

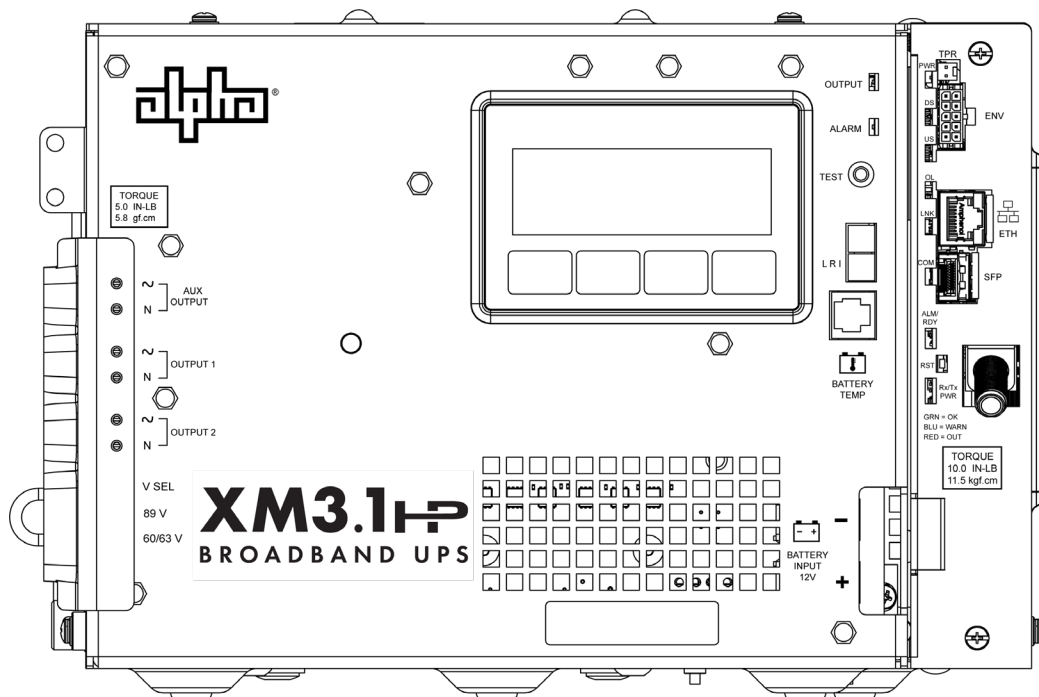
an EnerSys® company

Intelligent Broadband UPS™ Technical Manual

XM3.1-HP Series

3 & 5 Amp Models

Effective: April 2022



Safety Notes

Review the drawings and illustrations contained in this document 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.



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.

XM3.1-HP Intelligent Broadband UPS™

3 & 5 Amp Models

Technical Manual

017-947-B0-001, Rev. A

Effective Date: April 2022

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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® representative.

Alpha Technologies Services, Inc. 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 A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

Contact Information

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XM3.1-HP 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 symbols defined on page 2 have been placed throughout this manual. Where these symbols appear, use extra care and attention.

This equipment shall be installed or configured by qualified service personnel only, according to the installation instructions provided with each unit.

The equipment needs a suitable Fire Enclosure (non-compliant bottom openings) when not installed in one of the manufacturer's enclosures or open rack (manufacturer options) when installed in the final application.

This power supply has been investigated by regulatory authorities for use in a restricted access area. When not installed in one of the manufacturer's enclosures, open rack or shelf options described in this manual the power supply must be mounted over concrete or other non-combustible surface or installed in a separate enclosure.

The above models are not intended for direct outdoor installation.

This equipment is for use at up to 40°C ambient temperature for open manufacturer's rack applications (indoor) and at max 60°C ambient temperature when used inside manufacturer's enclosures (outdoor), Pollution Degree 3 environment, overvoltage category III.

The product was tested in a branch circuit protected by a 20 A circuit breaker. Additional evaluation shall be conducted if a higher protector is to be used in the end system.

The SFP port should only be used for optical implementations.

Battery testing was conducted with the manufacturer's recommended batteries (AlphaCell® series).

This equipment contains VDRs bridging insulation when provided with the optional MOV board.

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.

Veillez 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.

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 voltages. 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!

- 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.

ATTENTION:

This power supply has been investigated by regulatory authorities for use in various Alpha® enclosures. If you are using a non-Alpha enclosure, it is your responsibility to ensure your 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), from your person.
- 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.

Shipping Inspection

Remove the power supply from the shipping container. Confirm the power supply, including the Precision Temperature Sensor and all other ordered options, are included. 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.

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 (*box: Alpha p/n 966-681-10-001; foam insert: Alpha p/n 966-682-10*) 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.

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 used, it is the installer's responsibility to ensure the combination conforms to 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 an HACR (Heating, Air Conditioning, Refrigeration) 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 Connections

Proper 120VAC 15A service requires the installation site to be:

- Equipped with a 120VAC duplex receptacle which provides power to the power supply and peripheral equipment.
- **For 15A service:** Have a NEMA 5-15R receptacle that is protected by a single-pole, 15 amp High Magnetic (HM) circuit breaker inside the service entrance.
- 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

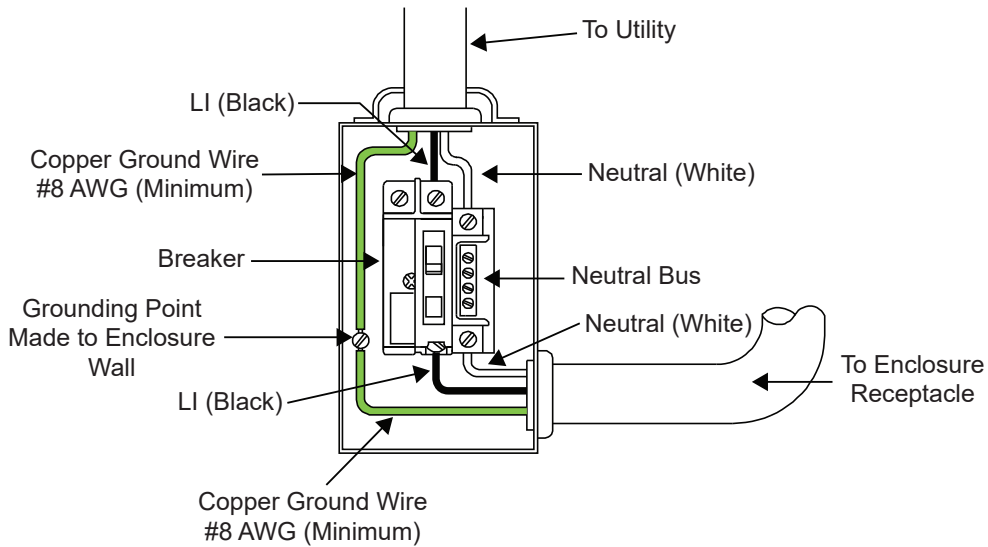


Fig. 0-1, Typical 120VAC Service Entrance Wiring

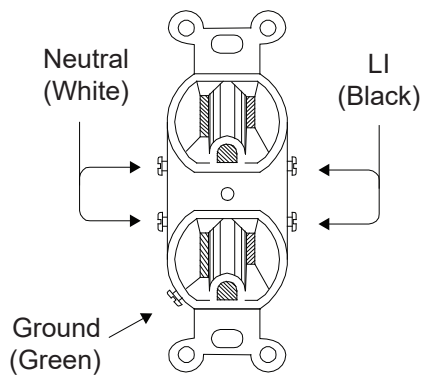


Fig. 0-2, Typical 120VAC 15A Receptacle Wiring, 5-15R (P/N 531-003-10)

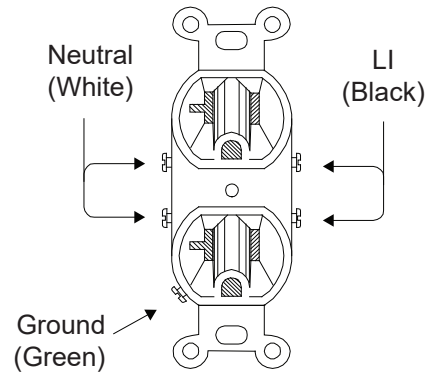


Fig. 0-3, Typical 120VAC 20A Receptacle Wiring, 5-20R (P/N 531-006-19)

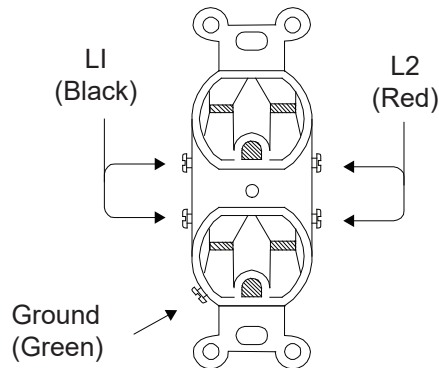


Fig. 0-4, Typical 240 VAC 15A Receptacle Wiring, 6-15R (P/N 531-004-19)

Utility Power Connection Notes, continued

Proper 240VAC 15A service requires the installation site to 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*).

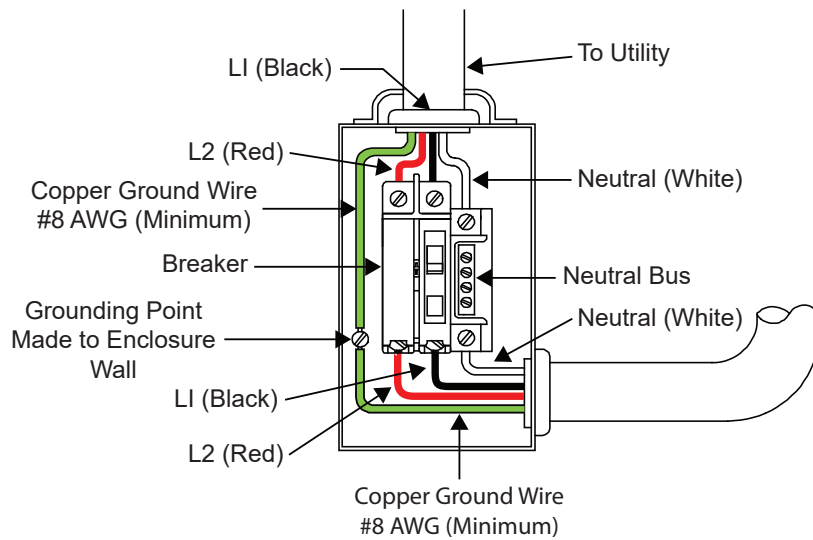


Fig. 0-5, Typical 240VAC 60 Hz Service Entrance Wiring

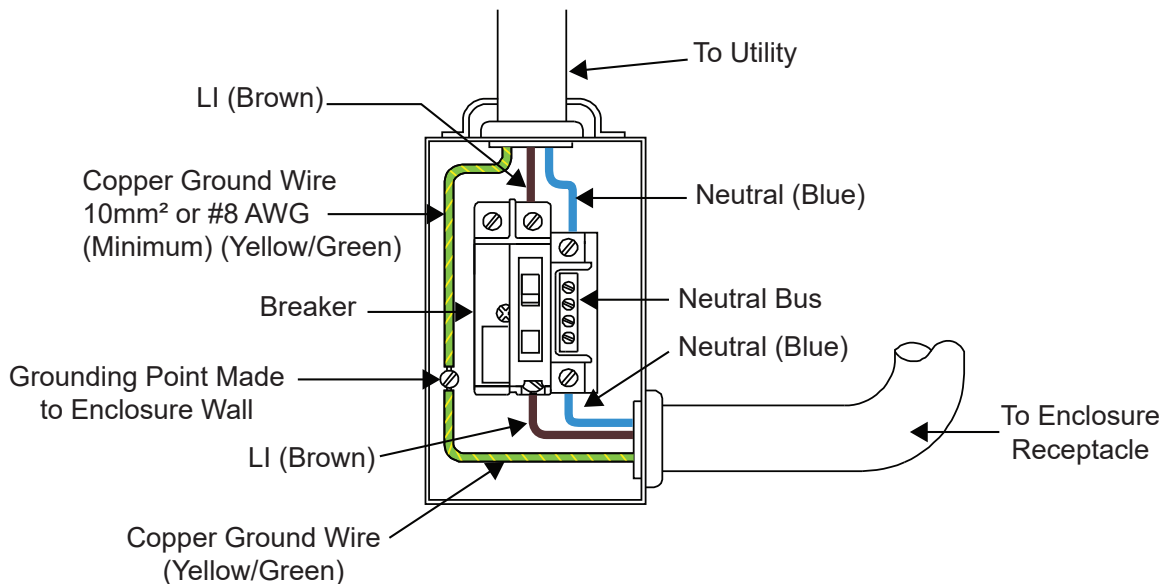


Fig. 0-6, Typical 230VAC 50 Hz Service Entrance Wiring

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, composed of the utility service and the Alpha system.

- 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.
- The Alpha[®] grounding system:
 - The Alpha grounding system consists of a low-impedance connection between the enclosure and an earth ground (located at least 6' away from the utility earth connection).
 - This impedance between the enclosure and earth must be 25 ohms or less at 60 hertz as measured by AMPROBE[®] Model DGC-1000 or equivalent. The measurement should be made on the wire or ground rod after it exits the enclosure.
 - Local soil conditions will determine the complexity of the grounding system required to meet the 25 ohm (maximum) resistance specified above. For example, a single 8' ground rod may be sufficient to meet the requirement. In some cases, a more elaborate system may be required such as multiple ground rods connected by a #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.
- In applications where there is no other enclosure provided (indoor MDU) and there is an SPI provided, a #6 AWG solid copper wire is to be connected from the external ground screw (see Fig. 1-6, item 23), to a suitable building ground.

Power Output Return

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

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[™]. 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.

1.0 Introduction

1.1 Alpha® XM3.1-HP Intelligent Broadband UPS™

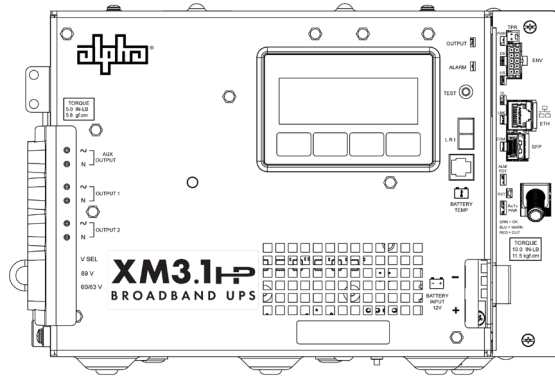


Fig. 1-1, Alpha XM3.1-HP Intelligent Broadband UPS

The XM3.1-HP powers signal processing equipment in cable television and broadband LAN distribution systems. It is composed of three main components - 1) transformer, 2) inverter, and 3) communications module. 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 automatically switches to inverter operation and maintains power to the load. During the switch to inverter operation, energy in the module's ferroresonant transformer continues to supply power to the load. In inverter mode, the power supply powers the load until the battery voltage reaches a low-battery cutoff point or the utility power returns.

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 inverter operation depends upon the type and number of batteries and the load on the power supply.

The XM3.1-HP Broadband UPS contains the following:

- Smart Display
- Inverter and Battery Charger
- Built-in Self-test
- Wide input voltage range
- High efficiency ferroresonant transformer
- Cable Modem Module Communications menu with DOCSIS® parameters (only with optional CMM installed)
- Two parallel output connectors
- Via the Smart Display, the operator can view all of the power supply's operating parameters
- Troubleshooting tips automatically displays in the Alarm menu screen
- Built-in metering circuits measure voltage and current without the need for external test equipment
- AlphaAPPs option for advanced functionality
- Precision Battery Temperature Sensor
- One Auxiliary Output for powering an enclosure ancillary device (110 or 220VAC)
- External Output Voltage Select

✓ **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 1.0A is applied.

1.0 Introduction, continued

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 transfer 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 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 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.
 - See Table 1-1 for battery specific EOD (end of discharge) settings. Operation is defined as follows:
1. Battery String Voltage Mode which shuts off the inverter when the 12V bus voltage reaches Low Battery Cutoff Voltage as seen at the inverter.

	AlphaCell® HP Batteries	AlphaCell® XTV Batteries	Other Batteries
	Fixed	Fixed	Fixed
String Low Battery Cutoff (EOD)	10.2 VDC (1.70 V/cell)	10.5 VDC (1.75 V/cell)	10.5 VDC (1.75 V/cell)

Table 1-1, Low Battery Cutoff

2. 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.

NOTICE:

This delay only applies if the inverter is still running and has not yet reached low battery cutoff. After low battery cutoff, the relay closes, and there is no delay when utility returns.

1.0 Introduction, continued



NOTICE:

If extreme low temperatures performance is expected then at least two 100AH batteries wired in parallel are recommended for loads above 3 Amps.

The following table highlights optimal XM3.1-905-HP runtimes with AlphaCell® HP and AlphaCell® XTV batteries at 77°F (25°C) with a power factor assumed at 1.00.

89 VAC @	1A or 89W						1.5A or 133W					
	100XTV	150XTV	195XTV	240XTV	3.5HP	4.0HP	100XTV	150XTV	195XTV	240XTV	3.5HP	4.0HP
1 Battery	307	441	555	636	592	644	209	298	379	438	406	441
2 Batteries	652	952	1185	1358	1250	1387	453	654	819	936	868	951
3 Batteries	997	1475	1828	2109	1918	2166	698	1021	1270	1457	1339	1490
4 Batteries	1341	2004	2479	2876	2590	2966	943	1393	1728	1992	1814	2044

89 VAC @	2A or 178W						2.5A or 222W					
	100XTV	150XTV	195XTV	240XTV	3.5HP	4.0HP	100XTV	150XTV	195XTV	240XTV	3.5HP	4.0HP
1 Battery	157	225	289	337	309	339	122	176	227	269	244	270
2 Batteries	348	501	629	720	670	729	276	396	500	573	533	579
3 Batteries	541	786	980	1122	1037	1143	433	625	782	894	830	908
4 Batteries	734	1076	1337	1535	1409	1570	590	858	1069	1224	1130	1249

89 VAC @	3A or 268W						3.5A or 311W					
	100XTV	150XTV	195XTV	240XTV	3.5HP	4.0HP	100XTV	150XTV	195XTV	240XTV	3.5HP	4.0HP
1 Battery	99	143	186	224	200	224	82	119	156	190	167	191
2 Batteries	227	325	413	476	441	480	191	273	348	404	373	406
3 Batteries	359	516	648	742	690	751	304	436	549	629	585	636
4 Batteries	491	711	888	1016	941	1034	418	602	754	862	801	876

89 VAC @	4A or 356W						4.5A or 400W					
	100XTV	150XTV	195XTV	240XTV	3.5HP	4.0HP	100XTV	150XTV	195XTV	240XTV	3.5HP	4.0HP
1 Battery	69	101	133	165	143	165	59	87	115	145	124	146
2 Batteries	164	234	300	350	321	352	142	204	262	308	281	309
3 Batteries	262	375	474	545	506	550	229	328	416	479	444	483
4 Batteries	362	520	653	747	694	757	317	455	573	656	611	664

89 VAC @	5A or 445W					
	100XTV	150XTV	195XTV	240XTV	3.5HP	4.0HP
1 Battery	52	76	101	129	109	130
2 Batteries	125	179	232	275	249	276
3 Batteries	203	290	369	427	395	430
4 Batteries	282	404	510	585	544	591


Table 1-2, XM3.1-HP-905 Runtimes

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 (Programmable)	OFF	ON (Programmable)	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 1-3, Charger Modes of Operation

 **NOTICE:**

If a battery type other than an AlphaCell® is installed, it is the responsibility of the technician to review the proper charging specifications for the battery used.

The Alpha® XM3.1-HP uses a three-stage (other), four-stage (AlphaCell® GXL and XTV), or five-stage (AlphaCell® HP) 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.

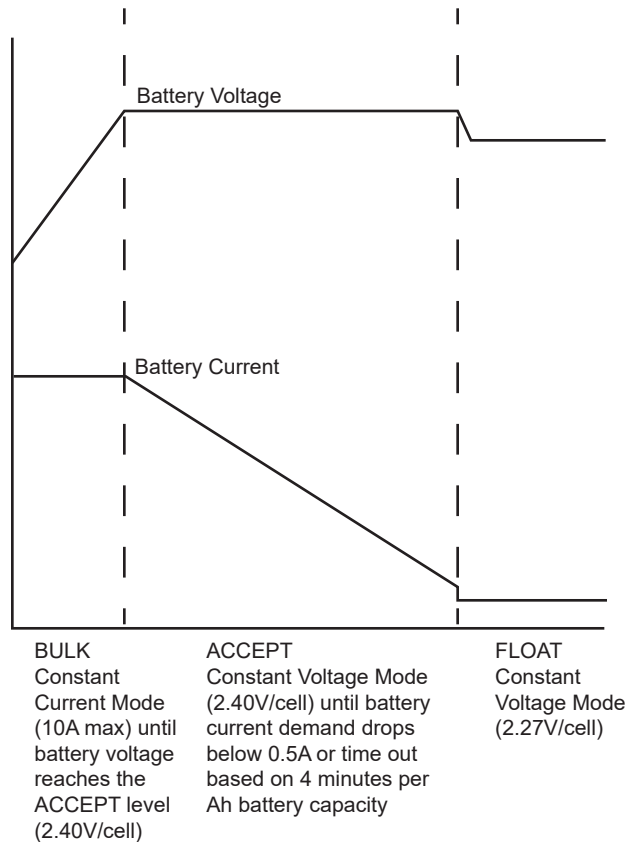


Fig. 1-2, 3-Stage Charger Modes

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 (See **Section 3.5, 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.

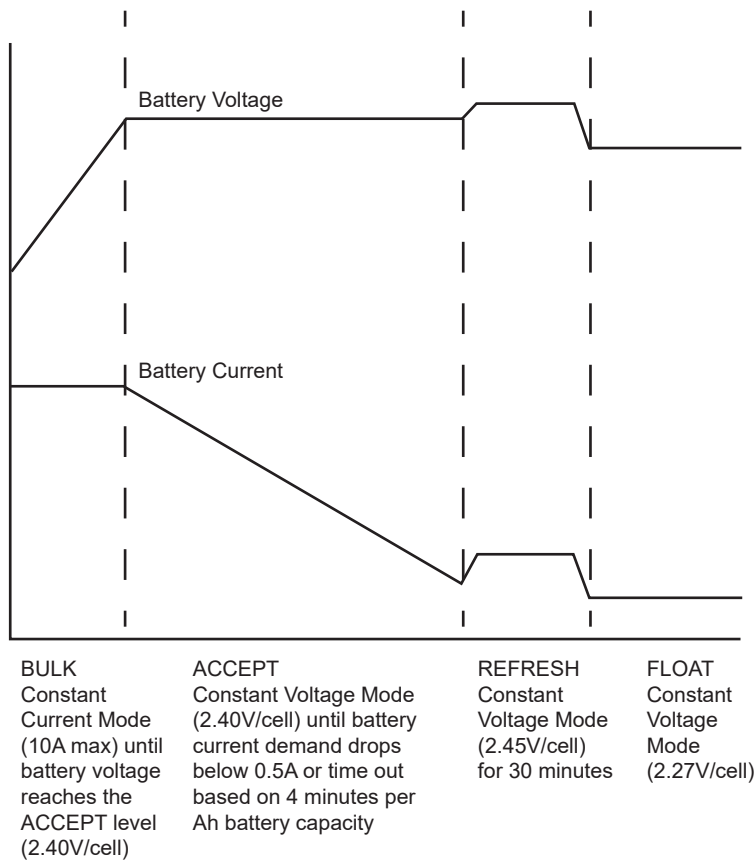


Fig. 1-3, 4-Stage Charger Modes

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.

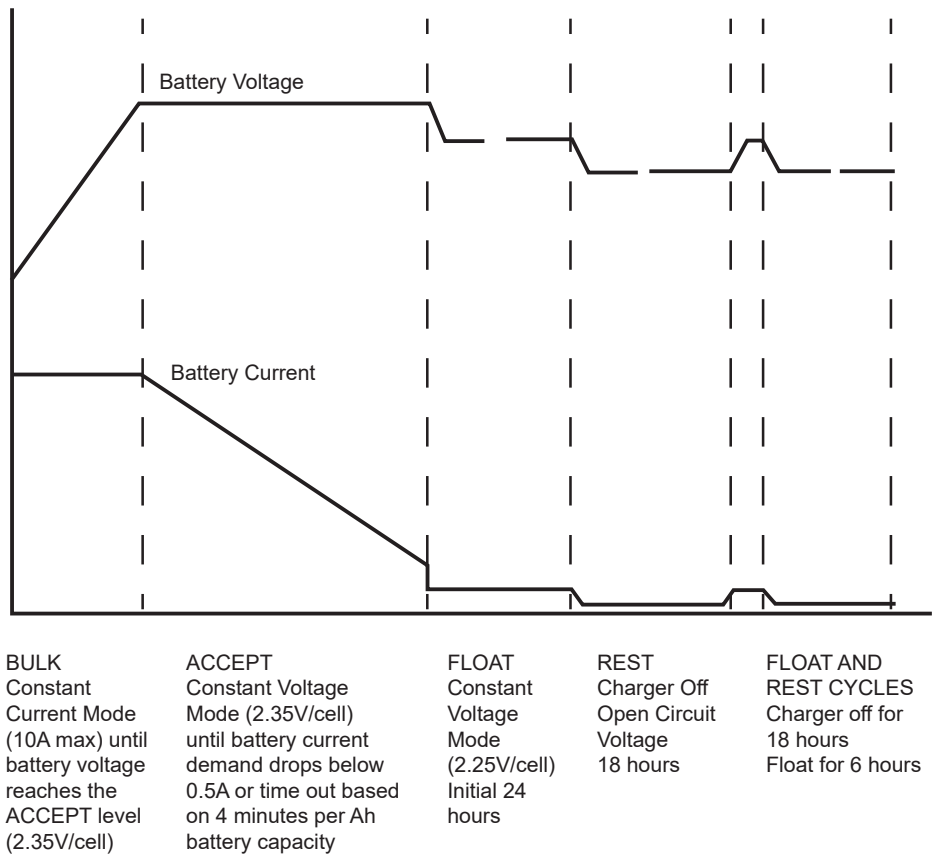


Fig. 1-4, 4-Stage Charger Modes for XTV Batteries

1.0 Introduction, continued

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

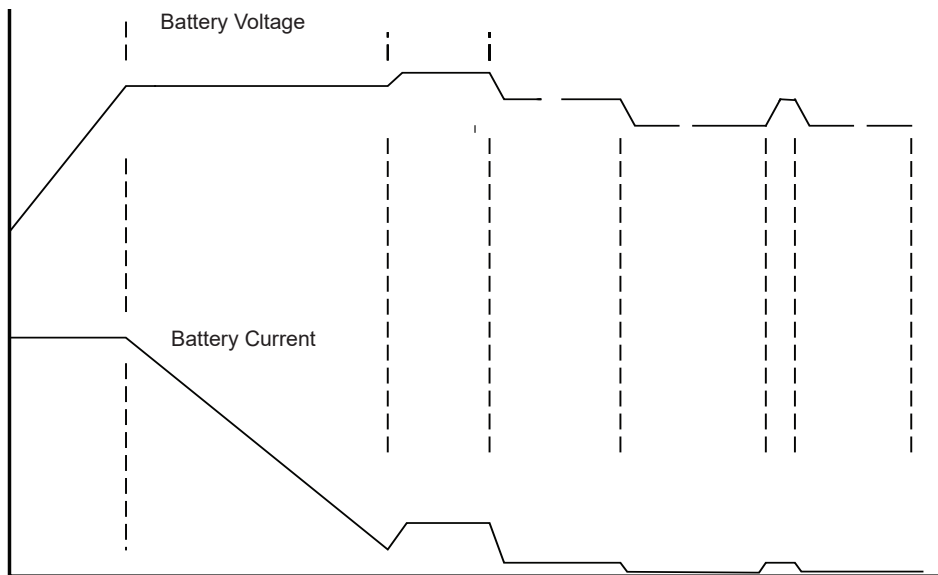
This preset value is applied to AlphaCell® HP batteries when selected in the Smart Display Menu.

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.

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.



BULK	ACCEPT	REFRESH	FLOAT	REST	FLOAT AND REST
Constant Current Mode (10A max) until battery voltage reaches the ACCEPT level (2.40V/cell)	Constant Voltage Mode (2.40V/cell) until battery current demand drops below 0.5A or time out based on 4 minutes per Ah battery capacity	Constant Voltage Mode (2.45V/cell) for 30 minutes	Constant Voltage Mode (2.27V/cell) Initial 24 hours	Charger Off Open Circuit Voltage 18 hours	CYCLES Charger off for 18 hours Float for 6 hours

Fig. 1-5, 5-Stage Charger Modes

1.0 Introduction, continued

1.2.4 Output Voltage Modes of Operation

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

Fine Mode:

In Fine Mode the power supply will maintain the tightest output voltage regulation possible, $-4\%/+1$ for 89V or $-4\%/+1.5$ for 60V/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 will maintain a wider output voltage regulation window, $-5\%/+1$ for 89V or $-6\%/+1.5$ for 60V/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.

RMODE Inverter Regulation:

Reduced Peak Mode is intended for power HFC devices that are sensitive to peak voltage. Reduced Peak Mode will lower the output peak voltage by approximately 20%. RMODE can be enabled locally via the Smart Display or remotely via the Alpha[®] Cable Modem web page.

Background: Legacy CATV HFC equipment may be more susceptible to the peak voltage of the XM3.1-HP 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 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.

1.3 Alpha® XM3.1-HP Broadband UPS™ Layout

The XM3.1-HP (3 and 5 Amp models) is composed of the following embedded modules:

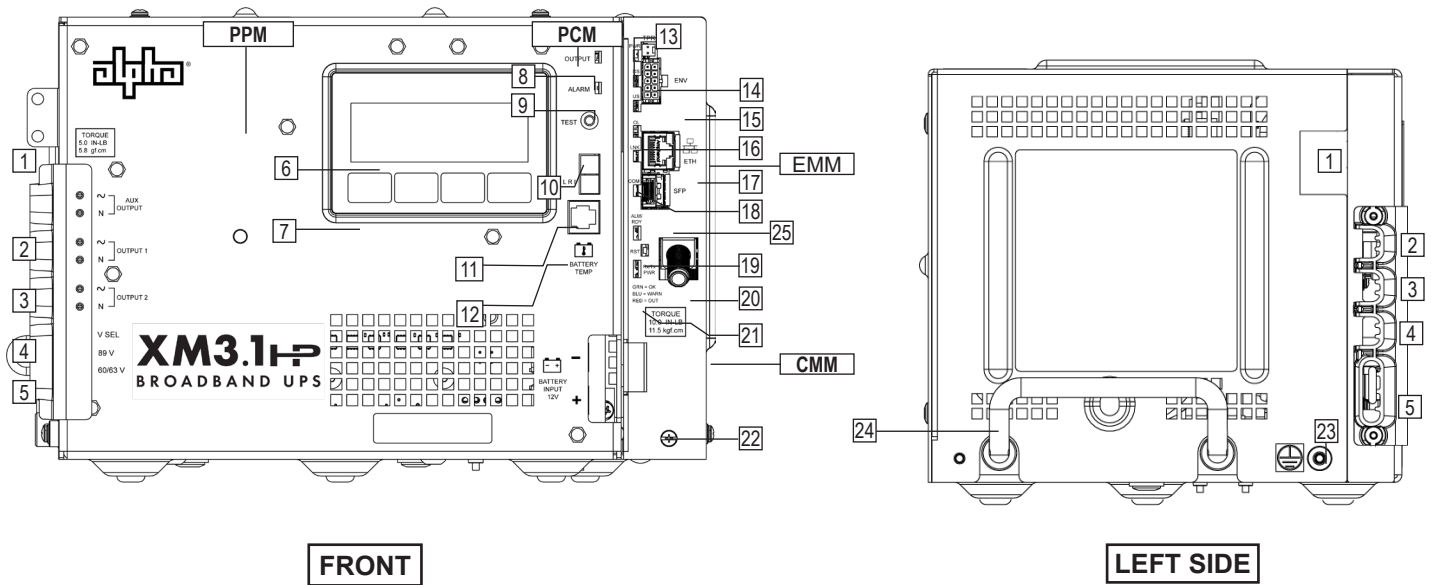
Transformer Module — provides a critical load with current-limited regulated AC power that is free of spikes, surges, sags and noise.

Power Processing Module (PPM) — contains circuits for the Inverter, Sensing, Relays and Input/Output power.

Power Control Module (PCM) — controls the core power supply functions such as Line Mode (AC Input), Inverter, Battery Charger, Data Storage and AC Output.

Element Monitoring Module (EMM) — is the interface between the Power Control Module and the Cable Modem Module (CMM). The EMM provides the necessary data storage and performs advanced functions such as logging power supply events, utility events, and battery health analysis. Additionally, the EMM provides the interface for the local web page and logic for the ancillary equipment such as tamper switches. **NOTE: Should the EMM be removed, the Smart Display will be disabled.**

Cable Modem Module (CMM) — interfaces with the EMM to provide the necessary communication over the DOCSIS® and Ethernet networks. The CMM enables the local Ethernet port for local web server access. The CMM may be removed from the power supply along with the EMM. **NOTE: Smart Display functionality will cease until the EMM is installed.**



- | | | |
|--|---|-------------------------------|
| 1 Line Cord IEC Input | 10 Self-Test Button | 19 Alarm / Ready |
| 2 Aux Output, 110VAC/220VAC, RMS | 11 Local/Remote Indicator (LRI) Connector | 20 RF Connector for CMM |
| 3 Output 1 [Voltage set by Vout Selection] | 12 Precision Temperature Sensor (PTS) Connector | 21 Rx/Tx Power Indicator |
| 4 Output 2 [Voltage set by Vout Selection] | 13 Cable Modem Power (PWR) Indicator | 22 Battery Input 12V |
| 5 Vout Selection Tap Terminal Block | 14 Tamper (TPR) Switch Connector | 23 External Ground Connection |
| 6 Smart Display | 15 Environmental Control Connector | 24 Folding Handle |
| 7 Soft Keys | 16 Upstream/Downstream Indicator for CMM | 25 SFP Port |
| 8 Output LED | 17 Ethernet (ETH) Connector | |
| 9 Alarm LED | 18 LNK: CPE Link Status | |

Fig. 1-6, Main features of the XM3.1-HP Series Power Supply

1.0 Introduction, continued

1.3.1 Inverter Overview

The non-removable inverter provides uninterrupted power to the ferroresonant transformer (via the battery) 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.
- 3** Output LED: Indicates output state of the Alpha XM3.1-HP.
- 4** Alarm LED: Indicates Alarm condition.
- 5** Self-test button: Initiates or stops Self-test.
- 6** Local/Remote Indicator Connector: Indicates alarm condition to exterior lamp on enclosure.
- 7** The Precision Temperature Sensor (PTS): Plugs directly into the Temperature Probe (RJ-11C type) Connector.
- 8** Battery Input 12V: The battery cable connector plugs directly into the Inverter battery input connector. The connector is polarized and fits in one direction only.

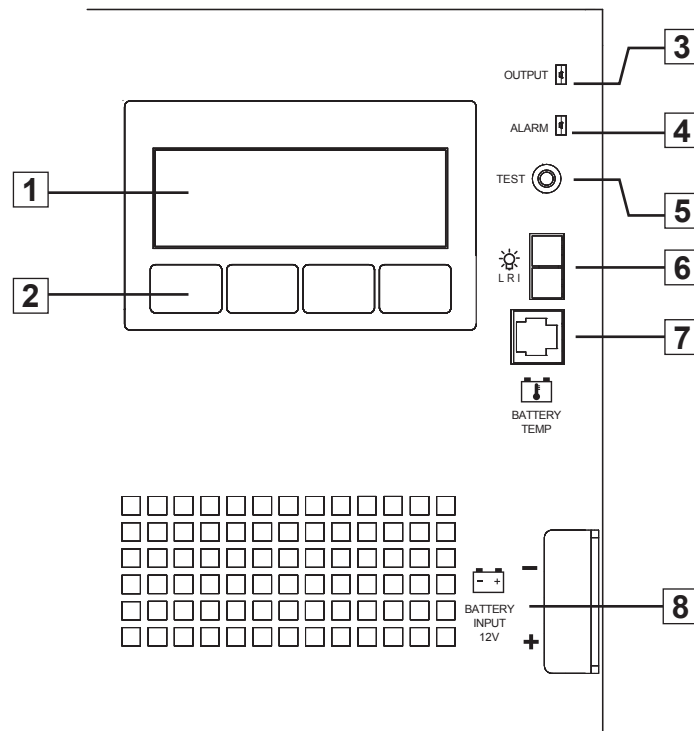


Fig. 1-7, Inverter Connections

1.3.2 Cable Modem Module

The embedded Cable Modem Module (CMM) may be ordered factory-installed or as a user-installed field upgrade (for full installation instructions refer to the communication module technical manual). 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.

NOTICE: If a display error such as a dark screen or black boxes appears on the Smart Display, or the operator is replacing the CMM, verify the top and bottom front panel mounting screws on the CMM are tightened to ensure a proper connection.

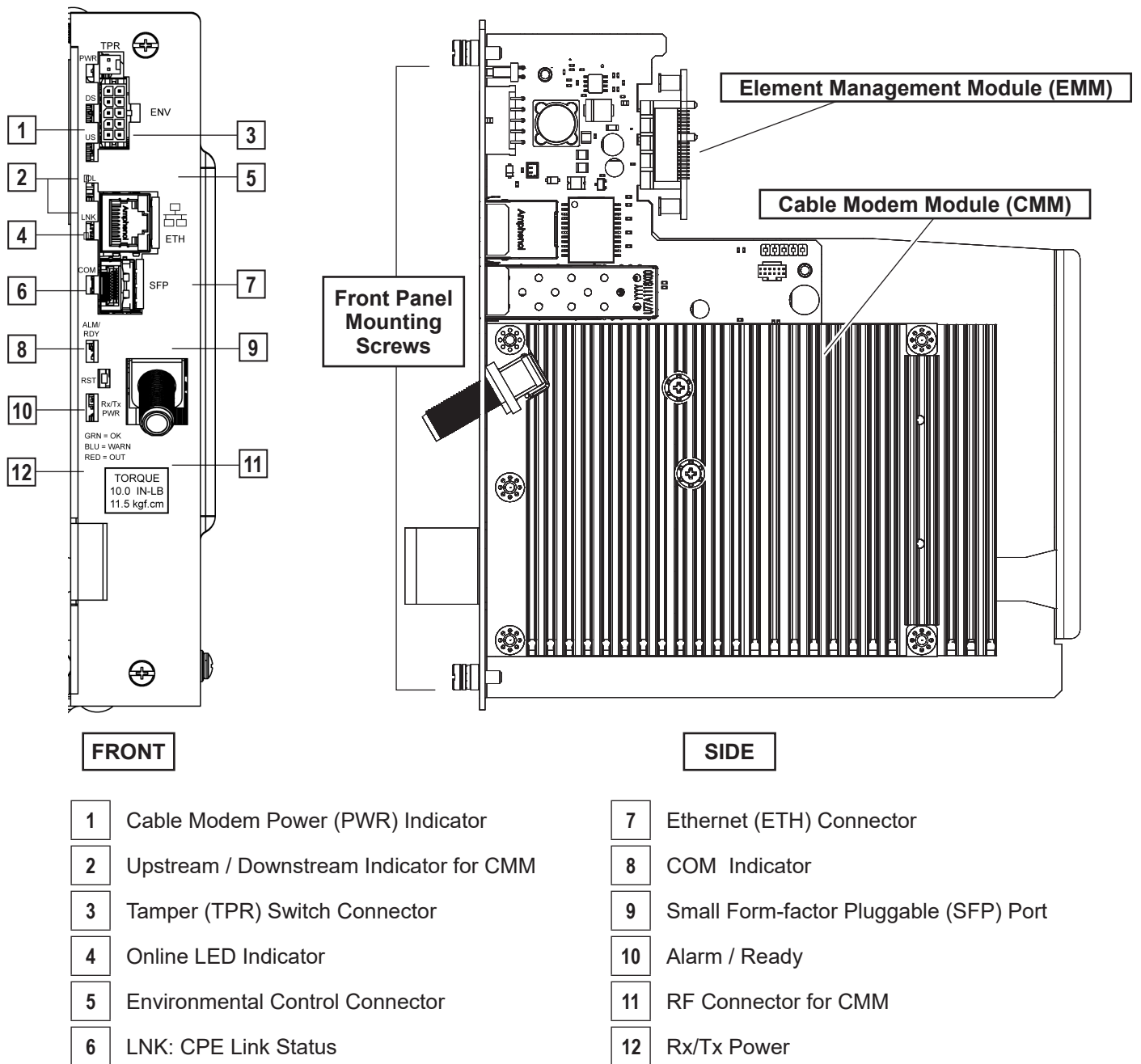


Fig. 1-8, Cable Modem Module Features

2.0 Installation

This section describes the procedures for installing the power supply in the enclosure and preparing it for turn-up and test. The procedures are laid out in the following subsections:

- 2.1 Installing The Power Supply
- 2.2 Pre-Service Connection Procedure
- 2.3 Battery Installation and Connection
- 2.4 Cable Modem Module Status Monitor
- 2.5 Power Module Configuration and Installation Procedure



CAUTION!

Before installation, verify the shelf, rack or enclosure has been properly installed per its instructions. That utility power is available, in compliance with NEC (National Electric Code) and matches the product voltage rating per the product label.

2.1 Installing the Power Supply

The XM3.1-HP can be shelf-mounted within a variety of Alpha® enclosures. Read and follow all safety instructions and the preliminary inspection below prior to installation of the power supply.

2.2 Pre-Service Connection Procedure

1. Verify Service Power Inserter (SPI) toggle switch is set to the ALT position (Fig. 2-1).



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), from your person.
 - 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.
2. Remove the plastic output terminal cover and verify the desired output voltage is selected by moving the wire jumper to the 60VAC/63VAC or 89VAC selection. Tighten to 5.0 in-lb / 5.8kgf.cm. A 0.6 × 3.5mm slotted screwdriver is recommended. Refer to the Specification table (**Section 6.1, Specifications, North American models** and **Section 6.2, Specifications, International Models**) for output voltage capabilities for your model. Plug the connector for the optional Local/Remote Indicator (LRI) into the front panel of the power supply at this time.
 3. Make the following CMM connections:
 - a. RF Cable to CMM RF Connector. Tighten to 10in-lb ± 1in-lb
 - b. Environmental cable (e.g., PoE control, Battery heater mat control) to ENV connector
 - c. Tamper switch cable into TPR connector
 4. Connect the power leads from the SPI (network load) to the Output 1 connector; Black to ~, White to N. Tighten to 5.0 in-lb / 5.8kgf.cm. A 0.6 × 3.5mm slotted screwdriver is recommended.
 5. If used, connect the power leads from a second SPI (e.g., fan) to the Output 2 connector (optional); Black to ~, White to N. Tighten to 5.0 in-lb / 5.8kgf.cm. A 0.6 × 3.5mm slotted screwdriver is recommended.
 6. Turn on AC breaker (located on the enclosure) and verify the correct (per unit's nameplate voltage) utility voltage is present at the outlet before plugging the XM3.1-HP line cord into the utility outlet.

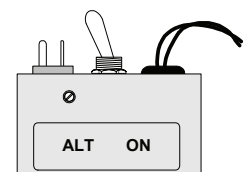


Fig. 2-1, SPI Toggle Switch
(shown in ALT position)

2.3 Battery Installation and Connection

Tools Required:

- True RMS Digital multimeter
- Box end wrenches, insulated
- NO-OX® Corrosion Inhibitor
- Socket wrenches, insulated
- Torque wrench calibrated in in-lbs



WARNING! ELECTRICAL HAZARD

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



NOTICE:

The battery terminal hardware is subject to change based on battery make and model.

1. Load batteries with the positive terminals (+) facing forward. Coat the hardware and battery terminals with electrical contact lubricant and assemble the battery cables, PTS and hardware as shown in the illustrations below. Torque hardware to 110 in-lbs (12.43 Nm).
2. The 12V batteries can be wired in parallel, up to four batteries total, to extend standby runtime. Other factors such as cabinet size and company policies may depict the number of batteries utilized at a specific site. For sites with multiple batteries, the individual battery voltages are not available in monitoring systems due to the parallel wiring connectivity.
3. With a MIDTRONICS™ Conductance meter (Celltron® Essential, Celltron® Advanced or equivalent) measure the conductance value (mhos) of each battery and record for use in Section 3.5, *Battery Installation and Configuration*. Also, record the battery date code on the battery label for entry on the DATE SET screen.
4. Connect the Battery Cable Connector to the power supply.

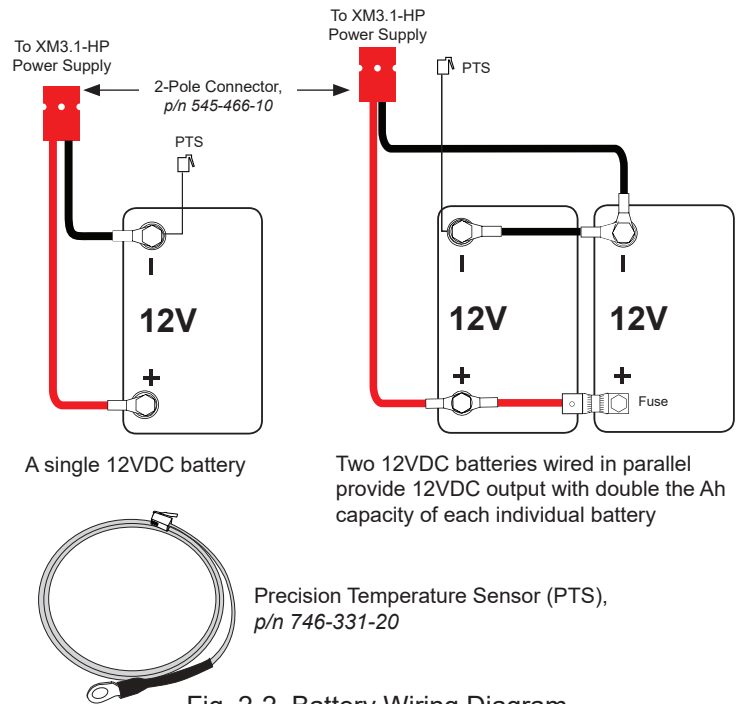


Fig. 2-2, Battery Wiring Diagram



CAUTION!

Use M6 × 20 mm bolts for threaded insert terminals on the AlphaCell® 100XTV. If using a spacer for the in-line fuse link, use M6 × 30 mm bolts. For AlphaCell® 4.0HP batteries, use 1/4" 20 UNC bolts for insert terminals. If using a spacer for the in-line fuse link, use 1/4-20 × 1-1/4" bolts.

Threaded Insert Terminals

Threaded insert terminals require the use of 1/4-20 × 3/4" (M6 x 20 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 conductive electrical grease (NO-OX® Corrosion Inhibitor) on all exposed connections. Torque all nuts and bolts to 110 in-lbs (12.43 Nm).

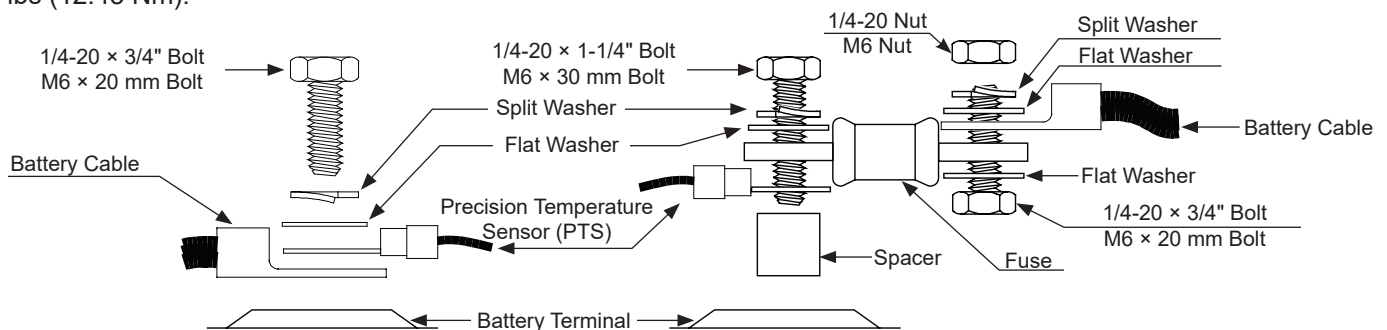


Fig. 2-3, Hardware Stack-up, Non-Fused Connection

Fig. 2-4, Hardware Stack-up, Fused Connection

2.4 Cable Modem Module Status Monitor

2.4.1 DOCSIS Cable Modem

CMM LED Indicators and Connection Points

Connect the RF drop according to the diagram below. The RF drop must have a properly installed grounded surge protector in the power supply enclosure.

The DOCSIS specification for downstream power is +/-15 dBmV. For optimal performance, set the level as close to 0 dBmV as possible.

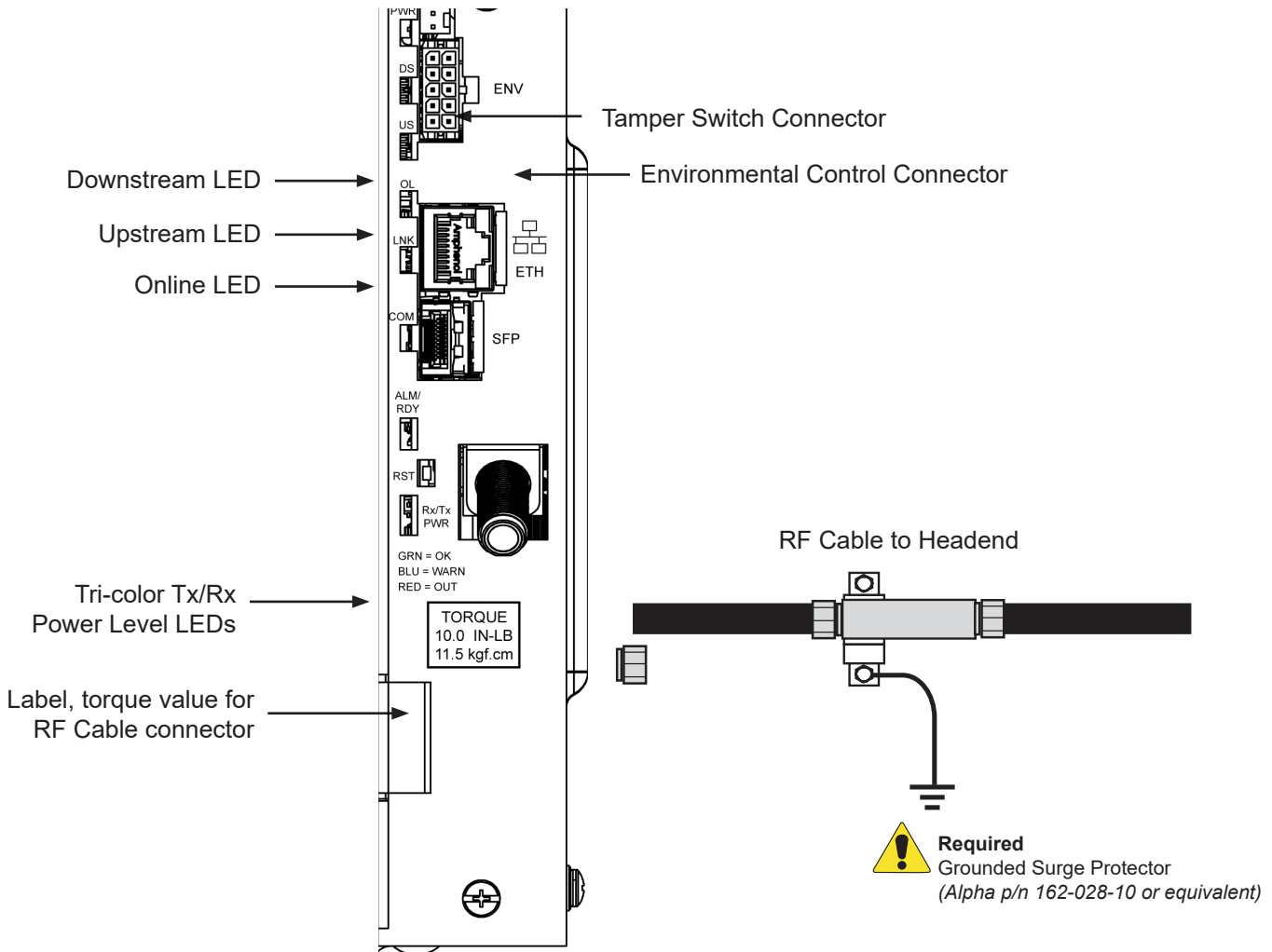


Fig. 2-5, CMM Connections and LEDs

NOTICE:

The warranty may be void if the grounded surge protector is not used.

2.0 Installation, continued

CMM 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)

Table 2-1, CMM LEDs

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

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

- Blue Rx/Tx Power LED indicates Rx/Tx Power at a warning level. Make the necessary RF level adjustments.
- Red Rx/Tx Power LED indicates Rx/Tx Power at an alert level. Make the necessary RF level adjustments.

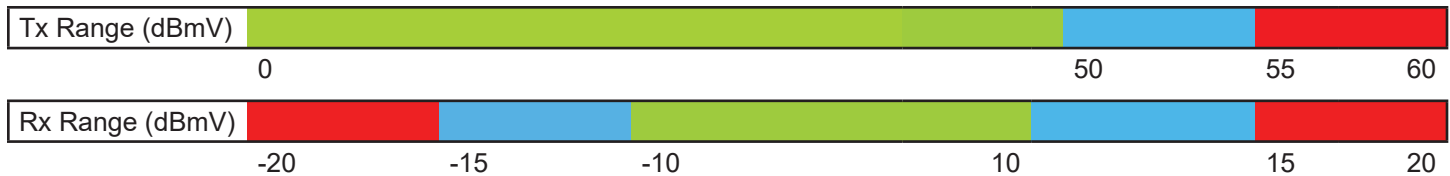


Table 2-2, CMM Receive (Rx) and Transmit (Tx) LEDs

✓ **NOTICE:**

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

2.0 Installation, continued

2.4.2 SFP Optical Connection

The CMM can use an optical link instead of a DOCSIS RF cable for communicating status monitor information.

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. 2-6). Insert the associated fiber(s) into the opening on the protruding end of the module. (An 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.



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.

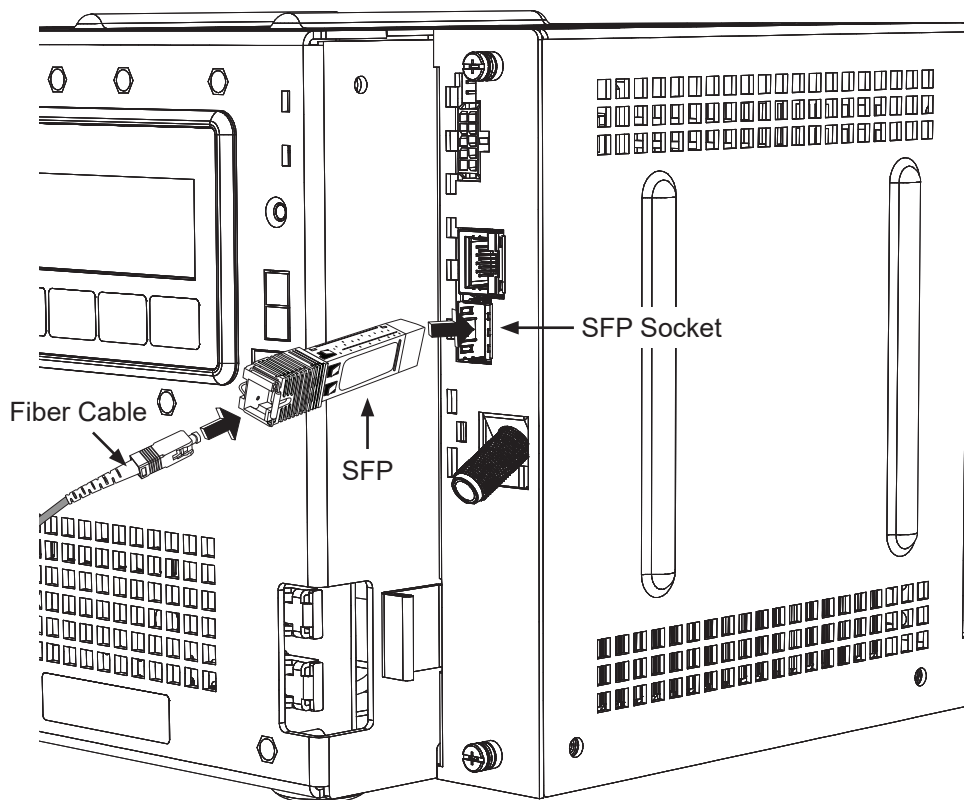


Fig. 2-6, Installing SFP and Fiber Connection

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.

2.0 Installation, continued

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 and transmit power levels are acceptable (or the SFP module doesn't report power status).
- **BLUE:** There is a WARNING for the receive power level.
- **RED:** There is an ALARM for the receive 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 3.6) or the SFP web page (Section 2.9).

2.4.3 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 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.

2.4.4 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.

2.5 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.

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

1. Verify all connections are correct.
2. 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.
3. Toggle SPI switch to ON.
4. 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.

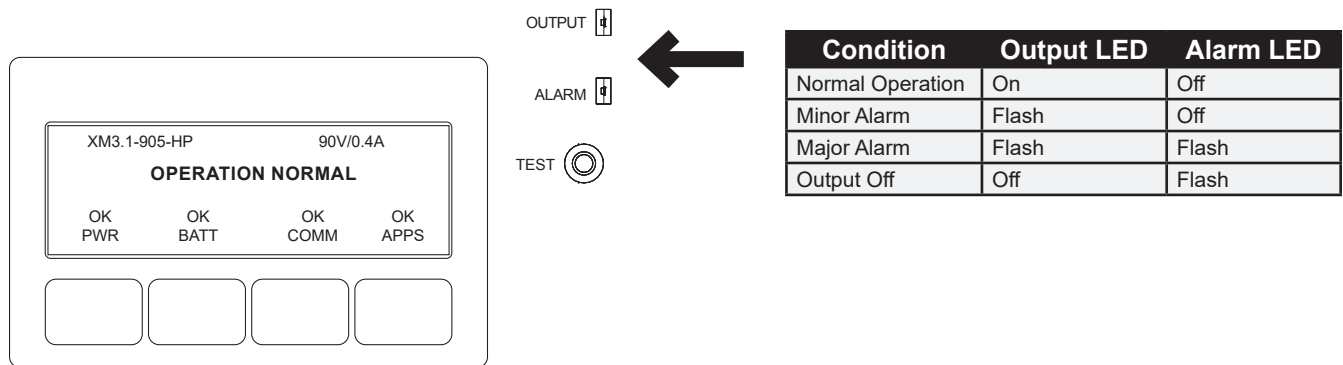


Fig. 2-7, Active Alarm Table

5. 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.
6. Press **UP** or **DOWN** to select the alarm of interest.
7. Press **ENTR** to select the alarm and display diagnostic information. Press **ESC** to return to the alarm list.
8. Enter Battery Type (or parameters) and number of battery strings. Battery type entries can be made on the LCD screen.
9. Enter the battery DATE code and the mhos (conductance) readings. Battery date and mhos entries can be made on the LCD screen (see Figs. 2-8 and 2-9).

2.0 Installation, continued

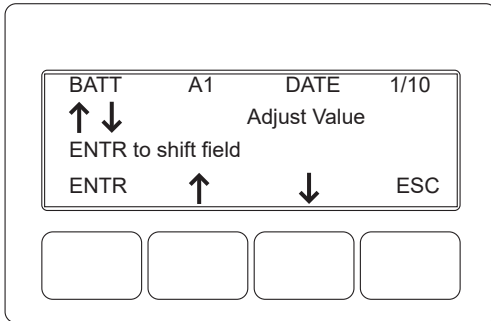


Fig. 2-8, Enter Battery Date Code

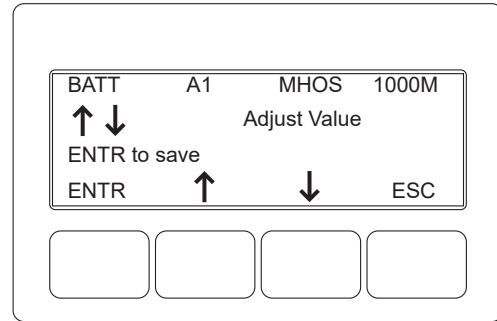


Fig. 2-9, Enter Battery Mhos Reading

✓ **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.

10. 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, Start-Up and Test**).
11. Perform standby test by shutting off utility breaker and verifying unit goes into standby and supports the load.
12. Re-apply AC power and verify unit goes to Line Mode.

✓ **NOTICE:**
 Two output connectors will be present on the side of the front panel labeled Output 1 and Output 2. The two connectors are wired in parallel by means of an internal split ("Y") wiring harness.

✓ **NOTICE:**
 The default language is set to English. Unless the XM3.1-HP 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 Figure 2-10.

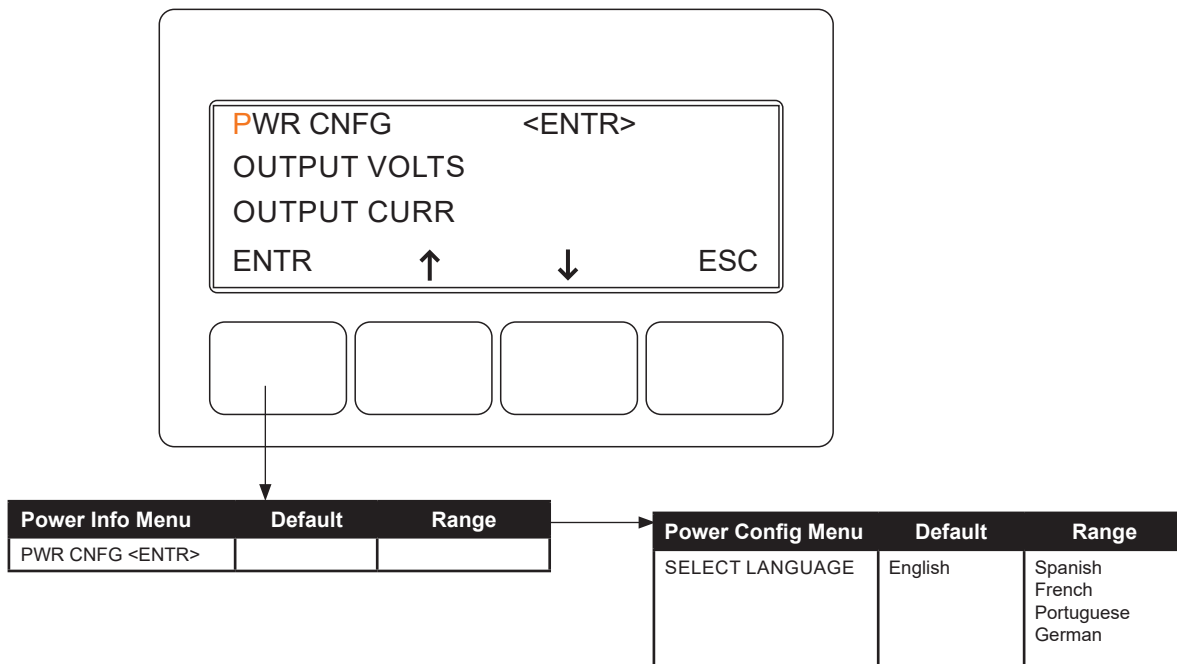


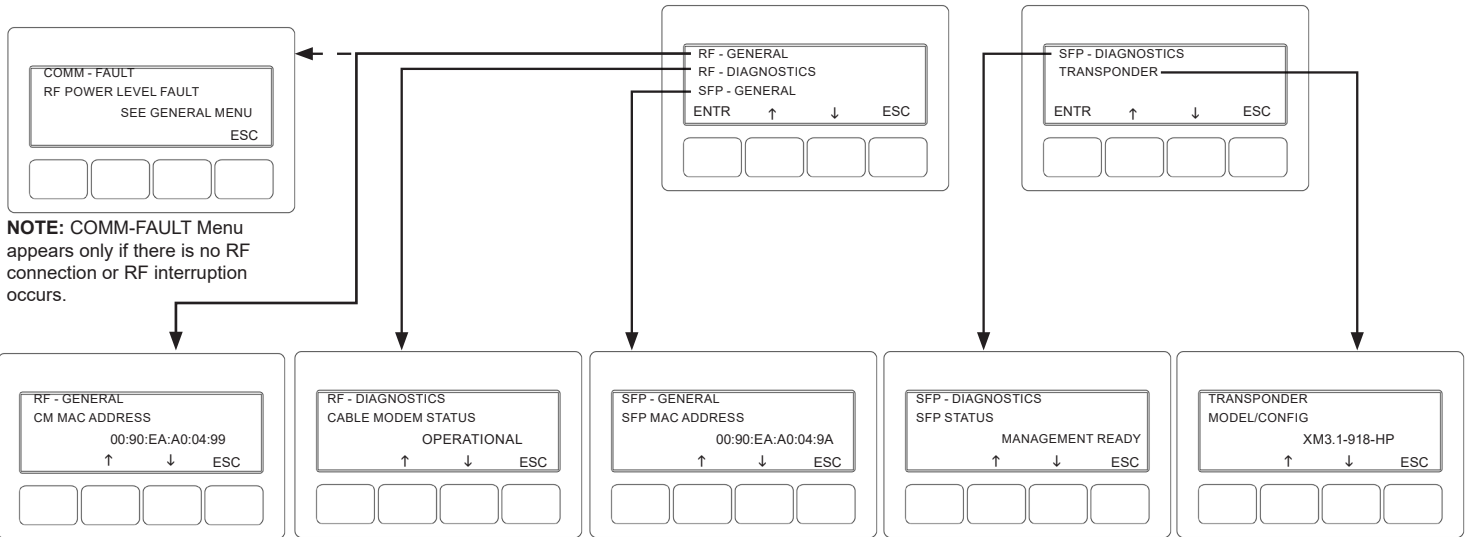
Fig. 2-10, Select Language in PWR CNFG Menu

2.6 Local Verification of DOCSIS Cable Modem Module (CMM)

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

The DS (Downstream), US (Upstream) and OL (Online) LEDs on the front of the CMM should be ON solid green. This indicates successful registration with the headend. 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 CMM 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. Figure 2-11 provides a list of parameters available on the XM3.1-HP Smart Display populated with sample values.



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

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

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

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.

TRANSPONDER	
MODEL/CONFIG	XM3.1-918-HP
FIRMWARE VERSION	XM3.1-0.31.00.1912011841.JENKINS ¹
SYSTEM NAME*	ABC123 CABLE
SYSTEM CONTACT ²	JOHN DOE
SYSTEM LOCATION ²	123 BAKERVIEW
COMMON LOGICAL ID	XM3.1HP
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. 2-11, COMM Menu Options

2.7 Web Interface

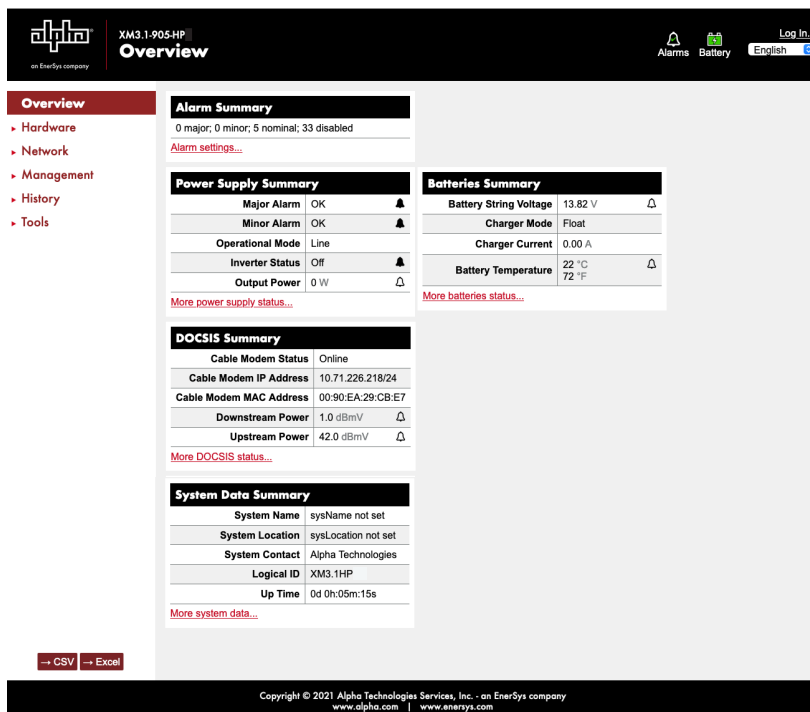
Overview

The Cable Modem Module (CMM) 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.

2.7.1 Local Web Server Access

The Cable Modem Module’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 CMM web server interface to verify/configure common communication parameters and view power supply status and battery values. The Ethernet port on the CMM is a fully functional standard Ethernet port, capable of providing all the functionality of any standard Ethernet connection.

To access the CMM 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
- Active Scripting
- Show Pictures

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

Fig. 2-12, XM3.1-HP Overview Web Page
(Data values shown for illustration purposes only.)

1. Connect a standard Ethernet cable (CAT5 or better) between the CMM Ethernet port (ETH) and a laptop or computer’s network interface port.
2. Launch a web browser.
3. Enter the CMM'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. 2-11). **Note: For the Cable Modem Module, this may take up to a minute when the CMM is initially powered up.**
5. Click the **Language** drop down menu located in the upper right corner to select a desired language for the text information on the web page. The language choices are English (default), Spanish, Portuguese, French & 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 2.7.3, Web Interface Security Levels.**

NOTICE:

If you are unable to view the home page of the Cable Modem Module (CMM) using IP address 192.168.100.1, the network configuration on the computer that is being used to connect to the CMM 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. You will see a dialog box much like Fig. 2-13; click **Internet Protocol (TCP/IPv4)** and then click the **Properties** button.

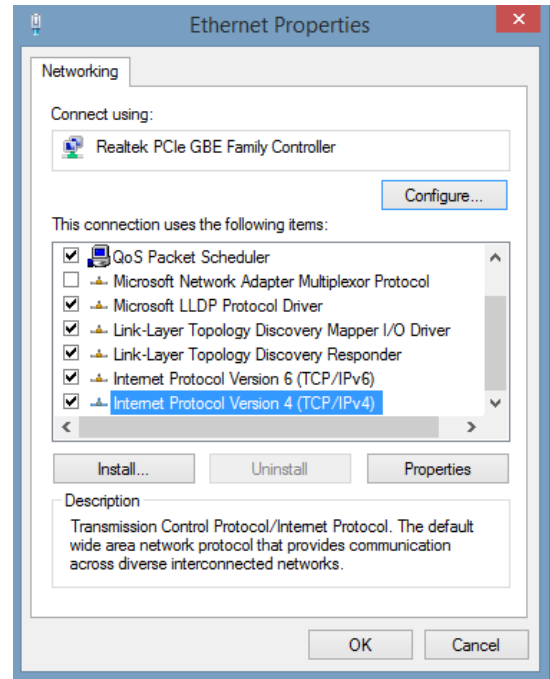


Fig. 2-13, Local Area Connection Properties Screen, Windows 10

7. The Internet Protocol (TCP/IP) Properties dialog box will open (Fig. 2-14). 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 Cable Modem Module once again using 192.168.100.1 in the web browser.

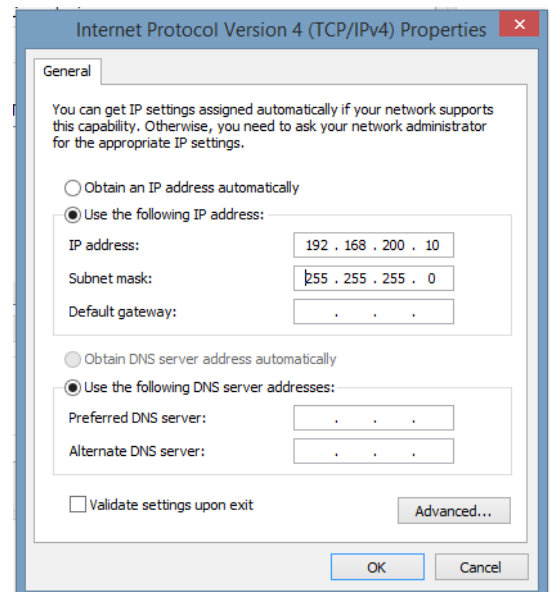


Fig. 2-14, Internet Protocol (TCP/IP) Properties Screen, Windows 10

2.0 Installation, continued

2.7.2 Remote Web Server Access

To remotely access the CMM web server utilizing 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 Cable Modem Module's 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 CMM's web server home page will appear (Fig. 2-15).
5. The web page language will default to the language set on the XM3.1-HP. To change the language, click on the Language drop down menu in the upper right corner to select a desired language for the text information on the web page. English, Spanish, Portuguese, French, German and Chinese 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 2.7.3, Web Interface Security Levels**.

7. Information on the web page can be exported as either an Excel® spreadsheet or CSV file. This option is available on the lower left of the web page in the navigation panel. See below.

The screenshot shows the web server overview page for an XM3.1-905-HP device. The page includes a navigation menu on the left with options like Hardware, Network, Management, History, and Tools. The main content area is divided into several summary sections: Alarm Summary (0 major, 0 minor, 5 nominal, 33 disabled), Power Supply Summary (Major Alarm OK, Minor Alarm OK, Operational Mode Line, Inverter Status Off, Output Power 0 W), Batteries Summary (Battery String Voltage 13.82 V, Charger Mode Float, Charger Current 0.00 A, Battery Temperature 22 °C / 72 °F), DOCSIS Summary (Cable Modem Status Online, Cable Modem IP Address 10.71.226.218/24, Cable Modem MAC Address 00:90:EA:29:CB:E7, Downstream Power 1.0 dBmV, Upstream Power 42.0 dBmV), and System Data Summary (System Name sysName not set, System Location sysLocation not set, System Contact Alpha Technologies, Logical ID XM3.1HPL, Up Time 0d 0h:05m:15s). In the top right corner, there are icons for Alarms, Battery, and a Log In button. Below the Log In button is a language selection dropdown menu currently set to English. At the bottom left, there are buttons for CSV and Excel export. Annotations with arrows point to the Log In button, the Language Selection dropdown, and the CSV/Excel export buttons.

0 major, 0 minor, 5 nominal, 33 disabled
--

Major Alarm	OK
Minor Alarm	OK
Operational Mode	Line
Inverter Status	Off
Output Power	0 W

Battery String Voltage	13.82 V
Charger Mode	Float
Charger Current	0.00 A
Battery Temperature	22 °C / 72 °F

Cable Modem Status	Online
Cable Modem IP Address	10.71.226.218/24
Cable Modem MAC Address	00:90:EA:29:CB:E7
Downstream Power	1.0 dBmV
Upstream Power	42.0 dBmV

System Name	sysName not set
System Location	sysLocation not set
System Contact	Alpha Technologies
Logical ID	XM3.1HPL
Up Time	0d 0h:05m:15s

English
Español
Français
Português
Deutsch

Fig. 2-15, Web Server Overview Page

2.0 Installation, continued

2.7.3 Web Interface Security Levels

There are two levels of function-specific security. General operations are set at "basic" access and configuration-related functions are set at "administrator" access. Default User Name 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

2.7.4 Navigating the Web Page

Once the web page has been successfully accessed, the operator is able to select a link on 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 SNMP (Simple Network Management Protocol) 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..

2.7.5 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 battery.
- **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 CSV (Comma-separated Values) file.
- **Command Buttons:** When you are logged in, some web pages include command buttons to perform immediate tasks. (Refer to **Section 2.7.3, Web Interface Security Levels**, for User Name 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.

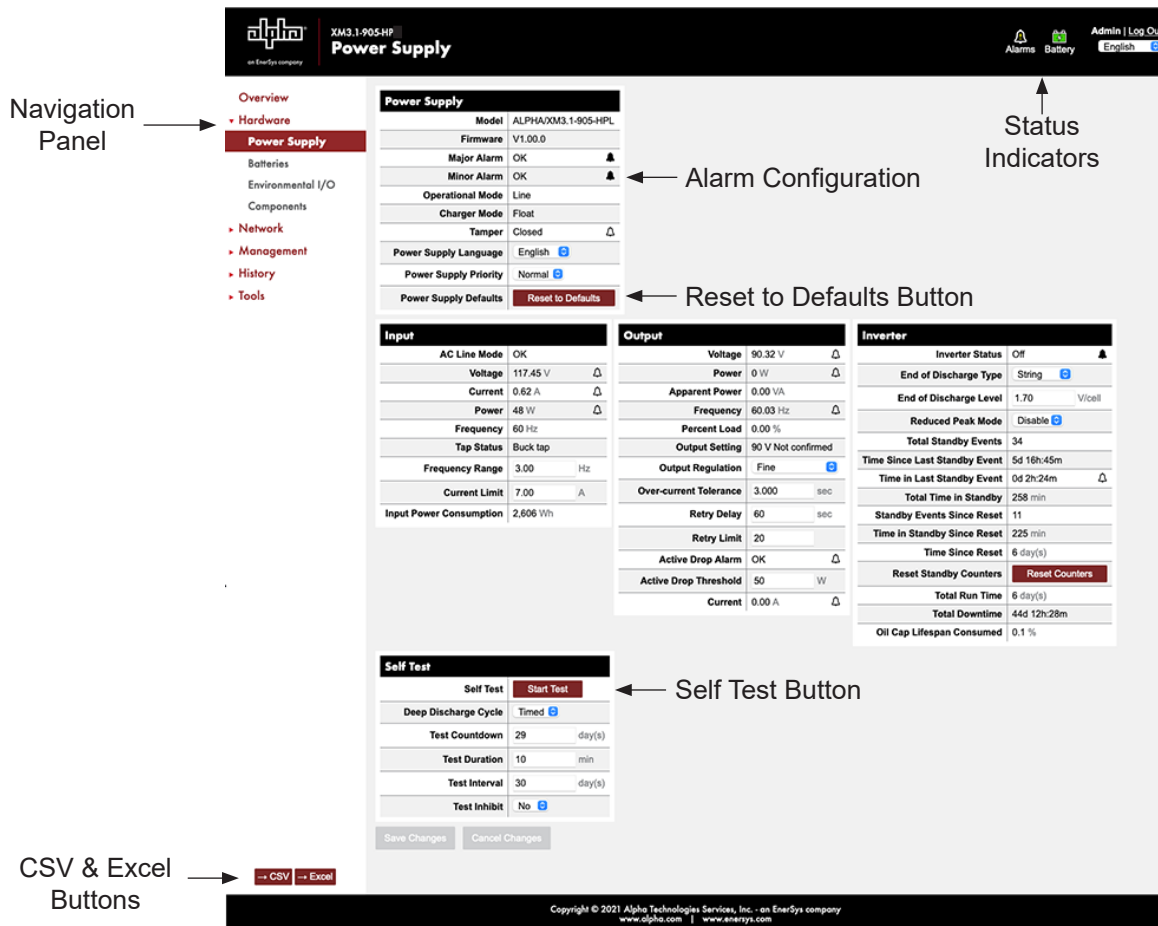


Fig. 2-17, Power Supply Web Page

3.0 Operation

3.1 Start-Up and Test

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 and hold the Self-test button on the Inverter 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. 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 coax seizure screw.

Voltage Regulation		
Voltage Setting	Fine	Coarse
89VAC	85.44VAC / 89.89VAC	84.60VAC / 89.89VAC
60VAC	57.60VAC / 60.90VAC	56.40VAC / 60.90VAC
63VAC	60.48VAC / 63.95VAC	59.22VAC / 63.95VAC

Table 3-1, AC Output




NOTICE:

For Voltage Regulation details, see **Section 6.0, Specifications**.

3.0 Operation, continued

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:

 **NOTICE:**

Should the Element Management Module (EMM) be removed, the Smart Display will be disabled. The EMM is located in the top half of the communication module slot.

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 Backlighting: The display is normally unlit. Press any softkey once to activate backlighting and illuminate the display.

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.

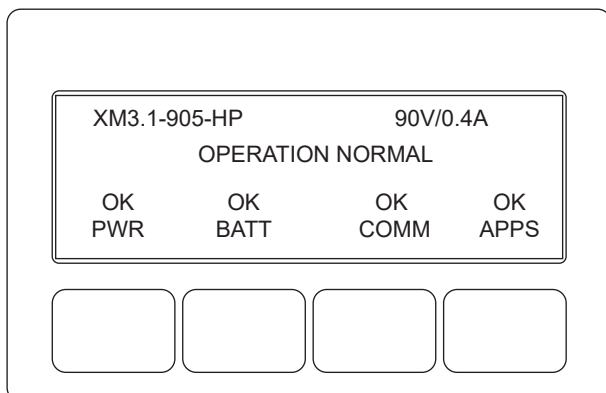


Fig. 3-1, Operation Normal Display Screen

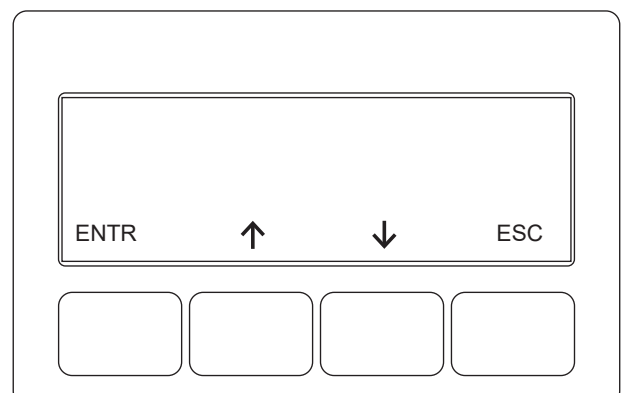


Fig. 3-2, Navigating Through Menu Screens

3.0 Operation, continued

3.3 Smart Display Menus

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

NOTICE:

For the XM3.1-HP, the Input Voltage Settings screen will appear. Correct voltage must be set in order to exit this screen (see Fig. 3-3).

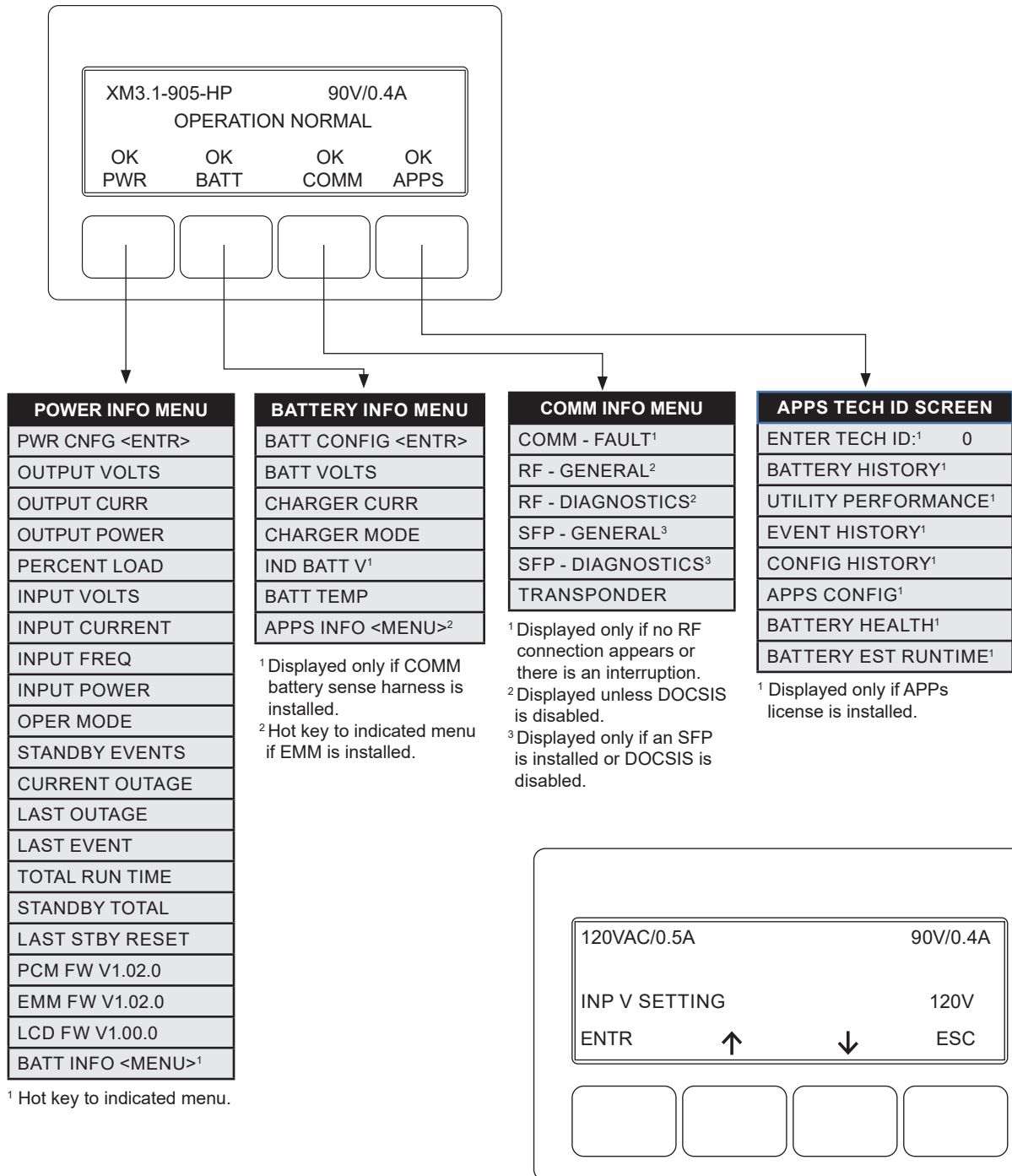
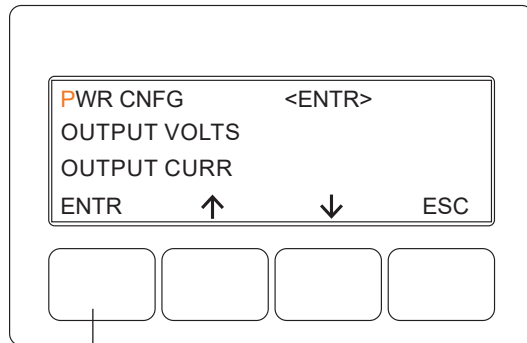


Fig. 3-3, Input Voltage Settings Screen and Menu Options

3.4 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 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.



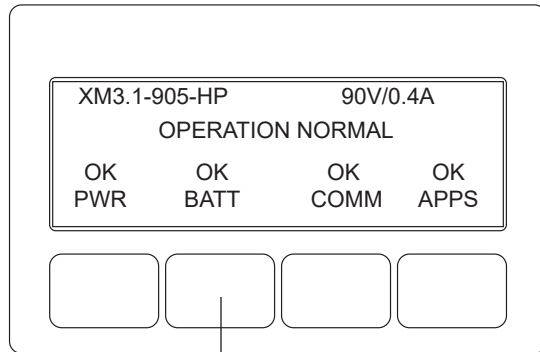
POWER INFO MENU	DEFAULT	RANGE
PWR CNFG <ENTR>		
OUTPUT VOLTS		
OUTPUT CURRENT		
OUTPUT POWER		
PERCENT LOAD	80%	
INPUT VOLTS	120V	
INPUT CURRENT	(4.5A)	
INPUT FREQ	60HZ	
INPUT POWER	2000W	
OPER MODE		LINE/STANDBY
STANDBY EVENTS		0-65535 EVENTS
CURRENT OUTAGE		0-65535 MIN
LAST OUTAGE		0-65535 MIN
LAST EVENT	(DD:HH:MM)	
TOTAL RUN TIME		0-65535 DAYS
STANDBY TOTAL		0-65535 MIN
LAST STBY RESET		0-65535 DAYS
XM3.1-HP FIRMWARE	Vx,xx,x	
PCM FW		
EMM FW		
LCD FW		
TM #####		
IM #####		
BATT INFO	<ENTR>	

POWER CONFIG MENU	DEFAULT	RANGE
SELF-TEST	OFF	ON / OFF
TEST INTERVAL	30 DAYS	0-365 DAYS
TEST DURATION	10 MIN	5-180 MINUTES
TEST COUNTDOWN	30 DAYS	0-365 DAYS
TEST INHIBIT		+7 Days=Test Inhibit; 0=OFF
DISCHARGE LVL	TIMED	TIMED, 10-50%
FREQ RANGE	3.0HZ	1-6HZ
OUTPUT VOLT REG		FINE/COARSE
RMODE	DISABLE	ENABLE/DISABLE
PS PRIORITY		NORMAL
INPUT LIMIT		
SET DEFAULTS	NO	NO / YES
RESET STANDBY	NO	NO / YES
SELECT LANGUAGE	English	Spanish, French, Portuguese, German

Fig. 3-4, Power Information and Configuration

3.5 Battery Information and Configuration

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



BATTERY INFO MENU	NOTE
BATT CONFIG <ENTR>	Pressing enter goes to the Battery Configuration menu shown below
BATT VOLTS	Displays combined string voltage
CHARGER CURR	Displays Batt Current for Inverter Mode
CHARGER MODE	Displays current Charger Mode: OFF/FLOAT/REFRESH
BATT TEMP	Displays battery temperatures (°C)
APPS INFO <ENTR>	Pressing enter goes to the APPS/INFO menu on APPS Tab ¹

¹ Displays only if Apps license is installed.

BATTERY CONFIG MENU	DEFAULT	RANGE	NOTE
BATT MHOS	0	0-2550	Hidden if CMM is not installed
BATT DATES	User programmable		
BATT MODEL	OTHER		AlphaCell models listed at right
BATT STR DETECT	AUTO	AUTO / MANUAL	
NUM BATT STRINGS	1	1-4	
BATT CAPACITY	100AH	1-1000	Automatically set when AlphaCell model is selected
FLOAT	2.27V/C	2.10-2.35	
ACCEPT	2.40V/C	2.20-2.45	
REFRESH	2.45V/C	2.40-2.50	
REST ENABLE	OFF	ON/OFF	
TEMP COMP	5.0MV	0-5.0MV per cell	
EOD VOLT	1.75V/C		Hidden if EOD TYPE = STRING
REFRESH ENABLE	ON	ON/OFF	Pressing Enter goes to adjust screen
HEATER MAT	NO	YES/NO	Pressing Enter goes to adjust screen

ALPHACELL BATTERIES
4.0HP
3.5HP
240XTV
195XTV
150XTV
100XTV
220GXL
195GXL
165GXL
195GOLD
220GOLD
180GXL
210GXL
170XLT
OTHER
NO BATTERY ¹

¹ NO BATT will display instead of OK BATT if this is selected

Fig. 3-5, Battery Information and Configuration

3.0 Operation, continued

Battery Configuration

1. From the Operation Normal screen, press the **BATT** softkey to open the BATTERY INFO menu.
2. Press **ENTR** to open BATT CONFIG Menu. The BATT MHOS screen opens*; press **ENTR** to access the first battery in the string, for example, (A1). The first digit will be cycling on and off. Press the **UP arrow** key to set the value of each digit as recorded at the time the batteries were installed. Once the correct value is set, press **ENTR** to advance to the next digit. Use the **UP arrow** key as before to set the value. Repeat for each following digit. When complete, press **ENTR** to return to the BATTERY MHOS screen. Press the **DOWN arrow** key to select the next battery in the string and repeat the MHOS setting process.
3. Once the MHOS values for each battery have been set, press **ESC** to return to the BATTERY CONFIG MENU.
4. Press the **DOWN arrow** key to select the next line item for adjustment: BATT DATES.
5. Press **ENTR** to select battery and advance to DATE SET screen. Press **ENTR** to select Batt A1 date. Select **ENTR** and key in the dates recorded from the battery labels at the time of installation. Press **ESC** to return to the DATE SET screen and the **DOWN arrow** to select the next battery. Repeat the above steps for each remaining battery.
6. Press **DOWN arrow** softkey and select BATT MODEL and from the submenu, select the battery type installed.
7. Press **ENTR** to return to the Battery Config menu and select NUM BATT STRINGS and enter the correct value.
8. Press **ENTR** to accept new data.
9. Press **ESC** to return to the OPERATION NORMAL screen.
10. Switch SPI/ALT **ON**, verifying load to the XM3.1-HP.

** Battery Mhos and Date code can only be set after DOCSIS CMM has registered with CMTS. Please wait 3 minutes after power up to enter Battery Mhos measurements.*

3.6 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).

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.

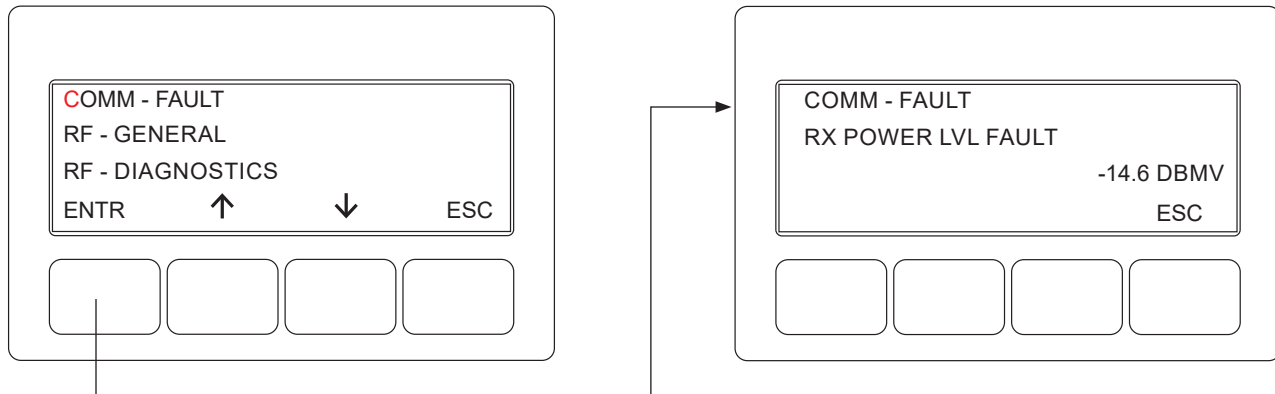
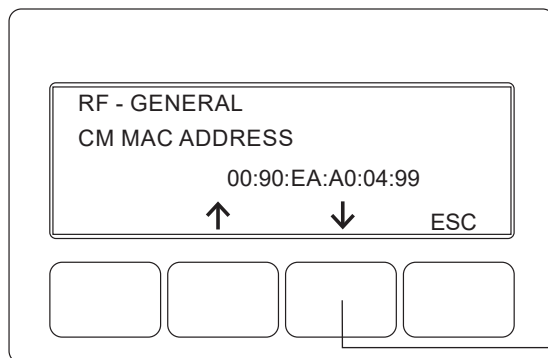


Fig. 3-6, Selecting COMM - FAULT Menu

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:d1f0:290:3aff 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

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.

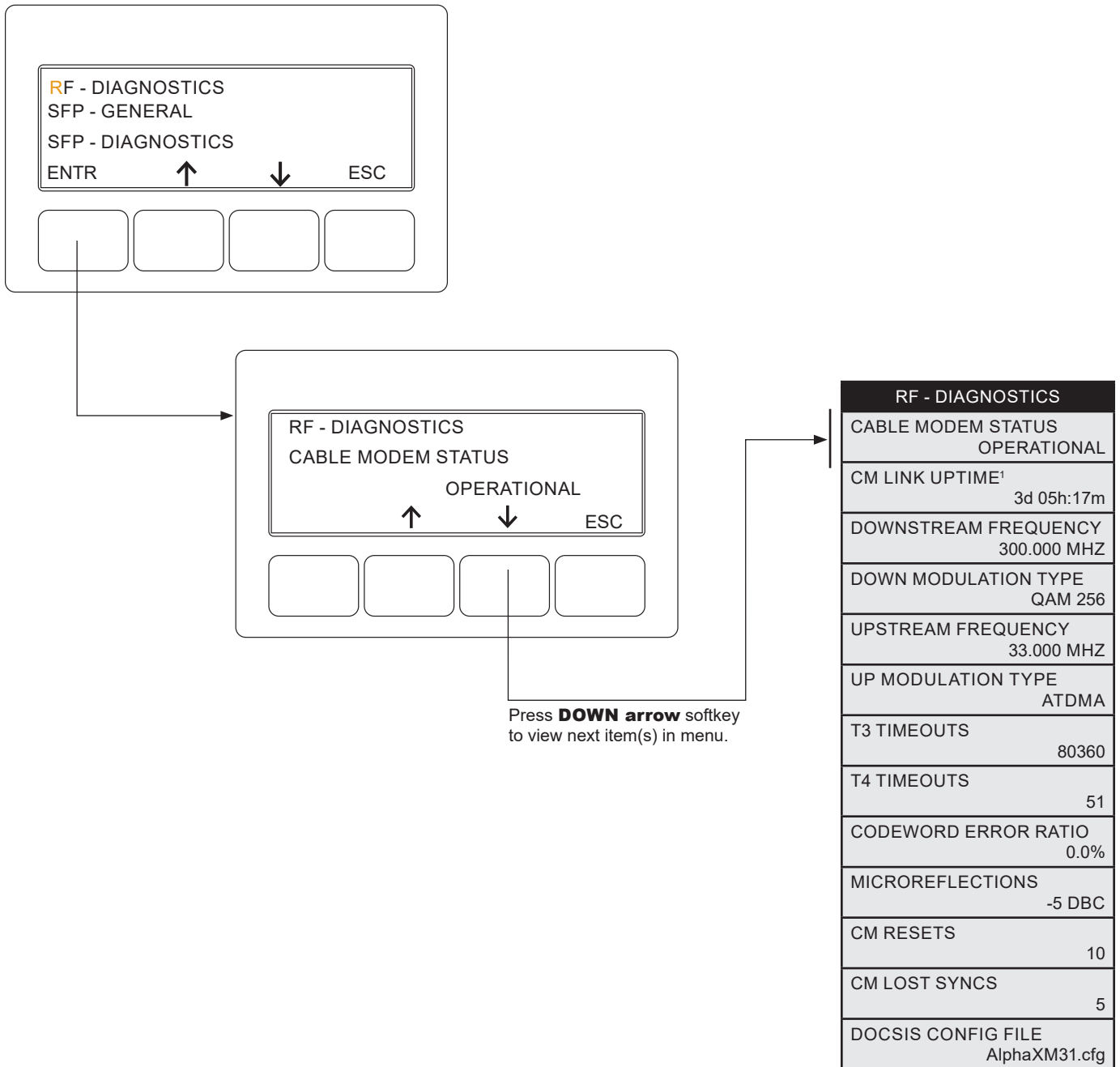
Fig. 3-7, RF - GENERAL Menu

3.0 Operation, continued

RF - DIAGNOSTICS

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

This menu enables 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 - 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

¹ Only displayed when the modem is online.

Fig. 3-8, RF - DIAGNOSTICS Menu

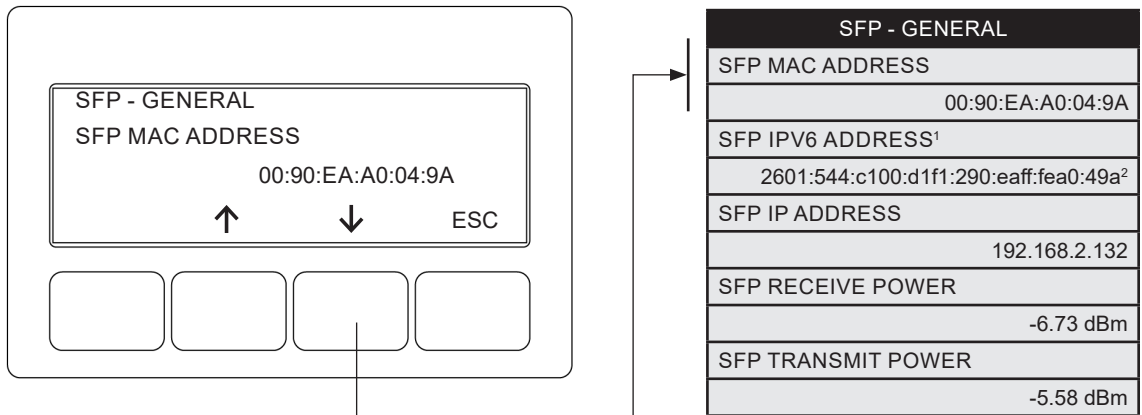
3.0 Operation, continued

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.

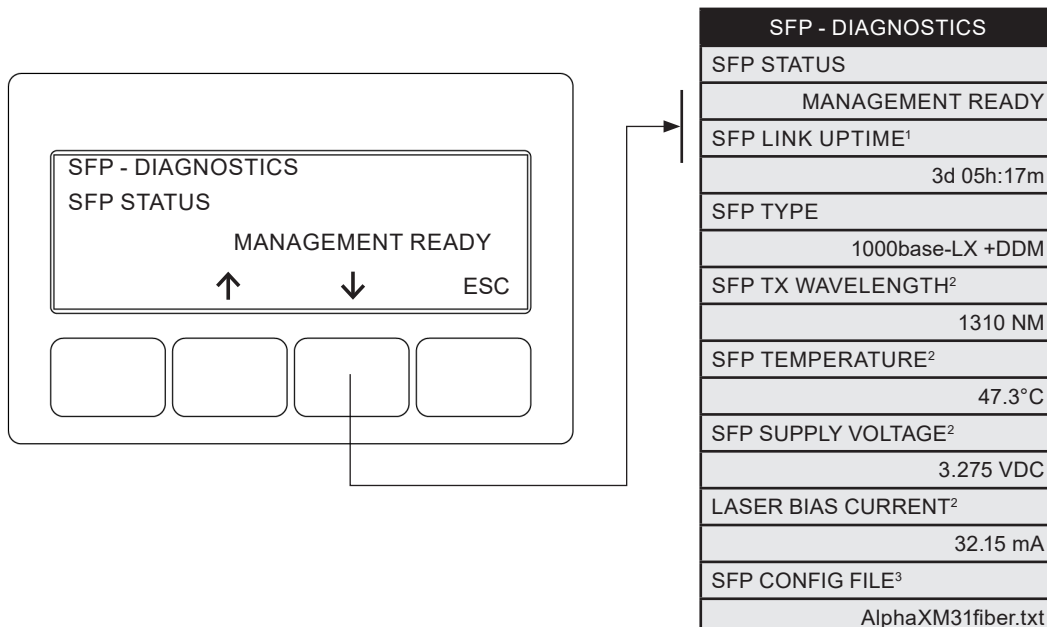
Fig. 3-9, SFP - GENERAL Menu

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 SFP - 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.

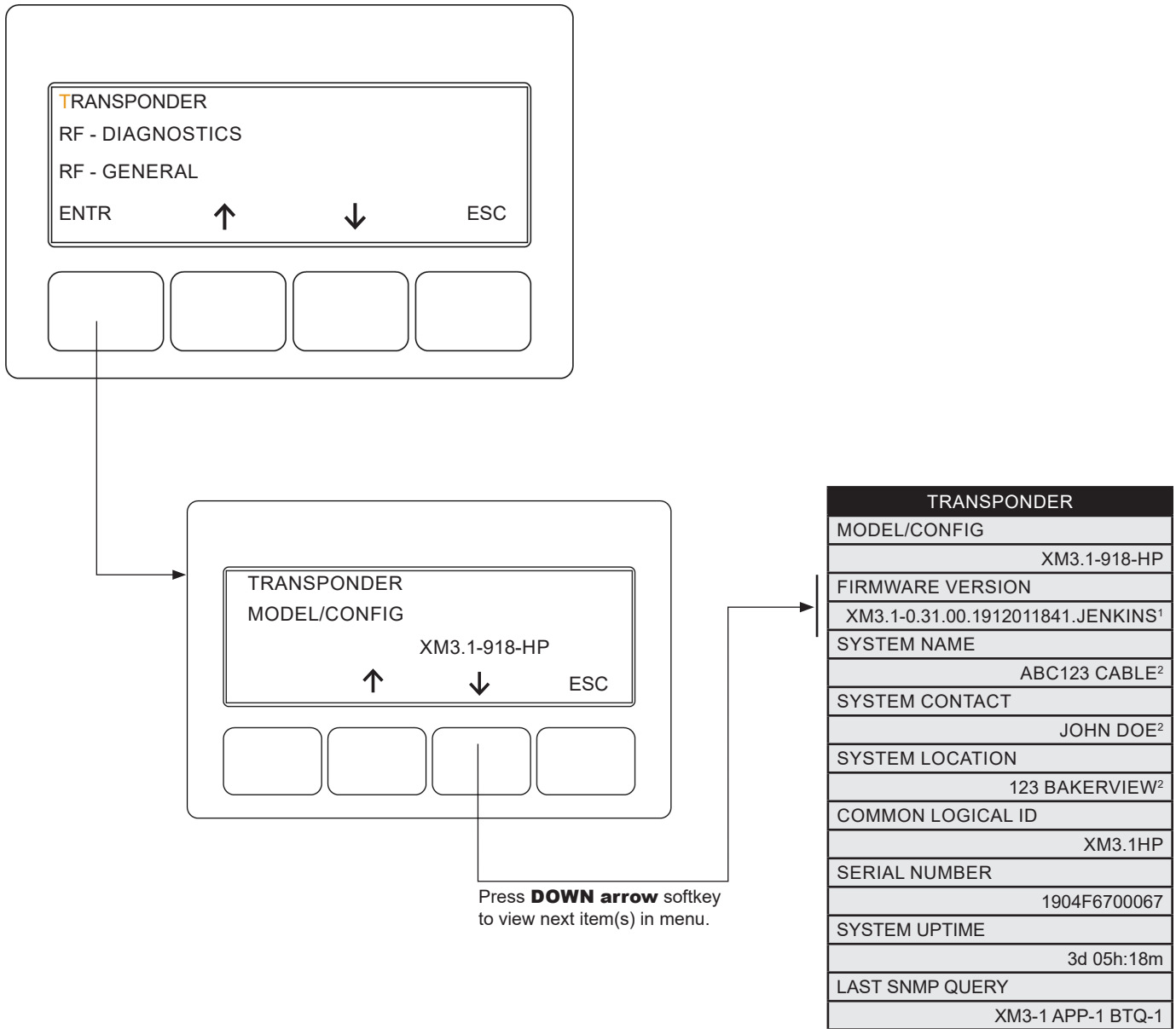
Fig. 3-10, SFP - DIAGNOSTICS Menu

3.0 Operation, continued

TRANSPONDER

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.

This menu enables 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 Information that is longer than the 20-character display will automatically scroll horizontally.

² User Input values are examples only.

Fig. 3-11, TRANSPONDER Menu

3.7 Alpha Applications Information and Configuration

NOTICE: If the optional APPS license is not installed, 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.

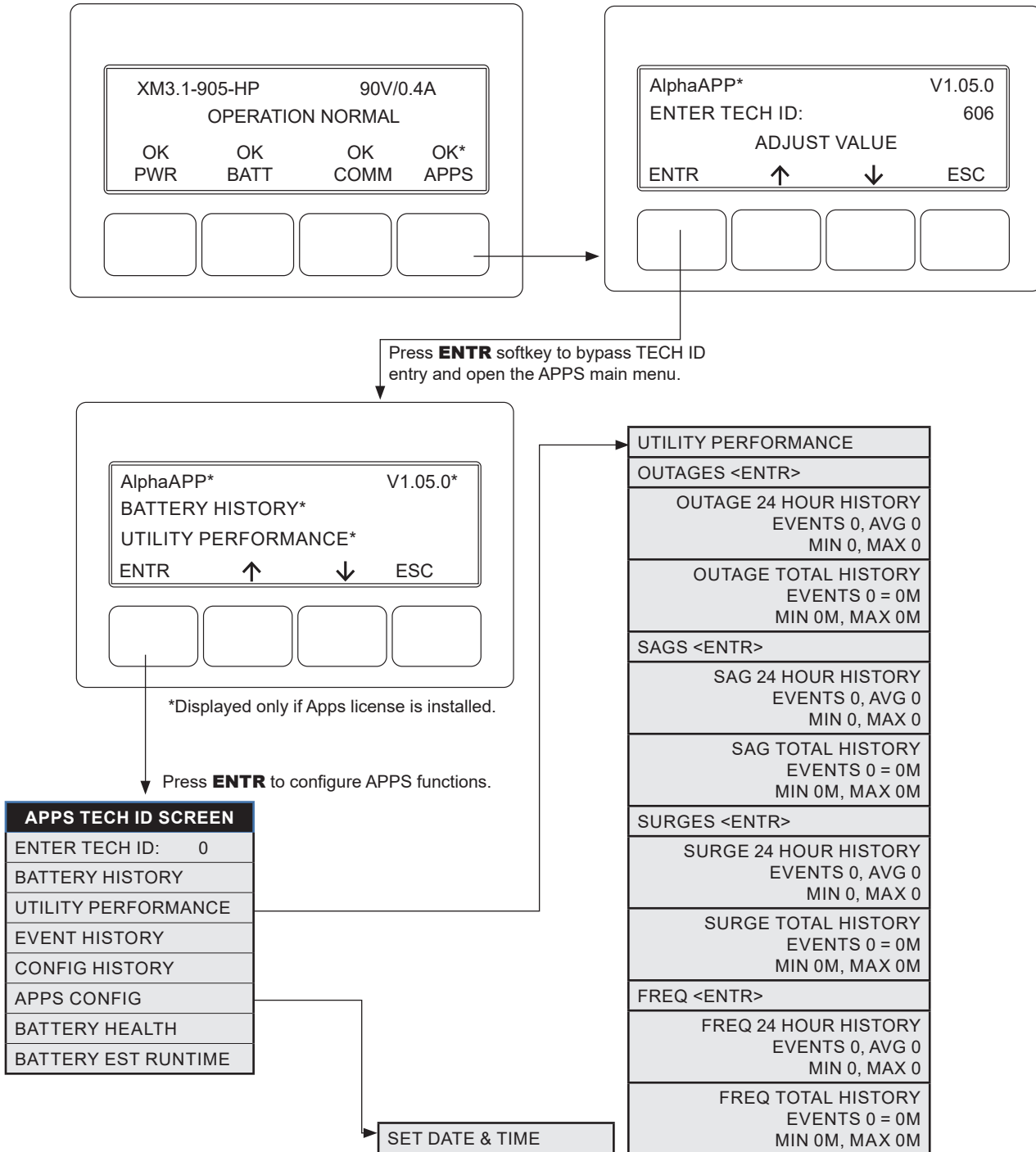


Fig. 3-11, Alpha APPS Menu

3.8 AlphaAPPs Overview

The AlphaAPPs (applications) function is an optional feature in the XM3.1-HP power supply. It operates as a computing system that gathers telemetry from the power supply, batteries and the environment. The embedded Alpha APP Operating System and Flash File System provides the customer 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 Cable Modem Module web APPs pages, and some are supported on the Continuity and Alpha XD status monitoring systems.

3.8.1 Display Structure

Technician ID Screen:

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

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 press 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.

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

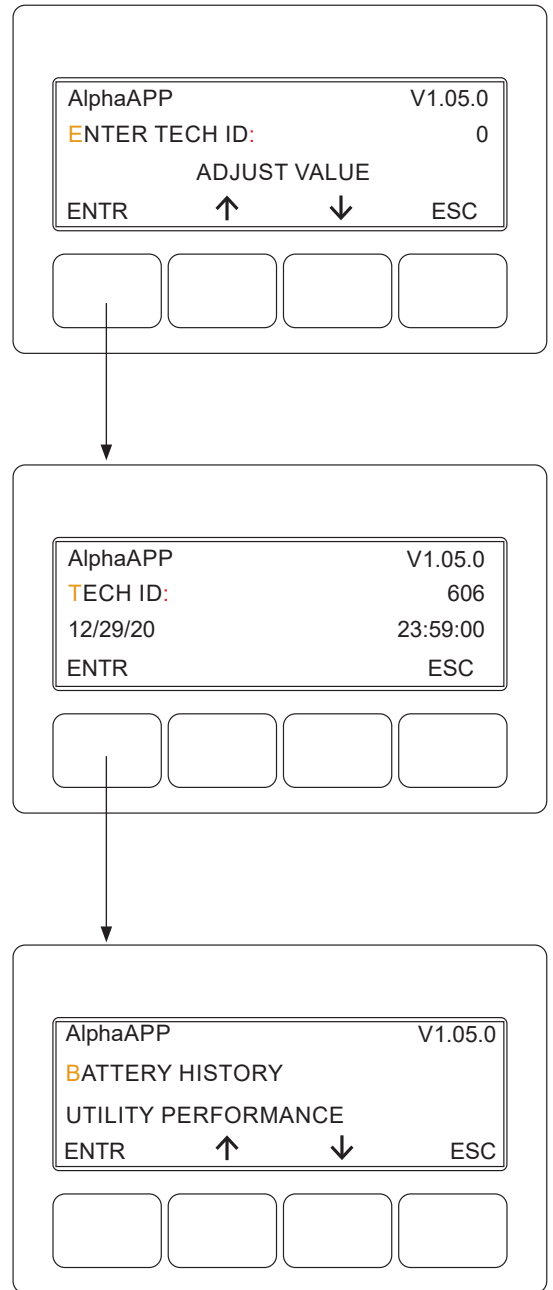


Fig. 3-12, AlphaAPPs Smart Display

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.

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 card 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.

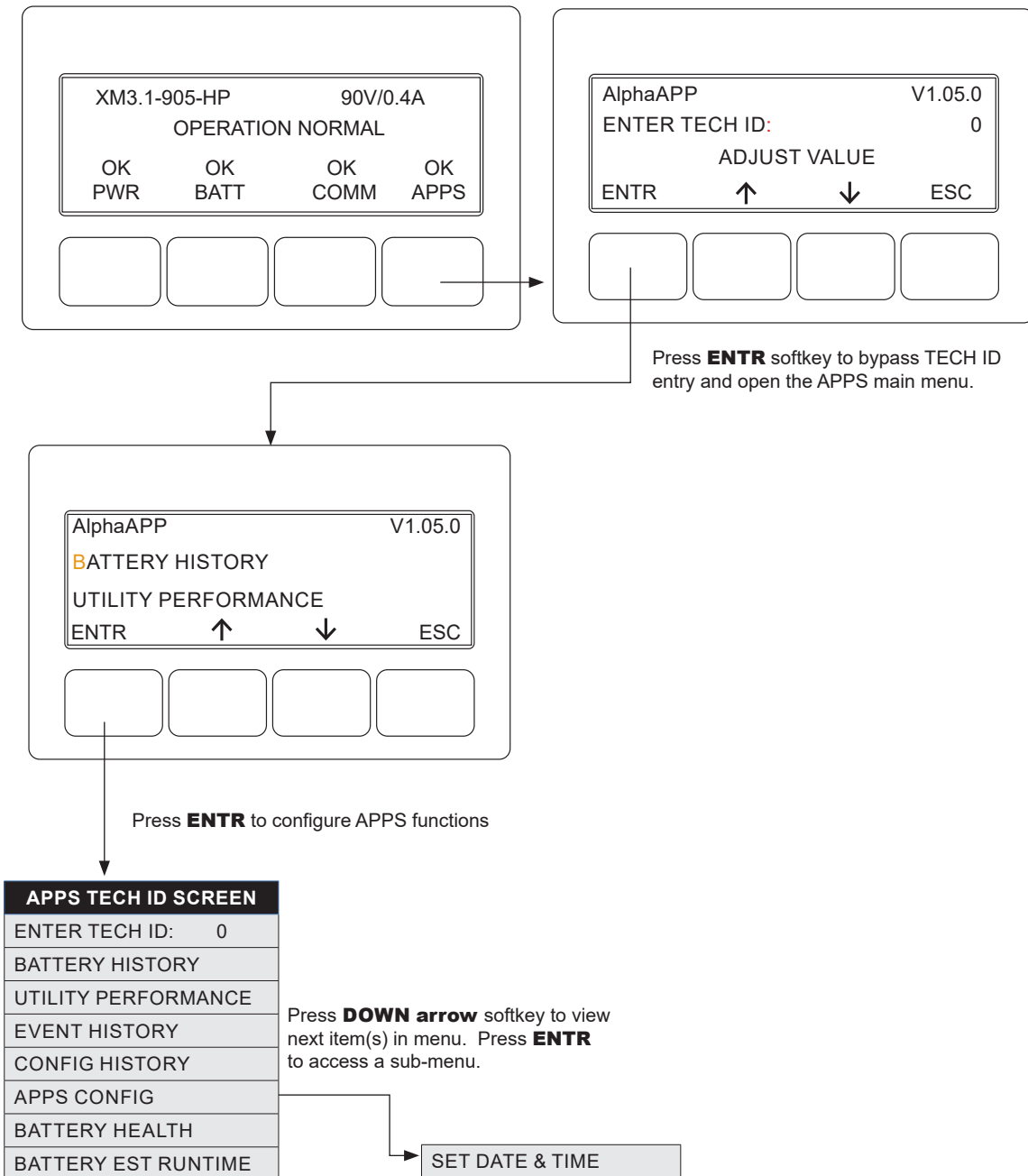


Fig. 3-13, APPs Config Menu

3.0 Operation, continued

3.8.2 Applications

Some common applications are:

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 arrow** softkey to view earlier records, or press the **UP arrow** softkey to view more recent records.

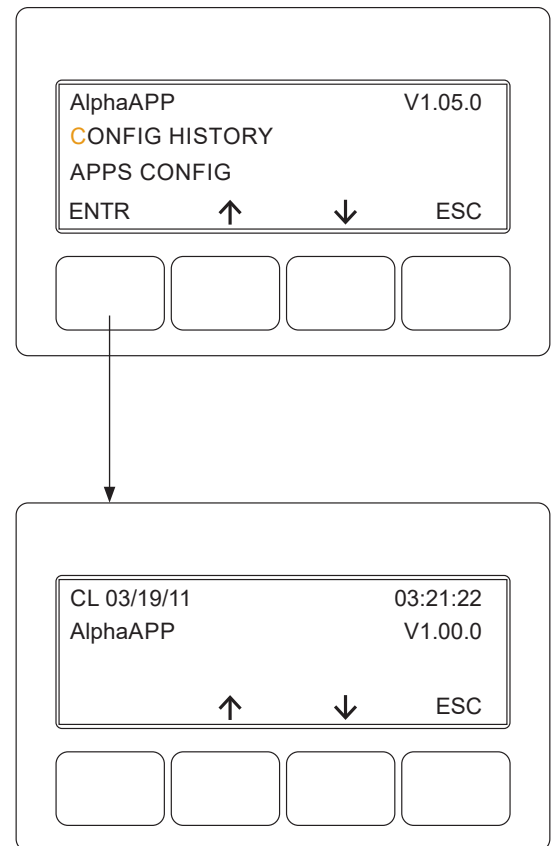


Fig. 3-14, CONFIG HISTORY Menu

3.0 Operation, continued

Event Logging App:

The APP function 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 for a list of Events and Alarms that are logged.

TABLE OF EVENTS/ALARMS LOGGED		
APP CODE DOWNLOADED	HIGH BATT VOLTS	REFRESH
APP HARDWARE STATUS	HIGH BATTERY ALARM	SELF-TEST ALARM
APP REAL TIME CLOCK SET	HW COMPATIBILITY	SELF-TEST FAIL
APP RESET CAUSE	INPUT FAILURE	SELF-TEST FAIL ALARM
APP TECHNICIAN CODE ENTERED	INPUT FAILURE ALARM	STR X MISWIRED
APP OPTION	INPUT OVER CURR	SURGE MOV FAIL
BATT TEMP PROBE	INV EEPROM ERROR	TM COMPATIBILITY
BATTERY EOD	INVERTER ALARM	X BAL STAGE
BATTERY FAIL	INVERTER ENABLE	
BATTERY LOG CLEARED	INVERTER TEMP	
BATT. TEMPERATURE PROBE STATUS ALARM	LINE ISOLATION	
CHARGER ENABLE	LINE ISOLATION ALARM	
CHARGER FAIL ALARM	LOW BATT VOLTS	
CHARGER FAILURE	LOW BATTERY SHUTDOWN ALARM	
CLOCK NOT SET	MAJOR APPLICATION ALARM	
CM IP ADDRESS	MINOR APPLICATION ALARM	
CM MAC ADDRESS	NO BATTERIES	
CONFIG ERROR	OUTPUT FAILURE	
CONFIGURATION LOG CLEARED	OUTPUT OVERLOAD	
CPE IP ADDRESS	OUTPUT OVERLOAD ALARM	
CPE MAC ADDRESS	PDB EEPROM ERROR	
DNSTRM POWER FAULT	POWER SUPPLY INPUT CURRENT LIMIT ALARM	

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.

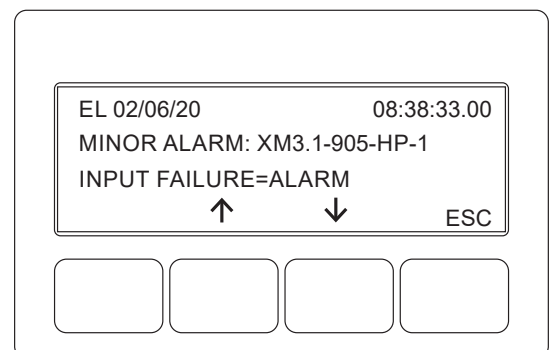


Fig. 3-15, Event Log Smart Display

3.0 Operation, continued

Battery Logging App:

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

1. To enter the battery manufacture dates, press the **BATT** softkey on the XM3.1-HP 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 function 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.

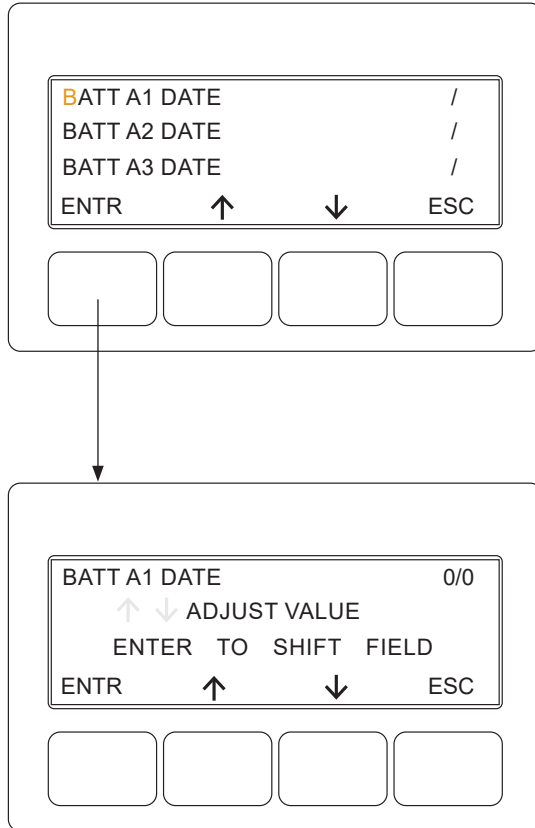


Fig. 3-16, Battery Log Smart Display

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

As a time saving feature, if battery dates have never been entered into the APP, 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 function will create a battery log record recording the date and time of the entry and the battery manufactured date for this battery.

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 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 function 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.

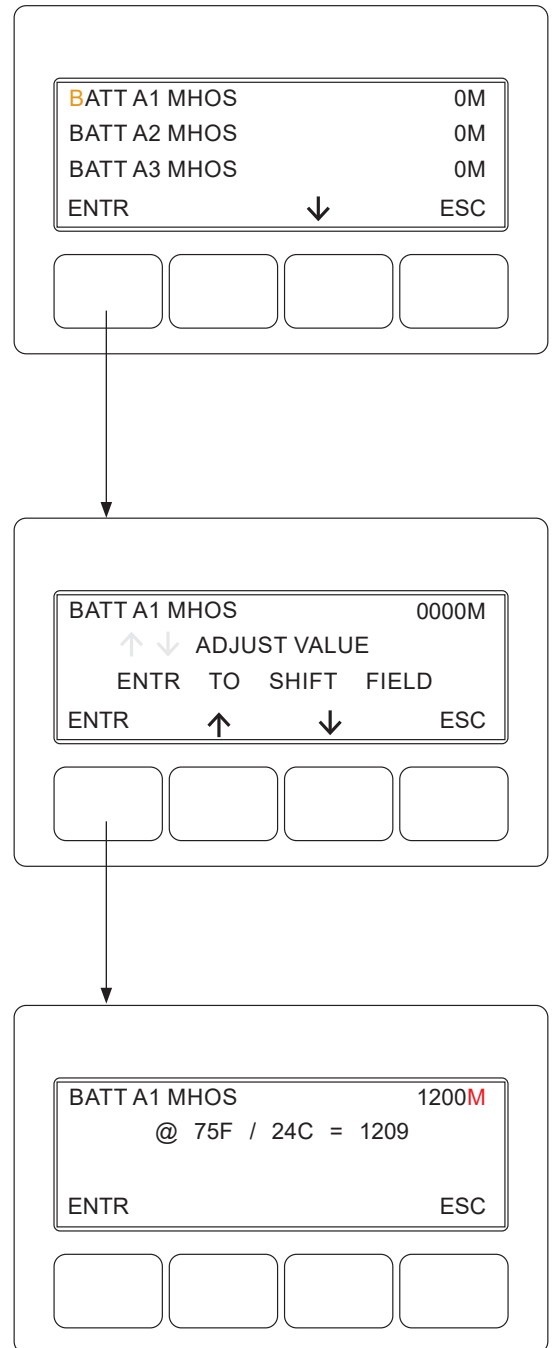
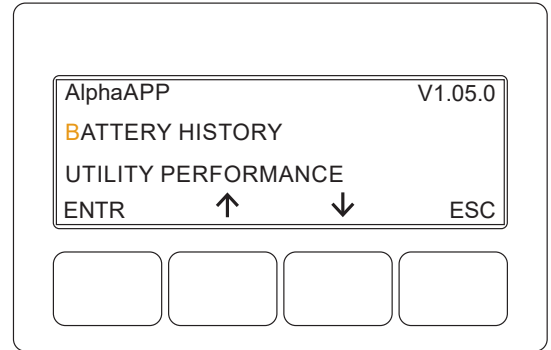


Fig. 3-17, Battery Mhos Smart Display

3.0 Operation, continued

Battery Log Screen:

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

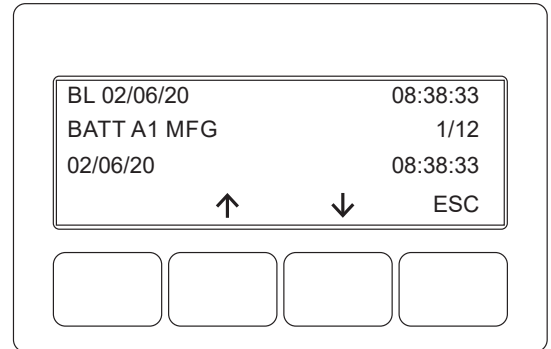


Press **ENTR** to access the BATTERY HISTORY screen:

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.

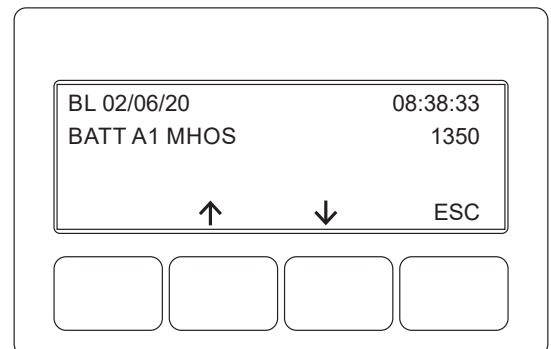


Fig. 3-18, Battery History Smart Display

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. Outage – If the AC input is below a factory set threshold, an outage condition is recorded.
2. Sag – If the AC input exists but is below a factory set threshold, a line sag condition is recorded.
3. Surge – If the AC input exceeds a factory set threshold, a line overvoltage or surge condition is recorded.
4. 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.

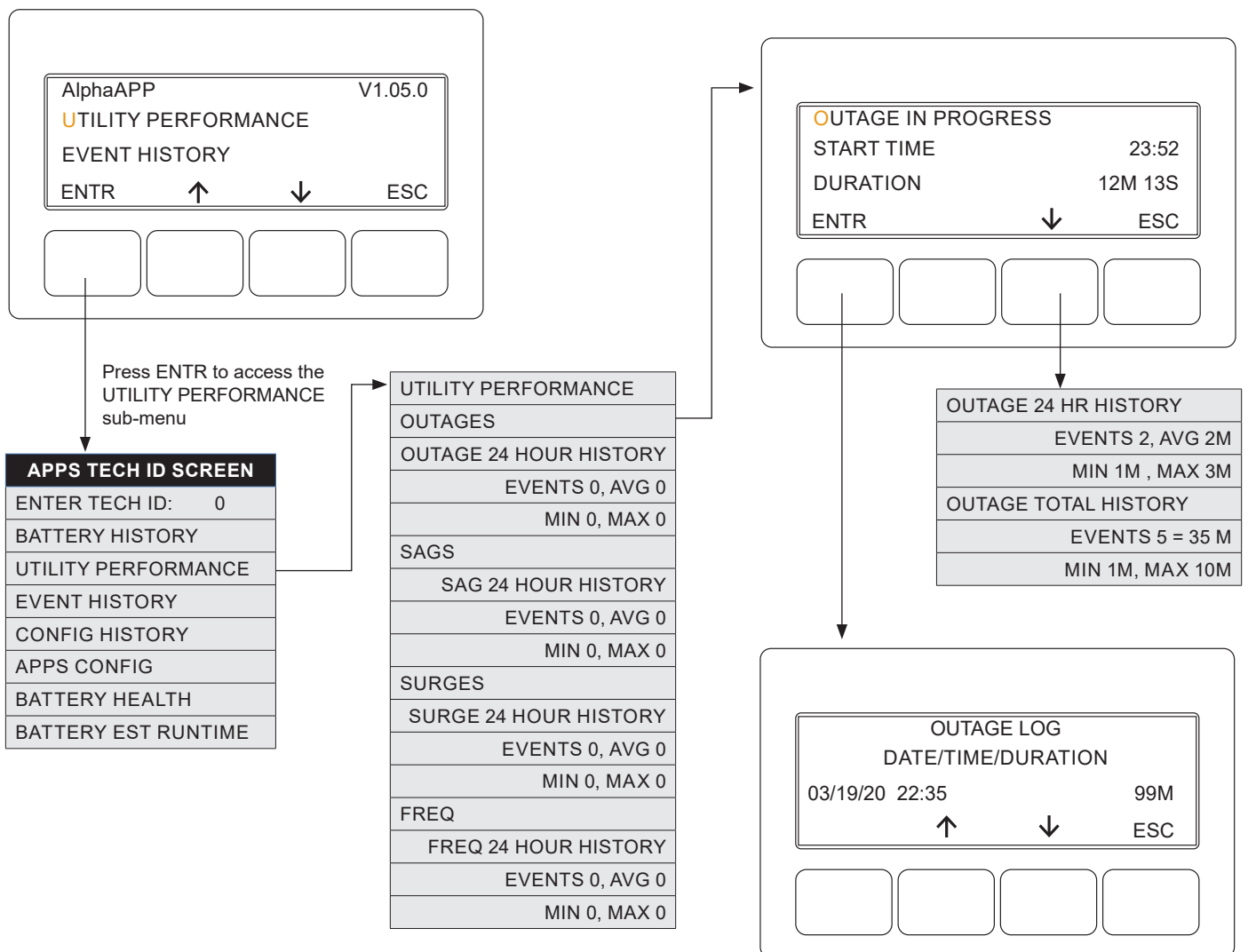


Fig. 3-19, Utility Performance Menu Options and Smart Display

3.0 Operation, continued

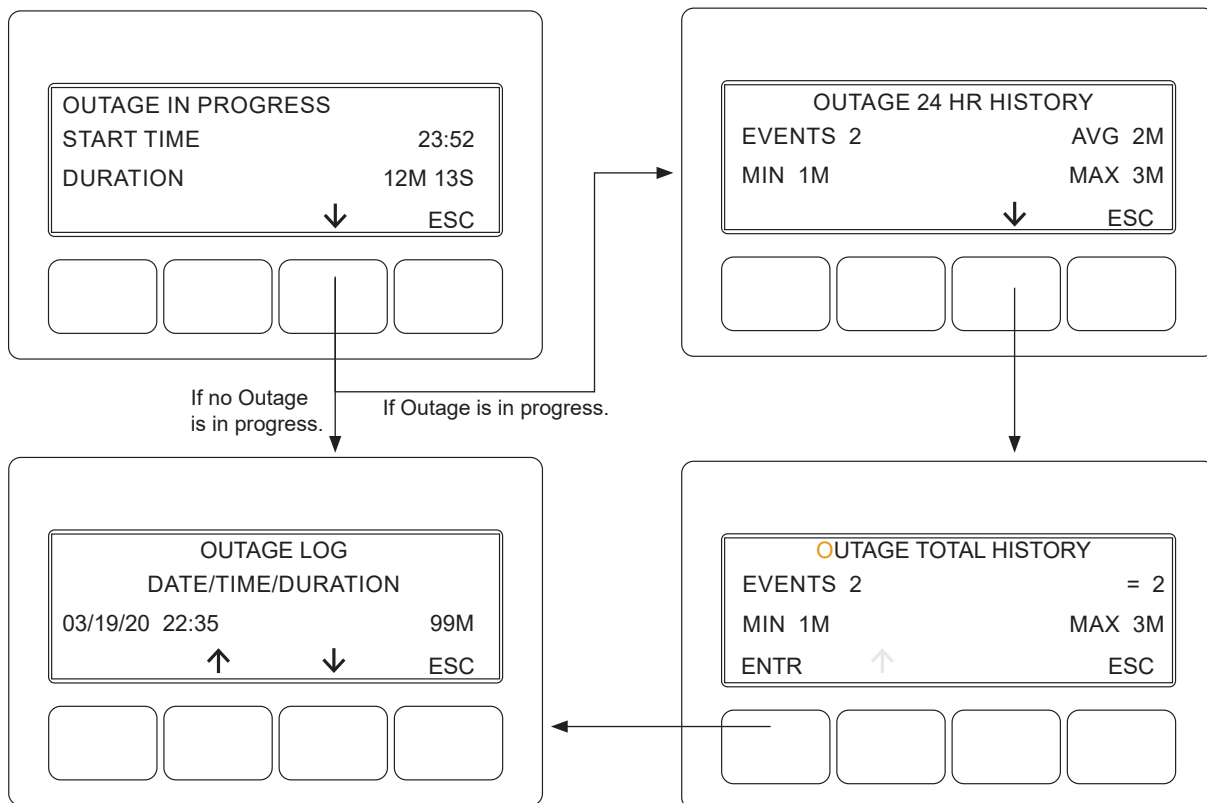


Fig. 3-20, Outage History

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 type, 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.

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 sent to the headend automatically. When a power supply is first installed, the display will indicate calculating to the headend 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.

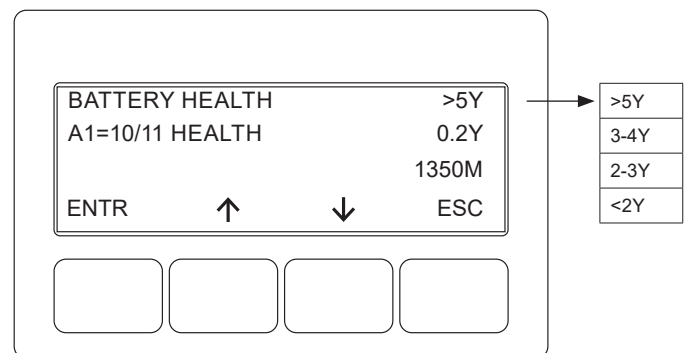
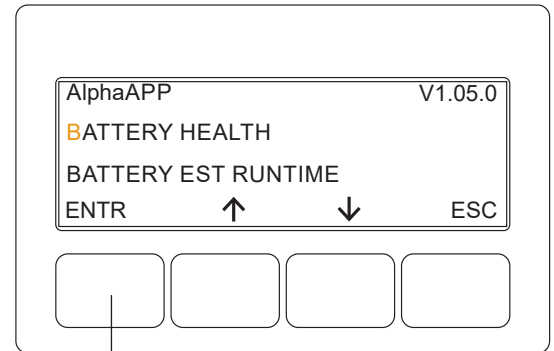
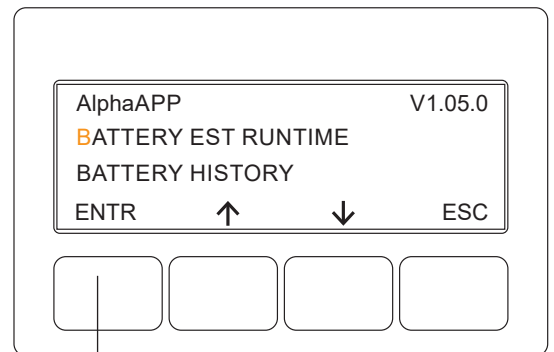


Fig. 3-21, Battery Health Menu



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

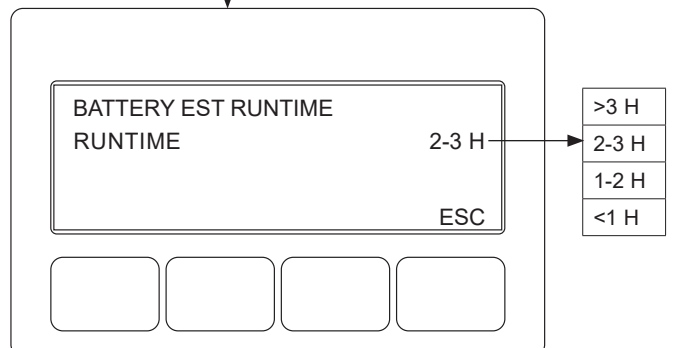


Fig. 3-22, Battery Run Time App Screen

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.

The 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.

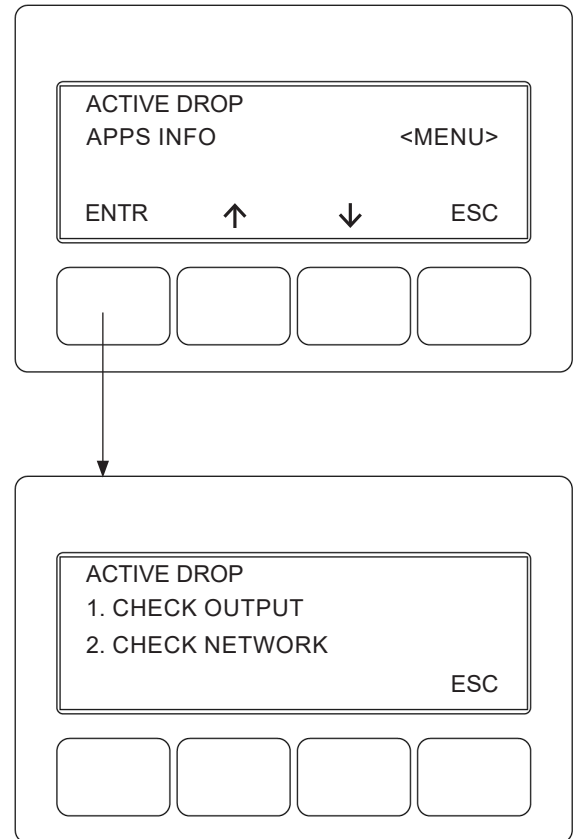


Fig. 3-23, Active Drop App Screen

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

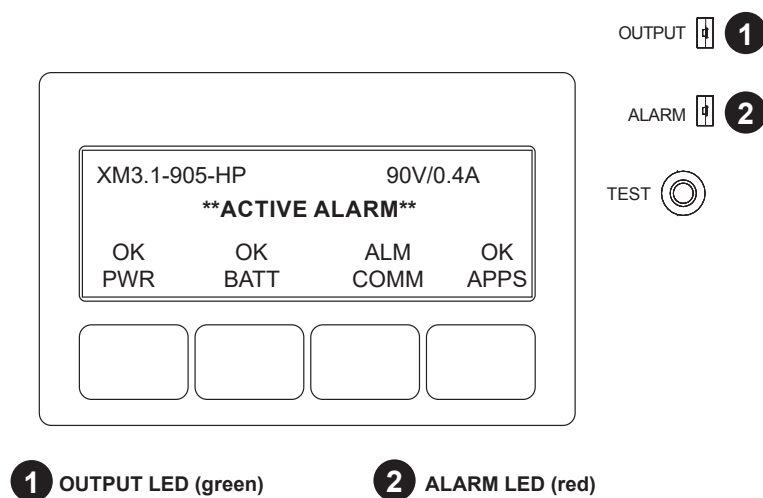
3.9 Active Alarms

Two LEDs on the Inverter indicate the condition and status of the Intelligent Broadband UPS.

- 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 an alarm has been detected. If the Output LED is off, the output is 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.

- 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.



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

Fig. 3-24, Active Alarm Screen and 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 the **UP** or **DOWN arrow** 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 Precision Temperature Sensor (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.

3.0 Operation, continued

3.9.1 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.

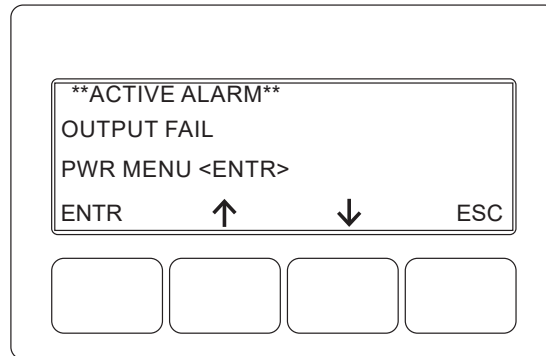


Fig. 3-25, Sample Active Alarm Display, PWR Menu

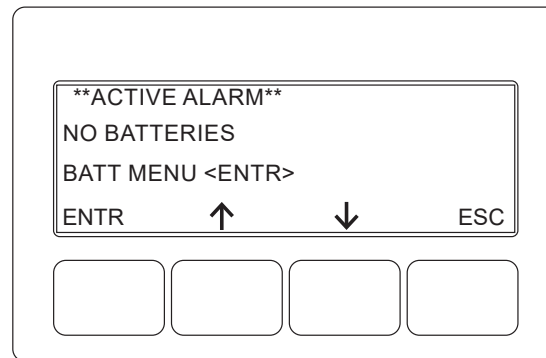


Fig. 3-26, Sample Active Alarm Display, BATT Menu

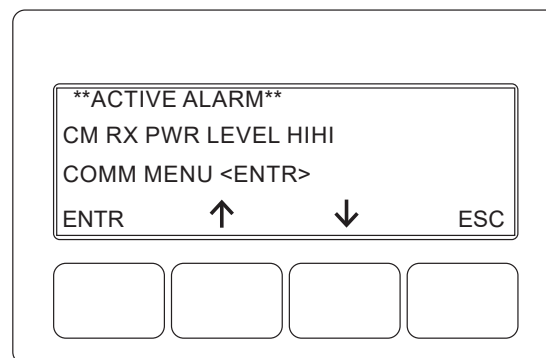


Fig. 3-27, Sample Active Alarm Display, COMM Menu

3.0 Operation, continued

3.9.2 PWR Alarms

The XM3.1-HP Broadband UPS™ 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 LEDs (see Table 3-4).

Active Alarm	Type	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 > 1.0A load or higher 2. Output Overloaded 3. Check Battery String 4. Replace Power Supply	NO
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 PDB.	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 Charger	NO
HW COMPATIBILITY	Minor	PWR	There is a hardware incompatibility between the Main micro board and the inverter board.	1. Check Micro Board	NO
PPM EEPROM ERROR	Minor	PWR	There has been an error reading the EEPROM on the PPM.	1. Replace power supply	NO

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

3.0 Operation, continued

3.9.3 BATT Alarms

The XM3.1-HP Broadband UPS™ 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 LEDs.

Active Alarm	Type	Category	Probable Cause	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 Cable Kit 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 Power Supply	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

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.

 **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 to go into Self-test and Standby.

3.0 Operation, continued

3.9.4 COMM Alarms

The XM3.1-HP Broadband UPS™ 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 LEDs on the front panel.

Active Alarm	Category	Probable Cause	Corrective action	Standby Disabled
Rx Power Level	COMM	RF receiver power level is outside optimal thresholds	1. Check attenuation / RF padding 2. Check alarm level settings	NO
Tx Power Level	COMM	RF transmitter power level is outside optimal thresholds	1. Check attenuation / RF padding 2. Check alarm level settings	NO
SFP Receive Power	COMM	Optical receiver power level is outside optimal thresholds	1. Check fiber integrity 2. Check optical attenuation	NO
SFP Transmit Power	COMM	Optical transmitter power level is outside optimal thresholds	1. Ensure SFP is enabled 2. Replace SFP module	NO
SFP Temperature	COMM	Module temperature is outside optimal thresholds	1. Check enclosure ventilation	NO
SFP Supply Voltage	COMM	Power to the SFP module is outside optimal thresholds	1. Replace SFP module 2. Replace power supply	NO
Laser Bias Current	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

3.9.5 APP Alarms

The XM3.1-HP Broadband UPS detects and initiates an alarm if certain parameters for Applications are not met. See Table 3-7 for APP Alarms.

Active Alarm	Type	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

3.10 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 "0." 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 "0" 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 card is not installed.
Battery Model	The AlphaCell® battery type can be specified in the Smart Display (if not AlphaCell, leave as default battery type, Other). If AlphaCell 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 CMM 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. Programming this parameter to "0.0" disables temperature compensation. It is factory set for AlphaCell batteries (5mV/cell). If another manufacturer's batteries are used, consult the battery manufacturer for Charger Temperature compensation ranges.
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	MAC (Media Access Control) 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 +55 dBmV. The ideal operating transmit power is less than +50 dBmV.

3.0 Operation, continued

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.
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. A MAC label is provided on the DOCSIS 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 Cable Modem Module 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.
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.
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	AC input voltage frequency range limit. This limit establishes the acceptable input frequency range outside of which standby operation is initiated. (Setting may be increased when powering with AC Generator.)
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 Inverter.
Individual Battery Voltages	List of the individual battery voltages measured from the battery sense harness from the status monitor card.
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 Current	The AC input current to the power supply.
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.

3.0 Operation, continued

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.
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 Current	The total AC output current of the power supply.
Output Power	The total output power in watts.
Output Voltage Regulation Mode	The XM3.1-HP 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.
Power Save 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.
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	Reduced Peak Mode - An inverter control that limits the peak output voltage. This feature is intended for powering HFC devices that are sensitive to peak voltage. Reduced Peak Mode will lower the output peak voltage by approximately 20%.
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.
Standby Events	A standby events counter. This does not include Self-test events. Resetting factory defaults does not clear Standby Events or Standby Total.
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.

3.0 Operation, continued

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.
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 as less than seven days (See Section 3.11, 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 #####	The serial number of the XM3.1-HP transformer module.
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 micro board.

3.0 Operation, continued

3.11 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 a value 1 to 365 days (excluding "0"). The default test interval is 30 days.

The test sequence process:

- Begins with a check to verify the batteries are attached. 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. **Note: The test should never drop the load as long as the utility is present.**
- 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) 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.

3.12 Providing Power via Portable Generator or Inverter

In the event of an extended utility failure, an external AC 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 in the following section.

3.0 Operation, continued

3.12.1 AC Powering

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

Connection Procedure:

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



CAUTION!

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

3.0 Operation, continued

3.12.2 Using a Truck-mounted Inverter or Generator

To use a truck-mounted inverter or generator, follow the steps listed in **Section 3.12.1, 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.

3.13 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 11.5VDC. 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.
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 ± 3 Hz range.



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.



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 unplug the battery input cable from the power supply before unfastening battery terminals.
- 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. Disconnect both AC and battery inputs before servicing.
- 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 technician is using a non-Alpha enclosure, it is the technician's responsibility to ensure the combination conforms to the 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-lbs
- 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
- Slotted screwdriver (0.6 x 3.5mm)
- Phillips screwdriver

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

4.0 Maintenance, continued

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, 59.8V for 63V units, or below 57V for 60V units a site visit is required.



CAUTION!

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

On-Site Power Supply Preventive Maintenance

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 NEC or Local Authority specs.

2. Interior Cabinet Inspection

Remove any dust, debris, or rodent signs from enclosure, louvers or vents. If enclosure has filters, clean with compressed air or leaf blower.

3. Power Supply Component Inspection

- a. Before physical inspection of the power supply, verify normal operation on the XM3.1-HP Smart Display. Clear all Active Alarms before proceeding.
- b. Check physical condition of power supply; remove any dust or debris built up in or around openings.
- c. Inspect all cabling and connections of the power supply system. Verify that all cabling is intact.
- d. Check all interior locks, hinges and battery slide trays for proper operation and lubricate if necessary.
- e. Verify that SPI (ALT Box) is tight along with coaxial connection, ensuring that power supply and sheath of coaxial is grounded.
- f. Connectors are properly seated; resolve as needed.
- g. Verify that power supply has a Surge Arrestor that is in working condition. Replace the unit as needed.



NOTICE:

Whenever the batteries are not connected, the Broadband UPS 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.

4. Test Inverter

- a. Turn off the utility input breaker to remove input power. The power supply goes into standby operation.
- b. Verify on the Smart Display that there is no interruption to the output.
- c. 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 Smart Display and record in the XM3.1-HP system maintenance log:

Operational Data:

- Output 1 Voltage
- Input Voltage
- Total Standby Time
- Output Watts
- Outside Ambient
- Output 1 Current
- Standby Events
- Input Watts
- PTS Reading

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. 4-1, PM Certification Report, Page 1

4.0 Maintenance, continued

4.4 PM Certification Report, continued



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		Coax 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	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 #

5.0 Shut Down

The Alpha XM3.1-HP Broadband UPS™ 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.

5.1 Emergency Shutdown Procedure:

- 1** Unplug the battery cable connection.
- 2** Unplug the AC Input Line Cord from the service entrance.

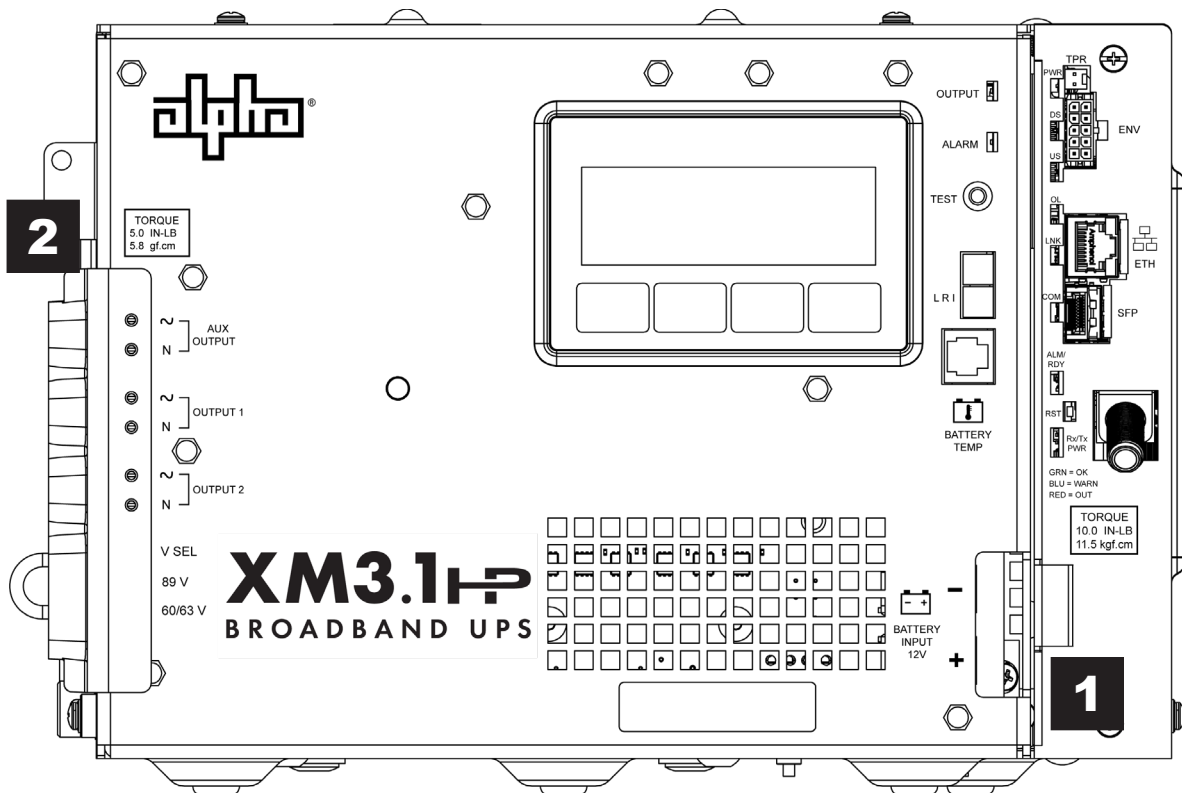


Fig. 5-1, Emergency Shutdown

6.0 Specifications

6.1 Specifications, North American Models

	XM3.1-903-HP	XM3.1-905-HP	XM3.1-905P-HP
Parameter			
Power Supply Nameplate Rating	110VAC – 127VAC	110VAC – 127VAC	200VAC – 240VAC
Nominal AC Input Voltage	120VAC	120VAC	240VAC
Nominal Input Frequency	60Hz	60Hz	60Hz
Input Frequency Tolerance (%)	±3	±3	±3
Input Voltage Operating Range Tolerance (%)	-30 / +15	-30 / +15	-30 / +25
Input Voltage Range (VAC)	84 –138	84 –138	161 –288
Input Current Maximum (A) [Battery Charger Shutdown]	4	7	4
Output Voltage (VAC)	60 / 89	60 / 89	60 / 89
Output Voltage Minimum (RMS)	84.5	84.5	84.5
Output Voltage Maximum (RMS)	90	90	90
Output Voltage Regulation (%) - Coarse Mode [Based on nominal input voltage at 50% load, 25°C]	89V: -5/+1% 60V: -6/+1.5%	89V: -5/+1% 60V: -6/+1.5%	89V: -5/+1% 60V: -6/+1.5%
Output Voltage Regulation (%) - Fine Mode [Based on nominal input voltage at 50% load, 25°C]	89V: -4/+1% 60V: -4/+1.5%	89V: -4/+1% 60V: -4/+1.5%	89V: -4/+1% 60V: -4/+1.5%
Line Load Frequency Vout Regulation (%)	9	9	9
Maximum Rated Output Current (A)	3	5	5
Maximum Output Power (VA)	270	450	450
Auxiliary Output Voltage (RMS)	110	110	220
Auxiliary Output Voltage Tolerance %	6	6	6
Line Mode Efficiency	Up to 90%		
Standby Efficiency	Up to 91%		
Output Waveform	Quasi-square wave		
Short Circuit Protection	<150% of maximum current rating		
Transfer Characteristics	Uninterrupted output		
Battery Voltage (VDC)	12	12	12
Battery Charger			
Temperature Compensation	Programmable (0 to 5mV/cell/°C)		
Bulk Charger Current (Amps @ 80% Load & Nomline)	10A		
5 Stages	Refresh, Bulk, Accept, Float, Rest		
Mechanical			
Inverter Module	Non-removable Inverter Module		
Dimensions H x W x D (in/mm)	7.95 × 11.45 × 9.72 / 202 × 291 × 247		
Weight (lb/kg)	48.5 / 22.0	49 / 22.3	
Input Power Connector (IEC 320/C20)	NEMA 5-15P Plug	NEMA 5-15P Plug	NEMA 6-15P Plug
Battery Connector	50A 2-Pole Anderson style (SB 50 Red)		
Remote Temp Sensor	Ring lug fastens to negative terminal on battery		
Display	4 line by 20 character blue LCD with soft-key menu controls		
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)		

Table 6-1, North American Specifications

6.0 Specifications, continued

6.2 Specifications, International Models

	XM3.1-605CE-HP	XM3.1-905E-HP
Parameter		
Power Supply Nameplate Rating	230VAC	200VAC – 240VAC
Nominal AC Input Voltage	230VAC	230VAC
Nominal Input Frequency	50Hz	50Hz
Input Frequency Tolerance (%)	±3	±3
Input Voltage Operating Range Tolerance (%)	-30 / +25	-30 / +25
Input Voltage Range (VAC)	161 –288	161 –288
Input Current Maximum (A) [Battery Charger Shutdown]	4	4
Output Voltage (VAC)	63	63 / 89
Output Voltage Minimum (RMS)	59	59 / 63
Output Voltage Maximum (RMS)	64	64 / 63
Output Voltage Regulation (%) - Coarse Mode [Based on nominal input voltage at 50% load, 25°C]	63V: -6% / +1.5%	89V: -5/+1% 63V: -6/+1.5%
Output Voltage Regulation (%) - Fine Mode [Based on nominal input voltage at 50% load, 25°C]	63V: -4% / +1.5%	89V: -4/+1% 60V: -4/+1.5%
Line Load Frequency Vout Regulation (%)	9	9
Maximum Rated Output Current (A)	5	5
Maximum Output Power (VA)	315	450
Auxiliary Output Voltage (VAC)	220	220
Auxiliary Output Voltage Tolerance %	6	6
Line Mode Efficiency	Up to 90%	
Standby Efficiency	Up to 91%	
Output Waveform	Quasi-square wave	
Short Circuit Protection	<150% of max. current rating	
Transfer Characteristics	Uninterrupted output	
Battery Voltage (VDC)	12	12
Battery Charger		
Temperature Compensation	Programmable (0 to 5mV/cell/°C)	
Bulk Charger Current (Amps @ 80% Load & Nomline)	10A	
5 Stages	Refresh, Bulk, Accept, Float, Rest	
Mechanical		
Inverter Module	Non-removable Inverter Module	
Dimensions H x W x D (in/mm)	7.95 × 11.45 × 9.72 / 202 × 291 × 247	
Weight (lb/kg)	48.5 / 22.0	49 / 22.3
Input Power Connector (IEC 320/C20)	Shuko Plug	Shuko Plug
Battery Connector	50A 2-Pole Anderson style (SB 50 Red)	
Remote Temp Sensor	Ring lug fastens to negative terminal on center battery	
Display	4 line by 20 character white LCD with soft-key menu controls	
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)	

Table 6-2, International Specifications

6.0 Specifications, continued

6.3 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
XM3.1-903-HP XM3.1-905-HP	110-127V 60Hz	NRTL UL/CSA 60950-1; CB IEC 60950-1 UL1778, CSA 107.3 Applicable parts	FCC CFR47 Part 15 Class B (US), ICES-003 (CAN), Comcast immunity (10V/m)
XM3.1-905P-HP	200-240V 60HZ	NRT UL/CSA 60950-1; CB IEC 60950-1 UL1778, CSA 107.3 Applicable parts	FCC CFR47 Part 15 Class A ICES-003
XM3.1-905E-HP	200-240V 50Hz	CB EN/IEC 60950-1 with national differences EN/IEC 62040-1 Applicable parts	CISPR 22 (55022) Class B, CISPR 24 (55024)
XM3.1-605CE-HP	230V 50Hz	CB EN/IEC 60950-1 with national differences EN/IEC 62040-1, EN/60728-11 Applicable parts, CE	CISPR 22 (55022) Class A, CISPR 24 (55024) EN62040-2 (UPS Equipment), Category C2 (C1 desired) EN50083-2 (CATV Equipment EMC) (Class B Conducted Limits)

Table 6-3, Product Certifications Regarding Safety, EMC Compliance

6.4 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.

Coaxial Surge Arrestor

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



NOTICE:

The warranty for the status monitor may be void if a coaxial surge arrestor is not used.

APP9005C, APP90S/APP9022S (Service Power Supply)

The APP9005C, APP90S/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 APP9005C, APP90S/APP9022S be set for 90/75/60VAC applications. Use a 15A or 25A SPI (Service Power Inserter) to transfer power from the APP9005C, APP9015S/APP9022S to the load.

6.0 Specifications, continued

6.5 Return and Repair Information

In the event you need to return the power supply 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.

6.6 Common Parts for XM3.1-HP

Common Parts for XM3.1-HP	
Part Number	Description
Line Cord	
875-853-19	120V, 5-15P, 24", RIGHT ANGLE C13
876-022-19	120V, 5-15P, 96", RIGHT ANGLE C13
875-863-19	230V, 50Hz, SCHUKO (EU), 36", STRAIGHT C13
875-967-19	240V, 6-15P, 24", RIGHT ANGLE C13
Precision Temperature Sensor (PTS)	
746-331-20	PTS, 48" (1.2m), for PWE Appl
746-331-21	PTS, 144" (3.6m)
746-331-22	PTS, 300" (7.6m)
Precision Temperature Sensor (PTS) w/ Ferrite Bead	
746-331-30	PTS, 61" (1.5m), for PWE Appl, w/ Ferrite
746-331-31	PTS, 125" (3.1m), for 2.5m Appl, w/ Ferrite
746-331-32	PTS, 420" (10.7m), for 10m Appl, w/ Ferrite
Battery Cable Kit	
875-874-20	BCK-1×1×12 - 12V - 13"/22" LPE
746-00020-20	BCK,FU,2×12V,6AWG,1/4R,36"
Battery Fuse Kit	
744-863-20-002	KT, FU UPGRD, 100A, FOR BCK
MOV Boards	
704-224-20-001*	120V *Default MOV Board used in the XM3.1-HP
704-224-21-001	240V
704-224-30-001	120V w/ Heat Shrink Tubing on MOVs
704-224-31-001	240V w/ Heat Shrink Tubing on MOVs

Table 6-4, XM3.1-HP Common Parts

7.0 Mounting Options

7.1 Wall-Mount Shelf (Large)

 **NOTICE:**

Install the system in a sheltered, weather-protected location inaccessible to the general public.


 **CAUTION!**

The installer must verify the wall is capable of supporting the loaded rack. Direct mounting to a wall stud or equivalent is required.

• Tools and Materials:

- Four user-supplied 5/16" × 3" (or metric equivalent) lag bolts
- User-supplied 1/2" thick sheet of plywood
- User-supplied grounding wire (of sufficient length for application)
- Drill with 1/4" (or metric equivalent) drill bit
- Ratchet with 1/2" and 5/16" (or metric equivalent) sockets
- Level
- 1" Torque Wrench
- Stud finder (optional)
- Tape measure (optional)

Installation Procedure:

1. Refer to Fig. 7-1 for the shelf dimensions. Select a location that allows sufficient clearance on the top, bottom and sides of the shelf for cabling required for the installation.
2. Using the back of the shelf as a template, cut a piece of 1/2" plywood and mark and drill pilot holes for the keyslot.
3. Locate one stud and a drill pilot hole. Install the first user-supplied 5/16" lag bolt and hang the shelf and plywood behind it using the keyslot. Drill the second hole through the plywood and into the stud and install the second lag bolt. Drill the top left and right holes in the plywood through the shelf and install the 3rd and 4th lag bolts. Tighten all lag bolts once the shelf is positioned.
4. Install the SPI to the SPI bracket and torque to 130 in-lbs (14.5 Nm). Follow the proper stack-up as shown in Fig. 7-2 and mount the SPI bracket onto either of the #10-32 studs  in Fig. 7-1, and tighten the supplied #10-32 nut, lock washer, and flat washer.

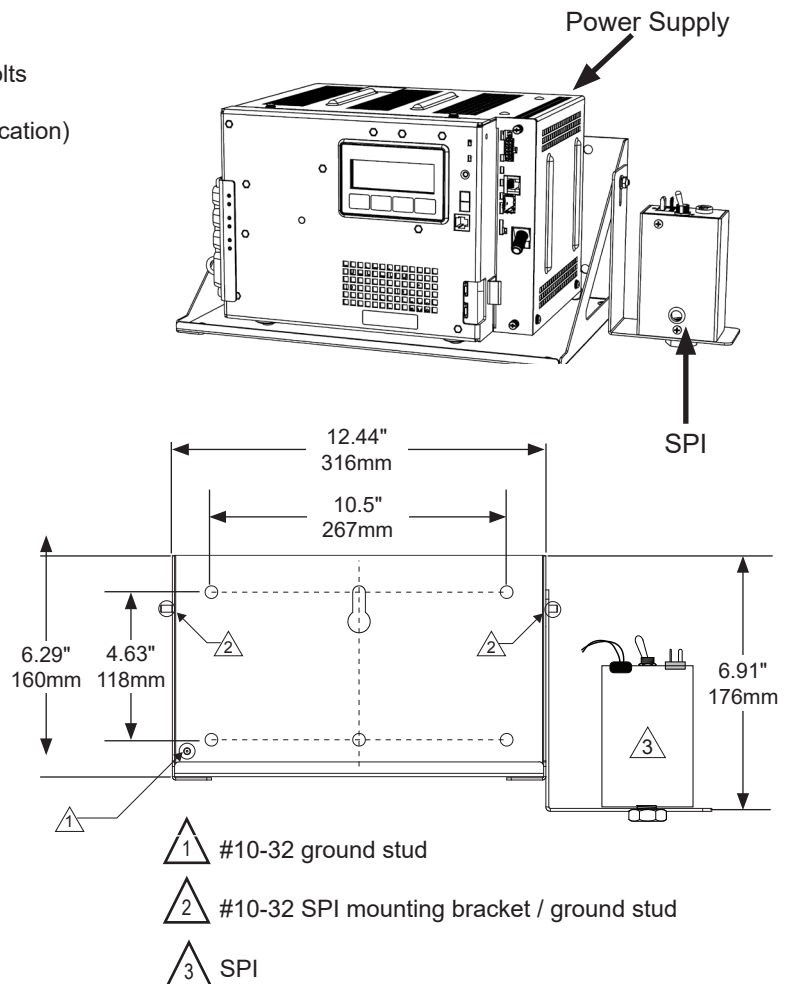




Fig. 7-1, Wall-Mount Shelf Mounting Hole Layout and SPI Bracket

IMPORTANT:

For proper operation of the Power Supply and Communications Module, external grounding of the shelf is required.

5. Verify the power supply is connected to the shelf grounding connection. The power supply connects to the ground stud  in Fig. 7-1. Follow the proper stack-up as shown in Fig. 7-3 to attach the supplied lock washer, #10-32 nut and supplied ground wire.
6. Verify the shelf is grounded via the unused #10-32 ground stud  in Fig. 7-1, and a user-supplied ground wire. Follow the proper stack up as shown in Fig. 7-3 to attach the supplied lock washer, #10-32 nut and customer supplied ground wire. Refer to applicable codes to determine additional grounding requirements.

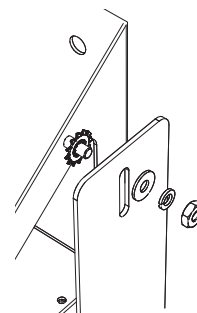


Fig. 7-2, SPI Hardware Stack Up

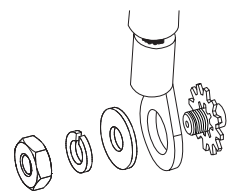
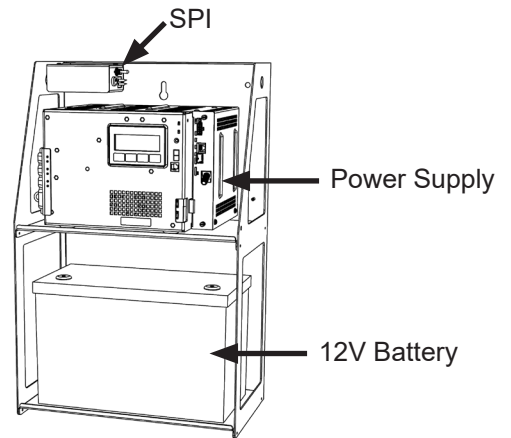


Fig. 7-3, Ground Wire Stack Up

7.2 Wall-Mount Rack (1 Battery)

NOTICE:
Install the system in a sheltered, weather-protected location inaccessible to the general public.

CAUTION!
The installer must verify the wall is capable of supporting the loaded rack. Direct mounting to a wall stud or equivalent is required.



Tools and Materials:



- Four user-supplied 5/16" × 3" (or metric equivalent) lag bolts
- User-supplied grounding wire (of sufficient length for application)
- Drill with 1/4" (or metric equivalent) drill bit
- Ratchet with 1/2" and 5/16" (or metric equivalent) sockets
- Level
- 1" Torque Wrench
- Stud finder (optional)
- Tape measure (optional)

Installation Procedure:

1. See Fig. 7-4 for the dimensions of the shelf. Select a location that allows sufficient clearance on the top, bottom and sides for cabling and ventilation required for the installation.
2. Locate one stud and drill pilot hole. Install first user-supplied 5/16" lag bolt and hang the shelf using keyslot. Mark and drill second hole in a stud and install second lag bolt. Secure both lag bolts once shelf is positioned.
3. To install an SPI, use either of the two SPI mounting holes on the top of the rack. Place the SPI so that the seizure screw is facing up. Tighten the SPI to 130 in-lbs (14.5 Nm) of torque.

IMPORTANT:

For proper operation of the Power Supply and Communications Module, external grounding of the rack is required.

4. Verify the power supply is connected to the rack grounding connection. The power supply connects to a ground stud  in Fig. 7-4. Follow the proper stack-up as shown in Fig. 7-5 to attach the supplied #10-32 nut, lock washer, flat washer, and supplied ground wire.
5. Verify the rack is connected to ground via either of the #10-32 ground studs  in Fig. 7-4, and a user-supplied ground wire. Follow the proper stack-up as shown in Fig. 7-5 to attach the supplied #10-32 nut, lock washer, flat washer, and customer supplied ground wire. Refer to applicable codes to determine additional grounding requirements.

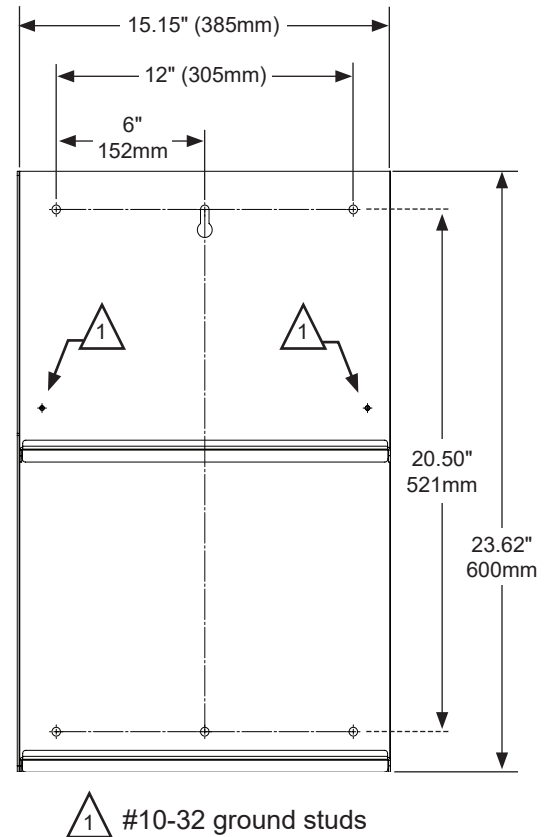


Fig. 7-4, Wall-Mount Rack Mounting Hole Layout

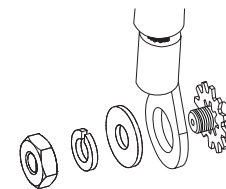


Fig. 7-5, Ground Wire Stack Up

7.3 Wall-Mount Rack (2 Battery)

NOTICE:
Install the system in a sheltered, weather-protected location inaccessible to the general public.

CAUTION!
The installer must verify the wall is capable of supporting the loaded rack. Direct mounting to a wall stud or equivalent is required.

Tools and Materials:



- Four user-supplied 5/16" × 3" (or metric equivalent) lag bolts
- User-supplied grounding wire (of sufficient length for application)
- Drill with 1/4" (or metric equivalent) drill bit
- Ratchet with 1/2" and 5/16" (or metric equivalent) sockets
- Level
- 1" Torque Wrench
- Stud finder (optional)
- Tape measure (optional)

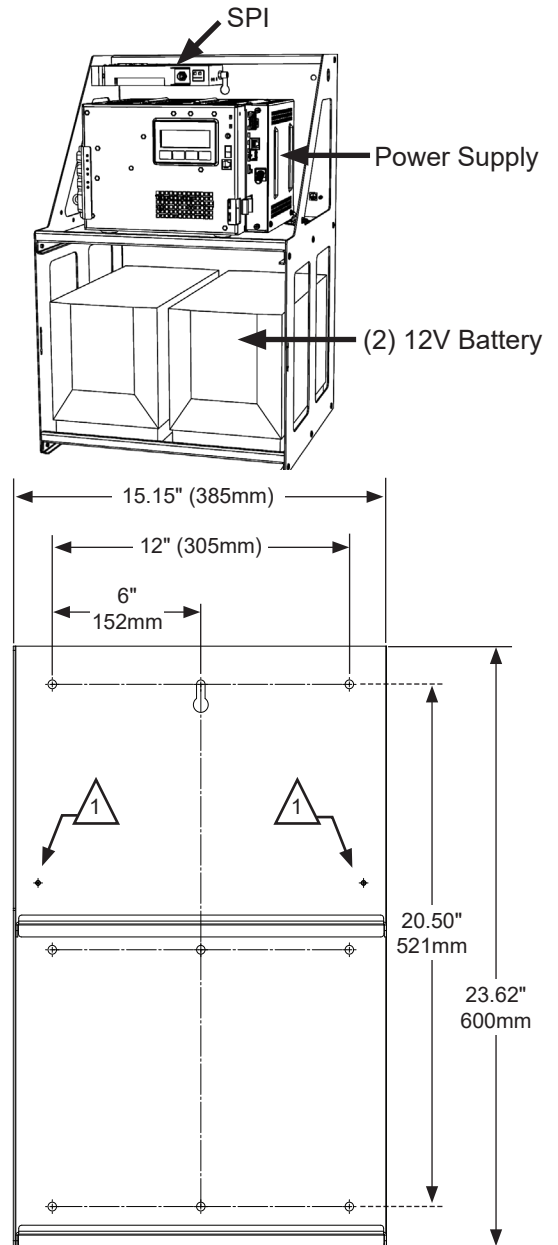
Installation Procedure:

1. See Fig. 7-6 for the dimensions of the shelf. Select a location that allows sufficient clearance on the top, bottom and sides for cabling and ventilation required for the installation.
2. Locate one stud and drill a pilot hole. Install the first user-supplied 5/16" lag bolt and hang the rack using the keyslot. Mark and drill the second and third center-line holes in the stud and install the second and third lag bolts. Tighten all lag bolts once the rack is positioned.
3. To install an SPI, use either of the two SPI mounting holes on the top of the rack. Place the SPI so that the seizure screw is facing up. Tighten the SPI to 130 in-lbs (14.5 Nm) of torque.

IMPORTANT:

For proper operation of the Power Supply and Communications Module, external grounding of the rack is required.

4. Verify the power supply is connected to the rack grounding connection. The power supply connects to the left ground stud  in Fig. 7-6. Follow the proper stack-up as shown in Fig. 7-7 to attach the supplied #10-32 nut, lock washer, flat washer, and supplied ground wire.
5. Verify the rack is connected to ground via either of the #10-32 ground studs  in Fig. 7-6, and a user-supplied ground wire. Follow the proper stack-up as shown in Fig. 7-7 to attach the supplied #10-32 nut, lock washer, flat washer, and customer supplied ground wire. Refer to applicable codes to determine additional grounding requirements.




 #10-32 ground studs

Fig. 7-6, Wall-Mount Rack Mounting Hole Layout

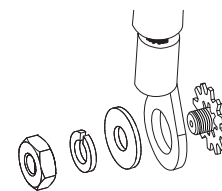
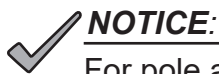


Fig. 7-7, Ground Wire Stack Up

7.0 Mounting Options, continued

7.4 LPE Enclosure



NOTICE:

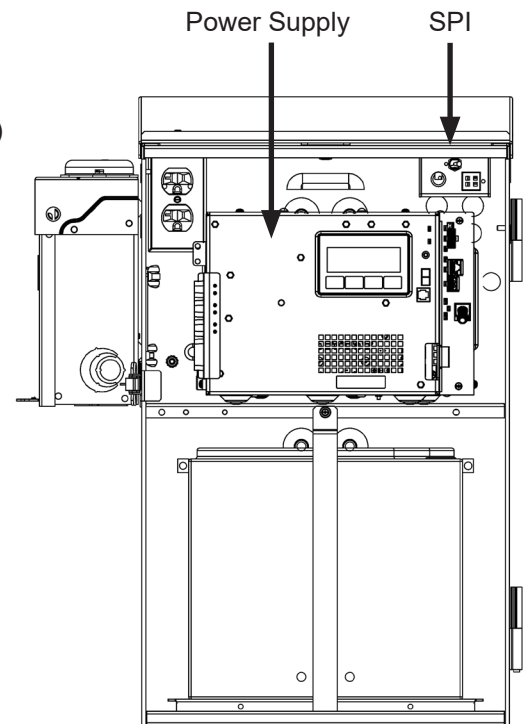
For pole and ground mount options, download the LPE Enclosure Installation Manual (*Alpha p/n 031-302-B0-001*) at www.alpha.com.

Tools and Materials:

- Ratchet w/ 1/2" and 9/16" socket (or metric equivalent)
- Two user-supplied 3/8" × 4-1/2" (or larger) lag bolts (or metric equivalent)
- Two 3/8" stainless steel flat washers, 1.00" max diameter x 0.08" min. thickness
- Drill w/ 1/4" drill bit or metric equivalent
- Level
- Stud finder
- Tape measure

Wall-mount Installation Procedure:

1. Position the bracket on a wall capable of support 150 lbs (68 kg). Use a 3/4" plywood backing plate.
2. Maintain a minimum distance of 6" (153mm) from the bottom of the bracket to the ground for proper enclosure ventilation.
3. Level the bracket vertically with the tab facing up. Center the bracket on a wall stud.
4. Secure the bracket to the wall using two user-supplied 3/8" × 4-1/2" (or larger) lag bolts and flat washers specified above. The hardware must sit flush inside the bracket dimples for proper installation. Verify there is at least 6" spacing between the bracket and the ground.
5. Hang the enclosure on the bracket.
6. Securely fasten the enclosure to the bracket using the six 5/16" bolts, lock washers and fender washers (supplied).



WARNING! ELECTRICAL HAZARD

Only qualified personnel should connect the utility power. Power must be connected in compliance with local electrical codes and common safety practices must be observed.

Installing the XM3.1-HP

1. Place the XM3.1-HP on the top shelf of the LPE enclosure.
2. Verify the necessary utility connections (per the **Utility Power Connection Notes** section) have been made.
3. Load batteries on the bottom shelf and connect per the wiring diagram in **Section 2.3, Battery Installation and Connection**. DO NOT connect the battery string to the power supply at this time.
4. Connect the SPI, CMM and Tamper Switch.
5. Apply utility power.
6. Connect battery string to the power supply.
7. Switch battery breaker on.
8. Wait for battery alarm to clear.
9. Unit is now ready to be placed into service.

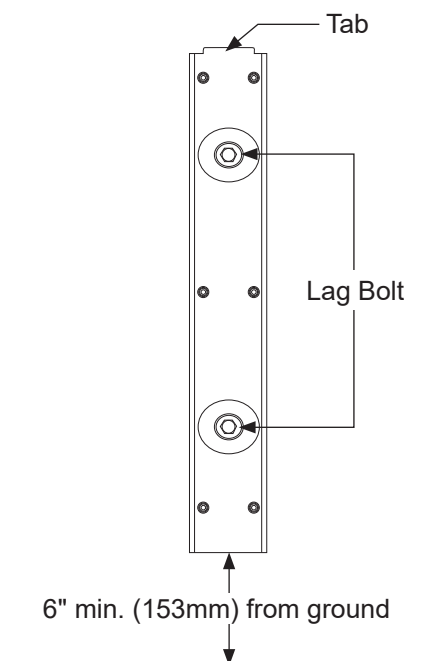
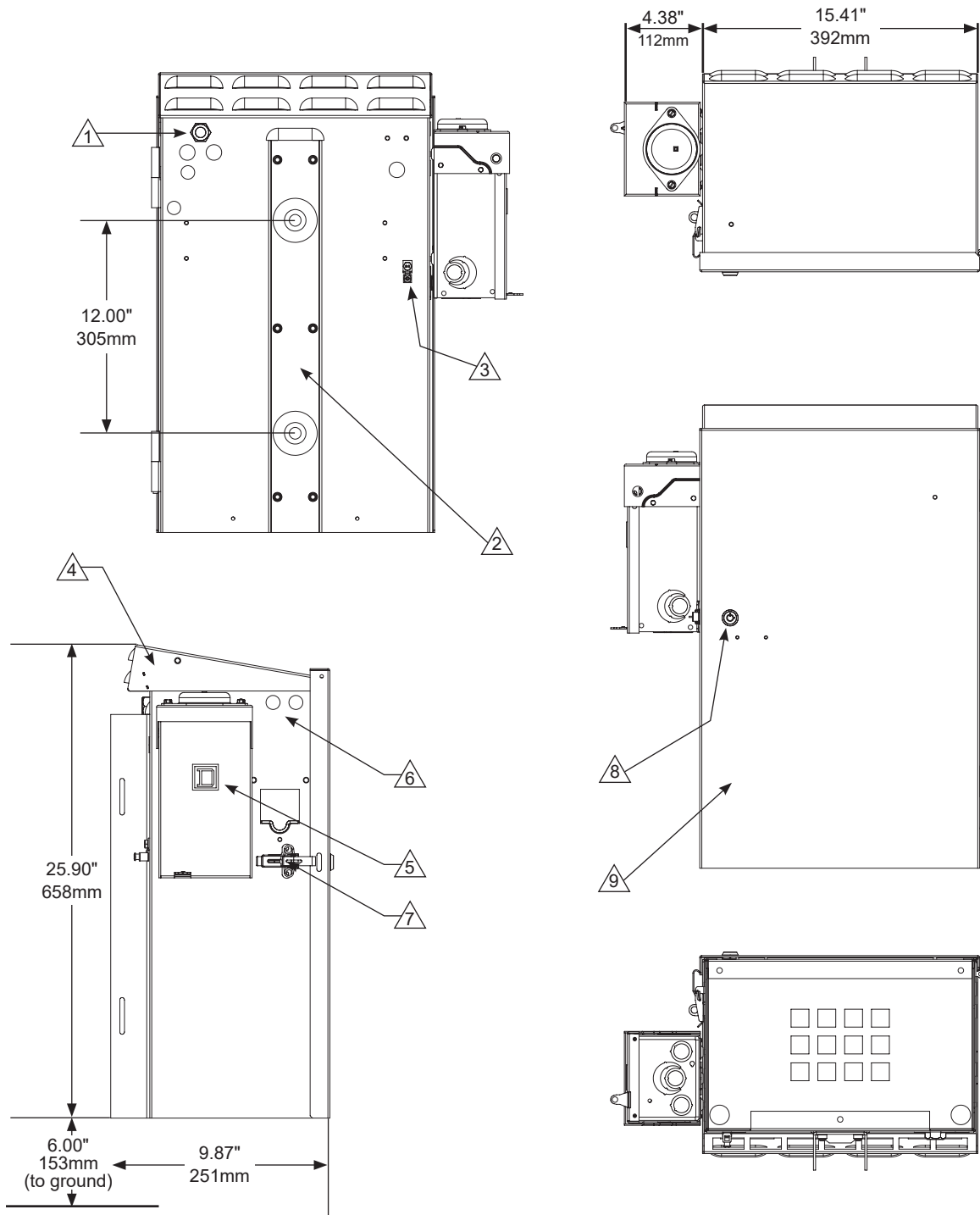


Fig. 7-8, Mounting Bracket

7.0 Mounting Options, continued



- | | | | |
|---|---------------------------|---|---|
| ① | Optional SPI or SPI RF | ⑥ | Knockouts for optional ACI, LRI indicator lamps |
| ② | Pole/wall mount bracket | ⑦ | Lockable door latch |
| ③ | Enclosure ground point | ⑧ | Optional GEM lock |
| ④ | Removable lid | ⑨ | Hinged removable door |
| ⑤ | Optional service entrance | | |

Fig. 7-9, LPE Enclosure Wall-mount Dimensions

7.5 Node Power Supply Enclosure



NOTICE:

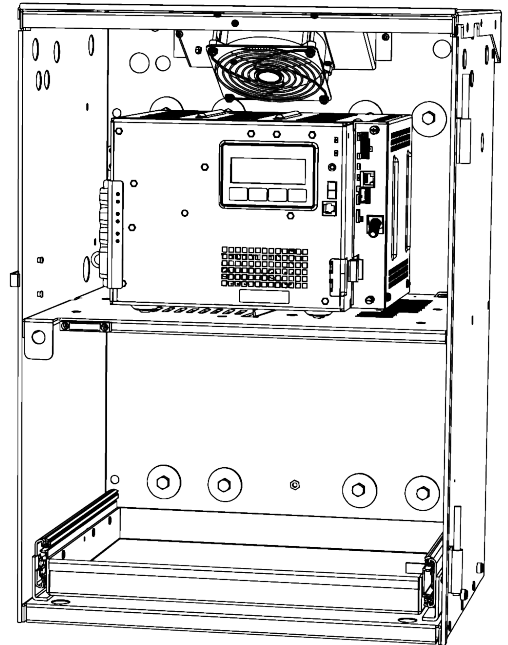
For pole, rack or floor mount options, download the Node Power Supply Enclosure Installation Manual (Alpha p/n 031-295-B0-001) at www.alpha.com.

• Tools and Materials:

- Wall-mount kit (Alpha p/n 746-034-20)
- 3/8" wrench and socket
- Hand drill w/ 5/32" bit
- Level
- Stud finder
- Tape measure

Wall-mount Installation Procedure:

1. Remove the lid and door of the enclosure and set aside.
2. Use stud finder to locate centers of two studs and mark. (See Fig. 7-10)
3. Hold upper bracket to located centers and mark the two lower holes at this time.
4. Drill four 5/32" pilot holes at the marks.
5. Use four 3/4" × 2-3/4" lag bolts to fasten the bracket to the wall.
6. Attach the lower mounting brackets to the enclosure.
7. Attach the enclosure to the upper mounting bracket.
8. Mark the holes (on stud center) for the lower mounting brackets and drill 5/32" pilot holes.
9. Use the 1/4" × 1-1/2" lag bolts to secure lower brackets to the wall.
10. Installation complete. The enclosure is now ready for utility wiring and installation equipment.



WARNING! ELECTRICAL HAZARD

Only qualified personnel should connect the utility power. Power must be connected in compliance with local electrical codes and common safety practices must be observed.

Installing the XM3.1-HP

1. Place the XM3.1-HP on the top shelf of the Node Power Supply (NPS) enclosure.
2. Verify the necessary utility connections (per the **Utility Power Connection Notes** section) have been made.
3. Load batteries on the bottom shelf and connect per the wiring diagram in **Section 2.3, Battery Installation and Connection**. DO NOT connect the battery string to the power supply at this time.
4. Connect the SPI, CMM and Tamper Switch.
5. Apply utility power.
6. Connect battery string to the power supply.
7. Switch battery breaker on.
8. Wait for battery alarm to clear.
9. Unit is now ready to be placed into service.

7.0 Mounting Options, continued

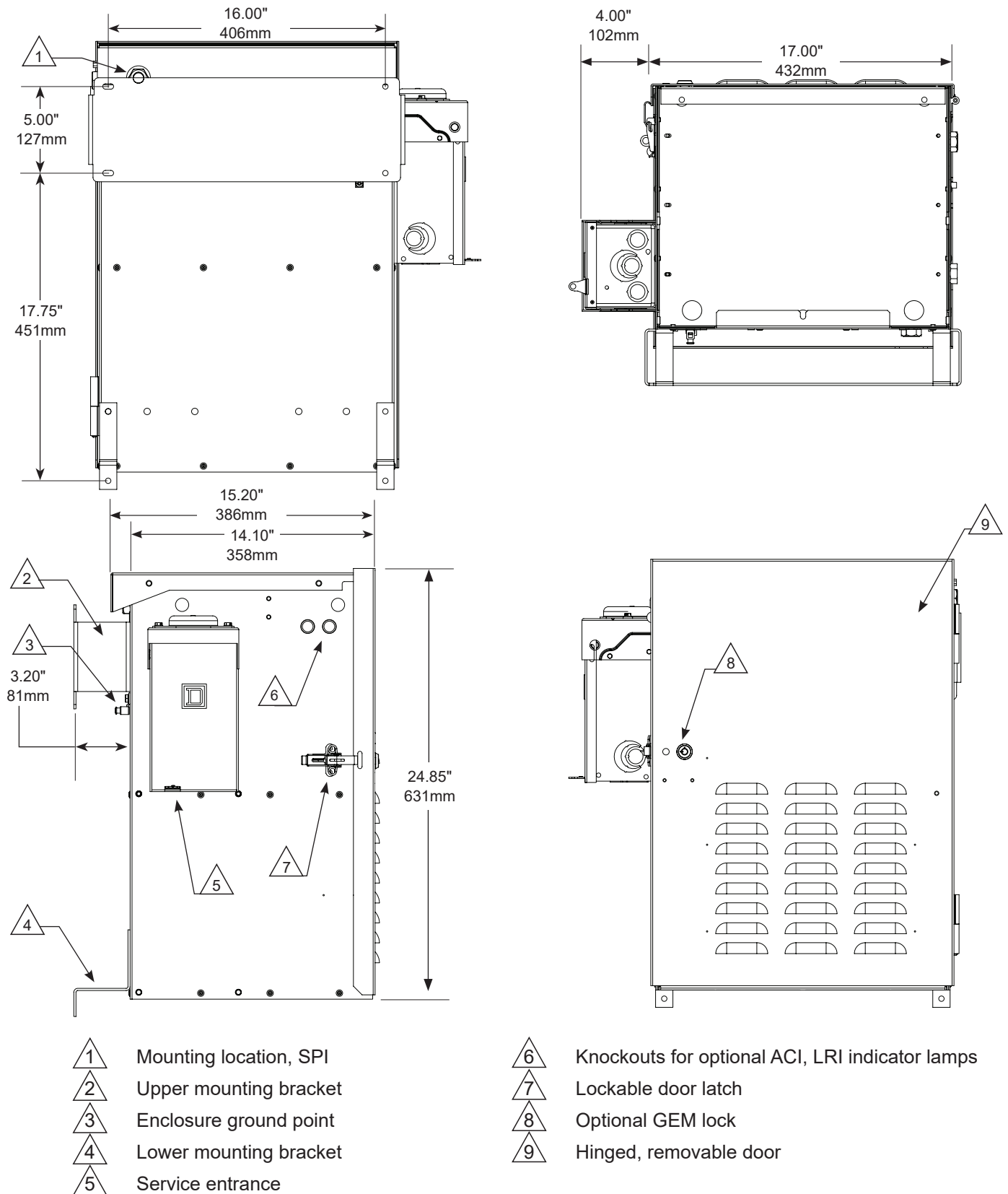


Fig. 7-10, Node Power Supply Enclosure Wall-mount Dimensions

8.0 Safety & Compliance Notes (Translations)

8.1 Safety Notes (German)

Sicherheitshinweise

Überprüfen Sie die in diesem Dokument enthaltenen Zeichnungen und Abbildungen, 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.

8.0 Safety & Compliance Notes (Translations), continued

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.

Dieses Gerät darf nur von qualifizierten Fachkräften gemäß der Anleitung, die jeder Einheit beiliegt, installiert oder konfiguriert werden.

Wenn das Gerät nicht in einem der Gehäuse oder Racks des Herstellers (Zubehör vom Hersteller) eingesetzt wird, muss es bei der endgültigen Montage in einen geeigneten Brandschutzschaltschrank (mit unkonventionellen Öffnungen an der Unterseite) untergebracht werden.

Die obigen Modelle sind nicht für eine direkte Installation im Freien vorgesehen.

Dieses Gerät ist für den Einsatz bei maximal 40 °C Umgebungstemperatur in offenen Racks des Herstellers (Innenbereich) und maximal 60 °C Umgebungstemperatur in geschlossenen Gehäusen des Herstellers (Außenbereich), Umgebungen mit Verschmutzungsgrad 3, Überspannungskategorie III, geeignet.

Das Produkt wurde in einem Zweigstromkreis, abgesichert durch einen 20-A-Trennschalter, getestet. Wenn im Endsystem ein höher bemessener Schutz verwendet werden soll, ist eine zusätzliche Begutachtung erforderlich.

Der SFP-Anschluss darf nur für optische Ausführungen verwendet werden.

Der Batterietest wurde mit den vom Hersteller empfohlenen Batterien (AlphaCell®-Serie) durchgeführt.

In Verbindung mit der optionalen MOV-Platine bietet dieses Gerät eine VDR-Isolierung gegen Wärmeüberbrückung.

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!

- Nur qualifiziertes Personal darf das Netzgerät warten.
- 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.

Versandkontrolle

Entnehmen Sie das Netzteil aus dem Versandbehälter. Vergewissern Sie sich, dass alle zum Netzteil gehörenden Teile vollständig sind, wie der Präzisionstemperatursensor und alle sonstigen bestellten Zubehörteile. Beim Versand können einzelne Teile verrutscht sein. Überprüfen Sie sorgfältig das Netzteil und sonstige Teile auf mögliche versandbedingte Mängel, wie z. B. lockere oder beschädigte Anschlüsse. Sollten irgendwelche Teile beschädigt sein oder fehlen, wenden Sie sich sofort an Alpha Technologies Services Inc. oder an die Versandfirma. Die meisten Versandfirmen haben eine kurze Reklamationsfrist.

Versuchen Sie nicht, ein Netzteil zu installieren, ohne zuvor eine umfassende Installationskontrolle durchzuführen.



HINWEIS:

Wenn das Netzteil zu Reparaturzwecken zurückgeschickt werden muss, verwenden Sie hierzu bitte den Original-Versandbehälter. Steht der Original-Versandbehälter nicht mehr zur Verfügung, wickeln Sie die Einheit in mindestens 7,5 cm dickes stoßdämmendes Material, um Schäden beim Versand zu vermeiden. Verwenden Sie das Verpackungsmaterial aus einer Lieferung (Box: Alpha-Teilenr. 966-681-10-001; Schaumstoffeinlage: Alpha-Teilenr. 966-682-10), um ein beschädigtes Netzteil zurück zu schicken. Falls dies erforderlich ist, packen Sie die Retoure auf eine Palette, um das Netzteil zu schützen.



VORSICHT!

Verwenden Sie keine Styroporflocken. Alpha Technologies Services Inc. haftet nicht für Schäden, die auf eine unsachgemäße Verpackung der Retoure zurückzuführen sind.

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 Schaltoptionen 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

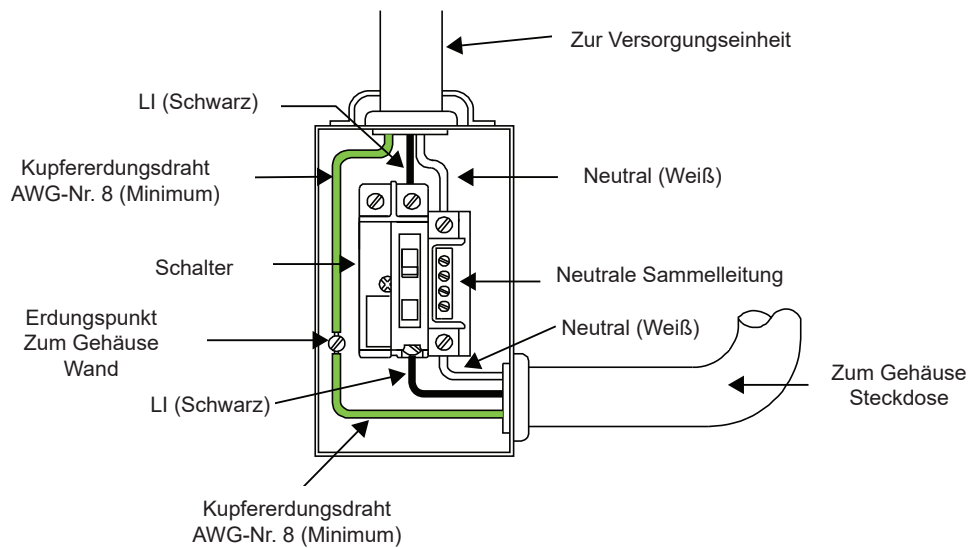


Fig. 8-1, Typische Netzanschlussverdrahtung für 120 V Wechselstrom

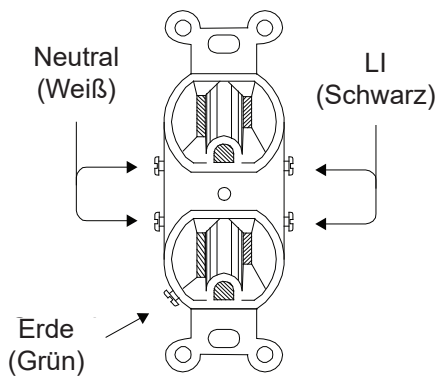


Fig. 8-2, Typische Steckdosenverdrahtung für 120 V/15 A Wechselstrom, 5-15R (Teile-Nr. 531-003-10)

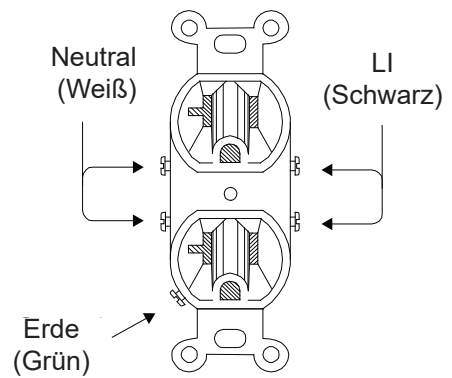


Fig. 8-3, Typische Steckdosenverdrahtung für 120 V/20 A Wechselstrom, 5-20R (Teile-Nr. 531-006-19)

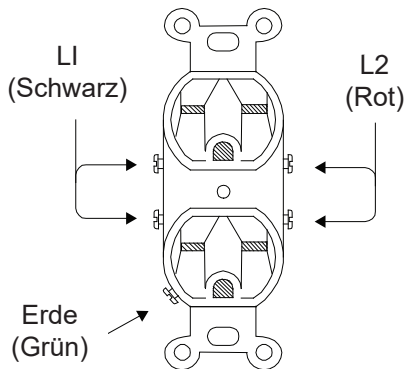


Fig. 8-4, Typische Steckdosenverdrahtung für 240 V/15 A Wechselstrom, 6-15R (Teile-Nr. 531-004-19)

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).

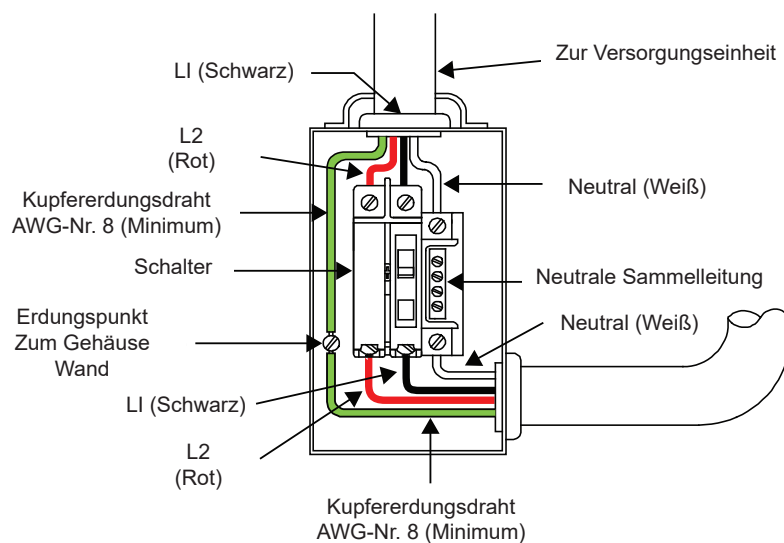


Fig. 8-5, Typische Netzanschlussverdrahtung für 240 V/60 Hz Wechselstrom

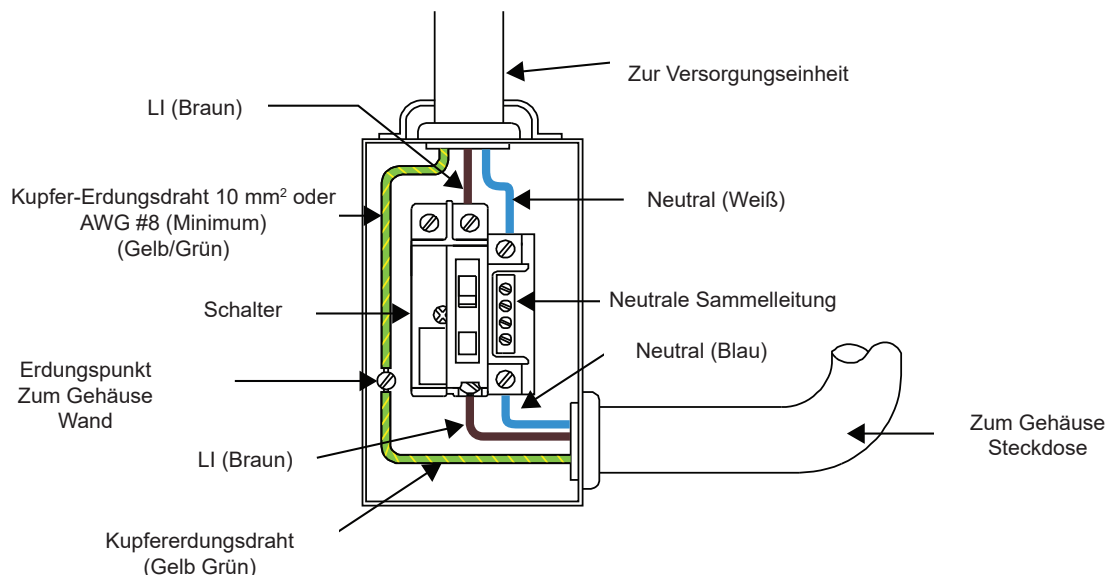


Fig. 8-6, Typische Netzanschlussverdrahtung für 230 V/50 Hz Wechselstrom

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.

- 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 Erdungsstift des Netzgeräts und dem Gehäuse vorhanden sein.
- 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.
- Bei Anwendungen, für die kein weiteres Gehäuse vorgesehen ist (MDU, Innenbereich) und eine SPI vorhanden ist, muss ein AWG 6-Massivdraht von der externen Erdungsschraube (siehe Abb. 1-6, Artikel 23) zu einem geeigneten Erdungsanschluss des Gebäudes verlegt werden.

Leistungsabgabe Rückleitung

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

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.

8.2 Safety Notes (Spanish)

Notas de Seguridad

Revise los dibujos e ilustraciones que figuran en este documento antes de continuar. 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.



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



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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.

8.0 Safety & Compliance Notes (Translations), continued

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.

El equipo deberá ser instalado o configurado únicamente por personal de servicio cualificado, de acuerdo con las instrucciones de instalación provistas con cada unidad.

El equipo necesita un gabinete contra incendios adecuado (aberturas inferiores no adaptadas) cuando no se instala en uno de los gabinetes del fabricante o estante abierto (opciones del fabricante) cuando se instala en la aplicación final.

Los modelos anteriores no están diseñados para instalación exterior directa.

Este equipo es para ser utilizado a una temperatura ambiente de hasta 40° C para aplicaciones en estantes abiertos del fabricante (interior) y a una temperatura ambiente máxima de 60° C cuando se utiliza dentro de gabinetes del fabricante (exterior), entornos grado 3 de contaminación, categoría III de sobrevoltaje.

El producto fue probado en un circuito derivado protegido por un disyuntor de 20 A. Se llevará a cabo una evaluación adicional en caso de utilizarse un protector superior en el sistema final.

El puerto SFP deberá utilizarse únicamente para implementaciones ópticas.

La prueba de baterías fue llevada a cabo con las baterías recomendadas por el fabricante (serie (AlphaCell®)).

El equipo contiene un aislamiento con puente VDR cuando se suministra con el tablero MOV opcional.

Precauciones de seguridad



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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.



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- 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!

- Solo el personal cualificado debe realizar el mantenimiento de la fuente de energía.
- 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



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- 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.



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- 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.



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- 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.

Inspección del envío

Retire la fuente de alimentación del contenedor del envío. Confirme que se hayan incluido la fuente de alimentación, el sensor de temperatura de precisión y todas las otras opciones solicitadas. Durante el envío, los componentes pueden moverse. Inspeccione cuidadosamente la fuente de alimentación y el resto del contenido para detectar posibles fallas relacionadas con el envío, tales como conectores que estén sueltos o dañados. En caso de que faltaran artículos o estuviesen dañados, póngase en contacto inmediatamente con Alpha Technologies Services, Inc. o la compañía de transporte. La mayoría de las compañías de transporte tienen un período breve para la presentación de reclamos. No intente instalar una fuente de alimentación sin antes contar con una inspección de preinstalación completa aprobada.



AVISO:

Utilice el contenedor original del envío si es necesario devolver la fuente de alimentación para su reparación. Si el contenedor original no está disponible, asegúrese de que la unidad esté bien embalada con al menos tres pulgadas de material amortiguador de golpes para evitar daños durante el envío. Utilice un embalaje de envío único (caja: Número de producto Alpha 966-681-10-001; inserto de espuma: Número de producto Alpha 966-682-10) para enviar de vuelta la fuente de alimentación si está dañada. De ser necesario, paletice el envío para proteger la fuente de alimentación.



PRECAUCIÓN!

No utilice material tipo palomitas de maíz. Alpha Technologies Services, Inc. no es responsable de daños causados por el embalaje inadecuado de las unidades devueltas.

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 ferresonantes (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

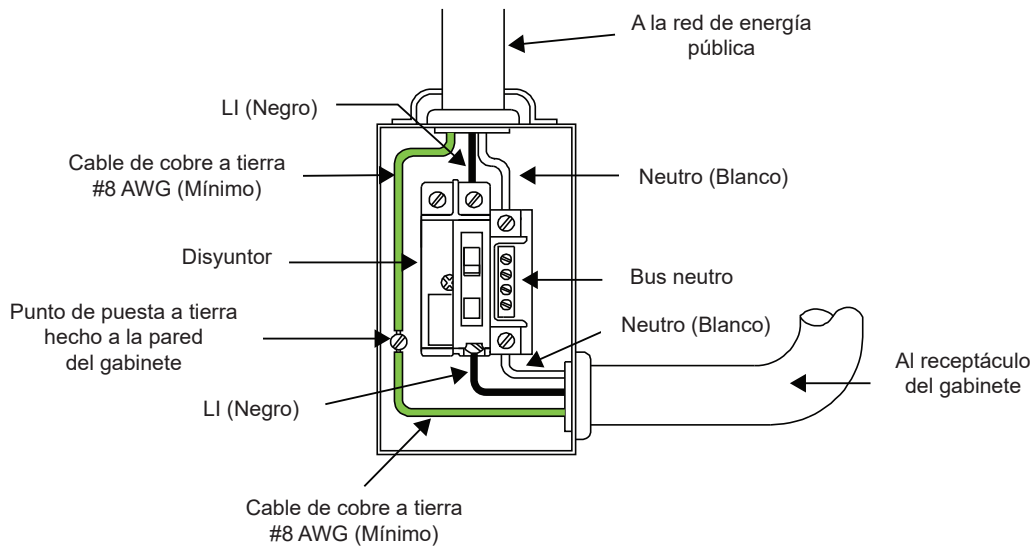


Fig. 8-7, Cableado típico de entrada de servicio de 120 VCA

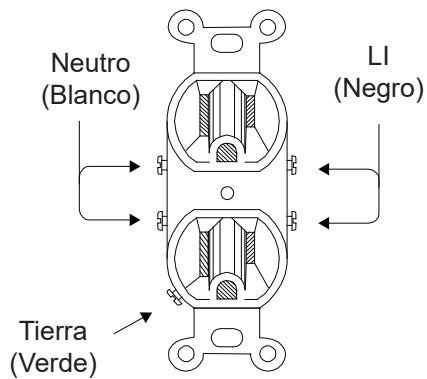


Fig. 8-8, Cableado típico de receptáculo de 120 VCA 15A, 5-15R (p/n 531-003-10)

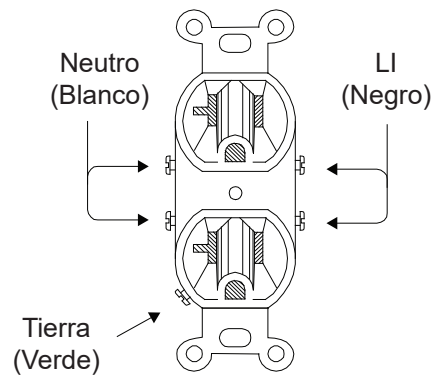


Fig. 8-9, Cableado típico de receptáculo de 120 VCA 20A, 5-20R (p/n 531-006-19)

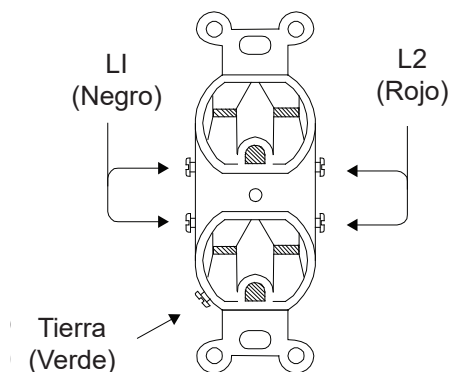


Fig. 8-10, Cableado típico de receptáculo de 240 VCA 15A, 6-15R (p/n 531-004-19)

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*).

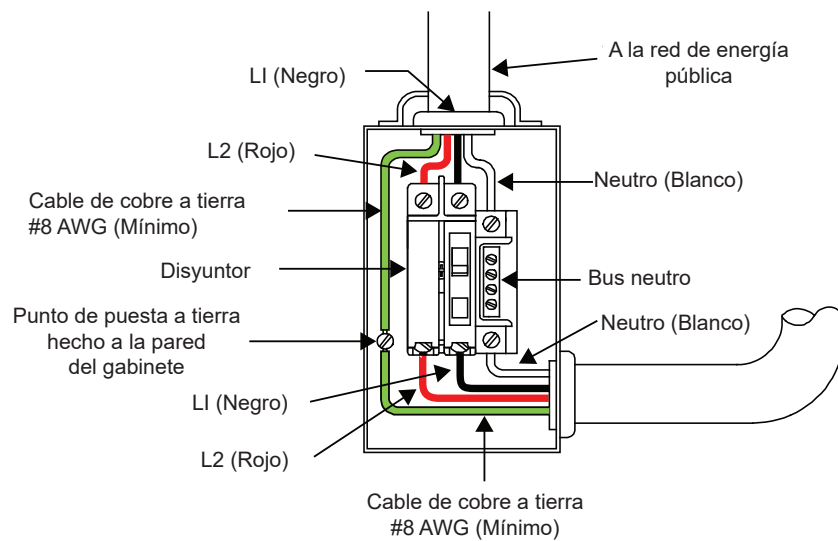


Fig. 8-11, Cableado típico de entrada de servicio de 240 VCA 60 Hz

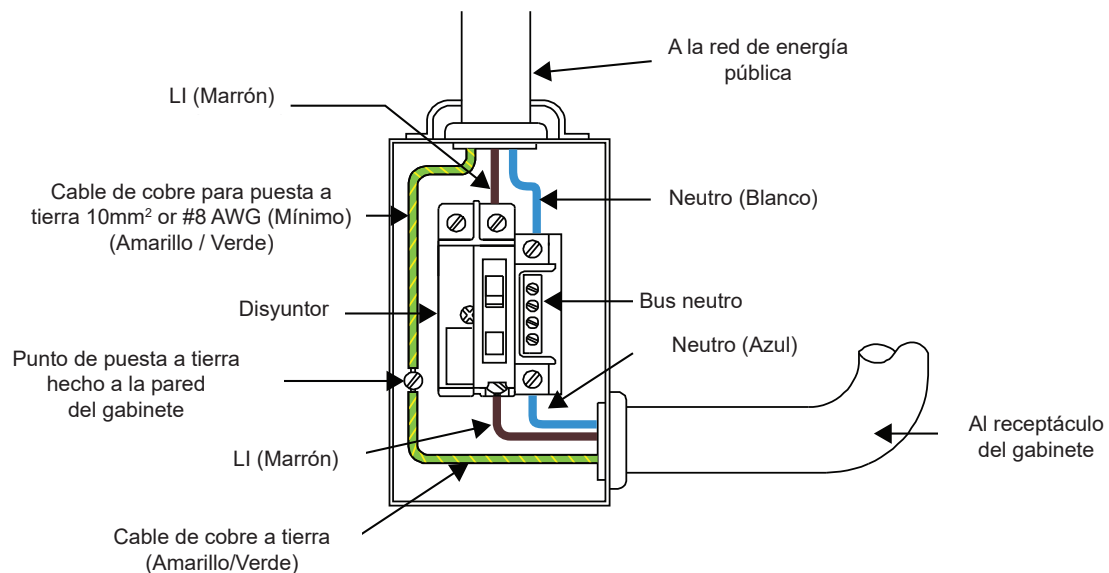


Fig. 8-12, Cableado típico de entrada de servicio de 230 VCA 50 Hz

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.

- 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.
- 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.
- En aplicaciones donde no se suministra otro gabinete (MDU interior) y hay un SPI suministrado, se debe conectar un cable de cobre sólido #6 AWG desde el tornillo de tierra externo (ver Fig. 1-6, artículo 23), a una conexión a tierra adecuada del edificio.

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.

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.

8.3 Safety Notes (Portuguese)

Notas de Segurança

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.

8.0 Safety & Compliance Notes (Translations), continued

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.

Este equipamento deve ser instalado ou configurado apenas por pessoas qualificadas, de acordo com as instruções de instalação fornecidas com cada unidade.

O equipamento precisa de um encapsulamento de proteção contra incêndio adequado (aberturas inferiores não compatíveis) quando não for instalado em um dos gabinetes do fabricante ou rack aberto (opções do fabricante) quando for instalado na aplicação final.

Os modelos acima não se destinam à instalação direta externa.

Este equipamento deve ser usado em temperatura ambiente de até 40°C para aplicações de rack aberto do fabricante (interno) e em temperatura ambiente máxima de 60°C quando utilizado dentro dos gabinetes do fabricante (externo), ambiente com Grau de Poluição 3, categoria de sobretensão III.

O produto foi testado em um circuito derivado protegido por um disjuntor de 20 A. Uma avaliação adicional deve ser realizada se um protetor mais alto for usado no sistema final.

A porta SFP deve ser usada apenas para implementações óticas.

O teste da bateria foi realizado com as baterias recomendadas pelo fabricante (série AlphaCell®).

Este equipamento contém isolamento em ponte de VDRs quando fornecido com a placa MOV opcional.

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 foco 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!

- Somente o pessoal qualificado deve fazer a manutenção da fonte de alimentação.
- 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.

Notas de Segurança da Bateria



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.

Inspeção de Transporte

Remova a fonte de alimentação da embalagem de transporte. Confirme se a fonte de alimentação, incluindo o sensor de precisão de temperatura e todas as outras opções solicitadas, está incluída. Durante o transporte, os componentes podem sofrer alterações. Inspeccione cuidadosamente a fonte de alimentação e outros conteúdos em busca de possíveis falhas relacionadas ao transporte, como conectores soltos ou danificados. Se algum item estiver danificado ou faltando, entre em contato imediatamente com a Alpha Technologies Services, Inc. ou a transportadora. A maioria das empresas de transporte tem um prazo curto para receber reclamações.

Não tente instalar uma fonte de alimentação sem primeiro passar por uma inspeção completa de pré-instalação.



NOTA:

Use a embalagem de transporte original se a fonte de alimentação precisar ser devolvida para manutenção. Se a embalagem original não estiver disponível, certifique-se de que a unidade esteja bem embalada com pelo menos 8 centímetros de material de absorção de choque para evitar danos durante o transporte. Use uma única embalagem para o envio (caixa: Alpha n/p 966-681-10-001; encarte de espuma: Alpha n/p 966-682-10) para enviar de volta uma fonte de alimentação danificada. Se necessário, paletize a embalagem para proteger a fonte de alimentação.



CUIDADO!

Não use material do tipo pipoca. A Alpha Technologies Services, Inc. não é responsável por danos causados por embalagens inadequadas de unidades devolvidas.

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 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 seguintes 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 contate 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*).

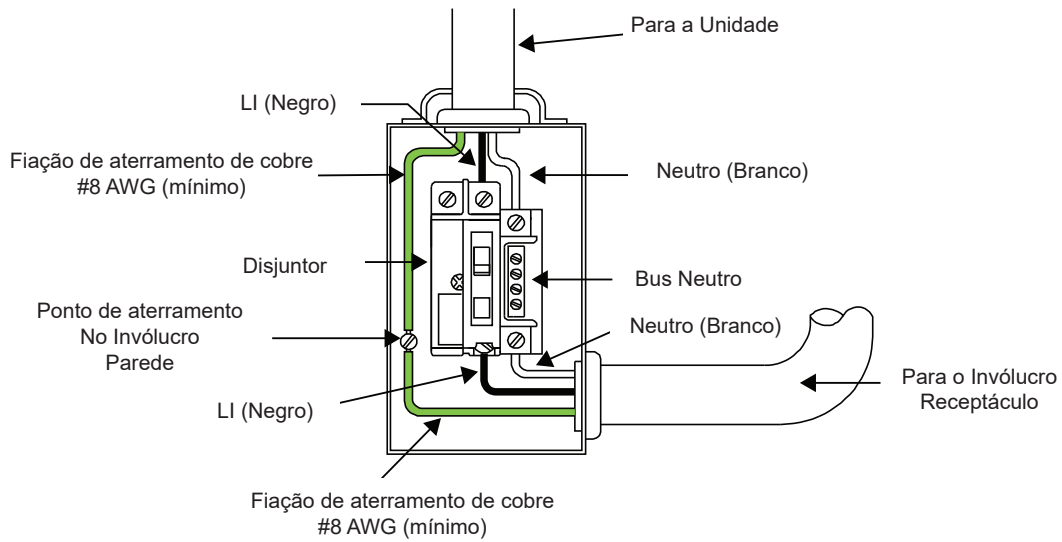


Fig. 8-13, Fiação Típica da Entrada de Serviço 120 VAC

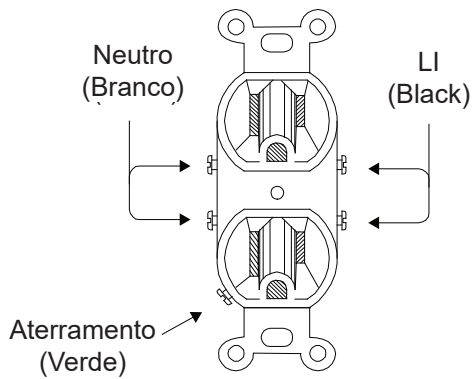


Fig. 8-14, Fiação Típica do Receptáculo 120 VCA 15A, 5-15R (p/n 531-003-10)

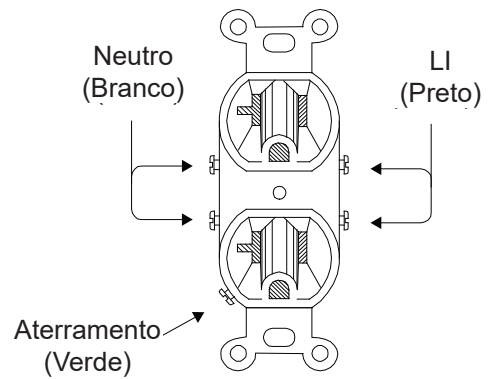


Fig. 8-15, Fiação Típica do Receptáculo 120 VCA 20A, 5-20R (p/n 531-006-19)

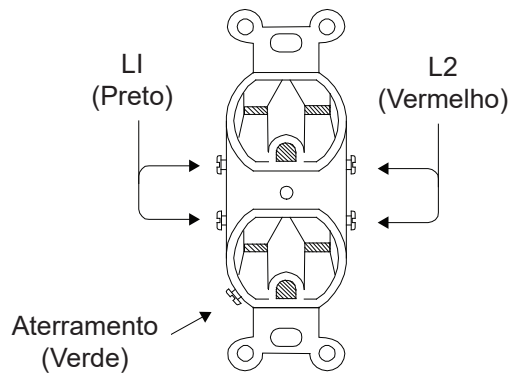


Fig. 8-16, Fiação Típica do Receptáculo 240 VCA 15A, 6-15R (p/n 531-004-19)

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*).

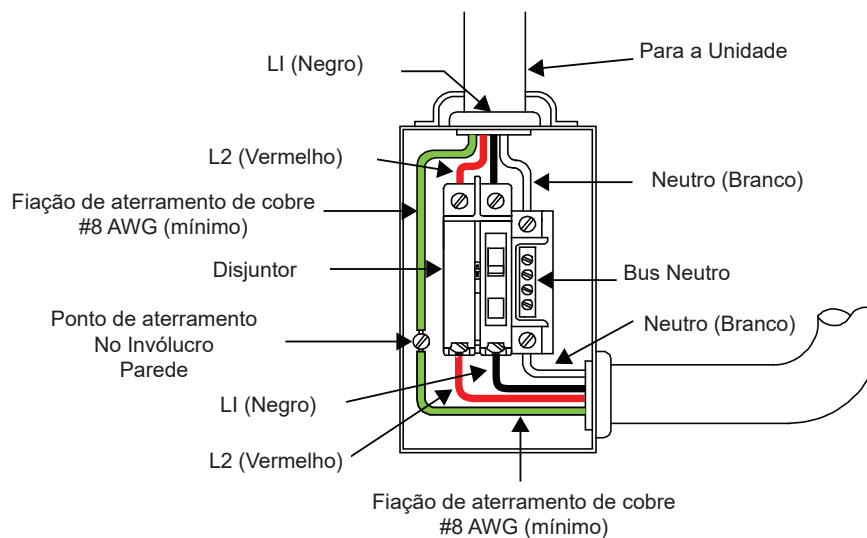


Fig. 8-17, Fiação Típica da Entrada de Serviço 240 VCA 60 Hz

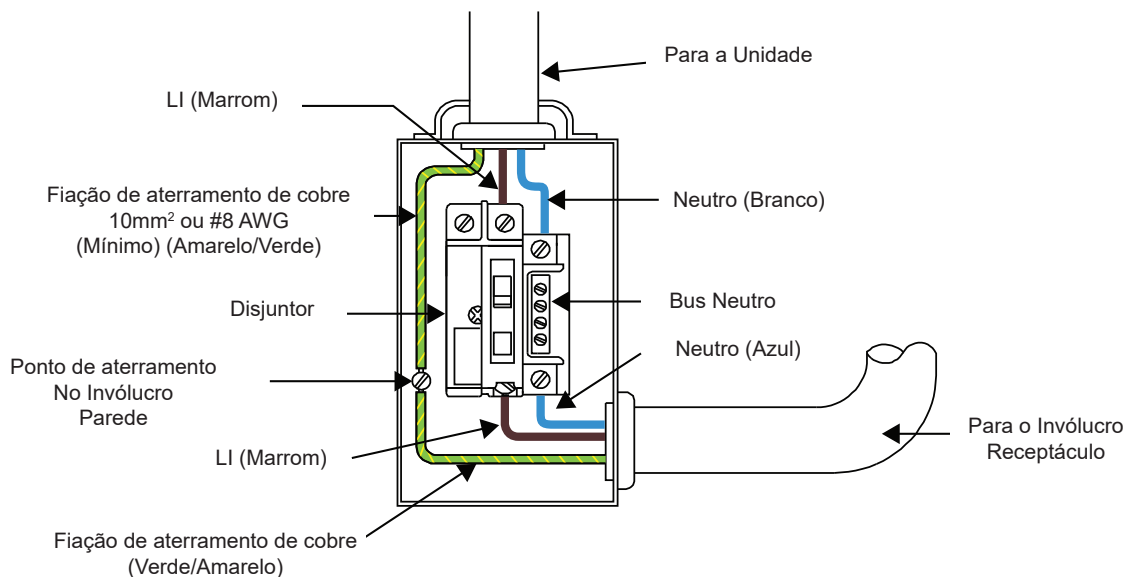


Fig. 8-18, Fiação Típica da Entrada de Serviço 230 VCA 50 Hz

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.

- 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.
- 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.
- Em aplicações onde não há outro gabinete fornecido (quadro de distribuição interno) e há uma Interface Periférica Serial fornecida, um fio de cobre sólido AWG N° 6 deve ser conectado do parafuso de aterramento externo (ver Fig. 1-6, item 23) a um solo de construção adequado.

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.

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.

8.4 Safety Notes (French)

Remarques sur la sécurité

Passez en revue les dessins et les illustrations contenus dans le présent document 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^{MC} 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 sécuritaire 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.

8.0 Safety & Compliance Notes (Translations), continued

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.

Cet équipement doit être installé ou configuré par le personnel d'entretien qualifié seulement, conformément aux directives d'installation fournies avec chaque appareil.

L'équipement requiert un boîtier coupe-feu approprié (ouvertures inférieures non conformes) lorsqu'il n'est pas installé dans l'une des armoires ou l'une des armoires ouvertes du fabricant (les choix du fabricant) au moment où il est installé dans l'application finale.

Les modèles ci-dessus ne sont pas conçus pour une installation directe à l'extérieur.

Cet équipement est conçu pour une utilisation à température ambiante maximum de 40 °C pour les applications installées dans les armoires ouvertes du fabricant (à l'intérieur) et à température ambiante maximum de 60 °C quand il est installé dans une armoire du fabricant (à l'extérieur). Environnement de pollution de type 3, catégorie de surtension III.

Le produit a été testé dans un circuit de dérivation protégé par un disjoncteur de 20 A. Une évaluation supplémentaire doit être réalisée si un protecteur de surtension plus puissant doit être utilisé dans le système final.

Le port SFP doit être utilisé uniquement pour les applications à fibre optique.

Les tests de batterie ont été menés avec les batteries recommandées par le fabricant (gamme AlphaCell®)

Cet équipement contient un pont thermique avec résistances VDR lorsqu'il est fourni avec un circuit avec varistance à oxyde métallique.

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!

- Seul le personnel qualifié doit faire l'entretien du bloc d'alimentation.
- 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.

Inspection à la réception

Retirez le bloc d'alimentation de l'emballage d'expédition. Vérifiez si le bloc d'alimentation, y compris le capteur de température de précision, et toutes les options commandées sont incluses. Les composantes pourraient s'être déplacées pendant le transport. Inspectez avec soin le bloc d'alimentation et toutes les autres composantes afin de déceler toute défaillance pouvant être liée au transport, par exemple des connecteurs desserrés ou endommagés. Si un article est endommagé ou manquant, veuillez communiquer avec Alpha Technologies Services, Inc. ou avec l'entreprise de transport. La plupart des entreprises de transport offrent une courte période de réclamation. Ne tentez pas d'installer un bloc d'alimentation sans avoir d'abord effectué une inspection complète.



AVIS:

Veillez utiliser l'emballage d'expédition original si vous devez retourner le bloc d'alimentation pour un entretien. Si l'emballage d'expédition original n'est pas disponible, assurez-vous de bien emballer l'appareil en plaçant au moins huit centimètres (trois pouces) de matériau amortisseur de chocs pour éviter les dommages pendant le transport. Utilisez un emballage d'expédition à usage unique (boîte : Alpha, numéro de pièce 966-681-10-001; morceau de mousse : Alpha, numéro de pièce 966-682-10) pour retourner un bloc d'alimentation endommagé. Au besoin, palettisez le colis afin de protéger le bloc d'alimentation.



PRUDENCE!

N'utilisez pas un matériau de type maïs soufflé. Alpha Technologies Services, Inc. n'est pas responsable des dommages entraînés par un emballage inadéquats des appareils retournés.

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

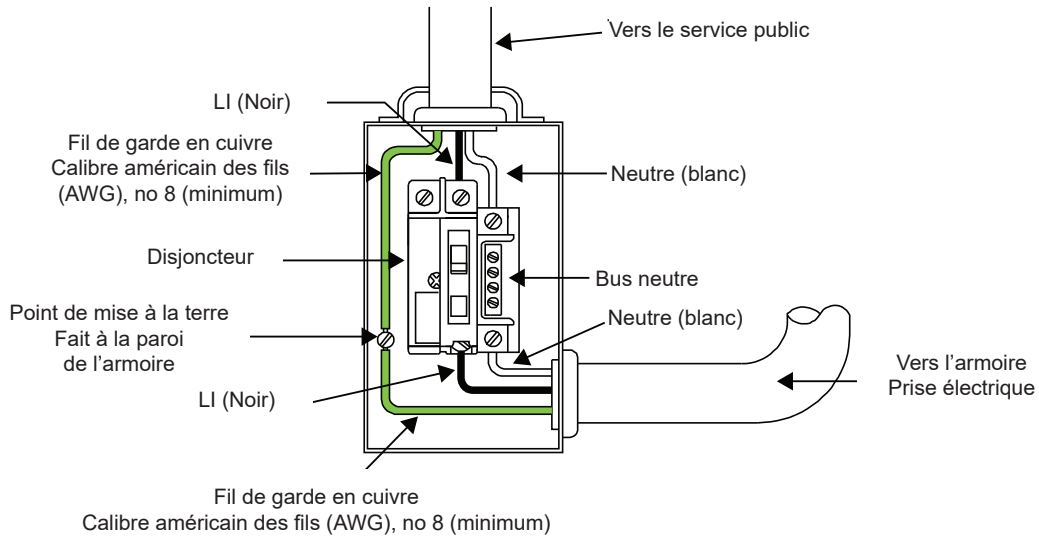


Fig. 8-19, Câblage typique d'un branchement de 120 VCA

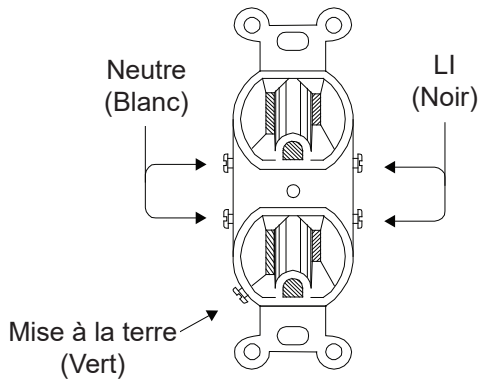


Fig. 8-20, Câblage typique d'une prise de courant de 120 VCA 15 A, 5-15R (No de pièce 531-003-10)

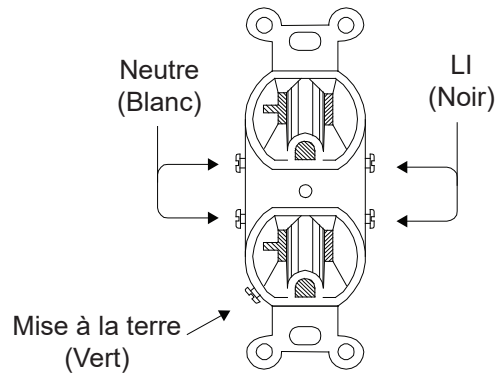


Fig. 8-21, Câblage typique d'une prise de courant de 120 VCA 20 A, 5-20R (No de pièce 531-006-19)

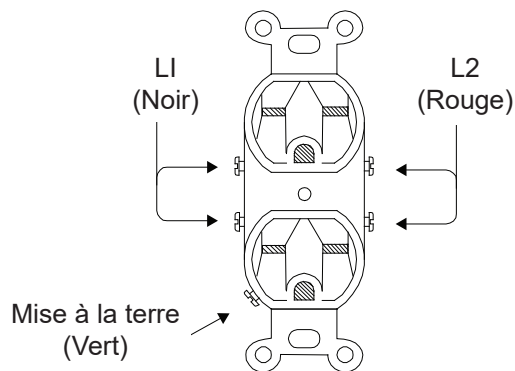


Fig. 8-22, Câblage typique d'une prise de courant de 240 VCA 15 A, 6-15R (No de pièce 531-004-19)

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).

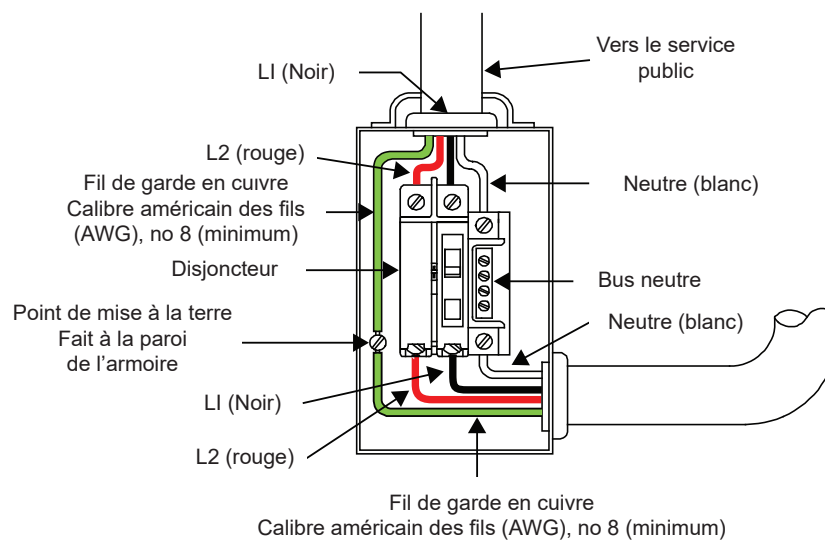


Fig. 8-23, Câblage typique d'un branchement de 240 VCA 60 Hz

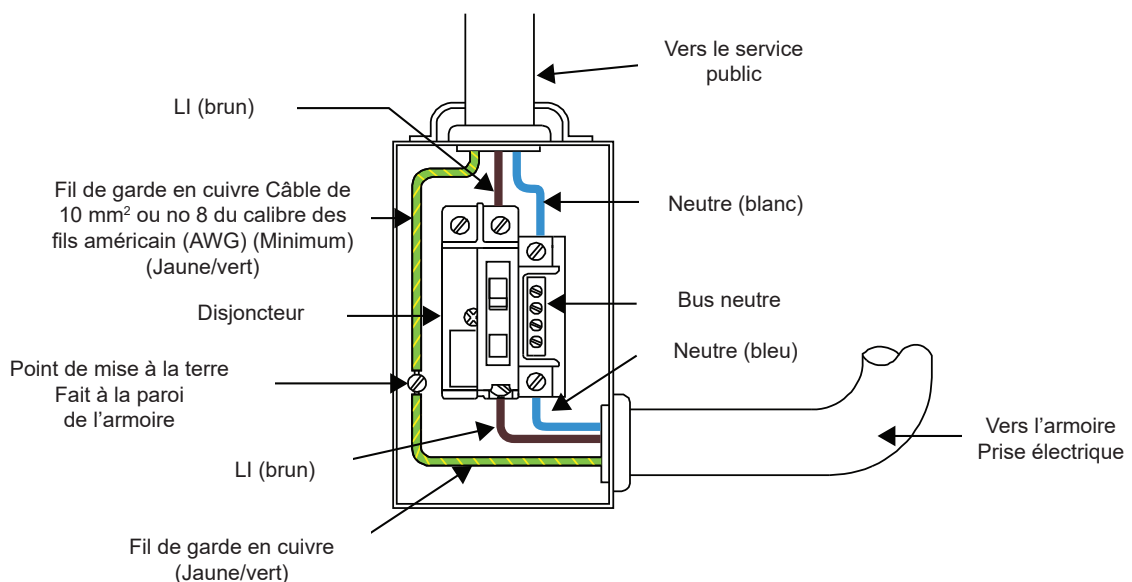


Fig. 8-24, Câblage typique d'un branchement de 230 VCA 50 Hz

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.

- 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.
- 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.
- Pour les applications où aucune autre armoire n'est fournie (multi-logements à l'intérieur) et qu'un bloc auxiliaire (Service Power Inserter) est fourni, un fil en cuivre massif no 6 AWG doit être connecté à la vis de la borne de mise à la terre (voir illustration 1-6, point 23) et relié à la prise de mise à la terre appropriée du bâtiment.

Retour de puissance

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

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.



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017-947-B0-001, Rev. A (04/2022)