto son las conexiones en el gabinete y las conexiones a tierra. La puesta a tierra de un solo punto en el gabinete se logra uniendo todas las conexiones eléctricas al gabinete, incluyendo la conexión a tierra, lo más cerca posible en el gabinete. La puesta a tierra de un solo punto para la conexión a tierra se logra, por ejemplo, mediante la adecuada unión de las varillas de tierra.

Conexión de puesta a tierra de seguridad

La puesta a tierra de seguridad es un sistema de dos partes, compuesto por el servicio de la red de energía pública y el sistema de puesta a tierra de Alpha.

1. El servicio de la red de energía pública:

Como requisito mínimo para la protección del equipo Alpha, el servicio de la red local de energía pública debe proporcionar un camino de baja impedancia para el retorno de la corriente de falla. Además, debe haber un camino unido de baja impedancia entre la clavija de tierra de la fuente de energía y el gabinete.

2. El sistema de puesta a tierra de Alpha:

El sistema de puesta a tierra de Alpha consiste en una conexión de baja impedancia entre el gabinete y una puesta a tierra (situada al menos a 6' de la conexión de tierra de la red de energía pública).

Esta impedancia entre el gabinete y la tierra debe ser de 25 ohmios o menos a 60 hercios, según la medición del Modelo DGC-1000 de Amprobe® o equivalente. La medición debe realizarse en el cable o en la varilla de tierra después de que salga del gabinete. Consulte su código local o NEC 250.53.

Las condiciones locales del suelo determinarán la complejidad del sistema de puesta a tierra necesario para cumplir con la resistencia de 25 ohmios (máximo) especificada anteriormente. Por ejemplo, una sola varilla de tierra de 8' podría ser suficiente para cumplir con el requisito. En algunos casos, podría ser necesario un sistema más elaborado como múltiples varillas de tierra conectadas por un cable de cobre sólido #6 AWG enterrado a 8-12" bajo la superficie. Cuando esto no sea posible, póngase en contacto con un experto local en sistemas de puesta a tierra para obtener métodos alternativos que cumplan con la especificación de 25 ohmios (máximo).

Todas las conexiones de la varilla de tierra deben hacerse por medio de una abrazadera de puesta a tierra aprobada y adecuada para el enterramiento directo o la soldadura exotérmica.

Retorno de salida de energía

Para un funcionamiento correcto, el Insertor de energía de servicio (SPI, Service Power Inserter) debe estar firmemente unido al gabinete.

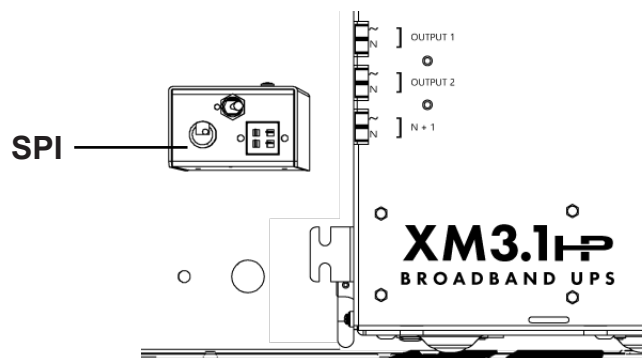


Fig. 8-13, Ubicación del SPI

Comunicaciones a tierra

En el caso de los sistemas que utilizan un transpondedor incorporado, la conexión a tierra se realiza normalmente a través de un bloque de tierra de chasis separado unido al gabinete o mediante los accesorios de montaje interno que une el transpondedor a través de la fuente de energía de CableUPS. Consulte el manual del producto de comunicaciones apropiado para los procedimientos de instalación.

Para los cables de comunicación, Alpha recomienda encarecidamente el uso de un dispositivo de detención de sobretensiones unido eléctricamente al gabinete Alpha.



¡ADVERTENCIA! RIESGO ELÉCTRICO

La puesta a tierra de baja impedancia es **obligatoria para la seguridad del personal** y crítica para el funcionamiento adecuado del sistema de cable.

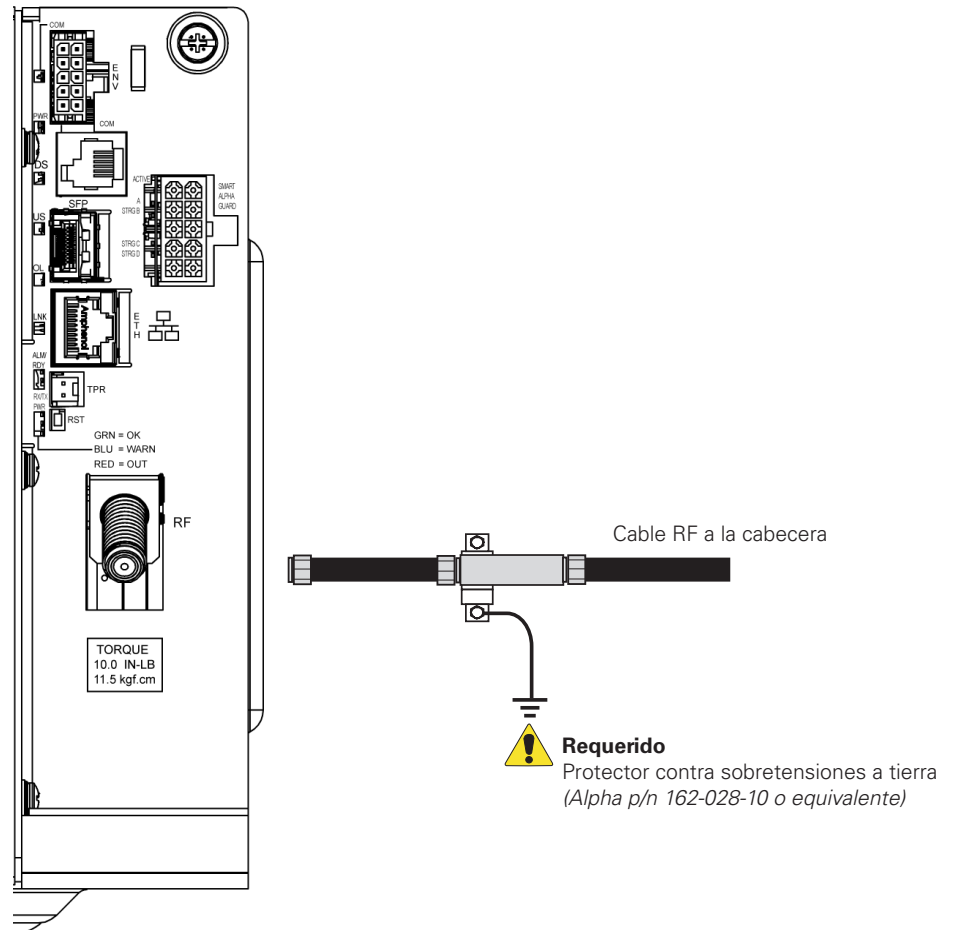


Fig. 8-14, Comunicaciones a tierra

8.3 Safety Notes (Portuguese)

Notas de Conformidade e Segurança XM3.1-HP

Veja os desenhos e ilustrações contidos neste documento antes de continuar. Se surgir qualquer dúvida sobre como instalar ou operar com segurança o sistema, contate a Alpha Technologies Services, Inc. ou o representante mais próximo da Alpha®. Guarde este documento para futuras consultas.

Para reduzir o risco de lesões ou morte e assegurar a operação segura continuada deste produto, os seguintes símbolos acompanham as instruções deste manual. Ao encontrar estes símbolos, recomenda-se maior precaução e atenção.



ATENÇÃO! RISCO GERAL

ALERTA DE RISCO GERAL fornece informações elétricas de segurança para EVITAR LESÕES OU MORTE de técnicos e usuários.



ATENÇÃO! PERIGO ELÉTRICO

ALERTA DE PERIGO ELÉTRICO fornece informações elétricas de segurança para EVITAR LESÕES OU MORTE de técnicos e usuários.



ATENÇÃO! PERIGO DE GASES

ALERTA DE GASES PERIGOSOS fornece informações de segurança relativas aos gases para EVITAR LESÕES OU MORTE de técnicos e usuários.



ATENÇÃO! PERIGO DE INCÊNDIO

ALERTA DE PERIGO DE INCÊNDIO fornece informações de segurança de inflamabilidade para EVITAR LESÕES OU MORTE de técnicos e usuários.

Uma solicitação pode ter vários avisos ou alertas associados. Exemplo:



ATENÇÃO! RISCOS ELÉTRICOS E DE INCÊNDIOS

Este AVISO fornece informações de segurança sobre Riscos Elétricos E de Incêndios



ADVERTÊNCIA!

CUIDADO proporciona informações de segurança destinadas a EVITAR DANOS ao material ou equipamentos.



AVISO:

AVISO fornece informações adicionais para ajudar a realizar um procedimento ou tarefa específica.

ATENÇÃO:

ATENÇÃO indica requisitos regulamentares ou de códigos específicos que podem afetar a colocação do equipamento e/ou os procedimentos de instalação.

As seguintes seções contêm informações de segurança importantes que devem ser seguidas durante a instalação e a manutenção do equipamento e das baterias. Leia todas as instruções antes da instalação e operação dos equipamentos e guarde este manual para futura referência.

Precauções de Segurança



ATENÇÃO! RISCOS ELÉTRICOS E DE INCÊNDIOS

Não permita que os cabos energizados da bateria entrem em contato com o chassi do invólucro. Um curto-circuito dos cabos da bateria pode resultar em fogo de incêndio ou, possivelmente, explosão.



ATENÇÃO! PERIGO ELÉTRICO

- Em caso de curto-circuito, as baterias apresentam o risco de choque elétrico e queima devido à corrente elevada. Observe as precauções de segurança adequadas.
- A cadeia de bateria, fornecendo energia reserva, contém uma energia perigosa. Somente pessoal qualificado pode inspecionar ou substituir as baterias.
- A fonte de alimentação contém mais de um circuito energizado! Ainda que não tenha tensão CA na entrada, é possível que a saída contenha alguma tensão.



ADVERTÊNCIA!

- Este equipamento deve ser instalado apenas por equipes técnicas qualificadas, de acordo com as instruções de instalação fornecidas com cada unidade.
- Este equipamento não é fornecido com um gabinete anti-incêndio adequado. Sua instalação final deve ser feita em um gabinete anti-incêndio adequado.
- Este equipamento não deve ser instalado diretamente ao ar livre. Um gabinete externo adequado deve ser fornecido na instalação final.
- A saída da fonte de alimentação é considerada uma tensão secundária perigosa (CATV).
- Este equipamento deve ser usado em um sistema nacional de CATV de dois fios. A fase-neutra/terra é funcional e depende do aterramento multiponto do gabinete de uso final para segurança. A aceitabilidade deste equipamento no sistema CATV de uso final deve ser determinada pela autoridade com jurisdição (AHJ).
- Circuitos externos na bateria, placa de comunicações e "Sonda de temperatura" são considerados ES1.
- O teste da bateria foi realizado com as baterias recomendadas pelo fabricante.
- O produto foi testado em um circuito derivado protegido por um disjuntor de 20A. Uma avaliação adicional deve ser conduzida se um protetor mais alto for usado no sistema final.
- Avaliado para uso sob temperatura ambiente máxima de 60°C (redução aplicável), ambiente com grau de poluição 3, categoria de sobretensão III.
- O equipamento contém VDRs e tubos de gás que fazem a ponte de isolamento. A aceitabilidade será determinada pelo autoridade com jurisdição (AHJ) responsável pela aprovação.
- Avaliado para conexão a um SISTEMA DE DISTRIBUIÇÃO DE CABOS com uma classificação de sobretensão transiente externa máxima de 4000 Vpk.
- Verifique antes da instalação os requisitos de tensão do equipamento (carga) para estar protegido e também a tensão de entrada CA na fonte de alimentação (linha) e a tensão da saída do sistema.
- Coloque com um disjuntor com a classificação adequada para o uso com esta fonte de alimentação no painel de manutenção de serviço do aparelho.
- Ao conectar a carga, NÃO exceda a classificação de saída da fonte de alimentação.
- Sempre use as técnicas de elevação adequadas com unidades de manejo, módulos ou baterias.
- Se for acrescentar um fusível externo para o conjunto de baterias como mostrado na Fig. 2-12, selecione um valor no qual as propriedades de abertura são mais elevadas do que do disjuntor CC fornecido em sua unidade.

ATENÇÃO:

O uso desta fonte de alimentação foi analisado em diversos invólucros Alpha por autoridades regulatórias. Se for usado um invólucro de outra marca que não a Alpha, será responsabilidade do operador ou instalador assegurar a conformidade com seus requisitos regulatórios locais e que tal fonte de alimentação esteja dentro de suas especificações ambientais.



ATENÇÃO! PERIGO ELÉTRICO

- Sempre utilize proteção ocular, luvas de borracha e um colete de proteção quando for trabalhar próximo de baterias. Remova todos os objetos metálicos (como anéis ou relógios) a fim de evitar que entrem em contato com a bateria.
- Antes de manusear as baterias, toque em um objeto metálico aterrado para dissipar a carga estática que possa haver em seu corpo.
- Use ferramentas com cabos isolados e não apoie nenhuma ferramenta em cima das baterias.
- Tome cuidado especial com a conexão ou o ajuste do cabeamento da bateria. Qualquer cabo da bateria não conectado ou mal conectado pode entrar em contato com uma superfície imprevista, podendo causar formação de arco, incêndio ou possível explosão.



ATENÇÃO! PERIGO DE INCÊNDIO

- Baterias produzem gases explosivos. Mantenha todas as chamas abertas e fagulhas distantes das baterias.
- Não carregue as baterias em recipientes vedados. Cada bateria deve ter pelo menos 1/2 polegada (13 mm) de espaço entre si e todas as superfícies circundantes para permitir o resfriamento por convecção.
- Todos os compartimentos da bateria devem ter ventilação adequada para evitar o acúmulo de um gás potencialmente perigoso. Nunca coloque baterias em um invólucro vedado. Assegure que todos os respiros e filtros do invólucro estejam limpos e sem detritos.



ATENÇÃO! RISCO GERAL

- As emissões líquidas ou de gel das baterias de chumbo-ácido reguladas por válvula (VRLA) contêm ácido sulfúrico diluído, o que pode ser nocivo para pele e olhos. As emissões são eletrolíticas, eletricamente condutoras e corrosivas.
- Se qualquer emissão da bateria entrar em contato com a pele, lave-a com água imediatamente e de modo cuidadoso. Siga os procedimentos de exposição química aprovados por sua empresa.
- Neutralize as emissões vazadas da bateria com uma solução especial contida em um kit próprio para vazamentos ou com uma solução de cerca de 454 g de bicarbonato de sódio em cerca de 3,8 litros de água. Informe a respeito de um vazamento químico por meio do esquema de relato de vazamento da companhia e, se necessário, procure atendimento médico.

Instruções de Manutenção da Bateria



ADVERTÊNCIA!

- Inspeção cada bateria em cada verificação de manutenção. Substitua ou repare as baterias se constatar algum dos seguintes indícios:
 - **Sinais de rachaduras, vazamento ou dilatação da bateria.**
 - **Sinais de danos no cabo da bateria.**
 - **Conector de bateria frouxo.**
- Não tente retirar os respiradouros (válvulas) da bateria de banda larga AlphaCell® nem coloque água. Isso gera um risco para a segurança e anula a garantia.
- Uma bateria com sinais de rachaduras, vazamento ou dilatação deve ser substituída imediatamente por pessoal autorizado.
- Sempre substitua as baterias por baterias da mesma classificação e tipo. A condutância, a tensão e os códigos de data devem ser equiparáveis. Nunca instale baterias não testadas.
- Sempre siga as instruções de armazenamento do fabricante da bateria.
- Aplique o lubrificante de contato elétrico ou uma graxa, como a graxa NO-OX®, em todas as conexões expostas.

ATENÇÃO:

- Limpe os respingos de eletrólito conforme as regulamentações e códigos federais, estaduais e locais.
- Baterias usadas ou danificadas são prejudiciais ao meio ambiente. Sempre recicle as baterias usadas. Consulte o modo de descarte adequado de baterias nos códigos locais.

Notas de Conexão da Fonte da Unidade

AVISO:

Os invólucros da Alpha são projetados para conduzir adequadamente a fonte de alimentação por seus respiradouros. O uso de várias fontes de alimentação não foram analisadas em diversos invólucros Alpha por autoridades regulatórias. Se for usado um invólucro de outra marca que não a Alpha, será responsabilidade do operador ou instalador assegurar a conformidade com seus requisitos regulatórios locais e que tal fonte de alimentação esteja dentro de suas especificações ambientais.

ATENÇÃO:

A conexão do aparelho deve ser realizada somente por pessoal de manutenção qualificado e em conformidade com os códigos da eletricidade local. A conexão de energia do aparelho deve ser aprovada pelos serviços públicos locais antes da instalação da fonte de alimentação.

É possível que as autoridades regulatórias locais exijam o uso de uma entrada de serviço aprovada e/ou um interruptor de desconexão para manutenção se a fonte de alimentação estiver instalada em um invólucro em área aberta. Os invólucros Alpha oferecem algumas opções de interruptor. Em caso de utilizar um invólucro diferente do invólucro da Alpha, o instalador deve providenciar esse tipo de interruptor.

AVISO:

Para acomodar altas correntes de influxo normalmente associadas com a inicialização dos transformadores ferro-ressonantes (400 amp, sem desarme, ciclo da primeira metade), use um disjuntor de desarme "altamente magnético" ou de Aquecimento, Ar condicionado, Refrigeração (HACR). Não substitua esses disjuntores por um disjuntor convencional de entrada de serviço. A Alpha recomenda SOMENTE disjuntores Square D devido à maior confiabilidade exigida nesta aplicação energética. A Alpha Technologies Services, Inc disponibiliza disjuntores altamente magnéticos Square D e uma opção BBX (entrada de serviço listada pela UL).

Descrição	Número da Peça da Alpha	Número da Peça Square D
Instalação 240V - HACR (15A)	470-224-10	QO215
Instalação 120V - Altamente magnética (20A)	470-017-10	QO120HM
BBX 2 espaços - Desconexão do Serviço Externo	020-085-10	QO2-4L70RB
BBX 8 espaços - Desconexão do Serviço Externo	020-141-10	QO8-16L100RB

Table 8-3, Disjuntor e Desconectores de Serviço

ATENÇÃO:

GERALMENTE, AS SEGUINTE CONFIGURAÇÕES SÃO ADEQUADAS PARA A ENTRADA DE SERVIÇO COM A FIAÇÃO DE UM RECEPTÁCULO DUPLEX PARA A DESCONEXÃO DE SERVIÇO. PODEM SER APLICÁVEIS OUTROS CÓDIGOS. SEMPRE CON-TATE O SEU SERVIÇO PÚBLICO LOCAL PARA A VERIFICAÇÃO DA FIAÇÃO DE ACORDO COM OS CÓDIGOS APLICÁVEIS.

Conexões XM3.1-HP

Para manutenção adequada de 120VAC 20A, o local da instalação deve ter:

- Um receptáculo duplex 120VAC que forneça energia para a fonte de alimentação e os equipamentos periféricos.
- Um receptáculo NEMA 5-20R protegido por um disjuntor Altamente Magnético (HM) 20 amp, polo único na entrada de serviço.
- A fiação AWG apropriada (sugerimos bitola dos fios #12 AWG) deve ser verificada de acordo com o Código NEC/CEC ou com suas autoridades regulatórias locais.
- Um grampo de aterramento no invólucro para facilitar o aterramento exclusivo.

AVISO:

Quando for necessária uma ligação da caixa à uma placa neutra, use o parafuso de conexão verde comprido (*Alpha p/n 523-011-10, Square D p/n 40283-371-50*).

8.0 Safety & Compliance Notes (Translations), continued

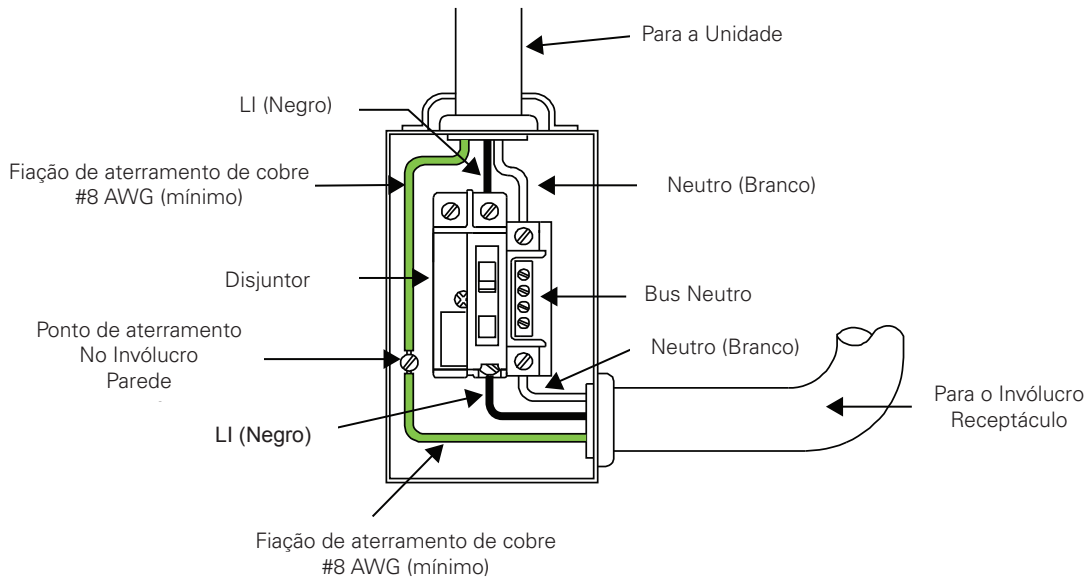


Fig. 8-15, Fiação Típica da Entrada de Serviço 120 VAC

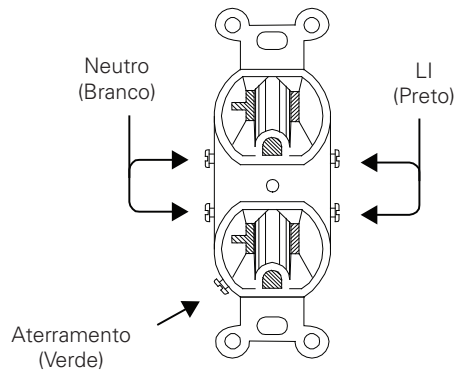


Fig. 8-16, Fiação Típica do Receptáculo 120 VCA 20A, 5-20R (p/n 531-006-19)

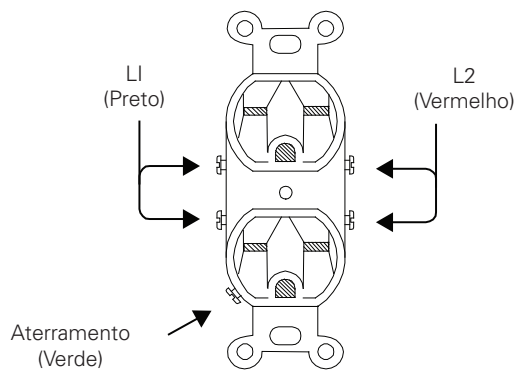


Fig. 8-17, Fiação Típica do Receptáculo 240 VCA 15A, 6-15R (p/n 531-004-19)

8.0 Safety & Compliance Notes (Translations), continued

Para o serviço adequado de 240VAC 15A, o local da instalação deve ter:

- Um receptáculo duplex 240VAC que forneça energia para a fonte de alimentação e os equipamentos periféricos.
- Um receptáculo NEMA 6-15R protegido por um disjuntor comum 15A, 2 polos dentro da entrada de serviço.
- A fiação AWG apropriada (sugerimos bitola dos fios #14 AWG) deve ser verificada de acordo com o Código NEC/CEC ou com suas autoridades regulatórias locais.
- Um grampo de aterramento no invólucro para facilitar o aterramento exclusivo.

✓ AVISO:

Quando for necessária uma ligação da caixa à uma placa neutra, use o parafuso de conexão verde comprido (*Alpha p/n 523-011-10, Square D p/n 40283-371-50*).

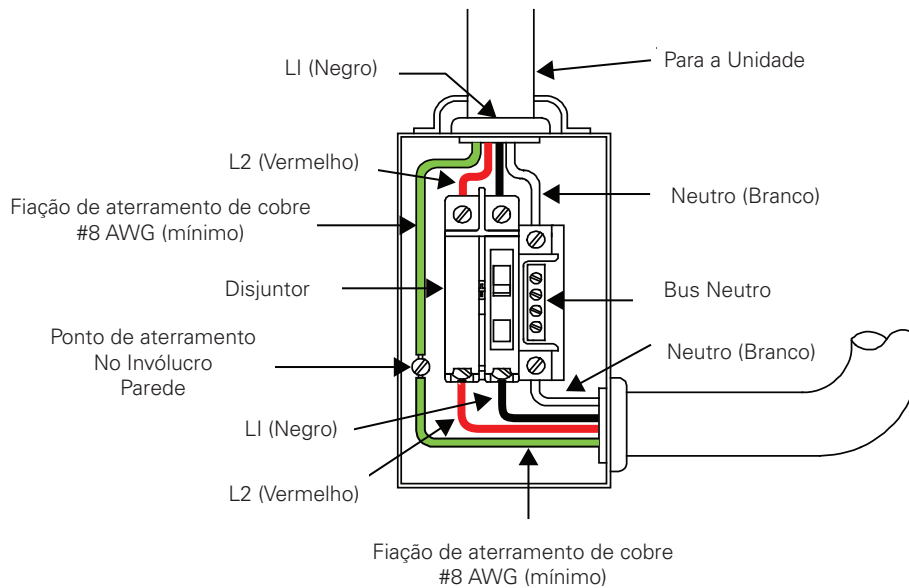


Fig. 8-18, Fiação Típica da Entrada de Serviço 240 VCA 60 Hz

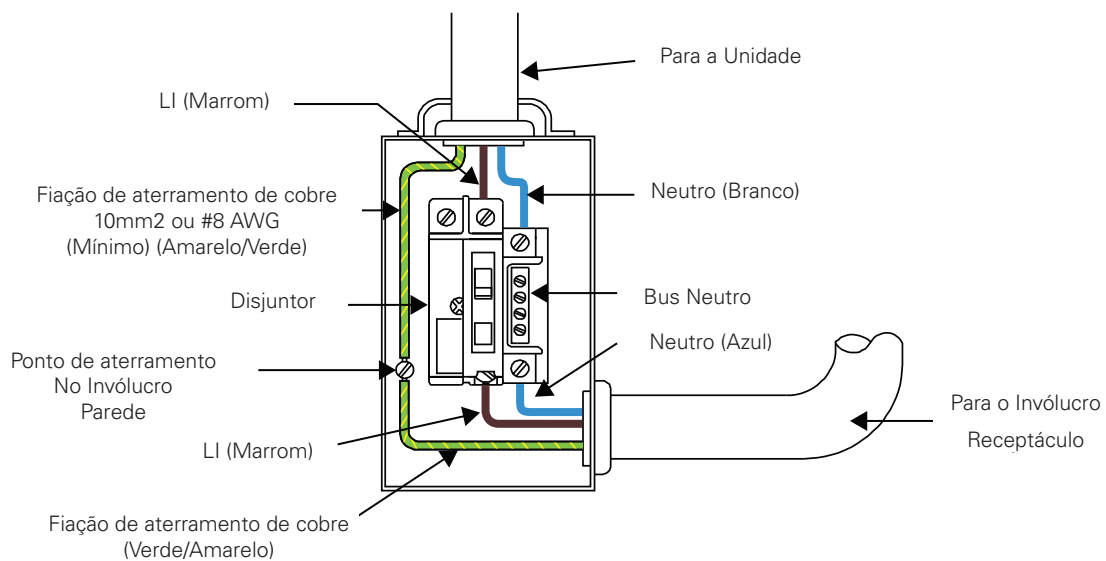


Fig. 8-19, Fiação Típica da Entrada de Serviço 230 VCA 50 Hz

Notas de Aterramento e Ligação à Terra

Para fornecer uma fonte de energia reserva confiável e acessível, é necessário conectar a fonte de alimentação a um sistema de aterramento eficaz. Não apenas proporcionando segurança para o pessoal responsável por sua operação e manutenção, mas ainda facilitando tanto a operação quanto a proteção adequadas dos equipamentos na rede. Esse sistema de aterramento fornece proteção relativa à segurança do operador, comunicações do sistema e proteção para os equipamentos.

Quedas de raio, comutação de rede ou outros incidentes na linha de energia e/ou cabos de comunicação podem causar transições de alta carga energética que podem danificar os sistemas de alimentação ou comunicações. O método mais viável disponível para proteger o sistema de danos é impedir estas transições indesejáveis de alta carga energética ao longo de um caminho de baixa impedância até o aterramento. Um caminho de baixa impedância até o aterramento impede que essas correntes atinjam altos níveis de tensão que poderiam afetar equipamentos.

A chave para o sucesso de proteção contra descargas atmosféricas é o aterramento em um único ponto de modo que os componentes do sistema de aterramento apareçam como um único ponto de impedância uniforme. Os dois locais recomendados pela Alpha para o aterramento de um único ponto são as conexões no invólucro e ligações à terra. O aterramento em um único ponto no invólucro pode ser conseguido com a ligação de todas as conexões elétricas ao invólucro, incluindo a ligação à terra, tão unidas quanto possível no invólucro. O aterramento em um único ponto para a ligação à terra é obtido, por exemplo, por meio da ligação adequada das barras de aterramento.

Aterramento de Segurança e Ligação à Terra

O aterramento de segurança e a ligação à terra é um sistema de duas partes consistindo de serviço público e o sistema de aterramento Alpha.

1. O serviço público:

Como requisito mínimo de proteção dos equipamentos Alpha, o serviço público deve fornecer um caminho de baixa impedância para o retorno da corrente de falha. Além disso, deve haver um caminho conectado de baixa impedância entre o pino de aterramento da fonte de alimentação e o invólucro.

2. O sistema de aterramento Alpha:

O sistema de aterramento Alpha consiste em uma conexão de baixa impedância entre o invólucro e um aterramento (localizado a, no mínimo, 1,8 m da conexão de terra do serviço público).

Essa impedância entre o invólucro e a terra deve ser de 25 ohms ou menos de 60 hertz medido pelo Modelo DGC-1000 Amprobe® ou equivalente. A medição deve ser feita no fio ou com a barra de aterramento após a saída do invólucro. Consulte o código local ou NEC 250.53.

As condições locais do solo determinarão a complexidade do sistema de aterramento necessária para atender a especificação de 25 ohms (máximo) mencionada acima. Por exemplo, uma única barra de aterramento de 2,45 m pode ser suficiente para atender essa especificação. Em alguns casos, pode ser necessário um sistema mais elaborado, tal como de várias barras de aterramento conectadas por um cabo de cobre sólido #6 AWG enterrado a cerca de 20,5 - 30,5 cm abaixo da superfície. Quando não for possível, entre em contato com um especialista local em sistemas de aterramento para conhecer métodos alternativos que atendam a especificação (máxima) de 25 ohms.

Todas as conexões da barra de aterramento devem ser feitas por meio de um grampo de ligação à terra listado adequado para o enterramento direto ou soldagem exotérmica.

Retorno da Saída de Potência

Para a operação adequada, o serviço injetor de alimentação (SPI - Service Power Inserter) deve ser ligado de forma segura ao invólucro.

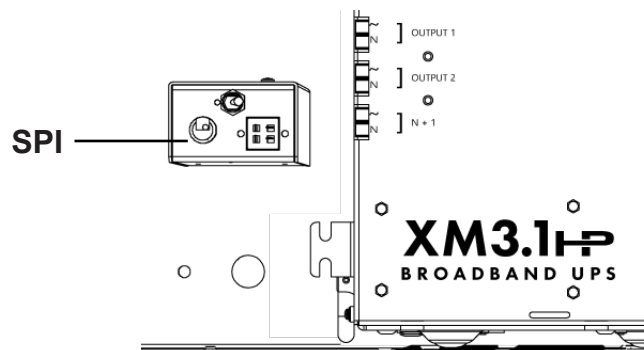


Fig. 8-20, Local do SPI

Aterramento das Comunicações

Para os sistemas com o uso de um transponder incorporado, geralmente, a conexão de aterramento é feita por meio de um bloco de aterramento do chassis separado até o invólucro, ou por meio de um hardware com montagem interna que liga o transponder por meio da fonte de alimentação CableUPS. Consulte no manual de produto de comunicações apropriado os procedimentos de instalação.

Para cabos de comunicações, a Alpha recomenda fortemente o uso de um dispositivo supressor de sobretensão eletricamente ligado ao invólucro Alpha.



ATENÇÃO! PERIGO ELÉTRICO

O aterramento de baixa impedância é **obrigatório para a segurança do pessoal** e crítico para o funcionamento adequado do sistema de cabeamento.

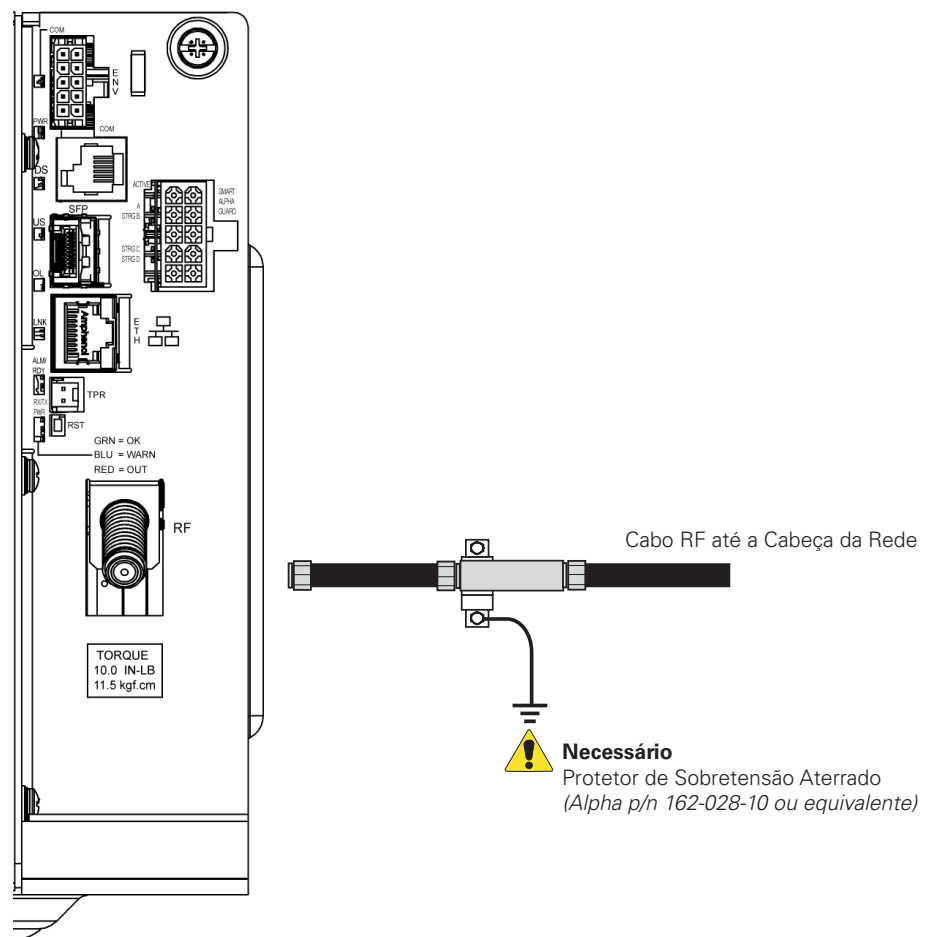


Fig. 8-21, Aterramento das Comunicações

8.4 Safety Notes (French)

XM3.1-HP Remarques sur la sécurité et la conformité

Passez en revue les dessins et les illustrations contenus dans le présent manuel avant de procéder. Pour toute question concernant l'installation ou le fonctionnement sécuritaire du système, veuillez communiquer avec Alpha Technologies Services, Inc., ou le représentant Alpha® le plus près. Veuillez conserver le présent document pour le consulter ultérieurement.

Afin de réduire le risque de blessure ou de mort, et pour assurer le fonctionnement continu et sûr de ce produit, les symboles suivants ont été répartis dans l'ensemble du manuel. Lorsque ces symboles sont présents, veuillez faire preuve de plus de prudence et d'attention.



AVERTISSEMENT! DANGER GÉNÉRAL

L'AVERTISSEMENT DE DANGER GÉNÉRAL fournit des renseignements sur la sécurité afin de PRÉVENIR LES BLESSURES au technicien ou à l'utilisateur, voire LA MORT.



AVERTISSEMENT! DANGER ÉLECTRIQUE

L'AVERTISSEMENT SUR LES DANGERS ÉLECTRIQUES fournit des renseignements sur la sécurité électrique afin de PRÉVENIR LES BLESSURES au technicien ou à l'utilisateur, voire LA MORT.



AVERTISSEMENT! RISQUES D'ÉMANATION

L'AVERTISSEMENT SUR LES RISQUES D'ÉMANATION fournit des renseignements sur la protection contre les émanations afin de PRÉVENIR LES BLESSURES au technicien ou à l'utilisateur, voire LA MORT.



AVERTISSEMENT! RISQUE D'INCENDIE

L'AVERTISSEMENT SUR LES RISQUES D'INCENDIE fournit des renseignements sur la sécurité concernant la protection contre l'inflammabilité afin de PRÉVENIR LES BLESSURES au technicien ou à l'utilisateur, voire LA MORT.

Il pourrait y avoir plusieurs avertissements associés à la directive. Exemple :



AVERTISSEMENT! DANGER ÉLECTRIQUE ET RISQUE D'INCENDIE

Cet AVERTISSEMENT fournit des renseignements sur la sécurité concernant à la fois le danger électrique ET le risque d'incendie.



PRUDENCE!

PRUDENCE fournit des renseignements sur la sécurité visant à PRÉVENIR LES DOMMAGES au matériel ou à l'équipement.



AVIS :

« AVIS » fournit des renseignements supplémentaires pour aider à terminer une tâche ou une procédure particulière.

ATTENTION :

« ATTENTION » fournit des exigences réglementaires ou de codes spécifiques qui peuvent avoir un effet sur la mise en place de l'équipement, les procédures d'installation, ou les deux.

Les sections suivantes contiennent des renseignements importants relatifs à la sécurité qui doivent être respectés pendant l'installation et l'entretien de l'équipement et des accumulateurs. Veuillez lire les instructions en entier avant d'installer ou de faire fonctionner l'équipement et conserver ce manuel pour le consulter ultérieurement.

Mesures de précaution



AVERTISSEMENT! DANGER ÉLECTRIQUE ET RISQUE D'INCENDIE

Ne laissez pas les fils de l'accumulateur sous tension entrer en contact avec le châssis de l'armoire. Un court-circuit des fils de l'accumulateur peut provoquer un incendie ou une explosion.



AVERTISSEMENT! DANGER ÉLECTRIQUE

- En cas de court-circuit, les accumulateurs présentent un risque de décharge électrique et de brûlure par courant fort. Respectez les mesures de sécurité appropriées.
- La chaîne d'accumulateurs, qui fournit une alimentation de secours, contient une énergie dangereuse. Seul le personnel qualifié doit inspecter ou remplacer les accumulateurs.
- Le bloc d'alimentation contient plus d'un circuit actif! Même si la tension alternative n'est pas présente à l'entrée, elle peut toujours être présente à la sortie.



PRUDENCE!

- Cet équipement doit être installé par le personnel qualifié seulement, conformément aux instructions d'installation fournies avec chaque appareil.
- Cet équipement n'est pas fourni avec une armoire coupe-feu adéquate. Conçu pour être installé dans une armoire coupe-feu adéquate pour l'installation finale.
- Cet équipement n'est pas conçu pour une installation directe à l'extérieur. Une armoire adéquate pour l'extérieur doit être fournie pour l'installation finale.
- La tension de sortie de l'alimentation est considérée comme une tension secondaire dangereuse (câblodistribution).
- Cet équipement est conçu pour une utilisation dans un système de câblodistribution national à deux câbles. La ligne, le neutre et la masse sont fonctionnels et dépendent d'une mise à la terre sur plusieurs points de l'armoire de l'utilisation finale pour assurer la sécurité. L'acceptabilité de cet équipement pour l'utilisation finale dans un système de câblodistribution doit être déterminé par les autorités compétentes.
- Les circuits externes de la Batterie, des cartes de communication et de la « sonde à température » sont considérés comme ES1.
- La batterie a été testée avec les batteries recommandées par le fabricant.
- Le produit a été testé sur un circuit de dérivation protégé par un disjoncteur 20 A. Une évaluation additionnelle doit être réalisée si un protecteur plus élevé doit être utilisé dans le système final.
- Évalué pour une utilisation sous une température maximale de 60 °C (déclassement applicable), dans un environnement où le degré de pollution est de niveau 3, avec une catégorie de surtension III.
- Cet équipement contient des magnétoscopes numériques et une protection de pontage avec tubes à gaz. L'acceptabilité sera déterminée par les autorités compétentes.
- Évalué pour un branchement à un SYSTÈME DE CÂBLODISTRIBUTION avec une surtension transitoire externe maximale d'une valeur de 4 000 V en pointe.
- Avant l'installation, vérifiez les exigences de tension de l'équipement à protéger (charge), la tension d'entrée CA de l'alimentation électrique (ligne) et la tension de sortie du système.
- Équipez le panneau d'entrée électrique d'un disjoncteur correctement calibré pour l'utiliser avec ce bloc d'alimentation.
- Lors du branchement de la charge, NE dépassez PAS la puissance nominale du bloc d'alimentation.
- Utilisez toujours des techniques de levage appropriées lorsque vous manipulez des appareils, des modules ou des accumulateurs.
- Si vous ajoutez un fusible d'accumulateur externe comme indiqué à l'illustration 2-12, sélectionnez une valeur dont les caractéristiques d'ouverture sont supérieures à celles du disjoncteur CC fourni dans votre appareil.

ATTENTION :

Ce bloc d'alimentation a fait l'objet d'une enquête par les autorités réglementaires pour une utilisation dans diverses armoires Alpha. Si une armoire autre qu'une armoire Alpha est utilisée, il incombe à l'opérateur ou à l'installateur de s'assurer que la combinaison est conforme aux exigences réglementaires locales et que le bloc d'alimentation reste dans les limites de ses spécifications environnementales.

Remarques sur la sécurité concernant les accumulateurs



AVERTISSEMENT! DANGER ÉLECTRIQUE

- Portez toujours un équipement de protection des yeux, des gants en caoutchouc et un gilet de protection lorsque vous travaillez à proximité d'accumulateurs. Afin d'éviter d'entrer en contact avec l'accumulateur, retirez tous les objets métalliques sur vous (par exemple, des bagues ou des montres).
- Avant de manipuler les accumulateurs, veuillez toucher à un objet métallique mis à la terre afin d'éliminer toute charge statique qui pourrait s'être développée sur votre corps.
- Utilisez des outils équipés de poignées isolées et ne déposez aucun outil sur les accumulateurs.
- Soyez particulièrement prudent lorsque vous connectez ou ajustez le câblage de l'accumulateur. Un câble d'accumulateur mal ou non connecté peut entrer en contact avec une surface non voulue qui peut provoquer un arc électrique, un incendie ou une explosion.



AVERTISSEMENT! RISQUE D'INCENDIE

- Les accumulateurs produisent des gaz explosifs. Gardez toutes les flammes nues et les étincelles loin des accumulateurs.
- Ne chargez pas les accumulateurs dans un contenant fermé. Chaque accumulateur doit avoir au moins 13 mm (1/2 po) d'espace entre lui et toutes les surfaces environnantes pour permettre un refroidissement par convection.
- Tous les compartiments des accumulateurs doivent être suffisamment ventilés pour éviter l'accumulation de gaz potentiellement dangereux. Ne placez jamais les accumulateurs dans une armoire hermétique. Veillez à ce que tous les orifices et filtres des armoires soient propres et exempts de débris.



AVERTISSEMENT! DANGER GÉNÉRAL

- Toute émission gélifiée ou liquide provenant d'un accumulateur au plomb-acide à régulation par soupape (VRLA) contient de l'acide sulfurique dilué, qui est nocif pour la peau et les yeux. Les émissions sont électrolytiques et sont électriquement conductrices et corrosives.
- Si des émissions de l'accumulateur entre en contact avec la peau, il faut se laver immédiatement et abondamment à l'eau. Suivez les procédures d'exposition aux produits chimiques approuvées par votre entreprise.
- Neutralisez toute émission déversée par un accumulateur avec la solution spéciale contenue dans une trousse en cas de déversement approuvée ou avec une solution de 454 grammes (1 livre) de bicarbonate de soude dans 3,8 litres (1 gallon) d'eau. Signalez un déversement de produits chimiques en utilisant la structure hiérarchique de notification des déversements de votre entreprise et consultez un médecin si nécessaire.

Directives d'entretien de l'accumulateur



PRUDENCE!

- Inspectez chaque accumulateur lors de chaque contrôle d'entretien. Remplacez ou réparez les accumulateurs dans les cas suivants :
 - **Signes de fissuration, de fuite ou de gonflement de l'accumulateur.**
 - **Signes d'endommagement des câbles de l'accumulateur.**
 - **Quincaillerie de connexion de l'accumulateur desserrée.**
- N'essayez pas de retirer les événements (soupapes) de l'accumulateur à large bande de AlphaCell® ou d'ajouter de l'eau. Ceci constitue un risque pour la sécurité et annule la garantie.
- Un accumulateur présentant des signes de fissuration, de fuite ou de gonflement doit être remplacé immédiatement par du personnel autorisé.
- Remplacez toujours les accumulateurs par ceux d'un type et d'une puissance identiques. Faites correspondre les codes de conductance, de tension et de date. N'installez jamais des accumulateurs non testés.
- Respectez toujours les consignes d'entreposage de l'accumulateur du fabricant.
- Appliquez un lubrifiant pour contacts électriques ou une graisse telle que la graisse NO-OX^{MD} sur toutes les connexions exposées.

ATTENTION :

- Nettoyez tout électrolyte renversé conformément à tous les règlements ou codes fédéraux, provinciaux et locaux.
- Les accumulateurs usagés ou endommagés ne sont pas sûrs pour l'environnement. Recyclez toujours les accumulateurs usagés. Reportez-vous aux codes locaux pour connaître la bonne méthode d'élimination des accumulateurs.

Remarque sur la connexion au réseau de distribution d'électricité

AVIS :

Les armoires Alpha sont conçues pour ventiler correctement le bloc d'alimentation. Les blocs d'alimentation ont fait l'objet d'une enquête par les autorités réglementaires pour une utilisation dans diverses armoires Alpha. Si une armoire autre qu'une armoire Alpha est utilisée, il incombe à l'opérateur ou à l'installateur de s'assurer que la combinaison est conforme aux exigences réglementaires locales et que le bloc d'alimentation reste dans les limites de ses spécifications environnementales.

ATTENTION :

Le raccordement au service public doit être effectué uniquement par du personnel qualifié et en conformité avec les codes électriques locaux. Le raccordement au réseau électrique doit être approuvé par le service public local avant l'installation du bloc d'alimentation. Les autorités réglementaires locales peuvent exiger l'utilisation d'un branchement approuvé et/ou d'un sectionneur lorsque le bloc d'alimentation est installé dans une armoire extérieure. Les armoires Alpha offrent un choix de sectionneurs. L'installateur peut avoir besoin de les fournir s'il utilise une armoire autre qu'une armoire Alpha.

AVIS :

Pour faire face aux courants d'appel élevés normalement associés au démarrage des transformateurs ferorésonnants (400 ampères, sans déclenchement, premier demi-cycle), il faut utiliser soit un disjoncteur à « haute intensité magnétique », soit un disjoncteur de déclenchement HACR (chauffage, climatisation, réfrigération). Ne remplacez pas ces disjoncteurs par un disjoncteur de branchement classique. Alpha recommande UNIQUEMENT les disjoncteurs carrés D en raison de la fiabilité accrue requise dans cette application d'alimentation. Des disjoncteurs carrés D à haute intensité magnétique et une option BBX (branchement répertorié UL) sont disponibles auprès d'Alpha Technologies Services, Inc.

Description	Numéro de pièce Alpha	Numéro de pièce du carré D
Installation 240 V - HACR (chauffage, climatisation, réfrigération) [15 A]	470-224-10	QO215
Installation 120 V - Haute intensité magnétique (20 A)	470-017-10	QO120HM
BBX 2 espaces - Sectionneur externe	020-085-10	QO2-4L70RB
BBX 8 espaces - Sectionneur externe	020-141-10	QO8-16L100RB

Table 8-4, Disjoncteurs et sectionneurs

ATTENTION :

Dans la plupart des cas, les configurations suivantes peuvent être utilisées comme branchement lorsqu'il s'agit de câbler une prise double à un sectionneur. D'autres codes peuvent également s'appliquer. Contactez toujours votre service public local pour vérifier que le câblage est conforme aux codes en vigueur.

Connexions XM3.1-HP

Pour un service 120 VCA 20 A correct, le site d'installation doit être :

- Équipé d'une prise double de 120 VCA qui alimente le bloc d'alimentation et les équipements périphériques.
- Équipé d'une prise NEMA 5-20R protégée par un disjoncteur unipolaire de 20 ampères à haute intensité magnétique (HM) à l'intérieur du coffret de branchement.
- Vérifié selon le code NEC/CEC ou auprès de votre autorité réglementaire locale pour vérifier le bon calibre américain des fils (AWG) (le calibre suggéré est no 12).
- Équipé d'une pince de mise à la terre sur l'armoire pour faciliter une mise à la terre dédiée.

AVIS :

Lorsqu'il est nécessaire de coller la boîte à une plaque neutre, utilisez la longue vis de collage verte fournie (no de pièce Alpha 523-011-10, carré D, numéro de pièce 40283-371-50).

8.0 Safety & Compliance Notes (Translations), continued

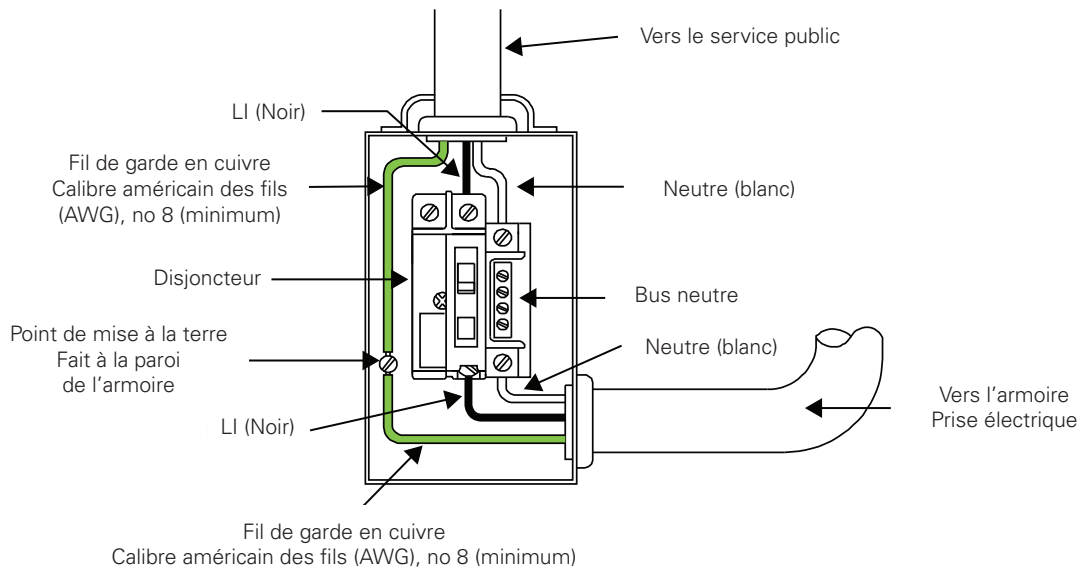


Fig. 8-22, Câblage typique d'un branchement de 120 VCA

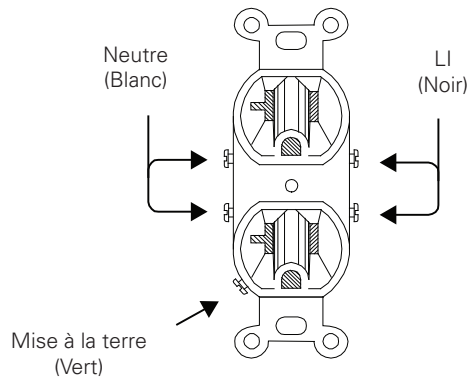


Fig. 8-23, Câblage typique d'une prise de courant de 120 VCA 20 A, 5-20R (No de pièce 531-006-19)

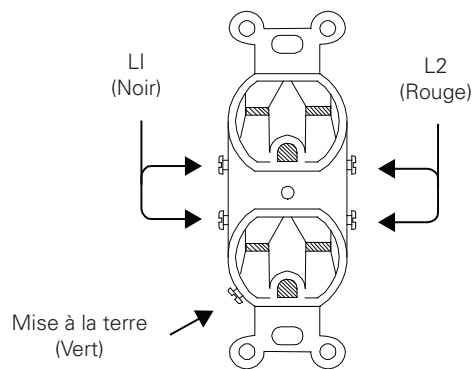


Fig. 8-24, Câblage typique d'une prise de courant de 240 VCA 15 A, 6-15R (No de pièce 531-004-19)

8.0 Safety & Compliance Notes (Translations), continued

- Pour un service 240 VCA 15 A correct, le site d'installation doit être équipé d'une prise double de 240 VCA qui alimente le bloc d'alimentation et les équipements périphériques.
- Disposez d'une prise NEMA 6-15R protégée par un disjoncteur bipolaire de 15 A à déclenchement commun à l'intérieur du coffre de branchement.
- Vérifié selon le code NEC/CEC ou auprès de votre autorité réglementaire locale pour vérifier le bon calibre américain des fils (AWG) (le calibre suggéré est no 14).
- Équipé d'une pince de mise à la terre sur l'enceinte pour faciliter une mise à la terre dédiée.

✓ AVIS :

Lorsqu'il est nécessaire de coller la boîte à une plaque neutre, utilisez la longue vis de collage verte fournie (no de pièce Alpha 523-011-10, carré D, numéro de pièce 40283-371-50).

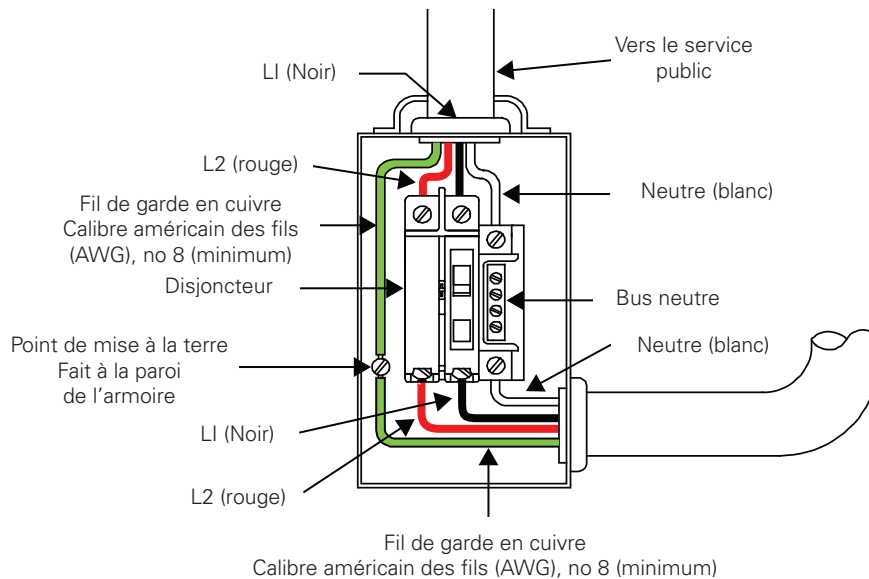


Fig. 8-25, Câblage typique d'un branchement de 240 VCA 60 Hz

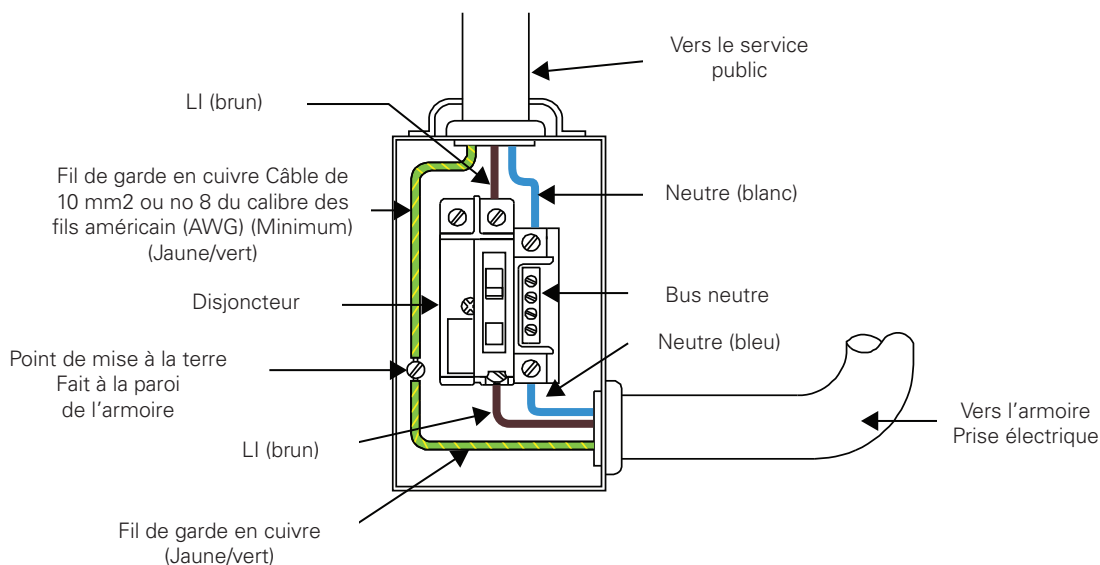


Fig. 8-26, Câblage typique d'un branchement de 230 VCA 50 Hz

Remarques sur la mise à la terre et la continuité des masses

Afin de fournir une source d'alimentation de secours prête et fiable, il est nécessaire de connecter le bloc d'alimentation à un système efficace de mise à la terre. Cela permet non seulement d'assurer la sécurité du personnel de service chargé de son opération et de son entretien, mais aussi de faciliter le bon fonctionnement et la protection des équipements du réseau. Un tel système de mise à la terre offre une protection en ce qui concerne la sécurité des opérateurs, la communication du système et la protection des équipements.

Les éclairs, la commutation du réseau ou d'autres aberrations sur la ligne électrique et/ou le câble de transmission sont susceptibles de provoquer des transitoires à haute énergie qui peuvent endommager les systèmes d'alimentation électrique ou de communication. La méthode la plus viable disponible pour protéger le système contre les dommages est de détourner ces transitoires à haute énergie indésirables le long d'une trajectoire à faible impédance vers la terre. Une trajectoire à faible impédance vers la terre empêche ces courants d'atteindre des niveaux de tension élevés et de constituer une menace pour les équipements.

La clé du succès de la protection contre la foudre est la mise à la terre en un point unique, de sorte que les composants du système de mise à la terre apparaissent comme un point unique d'impédance uniforme. Les deux endroits recommandés par Alpha pour la mise à la terre en un point unique sont les connexions dans l'armoire et les liaisons à la terre. La mise à la terre en un point unique dans l'armoire est réalisée en reliant toutes les connexions électriques à l'armoire, y compris la liaison à la terre, aussi près que possible de l'armoire. La mise à la terre en un point unique pour la liaison à la terre est réalisée, par exemple par la continuité des masses correcte avec des piquets de terre.

Connexion de mise à la terre et liaison à la terre en toute sécurité

La mise à la terre et la liaison à la terre en toute sécurité composent un système en deux parties, comprenant le service public et le système de mise à la terre Alpha.

1. Le service public :

Comme exigence minimale pour la protection des équipements Alpha, le service public local doit fournir une trajectoire à faible impédance pour le retour du courant de défaut. De plus, il doit y avoir une trajectoire de liaison à faible impédance entre la broche de mise à la terre du bloc d'alimentation et l'enceinte.

2. Le système de mise à la terre Alpha :

Le système de mise à la terre Alpha consiste en une connexion à faible impédance entre l'armoire et une prise de terre (située à au moins 2 mètres (6 pieds) de la liaison à la terre du service public).

Cette impédance entre l'armoire et la terre doit être de 25 ohms ou moins à 60 hertz, telle que mesurée par Amprobe^{MD} modèle DGC-1000 ou équivalent. La mesure doit être effectuée sur le fil ou le piquet de terre après sa sortie de l'armoire. Consultez votre code local ou le NEC 250.53.

Les conditions locales du sol détermineront la complexité du système de mise à la terre nécessaire pour satisfaire à la résistance de 25 ohms (maximum) spécifiée ci-dessus. Par exemple, un seul piquet de terre de 2,5 mètres (8 pieds) peut suffire pour répondre à l'exigence. Dans certains cas, un système plus élaboré peut être nécessaire, par exemple des piquets de terre multiples reliés par un câble en cuivre massif de calibre américain des fils (AWG) numéro 6 enterré à 2,5 mètres et jusqu'à 3,7 mètres (8 à 12 pieds) sous la surface. Si cela n'est pas possible, contactez un expert local en systèmes de mise à la terre pour trouver d'autres méthodes qui répondent à la spécification de 25 ohms (maximum).

Tous les raccordements de piquets de terre doivent être effectués au moyen d'une pince de mise à la terre homologuée, adaptée à l'enfouissement direct ou à la soudure exothermique.

Retour de puissance

Pour un fonctionnement correct, le Service Power Inserter (SPI) doit être solidement fixé à l'enceinte.

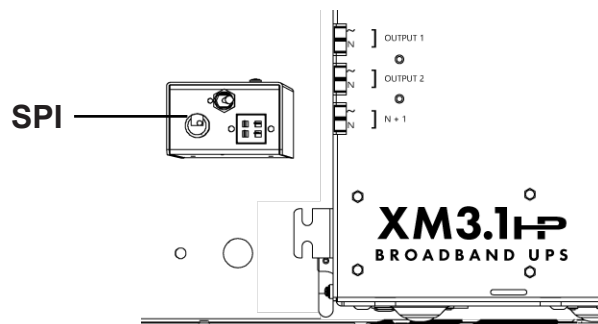


Fig. 8-27, Emplacement du SPI

Mise à la terre des lignes de transmission

Pour les systèmes utilisant un transpondeur intégré, la mise à la terre est généralement réalisée soit au moyen du châssis d'un bloc de mise à la terre séparé, collé à l'armoire, soit au moyen du matériel de fixation qui relie le transpondeur par l'intermédiaire du bloc d'alimentation CableUPS. Veuillez vous reporter au manuel du produit de communication approprié pour les procédures d'installation.

Pour les câbles de transmission, Alpha recommande fortement l'utilisation d'un dispositif de protection contre les surtensions relié électriquement à l'armoire Alpha.



AVERTISSEMENT! DANGER ÉLECTRIQUE

La mise à la terre à faible impédance est **obligatoire pour la sécurité du personnel** et essentielle pour le bon fonctionnement du système de câbles.

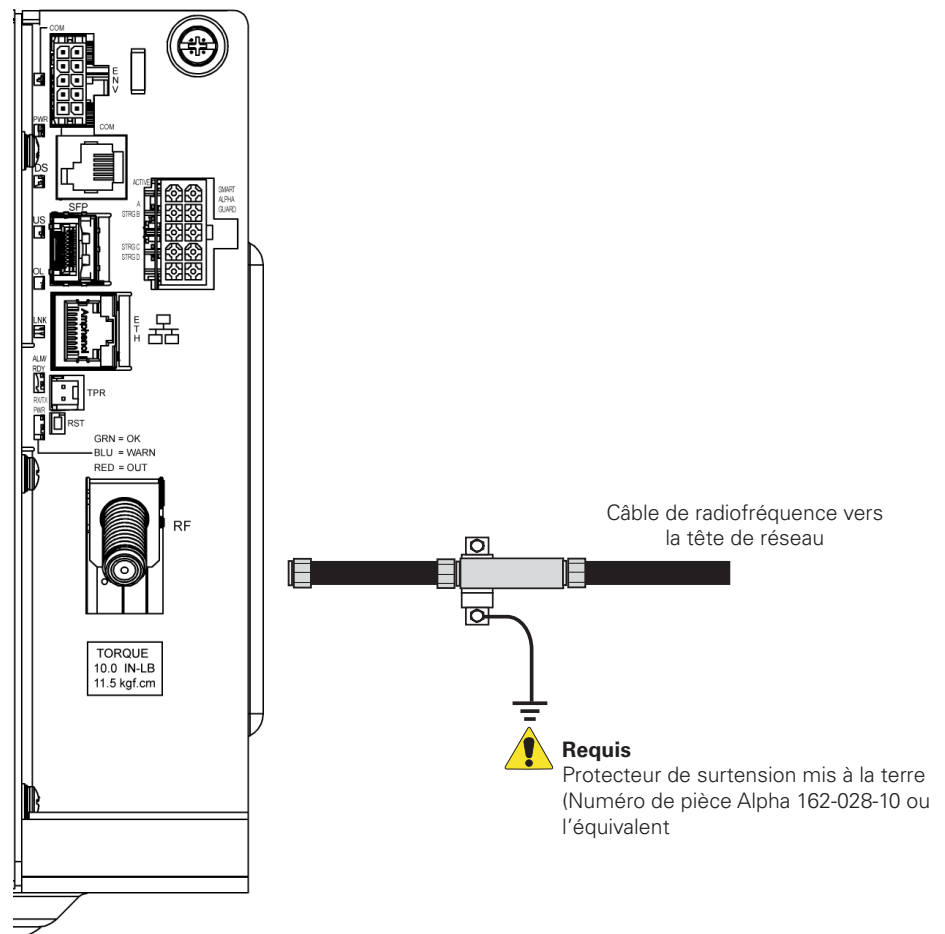


Fig. 8-28, Mise à la terre des lignes de transmission



an EnerSys® company

Alpha Technologies Services, Inc. | 3767 Alpha Way, Bellingham, WA 98226, USA

Tel.: Toll Free North America: +1 800-322-5742 | Outside US: +1 360-647-2360 | Technical Support: +1 800-863-3364

For more information visit www.alpha.com

© 2024 Alpha Technologies Services, Inc., an EnerSys company. All Rights Reserved. Trademarks and logos are the property of EnerSys and its affiliates except Amprobe®, NO-OX®, NEMA®, Anderson™, National Electrical Code®, NEC®, National Electrical Safety Code®, DOCSIS®, UL®, Puma™, Intel® CEC®, IEC®, IEEE®, RoHS®, and CSA®, which are not the property of EnerSys. Subject to revisions without prior notice. E.&O.E.

017-950-B0-001, Rev. C (06/2024)